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A HISTORY
OF THE
BIRDS OF NEW ZEALAND.

BY

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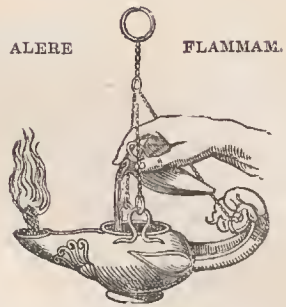
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 Orange-wattled Crow (*Glaucopis cinerea*).
- „ II. Huia (*Heteralocha acutirostris*): male and female.
- „ III. Jack-bird (*Creadion cinereus*).
 Saddle-back (*Creadion carunculatus*).
- „ IV. North-Island Thrush (*Turnagra hectori*).
 South-Island Thrush (*Turnagra crassirostris*).
- „ V. North-Island Tomtit (*Myiomoira toitoi*).
 South-Island Tomtit (*Myiomoira macrocephala*).
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 South-Island Robin (*Miro albifrons*).

- PLATE VI. Yellow-head (*Clitonyx ochrocephala*).
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- „ VII. Fern-bird (*Sphenæacus punctatus*).
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- „ X. Tui or Parson bird (*Prothemadera novæ zealandiæ*): adult and young.
- „ XI. Stitch-bird (*Pogonornis cincta*): male and female.
- „ XII. Rifleman (*Acanthidositta chloris*): male and female.
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- „ XIII. New-Zealand Kingfisher (*Halcyon vagans*).
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- „ XV. Shining Cuckoo (*Chrysococcyx lucidus*): with young Cuckoo in Warbler's nest.
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* In this Plate seven eighths natural size is inadvertently given for three eighths.

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NEW ZEALAND DOTTREL.
CHARADRIUS OBSCURUS.

BANDED DOTTREL.
CHARADRIUS BICINCTUS.

(SEVEN-EIGHTHS NATURAL SIZE)

CHARADRIUS OBSCURUS.

(NEW-ZEALAND DOTTREL.)

- Dusky Plover*, Lath. Gen. Syn. iii. pt. 1, p. 211 (1785).
Charadrius obscurus, Gm. Syst. Nat. i. p. 686 (1788).
Charadrius glareola, Forst. Descr. Anim. p. 109 (1844).
Pluviorhynchus obscurus, Bonap. C. R. xliii. p. 417 (1856).

Native names.—Tuturiwhati and Tuturiwhatu.

Ad. ptil. æstiv. suprâ sordidè cinereus, ochraceo-rufo lavatus, plumis omnibus hôte colore marginatis : collo postico paullò dilutiore cinereo : tectricibus alarum dilutè cinereis, pallidiùs marginatis, majoribus angustè albido terminatis : remigibus cinerascenti-brunneis, extùs et versùs apicem saturatoribus, seapis albis, remigibus minoribus et secundariis extimis basin versùs albis et conspicuè albo terminatis, secundariis dorsalibus dorso concoloribus : caudâ saturatiùs brunneâ, rectricibus externis magis cinerascantibus albo terminatis, pennâ extimâ ferè albidâ : loris et supercilio distincto fulvescenti-albis : regione paroticâ brunnescente : subtùs ochraceo-rufus, genis et gulâ pallidioribus : hypocondriis cum crisso et subcaudalibus albidis : subalaribus et axillaribus albis : rostro nigro : pedibus plumbeis : iride nigrâ.

Ad. ptil. hiem. similis ptilosâ æstivâ, sed sordidior : suprâ dilutè cinereus, haud rufescente lavatis : subtùs albicans, pectore superiore laterali cinerascante.

Adult in summer. Crown of the head, hind part of neck, and all the upper surface greyish brown, each feather narrowly margined with chestnut ; a small spot on the forehead, and all the chin white ; throat, fore neck, and underparts of the body chestnut-brown ; lining of wings, flanks, lower part of abdomen, and under tail-coverts white ; wing-feathers brownish black, the first primary having the entire shaft white, and the rest white in their median portion. Irides and bill black ; legs and feet leaden grey. Length 10·5 inches ; extent of wings 21 ; wing, from flexure, 6·5 ; tail 2·75 ; bill, along the ridge 1·1, along the edge of lower mandible 1·2 ; bare tibia ·5 ; tarsus 1·4 ; middle toe and claw 1·2.

Adult in winter. Upper surface greyish brown, without the chestnut margins ; underparts pure white, the breast crossed by an interrupted zone of dark grey, and the sides of the body tinged with the same.

Obs. It ought to be mentioned that the extent and depth of the chestnut colouring of the underparts vary appreciably in different individuals. I have found one with the fore neck, breast, and all the underparts of a bright rufous brown, whilst in another killed in the same locality and at the same time there is a mere wash of chestnut on the underparts. I have seen a pair (♂ and ♀) shot in company at the height of the breeding-season, in both of which there was only a faint wash of cinnamon on the underparts, and much white on the secondaries, the outer vanes being almost wholly white. Birds in transitional plumage with rufous patches, or scattered summer feathers of a bright colour intermixed with the white, are common enough and are met with all the year round.

THIS fine species, although nowhere very plentiful, is dispersed along the whole of our shores, frequenting the ocean-beaches and the sand-flats at the mouths of all our tidal rivers. It, moreover, inhabits the interior, and appears to affect very high altitudes. The late Sir J. von Haast sent me specimens obtained by him far up in the Southern Alps ; Mr. Enys states that he has met with it at

an elevation of nearly 7000 feet; and Mr. Buchanan informs me that during his ascent of Mount Egmont, in company with Messrs. Richmond and Hursthouse, he discovered a pair of these birds on the slope of the cone at an elevation of at least 6000 feet. Mr. Travers assures me that he met with it in small flocks on the Spencer ranges, in the Provincial district of Nelson, at an elevation above the sea of fully 8000 feet!

It is more plentiful on the mud-flats and sand-banks of the Kaipara basin and Manukau harbour than in any other part of the colony. It is gregarious in its habits, associating in small flocks, which fly together from one feeding-place to another and then, scattering themselves, mingle freely with the Godwit and other Waders frequenting the same localities. The young birds remain with their parents till the breeding-season comes round again.

It subsists chiefly on small crustaceans, mollusca, and sand-hoppers, and pursues its prey on foot. It has a common habit of running about on the dry sand-drift, among the tauhinu bushes, near the sea-shore, in pursuit of insects of various kinds. On a close inspection the little footprints may be observed in the loose sand running in lines in all directions. When disturbed it rises in the air with a rapid vibration of its wings, and flies in a circle, with an occasional sailing movement, when the wings are motionless and assume the form of a bow.

An excellent illustration of this bird (in full summer plumage) was given in Gray's 'Birds of New Zealand,' forming part of the 'Voyage of the Erebus and Terror.'

The example figured in the accompanying Plate, which is likewise in summer garb, was obtained on the ocean-beach at Port Chalmers, where this Dottrel is comparatively rare.

Major Mair writes to me that at Te Arikiroa, a bay in Rotorua lake, he observed numbers of these birds running about among the warm springs and along the sulphur-crusts, where they appeared to be catching insects.

On the nesting-habits of this species Mr. Potts writes:—"In the breeding-season I have noticed it at such a considerable altitude as the summit of Dog range, in the Ashburton district. The nest is difficult to find; it is so slight an affair that it easily escapes observation—merely a few stems of grass twisted into a slight hollow in the ground, so loosely put together that it is not easy to pick it up and yet preserve its form. The eggs, three in number, just fill the nest; they are of a delicate soft brown, suffused with dark brown (almost black) marks, somewhat oval in shape, 1 inch 9 lines in length, with a breadth of 1 inch 3 lines. The young run with speed almost as soon as hatched, and conceal themselves with much skill. I have observed eggs and young in the months of October and November. I know of one spot where it has bred for several years in close proximity with the nests of the Stilt-Plover, the Oyster-catcher, and the Banded Dottrel."

There is a good series of eggs in the Canterbury Museum: in some examples the spots and markings are blotched, in others they are rounded and distinct, while in some they are more or less confluent towards the larger end. In size they average 1.8 inches in length by 1.2 in breadth.

The same collection contains an egg belonging undoubtedly to the Black-fronted Tern (*Sterna antarctica*), which was taken by Mr. Donald Potts from a nest of this Dottrel near the banks of the Rangitata. This is a singular coincidence, because the two birds have nothing in common. In their nesting-habits they are entirely dissimilar, the one being gregarious and the other solitary.

Mr. Robson writes to me that he took from the ovary of a bird he had shot an egg just ready for extrusion, and that "it was ovoido-conical in shape and of a very delicate shade of light greenish blue without spots of any kind."

CHARADRIUS BICINCTUS.

(BANDED DOTTREL.)

- Chestnut-breasted Plover*, Lath. Gen. Hist. ix. p. 324 (1824).
Charadrius bicinctus, Jard. & Selby, Ill. of Orn. i. pl. 28 (1825).
Ægialitis bicinctus, Gould, Syn. B. Austr. pt. ii. (1837).
Hiaticula bicincta, Gould, B. of Austr. vi. pl. 16 (1848).
Ochthodromus bicinctus, Gray, Hand-l. of B. iii. p. 16 (1871).

Native names.—Tuturiwhati, Tuturiwhatu, and Pohowera.

Ad. æstiv. suprâ obscure è cinereis, supracaudalibus exterioribus albo terminatis: tectricibus alarum dorso eoneoloribus, majoribus angustè albo terminatis: remigibus brunneis, extûs et versûs apicem saturatoribus, seapis medialiter albis, primariis internis ad apicem albis, remigibus minoribus albo eonspicue terminatis, secundariis dorsalibus dorso eoncoloribus: caudâ saturatè brunneâ, rectricibus exterioribus eincrassentibus et albo terminatis, reetrice extimâ albieante: fasciâ frontali latâ suprâ oculos angustius ductâ albâ, fasciâ alterâ nigrâ frontali utrinque marginatâ: plumis infraocularibus pallidè eincrassentibus: regione parotieâ eincrassente, dorso concolore: fasciâ mystacali nigrâ eum lineâ anteriore frontali conjunctâ: subtûs albus, torque jugulari latâ nigrâ, alterâ pectorali castaneâ: subalaribus albis, imis eincrassentibus: rostro nigro: pedibus flavicanti-cinereis: iride nigrâ.

Ad. hiem. similis ptilosi æstivæ, sed obscurior: torquibus pectoralibus minoribus, vel interdum obsolete indicatis.

Adult male. Forehead white, margined above and below with black; crown of the head, nape, and all the upper surface greyish brown; from the base of the upper mandible a black streak, which crosses the eyes and blends into the grey on the sides of the neck; throat and fore neck pure white; across the breast a narrow zone of black, and (a short space below it) a broad band of chestnut, which covers the upper part of the abdomen; the rest of the underparts pure white; quills brown with white shafts; the middle tail-feathers dark brown, with greenish reflections in their apical portion, the lateral feathers paler, with white shafts, and the outermost one on each side pure white. Irides blackish brown; bill black; legs yellowish grey. Length 8.5 inches; extent of wings 16; wing, from flexure, 5.25; tail 2.75; bill, along the ridge .75, along the edge of the lower mandible .75; bare tibia .5; tarsus 1.25; middle toe and claw 1.

Female. Similar to the male, but with the margins of the frontal spot less defined, and the pectoral bands somewhat duller.

Obs. There is a seasonal change of plumage, the chestnut band becoming considerably reduced in winter, although it is never entirely absent in the fully adult bird.

Young. Upper parts suffused with rust-red, each feather having a narrow margin of that colour; forehead, throat, and underparts white with a slight tinge of rufous, the frontal spot being inconspicuous; a narrow zone of dark mottled grey encircles the fore neck, spreading and darkening to greyish brown on the sides of the breast; but there is no indication of the pectoral band of chestnut.

Fledgling (Taupo, Dec. 24). Feathers of the upper parts brown largely margined with fulvous; underparts white, with fulvous markings on the breast; the sides of the head and lower part of back and rump covered with down of a dull sandy yellow spotted with black, and with fluffy down still adhering to other parts of the body. Bill dark brown; legs brownish grey.

Chick. Covered with soft down of a bright sandy yellow on the upper surface, changing to yellowish white on the underparts; the crown of the head and the back prettily mottled and varied with dark brown, of which there is also a broad streak on the wings and thighs.

THIS pretty little Dottrel is very common on our shores, and is frequently met with also at a considerable distance inland. It associates in flocks, and is always to be found on the ocean-beach, or on the dry sands and grassy plains in the vicinity of the coast; but I have also observed it on the Onetapu desert, in the interior of the North Island, and it is very commonly met with on the pastures several miles from the sea. It has been recorded from Lord Howe's Island; and Mr. Ronald Gunn states that it is plentifully dispersed along the northern shores of Tasmania; but Mr. Gould saw it only once in Australia, when, as he informs us, considerable numbers visited a common in the neighbourhood of George Town, and appeared to be acting under some migratory impulse; for, after remaining a day or two, they suddenly disappeared. This occurred about the 15th of May, the middle of the Australian winter; and the flights consisted of birds of various ages and in different states of plumage.

It is more active in its habits than the preceding species, running swiftly over the sands, and stopping at short intervals to bob its head and utter a rather plaintive note. It rises in the air with a very rapid movement of its wings, and usually adopts a circular course, the whole flock wheeling simultaneously and descending to the ground in an oblique direction.

It is hard to kill, often flying a considerable distance after being mortally hit with pigeon-shot. On taking a wounded bird into my hand I felt almost a sense of remorse at taking its life, the lustrous brown eyes of my little victim having a peculiarly soft and tender expression.

In the high sandy flats near the sea-shore where the bright pingao grass mixes with the wild sage, this bird may always be met with in the breeding-season, which commences as early as August; and so perfect an adept is it in the art of deception that I have been decoyed away from its nest and young when, as afterwards discovered, they were at my very feet. In the location of the nest itself there is very little attempt at concealment, the bird apparently trusting more for protection to the assimilative colouring; but after the young are hatched out, the old birds (and particularly the female) manifest considerable solicitude for the safety of their offspring, and feign lameness or a damaged wing for alluring intruders away, a device which very often succeeds. The young bird runs the moment it quits the shell, and is not slow to second its parent in the art of self-preservation. Its sandy colouring makes it almost indistinguishable when squatting on the ground, and it has the instinct to remain perfectly motionless the moment it hears the note of alarm, even allowing itself to be handled without betraying a sign of vitality.

The eggs are generally three in number, broadly oval in form, measuring 1.3 inch in length by 1 in breadth, and are of a dark grey colour, much speckled and mottled with brown. The numerous examples in the Canterbury Museum exhibit some variety in their colouring; they are of different shades of brownish grey, inclining in some to greenish grey, spotted and pencilled or marked all over, but especially at the larger end, with brownish black. The specimens vary not only in the tone of the ground-colour, but also in the form and extent of the markings, some being very handsomely pencilled and spotted, whilst others have a dark or blotched appearance, particularly at the larger end.

I once discovered a nest of this species in a grass paddock at Manawatu, several miles from the sea-shore; and on my taking up one of the chicks, the old birds flew round me in circles and gave vent to their anxiety in a rapid clicking note, in which both of them joined. This was on the 22nd of December, and the young birds appeared to have only just emerged from the shell.

I sketched this nestling, although I did not preserve the specimen, and my drawing is reproduced in the woodcut on p. 15.

CHARADRIUS RUFICAPILLUS.

(RED-CAPPED DOTTREL.)

Charadrius ruficapillus, Temm. Pl. Col. vol. v. pl. 47. fig. 2 (1838).*Hiaticula ruficapilla*, Gould, Birds of Austr. fol. vol. vi. pl. 17 (1848).*Ægialophilus ruficapillus*, Gould, Handb. Birds of Austr. vol. ii. p. 235 (1865).

Ad. pallidè cinerascenti-brunneus, alarum tectricibus vix pallidioribus, majoribus albo terminatis: alâ spuriâ, tectricibus primariorum et remigibus fuscescenti-brunneis, scapis albis, secundariis intimis dorso concoloribus: supracaudalibus saturatiùs brunneis, lateralibus albis: reetricibus medianis saturatè brunneis, proximis pallidioribus albo marginatis, reliquis albis: pileo et collo postico pallidè cinnamomeis: fronte albâ, postice nigro fasciatâ: strigâ lorali et fasciâ supraparotieâ nigris: subalaribus quoque albis, imis majoribus cinerascensibus.

Adult male. Forehead crossed by a broad band of white, which diminishes to a point at the posterior angle of the eye; above this a narrow band of black; crown, nape, and back of neck bright rust-red; a line of black from the gape extending across the eyes and down the sides of the neck, forming an edging to the rust-red colour; back, rump, and upper surface of wings pale greyish brown, each feather margined with a lighter tint; tail-feathers white, except the two middle ones which are brown; throat, fore neck, and entire under surface pure white. Irides and bill black; legs and feet greyish black. Total length 5·75 inches; wing, from flexure, 4; tail ·9; bill, along the ridge ·6, along the edge of lower mandible ·7; bare tibia ·4; tarsus 1; middle toe and claw ·75.

Female. Differs from the male only in the paler tints of the plumage.

Obs. Some specimens have a faint wash of fulvous on the breast and sides of the body.

Of this Dottrel, which is widely distributed along the shores of Australia, a single straggler has been recorded in New Zealand*. This was obtained on the ocean-beach near Waikanae, in the North Island, and the specimen (from which the above description of the adult male was taken) is now in the Colonial Museum at Wellington.

Like many other members of the extensive family to which it belongs, this species resorts to very clever devices for the purpose of diverting attention from its nest and young, feigning lameness or a crippled wing, and simulating, in a very remarkable manner, the actions of a partially disabled or wounded bird.

Mr. Gould describes the eggs as being one and a quarter inches in length by seven eighths of an inch in breadth, and of a pale stone-colour, sprinkled all over with small irregular blotches of brownish black.

* T. W. Kirk, Trans. N.-Z. Inst. vol. xii. p. 246.

CHARADRIUS FULVUS.

(EASTERN GOLDEN PLOVER.)

- Fulvous Plover*, Lath. Gen. Syn. iii. p. 211 (1785).
Charadrius fulvus, Gm. Syst. Nat. i. p. 687 (1788, ex Lath.).
Charadrius pluvialis, Horsf. Tr. Linn. Soc. xiii. p. 187 (1822).
Charadrius xanthocheilus, Wagl. Syst. Av. *Charadrius*, sp. 36 (1827, ex Lath.).
Charadrius taitensis, Less. Man. d'Orn. ii. p. 321 (1828).
Charadrius virginianus, Jard. & Selby, Ill. Orn. ii. pl. lxxxv. (c. 1830).
Charadrius glaucopsis, Forster, Deser. Anim. p. 176 (1844).
Charadrius virginicus, Blyth, Cat. B. Mus. A. S. B. p. 262 (1849, nec Borkh.).
 " *Pluvialis longipes*, Temm.," Bonap. C. R. xliii. p. 417 (1856).
Pluvialis xanthocheilus, id. tom. cit. p. 417 (1856).
Pluvialis taitensis, id. tom. cit. p. 417 (1856).
Pluvialis fulvus, id. tom. cit. p. 417 (1856).
Charadrius auratus, Schrenk, Reis. Amurl. Vög. p. 410 (1860).

