

ART. XX.—*On the Birds of New Zealand.* By T. H. POTTS, F.L.S.

(PART III.)

(With Illustrations.)

[*Read before the Wellington Philosophical Society, 23rd October, 1872; and before the Philosophical Institute of Canterbury, 4th September and 12th December, 1872.*]

LIST OF BIRDS DESCRIBED IN THIS PAPER.

[The species are numbered in conformity with the lists given in Parts I. and II. in *Trans. N.Z. Inst.*, Vol. II., Art. viii., and Vol. III., Art. xi.]

- No.
6. *Athene (Strix) parvissima*, Potts.
7. *Halcyon vagans*, Gray.
12. *Anthornis melanocephala*, Gray.
16. *Zenicus longipes*, Gml.
19. *Orthonyx*.
20. *Sphenceacus punctatus*, Quoy.
- B. 24. *Gerygone sylvestris*, n. s.
26. *Certhiparus novæ-zealandiæ*, Gml.
35. *Zosterops lateralis*, Lath.
36. *Keropia crassirostris*, Gray.
- 37–8. *Rhipidura*.
45. *Creadion carunculatus*, Gml.
50. *Platycercus*.
60. *Coturnix novæ-zealandiæ*, Quoy.
61. *Apteryx australis*, Shaw.
62. „ *oweni*, Gould.
63. „ *mantelli*, Bartl.
64. „ *haastii*, Potts.
- A. 65. *Charadrius obscurus*, Gml.
65. „ *bicinctus*, Jard.
- B. 65. *Anarhynchus frontalis*, Quoy.
- D. 73. *Ardea alba*, Linn.
- C. 78. *Himantopus spicatus*, Potts, n. s.
- A. 79. *Limnocinclus australis*.
84. *Rallus pictus*, Potts.
87. *Ocydromus*.
92. *Casarca variegata*, Gml.
95. *Spatula variegata*, Gould.
- A. 106. *Puffinus tristis*, Forst.
- A. 119. *Prion australis*, n. s.
- B. 131. *Sterna nereis*, Gould.
138. *Phalacrocorax punctatus*, Sparrm.

No. 6.—*ATHENE (STRIX) PARVISSIMA*, Potts.

Dr. Finsch expresses an opinion that this small raptorial should no longer remain on the list of our fauna, but since the third volume of the *Transactions* was published, the writer has been able to collect additional evidence as to the existence of this arboreal owl.

On reference to that volume (pp. 68 and 69) it may be seen that three localities were named, in the forests and bushes that hem in the Rangitata and its tributaries, in which it had been observed.

It has also been taken at the Waimate, where it remained for a day in the roof of a hut. Mr. M. Studholme had it in his hands, but permitted it to escape. At the Waimate stands, or stood, the finest totara forest (*Podocarpus*) in Canterbury. On a visit to the Waio river, in Westland, the writer found that it had been twice observed there. In the first instance the captor, delighted with the gentle manner of the little owl, gave it liberty. The second specimen was shot at dusk, on the meat-gallows of a secluded out-station, about ten miles inland from the sea; this spot is surrounded by dense forests, which bound the river on either hand. The person who got this bird, did not think of preserving it. He described it as being of a similar brown colour above, to the more-pork (*Athene novæ-zealandiæ*), but that the feathers of the breast were marked with yellowish, that is spotted with a lighter shade of fulvous.

Mr. Phillips of Rockwood, in this province, one moonlight night captured a specimen by taking it quietly off a bough of an apple tree; here is a good instance in which no mistake could occur, as the young of *Athene novæ-zealandiæ* have been several times snared in the bush at Rockwood. Mr. Phillips, like Mr. Studholme with his bird, carried it between his hands and allowed it liberty; he described it as being about the size of our kingfisher. Note that each observer of this pretty owl was impressed with its gentleness and its fearless confidence. Both have long colonial experience, are accustomed to birds, and are men of position, well known beyond their own districts. *Athene parvissima* must not be given up, even to satisfy the most erudite of ornithologists; for how long was the shrike (*Colluricincla*) considered a doubtful species? The fiat of the ornithologist went forth, ordering our lists to be purged of *Graculus carunculatus*; yet, after a very long dive, that ornamental shag has once more come up to the surface, and "saved the number of his mess."

No. 7.—*HALCYON VAGANS*, Gray.

Kotare.

Kingfisher.

This valuable insectivorous bird, never molested here, remains with us throughout the year, and in greater numbers than formerly; constant familiarity

has enabled us to acquire further knowledge of the ways of the halcyon. Rather late in August, when the brown-skinned konini begins to deck its bare sprays with pendulous flowers, when the head of the straight-stemmed kowhai is already crowned with racemes of golden blossoms, *integratio amoris*, or rather the beginning of courtship, seems to occupy a share of the time which is not required to obtain the means of satisfying the cravings of the halcyon's somewhat exacting appetite. Observation has rather led us to the belief that the female takes the initiative in these amorous advances. Whilst watching several birds which were busily engaged in snatching up and bearing off *crustacea* from the sea-beach, in which employment the cock birds displayed most activity, usually getting three or four crabs to one picked up by a hen bird, a hen would perch herself close to a male after one of his successful darts; all unmoved, he rapped his prey on his rocky stand and proceeded to gulp it down, apparently unconscious of the blandishments of the would-be charmer. Through the month of September we have noticed similar instances of insensibility or coyness on the part of the males, under circumstances when the females have had little chance of being favoured with some choice prey as a *gage d'amour*. Forwardness on the part of "the sex" is not without precedent; we have noticed that the nuptial plumage of the female spotted shag (*P. punctatus*) reaches its full development before that of the male; frequently one may observe the red plume-like stigmas of the hazel on the spray where the male catkins hang immature.

During last season we knew of several nests that contained altogether nearly forty eggs. At each breeding place that had been excavated in a bank or wall, the tunnel *invariably* inclined upwards, the entrance at some distance from the ground, four or five feet and upwards. In one instance the hole was not more than two feet from the base of a wall built on rather a steep slope, this is noted to show that the habits of our bird differ from those of its European congener *Alcedo ispida*. In Wood's "Homes without Hands," p. 519, is a representation of the nest of the English bird, and it may be noticed there that the floor of the tunnel is nearly on a level with the surface of the water; our bird always *ascends* in entering, and *descends* on quitting the nest.

NOTE.—October 10th, first egg laid in a nest on our cliff; second egg laid on the 12th before 10 a.m.; third egg laid on the 14th; fourth egg on the 15th; fifth egg on the 16th; sixth, and last egg, on the 17th.

Subsequently the nesting place was measured, and gave the following dimensions:—Entrance rather over 2 inches in diameter, tunnel 16 inches in length; egg chamber, of ovoid form, 7 inches in length, $5\frac{1}{2}$ inches in width, with a height from the bottom of 4 inches. The size of the nest may create surprise when one thinks of the space occupied by the eggs, but a roomy home is necessary, for, like those of most troglodytal breeders, the young remain in

their hole till their wings are well grown. This *stay-at-home* habit saves the parents much expenditure of force, depending, as they do, for food on living prey; nor is the safety of their offspring so often jeopardised. Rapid digestion would cause the young to utter constant cries for food, which would disclose to enemies the whereabouts of each member of a scattered brood; the labour of hunting after stray young ones would be very great compared to the task of carrying food to one common feeding place. It should be noted that the egg chamber is hollowed out slightly below the floor of the tunnel, a ridge is thus formed by which the eggs and newly hatched young are kept safe from accident; in fact there is no need of a nest during incubation, the warmth that is communicated to the hole by the body of the sitting bird being very considerable.

The birds that built near us last season gave plenty of opportunity to watch their labours; steady hard work it is, indeed, that in some instances endures for weeks. After the site is selected, and a commencement made, the birds do not both leave the spot, watch being kept by one whilst its mate works or is absent after food. Should an alarm be given it is speedily answered, though from the distance of half-a-mile. Both take about an equal share of labour. On timing them it was found that if the hen worked hardest one day on the next the cock was most laborious.

NOTE.—October 23rd, hen at work in the hole three minutes, cock then took his turn; the time in the tunnel for either bird varying from a few seconds to about three minutes. When the hen flew off to feed, the cock remained to watch just below the hole; after his mate returned, in about 20 minutes, he at once recommenced work. They darted upwards from their perches into the hole, always correctly judging the distance, at the moment of entering uttering a short cry of two notes like "chi-rit." They turned when in the tunnel, as they always emerged head first. Once the hen darted to the hole and flew back, perhaps from timidity, more likely from coquetry, then sought the cock, who bent down from his perch and caressed her with his bill. Early in the morning, from five to six o'clock, little work was done, that part of the day seeming to be the time allotted for feeding, but the state of the tide might have had something to do with this as the greater part of their food is procured from the mud-flats at ebb tide.

A notable instance of their perseverance was given this season; a pair fixed for the site of their nesting place the back of a plastered sod chimney attached to an empty cottage; they were working at the chimney on the 19th of October. After commencing on the egg chamber this nest was abandoned, probably the wall not affording what was considered by them a sufficient depth for the safety of their offspring.

NOTE.—November 3rd, they were hard at work with a fresh nest in front

of the cottage, between the door and a window; this was deserted for probably the same reason as caused them to leave the first nest. November 14th, saw the same pair at work on a fresh site on the south wall of the same cottage, darting upwards from a convenient rail five and six times in a minute, till the hard plain surface of the wall was broken by the dig of the bill. This was the difficult commencement of their toil; here was no foothold, the beak served as a pick, and a separate dart upwards had to be made each time this pick was applied. Alas! their labour was again lost, three more holes were begun and partly completed in that wall; then this indefatigable pair went over to the opposite end of the cottage, and, in the chimney-wall they had first attacked, commenced another nesting place; this was the seventh attempt on November 26th. On December 4th this contained two eggs, on the 7th five eggs. The nest was visited, always by the same person, on the 9th, 16th, and 23rd; on the 25th there were five young ones, apparently hatched on the previous day, thus allowing seventeen days for incubation. From the state of the tunnel the bird fed or was fed during incubation.

When a fortnight old the young look very strange, they have a dim show of the colours of the old birds, but the feathers are in their sheaths over their whole bodies, so that they look prickly all over; irides dark brown, almost black, the bill black with white tip to the upper mandible. On the twenty-fourth day the young left the nest, dashing out of the hole and covering quite 200 yards before seeking a perch. This occurred on January 8th so that most of the heavy labours of the birds, which commenced on or before the 19th of October, are now over, as the young are able to follow their parents to the feeding ground.