Ad. hiem. suprâ brunneus, plumis ochrascenti-fulvo ubique marginatis: collo postico cinerascente: tectricibus alarum cinerascenti-brunneis, albido et pallidè ochraceo maculatis, majoribus magis conspieuè albo terminatis: remigibus brunneis, versùs apicem nigricantibus, secundariis elongatis extùs ochrascenti-fulvo maculatis, remigibus minoribus angustè albo terminatis: rectricibus cinerascenti-brunneis, albo terminatis, exterioribus saturatè brunneo variis: loris albicantibus: facie laterali et supercilio indistincto ochrascenti-albis, brunneo notatis, regione paroticâ saturatiùs brunneâ: subtùs albescens, pectore superiore et laterali fumoso, ochrascenti-fulvo lavato: subalaribus et axillaribus pallidè fumosis: rostro nigro: pedibus plumbeis: iride fuscâ.

Ad. æstiv. pectore nigro distinguendus: supercilio lato cum collo et pectore lateralibus albis, his nigro notatis.

Adult in winter. Crown of the head, hind part of neck, and all the upper surface brownish black, each feather marked on both webs with rounded spots of pale golden yellow; on the nape these yellow markings are confluent, and on the scapulars they are paler, these feathers having likewise a terminal margin of yellowish white; lower part of forehead, sides of face, and throat fulvous white; ear-coverts dark brown; fore neck tawny white, largely mottled and spotted with brown; the rest of the underparts fulvous white, clouded with brown; lining of wings and axillary plumes pale smoky grey; quills blackish brown, with white shafts; the long inner secondaries with a series of triangular yellow spots along the outer edge of both webs; wing-coverts greyish brown, margined with yellowish white; tail-feathers blackish brown, toothed on both webs, and terminally margined with yellowish white. Irides dark brown; bill black; legs and feet plumbeous. Length 10 inches; wing, from flexure, 6.75; tail 2.5; bill, along the ridge .9, along the edge of lower mandible 1; bare tibia 1; tarsus 1.6; middle toe and claw 1.25.

Adult in summer. Upper parts darker, and with the golden spots larger and more conspicuous; a band across the forehead, and continued over the eyes down the sides of the neck, fulvous white; throat, cheeks, fore neck, breast, and abdomen black, with a few white feathers intermixed; sides of the body white, varied with black; inner lining of wings and axillary plumes smoky grey; under tail-coverts white, with irregular transverse bars of black.

The following is the description of a specimen shot near Christchurch in the summer of 1885:—Crown of the head, hind neck, mantle, back, rump, and long inner secondaries brownish black, marked all over with spots of golden yellow, which diminish in size but become narrower on the head and neck, presenting on these parts a mottled appearance; on the upper wing-coverts the yellow markings are absent, the feathers being variegated with greyish white; a broad band of white crosses the forehead and, passing over the eyes, extends down the sides of the neck and expands on the sides of the breast. Sides of the head, fore neck, and centre of breast slaty black, which becomes mixed with white towards the throat (in which respect alone it differs from a specimen in summer dress from Sweden, with which I compared it); the whole of the abdomen slaty black, variegated with white; sides of the body white, irregularly barred and marked with black, the feathers near the insertion of the wings narrowly margined with yellow; the entire inner lining of wings delicate ash-grey; wing-feathers brownish black with white shafts; the tail-feathers blackish brown obscurely barred with greyish white. Bill black; tarsi and toes greyish black. Total length 11 inches; wing, from flexure, 6.75; tail 2.5; bill, along the ridge 1, along the edge of lower mandible 1.25; bare tibia .75; tarsus 1.75; middle toe and claw 1.25.

Obs. The sexes are alike, except that in the adult female the golden spots are less conspicuous than in the male, the neck-markings are less distinct, and there is a faint wash of yellow on the breast.

Note. The above description of the winter plumage is taken from a New-Zealand example presented to the British Museum by Miss R. Stone.

In the Colonial Museum there is a fine specimen obtained at Worsler Bay, near Wellington, and first recorded by Mr. T. W. Kirk*. In this bird there is a slight wash of yellow over the throat, sides of the head, and fore neck; the yellow spots on the mantle and long inner secondaries are very distinct, and the dark mottling on the fore neck and breast is very pretty.

In the Auckland Museum there are two specimens (♂ and ♀) shot together at Manukau harbour early in December 1880. Both of these are in winter plumage, although they show signs of being about to assume the summer dress. Mr. Cheeseman states that ten or twelve were observed at the time these were killed †.

I have before me two birds (both marked ♀) obtained by Mr. Robson on Portland Island in September and November respectively. The larger of the two gives the following measurements:—Total length 10 inches; wing, from flexure, 7.25; tail 2.75; bill, along the ridge .95, along the edge of lower mandible 1; bare tibia .75; tarsus 1.6; middle toe and claw 1.25. One of these is in unmistakable summer plumage, the black of the upper surface being pronounced and the yellow spots round and bright; the fore neck, breast, abdomen, and flanks irregularly marked with blotches of black, intermixed or softly blended with the greyish ground-colour and slightly suffused on the breast with yellow; lining of wings and axillary plumes smoky grey; upper surface of wings blackish brown, vandyked and varied with white, but without any yellow markings, except on the long inner secondaries; wing-feathers and tail blackish brown, the latter handsomely barred and their coverts vandyked with greyish white. Bill black; legs greyish brown (probably tinged with green in the fresh bird). The other has much less yellow on the upper surface, the spots being small and indistinct; there is an absence of dark markings on the underparts; the fore neck and breast are pale fulvous brown varied with grey; and the abdomen is yellowish white.

In Sharpe and Dresser's 'Birds of Europe,' where the above synonymy has already appeared, there is an admirably exhaustive account of this species, which appears to have a very wide range in the eastern part of the Old World, but only rarely makes its appearance in Europe. The above-named authors have enumerated the localities in which it has occurred within the limits of the Western Palearctic region; and they express their belief that this is the bird mentioned by Pallas, under the name of *C. pluvialis*, as being exceedingly common in Siberia, whence it migrates in the autumn in flocks, along with other species, to more southern latitudes. Steller observed it in Kamtschatka in

* Trans. N.-Z. Inst. vol. xvii. p. 59.

† Cf. also Cheeseman, Trans. N.-Z. Inst. vol. xiv. p. 264.

autumn, and states that it breeds within the polar circle. Mr. Swinhoe gives its range as extending throughout China. He procured it between Takoo and Peking, and says that it is a common bird near Canton, where it passes the summer, while at Formosa it is plentiful all the year round, breeding in great abundance on the south-west marshy plains. In the 'Muséum des Pays-Bas,' Prof. Schlegel has recorded a list of specimens, more than sixty in number, contained in the Leyden Museum, from which it would appear that examples have been collected in nearly every island of the Malay archipelago. Dr. Jerdon writes:—"The Golden Plover occurs throughout India in open plains, grassy downs, ploughed fields, and on the edges of rivers, lakes, &c., associating in flocks of various magnitude and feeding on beetles and other land-insects, worms, &c.;" and Mr. Holdsworth reports that it is very common in winter in the northern portion of Ceylon, sometimes extending as far south as Colombo. Mr. Gould records that it is generally dispersed over all the colonies from Tasmania to the extreme north of the continent of Australia, and adds that "its habits, manners, and general economy so closely resemble those of the Golden Plover of Europe, that a description of one is equally characteristic of the other." Drs. Finsch and Hartlaub have given a full account of the distribution of the species among the islands of the South Pacific; and Dr. E. Gräffe, writing from Tongatabu, says that it is found on that island all the year round, but is most numerous from October to March and during the season of migration. It occurs occasionally on the New-Zealand coast, but apparently only as a straggler, and almost always in winter plumage.

Several examples have been obtained in the Mannkau harbour, and two of these (σ and ♀) are in the Auckland Museum, but it has not yet been found breeding there. Several others have been taken on the Wellington coast, two of which are in the Colonial Museum; while in the South Island small flights have been observed on the shores of Lake Ellesmere, and one or two specimens obtained on the south-east coast of Otago.

From Portland Island I received, through the courtesy of Mr. Robson, two specimens, one of which is in winter plumage, whilst the other has partially assumed the summer dress. The same correspondent was fortunate enough to discover its breeding-place, and he sent me some interesting notes, which I communicated at the time to the Wellington Philosophical Society*. He says:—"On the 9th of January last a Golden Plover was found sitting on three eggs at the northern end of Portland Island. The nest is a very simple affair, composed of a little grass laid in a slight hollow amongst the driftwood a few yards above high-water mark; the egg is large for the bird, being about the size of a pullet's, ovoid, a good deal pointed, in colour of a light greenish yellow with irregular blotches of dark rufous brown, almost black in the larger spots, and varying in size from a pin's head to a shilling, the largest being at the more obtuse end of the egg. When disturbed the bird rose with a harsh rattling cry, but did not seem frightened, and returned to the nest after a few minutes. On the 10th the nest was not visited, it being thought best not to disturb the bird again so soon; and on the 11th, on going to it for a specimen egg, the nest was found deserted and the eggs gone, not a particle of shell remaining."

Mr. Swinhoe represents this bird as breeding plentifully on Formosa, and he has given the following account of its nidification:—"Its eggs, four in number, are laid in a loose nest of dried grasses and fibres placed in a hollow. They are of a greenish-grey ground-colour, blotched and spotted with deep-blackish sepia, and have occasional obsolete purplish-grey spots. They do not vary much in size, are narrowed near the end, and measure 1.5 inch by 1.1."

Referring to this, Mr. Seebohm says:—"I can imagine that barren birds in imperfect breeding-plumage may not unfrequently be found during summer in their winter-quarters; but I scarcely think it possible that *C. fulvus* breeds south of the Arctic circle, at least three thousand miles further north than Formosa."

* Trans. N.-Z. Inst. vol. xvi. p. 308.

ANARHYNCHUS FRONTALIS.

(WRY-BILLED PLOVER.)

Anarhynchus frontalis, Quoy et Gaim. Voy. de l'Astr. Zool. i. p. 252, pl. 31. fig. 2 (1830).*Thinornis? frontalis*, Gray, Gen. of B. iii. p. 545 (1847).*Anarhynchus albifrons*, Schl. Handl. Dierk. i. p. 435 (1857).*Charadrius frontalis*, Gray, Ibis, 1862, p. 234.*Thinornis frontalis*, Gray, Hand-l. of B. iii. p. 17 (1871).*Native name.*—Ngutupare.

Ad. suprâ dilutè cinereus, scapularibus et tectricibus alarum dorso concoloribus: alâ spuriâ brunneâ: remigibus cinerascenti-brunneis, versûs apicem conspicuè saturatoribus, scapis albidis: secundariis cinereis, dorso concoloribus: caudâ cinerascenti-brunneâ, reetricibus exterioribus pallidè cineraceis, extimis albicantibus: fronte et supereilio distincto albidis: lineâ secundâ frontali nigrâ: lineâ per oculum ductâ et regionem paroticam amplectente cineraceâ: subtùs albus, torque pectorali lato nigro: subalaribus albis, imis cinereo lavatis: rostro nigro: pedibus nigricanti-viridibus vix cinerascensibus: iride nigrâ.

Juv. similis, sed sine torque pectorali.

Adult male. Crown, hind neck, and all the upper surface uniform dark grey, the wing-coverts edged with lighter; primaries dark brown on their outer webs and at the tips, with white shafts, and the inner webs dusky grey; the inferior primaries marked with white on their basal portion; secondaries and their long covering-plumes dusky grey; the middle tail-feathers greyish brown, the outer ones silvery grey, margined and tipped with white; forehead, throat, and all the underparts pure white, a narrow line of black bordering the white forehead; the upper part of the breast crossed by a broad band of velvety black, which is generally widest on the left side; under tail-coverts and lining of wings pure white. Irides and bill black; legs and feet blackish green tinged with grey. Total length 8 inches; wing, from flexure, 4.75; tail 2; bill, following the curvature, 1.4; bare tibia .4; tarsus 1; middle toe and claw 1.05.

Female. Similar to the male, but without the frontal black line, and with the pectoral band much narrower, of a duller black, and sometimes interrupted in the middle.

Young. Plumage of the upper parts as in the adult, but paler; no pectoral band; under surface pure white. The progress towards maturity is indicated by a narrow irregular zone of sooty black mottled with white.

Chick. Covered with silky-looking down of a stone-grey colour (similar to the upper surface of the adult) freckled all over with white; bill and feet pale brown. The curved bill is congenital, being quite as pronounced in the newly hatched chick. In a more advanced state the bill is greyish black, brownish at the tip; legs and feet greyish olive.

THIS very remarkable form, distinguished from all other Waders by its peculiar asymmetrical bill, affords another instance of the very distinctive character of the New-Zealand avifauna. The species was first made known to science by MM. Quoy and Gaimard, who obtained it during the French Expedition in the years 1826-29, and gave a figure of it in the 'Voyage of the Astrolabe;' but no specimens of the true *Anarhynchus* having, for many years after, been received in Europe, Mr. G.

R. Gray, in his List of New-Zealand Birds (July 1862), pronounced the curved bill a mere deformity, adding "the bill is perfectly straight in most specimens," a statement which appears to have been purely hypothetical. Mr. Harting, in an able paper "On Rare or Little-known Limicolæ," was the first to clear up the confusion in which the species had become involved, and to claim for it a proper recognition as the type of a genus quite distinct from *Charadrius*, in which it had been placed by Gray and other modern authors. Mr. Harting's paper had the effect of calling special attention to this singular species on the part of local observers; and thus a bird which had up to that period been deemed of rare occurrence was found to have a very general distribution along our shores, in all suitable localities, in both the North and South Islands. It is generally met with in small flocks on the smooth ocean-beach, or on the broad sand-banks and shingle-beds at the mouths of our tidal rivers, where it feeds upon minute crustaceans, fluviatile insects, and other marine life, for the capture of which its peculiar bill is specially adapted.

In the North Island the Wry-billed Plover is particularly plentiful during the spring and winter months on the extensive sand-banks at the mouth of the Kaipara, on the mud-flats of the Manukau basin*, in the Bay of Plenty, and on the ocean-beach between Waikanae and Wanganui, where numerous tidal streams and rivers discharge their waters. In the South Island it is abundant in Queen Charlotte's Sound, and both at the mouths and along the shingle-beds of all the snow-rivers that find their outlet eastward.

At a little distance it is scarcely to be distinguished from the Banded Dottrel, with which it freely associates, but it is of a smaller and plumper form, and on a nearer view may be recognized by the absence of the red pectoral band, so conspicuous in the last-named species. It is likewise more approachable and less inclined to take wing. It runs along the sands in front of you, and utters no sound, whereas the last-named bird emits at brief intervals a "click" or short call-note. I have observed also that these birds have not the same habit of bobbing their heads when they stop running. They run with marvellous celerity, their little black legs, when viewed sideways, appearing to revolve like the spokes of a wheel. On the wing, the flocks form such compact bodies that ten or more may be killed at a single shot. At nesting-time they emit a low purring sound.

It breeds early in the spring, but not so soon as the Banded Dottrel, and is even tamer than at other times, being always very reluctant to take wing.

On its reproduction Mr. Potts writes:—"Its nesting-place would be discovered with very little difficulty, were it not for the wonderful instinct it exhibits in selecting the ground for depositing its eggs. They are simply laid, without any preparation, amongst the pebbles of some river-bed usually, and never far from water; and so well does their grey tint harmonize with the general colour of the shingle around them, that their detection would be almost hopeless if the bird were less confident. . . . The young, if undisturbed, remain for some time near the spot where they were hatched; to escape observation they lie concealed behind stones, and should an attempt be made to molest them, they start off with considerable celerity, uttering at the same time a shrill piping cry of alarm. When hard pressed they take to the water; and I have known them to cross a stream of considerable volume. . . . So tame does the *Anarhynchus* become under the influence of parental instinct that after eggs have been picked up, examined, and replaced on their unsheltered sandy bed, I have seen the old bird immediately resume her duty of incubation, although I may have removed but a few paces distant, and remained in sight for some time."

There are three eggs of this species in the Canterbury Museum, all exactly alike both in form and colouring. They are broadly ovoido-conical, or slightly pyriform, measuring 1.35 inch in length by 1.05 in breadth, and of a delicate greenish stone-grey, freckled over their entire surface with purplish brown.

* Mr. Cheeseman writes to me:—"At Manukau I have, on some occasions, seen as many as 200 or 300 together; but this is quite unusual, the flocks in that locality generally numbering from 10 to 20 birds."



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SAND PLOVER.
THINORNIS NOVE ZEALANDIÆ.

WRY-BILLED PLOVER.
ANARHYNCHUS FRONTALIS.

(SEVEN-EIGHTHS NATURAL SIZE)

THINORNIS NOVÆ ZEALANDIÆ.

(NEW-ZEALAND SHORE-PLOVER.)

- New-Zealand Plover*, Lath. Gen. Syn. iii. pt. 1, p. 206, pl. lxxxiii. (1785).
Charadrius novæ seelandiæ, Gm. Syst. Av. i. p. 684 (1788, ex Lath.).
Charadrius novæ zealandiæ, Lath. Ind. Orn. ii. p. 745 (1790).
Charadrius dudoroo, Wagler, Syst. Av. *Charadrius*, sp. 14 (1827).
Hiaticula novæ seelandiæ, Gray, in Dieff. Trav. ii., App. p. 195 (1843).
Thinornis novæ seelandiæ, Gray, Voy. Ereb. & Terror, Birds, p. 12, pl. 11 (1844).
Thinornis rossii, id. op. cit. p. 12, pl. 11a (1844).
Charadrius torquatula, Forst. Descr. Anim. p. 108 (1844).
Thinornis novæ zelandiæ, Buller, Essay Orn. N. Z. p. 17 (1865).
Thinornis novæ zealandiæ, Finsch, J. f. O. 1870, p. 341.

Native names.—Kohutapu and Tuturuatu.

Ad. suprâ grisescenti-cinereus : fronte, facie laterali et in collo undique posticè ductâ torquem collarem formante, et gutture toto nigris : lineâ albâ ab oculo ductâ pileum circumeunte : tectricibus alarum dorso concoloribus, majoribus albo terminatis : remigibus brunneis, primariis basin versùs albis, minoribus albo terminatis, secundariis exterioribus latè albo marginatis, intimis dorso concoloribus : caudâ purpurascenti-brunnâ, rectricibus exterioribus albo terminatis et basin versùs gradatim albis, pennâ extimâ omninò albâ : corpore reliquo subtùs et subalaribus albis : rostro aurantiaco versùs apicem nigro : pedibus aurantiacis : iride nigrâ.

Juv. saturatiùs brunneus : facie laterali et gutture brunnescentibus, vix nigricantibus : hypochondriis brunneo notatis.

Adult. Forehead, sides of the head, throat, fore part of neck, and a broad nuchal collar brownish black ; crown and hind part of the head brownish grey, being separated from the darker plumage by an ill-defined streak of white, which passes immediately over the eyes and widens on the forehead ; back, shoulders, sides of the breast, and upper surface of wings brownish grey ; the whole of the underparts pure white ; primaries dark brown, with a streak of white along the shaft near the apical extremity ; tail-feathers dark brown, the lateral ones tipped with white, which increases outwardly, the outermost feather on each side being pure white, and the adjoining one with merely a central spot of brown on its inner web. Irides black, with red cyclid ; bill orange for rather more than half its length, then black to the tip ; tarsi and toes orange ; claws black. Length 7·5 inches ; wing, from flexure, 4·75 ; tail 2·75 ; bill, along the ridge 1, along the edge of lower mandible ·9 ; bare tibia ·5 ; tarsus ·9 ; middle toe and claw ·75.

Obs. The sexes are alike, except that the female is slightly smaller than the male, has all the colours of the plumage duller, and less orange in the bill and feet. There is a specimen of the latter in Mr. James Brogden's collection at Porthcawl.

Young. Differs from the adult in having the whole of the upper surface darker, and the white streak on the forehead and sides of the head less conspicuous ; the whole of the fore neck and upper part of the breast is dark brown ; and this colour is continued on the sides of the body and flanks.

Note. In the ' Voyage of the Erebus and Terror,' where both *Thinornis novæ zealandiæ* and the so-called *Th. rossii*

are figured, the latter is represented with the basal interdigital web, and the former without it, an error for which the artist is doubtless responsible.

TILL of late years this handsome Wader appears to have been of very rare occurrence. Forster's original specimen was obtained at Queen Charlotte's Sound, where, as he states, it was called Tuturuatu by the natives. Mr. Percy Earl (about the year 1844) found a pair on the ocean-beach near Port Chalmers, and records it "as a very rare species" in that locality.

Owing, however, to the increased activity of ornithological research in the colony, it has been discovered to be comparatively plentiful on various parts of our coast, both north and south. The mouth of the Piako river, in the Hauraki Gulf, the broad flats of Manukau harbour, and the sand-spits off Tauranga are some of the localities where flocks have been met with in the spring and autumn. In the South Island, some of the favourite resorts are Queen Charlotte's Sound and the various inlets on the eastern and south-eastern coasts. It is also recorded from the Chatham Islands, where it has been found breeding*.

There are two specimens in the Canterbury Museum from the last-mentioned locality; one of these is marked ♂, and the sex of the other is undetermined: but both examples are in very indifferent plumage.

It hunts about for its food among the sand and dry ooze in a very diligent manner, and associates freely with the flocks of Godwit, both on their common feeding-ground and when the latter crowd upon the high banks, during the alternation of the tides, in the manner so familiar to those who have studied their habits. Individually its movements are very graceful and it is undoubtedly the most beautiful of our Plovers.

This bird has the same peculiar alarm-cry of 'click-click' which denotes the presence on the sands of the Banded Dottrel. This cry is also uttered on the wing, being repeated several times in rapid succession.

There can be no doubt, I think, that the so-called *Thinornis rossii*, of which there is a single specimen in the British Museum, brought by the Antarctic Expedition from Auckland Island, is the young of the present species; and I have described it in that character.

* In the 'New-Zealand Journal of Science,' vol. ii. pp. 508-9, there is the following interesting account of its breeding-habits:—"It is content with collecting a few leaves of grass, which are bent and twisted into a circular form just about large enough to contain the eggs, which are protected by this flimsy structure as it keeps them together. I have the eggs from the southern part of this island as well as a series from the Chatham group; one of the nesting-places in the last-named habitat offers such interesting features that it is worth being recorded and described. To the north-by-west of the main Chatham island lies a small group of rocky islets known as 'The Sisters,' or Rangitutahi. One of these wave-beat islets, rising to some 150 feet above the sea, having an area of about five acres only, affords a nesting-place to the Shore-Plover. This very exposed and unsheltered site apparently is shared only by the huge Albatros and the giant Petrel, which there rest awhile from almost ceaseless wanderings over the surrounding ocean. Exposed to gales that sweep over a vast unbroken expanse of sea and break against this little speck of rock, the only screen that may shelter the home of the Shore-Plover is the tussock of wiry-grass or saw-edged carex, for no tree is there found to lend a friendly shelter. The eggs, three in number, are ovoid-conical, ovoid, with the smaller end blunt or somewhat pyriform; smooth, sub-shining, pale or warm stone-colour, freely sprinkled with blackish-brown or almost black irregular marks, angular lines and dots; pale greenish-white, very much scribbled over with fine irregularly shaped marks and minute dots, these becoming more conspicuous towards the larger end, around which they form an unevenly defined zone; stone-colour, more or less covered with irregularly shaped marks of umber-brown; pale stone-colour with a faint greenish tint, sparingly sprinkled below the bilge with very small blackish-brown freckles, some of which seem sunk into the surface, the upper portion splashed with bolder marks of umber and deep chestnut-brown; rich warm stone-colour, abundantly covered with blotches of chestnut and umber-brown interspersed with minute dots, freckles, or fine linear scribbling marks of dark brown."—Potts.

LOBIVANELLUS LOBATUS.

(AUSTRALIAN MASKED PLOVER.)

Tringa lobata, Lath. Ind. Orn. Suppl. p. 65 (1801).*Vanellus novæ hollandiæ*, Steph. Cont. Shaw's Gen. Zool. vol. xi. p. 516 (1819).*Vanellus lobatus*, Vieill. Encycl. Méth., Orn. pt. iii. p. 1075 (1823).*Charadrius lobatus*, Wagl. Syst. Av. sp. 51 (1827).*Vanellus gallinaceus*, Jard. & Selb. Ill. Orn. vol. ii. pl. 84 (1829).*Lobivanellus lobatus*, Gould, Birds of Austr. vol. vi. pl. 9 (1848).

Ad. suprà cinerascenti-brunneus, tectricibus alarum clariùs cinerascentibus: tectricibus primariorum remigibusque nigris, secundariis extùs cinerascenti-brunneis, intùs basaliter albis: secundariis longioribus intimis dorso concoloribus: supracaudalibus albis, fasciam latam formantibus: caudâ dimidiatim albâ, fascia medianâ pallidè cinerascenti-brunneâ, parte terminali nigra, fasciam latam nigram exhibente, apicaliter albo aut pallidè cinerascente limbato: pileo toto et collo postico angustatim nigris, hoc utrinque usque ad pectus laterale nigrum extenso: facie laterali, collo laterali et corpore subtùs toto eum subcaudalibus, subalaribus et axillaribus, purè albis: carunculo lobato fasciali flavo.

Adult. Crown of head, nape, hind neck, and a graduating band on the sides of the chest, interrupted in front, jet-black; the shoulders, the whole of the back, and the upper surface of the wings cinnamon-grey, changing in certain lights; throat, fore neck, sides of the neck, and the entire under surface, as well as the lining of the wings, pure white; primaries and outer secondaries brownish black; middle secondaries brownish black in their apical portion, cinnamon-grey towards the base, the latter colour gradually spreading till it entirely prevails on the long inner secondaries, which are whitish on their basal portion; tail-feathers pure white in their basal half, then black, with a narrow terminal edge of greyish white. Bill pale sulphur-yellow; lobed mask brighter yellow; legs and feet delicate red. Extreme length 13·6 inches; wing, from flexure, 10; wing-spur ·6; tail 4·5; bill, along the ridge 1·3, along the edge of lower mandible 1·2; tarsus 3; bare tibia 1·5; middle toe and claw 1·2.

Obs. Of the New-Zealand specimen mentioned below Mr. Drew has sent me the following measurements:—
“Length 12·6 inches; wing 10·4; extent of wings 33; tail 4·6; upper mandible 1·3; spur on wing ·5; tarsus 3·6; bare tibia 1·5; middle toe and claw 1·4, hind toe ·2.”

I AM indebted to Mr. S. H. Drew, of Wanganui, for a notice of the recent occurrence of this Australian species in New Zealand. Writing to me on the 4th August, 1886, he says:—“I have just received a bird that I take to be a Plover, and as I do not see it mentioned in your ‘Manual,’ I hasten to let you have a description. The bird was alive when I took the measurements, so was not distorted by stuffing. It is a beautiful bird, and as I let it lie on my hand it does not peck or even attempt to get away. But it is very emaciated and I cannot induce it to eat anything. It was taken at Kai-iwi by Mr. George Peake, who found it in one of his paddocks.”

It is common in various parts of New South Wales and on some of the islands in Bass Strait, where it has been found breeding in the month of January.

STREPSILAS INTERPRES.

(TURNSTONE.)

- Tringa interpres*, Linn. Syst. Nat. i. p. 248 (1766).
Tringa morinella, Linn. Syst. Nat. i. p. 249 (1776).
Tringa hudsonica, Müller, Syst. Nat. Suppl. p. 114 (1766).
Morinella collaris, Meyer and Wolf, Taschen. deutsch. Vögelk. ii. p. 383 (1810).
Charadrius cinclus, Pall. Zoogr. Rosso-As. ii. p. 148 (1811).
Strepsilas interpres, Illiger, Prodr. p. 263 (1811).
Strepsilas collaris, Temm. Man. d'Orn. i. p. 349 (1815).
Arenaria interpres, Vieill. N. D. d'Hist. Nat. xxxiv. p. 345 (1819).
Strepsilas borealis, Brehm, Vög. Deutschl. p. 559 (1831).
Strepsilas littoralis, Brehm, Vög. Deutschl. p. 560 (1831).
Cinclus morinellus, Gray, List Gen. of B. p. 85 (1841).
Cinclus interpres, Gray, Gen. of B. iii. p. 549 (1846).
Strepsilas minor, Brehm, Naum. 1855, p. 289.

Ad. ptil. æstiv. pilco et cervicæ albis, plumis medialiter nigris, quasi striatis: fasciâ nigrâ frontali antè oculos decurrente et unâ eum genis nigris ad collum laterale conjunctâ: regione oculari albâ: dorso lætè castaneo, plagâ magnâ interscapulari utrinque nigrâ, et ptilosi reliquâ plus minusve nigro notatâ: dorso postico et supracaudalibus albis, uropygio nigro: tectricibus alarum pallidè ferrugineis, exterioribus nigro notatis, majoribus latè albo terminatis: remigibus brunneis, et versùs apicem saturatoribus, primariis minoribus ad basin albis, remigibus minoribus angustè albo terminatis, secundariis latissimè albo marginatis, secundariis intimis dorso concoloribus: caudâ albâ, latè brunneo transfasciatâ, rectricibus duabus centralibus omninò brunneis: gula albâ, nigro notatâ: gutture et pectore toto superiore nigerrimis: corpore reliquo subtùs purè albo: rostro nigro: pedibus rubris: iride nigrâ.

Ad. ptil. hiem. ubique obscurior, nigredine brunnescente mixtâ: vertice nigro albo paullulùm vario: gulâ albidâ: coloribus ut in ptilosi æstivâ agnoscendis sed semper pallidioribus.

Adult in summer. Forehead and sides of the head white, the former crossed by a narrow band of velvety black which connects the eyes, and widening below them, joins a broader band of the same colour, extending from the base of the lower mandible on each side of the throat; crown of the head white, each feather centred with black; hind part of neck white, more or less varied with brownish black; shoulders and upper part of the back glossy black, with a broad irregular mark of chestnut in the line of the spine; the whole of the mantle black, varied with chestnut, and some of the feathers narrowly tipped with white; the lower part of the back and the upper tail-coverts white; throat white, mottled on the lower part with black, which rapidly predominates, the fore part and sides of the breast, up to the insertion of the wings, as well as the rump, being velvety black; the rest of the body-plumage pure white; the wing-feathers blackish brown, with white shafts, and pale grey on their under surface, with darker tips, the inner primaries and the short secondaries white towards the base, and narrowly tipped with the same; the long secondaries dark velvety brown, varied on their outer webs with chestnut; the small wing-coverts pale ferruginous, varied with chestnut and black; the superior coverts blackish brown, with a conspicuous terminal band of white; tail-feathers white, crossed in their apical portion by a broad band of brownish black, which is greater on the two median ones, the closed tail appearing to be entirely of that colour beyond the upper coverts. Irides and bill black;

tarsi and toes red; claws black. Length 9 inches; wing, from flexure, 6.25; tail 2.5; bill, along the ridge .9, along the edge of lower mandible 1; tarsus 1; middle toe and claw 1.1; hind toe and claw .35.

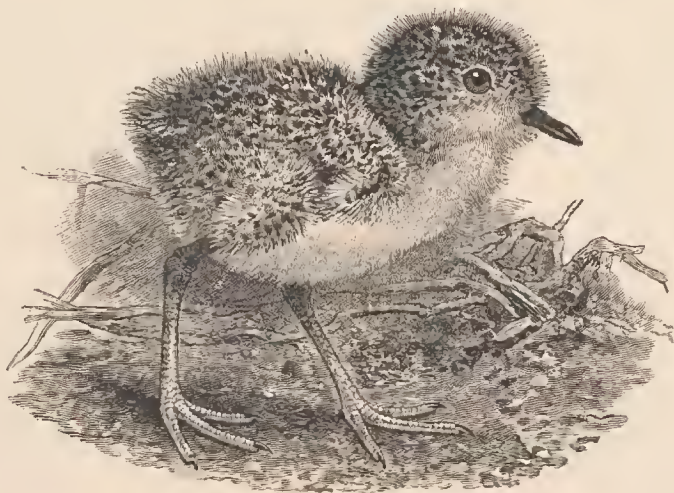
Adult in winter. Has the entire plumage duller, and little or no chestnut on the upper surface, the feathers being brownish black, tipped more or less with white, and slightly varied with ferruginous; the facial mark described above is less defined, and the black of the fore neck and breast is strongly suffused with brown.

Obs. In the Auckland Museum there are two specimens (♂ and ♀) obtained on the Manukau flats, in both of which the plumage of the upper surface is variegated with rich patches of rufous brown.

DR. FINSCH, writing in September 1870 (*Journ. für Ornith.* p. 349), expressed his conviction that, among other species which breed in high northern latitudes and migrate southwards on the approach of winter, the common Turnstone would yet be met with on the New-Zealand coast; and in the following season this prediction was amply verified by the capture of several specimens on the Ninety-mile Beach, in the South Island. All of these were females in winter plumage; but subsequently an example in summer plumage was shot at the Wade, and another was sent to me by Mr. Robson from Portland Island. Of late years the bird has become tolerably common as a seasonal migrant, being particularly numerous in certain months in Manukau harbour and in the Bay of Plenty. They were exceptionally abundant in the former locality in 1880; and Mr. Cheeseman informs me that in March of that year he met with a flock there which must have contained upwards of a thousand birds, besides several smaller ones. Some that were shot on this occasion were so extremely fat as to be quite useless for skinning, from the quantity of oily matter that exuded from the skin of the breast and completely saturated the feathers. According to his observations the birds usually arrive in November or December, and depart in March or April, only a few of them remaining with us during the winter.

Captain Mair has found it associating in flocks with the Godwit at Tauranga. He has obtained a number of both at a single shot, by ensconcing himself with his gun under a bush, and pouring a charge into a flight of birds as they passed overhead.

The history of this familiar bird may be found in any standard work on European ornithology; and it is needless therefore to do more than furnish a description of the plumage for purposes of reference.



Nestling of Banded Dotterel (see page 4).

HÆMATOPUS LONGIROSTRIS.

(PIED OYSTER-CATCHER.)

Hæmatopus longirostris, Vieill. Nouv. Dict. d'Hist. Nat. xv. p. 410 (1817).*Hæmatopus picatus*, Vigors, App. King's Voy. p. 420 (1834).*Hæmatopus australasianus*, Gould, P. Z. S. 1837, p. 155.*Native names.*—Torea and Torea-tai.

Ad. suprâ niger, dorso postico et uropygio eum supraudalibus albis, his nigro notatis: tectricibus alarum majoribus conspieuè albo terminatis, fasciam verticalem formantibus: remigibus brunnescenti-nigris, scapis brunneis: caudâ nigrâ, rectricibus versùs basin albis: gutture toto et pectore superiore nigris, illo paullò brunnescente: corpore reliquo subtùs albo, subalaribus marginalibus nigris: rostro apice flavo eruentato: pedibus eruentatis: iride coccineâ.

Adult. Head, neck, and fore part of breast, mantle, scapulars, and upper surface of wings and tail shining black, glossed with green in certain lights; back, rump, lower part of breast, and all the under surface pure white; the secondaries and their coverts crossed by a broad band of white, which is very conspicuous when the wings are spread; the axillary plumes and the inner lining of wings pure white, the edges of the latter mottled with dusky black. In some examples the dark plumage is sharply defined against the white of the lower parts by a line crossing the breast just above the insertion of the wings; in others the line of demarcation is broken by scattered fringes of white intermixed with the black. Irides and eyelids crimson; bill dark arterial red, changing to coral-red towards the tips of both mandibles, which are yellow; legs dark arterial red. Length 18 inches; wing, from flexure, 10·5; tail 4·25; bill, along the ridge 3·6, along the edge of lower mandible 3·75; bare tibia 1; tarsus 2; middle toe and claw 1·6.

Obs. The sexes are alike in plumage, but the male is somewhat larger than the female.

Young. In a fledgling I find that the distribution of the colours is the same as in the adult. The white of the underparts is sufficiently although not sharply defined against the dark plumage of the breast, and the blackish-brown down of the upper parts is giving place to black feathers with dull brown margins; the lower part of the back, rump, and upper tail-coverts white, with some obscure greyish markings; tail-feathers black, with long, straggling filaments of down still adhering to their extremities; alar white mark quite conspicuous. Bill blackish brown, changing to reddish towards the base of lower mandible; legs and feet reddish brown. In another from the same nest, but in a more downy condition, the crown, sides of the head, and fore neck are lighter, being mottled with grey, whilst the lower part of back, rump, and upper tail-coverts are obscurely barred all over with blackish brown.

Younger state. Uniform dull black strongly tinged with brown especially on the entire upper surface, the wing-coverts very minutely and the secondaries more largely tipped with fulvous brown. Irides dark brown, with a reddish eyelid; bill dull orange-red at the base and on the rictal membrane, passing into reddish olive in the middle portion and shading into brown towards the tips of both mandibles; legs and feet leaden grey. Enlargement under tarsal joint very conspicuous.