Here a very interesting question rises. In what state was the ovary of this hen bird during the protracted labours of nest building? What limit is there to the power of retention? as during a space of about six weeks, judging from the almost finished state of the nest, she was three times ready, or nearly ready, to deposit her eggs.

We found the halcyon scarce through some part of Westland, from Hokitika south to the Waio River; the note was only heard, or the bird seen, twice or thrice near the rivers Waitaroa and Okarito. Inland from the coast we have met with it as far back as Castle Hill, near Porter's Pass; this was at breeding time (December 6th). It is during this all important season that these, our silent birds, change their habit so much as to become really noisy; so many varying calls or cries are used that one accustomed to their society could tell of much they might be engaged in, even with his eyes shut. Their boldness in driving away intruders from their young is most conspicuous. The hen bird will often meet a person some two or three hundred yards from her treasures, dash at the intruder, return to the place where the young are

perched, and repeat the attack again and again. We have known it attack and drive back a dog; in the autumn, when the old birds are accompanied by their young, boldness seems mingled with mischief or humour. We have seen a group of fine pigeons sunning themselves whilst preening their feathers on the roof of our village parsonage, in an instant scattered to the winds, as one might say, by the sudden dash of a mischievous kingfisher, with no other apparent object than to excite their alarm. We have noticed sheep and cattle grazing close to a nest without causing any anxiety to the birds, yet a cat, dog, or human being, would be immediately attacked. We have seen our handsome butterfly (*Pyrameis*) sunning itself unmolested just above a nesting hole at which a pair of kingfishers were at work, yet after the young had flown we found the bottom of the chamber covered with remains of thousands of insects, including the gauzy wings of our largest dragon-fly.

At Ohinitahi, in the breeding season of 1871, we knew of three nests containing in each seven eggs, one nest with six, and another with five eggs.

No. 12.—*ANTHORNIS MELANOCEPHALA*, Gray.

The nest and eggs of this species, collected in the Chatham Islands, has been recently added to our collection in the Canterbury Museum.

The structure of this nest does not show much likeness to that of *A. melanura*, the foundation being laid with a well interwoven mass of bent twigs and roots, on which is built a round nest composed chiefly of leaves of coarse grass, which are twisted into a symmetrical shape; the interior of the cavity has a few tufts of wool, which are not woven into the fabric; a few feathers, sparingly introduced, completes the nest, which has the following dimensions:—From outside to outside of wall, 7·5 in.; diameter of cavity, 2·5 in.; depth of cavity, 2 in.

No. 16.—*XENICUS LONGIPES*. Gml.

Huru-pounamu.

Green or Striped-faced Wren.

The green wren, with its confident habits, is a lively object in the sombre woods of the back country; it may be found in the *Fagus* forests which clothe the bases of the mountains that confine the Wilberforce, Havelock, and other snow-fed streams, frequenting the outskirts of the bush.

We have found that a very poor imitation of its note brings it close enough for observation, for within a yard's distance it will often pursue its restless insect search, apparently indifferent to the presence of an observer. Its time is chiefly occupied with minute investigation of the lichens and mosses that decorate and partially clothe the undergrowth of the forest, especially we have seen it busily engaged where the level velvety surface of the ground has been disturbed and upturned by the strong claws of the wood-hen (*Ocydromus*).

On a visit to the Rangitata glaciers, late in the month of December, the writer was lucky enough to find the nest, perhaps one of the most difficult to discover amongst those of our native arboreals; this is owing to the perfect manner in which the structure is hidden amidst surrounding moss.

The nest was discovered just within a mixed bush of totara, ribbon-wood (*Plagianthus*), and birch, far up the Havelock. Beneath the moss-covered roots of one of the ribbon-wood trees was fixed the nest, which was pouch-shaped; with the opening near the top; the sides of the entrance being strengthened with fern-root, carefully interlaced; indeed, it was almost wholly composed of fern-root, beautifully interwoven; and the interior was furnished rather profusely with feathers. It was so well concealed, that it was with difficulty believed to be a nest at all, the entrance being scarcely discernible. It measured about 3.5 inches in depth, by 3 inches in breadth; entrance, 1.5 inches; depth of cavity, 2.5 inches.

The call of the green wren is a sharp cheep; not so shrill as that of the brown creeper (*Certhiiparus*), yet much more powerful than that of the little wren creeper (*Acanthisitta*.)

NO. 19.—*ORTHONYX.*

The writer, after careful comparison of a series of nests and eggs of *Orthonyx*, is inclined to believe that the two species are less closely allied than is usually supposed. With respect to the colour of the eggs of *O. ochrocephala*, the writer informed Dr. Buller that white with red marks was not a satisfactory description; white, washed or clouded with yellowish brown, would more accurately describe their colour. We have nests and eggs from Okarita and Ahaura, in Westland.

NO. 20.—*SPHENCEACUS PUNCTATUS, Quoy.*

We found the nest of this bird last December, at the margin of the Okarita lagoon, Westland.

NO. B. 24.—*GERYGONE SYLVESTRIS. n. s.*

The writer sent the following description to the "Ibis," of a *Gerygone* which affects dense bush near lake Mapourika, Westland. His attention was attracted to the bird by its peculiar song, which differs from that of *Gerygone flaviventris*.

The editor of the "Ibis" supplies a note, in which he states that Dr. Buller believes this *Gerygone* to be *G. albofrontata*, Gray. Dr. Buller does not assign his reasons for this belief, neither does he give any account of the song, or habits of *G. albofrontata*. I, therefore, confidently bring this species forward for the consideration of New Zealand observers, and apply the specific name of *sylvestris* as indicative of its habits.

“The habitat was unusual, *in the thick bush*, between the bluff of Okarita and lake Mapourika; whereas our little riroriro delights in trilling from the shrubs on the creek-side, or more open country, or in flitting about the bushy vegetation of the gullies that fringe or form the outskirts of a forest. Neither my son, who accompanied me, nor myself had ever heard a similar note; with diffidence we set it down as a new species. For the next few days, whilst rambling in that locality, we heard the same note repeatedly, and saw the birds, but we never observed one of them on the outside of the bush.

“The diagnosis of a male bird, killed 20th December, four miles west of lake Mapourika, is here given. This bird was in full song. Upper surface dark olivaceous; wings smoky black, except first two feathers, outer webs fringed with yellow; cheek dark grey; neck and breast pale grey; abdomen white; under wing-coverts white; upper wing-coverts brown, margined with yellow; upper tail-coverts slaty black, tipped with yellow; tail brown, with a broad band of black, two centre feathers black, tipped with brown, four feathers on each side tipped with white on inner webs, pale brown on outer web, two outer feathers broadly barred with white, tipped with brown.

“Bill black; both mandibles horn-colour at the point; legs and feet black; inside of feet yellowish flesh; irides bright blood-red.

“Bill from gape, 6 lines; wing from flexure, 2 inches; tail, 2 inches 2 lines; tarsus, 9 lines; middle toe and claw, 5 lines; total length, 4 inches 5 lines.”*

No. 26.—*CERTHIPARUS NOVÆ-ZEALANDIÆ*, *Gml.*

Brown Creeper. (Plate XVII.)

An illustration is given of the nest of this species, as it has been but seldom observed, notwithstanding that the bird is of common occurrence in the bush. We noticed this species in the Westland forest, from the Teremakau to the southern Waio. It frequents the Irishman scrub (*Discaria toumatou*) on the upper Rangitata river; this habitat is little sheltered, and appears rather peculiar considering the habits of the bird.

No. 35.—*ZOSTEROPS LATERALIS*, *Lath.*

Blight Bird.

From observation of an egg taken last summer, the writer is in doubt whether this immigrant has not become the dupe of the whistler (*Chrysococcyx*).

A nest was found, built in a manuka bush (*Leptospermum scoparium*), containing four eggs, one of which greatly exceeded the others in size, and was of a deeper blue-green colour. This incident bears upon a very interesting and much discussed question as to protective mimicry by parasites of the eggs of dupes, by approximate colouration. The nest and eggs are deposited

* “Ibis,” July, 1872, p. 325.

in the Canterbury Museum. This summer the blight bird is far less abundant than it has been for several years, the exceptionally severe winter of 1872 having greatly diminished its numbers. Birds of this species, dead and dying, were often observed after storms of snow-sleet, or even cold rain; this tenderness of constitution is a strong argument in favour of the opinion of the writer, that the *Zosterops* is but a recent settler amongst us.

No. 36.—*KEROPIA CRASSIROSTRIS*, Gray.

Pio-pio.

Thrush.

[Notes of a Paper forwarded to the Linnæan Society.]

In writing on the natural history of our birds, the bewailment of their lessened numbers has come to be a matter of course, the rapid settlement of the country has, in the case of the thrush, limited its range greatly, few birds having retreated with so much haste before the efforts of the cultivator.

Let us take a section of this island, say one hundred miles in width, including Banks Peninsula, and stretching from the eastern to the western shore, this will afford some information as to its present habitat.

Within this range at one time, the *pio-pio* might be found in any bushy place, not too far from water, where belts of shrubs afforded shelter and abundance of seeds; ten years at least have passed since we heard of its occurrence in this neighbourhood (Governor Bay); on Banks Peninsula proper it is now scarce; in the bush-dotted gullies of the Malvern Hills, the Thirteen-mile Bush, Alford Forest, and many other localities, it was not very uncommon; now, let an enthusiastic naturalist traverse these places in quest of our feathered philosopher, he will find it has become a *rara avis* indeed.

We must pass through these portals of the mountains, the river gorges, to catch sight of the thrush hopping about the openings of the bush, much after the fashion of its English namesake; but even here its numbers have become woefully diminished; four or five years ago, on either side of the Upper Rakaia, where the bushes descend the mountain slopes, these birds fairly teemed in their favourite haunts, but they are already becoming rare. They may be seen about the bushes that skirt the cold streams of the Havelock, the Upper Waimakariri, and the Bealey; through the romantic gorge of the Otira to the more level ground that stretches away to the Teremakau it may be frequently seen, always appearing to prefer the timbered forests, the mixed scrub, made-up of moderate sized bushes of *Coriaria*, *Olearea*, *Veronica*, and *Coprosma*.

As we reach the western coast, about the Arahura river it was, three years since, most abundant. Last December we searched one of their former favourite haunts, a large island in that river more or less covered

with scrub-bush, dotted with ti trees, and two or three specimens only were to be seen; they have been driven away from Arahura by the clearances for paddocks to supply the requirements of the West Coast cattle trade.

Last December in travelling along the coast from Ross to Okarita, we saw this bird in abundance on the face of those bluffs which form such picturesque breaks in that journey; up the river flats it was equally numerous.