More advanced state. Plumage as in the adult, but with the dark plumage more or less suffused with brown, the white of the underparts less pure, and the pectoral line of demarcation somewhat broken or indeterminate; the axillary plumes and under tail-coverts irregularly margined and broadly tipped with dusky black; rump

and upper tail-coverts varied more or less with black, many of the feathers being blotched and all of them tipped with that colour; the white alar bar very narrow and inconspicuous; the wing-coverts and inter-seapulars narrowly edged with fulvous brown; and the plumage of the upper surface without any sheen or gloss. Bill reddish yellow, darker at the base; legs and feet pale red.

Chick. Covered with down of a greyish-buff colour, varied on the upper parts with black; there is a broad streak of black on the crown, another on each wing and thigh, and a series of large square spots down the middle of the back, tinged with red at the base; bill and feet dull brown.

Albino. Major Mair informs me that he saw a pure albino of this species on the ocean-beach at Opotiki. The whole of the plumage was of snowy whiteness, and the irides, bill, and feet bright red. He observed this beautiful bird on several occasions, but failed in all his efforts to secure it.

THIS fine species, which closely resembles the European Oyster-catcher (*H. ostralegus*), is generally dispersed over the southern coast of Australia, and is particularly abundant in Tasmania and among the islands in Bass Strait. It likewise occurs all round the New-Zealand coasts; but although a few may be met with on every stretch of sandy beach, it is nowhere very abundant. Occasionally they are found in parties of six or more, but more generally in pairs, and sometimes in association with the Black Oyster-catcher, which is a far more common bird in the middle and southern portions of the colony. I have counted as many as nineteen consorting together at one time, of which number only six belonged to this species. They are occasionally met with in the Hot-lakes District of the North Island, wading about in the warm water and capturing small prey. Like its European prototype, it subsists on small mollusks and crustaceans, for securing which its long wedge-shaped mandibles are peculiarly adapted. Notwithstanding its ungainly form, the strongly contrasted black and white of its plumage and the bright red of its bill and feet render it an attractive object on the smooth sandy beach, where it may be observed sedately reposing on one leg, or nimbly running to and fro in search of its prey left exposed on the beach by the receding tide. During the nuptial season, it is curious to watch the male bird paying his addresses to the mate of his choice: elevating his back and lowering his bill till it nearly touches the ground, he struts or runs round her with a loud quivering note, no doubt expressive of his undying attachment; and when there are two rival males thus performing in concentric circles before the same shrine of devotion, it is amusing to observe with what perfect indifference the object of this demonstration appears to receive the attentions of her rival suitors. When once, however, her affections are secured, she appears to remain faithful to her mate, and the pair continue together, if not for life, certainly long after the breeding-season, with all its cares, has passed by. Even when consorting together, as they frequently do, in small flocks, each pair seems to maintain its individuality; and when at rest on the sands the party may be seen disposed in couples, at short distances apart from the rest.

They love to bask in the sun, squatting close to the ground; and when disturbed by the presence of a dog or other disquieting object, instead of immediately taking wing they habitually run some distance along the sands. On being disturbed at night they take to the shallow water for safety.

The flight of this species is rapid; and on the wing it repeatedly emits a shrill whistling cry.

It breeds on the open sandy spits, or in the dry river-beds, forming its nest among the small drift-wood and other débris of the sea, or rather selecting a suitable depression in which to deposit its eggs; these are usually three in number, ovoid, measuring 2·5 inches by 1·5, and pale yellowish brown of a warm tint, marked over the entire surface with rounded spots and blotches of blackish brown, among which are paler markings of purplish brown. Sometimes, however, the nesting-place is on a sandy plain a couple of miles or more from the sea-shore. The young are able to run immediately on quitting the shell; but on the approach of danger they secrete themselves by squatting among the stones, to which their colour closely assimilates, while the parent birds resort to various cunning devices for drawing away the intruder.

HÆMATOPUS UNICOLOR.

(BLACK OYSTER-CATCHER.)

Hæmatopus unicolor, Wagler, Isis, 1832, p. 1320.*Hæmatopus fuliginosus*, Gould, B. of Austr. vi. pl. viii. (1848).*Hæmatopus niger oceanicus*, Bonap. C. R. xliii. p. 420 (1856).*Hæmatopus niger australasianus*, Bonap. C. R. xliii. p. 420 (1856).*Hæmatopus niger*, Ellman, Zool. 1861, p. 7469.*Native name.*—Torea-pango.*Ad.* ubique niger, remigibus et caudâ brunnescentibus, scapis primariorum ad basin albidis: rostro corallino, apice flavicanti-corneo: pedibus pallidè rubris: iride et regione oculari cocceinis.*Adult male.* The whole of the plumage glossy brownish black, with faint metallic reflections on the back and wings. Irides and bare eyelids crimson; bill coral-red, changing to yellowish horn-colour at the tips of both mandibles; tarsi and toes pale red. Length 19 inches; wing, from flexure, 10·5; tail 4·25; bill, along the ridge 3·5, along the edge of lower mandible 3·6; tarsus 2·25; middle toe and claw 1·75.*Female.* Similar to the male, but somewhat smaller and more strongly tinged with brown, especially on the under surface.*Young.* Uniform dull brownish black, the feathers of the back and the wing-coverts narrowly margined with fulvous brown. Bill and feet dull red, the former brown in its outer portion.*Chick.* Covered with down of a uniform blackish-brown colour; bill and feet dull brown.*Var.* Mr. Robson informs me that he saw a perfect albino of this species at Portland Island, in the month of October. It came near enough for him to observe the red colour of its irides, but he was unfortunately without a gun at the time, and never saw it again.*Obs.* Examples are not unfrequently met with exhibiting a white abdomen and a dull whitish bar on the wings, or with this alar bar wholly wanting. It is not unlikely that this is due to hybridism; for the two species are often seen associated. The following is a description of one of these parti-coloured birds in the Canterbury Museum:—Head, neck, fore part of breast, and all the upper surface black; an indistinct alar bar and the tips of some of the upper tail-coverts white; lower part of breast, sides of the body, flanks, abdomen, axillary plumes, and under tail-coverts largely varied with white.

THIS species, which also occurs in Australia, is far more abundant in the southern parts of New Zealand than the Pied Oyster-catcher, and not uncommon in the northern parts also. On the ocean-beach between Waikanae and Otaki, within a stretch of ten miles, I have counted as many as fifty in the course of a morning's ride. Its habits are precisely the same as those of *H. longirostris*, with which it associates freely, frequenting the same feeding-grounds and often breeding in the same locality. It swims with facility and when wounded will elude pursuit by diving, often remaining under the surface a considerable time.

It has the same peculiar habit of courtship as that mentioned in my account of *H. longirostris*;

and it is really amusing to watch the male bird waltzing round his spouse with his back arched and his long red bill pointing to the ground.

At Baker's Hotel, Waipawa, I was interested in seeing a perfectly tame bird of this species, of which I made the following note:—It is a young bird, and has been in the possession of the landlord for about nine months, frequenting the open paddock, and consorting alternately with a tame Paradise Duck (apparently the favourite) and a flock of Domestic Geese. Sometimes it associates with a pair of Black Swan, but seems rather indifferent to their companionship. It can fly with facility, but hardly ever leaves the paddock except to enter the fowl-yard, where it appears to be on perfect terms with all the other occupants. Regularly every morning it comes to the gate and waits for the gardener to bring its meal of fresh meat, and having partaken of this it spends its time strutting about the grass, and hunting with its long bill for the worms and grubs upon which it subsists for the rest of the day.

The only cry I heard it utter was a call like 'Phillipic' in a high key.

It is not an uncommon occurrence to see this species paired with the Pied Oyster-catcher. I have described above what I take to be the hybrid result of such a union. Further observation only tends to confirm this view. I have seen a dimorphic pair followed by two young birds, both of them in the indeterminate black-and-white plumage, and I have more than once seen a black bird followed by a single young one in the same parti-coloured garb. On several occasions I have seen a similar hybrid, more or less pronounced, with a group of black ones. It would seem from this that, as in the case of our pied and black *Rhipiduræ*, which often breed together, the general tendency in the offspring is to follow the former of these types.

As the breeding-season approaches the little groups are no longer met with on the ocean-beaches, the birds having paired and gone off to their nesting-grounds on rocky islands or in the less frequented parts of the coast. This will account for their almost total disappearance from the well-travelled beaches between Wellington and Wanganui during the spring and early summer months.

The young usually quit the nest early in December, but I have found birds breeding on the Rurimu Rocks as late as the 17th January, the young at this time being fully fledged and following the old birds but unable to fly. On capturing one of the latter it uttered a feeble squeak, and the parents evinced their solicitude by flying in circles overhead with an excited cry of *keria, keria* *.

On their sanctuary being invaded the old birds feign lameness, or roll and tumble over on their backs in apparent agony in order to entice intruders away from their nesting-ground, whilst the downy chicks looking (as a friend expressed it) "like little boys in night-gowns," make a bee-line for the sea, and on reaching it dive into the surf and swim out into deep water. If unable to reach the sea they take to the rock-pools and dive under the projecting ledges, hiding themselves in the crevices till all danger has passed.

An egg of this species in my son's collection is ovoido-conical in shape, measuring 2.25 inches in length by 1.5 in breadth, and is greenish white thickly and irregularly spotted and smeared with inky black and dark brown, with washed-out markings of the usual kind interspersed. But there is a wide scope of variety in the tints and markings, these being, in a very perceptible manner, adapted to the surroundings: for example, on the Rurimu Rocks, the eggs that were deposited on the white sand were lighter in colour with very small markings on their surface; those found in nests placed among the drift seaweed above high-water mark, or among the rocks, were much darker and more or less blotched in the manner described.

* The Rev. W. Colenso, F.R.S., writes:—"The Maoris believe that this bird knows of an approaching storm, which he indicates by a difference in his note; crying *keria, keria* (dig, dig,—i. e. for shell-fish out of the sand, by the waves, as food for himself) before a storm, and *tokia, tokia* after one."

RECURVIROSTRA NOVÆ HOLLANDIÆ.

(RED-NECKED AVOCET.)

Recurvirostra novæ hollandiæ, Vieill. Nouv. Dict. d'Hist. Nat. iii. p. 103 (1818).*Recurvirostra rubricollis*, Temm. Man. d'Orn. ii. p. 592 (1820).*Avocetta novæ zealandiæ*, Ellman, Zool. 1861, p. 7470.

Id. pulchrè niveus, scapularibus imis nigricantibus: capite cum collo postico et laterali guttureque toto saturatè ferrugineis: pileo anteo et vertice cinerascens, gulâ etiam albido variâ: tectricibus alarum minimis albis, medianis nigris, majoribus albis: remigibus nigricanti-brunneis, pennis minoribus et secundariis exterioribus albis: caudâ albâ, pennis centralibus pallidè cinereis: subtus niveus: rostro nigro: pedibus plumbeo-nigris: iride rubrâ.

Adult. Head and about two thirds of the neck dark rufous, paler on the crown, and inclining to greyish brown towards the base of the bill; the inner scapulars, the first six primaries, and the longer secondaries, with their coverts, black, the latter tinged with brown; the effect produced in the closed wing being that of a black surface, with a narrow longitudinal bar of white; tail pale ash-grey; the rest of the plumage pure white. Irides red; bill black; legs and feet bluish black. Length 17.25 inches; wing, from flexure, 9; tail 4; bill, along the ridge, following the curvature, 3.75; bare tibia 1.5; tarsus 3.5; middle toe and claw 1.75; hind toe and claw 1.4.

Young. The young of the first year has the black of the upper surface deeply tinged with brown; across the shoulders, when the wings are closed, there is a horse-shoe mark of blackish grey; head and neck pale ashy brown, darker on the throat, and inclining to rufous on the nape and sides of the neck.

Obs. The sexes are exactly alike in plumage.

THIS beautiful Australian Avocet, to which I have restored Vieillot's original name of *Recurvirostra novæ hollandiæ*, is an occasional visitant to our shores. In the summer of 1859-60 I saw a small flock of them far up the course of the Ashburton river, and again in a small lagoon near the township of Timaru, but, not having a gun with me, I was unable to secure any. In the same season a specimen was shot by Mr. French on the tidal flats near the mouth of the Kaiapoi river; and this, unfortunately, was allowed to perish. Three years later I met with a flock numbering five or six on the south-west coast of the Wellington Province. They were very shy, rising high in the air on my attempting to approach them, and taking their course for the opposite side of Cook's Strait. Two specimens have been shot on the ocean-beach near Dunedin; and Dr. Richardson received another from the Whakatipu Lake, in the interior of the Otago Province. A solitary one was shot on the mud-flats near Whangarei some years ago; and the skin was preserved by Mr. George Burnett, who forwarded it to Europe. The specimen from which my description of the adult is taken was killed on the mud-flats near Christchurch in 1864.

From the same locality Mr. Sparkes afterwards obtained the young bird described above (which is now in the Canterbury Museum); also two more adults, in full plumage, one of which is now in my possession, and the other in Mr. Silver's collection at Letcomb Manor.



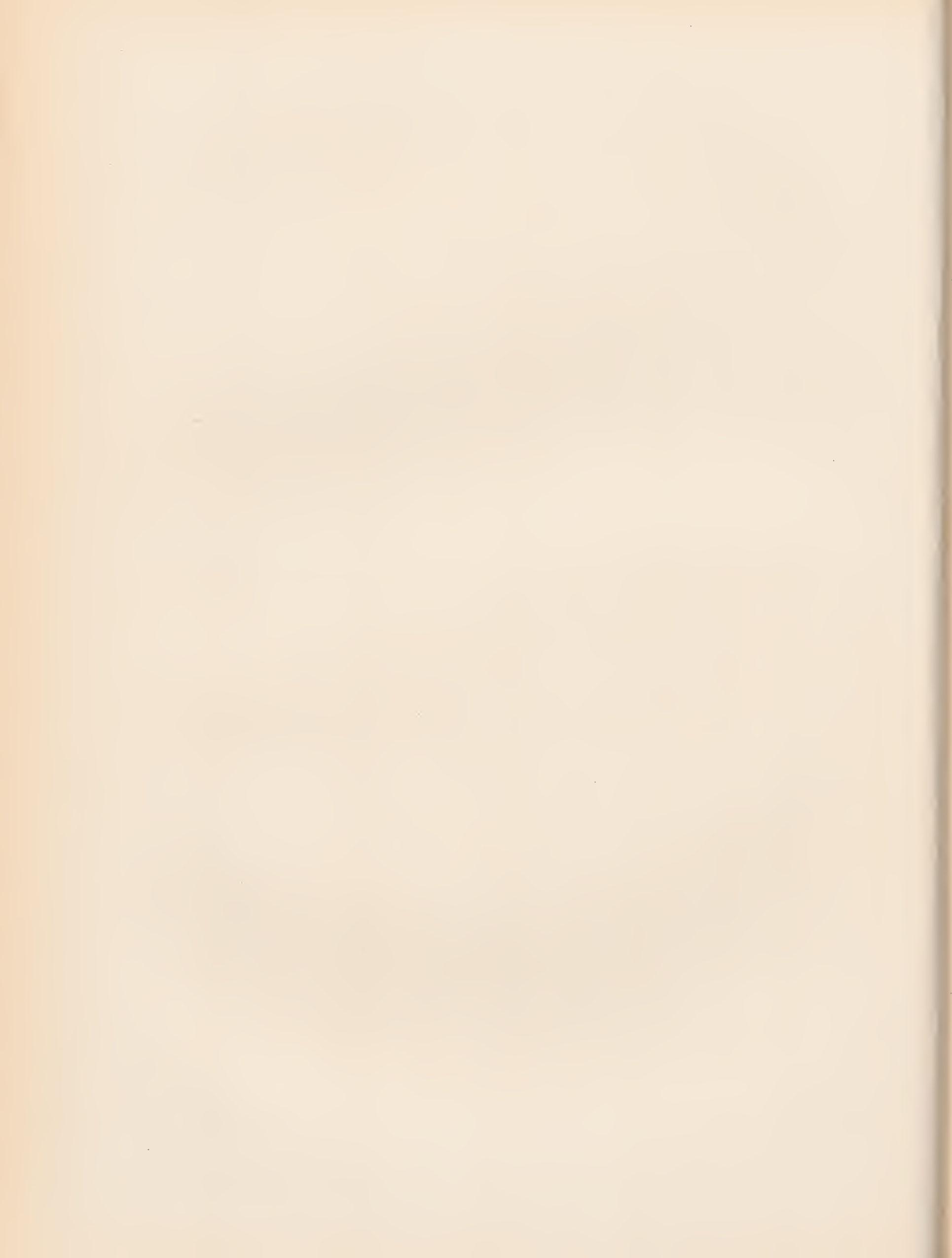
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RED-NECKED AVOCET.
RECURVIROSTRA NOVÆ HOLLANDIÆ.

BLACK STILT. *H. NOVÆ ZEALANDIÆ.* (IN THE DISTANCE.)
(SEVEN-EIGHTHS NATURAL SIZE)

PIED STILT.
HIMANTOPUS LEUCOCEPHALUS.



HIMANTOPUS LEUCOCEPHALUS.

(WHITE-HEADED STILT.)

Himantopus leucocephalus, Gould, P. Z. S. 1837, p. 26.*Himantopus albus*, Ellman, Zool. 1861, p. 7470.*Native names.*

Tutumata and Tukuripourewa; Torea (of Arawa tribe).

Ad. suprâ niger, pileo undique, collo laterali et postico torquem collarem formante albis : dorso postico et uropygio albis : alis omninò nigris dorso concoloribus : caudâ albâ, eimerascente lavatâ, pennis duabus centralibus omninò cinerascensibus : corpore toto subtùs purè albo : rostro nigro : pedibus eruentatis : iride rubrâ.

Juv. suprâ niger, brunneo tinetus : collo postico sordidè griseo-albo : tectricibus alarum et supracaudalibus albo terminatis.

Adult. Back of the neck, middle portion of back, scapulars, and entire upper surface of wings glossy greenish black ; lining and under surface of wings sooty black ; the rest of the plumage pure white, with the exception of the tail-feathers, which are more or less tinged with smoky grey. Irides and eyelids brick-red, bill black, sometimes horn-coloured at the tip ; legs and feet deep pink flesh-colour, and sometimes beautiful pale lake-red ; claws black. Length 14 inches ; extent of wings 26.5 ; wing, from flexure, 9 ; tail 3 ; bill along the ridge 2.4, along the edge of lower mandible 2.6 ; bare tibia 2 ; tarsus 4.25 ; middle toe and claw 1.7.

Obs. Individuals vary considerably in size. A specimen in my collection from Hawke's Bay gives the following measurements :—Length 15.75 inches ; extent of wings 29.5 ; wing, from flexure, 10 ; tail 3.5 ; bill, along the ridge 2.75, along the edge of lower mandible 3 ; bare tibia 3.25 ; tarsus 4.5 ; middle toe and claw 1.75.

A fine specimen in the Colonial Museum has the head, fore neck, and all the underparts white ; hind neck and upper parts generally satiny black ; across the shoulders there is some indication of white, which disappears in the hinder part ; nape and fore neck freckled with black, the margins of the dark colours being indeterminate.