Settlers have given the name of the thrush to the pio-pio, from its size and brown plumage recalling to mind their favourite of the old country; it possesses not in the slightest degree that charm of song which distinguishes the thrush, yet it enjoys the power of giving utterance to several pleasing notes. It does not stir so early as many other birds; its morning salute is a long-drawn rather plaintive note; this peculiar whistle it indulges in at times only, for its habit, when close to the water frequently, is to pipe thrice, in a way that at once recalls the red-bill (*Hæmatopus*); the imitation is so like, that the writer and his son (well acquainted with bird-notes and calls) were frequently deceived, and have looked for a red-bill till the pio-pio disclosed himself by fluttering from bush to bush. Its common song seems to be near akin to that of the lark (*Anthus novæ-zealandicæ*); it sounds two preludatory notes, then strikes off into a very brief song; when joyously flying in pursuit of the female it utters a quick chi-chi-chit, chi-chi-chit; it marks its displeasure, or tries to intimidate intruders that approach its nest, with a low purring chur-r-r; both cock and hen join in this cry of anger. When singing, the effort is marked by the tail being spread, the wings held not quite close; the feathers of the breast and back are not raised as in the case of the bell-bird.

We have called this pio-pio a philosopher; he has quite as good a claim as many a biped to whom that title is accorded; who doubts this, let him make acquaintance with the pio-pio; not merely a sight acquaintance, but such an one as ripens into intimacy. The result will be to know a bird who takes the world as it is, indifferent as to food; that feeds on insects when procurable, or can make shift on grasses, seeds, or fruits; that neither courts nor avoids observation; is as bold as the robin or tit, without their intrusive friendliness; that, when in the presence of strangers, coolly pursues its occupation without the prying inquisitiveness of the brown-creeper, or the watchful distrust of the popokatea; that defends his home with almost the courage of the falcon or tern.

It seems to delight in those openings which are found in river-beds, between long belts of tutu and other scrub; there it may be observed either hopping along the ground or fluttering about the lower sprays of shrubs, flying out to the spits of sand, or drifted trees, that lie stranded in the river-bed. On some of the longer formed spits, that are becoming clothed with vegetation, it searches amongst the burry *Acæna*, snips off the fruit stalks of

moss, picking the seed of some trailing *Veronica*. Its progress on the ground is usually deliberate; it hops with both feet together, a slight flutter of the wings, and a flirt of the tail accompanying each motion; when approached too closely, it leaves its perch, always descending at first, as though safer when near or on the ground; if it would rise on the wing, a momentum is gained by a succession of hops. In some of its habits one is reminded much of the wattle-bird; its usual associates, at any rate during the summer months, are tuis, parroquets, and robins.

Not much secretiveness is displayed in the choice of a site for its nest; it may be found at varying distances from the earth, from four feet to twelve and upwards, usually at seven or eight. The structure is firmly and compactly built, with small sprays for the foundation, on which moss is abundantly interwoven with pliant twigs; the lining is usually of fine grass bents; some nests are finished off with soft tree-fern down; it is usually placed in tutu (*Coriaria ruscifolia*), sometimes in *Coprosma*, or manuka. From the neighbourhood of its home, rivals of its own species as well as other birds are driven off.

Probably it breeds twice in the season, although we have not observed more than two eggs to a nest; yet we have found four eggs tolerably forward in the ovary of a female killed at Christmas time. The full complement of eggs is probably four. The egg is of ovoid, sometimes elongated form, pure white, spotted with blackish brown or black, purplish at the edges of the spots; sometimes it is of a delicate pinkish tinge, just staining the white, spotted with brownish grey, with purplish blotches at the larger end.

From a nest found at Arahura we have an egg that exactly resembles in its colour and markings that of *Oriolus gallula*, of Europe. In size this specimen measures through the axis 1 in. $3\frac{1}{2}$ lines, with a diameter of $11\frac{1}{2}$ lines.

NOTE.—December 26th, River Waio. In a nest, about 12 feet from the ground, in a bush of *Coriaria*, the eggs, two in number, were of elongated form, and measured in length 1 in. 7 lines by nearly 1 inch in width.

December 27th, River Waio. A nest in a small-leaved *Coprosma* (probably *rhamnoides*); hen incubating a single egg; she remained on the nest till pushed off. The cock bird was summoned by a jarring call, and both birds joined in a bold defence.

Near Lake Mapourika, in a very swampy situation, we found a nest with the walls very thickly built of moss and manuka sprays interwoven, it was placed about 15 feet above the ground in a tall manuka. Dimensions of the nest across the top from outside to outside of wall about 7 in., diameter of cavity about 3 in., with a depth of 2 in. We find this a fair average after looking at scores of nests. The young when they emerge from the shell have a covering of dark down. We think the eye of the pio-pio gleams with much

intelligence ; perhaps this notion is conveyed by its narrow, but bright pale yellow iris ; the tongue is pointed, and furnished on the inferior side with a strong muscular process of almost horn-like consistence. Both skin and flesh are dark, but the flavour of the bird is not at all bad. It makes a savoury broil for those who bring the proper (hunger) sauce ; when not so provided they do wanton mischief who kill a bird so harmless and interesting.

They are very sociable, and a bush-hand, living the life of a hermit in his little whare of tree-fern stems, up the Waio river-bed, fed some thrushes until he had enticed them to enter his hut. Once up the Havelock in one of the outskirts of a mixed bush of *Phyllocladus*, *Fagus*, and *Podocarpus*, several thrushes were observed flying from the top of a tree after insects, fly-catcher fashion, in the glow of a hot afternoon.

The writer inclines to the belief that the imitation of the red-bill's note, above alluded to, is a good instance of the protective mimicry of sound. The pio-pio gets ample food, in the summer days at least, from the glades in the river beds. Over these, high above, dash the falcons from amongst the rocky heights of the mountain chain ; the hawk notes the movement of a bird below, but hearing the simulated cry of the red-bill, withholds his dashing swoop, knowing that the wary red-bill will alarm his faithful mate, and that the pair, with forces combined, are not to be attacked with impunity.

No. 37-8.—RHIPIDURA.

Fantails.

Dr. Finsch states, "All the specimens I have seen showed not the slightest sign of a white spot above the eye." The black flycatcher, with the white spot, is not uncommon about Ohinitahi. Specimens could be procured without difficulty. The writer has called the attention of ornithologists to the fact of the interbreeding of the black with the pied species (*Trans. N.Z. Inst.*, Vol. II., p. 64). Such joint nests, with eggs, have been placed in our collection in the Canterbury Museum. To those who take an interest in bird architecture these exhibit features of great interest ; the writer has pointed out a peculiar style of construction which sometimes marks the work of *R. flabellifera* in order to meet the conditions of certain positions ; in an union nest where the hen bird was a *flabellifera* the domestic structure showed the influence of her instinct by the affixing of the appendage used, as the writer believes, to steady the nest in very good positions for a food supply for the young ; but at the same time these sites are affected, perhaps, by sudden draughts of air or puffs of wind. Now, the question is whether a pair of *R. fuliginosa* would have ventured to build a home in the position chosen by the union nest builders, not possessing the superior intelligence of the pied species ? As far as our observations of some years are of value they would not, neither would

an union nest be so constructed unless the hen happened to be a *flabellifera*. Thus, in course of time, as the *flabellifera* could live well where *fuliginosa* would not attempt to rear their young, the pied should outnumber their black congeners.

NOTE.—October 29th. The writer has seen what he took for *R. flabellifera* attending and watching three young birds, well able to forage for themselves. These, to all appearance, were *R. fuliginosa*, blackish, or very dark olivaceous brown; head, greyish shade of black; neck, slaty black; bristles at the base of the mandible grizzly, or silvery black.

Further observations will be necessary to clear up some very interesting points in connection with this fact.

No. 45.—CREADION CARUNCULATUS, *Gml.*

Tieke.

Saddle-back. Pl. XVII.

The saddle-back, which a few years since was commonly met with in the more thickly wooded portions of Banks Peninsula, is now of rare occurrence there. The extensive area of growing timber at the Little River Bush will probably be its last refuge in that part of the country, so rapidly is the Peninsula becoming disforested. Although we have met with, and have known of the nest of this striking looking bird in the more open parts of the forest, yet it seeks and loves the shady covert of the densest bush, where decaying tree and damp mosses conceal an insect food supply. It does not appear to be strong on the wing; we have never seen it attempt a lengthened flight, yet its movements are notably prompt, rapid, and decided. It usually announces its sudden approach by a shrill note unlike that of any other bird we know; it sounds like "chee-per-per, chee-per-per," repeated several times in quick succession. No sooner is this call-note heard than the bird emerges from its leafy screen and bounds before the spectator as suddenly as harlequin in a pantomime. From these abrupt movements, or flying leaps, thus shrilly accompanied, it seems to perform a rôle of its own that appears almost startling amidst the umbrageous serenity of the forest. Let the eye follow its motions, that are so quickly changed, and watch the tieke perched for a few moments on the lichen-mottled bole of some fallen tree, a favourite position—its glossy black plumage is relieved from sameness by the quaint saddle-mark of deep ferruginous that crosses its back and wings, the red caruncles add much to the sprightliness of its air; the observer will probably notice that its attitude is peculiar, or, in colonial phrase, "it has a queer set on it." The head and tail are kept rather elevated, the feathers of the tail take a gently sweeping curve, the bird looks as though prepared to leap, one more glance and it is away, climbing some moss-clothed trunk, or picking its

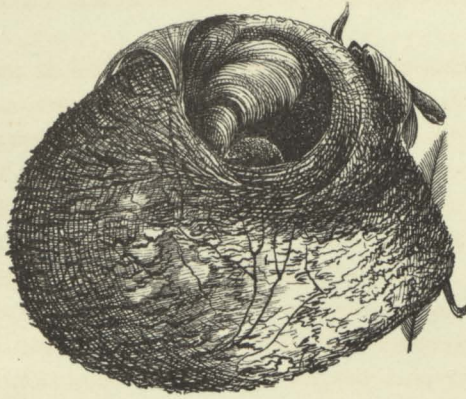
food from beneath the flakes and ragged strips of bark that hang from the brown-stemmed fuchsia tree. It must be an early breeder. On the Tere-makau we have seen the young, almost of adult size, in the first week of December.

For its nesting place a hollow or decayed tree is usually selected, sometimes the top of a tree-fern is preferred. The first nest we knew of was found by an old friend in a hole about four feet from the ground in a huge white pine, kahikatea (*Podocarpus dacrydioides*), close to the bank of the Ahaura river; it contained three eggs hard set. We found a nest in a dead tree-fern not far from Lake Mapourika, Westland. This was of slight construction, built principally of fern-root, deftly woven into rather a deep-shaped nest with thin walls; as the structure just filled the hollow top of the tree-fern thick walls were unnecessary. Another nest, in a small-sized decayed tree in the Okarita bush, was in a hole not more than three feet from the ground; it was roughly constructed, principally of fibres and midribs of decayed leaves of the kiekie (*Freycinetia banksii*), with a few tufts of moss, leaves of rimu, lined with moss and down of tree-ferns (*Cyathea*); it measured across from outside to outside of wall 12 in. 6 lines, cavity 3 inches diameter, depth of cavity 2 in. The egg, measuring nearly 1 in. 4 lines through the axis with a breadth of $11\frac{1}{2}$ lines, is white, sprinkled over with faint purplish marks, towards the broad end brownish purple, almost forming one large blotch. The breeding season probably extends from September to January; the young are protected and fed by the old birds till almost full grown; they are summoned by the parent birds with their usual call, nor from this does the note of their active offspring greatly differ; the saddle-back quickly responds to the summoning note of its species. An imitation of the sound by the assistance of a leaf between the lips serves to attract its presence, and is sometimes used by the collector for this purpose.

The next point to be considered is the plumage; that of the adult is easily described, for the feathers of the sexes fail to exhibit any distinction. The collection in the Canterbury Museum contains numerous specimens in the young state, procured at different seasons of the year:—

A.—Female obtained on Banks Peninsula, in the month of March (our autumnal period), has the whole plumage cinereous brown, slightly flushed with rufous, excepting bastard wing and the inner webs of the tail-feathers which are black; outer wing-coverts margined with ferruginous; upper and under tail-coverts ferruginous; wattles very small, pale yellow; mandibles black, except the edge of the basal portion of the lower mandible, which is margined with yellow for a distance of 6 lines; tarsi and feet black; claws horn-colour; length of bill from gape 1 inch 4 lines.

B.—Male killed at Little River Bush in November (early summer), differs



NEST OF
CERTHIPARUS NOVE-ZEALANDIÆ, GmL.



NEST OF
CREADION CARUNCULATUS, GmL.

but little from the preceding specimen, except that the caruncles are more developed, and the bill is longer by 2 lines.

C.—Male obtained in the bush near Akaroa, in August (the last winter month), has a warmer tinge of ferruginous flecked on the interscapulars and dorsals.

D.—Female, procured on the same day at the same locality, differs only from specimen A in being less warmly tinted with rufous.

E.—Male, killed near Akaroa in the same month (August), has the interscapulars and dorsals margined with rich ferruginous; the yellow edge on the basal part of lower mandible indistinct.

F.—Male, obtained on Banks Peninsula in March, has the growing secondaries and rectrices black; a sprinkling of the same colour on the auriculars; upper wing-coverts, dorsals, upper and under tail-coverts, ferruginous. It may be noted from the description of these specimens of the young state, how much variation may be met with, owing in part to the extended breeding season perhaps; and it may be that the adult state is not arrived at till the second year.

The plumage of the adult bird is deep glossy black; back, wing-coverts, upper and lower tail-coverts, ferruginous; bill, tarsi, and feet, black; irides dark brown; caruncles from yellow to red; bill from gape, 1 inch 5 lines; tarsus 1 inch 6 lines; wing from flexure 4 inches; tail 3 inches 6 lines; total length 10 inches; weight $2\frac{3}{4}$ ounces.

The tieke abounds in the Westland bush, its note is there one of the common bird sounds; it finds abundant means of support in the insect life which exists out of reach of the kiwi. Last season, my friend revisited the kahikatea on the bank of the Ahaura, but the saddle-backs had not again resorted to the hole for breeding.

A sketch of the nest is given, as it may be deemed interesting; there is nothing strikingly characteristic about its construction.

NO. 50.—*PLATYCERCUS.*

Parroquets.

Specimens of a red-headed parroquet have been obtained from Bealey, which are not larger than *P. auriceps*. They appear not unlike some specimens of *P. alpinus* that Mr. Bills procured in Otago last year.

NO. 60.—*COTURNIX NOVÆ-ZEALANDIÆ, Quoy.*

Quail.

Eggs from one of the natural paddocks or grassy spots near Hokitika, Westland, rather exceed the dimensions of those that have been procured on the eastern side of the ranges.

No. 61.—*APTERYX AUSTRALIS*, Shaw.*Rowi* of the natives.

Big Kiwi of the miners.

Why should there yet be so much mystery about the habits of birds so well known as kiwis? Their flesh has for years been recognised as forming a part of the bush-food of the prospector or digger in Westland; just as much so, indeed, as that of the pigeon, the weka, or the kaka, still we have not any minute history of this quaint-looking creature.

There are, in the writer's opinion, probably five or six species of *Apteryx*; of these, all but one are supposed to exist on the South Island, whilst *A. mantelli* is now the sole representative of the race in the North Island.

The rowi, or big kiwi of the west coast of the South Island, is far more local in its distribution than is *A. oweni*, or even perhaps than *A. mantelli*; according to Mr. Docherty, it is known to inhabit certain districts, the well-defined boundaries of which it does not attempt to pass; its range is as isolated and distinctly marked as though impassable barriers existed between its haunts and the surrounding country.

We have had many opportunities of watching the mode of progression of three kinds of kiwi, and of judging of the defensive powers of the bird, supposed to be conferred by the robust tarsus and foot, which have gallinaceous characteristics much more prominent in life than in the best preserved specimens. The articulation of the tibia with the tarsus is one of great strength; the powerful scale-defended leg is united to a foot furnished with strong claws, with which the bird scratches for its food, after being directed thereto by its powerful olfactory organs. We believe that the beautifully organized bill (which should be observed in life to understand its delicacy) is used solely for probing into soft humus, moss, and decayed wood. When the rowi is irritated it makes a cracking noise by snapping the mandibles together very rapidly. In attempting to defend itself it displays an awkward feebleness rather than a posture of self-protection, by striking forwards with its foot, as in the act of scratching, at a line about its own height, and its only defence against dogs is in concealment. In walking the step is peculiar, the foot is lifted deliberately, and rather high above the ground; its gait reminding one of the movements of a person walking stealthily. Its run is a slinging trot, but in fairness it should be remembered that our judgment of its locomotive powers is based on the blundering efforts of the wretched animal half-blinded by the unaccustomed glare of daylight, or frightened and dazzled by artificial light at night.

There are a few other points in its organization which must be taken into consideration. In the first place the feathers are soft, flocculent, and silky towards the base, whilst the distal portions terminate in produced hair-like

webs, the plumage consisting simply of clothing feathers, which during the progress of the bird give out no sound of fluttering or rustling. This peculiarity of the plumage confers another advantage by its compressibility, whilst it can be kept far cleaner than the integument of birds having feathers with closer vanes, interlocking barbules, or thicker down, as with this hair-like dress a single shake rids the bird of every foreign particle, while the feathers, covering the body like a thatch, effectually keep off the wet of the ever humid ferns and mosses among which the bird lives. If an *Apteryx* be plucked its body will be found somewhat conical from the point of the bill to the thighs, a form well devised for gliding through the thick ferny bottoms choked with the heavy fronds of *Todea superba* or the close trailing folds of *Freycinetia*, and enabling the long bill to be used to the greatest advantage in exploring deep but narrow fissures about the roots of trees.

It is probable that the rowi pairs for life, for there appears to exist between the sexes a lasting companionship. For a nesting place it selects a hole in some huge tree or log, or amongst roots; sometimes the hole is excavated in a soft bank, where the soil is light; but in every case care is taken that the site shall be on a ridge or dry ground. We examined a nesting place on the 17th December last, which was tunnelled in a mound of light earth, probably formed by the uprooting of some forest giant; the entrance was 9 inches in diameter, a chamber was found to be excavated to the left of the entrance, from this to the back of the chamber was a depth of 3 feet, with a height of 15 inches. This retreat had been abandoned by the family, but we picked pieces of egg-shell from the floor.

The breeding season extends over some months, from October to February. Two eggs are usually laid, on which the old birds rather lie than sit. The mode of roosting is very peculiar; they squat opposite each other with their legs bent under them, each with its head tucked under the scanty apology for a wing. If there are young in the hole they also assume a similar position, on either side a young bird between the two parents, thus the result of this singular arrangement of the family is a nearly perfect hemisphere of feathers. They often appear torpid or very drowsy when surprised in their homes, sometimes remaining quite undisturbed by noise, and are very rarely discovered except in a hole. In good condition a bird will average from 5 to 6 lbs. in weight.

Their cry is much harsher than that of the kiwi, sounding something like "cr-r-r-ruck, cr-r-r-ruck," and is not uttered till after sundown; from timed observations in the bush we noticed that when the sun set about 7.30, we did not hear the rowi till from 8.15 to 8.30.

The young are well clothed when they leave the shell; with them the bill is not curved, following the ridge of the upper mandible it is slightly depressed about the middle of its length. The general colour of *A. australis* is greyish

brown, streaked with black in the young and adult state; in some fine old birds a glint of golden chestnut edges part of the plumage. Not unfrequently specimens have the aural feathers of dull yellowish white or grey, the same hoary tone of colour being sometimes found on the occiput, chin, neck, and front of the thighs. These marks are not confined to sex.

In giving measurements of species where an extensive collection yields an ample series from which selections can be made, care should be taken not to give dimensions of extraordinary specimens unless that fact is duly noted. A fairly average pair of *A. australis* from the Canterbury Museum afford the following measurements:—

	MALE.			FEMALE.		
	In.	Lines.		In.	Lines.	
Bill from gape	4 6	...	6 4	...	
Tarsus	2 8	...	2 11	...	
Middle toe and claw	2 9	...	3 0	...	
Length	21 9	...	25 0	...	

These specimens were obtained by Mr. Docherty, together with a large number of others, both of *A. australis* and *A. oweni*, from the West Coast, near Okarita.

We cannot conclude these notes on *A. australis*, the big kiwi, without expressing our sorrow at the impending fate of this interesting bird. It is rapidly becoming rare from the demand for specimens for collections; the number of skins and skeletons received at the Canterbury Museum alone is very great, and nothing but prompt action will save the rowi from extermination.

No. 62.—APTERYX OWENI, Gould.

Kiwi.

Straight-billed Kiwi.

Grey Kiwi.

Blue-hen of diggers.

As far as we are aware the habits of the straight-billed kiwi do not differ greatly from those of the rowi, or, perhaps we might safely say, from those of other species of *Apteryx*, due allowance being made for local influences.