Young of the first autumn. Crown of the head, nape, and hind neck dusky black mottled with white ; shoulders spotted with black, darkening towards the back ; upper part of back and scapulars brownish black ; upper surface of wings glossy black ; the median coverts, as well as the feathers of the back, narrowly tipped with brown ; lower part of back and rump white ; tail-feathers dull black, tipped with brown, their coverts (which are very fluffy) plumbeous at the base, white in their apical portion, and tipped with yellowish brown ; lining of wings black ; the rest of the plumage pure white ; bill black, brownish towards the base ; irides reddish yellow ; legs pale yellow ; the claws brown. Upper mandible 2 inches ; tibia 1.75 ; tarsus 2.75.

Progress towards maturity. A more advanced bird in my collection has the crown, nape, and sides of the head sooty black mixed with white, which increases on the back and sides of the neck ; the rest of the plumage as in the adult, except that there are white markings on the inner edges of the wings, the lining of which is blackish brown.

Younger condition. Crown of the head, middle portion of back, scapulars, and upper surface of wings and tail dull sooty black tinged with brown ; nape greyish white, blending on the shoulders into the darker plumage ; feathers composing the mantle, upper wing-coverts, and tail-coverts tipped more or less with greyish white ; inner lining of wings and axillary plumes sooty black, tipped with white ; the rest of the plumage pure white.

Chick. Covered with short soft down of various shades of fulvous yellow, varied on the upper parts with brown, and with a series of square black spots down the back, and a broad streak of the same colour on each thigh. (See woodcut on next page.)

THE White-headed Stilt, which appears to be also widely distributed over the continent of Australia, is a comparatively common bird in the middle and southern portions of New Zealand; but I know of only a single instance of its occurrence as far north as Auckland.

Notwithstanding the extraordinary length of its legs, this bird is most graceful in all its movements; and it is a pretty sight to watch a flock of them on the edges of a lagoon, stalking about in the shallow water in search of their food, which consists of aquatic insects and small mollusca, and displaying their well-balanced bodies in a variety of artistic and graceful attitudes. When on the wing, the legs are trailed behind, with a slight swaying motion as if to preserve the equilibrium; and the bird utters a sharp, quickly repeated note, like the yelping of a small cur.

When associating in flocks, I have noticed that they all act together as by a common impulse. On passing from one feeding-ground to another they form into a compact column and rise to a considerable height, with their heads drawn in and legs trailing behind, and descend again in the most perfect order.

On more than one occasion in the summer months I have observed large flocks of this Stilt-Plover, associating with the black species, in the salt-marsh near the town of Napier. They are to be seen every day from the carriage-windows as the train passes up and down the Meane spit, and the sight is a very pretty one. Two excellent representative specimens (an adult male and a fledgling, with the enlarged tarsi) were shot in this locality and sent to me by Mr. Hooper on the 17th December. Their stomachs contained grubs about an inch long and numerous small aquatic insects of various kinds.

Although they do not appear to leave the country, they perform some sort of migration, for by the end of April or beginning of May the large flocks which I have mentioned (numbering sometimes two hundred or more) have entirely disappeared from the Napier marshes. All through the winter, however, straggling parties of three or four, and towards spring birds in pairs, are to be met with in all their customary haunts.

In the south they are not so plentiful, but I have often met with autumnal gatherings of forty or fifty birds.

Mr. Gould has given an interesting account of this species in his 'Birds of Australia,' but states that he was unable to obtain any information respecting its nidification. We have been more fortunate in New Zealand, as the following account will testify.

I have found it nesting both on the dry sands or shingle-beds at the mouths of our tidal rivers and in the grass-meadows of our cultivated lands near the sea-shore. I have also met with it breeding in small companies, but each pair well apart, on the dry river-beds many miles from the sea*. They are somewhat capricious in their choice, frequenting certain river-beds to the exclusion of others in the same district, the preference being probably determined by the presence of some particular kind of food. They seem particularly partial to localities where the shallow water is covered by the small red duck-weed (*Azola rubra*). The proximity of the nest, however well concealed, is at once made manifest by the behaviour of the birds, who mount in the air and perform an undulatory flight in

* "In a nursery on the Upper Rangitata River, about ten yards distance from a thickly spread carpet of Gulls' eggs, was a long hollow in the flat by the narrow beach. In this natural rent, that gave something of a ditch-like shelter, were six small grassy nests of the Pied Stilt (*H. leucocephalus*). Five of these nests contained (December 14) in each four richly marked eggs; the sixth contained five, an unusual number and worth recording."—*Zoologist*.

circles overhead, with a cry of distress, sounding like *que-que*, the sexes crying responsively and in different keys.

The young can run nimbly almost immediately after quitting the egg. They often elude capture by squatting close to the ground; and their colours so exactly harmonize with their surroundings that it is almost impossible to discover them. One which I found, after an hour's diligent search, squatting on the sand near the edge of a sea-pond, remained perfectly motionless till I had taken it up in my hand, when it struggled to escape and uttered a feeble *cheep, cheep*, whereupon the old birds became excited, flew round me in circles, and repeatedly darted up to within two feet of my head, uttering all the time a sharp yelping cry of remonstrance.

I have observed that the Stilt sometimes feigns lameness to draw intruders away from the vicinity of its nest. I have seen one limping or rather tumbling along the ground, trailing its long legs as if helplessly broken, and uttering short cries as if in an agony of pain, persistently keeping up the deception till it had drawn the trespassers to a safe distance from the object of its solicitude, when it rose high in the air with an unmistakable note of relief in quick repetition.

It usually commences to breed in October; but I have found newly hatched young ones as late as the first week in January. It forms a very rude nest, if, indeed, it deserves that name; and sometimes deposits its eggs on the bare ground, a mere depression on the surface being selected for the purpose. The eggs are usually four in number, decidedly ovoido-conical in form, measuring 1.7 inch in length by 1.2 in breadth, and are of a warm yellowish brown, handsomely marked and spotted over the entire surface with brownish black.



Chick of White-headed Stilt (natural size).

HIMANTOPUS NOVÆ ZEALANDIÆ.

(BLACK STILT.)

Himantopus novæ zealandiæ, Gould, P. Z. S. 1841, p. 8.*Himantopus melas*, Hombr. & Jacq. Ann. Sci. Nat. 1841, p. 320.*Himantopus niger*, Ellman, Zool. 1861, p. 7470.*Himantopus melas*, Hutton, Cat. Birds of N. Z. 1871, p. 30.*Native names.*—Kaki and Tuarahia ; Torea-pango (of Arawa tribe).*Ad. ptil. æstiv.* suprâ nitidè virescenti-niger : subtùs fuliginoso-niger, loris et facie laterali pallidioribus : rostro nigro : pedibus cruentatis : iride rufescenti-brunnæ.*Ad. ptil. hiem.* dissimilis ptilosi æstivæ : pileo postico et cervice toto nigris : fronte, gutture et pectore albis : dorso, alis et caudâ nigris : abdomine fuliginoso-nigro.*Juv.* similis ptilosi æstivæ, sed dorso postico et uropygio albis : subtùs etiam albus : cervice et collo postico sordidè cinerascens saturatiùs variis : interscapulio, scapularibus et rectricibus alarum nigricanti-brunneis, fulvo marginatis : primariis pallidè cinerascens terminatis : caudâ cinerascens-brunnæ, rectricibus exterioribus versùs basin pogonii interni albis.*Adult in summer.* Head, neck, and all the under surface brownish black, inclining to slaty grey on the face and towards the base of lower mandible ; back, rump, and upper surface of wings and tail glossy greenish black. Irides and eyelids crimson ; legs and feet pinky red, the claws black. Length 15 inches ; extent of wings 28·5 ; wing, from flexure, 10 ; tail 3·25 ; bill, along the ridge 3, along the edge of lower mandible 3·25 ; bare tibia 3 ; tarsus 3·75 ; middle toe and claw 1·5.*Adult in winter.* Crown and sides of the head, hind part of neck, and the whole of the abdomen sooty black, or marked more or less with white ; back, wings, and tail glossy greenish black ; the rest of the plumage pure white.

A specimen in the Auckland Museum has a band across the shoulders, the scapulars, and upper surface of wings and tail black with greenish reflections ; the lower part of the abdomen black, without any gloss ; the upper and lower tail-coverts black, with white feathers interspersed ; rest of the plumage white, mixed or spotted with black on the crown and sides of the head, and on the hind neck ; the line of division between the white and the black on the shoulders and on the abdomen not distinctly defined.

Young. Forehead, sides of the head, fore part and sides of the neck, and all the underparts pure white ; crown of the head, mantle, and scapulars blackish brown, each feather margined at the tip with fulvous ; hind part of the neck and between the shoulders dark grey, mottled with paler grey ; back and rump white ; upper and lower surface of wings, as well as the axillary plumes, black ; the upper wing-coverts and the long inner secondaries margined with fulvous, and the primaries tipped with light grey ; tail-feathers greyish brown, the outer ones white on their inner webs, with an apical spot of brown.*Chick.* Covered with dark brown down ; bill and legs greyish black.*Varieties.* In the Colonial Museum there is a remarkable albino variety. The entire plumage is white, clouded with smoky grey on the crown and sides of the head, and on the upper surface of the body. There are a few

straggling black feathers on the wings, back, and rump, and the under surface of the quills is mottled with grey. The primaries and secondaries, it may be further mentioned, are much abraded or worn on both sides of the shaft.

An example obtained by Mr. Hamilton at Petane in July 1884, and presented to the Hawke's Bay Museum, is very remarkable:—Plumage black; the head, whole of the fore neck, breast, and underparts variegated with pure white feathers, giving the bird a pied or mottled appearance, the white slightly preponderating, and becoming dominant towards the base of both mandibles; the flanks, abdomen, and under tail-coverts sooty black, without any white feathers; mantle, back, rump, and upper surface of wings and tail satiny black, with greenish reflections. The specimen is marked ♀, and the condition of the legs indicates that it is an adult.

In the Canterbury Museum there is another (marked ♀) with scattered white feathers all over the underparts; another with white markings on the face and fore neck (no sex given); and two others (both ♂) altogether black.

Obs. The sexes are alike; but the summer plumage in the female has less gloss on the wings and tail, and a stronger tinge of brown on the underparts.

Two examples in the Auckland Museum, both in adult condition (the tarsi being fully developed), appear to be in transitional states of plumage:—

No. 1 has the head and neck white, clouded on the crown and hind neck with grey, these clouded markings becoming confluent and darker around the eyes; underparts white, clouded and marked on the thighs, vent, and under tail-coverts with slaty grey; mantle and upper surface of wings black; back and rump white.

No. 2 has the head and neck more thickly clouded, the ear-coverts and region of the eyes being entirely slaty brown; breast, and underparts as far as the flanks, white; thighs, lower part of abdomen, and under tail-coverts black; upper surface as in No. 1.

Three other specimens in transitional plumage (from winter to summer) are now before me:—

No. 1 has the forehead and chin pure white; the crown, lores, face, neck all round, and all the under surface black and white intermixed, the former preponderating on the sides, flanks, and abdomen; lining of wings and axillary plumes black, each feather minutely tipped with white; back, rump, and upper surface of wings and tail shining greenish black, the remnants of the old plumage on the wings dull blackish brown; a few straggling white feathers mingled with the black upper tail-coverts. Bill black, changing to brown at the base; legs reddish yellow.

No. 2 has the general plumage black, the sides of the head and neck all round marked with numerous white feathers; lower part of fore neck wholly white; on the breast two or three scattered white feathers.

No. 3 is black with much less white than the former, this being confined to straggling feathers on the neck, shoulders, breast, sides of the body, and under tail-coverts. This bird measures:—Length 14 inches; wing, from flexure, 9.25; tail 3; tarsus 3.75; bill along the ridge 2.6.

In a decidedly young bird received from Otago the head and neck are entirely white with a mark of grey on the vertex; lower part of hind neck and shoulders mottled with grey; wing-coverts and scapulars brownish black, minutely margined with pale brown; rump and tail white, the latter faintly washed with grey. In another young bird, received from Canterbury, the crown, sides of the head, and nape are washed with blackish grey, which is darkest on the vertex.

Another adult specimen in my own collection has the crown and sides of the head mottled and clouded with black; the white collar irregular and somewhat splashed with black.

Remarks. Owing to the many transitional states of plumage in which this bird is found, both in its progress towards maturity and in its seasonal changes of dress, it is the popular belief that there are two species of Black Stilt in New Zealand distinct from the well-known *Himantopus leucocephalus*; and this view has been adopted in Hutton's 'Catalogue,' where the true *H. novæ zealandiæ* is first described in its winter plumage, and then, under another name (*H. melas*), in its black summer garb. But this supposed other species has no real existence. Dr. Finsch, in his remarks on a collection of skins received from Dr. Haast, states (Journal für Ornithologie, 1870, p. 349) that a bird labelled "*Himantopus novæ-zealandiæ*, first year's plumage," proved, on examination, to be a mature example of *H. leucocephalus*, readily distinguished by its longer tibia and tarsus, from which accidental mistake he seems to infer that Haast is wrong in his description

of the young of this species. There can be no doubt, however, that the young of *H. novæ zealandiæ* is as I have described it, my examples exhibiting in every case that enlargement below the tarsal joint which, among birds of this group, is a sure indication of immaturity.

THIS species was originally made known by Gould, who afterwards figured it in the Supplement to his 'Birds of Australia,' his description being founded on two specimens "killed at Port Nicholson," both of which, however, appear to have been in an immature state of plumage.

It may readily be distinguished from the preceding species by its darker plumage and by its somewhat shorter legs. Its habits, however, are similar, excepting that it is less gregarious, associating in pairs rather than flocks, while it appears to prefer the dry shingle-beds to the lagoons and marshy grounds which constitute the favourite feeding-resorts of the other species. It is, moreover, a much rarer bird, although it is generally to be found in all the river-courses of the Wellington district and further south. Sir James Hector met with a solitary pair at Parengarenga, near the North Cape; and Mr. Robert Mair saw a flock of five at Kaipara, where it was considered by the natives an extremely rare visitant. A few pairs have for several years past frequented the Rotorua Lake; but it is never seen on Lake Taupo, although the White-headed Stilt is extremely abundant there, single flocks sometimes numbering thirty or forty birds. In Rotomahana also, where the latter bird is very plentiful at all seasons of the year, the Black Stilt till within the last few years was rarely seen. Formerly rare, both this and the White-headed Stilt are now very plentiful in the Lake district. They appear to subsist chiefly on the dead gnats that float on the surface of the water in the sulphur springs. These Plovers are continually to be seen wading about in the warm yellow water of these springs, feeding on the floating scum and on the small salamander worms which abound in such places.

Captain Mair found them nesting on a small flat surrounded by hot springs; but this was before the Tarawera eruption had devastated the district and obliterated the waters of Rotomahana.

In a meadow near the pretty little township of Waipukurau I saw several perfectly black Stilt-Plovers associating closely with the White-headed Stilt, and feeding amongst the grass; they took no heed of the passing train, although within twenty yards of them.

During the breeding-season these Stilts resort to every kind of subterfuge in order to draw intruders away from their nests. On the first alarm they secrete their young behind a stone or in a tuft of grass, and then go through their sham performance, enacting the part of a wounded bird in dire distress, flapping their wings, as if unable to rise from the ground, then trailing their legs as if broken, and tumbling about within a few yards of their pursuers till a safe distance from the nest has been reached, when all disguise is thrown off and the birds mount in the air and make a long circuit overhead, to reconnoitre the ground. If surprised in a place where there is no cover, the young birds squat close to the ground, trusting for concealment to the harmony of colour, and so strong is this instinct of self-preservation that they will remain perfectly motionless even when touched by the hand.

Mr. Potts records a nest, with three eggs, on Rakaia river-bed, on the 13th of September, and another, containing two, in the same locality, on the 14th of December; and in a note to myself he adds that he has seen the young as early as the middle of October. The eggs are of an elegant ovoid-conical form, measuring 1.8 inch in length by 1.3 in breadth, and of a warm yellowish-brown colour, handsomely marked over the entire surface with conspicuous spots of brownish black. There are good comparative series of the eggs of both this and the preceding species in the Canterbury Museum; and the difference they exhibit is very manifest to the eye, although not easily described.

Mr. Seebohm suggests that this species is the result of "an intermarriage of *Himantopus leucocephalus* with *H. melanopterus*," and he proposes to call it "*Himantopus leucocephalus picatus*;" but I think it would be extremely unsafe to adopt that view; for, as a matter of fact, no one has yet recorded an instance of the Black Stilt and the White-headed species breeding together, which would follow as a matter of course on the supposition of hybridism.

HIMANTOPUS ALBICOLLIS.

(WHITE-NECKED STILT-PLOVER.)

Himantopus albicollis, Buller, Trans. N.-Z. Inst. vol. vii. p. 224 (1874).

Ad. capite toto cum collo undique et corpore subtùs toto albis: interscapulio, scapularibus cum dorso summo et tectricibus alarum nigris: remigibus angustè albido terminatis: subalaribus nigris: dorso postico et uropygio albis: caudâ nigrâ: rostro nigro: pedibus pallidè cruentatis.

Adult. Head, neck all round, and all the under surface of the body, lower part of back, rump, and upper tail-coverts pure white; across the shoulders, scapulars, and upper surface of wings glossy black, with greenish reflections, the inferior primaries and the secondaries tipped with white; under surface of wings and the axillary plumes black; tail-feathers glossy black. Bill black; irides red; legs and feet pinky red. Total length 14.25 inches; wing, from flexure, 9.25; tail 3; bill, along the ridge 2.6, along the edge of lower mandible 2.9; bare tibia 2.2; tarsus 3.75; middle toe and claw 1.5.

Obs. The specimen from which the above description was taken is undoubtedly an adult bird, and is in a moulting condition, the glossy greenish-black feathers of the mantle replacing the brownish-black plumage of an earlier state.

Young. Has the head and neck as in the adult, but with the crown and nape more or less stained or washed with dark grey; all the feathers of the upper parts narrowly margined with brown.

More advanced state. The brown margins on the upper surface disappear, the plumage changing to dull satiny black with a greenish gloss, the clouded markings on the crown and nape, however, remaining unaffected. The adolescence of the bird in this condition of plumage is indubitably shown by its swollen tarsi.

Note. Through the kind attention of Mr. C. H. Robson, I have received from Cape Campbell a Plover clearly referable to the above species. From the enlarged condition of the tarsi below the joint, it is evidently an immature bird, and this will account for the crown and hind neck being tinged or faintly mottled with grey, these parts being wholly white in the adult. The flanks, rump, and under tail-coverts are clouded with black; tail-feathers on their inner web and towards the base white; the rest of the plumage as in my type.

In a paper which I communicated to the Philosophical Institute of Canterbury "On the Genus *Himantopus* in New Zealand"*, I discriminated, under the above name, a form which appeared to me to be specifically distinct from the two preceding ones.