The long, nearly straight bill of the kiwi is used in a similar manner to that of the rowi, and in dried specimens is of a dark horn colour, or at times resembles yellowish ivory, but in life is of a flesh colour, pale almost to whiteness, the minute blood vessels of its delicate membranous covering imparting a pinkish tinge to its distal end, and a perfect network of minute veins traverse its entire length from the point to the soft bristly integument which clothes its base. About eight lines above the truncated knob of the upper mandible these minute vessels assume a stellate arrangement, from

which their delicate ramifications appear to issue. We have observed that the double linear impression on the upper mandible is not always constant, as in some specimens the groove deepens into a single line as sharply defined as though marked by a scribing tool. The lower mandible is also furnished with similar minute blood vessels, most densely crowded towards the point. On the deflected tip of the upper mandible is an impression which in some birds is nearly circular; others have this mark of almost angular shape. It is probable that a great degree of sensibility is conferred on the elongated bill by its investing membrane, so that the movements of insect prey are readily followed. We can see no reason for mistaking this elaborately organized bill for an instrument to be used like a pick for digging into hard soil, and we doubt if the kiwi ever leaves the shelter of the bush. The tongue is very short but muscular, of angular shape, and can be used in crushing insects against the flat opposed surface of the upper mandible, as the strong muscle on the lower surface gives a great degree of strength.

The visual organs, which are feebly developed, are placed so as to command the movements of the upper mandible, and are protected by stiffish ciliae; the ears are well developed, and as an aid in discovering food are next in importance to the olfactories. The long straggling hairs, or weak bristles, planted amongst the feathers of the anterior part of the head, fulfil the useful office of protecting the eyes and head from injury; they may also guide or regulate the force of the thrust given by the bill. In life a perfect guard of feelers, they form a simple kind of defence, in strict harmony with the natural instinct of the kiwi—that of retiring cautiousness. The tarsi and feet, described as yellowish brown in life, are often as white as those of thoroughbred Dorking fowls, though now and then specimens will show a darkish tinge that stains the edges of the tarsal scales. The under surfaces of the feet are well protected by cushions; the claws, slightly curved, are sharp at their points, admirable for scratching, yet they are not shaped like those of the domestic fowl, which are adapted for traversing hard ground as well as for that purpose. The robust tarsi, defended by hard scales, are articulated with the tibiae by very strong joints, which must give to the kiwi great power of leaping or jumping, and thus enable it to scale fallen trees and search along their upper surfaces for insects. The hind toes and claws help in maintaining the position of the bird when fossicking about the prostrate trunks, strengthening the hold, and preventing it from slipping to the ground when reaching down.

The cry of the kiwi is not heard till nightfall, or, as the digger expresses it technically but truthfully, "not till the night shift comes on." We have paid great attention to the call; to us it sounded like "kvee, kvee, kvee," repeated sometimes as many as twenty times in succession, with moderate haste; we noticed that the cry had scarcely ceased before it was thus replied to

“kurr, kurr, kurr.” These calls were heard through the night, commencing sometime after sundown and ceasing about three o’clock in the morning; we never heard a call after dawn.

The breeding season extends over several months; eggs have been obtained on the West Coast during a great part of the year. The home is to be found usually beneath the spreading roots of trees, in logs, or under rocks, and will contain sometimes one or two eggs or young, but never more. The nests are found on the bare soil, and are never constructed of dried fern and grasses. The pair of birds usually remain together during some months and share the labours of incubation, but the male apparently allows much of the labour of rearing the young to devolve on the female. The young have been found at a short distance from the family abode—in a nursery in fact. They are quaint looking little animals, with not too much of the savour of youth about them, being nearly exact miniatures of the adult; that well known ornithic characteristic—change of colour—troubles them not; there is no young state of plumage with them, none of that half-pronounced variation in tone, or tint of colouration, which calls for the nice discrimination of the practised ornithologist when questions of age have to be settled. They assume not seasonal distinctions of dress; in winter and summer they adhere to their sober colours with quaker-like pertinacity.

The separate lodging is probably not set up till the young are well able to forage for themselves under the guidance and protection of the old birds; the family party is not necessarily broken up, because all its members do not abide together in one place of hiding and rest. There does not appear to be any reason for believing kiwis to be great travellers, ample supplies of food are to be obtained by fossicking around their homes. Judging from tracks, they appear to resort to the same holes for some time, probably till the family has consumed the more favourite kinds of food in the vicinity. Kiwis seem to adopt the same squatting posture as the rowi, and are quite as lethargic, suffering themselves to be captured without any other resistance than a feeble struggle, in which, at worst, a scratch or two would punish incautious handling. As for defence, the domestic cock or hen would be terrible as “a raging lion” compared to this harmless bush fowl.

They suffer from at least two races of parasites.

NOTE.—December 17th. Took a kiwi out of a log, very white skin, legs, and feet; it was infested with a species of *Pediculus*, sandy in colour, and remarkably active in its movements; immediately below the chin hung a slatish coloured species of *Acarus*, which maintained a very firm hold, and was dislodged with difficulty.

Sometimes the kiwi has been found very high up on the ranges, not very far below the snow it is said, but always in the bush.

NOTE.—December 24th. Took a kiwi from rather a deep hole beneath a fragment of rock, just within the scrub bush, about a mile westward of the Franz Joseph glacier; about two miles further to the west, near the north bank of the Waio river, found a pair of kiwis in a hole under the roots of a large konine (*Fuchsia excorticata*).

This pair of birds gave the following measurements :—

	HEN.			COCK.		
	In.	Lines.		In.	Lines.	
Bill from gape	4	3	...	3	6	
Tarsus	2	6	...	2	2	
Middle toe and claw	2	6	...	2	6	
Total length	18	0	...	17	6	

It will be observed from these dimensions that the hen slightly exceeds the cock in size, and that this disparity is most noticeable in the length of the bill. It is also commonly said that the female kiwi is the larger bird, and dissection of several specimens confirmed this statement. In all cases we found the gizzards to contain a very considerable quantity of rough pieces of slate and quartz, also rarely a few very hard seeds. These stony fragments in a fair average gizzard weighed as much as 114½ grains, five of the largest pieces weighing about five grains each. We believe the hard seeds had not been picked up for food, but for the purpose of trituration, probably in some locality where bits of stone were rarely met with.

When the kiwi is deprived of its skin or feathers, immediately below the lower neck on each side at the base of the wings, there may be noticed a rather angular-shaped protuberance not unlike the mamma of certain animals. These are adipose deposits of very firm texture, which we incline to believe are of material assistance during incubation. The difficulty that has been felt in understanding how an egg so disproportionate in size can be successfully hatched by a bird not larger than an ordinary barn-door fowl has led to many curious surmises. According to Mr. Docherty the kiwi, with her egg deposited on the bare soil, proceeds with the labour of incubation by arranging the egg between the feet, its axis or long diameter being kept parallel to the body. Now, the keelless sternum being laid on the egg, with the præpectoral masses of fat pressing on its oval sweep between the bilge and blunt end, may it not be inferred that its monstrous bulk is thus kept from slipping, while receiving its due supply of heat. Being easily turned by rotary motion initiated perhaps by the feet, the warmth derived from these fatty tumours also makes up at one end of the egg for the entire covering of the opposite extremity by the body of the bird, and thus equalizes its temperature to a certain extent. The kiwi, when relieved by its mate, or when resuming its sitting attitude after food search, would but have to reverse the position previously

maintained, in order to distribute over the entire surface of the egg a fair and equal amount of heat. The sitting pose assumed by various species of birds is in itself a study not devoid of interest either to the naturalist or the physiologist.

It is probable that, as in the case of struthious birds, the gizzard stones are disgorged, but we have no evidence thereof; it would be most interesting to ascertain if such regurgitation takes place, also if any correlation could be traced to seasonal or sexual conditions. The fecund kiwi within a brief period has to furnish a large supply of calcareous material for the formation of the egg shell; amongst gallinaceous birds in some cases the requisite supply of lime may be as considerable in proportion to the size of the bird, but longer time is given for its elimination and deposition; *Gallus*, *Perdix*, or *Coturnix* may be cited as examples, the prolificacy of these genera being evidenced by the production of from twelve to fifteen eggs, but the formation of these spreads over many days. The inquiries which suggest themselves are as follows:—To what extent (if any) do the gizzard stones affect the supply of necessary calcareous material for the wants of the female? Are the fragments of stone in the gizzard of the female greater previously to the breeding season than at other periods of the year? It must not be forgotten that the difficulty of obtaining the lime supply can only be fairly estimated by personal acquaintance with the habitat of the kiwi.

The feather of the *Apteryx* as distinguished from the emu, exhibits the peculiarity of not possessing an accessory plume; the barrel is very short in reference to the shaft and its diameter small. Taxidermists allege that the plumage of the kiwi is loosely attached to the skin and readily drops out, and a reason to account for the ease with which the quill parts from its sac might probably be found in the drying up of certain secretions after death. In dissecting specimens we found that the quills of the feathers over some portions of the trunk were deeply seated in the skin, so much so that we believe the bird would instantly feel the contact of external objects that might touch the spinal and femoral plumage. The thick tough skin which envelopes and protects this night toiler, working amidst the humid mosses of the bush, is rendered more completely defensive by being thus endowed with a keen sense of touch, for by the slightest displacement of its feathers the retiring cautiousness of the bird is at once awakened, and it is enabled to shrink from danger.

Dogs readily follow the scent of the *Apteryx*; those belonging to miners and prospectors destroy great numbers, far more than either they or their owners consume. We have observed that some kiwi-hunting dogs become so dainty that they content themselves with tearing off the head for the sake of consuming the brains, leaving the rest of the carcase untouched. Dogs that have lost their masters and have gradually entered upon a wild life,

are on the increase on some parts of the coast. Several were heard of up the Wanganui river as being in packs, but no attempt had been made to destroy and stamp out this beginning of a serious nuisance to the settler. Bushmen do not dislike the flesh of the kiwi, nor is this fact at all surprising to those acquainted with it, for although the meat is coarse it has a gamey flavour. We found the kiwi made excellent soup and stew, flavoured with pepper and salt, a few leaves of *Drimys*, tender shoots of *Rhipogonum* and *Schefflera digitata*, or piki-piki (the young curled tops of *Asplenium bulbiferum*). The gizzard is especially delicate, very unlike that decidedly tough organ of the domestic fowl. Mr. Docherty reports the eggs to be excellent eating.

This bird, it is said, exists in great abundance in the "Sound country" of the S.W. coast, but we fear that an evil day is at hand for these quaint denizens of the ancient forest; the requisitions of diggers, of collectors for museums, and the cruel slaughter by dogs, they might outlast for years; these causes are rapidly thinning their numbers, but they are not suddenly sweeping the *Apteryx* from the face of the earth. The new source of danger it is said arises from "that deformed thief fashion." A demand is springing up for the skins to furnish material for muffs for frivolous women; although the thought may seem far-fetched, who knows but this female vanity may be the means of modifying the serene climate of the West Coast, by causing the extermination of an ancient race of insect eaters, usefully employed as preservers of the forest. However much on economical grounds we may question the right or policy of permitting the extirpation of so useful a check on insect life, in this colony a strong protest against such barbarity cannot be expected; a few lovers of nature might raise their voices against it, but their words would fall unheeded unless backed by general opinion from without our little sphere. Instead of protest it is more likely that some blatant announcement would be circulated of the establishment of a new local industry. It would not be the first instance of living on destruction which could be euphemistically explained as "subduing the wilderness."

That the race of the *Apterygidae* is indeed ancient is proved by their being found on islands separated by deep channels from the main land.

Before concluding these remarks on the straight-billed kiwi it should be stated that specimens obtained south of the Waitaroa river, in Westland, present some differences of plumage by which they can readily be distinguished from skins in the Canterbury Museum, which were obtained in the neighbourhood of Hokitika. The birds from the northerly districts have a more flocculent plumage, lighter in tone than those which are found in the country lying under the shadow of Mount Cook.

Specimens are occasionally met with that are here and there marked with white, as on the anterior neck, thigh, etc.

Mr. Docherty, the kiwi hunter, informed the writer that up to the close of last year (1871) he had killed about 2,200 specimens of the kiwi and rowi (*A. oweni* and *A. australis*).

No. 63.—APTERYX MANTELLI, *Bartl.*

Kiwi or *Kiwi-nui*.

Brown Kiwi.

North Island Kiwi.

The North Island kiwi is now a rare bird, seldom to be found even in places where some few years since it was not uncommon. Ornithologists have manifested a disposition to drop this species and refer it to *A. australis*, on what appears to be insufficient grounds. The writer has had opportunities at divers times of becoming acquainted with living examples both of *A. mantelli* and *A. australis*; he has examined several skins of the North Island species, whilst hundreds of skins of the southern bird have passed under his observation, the result is that he arrives at conclusions which are opposed to Dr. Finsch's and also Mr. Buller's views on this question, (See *Trans. N.Z. Inst.*, Vol. III., pp. 52-54). Mr. Buller writes thus:—"Mr. Bartlett draws the following distinction as to the colouring of the two supposed species—'*Ap. australis*: Colour, pale greyish brown, darkest on the back. *Ap. mantelli*: Colour, dark rufous brown, darkest on the back.' The above descriptions are applicable, the former to the female and the latter to the male of the common species." In this paragraph Mr. Buller, in a summary way, disposes of Mr. Bartlett's (to our thinking) correct view of the distinction in the colour of the two species, and falls into a grave error by attributing sexual difference of colouration. It may not be impertinent to ask whence have specimens been obtained, or in what collection can authentic examples be seen that display a sexual distinction of colour hitherto unknown to the troglodytal *Apterygidae*?

That which Mr. Buller terms Mr. Bartlett's strongest point, namely, the distinction to be drawn from the scutellation or reticulation of the tarsus, is left for elucidation in Mr. Buller's work on our birds, now in progress. We have no hesitation in maintaining that the plumage *alone* presents sufficiently marked characteristics for the retention of the two species. In the "Catalogue of the Birds of New Zealand" (p. 23) Captain Hutton in some half-a-dozen words points out the distinction, which cannot be gainsaid, "*A. australis*: Feathers soft to the touch. *A. mantelli*: Feathers harsh to the touch."* The nut is cracked at a blow. The feathers which clothe the southern bird are produced into soft hair-like points; the hand passed over the plumage against the lay of the feathers encounters an almost downy softness; when compared with a similar test applied to the covering of *A. mantelli* it might be fairly so termed.

* See also *Trans. N.Z. Inst.*, IV., 363.—Ed.

The reason is obvious, the feathers of the latter species are produced into hair-like points of almost bristly stubbornness. This contrast in the character of the plumage is distinguishable in the young state. In Christchurch, either in the Museum or in private hands, there are specimens from which such a comparison can be made. In the words of a man experienced in mounting the skins of *Apteryx*, "the two species could be separated with one's eyes shut." This peculiarity leads one to expect that there exists some difference in the habit of the species, depending probably on climatic influence or the physical conditions of its habitat.

Dr. Finsch, after careful and repeated examination of two specimens received from Dr. Buller, cannot bring himself to consider the species as distinct, yet admits (which he may safely do) that the harshness of the plumage on the occiput and hind neck of *A. mantelli* may be constant; he gives also a very plain and good reason why it is so, namely, from the structure of the feathers. The conclusion he arrives at is that *A. mantelli* may be a local form of *A. australis*. Now comes our difficulty, in admitting distinct and constant varieties to form what may be termed sub-species in our fauna it may be only reasonable to ask where the line is to be drawn and who is to draw it? What authority is to decide the nice question as to the points which separate the distinct variety from a good species?

In 1852 the late Captain Daniells, of Rangitikei, one of the pioneers of the Wellington settlement, spoke of the brown kiwi as then being procurable from the Maoris. From reliable sources the writer is aware that it is frequently heard in the bush in the neighbourhood of Tauranga.

No. 64.—*APTERYX HAASTII*, Potts.

Roa-roa?

Haast's Kiwi.

Little addition can be made to the previous notes which accompanied the description of *A. haastii* (*Trans. N.Z. Inst.*, Vol. IV., p. 204). During a visit to the West Coast last summer the localities were pointed out to the writer whence the specimens now in the Canterbury Museum were procured. One was found in the bush far up the Okarita river, the other in the dense bush between the eastern shore of Lake Mapourika and the snowy range of which Mount Cook is monarch. Mr. Docherty stated that both of these birds appeared wilder than *A. australis*, and made somewhat more resistance during their capture.

Apteryx maxima, Verr., is as yet amongst the desiderata of collectors. Maoris commonly assert that such a bird exists. It is stated to be as large as a turkey. A recent communication from a settler at Martin Bay gives some weight to these statements.

It is probable that other species will be added to this interesting genus ; for the past two or three years we have known of the existence of a white kiwi, information concerning it having been scantily furnished at intervals by some wandering miner or prospector. Specimens have at different times been obtained from the bush in the Martin Bay district. From the descriptions that have been gathered they are not albinos, and their occurrence has been too frequent for them to be classed amongst specimens showing a mere accidental and rare variation either of *A. oweni* or *A. australis* ; the plumage is stated to be remarkably loose, soft, and flocculent. It is suggested that the name of *A. mollis* would not be inappropriate as its specific designation. A specimen of this beautiful little *Apteryx* in the Dunedin Museum has the bill slightly curved, showing an arc elevated about one-fifteenth of its length.

					In.	Lines.
Bill from gape to point	...	...	...	...	3	9
Tarsus	...	...	...	...	2	5
Middle toe and claw	...	...	...	...	2	4

Plumage white, extremities of the feathers more or less stained with yellowish ; bristly integument at the base of the mandibles yellowish ; narrow yellowish stain round the eye ; irides brown ; feathers soft to the touch ; habitat, bush about Martin Bay, west coast of Otago.

Other specimens have been obtained at Greymouth. The men who seek a living in the wilds of the S.W. coast of the South Island are not given, as a class, to the study of natural history ; examples of the rarer species of our fauna are not the specimens they care to hunt for. Not long since the writer met with a man who had probably fed on the *Notornis*, and had lived for two or three weeks on the rare eggs of the crested-penguin. Inquiry made of a boatman at the Waitaroa concerning the eggs of a rare, perhaps unknown, petrel, or *Puffinus*, elicited the information that "not being pretty at all they were hove away." A similar fate befel some eggs of the white heron, "because they would not go in the billy." *Auri sacra fames*, our noble motto, oft blunts the spirit of inquiry about all other objects. When journeying along the West Coast the writer was informed by a very intelligent Teremakau native that far to the south a black kiwi was to be met with ; he described it as "all the same as the kiwi, only black." Probably this may be the bird which the Bruce Bay Maoris call the toko-weka ; *Apteryx fusca* would properly distinguish this sombre-plumed species. There seems to be some tendency to dusky colours along the S.W. coast as seen in this kiwi, *Ocydromus*, etc., the black shag, for a long distance at least, according to our observation, frequents such points as are occupied by *P. punctatus* on the eastern side, so also *Hæmatopus unicolor* is there found in far greater abundance than *H. longirostris*.

No. A. 65.—*CHARADRIUS OBSCURUS, Gml.*

Red-breasted Plover.

About the middle of January the red-breasted plover may be found about the coast. We have seen old and young birds together on the flats at the head of Port Cooper on the 19th of January. They migrate from one part of the country to another, from the coast line to the higher grounds for breeding. They appear around Lake Heron in large numbers, finding their way to the Upper Rangitata flats in August. We have before noticed how this plover affects localities of considerable altitude for breeding, and we have a note of the occurrence of the nest and eggs as late as February on Browning Pass.

No. 65.—*CHARADRIUS BICINCTUS, Jard.*

Dotterel.

NOTE.—September 4th, weighed four dotterels.

Nos. 1 and 2	...	...	...	...	2 $\frac{3}{4}$ oz. each.
„ 3 and 4	...	...	...	...	2 $\frac{1}{4}$ oz. „

No. B. 65.—*ANARHYNCHUS FRONTALIS, Quoy.*

Crookbill.

Little variance is to be found in the weight of the crookbill. September 4th weighed eight crookbills. Six weighed 2oz. each, two weighed 1 $\frac{3}{4}$ oz. each.

No. 73.—*ARDEA ALBA, Linn.**Kotuku.*

White Crane.

A description of the habits and nesting of this interesting bird was contributed to the *Ibis* last year by the writer.

We have a note of the occurrence of a specimen which has a few black feathers. It is to be hoped that measures may be taken not only to preserve this fine wader from slaughter at all times in the year, but also that its breeding stations may be protected. The destruction of the white heronry on the Waitangituna river would almost exterminate the race over a great extent of country.

Could our noble kotuku enjoy the advantage of foreign birth, like the pert sparrow or black swan, what columns of print would denounce its destroyer before the virtuous indignation of the public would be appeased. We have recently learnt that one grand heronry, far away to the south in this island, has been utterly destroyed.

No specimen appears in the different Museums of the Colony of a variety of the white heron with yellow-stained plumes depending from the head. From a reliable source the writer is aware that a specimen was obtained in the Hakateramea district, South Canterbury. Hearsay evidence has given other

localities where this bird has occurred. This note is made with a view of drawing the attention of such naturalists as may have opportunities of making themselves acquainted with our wading tribes.