Five or six specimens have since passed through my hands at various times, but most of these were in a somewhat immature condition of plumage, thus raising in my mind a doubt as to whether this bird may not, after all, be merely a seasonal state of *H. novæ zeelandiæ*.

Mr. Seebohm is of opinion that my *Himantopus albicollis* is in reality the almost cosmopolitan *H. melanopterus*, and in his latest work, on the Charadriidæ, he accordingly states, as a fact, that the latter species has been met with in New Zealand. It has been known to occur in the Philippine Islands, and there would be nothing extraordinary in a few stragglers finding their way, at irregular intervals, to New Zealand. But after carefully examining the extensive series of specimens in the British Museum, I find it impossible to accept his determination of the species. Among other minor

* Trans. N.-Z. Inst. vol. vii. pp. 220-224.

differences, I find that *H. melanopterus*, at all stages of its growth, has a white or greyish tail, whereas *H. albicollis* in the adult state has a black one, and this alone would form a good distinguishing character. Again, *H. albicollis* has the primaries and secondaries tipped with white, whereas in *H. melanopterus* they are entirely black.

Mr. Hamilton, in his account of the birds of the Petane district (Hawke's Bay), says * that "the White-necked Stilt occurs not unfrequently."

As the subject, however, seems to need further investigation, it may be well to reprint here a portion of my paper referred to above:—

"Probably the most puzzling group of birds we have in New Zealand is that of the Stilt-Plovers, and my object in submitting the following notes is to make another step towards a better acquaintance with and elucidation of the species.

"In the first place, it is somewhat remarkable that New Zealand should possess certainly two, if not three, species of a genus of birds so peculiar that (if we except a small one said to exist on the west coast of Madagascar) each of the great divisions of the globe can only boast of one. Even Australia, teeming as it is with wading birds, is the home of only one species of Stilt (*H. leucocephalus*), which is also common to New Zealand, Ternate, Celebes, and Timor. The existence of a second species in this country (*H. novæ zealandiæ*) was first recorded by Mr. Gould in 1841. Since that date several other names have been added, and (owing to our imperfect knowledge of the seasonal and transitional states of plumage) the nomenclature has got into a state of confusion. As in all such cases, the only escape from this is a careful study of the species at all ages and at all seasons of the year, noting the changes of plumage that occur, and tracing their progress from youth to maturity.

"The present paper is intended to be a contribution of this sort, but as I have not collected or dissected any of the specimens referred to, it would be manifestly unfair to hold me responsible for the *data*. Particulars of season, sex, &c., I have been compelled to take on trust.

"For the purposes of this examination I have had before me forty-three specimens, in different conditions of plumage, belonging to the Canterbury Museum.

"There is no difficulty whatever in separating *Himantopus leucocephalus*, which is distinguished from *H. novæ zealandiæ* in the somewhat similar seasonal plumage by its purer and well-defined colours, its smaller bill, and appreciably shorter toes and claws. Of course specimens vary, and in a series like the present we meet with large examples of *H. leucocephalus* and small examples of *H. novæ zealandiæ*, but the general rule holds good throughout. The young are readily distinguished by the enlargement towards the distal end of the tarsus (a provision for the future lengthening of this bone), which diminishes with the growth of the bird. There are two fledglings in the collection, and as the description of the 'young' given in my 'Birds of New Zealand' (1st ed. p. 203) is taken from a somewhat older bird, I append the following notes:—

"*H. leucocephalus*, *juv.*—Crown of the head, back, and upper surface of the wings brownish black, tinged more or less with brown, and many of the feathers being narrowly tipped with greyish white; hind neck greyish white, mottled with black in its lower portion; forehead, fore neck, and all the under surface, as well as the rump, white; the whole of the quills black, the inferior primaries and the secondaries narrowly tipped with white; tail-feathers black, edged with fulvous, and white at the base. (Obtained at Rakaia, Nov. 1872. Weight, 6 oz.)

"Of *Himantopus novæ zealandiæ* I have given in the 'Birds of New Zealand' (1st ed. pp. 205–206) descriptions of the summer, winter, and adolescent states of plumage, and under the head of 'Remarks' I have referred to the numerous transitional states which have led to so much confusion in regard to this species. The description there given, however, of the *adult in winter*, I wish now to qualify by stating that the uniform dark plumage on the abdomen is by no means a constant character.

"First of all, as a result of my present examination, I feel bound to dismiss *Himantopus spicatus*, Potts, as having no claim whatever to the rank of a species. The type specimen is now before me, and the distribution of colours (as may be seen on reference to the published description) † indicates a transitional condition. The extra length of leg (as compared with *H. novæ zealandiæ*) appears to be rather in the tibia than in the tarsus. Mr. Potts makes the black neck and breast his distinguishing feature; but there is another bird in the collection (a male) in which the tarsus is 4 inches and the tibia 2 inches—altogether a bird of smaller proportions—in which the distribution of colours is the same, although there is a less extent of black on the breast.

"I have already described (*l. c.* p. 204) the young of this species from two young specimens in the Canterbury Museum, the parentage of which was placed beyond all doubt by Mr. Fuller, who secured at the same time the two old birds in black summer plumage. I may add that these latter are still in the collection; the male is perfectly black, and the female slightly pied.

"A more matured example of the young bearing the following label, 'Shot in Bottle Lake, Jan. 28, 1872; *juv.*—female; parent bird black,' presents a general resemblance to the young of *Himantopus leucocephalus*, but on a close comparison the following differences are observable:—The crown is lighter, being of an almost uniform ash-grey; there is more greyish white

* Trans. N.-Z. Inst. vol. xviii. p. 127.

† *Op. cit.* vol. v. p. 198.

between the shoulders, and the tail-feathers instead of being black are ashy white, the outer ones having a broad subapical mark of dark grey; and the axillary plumes, under the wings, instead of being black are pure white; there are fewer light margins on the wing-coverts; and the inferior primaries and the secondaries are more largely tipped with white. Some of these differences, however, may be due to the fact that this is a somewhat older bird. In the other specimens, mentioned above, the axillars are black, as in the young of *H. leucocephalus*.

"The collection contains nine perfectly black specimens. Of these eight are males; and, according to the labels, all of them were killed in summer. Out of twelve other specimens more or less pied with white, only three are females, all of them (of both sexes) being also summer birds. The extent of white, however, varies considerably in birds shot at one and the same time, some exhibiting only a few white feathers on the neck and breast, whilst in others the white predominates. This irregularity of plumage may perhaps be accounted for on the supposition that the birds do not undergo the complete change at their first seasonal moult, but at some later period—say in their second or third year.

"There are two specimens in the collection which are of more than ordinary interest, because they are quite distinct in appearance from either *H. leucocephalus* or *H. novae zealandiae* in their full plumage, and cannot, so far as I at present see, be a transitional state of either of those species. One of these, presented to the Museum by the late Dr. Barker, bears the following label, 'Orari, Feb. 16, 1872, male,' and appears to be in full adult plumage. The other, which is labelled 'Saltwater Creek, April 1873, male,' is apparently a less matured bird. On observing certain indications of a change from black to white in the latter, I at first supposed that the white head and neck might represent the true winter plumage of *Himantopus novae zealandiae*; but, as directly opposed to this view, Dr. Barker's specimen, which I am disposed to regard as a distinct species, was killed towards the end of summer. In this bird the entire head and neck, with the breast and underparts, are pure white; rump and upper tail-coverts also white; back, scapulars, and upper surface of wings and tail glossy black, the inferior primaries and the secondaries tipped with white; under surface of wings and the axillary plumes black.

"In selecting a specific name for this bird I have adopted that of *H. albicollis*, because it exactly expresses the feature which distinguishes it from the two others, namely, its having the neck entirely white. The same name was applied to a Stilt-Plover by Vieillot, but this has proved to be only a synonym of *H. autumnalis* and the title is therefore free again.

"The series of specimens under consideration is unfortunately very deficient in examples killed in winter, and the examination of the subject therefore has not been as complete or exhaustive as I would wish; but two points at any rate have been gained, namely the elimination from our list of *Himantopus spicatus* (which proves to be no species at all) and the placing on record of a hitherto undescribed form—the White-necked Stilt—which, so far as our present evidence goes, is a good and valid species. To my mind it is perfectly clear that it is either *H. novae zealandiae* in the mature winter plumage, hitherto unknown, or it is a distinct species; and if Dr. Barker's specimen is rightly labelled as killed in summer, that fact alone is sufficient to disprove the former assumption."

The late Dr. Jerdon wrote thus (*Ibis*, 1865, p. 35) of *Himantopus leucocephalus*:—"Examples of this bird quite similar to those figured in the 'Birds of Australia,' and to others which I have seen from this region, are not unfrequently obtainable in Lower Bengal in the same flocks with the common *H. candidus* (seu *melanopterus*). Great numbers of Longshanks are brought to the Calcutta provision-bazaar, often several dozens of them of a morning, during the season of their stay. Of these the great majority have a sooty-brown occiput, which changes to black at the approach of the breeding-season; but occasionally one then occurs with a purely white head and neck, or with more or less black down the nape, sometimes a mere trace of it, and sometimes the black nape is well developed (though never to the extent that is constant in the American species), and this may or may not be accompanied by the black occiput. I have also seen purely white-headed and white-naped specimens from Egypt, and one male from that country with just an indication of the dark nape; there is one with black nape and occiput among the British-killed specimens in the British Museum, and I have seen others like it from Europe and North Africa. Whether the *leucocephalus* type be constant in Australia remains to be ascertained; and the most likely explanation of this extraordinary and anomalous variation is, that differentiated races of this bird have more or less commingled. Most assuredly it can neither be referred to difference of age nor of season."

Whether this interbreeding has actually occurred in New Zealand I am not in a position to say; but it may be well to remember that instances of apparent hybridism between the Black and Pied Oyster-catchers (quite a parallel case) are not uncommon. In January, 1886, I saw on the ocean-beach between Whakatane and Matata, a beautiful Pied Oyster-catcher paired with a perfectly black one. The nesting-season was far advanced and these birds were without doubt breeding together.

PHALAROPUS FULICARIUS.

(THE GREY PHALAROPE.)

- Tringa fulicaria*, Linn. Syst. Nat. i. p. 249 (1766, ex Edw.).
Tringa glacialis, Gmel. Syst. Nat. i. p. 675 (1788).
Phalaropus lobatus, Lath. Ind. Orn. ii. p. 766 (1790).
Phalaropus glacialis (Gmel.), Lath. tom. cit. p. 776 (1790).
Phalaropus rufus, Bechst. Naturg. Deutschl. ed. 2, iv. p. 381 (1809).
Phalaropus platyrhynchus, Temm. Man. d'Orn. p. 459 (1815).
Phalaropus griseus, Leach, Cat. M. & B. Brit. Mus. p. 34 (1816).
Crymophilus rufus (Bechst.), Vieill. N. Dict. viii. p. 521 (1817).
Lobipes hyperboreas, Ross in Ross's Voy., 8vo, ii. App. p. 167 (1819, nec Linn.).
Phalaropus fulicarius (Linn.), Bonap. Comp. List, p. 54 (1838).
Phalaropus platyrostris, Nordm. in Démidoff, Voy. Russ. Mérid. iii. p. 250 (1840).
Phalaropus asiaticus, Hume, Stray Feathers, i. p. 246 (1873).

♀ *ad. ptil. æst.* pileo, nuchâ, mento et plumis ad basin rostri nigris, pileo saturatiore, maculâ magnâ albâ periophthalmicâ ferè ad nucham productâ : collo postico nigricante : dorso et seapularibus nigris, plumis omnibus rufescenti-ochraceo marginatis : primariis nigricanti-einereis, rhaehidibus albis, pogonio externo ad basin albido : secundariis einereis albido marginatis, intimis nonnullis brevibus ferè omnino albis, secundariis intimis elongatis nigricanti-einereis versùs apicem albido vix marginatis : tectricibus alarum nigricanti-einereis, medianis albido vix apicatis, et majoribus conspicuè albo terminatis : uropygio cinereo : supracaudalibus ferrugineis medialiter nigro notatis : rectricibus centralibus nigricantibus, reliquis saturatè einereis, duabus extremis versùs apicem rufo notatis : corpore subtùs saturatè ferrugineo : subalaribus albis einereo notatis : pedibus sordidè olivaceis : rostro flavo, ad apicem nigro : iride fuseâ.

♂ *ad. ptil. æst.* minor et sordidior : pileo haud nigro sed nuchâ et dorso nigricantibus, brunnescenti-ochraceo notatis, maculâ capitis laterali indistinctâ, et corpore subtùs pallidiore, abdominis plumis albo marginatis facilè a feminâ distinguendus.

Ptil. hiem. fronte, gulâ, collo et corpore subtùs purè albis, pileo nigro, plumis albis immixtis : nuchâ, collo postico et dorso antico nigris vix albido notatis : dorso et uropygio cum scapularibus pallidè œrulseenti-einereis vix nigro notatis : alis ut in ptilosi æstivali, sed nigricantibus nec nigricanti-einereis : fasciâ nigrâ per oculos productâ : rostro olivaceo : pedibus grisescenti-olivaceis.

Adult female in breeding-plumage. Crown, nape, chin, and all round the base of the bill black, this colour being most intense on the crown ; a large white patch covering the sides of the head round the eye, and extending backwards to the nape, where it nearly joins ; entire underparts and neck all round, except a narrow central black line at the back, rich dark rusty red ; back and seapulars black, the feathers all margined with rusty yellow ; primaries blackish grey on the outer web and on the central and terminal portion of the inner web, the outer and basal portion being white ; shafts white ; secondaries dark greyish, margined with white, one or two of the inner short ones nearly pure white ; elongated inner secondaries blackish grey, narrowly edged with white at the tip ; wing-coverts dark grey, the median coverts slightly edged with whitish, and larger wing-coverts broadly terminated with white, forming a broad white bar across the wing ; rump greyish ; upper tail-coverts dark rusty red, marked with dark brown or black along the centre of some of the feathers ; central rectrices blackish, remainder dark slate-grey, the two outer ones on each side marked with dark rufous towards the tip ; under wing-coverts white and grey varied. Irides dark brown ; bill flat, in colour yellowish,

except at the tip, where it is black; legs dull olive. Total length 8·5 inches; wing, from flexure, 5·4; tail 2·5; bill, along the ridge ·9, along the edge of lower mandible 1; tarsus ·75; middle toe and claw ·95.

Adult male in breeding-plumage. Differs from the female in being much duller in colour; the crown, nape, and back are black, marked with rusty or yellowish brown, all the feathers being margined with this colour, so as only to allow the black to appear through here and there; the white patch on the side of the face is almost obsolete, and the underparts are much duller in colour, the feathers on the lower abdomen being edged with white.

Winter plumage. Differs from the summer plumage in having the upper parts generally black and grey, and the underparts pure white; forehead, throat, neck, and entire underparts pure white; crown, nape, a narrow line down the back of the neck, and the fore part of the back black, slightly marked with whitish; on the crown several pure white feathers; back, rump, and scapulars dark French grey, intermixed with a few blackish feathers, one or two of which latter are slightly margined with yellowish brown; wings as in the summer dress, but much blacker, the grey shade being almost absent; through and behind the eyes a broad blackish streak. Bill dark olive; legs greyish olive.

WITH a few unimportant alterations and additions, I have availed myself of Mr. Dresser's permission to use the excellent description of this species given in his 'Birds of Europe.'

The only hitherto recorded example of this Palearctic species in New Zealand was shot, in June 1883, by the late Mr. Michael Studholme on the narrow strip of sandy beach which separates the Waimate lagoon from the sea. He observed it flying alone, without any companions; and on discerning that it was something new he sent the specimen to the Canterbury Museum.

The late Sir Julius von Haast, who brought the occurrence under the notice of the Philosophical Institute of Canterbury, gave the following interesting account of it* :—

"Unfortunately I did not receive the bird in the flesh, but, judging from its total length (8·25 inches), it is most probably a female. The plumage, fully agreeing with the descriptions of European and North-American specimens, proves that this Waimate example is in its breeding or fine summer dress. The occurrence of this bird is, therefore, one of the most curious facts on record as an addition to our New-Zealand avifauna; but as it resembles in general appearance, at least at a distance, some of our smaller Wading-birds, it may, although probably only an occasional straggler, have hitherto escaped detection by our naturalists.

"The following remarks as to its habits and migrations may demonstrate this strange appearance in the southern hemisphere still more clearly. In winter the Grey Phalarope is found regularly in Scotland and England, but not so frequently on the coasts of Germany, France, Italy, or North Africa. In Asia it has often been observed in the Black, as well as in the Japanese, Chinese, and Indian seas; and, though essentially a marine bird, it winters regularly in some parts of the interior of Asia, as, for instance, in Persia. It also occurs in the Arctic regions of America, leaving for the south when the arctic autumn fairly sets in, and travelling as far as Mexico and Guatemala. The occurrence of this bird in the southern hemisphere, as far as the latitude of New Zealand, is therefore very remarkable, especially in the middle of the arctic summer, and can only be accounted for by assuming that this bird, or more probably a flock, had been driven southwards by stress of weather when the time arrived for their returning to their home in Eastern Siberia or Western North America. However, the most curious fact is that the specimen before us is in its most brilliant summer or breeding-dress, and quite in accordance with the time of the year when it is breeding in the arctic regions; while, according to all accounts accessible to me, it has always been observed after its emigration to its winter-quarters in the more southern regions to be clothed in its more sober white and ash-coloured winter dress, instead of the rich rufous and black tints our specimen possesses so conspicuously."

* Trans. N.-Z. Inst. vol. xvi. p. 279.

GALLINAGO AUCKLANDICA.

(AUCKLAND-ISLAND SNIPE.)

Gallinago aucklandica, Gray, Voy. Ereb. and Terr., Birds, p. 13, pl. 13 (1844).*Scolopax holmesi*, Peale, U. S. Expl. Exp. viii. p. 229 (1848).*Cœnocorypha aucklandica*, Gray, Cat. Gen. of B. p. 119 (1855).

Ad. suprà ochraceo-fulvescens: pileo rufescenti-brunneo, plumis medialiter nigris: lineâ verticali et supercilio latissimo stramineis: collo postico magis fulvescente, plumis medialiter nigris: dorso rufescenti-brunneo, plumis nigro irregulariter maculatis aut vermiculatis, scapularibus et dorsi plumis quibusdam stramineo marginatis: tectricibus alarum dorso concoloribus: remigibus pallidè brunneis, secuudariis dorso concoloribus et eodum modo nigro maculatis et extùs latè stramineo limbatis: caudâ brunneâ, rectricibus centralibus rufescente variis, exterioribus pallidè cinerascensibus medialiter saturatoribus: facie laterali stramineâ, brunneo minutè triquetrè maculatâ, lineâ per oculum ductâ paullò saturatiore: subtùs fulvescens, gulâ et abdomine immaculatis: gutture imo, pectore superiore et laterali cum crisso rufescenti-brunneis, plumis saturatiore brunneo aut triquetrè medialiter notatis, aut transversim vermiculatis: subalaribus cinerascensibus: rostro grisescenti-corneo: pedibus pallidè brunneis: iride nigrâ.