No. C. 78.—*HIMANTOPUS SPICATUS*, n.s.

Black-throated Stilt.

Diagnosis of a female killed in October on the Selwyn or Waikerikeri river.

Upper plumage deep blackish green; frontals narrow; irregular circlet round the eye; chin white; space between eye and gape white, slightly flecked with black; foreneck and part of breast black; lower part of breast white; feathers sparingly margined with black, deepest on the centre of the breast; abdomen, white; tibials white, tipped with black; upper tail-coverts white, slightly tipped with deep green; under tail-coverts white; tail blackish green, four outer feathers on either side having the inner webs marked with white and brown, centre feathers deep blackish green, shafts white; shafts of wings black; bill black; legs light red, deeper colour than those of *H. leucocephalus*, but not so deep as those of *H. melas* = *H. novæ-zealandiæ*.

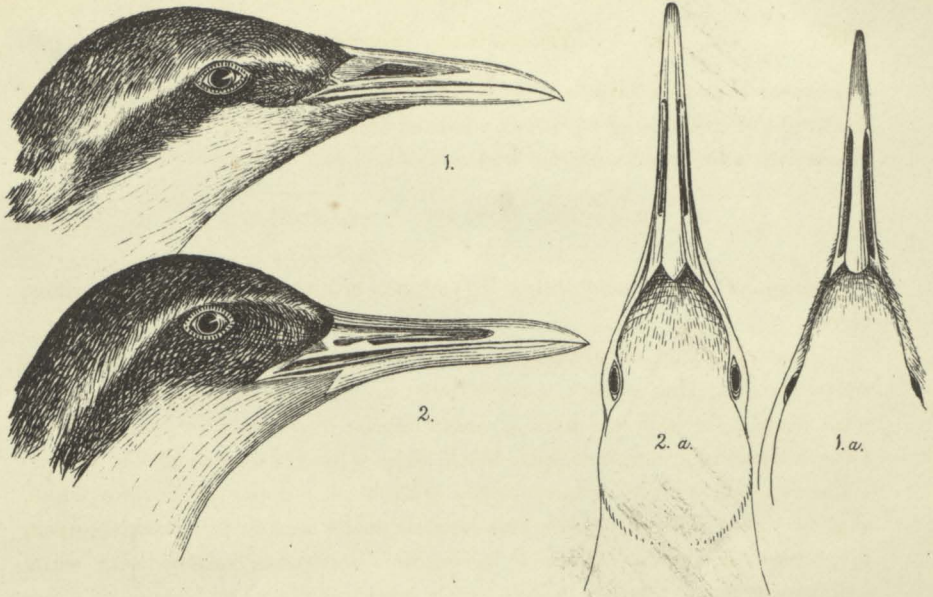
	In.	Lines.
Bill from gape	2	9
Tarsus	3	9
Middle toe and claw	1	6½
Wing from flexure	10	2
Tail	3	3
Total length	17	1

On comparing this specimen with a large series of *Himantopus* in the Canterbury Museum the bill was found to be shorter than that either of *H. melas*, or *H. leucocephalus*. The bird was a female, nearly in a condition to lay.

No. A. 79.—*LIMNOCINCLUS AUSTRALIS*, Gray.

Marsh Sandpiper.

On December 12th four small sandpipers were observed on the shore of Lake Ellesmere; these were obtained for the Canterbury Museum. Male, summer plumage, bill black; irides dark brown; top of the head ferruginous speckled with black; line from immediately above the base of upper mandible through the eye white; throat and chin white; ramals white with a few minute dots of brown; upper surface, centre of feathers dark brown, feathers margined with fulvous shaded down to almost white at the distal end; upper wing-coverts dark brown, edged with fulvous; primaries dark brown, outer web, darkest; shafts white; secondaries brown, narrowly edged with white; upper tail-coverts dark brown, edged with fulvous; tail brown, tipped with

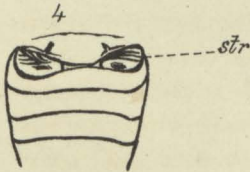
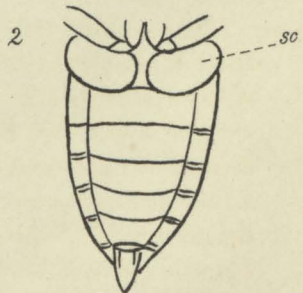
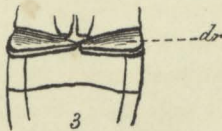
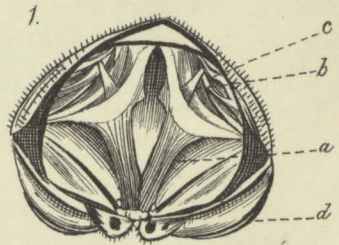


1. 1.a. *RALLUS PECTORALIS* Less. From type sp. in Bullers collection C.M.
2. 2.a. *RALLUS PICTUS*.

J.B. del. ex. v. v. h.



Transverse section of the abdomen of the female Cicada, showing the rudimentary drums (*dr*).



1. Transverse section of the abdomen of the male Cicada, showing anterior view of the muscles for vibrating the stridulating membrane: (*a*) muscle; (*b*) tendon inserted into (*c*), the under surface of the stridulating membrane; (*d*) the drums.
2. Under view of the abdomen, showing the scales covering the openings into the drum-cavities (*sc*).
3. Ditto, the scales removed, showing the drum-cavities (*dr*).
4. Upper surface of the stridulating membranes (*str*).

L.L. Powell del. J.E. v. h.



fulvous ; neck pale fulvous, speckled with brown ; breast and abdomen white ; under tail-coverts white with a narrow streak of brown in the centre ; legs, feet, and toes greenish brown, tinted with yellowish.

	In.	Lines.
Bill from gape to point	1	2
Tarsus	1	2
Middle toe and claw	1	1
Wing	5	2
Total length	8	6

Weight $2\frac{1}{2}$ oz.

Female is of smaller and slighter frame, weighing $2\frac{1}{4}$ oz.

This sandpiper, identical with *L. acuminatus*, Gould, is found both in Australia and Tasmania. Specimens have been recently received from Adelaide, South Australia, which were marked as having been procured in Northern Australia.

This is, perhaps, the first notice of the occurrence of this little *Tringa* so far to the south as Canterbury, New Zealand.

No. 84.—*RALLUS PICTUS*, Potts.

Pl. XVIII.

Dr. Finsch does not allow this as a good species.

Sketches are given which will permit a comparison of the bills of *R. pictus* and *R. pectoralis*. As yet the Canterbury Museum has been unable to transmit a specimen to Europe to enable foreign ornithologists to view the difference between these two rails.

For an account of the relative measurement, etc., of the two species see *Trans. N.Z. Inst.*, Vol. IV., p. 202.

No. 87.—*OCYDROMUS*.

On the southern river Waio, Westland, we procured a small woodhen (weka) of rich rufous. The cry of this bird differed from that of the usual *O. australis* in being repeated with far greater rapidity of utterance.

No. 92.—*CASARCA VARIEGATA*, Gml.

Paradise Duck.

We have a note of the occurrence of the nest of this bird at 15 feet from the ground in a hole in a black birch (*Fagus cliffortioides*) near Forest Creek, Upper Rangitata.

No. 95.—*SPATULA VARIEGATA*, Gould.

Shoveller.

A nest with ten eggs was found at Big Bay, Lake Ellesmere. The eggs do not differ from those before described. (See *Trans. N.Z. Inst.*, Vol. III., p. 103.)

No. A. 106.—PUFFINUS TRISTIS, Forst.

Mutton-bird.

The young mutton-bird has been obtained from holes in the cliff at Sumner; this downy mass of oil presents the curious fact of being larger than the parent bird.

No. A. 119.—PRION AUSTRALIS, n. s.

Southern Prion.

A short time since amongst some birds which arrived at the Canterbury Museum from Foveaux Strait, transmitted by the Rev. T. Wohlers, were specimens of a *Prion* which, from a careful inspection, could not be referred to either *P. turtur* or *P. vittatus*.

It is said to breed in holes, and descriptions are given below of the adult, young, and egg. In considering this specimen as new it is to be noted that the bill is considerably longer than the head; it is also much broader than that of *P. vittatus*, according to Gould. The pectinated apparatus of the upper mandible is fully disclosed. Of the primaries the first is quite as long, if not longer than the second quill, whilst the total length exceeds that of *P. vittatus* by some inches. It breeds on Papatea, or Green Island, near Ruapuke, in Foveaux Strait.

Adult.—Head dark bluish grey, mottled sparingly with black; aurals slatish, bounded above and below irregularly with white or yellowish-white; upper surface bluish grey; scapulars clouded with slaty black, tail-coverts tipped with the same; under surface white; under tail-coverts white, just tinged with delicate ash grey; quill feathers, of which the two first are longest and of about equal length, outer web black, inner web white, more or less stained with ash grey; tail bluish grey tipped with black; chin naked, the skin marked with narrow angular furrows arranged in regular order, angle within angle; bill longer than the head.

	In.	Lines.
Bill from gape to point	1	9
Greatest width	0	11
Tarsus	1	5
Middle toe with claw	1	6
Wing from flexure	8	0
Tail	4	0
Total length	14	3

The young taken out of the nest by Mr. Wohlers on the 25th November are clothed entirely with a dense covering of dark smoky grey, lightest on the neck and under surface, pectinations of the upper mandible undeveloped; the bill measures from gape to point 1 inch, greatest width only 4 lines. The

egg, which gives out a rancid sub-musky odour, is white, oval in form; measures 2 in. 6 lines through the axis, with a breadth of 1 in. 6 lines.

No. B. 131.—*STERNA NEREIS, Gould.*

Little Tern.

We have eggs of this tern from the shore of Lake Ellesmere.

No. 138.—*PHALACROCORAX PUNCTATUS, Sparrm.*

Kaivau.

Spotted Shag, Ocean Shag,

Crested Shag, or Flip-flap.

The spotted shag, or flip-flap, well known to our shore folk, is stated by ornithologists to be peculiar to New Zealand; its active movements enliven many a bluff headland or rocky inlet of our island coast line. It derives the name of the spotted shag from the grey feathers of its upper surface terminating in a dark green spot; some persons term it the ocean shag from its marine habits; it is known as the crested shag from the supplementary head feathers assumed in the winter and early spring months; it is called the flip-flap from its habits when cruising up the harbours following shoals of fish.

As gregarious as some of its congeners it may be seen flying, swimming, fishing, or nesting, in large companies; these numbers that thus delight to live together do so peacefully, with an absence of much of the clamour and bickering that often marks the state of living where multitudes congregate. With these assemblies life passes in alternate periods of restless activity and restorative repose; birds fly from one favourite fishing ground to another, usually at a low elevation, keeping just above the curl of the wave; in these short trips the flight seems more direct, and the aim more decided, as to the point to be reached than in the case of its congener *P. carbo*. If disturbed, as by a boat, it often, after taking wing, makes a circuit; sometimes this tour is repeated twice or thrice, never at a great height; this habit is so much a matter of course that we have often observed people calling out, "come back, come back," under the notion that the flip-flap will sail round once more. At the fishing ground its wonderful powers of diving insure an ample food supply, and its take of fish must be astonishingly great, as a half-pound moki is soon engulfed in its capacious throat. Not content with exploring the deeps that wash the coast it follows shoals of fish up the smoother waters of the harbours; in calm autumn days often have we watched the still waters of our shallow bays flash with the swift motions of the flip-flap. Sometimes a solitary fisher may be noticed cruising about; when diving no particular course appears to be taken, but only the fish pursued, as one may guess from noting the places where the bird reappears after diving. When the shag's wants are supplied, and its voracity appears almost insatiable, it seeks the rocky shore or cliff, and

basks on the sunlit crags till its rapid digestion relieves it from temporary repletion, and it is once more ready for sea ; when on the rocks it may be noticed drying its plumage with outstretched wings just in the same manner as does *P. carbo*. This shag swims low in the water, the tail is kept about level with the surface, and appears to afford great help to the bird when it essays to rise on the wing from the water ; this feat is accomplished by a slow ungraceful action, three or four leaps or bounds being necessary with the body held partly upright before it is fairly launched in flight. When perched the tail affords help in maintaining the almost perpendicular attitude the bird then assumes, and it keeps its equilibrium on the steepest cliffs as firmly as if supported by a self-adjusting tripod. The site of a nesting place is often in some sheltered nook in the cliffs, where, perhaps, whole rows of their structures may be observed in close neighbourhood and frequently the position chosen is almost, if not entirely, inaccessible. Both males and females labour in building their homes, which are often constructed of *Algae*, placed on a foundation of sticks. We have seen the birds carrying quite a large bunch of material at a time, so large and cumbersome the load that they have now and then been unable to effect a landing at the first attempt ; a wide circuit has enabled them to place their burthen on the spot where the nest was to be raised.

As in the case of birds in many other and far removed genera, the constructive faculty appears most developed in the female ; we have often noticed her sitting on the nest carefully and deftly arranging the tufts of material brought by her mate, some portion of which is collected from a great distance. We once saw, in a strong N.E. breeze, a fine bird beating out of Port Cooper, with a large piece of stick carried fore and aft. When the nest is completed it may be about 5 in. high and about 14 in. across ; it soon becomes foul and loathsome (a mass of writhing maggots), with a most horrible stench. Three eggs are laid, measuring in length 2 in. 4 lines, in width 1 in. 6 lines, of greenish white, more or less clouded with chalky white. In a brief space they become mottled and stained to an extent that quite alters their character ; these marks are no doubt occasioned by the incubating bird sometimes feeding at home, as bloody smears on the eggs are not otherwise to be accounted for unless thus painted by the fresh fish-blood on the bird's mandibles when the eggs are duly turned in the nest. The labour of incubation is fairly shared by each sex, as we have noticed that when one bird has left its charge its mate has immediately supplied its place ; when alarmed on her nest the shag utters a low note, rapidly opening and closing the mandibles, which gives a peculiar throbbing appearance to the cheek. From the middle of October the breeding season extends through the earlier summer months.

The embryo is at first flesh-coloured, and gradually assumes a darker hue on its upper surface till it reaches a dull slate colour ; the mandibles light horn-

colour, darkest at the extremities, gular pouch well developed. The young, blind when hatched, is of a lead colour, darkish about the eyes and along the centre of the back; mandibles and gular pouch flesh colour; tips of mandibles pinkish; tarsi lighter than the rest of the body; tongue very small; pectinated apparatus of the middle claw undeveloped; the entire body naked, being utterly devoid of down or feather. The first indication of plumage is the sprouting of the hair-like down of the tail, dark brown down next appears on the upper surface, whilst the under parts are covered with whitish down; the condition of the young always appears most thriving, the abdomen is distended as though stuffed. In the next change in the appearance of the young we note that it has assumed a dull smoky colour, lightest on the abdomen, the chin, and tarsi, the latter lightest on the inside; another change occurs before quitting the nest, the whole upper surface becoming of a dull slaty brown, almost white beneath; lore, chin, and pouch purplish flesh; up to this stage the aural orifice is unprotected. When clothed with down the middle claw is still wanting in its pectinated apparatus.

Whilst in the nests the young stretch up their long necks and move their heads in a snake-like manner from side to side; their note is hoarse and brief like the woffling bark of a puppy; when of a size to fill up their home the old birds remain at the edge of the nest. Below the nests there may often be observed a substance that looks not unlike some species of coral, this is formed of the exuviae of these birds, and by the solidifying of the liquid ejections which the shag so constantly produces. A well-known sea mark near Banks Peninsula, known as "White-wash Head," owes its distinctive name to the colour it has assumed from the accumulated white droppings of this sea fowl. It leaves its nest with reluctance as it is not a shy bird. The position chosen for the nest is perhaps rather to secure the advantage of shelter than from the fear of depredators. Its gruff brief note is not often heard; when ashore we have noticed that it frequently opens its mandibles widely as though the trachea was irritated by the presence of some parasite.

Ticks sometimes are found firmly fixed on the throat. It is worth noting that the plumage of the young when they leave the nest is of a dull inconspicuous tint, which may be of great advantage, not only in obtaining its food, by securing a nearer approach to its prey without observation, but also by its tone affording a certain amount of protection, as either afloat or ashore its colour harmonises with its surroundings, so that it is far from being a striking object; young females up to the period of their first nest differ but little from the tints of the young state. In this state of plumage these birds most frequently visit the shallower waters of the bays in the harbours; at sea we have never met with shags far from land, hence the name of ocean shag

does not seem appropriate. It will be observed that the middle or cleansing claw has a slight twist, and the comb differs from that on the middle claw of *Ardea* in the case of the bird under notice; the comb really appears to be an addition carried out to the end of the claw, and is doubtless an useful and well-used instrument; it is flexible to a certain degree, and it would be more proper to describe it as a scraping instrument than a comb; in fact it is the inside edge of the middle claw produced into a scraper of about sixteen broad curved flexible teeth.

As far as we know the spotted shag dives from the surface of the water, not from the heights from which some of the anserine order dash on their prey, yet those who examine its structure will note how admirably its anatomy is calculated to resist the strain or pressure caused by its manner of obtaining food, the coracoid and adjacent bones being not only in themselves of great strength, but also firmly attached to the sternum. The eye subject to so much exposure is defended in addition to the armature of the lore by a circlet of round flexible plates. In life at certain seasons these are of deep turquoise blue, and add greatly to the appearance of this bird.

Perhaps no other species of our *Pelecanidæ* is sooner or more completely robbed by death of so much of its beauty and character as *P. punctatus*, the evanescent colours of the membranes that decorate as well as protect certain parts of its body, and the varying tints of yellow, green, blue, and purple, defy the skill of the taxidermist to preserve and fade away into the semblance of a mass of leathery wrinkles.

The changes that take place in the plumage and in the colouration of the membranous processes have led some persons to make two species of the spotted shag, but a careful study of a large series of specimens procured at various periods of the year, and a tolerably close observation of the bird in its favourite haunts, prevents the writer from coinciding in this view. Having described the young from the embryo through several of its changes of appearance till it is of a size almost to quit the nest we now give some notes of its state of plumage at different ages and seasons.

Young female killed in March. Upper surface dull smoky grey, the apex of the scapulars of dull greenish brown; outer wing-coverts dull brown, edged with pale fawn; under surface white; thighs dull brown; tail-coverts dark brown; tail dark brown, shafts white; lore and chin yellowish flesh, tarsi and feet dull flesh colour. Female killed in August—Upper surface dark smoky brown, with a greenish glint on the head and neck, scapulars terminating in a deep green spot; back dark brown, changing to dark green; under surface white; throat and anterior of neck pale ash, leaving a broad stripe of white from the base of the upper mandible below the eye as far as the wing; lore and chin (of fine texture) dull, rather yellowish flesh colour; tarsi and feet

dull flesh colour. Males of the same age present no observable contrast in their plumage to that of the other sex. When this shag is about a year old the membranous processes, which are such conspicuous features, gradually lose their former texture, and become coarsely granulated; dark green spots are sparingly dotted on the wing-coverts, the throat assumes a darker hue, the white shafts of the tail feathers are exchanged for rectrices with shafts of slaty black, the two centre feathers are the first to be replaced; tarsi and feet take a more decided tinge of yellow. In all these changes there is a remarkable want of constancy, so that to note down all the variations that may be observed in an extensive series would exceed all reasonable limits for such a paper as this.

In the nuptial plumage this common bird becomes one of the handsomest of our sea-fowl, the great and striking alteration conferred by snow-white accessory plumes that decorate the head lasts but a short time in perfection in either sex, and gradually moults away into the more sober garb of the summer plumage. In the month of August adult birds have the head greenish brown, sparingly interspersed with narrow white feathers, immediately above the forehead rises a tuft of dark brownish green feathers, while another of the same shade forms a long irregular crest just above the nape; this inclines forward, reminding one of a clown's *toupet*; on either side a line of snow-white feathers, more or less produced, extends from above the eye to the wing, meeting in a broad band below the nape; upper surface brownish grey, marked with deep green spots; back deep glossy black-green; throat blackish green; under surface, leaden grey; lower abdomen, tail, and thighs deep glossy black green; thighs often sprinkled with narrow white plumes, which, like those on the head and neck, are of temporary duration; mandibles, horn colour; lore, bluish purple, the eye circlet of torquoise blue; chin greenish, often bluish purple, deepest at the point; tarsi and feet yellow.

Summer plumage, November; Head, neck, and upper surface dark greenish grey; wing-coverts and scapulars, dotted with deep green spots; throat and neck pale grey, mottled with dull green; under surface leaden grey; lower abdomen black green; rectrices black.

	MEASUREMENTS,				In.	Lines.
Bill from gape to point	3	4
Tarsus	2	5
Wing	9	2
Length	28	

Average weight of adult birds may be fairly estimated at 2 lbs. 13 ozs.

When this bird is cruising in search of prey its long neck is often moved from side to side, reminding one of the habits of the nearly allied *Plotina*; this is observable too in the young nestlings; of some species of *Plotina*: it is said that the neck is always in oscillation.