Adult. Crown of the head rufous brown, varied with dark brown, and with a narrow fulvous line down the middle; forehead and cheeks fulvous white, the former with an upward median streak of brown; from the base of the upper mandible to the anterior edge of the eyes a dull streak of the same; upper surface dark rufous brown, variegated with irregular spots of fulvous and black, especially on the back and scapulars, each feather being margined outwardly with pale fulvous, and marked with a large subterminal spot of black; underparts of the body pale fulvous, whitish on the abdomen, the breast obscurely spotted, the sides and flanks varied with rufous brown. Irides black; bill greyish brown; tarsi and toes pale brown. Length 9 inches; extent of wings 14; wing, from flexure, 4.5; tail 2; bill, along the ridge 2, along the edge of lower mandible 2.3; tarsus 1; middle toe and claw 1.5.

Young. A very young bird in Canon Tristram's collection, with the down still adhering to the feathers, has similar plumage to the adult, but with broader margins to the feathers of the upper surface, and a larger extent of fulvous white on the abdomen.

Note. In his 'Catalogue of New-Zealand Birds' (p. 77), Prof. Hutton treats *Gallinago pusilla* as distinct from this species, and says of it:—"In its colours this bird very much resembles the figure of *G. stricklandi*, Gray, in the 'Voyage of the Erebus and Terror,' pl. 33, of which there is no description nor locality given. It, however, appears to be smaller, and to have a much shorter bill than *stricklandi*."

THIS fine Snipe was brought from the Auckland Islands by the Antarctic Expedition in 1844, and the type specimen is in the British Museum.

If I am right in again separating the New-Zealand form, under the name of *Gallinago pusilla*, it would seem that the Auckland-Island species has never been met with either on our coasts or at the Chatham Islands. It has, however, been recorded from the Snares, a group of rocky islets to the south of Stewart's Island.

Sir James Hector quite recently writes to me:—"From Antipodes Island, Captain Fairchild has brought a very interesting form of Snipe, which is larger, darker in plumage, and with a more curved bill than the Auckland-Island species."



J. G. K. EMANS DEL. & LITH

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THE ISLAND SNIPE
GALLINAGO PUSILLA.

THE EASTERN GODWIT.
LIMOSA NOVÆ ZEALANDIÆ.

(THREE-FIFTHS NATURAL SIZE.)

GALLINAGO PUSILLA.

(CHATHAM-ISLAND SNIPE.)

Gallinago pusilla, Buller, Ibis, 1869, p. 41.*Gallinago aucklandica*, Buller, Birds of New Zealand, 1st ed. p. 196 (1873).*Ad. G. aucklandicæ* similis, sed minor.

Adult. Upper surface dark rufous brown; variegated with irregular spots of fulvous and black, these markings being most conspicuous on the back and scapulars, the feathers on these parts being margined outwardly with pale fulvous, and marked with a large subterminal spot of black; underparts fulvous; on the sides of the head and breast numerous spots of rufous brown, of which colour there is also an irregular line from the base of the upper mandible to the anterior edge of the eyes; sides of the body and flanks variegated with crescentic marks of rufous brown. Bill greyish brown; feet pale brown. Total length 8 inches, extent of wings 13; wing, from flexure, 4; tail 1.5; bill, along the ridge 1.75, along the edge of lower mandible 1.5; tarsus .75; middle toe and claw 1.2, hind toe and claw .2.

Young. Darker on the upper surface, the fulvous margins being reduced to mere lines, with an inner border of black forming a distinct crescent; on the scapulars and larger wing-coverts there are three such crescents in succession, but these markings are only observable on the plumage being disturbed; there is less fulvous on the underparts, the sides of the body, abdomen, and under tail-coverts being marked with crescents of rufous brown, which are broadest and most distinct on the flanks.

Note. "Judging from the measurements of specimens recently obtained in the Chatham Islands (*cf.* Finsch, J. f. O. 1874, p. 197) I am inclined to regard *G. pusilla* as a smaller species than *G. aucklandica*, which from its constantly lesser dimensions may be well kept distinct." (Sharpe in Voy. Ereb. & Terr. 1875, p. 30.)

In 1868 I received from Dr. (now Sir James) Hector a small Snipe obtained by Mr. Charles Traill during a visit to the Chatham Islands, the specimen being accompanied by the following memorandum:—"Found on a small rocky islet off Chatham Island." A second specimen, in no way differing from the first, and procured from the same locality, was deposited by that gentleman in the Colonial Museum. On comparing these birds with Mr. G. R. Gray's description of *Gallinago aucklandica*, I considered that the species was a distinct one, and characterized it accordingly (*l. c.*) as *Gallinago pusilla*, in allusion to its small size. The next record of its occurrence was from the Gulf of Hauraki, near Auckland; and Mr. Henry Travers subsequently brought further examples from the Chatham Islands.

Having brought with me to England one of Mr. Traill's original specimens, for illustration in my former edition, I carefully compared it with a series of eight skins of *Gallinago aucklandica* in the British Museum brought from the Auckland Islands by the Antarctic expedition, and with another from the same locality in the possession of the late Mr. Gould, and I came to the conclusion that, notwithstanding the great difference in the length of the bill, they were referable to one and the same species—or, at any rate, that till further specimens had been obtained it would be unwise to separate them. I summarized the results of my examination thus:—

In his description of *Gallinago aucklandica*, Mr. Gray gives the following measurements:—"Length 9 inches, wing $4\frac{1}{2}$, bill 2 inches and 4 lines." In the type of my *G. pusilla* the dimensions are appreciably smaller in every way; and in the specimen which I brought to England for comparison they are as follows:—Length 8 inches;

wing, from flexure, 4; bill along the ridge 1.7. Mr. Gould's specimen has the same length of wing, but the bill measures 2.45 inches. Of the eight examples in the British Museum, one corresponds very nearly with the last mentioned, in four of them the bill measures 2.25, in two others it barely exceeds 2 inches, and in the remaining one it is only 1.8 inch; while in none of them does the wing vary, in any material degree, from the standard length of 4 inches. The slight individual differences of plumage are only of the kind we are accustomed to look for in members of this group.

In 1875 Baron von A. Hügel, in a letter to 'The Ibis,' giving an account of his collecting-tour in New Zealand, said:—"In Invercargill I was very fortunate in procuring good things. I got two specimens of a *Gallinago* there, which I thought interesting enough to send to you. . . . As you will see, the one is from the Snares (south of Stewart Isle); and after comparing it with specimens from the Chatham Isles in the Otago Museum, I have not the slightest doubt that the two are identical. But the Snipe from the Auckland Isles seems to me different in size and colouring. . . . It struck me at the time that after all there might be differences between *Gallinago aucklandica* and *G. pusilla*, which I believe are at present considered synonymous." A year later Mr. Sharpe, in the Supplement to the 'Birds' of the 'Erebus and Terror' (as quoted above), treated the species as distinct. It was not, however, till I received this year from Canon Tristram two specimens of Snipes, which he had obtained from New Zealand and the Auckland Islands respectively, that I felt disposed to rehabilitate my *Gallinago pusilla*. Before doing so, I took the precaution of submitting the two skins to Professor Newton, who returned them to me with the following note:—"The smaller one has, to my eyes, many if not all the characteristics of a young bird; but hereby I do not mean to declare it to be the young of the larger one. There is to be borne in mind the possibility of a species retaining the plumage of immaturity in its adult condition—in other words, of being permanently immature in this respect. But, on the whole, I am strongly inclined to think that this smaller specimen is the skin of a young bird, though I cannot persuade myself that it is the young of *Gallinago aucklandica*, supposing the larger specimen to be rightly named. I demur to what you say as to the bill of the smaller specimen not being that of a young bird, for I well remember being very much struck with the large size of the bill of a nearly full-grown Jack-Snipe (of which I made a careful drawing, that I now possess, in Lapland many years ago), and I have seen the same amount of development in the young of our Common Snipe. Thus you will see that my impression is that the two specimens belong to different species, but that one is young and the other adult. I much wish I could speak more positively on the matter, but in any case it would be useful to figure the smaller specimen."

Mr. Sharpe, to whom I also submitted these specimens, pronounced unhesitatingly in favour of two species. On communicating the above results to Canon Tristram, he wrote to me:—

"I am much interested in your report of my South-Pacific Snipes. I am now sending you the young of *Gallinago aucklandica* for examination. You will see that it confirms our view of the distinctness of the two species, for it would expand into *G. aucklandica* but never into *G. pusilla*. Of the latter I have never seen the young."

Mr. Cheeseman writes, under date June 2, 1884:—"I have a specimen of *Gallinago pusilla* in the Auckland Museum, obtained by Mr. T. B. Hill in the Raglan district many years ago; but I have never met with the bird myself."

It appears to me that *Gallinago pusilla* is now fairly entitled to take rank as a good and valid species, and I have accordingly figured, on the same Plate as *Limosa novæ zealandiæ*, Canon Tristram's specimen, although apparently in younger condition than my type, which has been sent back to New Zealand. It is only right, however, to mention that Mr. Seebohm, to whom Canon Tristram had previously shown his specimens, expressed (and I believe still holds to) the belief that both birds are referable to the same species, the differences presented by the smaller one being due to immaturity.

TRINGA CANUTUS.

(THE KNOT.)

- Tringa canutus*, Linn. Syst. Nat. i. p. 251 (1766).
Tringa calidris, Linn. Syst. Nat. i. p. 252 (1766).
Charadrius utopiensis, Müll. Syst. Nat. Suppl. p. 117 (1776).
Maubèche tachetée, Buff. Pl. Enl. viii. p. 363 (1783).
Gristled Sandpiper, Lath. Gen. Syn. B. iii. pt. 1, p. 175 (1785).
Southern Sandpiper, Lath. tom. cit. p. 187 (1785).
Tringa cinerea, Gm. Syst. Nat. i. p. 673 (1788).
Tringa australis, Gm. tom. cit. p. 679 (1788, ex Lath.).
Tringa nævia, Gm. tom. cit. p. 681 (1788, ex Buff.).
Tringa grisea, Gm. tom. cit. p. 681 (1788, ex Lath.).
Tringa islandica, Gm. tom. cit. p. 682 (1788, ex Brünn.).
Tringa ferruginea, Meyer, Taschenb. deutsch. Vögelk. ii. p. 395 (1810).
Tringa rufa, Wils. Am. Orn. vii. p. 43, pl. 57 (1813).
Canutus islandicus, Brehm, Vög. Deutschl. p. 654 (1831).
Canutus cinereus, Brehm, op. cit. p. 655, Taf. 34. fig. 2 (1831).
Calidris canutus, Gould, B. of Eur. iv. pl. 324 (1837).
Canutus rufescens, Brehm, Naum. 1855, p. 292.

Native name.—Huahou.

Ad. ptil. hiem. suprà cinerascens : pilei plumis medialiter nigris, utrinque fulvescentibus, vix striatis : collo postico pallidiore, plumis nigro angustè medialiter striatis : dorso toto et scapularibus fulvescente et nigro alternè marginatis : uropygio imo et supracaudalibus albis, griseiscenti-nigro transnotatis : tectricibus alarum saturatè cinerascens, minimis angustè, majoribus latè albido limbatis, his etiam conspicuè albo terminatis : alâ spuriâ remigibusque saturatè brunneis, albido plus minusve latè limbatis : remigum scapis albis : caudâ cinereâ, plumis angustè albido marginatis, scapis albis : supereilio parvo albo : facie laterali, collo undique et pectore superiore albis, minutè brunneo striatis vel maculatis : gulâ albâ : corpore reliquo subtus albo, hypocondriis paullò griseiscenti variis : subalaribus et axillaribus albis, his vix griseiscenti notatis : rostro nigro : pedibus olivascens-nigris.

Ad. ptil. æstiv. omnino diversus, rufus : pilei plumis nigro medialiter lineatis : collo postico eodem modo angustissimè striato : dorsi plumis conspicuè medialiter nigris, rufo marginatis : tectricibus alarum et supracaudalibus ut in ptilosi hiemali coloratis, his autem rufescentibus : subtus lætè rufus, abdomine albicante, hypocondriis fasciis sagittiformibus notatis.

Adult in winter. Crown of the head, hind neck, and all the upper surface greyish brown, with darker shaft-lines, the feathers sometimes centred with brown ; sides of the head, chin, and throat white ; an obscure greyish streak across the lores ; fore neck and breast all round greyish white, with numerous minute streaks of brown ; on raising the plumage of these parts each feather is found to be largely centred with brown, with a produced apical spot of the same ; underparts of the body white, varied on the sides and flanks with irregular letter-V markings of brown ; inner lining of wings greyish white, the axillary plumes pencilled with brown in wavy lines ; rump and upper tail-coverts white, with circular bars of brown ; wing-feathers

dark brown, with white shafts; tail-feathers paler brown, with white shafts. Irides and bill black; legs greyish black. Length 10 inches; wing, from flexure, 6.25; tail 2.25; bill, along the ridge 1.3, along the edge of lower mandible 1.4; bare tibia .5; tarsus 1.2; middle toe and claw 1; hind toe and claw .25.

Adult in summer. Differs in having the plumage of the back brownish black, varied more or less with broad round spots of rufous; the sides of the head, throat, fore neck, breast, upper part of the abdomen, and sides of the body bright rufous; some of the feathers narrowly margined with white.

A specimen in full summer plumage, shot in the vicinity of Christchurch on the 2nd April, and preserved in the Museum, presents the following measurements:—Extreme length 9 inches; wing, from flexure, 6.4; tail 2.25; bill, along the ridge 1.15, along the edge of lower mandible 1.15; bare tibia .55; tarsus 1.15; middle toe and claw 1.15; hallux .25.

Another example in rust-red plumage was obtained by Reischek on the sand-banks in Manukau harbour.

Young. Readily distinguished by the crescentic markings on the upper parts, each feather having a narrow sub-terminal streak of black; the scapulars, wing-coverts, and long secondaries margined beyond with white.

Var. Mr. Cheeseman informs me that when out shooting at Manukau harbour he observed an albino. He did his utmost to secure it, but the bird was very shy and eluded him.

Obs. There are two noticeable specimens in the Auckland Museum. One of these has the sides of the face, fore part and sides of neck, and the whole of the breast pale rufous; primaries and secondaries slaty black, the latter margined on their outer vanes with white; tail-feathers slaty grey with a very narrow margin of white. In the other there are only clouded markings of the rufous colour on the same parts. In both birds the upper surface is prettily variegated with slaty black, the crescentic bars on the upper tail-coverts being very conspicuous.

In Mr. J. C. Firth's interesting collection of New-Zealand birds (at Mount Eden) there is another beautiful specimen:—Checks, throat, and fore neck chestnut-brown; the upper surface generally very prettily barred and spotted, the transverse markings on the tail-coverts being especially conspicuous.

Note. Dr. Finsch has suggested that the bird which visits New Zealand may be *Tringa crassirostris*, Temm. and Schleg. (Faun. Jap. pl. 64), the larger eastern representative of *canutus*; but I have not been able to discover any specific characters to distinguish it from the common form.

This cosmopolitan species is occasionally obtained in New Zealand, but generally in its winter plumage. There are several specimens in the Canterbury and Otago Museums, all of them obtained on the east coast.

Mr. Cheeseman wrote to me from Auckland, on August 14, 1877:—"My brother shot a specimen of *Tringa canutus* (in winter plumage) in Hobson Bay a few months ago, and the skin is now in the Museum. I believe that I have frequently seen it on the extensive mud flats near the mouth of the Thames river. I have likewise seen it, in flocks of probably two hundred, on the Manukau flats, where it appears soon after Christmas and remains about three months." This is the first authentic record of this species in the North Island; but Captain Mair has described to me a bird found associating, in considerable numbers, with the Godwit on the East Coast, which I have no doubt is the same. It has not, however, been met with yet on the Wellington coasts; and the only specimen in the Colonial Museum is one which I received some years ago, as a novelty, from the South Island. It is called Huahou by the Maoris, from the circumstance that its fat-season corresponds with the forming of the hue gourd—about February or March.

Mr. Gould states that a specimen collected by Strange on the 2nd September had the under surface much suffused with red, with many new black feathers among the grey ones on the back, showing that the bird was changing into its summer livery at the commencement of the Australian spring.

TRINGA ACUMINATA.

(SANDPIPER.)

- Totanus acuminatus*, Horsf. Linn. Trans. xiii. p. 192 (1820).
Tringa australis, Jard. & Selb. Ill. Orn. vol. ii. pl. 91 (1829).
Schœniclus australis, Gray, List of Birds in Brit. Mus. Coll. part iii. p. 105 (1844).
Limnocinclus acuminatus, Gould, Handb. B. of Austr. vol. ii. p. 254 (1865).
Tringa acuminata, Salvin, Cat. Strickl. Coll. p. 610 (1882).

Ad. suprâ nigricans, plumis angustè albido vel arenario marginatis : collo postico magis cinerascente : dorso postico et uropygio cum supracaudalibus nigris, vix arenario limbatis : tectricibus alarum remigibusque nigricantibus, albido vel pallidè arenario marginatis, tectricibus majoribus et secundariis conspicuè albo marginatis et terminatis : remigum scapis albis : secundariis intimis latè arenario-rufo marginatis : rectricibus cinerascenti-brunneis, albido limbatis et terminatis, subterminaliter nigricantibus, a scapis albidis : pileo rufo, nigro vario : loris, supercilio et facie laterali albis, angustissimè nigro punctatum lineatis : gulâ et corpore reliquo subtùs albis, præpectore et pectore superiore arenario-fulvis illo angustè nigro lineato : pectoris summi lateribus quoque nigricante striolatis : subalaribus albis, imis cinerascentibus albo interne marginatis et terminatis.

Adult. Crown of the head and lores dull rufous ; each feather centred with brown ; nape, hind neck, and the whole of the mantle brownish grey slightly tinged with rufous, each feather largely centred with dark brown, which gradually fades into grey ; lower part of back, rump, and upper tail-coverts blackish brown, slightly margined with rufous ; wing-feathers dark brown with white shafts, the superior coverts largely tipped, and the secondaries narrowly margined with white ; small wing-coverts dull brown with greyish margins ; tail-feathers blackish brown, with a narrow margin of fulvous white ; line over the eye, chin, and throat white ; sides of the head dark grey, speckled with brown ; the whole of the fore neck fulvous grey, speckled with brown, and more distinctly on the outer sides ; breast, abdomen, and under tail-coverts fulvous white, the latter with a streak of brown down the shafts ; sides of the body, axillary plumes, and inner lining of wings pure white ; towards the outer edges of the wing mottled with brown. The outermost upper tail-coverts also are white, with a lanceolate streak of brown down the centre. Irides black ; bill brown, changing to olive at the base ; legs and feet yellowish olive. Length 7 inches ; wing, from flexure, 5·15 ; tail 2·15 ; bill, along the ridge ·95, along the edge of lower mandible 1·05 ; bare tibia ·5 ; tarsus 1·1 ; middle toe and claw 1·2 ; hallux and claw ·3.

Young. Gould states that the young of the year are similarly marked to the adult in winter plumage, but have the greater portion of the feathers, and particularly those of the crown and the tertiaries, margined with sandy red and white, and the breast washed with buff.

ONLY a few examples of this bird, which is common enough in Australia and Tasmania, have occurred in New Zealand, and, so far as I am aware, all of these on the east coast of the South Island.

In its native country it is generally to be met with on the grassy sides of lagoons and in wet marshy places, where it may be seen diligently hunting for aquatic insects and their larvæ, on which kind of food it principally subsists.

The Canterbury Museum contains four specimens (two of each sex), obtained on the shores of Lake Ellesmere, which is separated from the sea only by a narrow neck of sandy ground.

TOTANUS INCANUS.

(GREY SANDPIPER.)

- Ash-coloured Snipe*, Lath. Gen. Syn. iii. p. 154 (1785).
Scolopax incanus, Gm. Syst. Nat. i. p. 658 (1788).
Totanus incanus, Vieill. Nouv. Dict. d'Hist. Nat. tom. iv. p. 400 (1816).
Totanus brevipes (summer plumage), id. ibid. p. 410.
Scolopax solitarius, Bloxh. Byr. Voy. p. 252 (1826).
Trynnga glareola, Pall. Zoogr. Ross.-As. vol. ii. p. 194 (1831).
Totanus pedestris, Less. Tr. d'Orn. p. 552 (1831).
Totanus fuliginosus, Gould, Voy. Beagle, 'Birds,' p. 130 (1841).
Totanus pulverulentus, S. Müll. Verhandl. Land- en Volkenk. p. 152 (1842).
Scolopax undulata, Forst. Descr. An. p. 173 (1844).
Scolopax pacifica (winter plumage), id. ibid. p. 174.
Totanus oceanicus, Less. Descr. Mamm. et Ois. p. 244 (1847).
Totanus griseopygius, Gould, Proc. Zool. Soc. 1848, p. 39, and Birds of Austr. vol. vi. pl. 38 (1848).
Totanus polynesia, Peale, Un. St. Expl. Exp. p. 237, pl. 65. fig. 1 (1848).
Actitis brevipes, Blyth, Cat. B. Mus. As. Soc. p. 267 (1849).
Heteroscelus brevipes, Baird, B. N. Amer. p. 734 (1858).
Gambetta pulverulentus, Gould, Handb. Birds of Austr. ii. p. 268 (1865).

Ad. (exempl. ex N. Z.) suprâ schistaceus, alis dorso concoloribus majoribus angustè albo terminatis : alâ spuriâ, tectricibus primariorum et primariis nigricantibus : caudâ dorso coneolore : pileo schistaceo : loris fuscis-centi-schistaceis, faseiâ suprâ lorali albidâ : facie laterali albidâ, angustè fusco striolatâ : gulâ albâ : corpore reliquo subtùs albido, gutture et præpectore fusciscentibus : pectore et abdominis lateralibus fusco fasciatis, hypochondriis et axillaribus et subalaribus schistaceis, his extùs albido fasciatis : subcaudalibus albis, extimis fusco fasciatis : remigibus subtùs schistaceis, intùs pallidioribus.

Male (N.-Z. example). Upper surface dark slaty grey, tinged with brown on the wing-coverts and scapulars ; sides of the head also dark slaty grey, with a broad stripe of white extending from the base of the upper mandible to the anterior edge of the eyes, and the cheeks more or less varied with white ; chin and upper part of throat pure white ; fore neck, breast, abdomen, and vent pale cinereous and white intermixed, changing to pure white on the flanks and crissum, the feathers of the breast and flanks, as well as the long under tail-coverts, crossed by broad wavy lines of slaty grey ; under surface of wings, axillary plumes, and sides of the body dark slaty grey, varied with white near the outer edges of the wing ; primaries brownish black, with paler shafts ; secondaries and the whole of the tail-feathers dark slaty brown. Bill brownish black ; legs and feet dark olive ; claws black. Total length 12.25 inches ; wing from flexure 7.25 ; tail 3 ; bill, along the ridge 1.6, along the edge of lower mandible 1.8 ; bare tibia .5 ; tarsus 1.3 ; middle toe and claw 1.3.

Female (N.-Z. example). Differs from the male in having a stronger tinge of brown on the upper surface ; the white frontal streak is narrower ; the fore neck is uniform pale slaty grey ; the underparts are lighter, and there is an almost entire absence of the dark wavy markings on the plumage of the breast and sides of the body, a few feathers, however, on each side of the abdomen and the long under tail-coverts being traversed by arrow-head markings of dull slaty grey.

Obs. There is no perceptible difference in size between the two sexes. Gould's two very characteristic figures of this Sandpiper, in the 'Birds of Australia,' pl. 38, represent very well my two specimens as described above.

THE only two examples of this nomadic species hitherto obtained in New Zealand are those from which the above descriptions of the male and female were taken. They are in the Author's collection, having been kindly presented by Mr. C. H. Robson, who obtained them on Portland Island in the autumn of 1883.

The late Dr. Jerdon recorded ('Ibis,' 1865, p. 40) that he had received specimens of this bird from North Australia, Timor, Borneo, Ceram, Japan, and both sides of the North Pacific.

Latham's original description of this species (the bibliography of which is very exhaustively given by Drs. Finsch and Hartlaub in their 'Birds of Central Polynesia') was taken from specimens in the collection of Sir Joseph Banks, from Eimeo and Palmerston Isles.

Mr. Gould writes of it:—"All the specimens I have seen of the bird were killed near the harbour of Port Essington, where it frequents the sandy beaches and rocks just above high-water mark; the salt-water lakes and swamps near the settlement also afford it a natural asylum, and there, at some seasons of the year, it may be seen in great flocks in company with the Stints and Plovers."

Although the two specimens described above, and now in the Author's collection, are absolutely the only examples hitherto recorded in New Zealand, it does not by any means follow that this species is not a frequent visitant. On the extensive sand-banks and mud-flats at the mouths of the tidal rivers, as well as upon the long stretches of ocean-beach in the less frequented parts of the country, thousands of sea-birds congregate at certain seasons of the year, or scatter themselves over the oozy flats in search of their natural food; and it is highly probable that large numbers of this and other hitherto rare species come to our shores and leave again without ever being detected.

For many years the Wry-billed Plover was considered one of our rarest birds; but now that the collector knows where to look for this form, and to distinguish it from the Banded Dottrel which frequents the same localities, it is found to be common enough. So also with *Tringa canutus* and *Tringa acuminata*, both of which, although only of late years included in our list of recognized species, are now known to visit us every season in appreciable numbers.

There is at present only one recorded instance of the occurrence on our shores of the Red-capped Dottrel; but at a little distance it is impossible to distinguish such a bird from the other small Waders among which it habitually consorts; and it is only reasonable to suppose that what has been known to happen once may, in point of fact, have happened very often.

It must be borne in mind also that a great portion of the west coast of the South Island is quite unexplored, being out of the track of our commerce, and it is to this side of our coast-line that we should naturally look for seasonal visitants from Australia.

The most recent of these casual additions to our avifauna is the capture of the Masked Plover (*Lobivanellus lobatus*) near Wanganui, as already mentioned at page 13, a very beautiful addition to our list; and doubtless from time to time other Australian Waders will join the ranks, if not as permanent recruits, nevertheless welcome enough as tending to enhance the value of our bird-collections and to keep alive the interest among our numerous local observers.

Mr. Kirk was in error in referring the last-mentioned bird to *Lobivanellus personatus* (Ibis, 1888, p. 46). As already pointed out by me (*op. cit.* p. 283), the colours and markings of the two species are very similar, but the character of the mask is entirely different in the two birds. Mr. Drew, in whose little museum at Wanganui the specimen is preserved, had sent me a sketch of the head, which placed its determination as *L. lobatus* beyond question. In the description which accompanied it, he mentions that the "crown, nape, hind neck, and ear-coverts are jet-black," and the back "reddish grey."

LIMOSA NOVÆ ZEALANDIÆ.

(THE SOUTHERN GODWIT.)

- Limosa baueri*, Naum. Vög. Deutschl. viii. p. 429 (1836).
Limosa lapponica, var. *novæ zealandiæ*, Gray, Voy. Ereb. and Terror, Birds, p. 13 (1844).
Limosa brevipes, Gray, Cat. Grallæ Brit. Mus. p. 95 (1844).
Limosa australasiana, id. op. cit. p. 96 (1844).
Limosa novæ-zealandiæ, Gray, Gen. of B. iii. p. 570 (1847).
Limosa uropygialis, Gould, P. Z. S. 1848, p. 38.
Limosa foxii, Peale, U. S. Expl. Exp. p. 231, pl. 65 (1848).
Limosa rufa, Temm. & Schl. Faun. Japon. p. 114 (1850).
Gallinago punctata, Ellman, Zool. 1861, p. 7470.
Limosa baueri, Buller, Birds of New Zealand, 1st ed. p. 198 (1873).

Native names.—Kuaka, and Hakakao (Bay of Plenty).

Ad. ptil. hiem. suprâ brunnescens, pileo summo unicolore : colli plumis vix medialiter saturatoribus ; dorsi plumis conspicuè medialiter saturatiùs brunneis, scapis nigricantibus, scapularibus cinereo lavatis : uropygio et supracaudalibus albis, fasciis brunneis conspicuis transnotatis : tectricibus alarum dorso concoloribus extùs fulvescente angustè marginatis, medianis et majoribus nigricante medialiter lineatis : primariis saturatè brunneis, intùs pallidioribus, scapis albis, secundariis cum tectricibus cubitalibus grisescenti-brunneis, albo terminatis : caudâ brunneâ, rectricibus centralibus cinerascensibus conspicuè albo terminatis : loris et genis albicantibus : corpore subtùs sordidè albo, collo inferiore et pectore summo cinerascensibus, hypochondriis vix brunneo fasciatis : subalaribus et axillaribus albis brunneo transfasciatis : rostro brunneo, mandibulâ ad basin rufescente : pedibus saturatè plumbeis : iride nigrâ.

Adult in winter. Crown, sides of the head, neck all round, and the entire upper surface dull stone-grey, obscurely mottled with brown, and darker on the back and mantle, where each feather has a broad central mark of blackish brown ; quills dark clove-brown, with white shafts and freckled with white on their inner webs ; the secondaries and their coverts tipped with white ; tail-feathers blackish brown terminally edged with white, and with broken bars of the same on the inner web and towards the base ; rump and upper tail-coverts white, conspicuously barred with blackish brown ; a broad streak from the base of the upper mandible to the eyebrows, the chin, and fore part of throat pure white ; fore neck and breast pale cinnamon-brown, obscurely mottled ; abdomen and under tail-coverts fulvous white, the sides of the body shaded with stone-grey, and many of the feathers, particularly on the flanks, more or less crossed with arrow-head markings of dark brown ; lining of wings and axillary plumes white, the former with horse-shoe markings, and the latter with broad transverse bars of cinnamon-brown.

Young. Crown of the head and sides of the face dusky brown, mottled with yellowish brown ; throat, and a streak from the base of the upper mandible extending beyond the eyes, white ; neck, all round, brownish grey, spotted with dark brown on the nape ; upper part of the back rusty brown, with darker centre spots, and mottled with white ; the scapulars light rust-brown, with a series of white triangular spots on each web ; lower part of back greyish white varied with brown ; rump and upper tail-coverts white, conspicuously barred with brown, these bars assuming on the outer feathers the form of arrow-heads ; breast and sides of the body creamy white, sometimes stained with grey ; abdomen and under tail-coverts pure white, some of the latter with irregular dusky bars ; lining of wings prettily varied with brownish black ; axillary

plumes white, conspicuously barred with brown in their whole extent; primaries clove-brown on their upper surface, darker on their outer webs and towards the tips, light grey on their under surface, with dusky freckles; secondaries marked like the scapulars, but with the spots on the inner webs inclining to fulvous; the wing-coverts clove-brown, more or less tipped with white; tail-feathers brown, barred towards the base, and the middle ones largely tipped with white. Irides black; bill light brown, tinged with purple in its basal half, black beyond; tarsi and toes deep bluish grey; claws black. Length 18 inches; extent of wings 31; wing, from flexure, 9.75; tail 3.5; bill, along the ridge, 4; bare tibia 1; tarsus 2.2; middle toe and claw 1.5; hind toe and claw .5.

Obs. Before the autumn livery is cast off the plumage of the upper surface becomes much worn and has a faded appearance, this being due to abrasion, the white notched markings being often worn completely out, giving the edge of the feather a serrated outline.

Summer plumage. In every considerable flock there are individuals known as "red kuakas." These have the plumage of the upper surface darker and largely varied with rufous instead of white, the sides of the head, throat, fore neck, breast, upper part of abdomen, sides of the body, and flanks bright rufous. This is a phase of the summer dress only. It should be mentioned that although, strictly speaking, only a seasonal visitant, a few stragglers remain with us all through the year, and that specimens are sometimes met with in a transitional state of plumage.

A specimen in Mr. Seeborn's collection, in full breeding-plumage (obtained at Shanghai in May 1873), has the frontal streak, sides of the face, throat, the whole of the fore neck, and the entire under surface uniform bright rufous, pointed with black on the sides of the chest, narrowly margined with white on the flanks, and varied with black and white on the under tail-coverts; the plumage of the upper surface is similar to that of the young as described above, except that the lighter parts are washed with rufous, which colour becomes predominant on the nape and upper tail-coverts; the lining of the wings and the axillary plumes are exactly as in the young bird. We may take it therefore that this is the first nuptial plumage.

A specimen in full summer plumage was obtained at Saltwater Creek, in the provincial district of Canterbury, at the end of summer or beginning of autumn.

Albino. The following is the description of an albino shot by myself at Ohau, on the west coast of the Wellington Province, in the spring of 1862:—The whole of the plumage white, tinged with brown on the head, back, and upper surface of wings; tertiaries and the primary-coverts partially brown; lining of wings, axillary plumes, and upper tail-coverts barred with pale brown; bill whitish; legs black.

Obs. In this species the length of the bill is very variable. A series of five examples, in a fine collection of birds made by Mr. W. T. L. Travers in the South Island, presents the following gradations in the bill:—3 inches, 3.5, 4.1, 4.4, and 4.5. The tarsi are of equal length in all five specimens, and there is scarcely any perceptible difference in the length of the wing. Nos. 1 and 2 are in partial summer dress, the former having scattered clouded spots of rufous on the underparts, the latter having the whole of the under surface stained more or less with rufous, especially the fore neck, breast, and sides of the body, where this colour predominates. The rest are in full winter plumage.

A specimen shown to me by Mr. Jewel, the local taxidermist at Christchurch, exhibited a still greater extension of bill than any of those mentioned above, the length from the base to the tip of the upper mandible being 5.1 inches.

DRS. FINSCH AND HARTLAUB, in their excellent work on the birds of Central Polynesia, have correctly referred our bird to the species described by Mr. Gould under the name of *Limosa uropygialis*; but, as will be seen on reference to the historical synonymy given above, this name has no claim whatever to recognition. There are no less than five recorded names of antecedent date; and, in settling questions of nomenclature, I shall, as far as possible, adhere to the established rule of adopting in every case the oldest admissible title. In my former edition I adopted for this species that of *Limosa baueri*; but as this name, bestowed by Natterer, was only on a Museum label without any published

description, I have now thought it best to discard it altogether in favour of *L. novæ zealandiæ*, Gray.

I have already, in the Introduction to Vol. I. (p. xl), referred to the extraordinary migration which this bird performs every year, spending several months in Siberia, where it breeds, and another portion of the year in the Malay Archipelago, Polynesia, Australia, and New Zealand, passing the coasts of Japan, Mantchooria, and China in the course of its weary pilgrimage.

Von Middendorff, who met with these birds in great numbers in Northern Siberia (74°–75° N. lat.), states that they appeared there on the 3rd June, and left again in the beginning of August. In the months of September and April Swinhoe observed migratory flocks on the coast of Formosa, and during the winter months he met with this species still further south. Von Middendorff found it also in summer on the south coast of the Sea of Ochotsk, although it did not appear to breed there. It has likewise been observed in China, Japan, Java, Celebes, Timor, Norfolk Island, Solomon Islands, and the New Hebrides, and its range doubtless extends much further; but it has never yet been met with in India, this being probably too far west of its annual course. It is met with on Prybilov Islands, coming in a straggling manner early in May, passing northward with little delay, and reappearing again towards the end of August in flocks of a dozen or fifty*.

The habits of this species are in no respect different from those of its European ally. As already stated, it is migratory; and towards the end of March or beginning of April large flocks may be seen at the far north taking their departure from our country. The departure from any fixed locality usually begins on almost the exact date year after year; and for a week or ten days after the migration has commenced fresh parties are constantly on the wing, the flight generally taking place about sunset, and sometimes after dark. The main body fly in silence, but the straggling birds cry out at intervals, while endeavouring to overtake the flock in advance. Near the North Cape, Captain Mair has observed them flying northward in tens of thousands, and always in considerable flocks, numbering from 700 to 1200 birds in each, and the wonder is where they all come from. During the period mentioned, this excitement of departure is unabated—flocks forming and following each other in perpetual succession.

The seasonal migrations of this species over a third of the globe's circumference in search of a congenial climate, and then back again to its distant home for breeding purposes, are astonishing facts in natural history, and to those who have not studied the subject might well appear incredible. But it is this romance of real life that so often forces upon the naturalist the conclusion that "fact is stranger far than fiction" †.

Though the greater number of the birds migrate, some remain with us during the winter, and it is not unusual, even in mid-winter, to see a flock of several hundred consorting together on the sand-banks. It has been remarked that at this season they are much tamer and more approachable than at other times. A pair continued to frequent Sulphur Point at Ohinemutu for two or three years; but they were ultimately shot at the request of the resident natives, who looked upon their constant appearance as an "aitua," or omen of some impending evil.

On their return to this country they do not make a sudden appearance, but come in straggling parties during the month of October, and gradually become more plentiful after the first week in November, and about Christmas they are in full force again all along our sea-shore.

Some of the flocks on their arrival are very tame and approachable. Captain Fairchild found them particularly so at Kawhia, a somewhat unfrequented place on the east coast. He advanced to

* Fauna Centralpolynesiens (1867), p. 181.

† The late Mr. Henry Mair shot some of these birds on Suvaro, Manihiki, and Savage Islands. They seemed exhausted and unable to fly any distance. These were probably birds that were unable to keep up with the migrating flocks, and were consequently left on these islands *en route*.

within twenty feet of them, and upon throwing an iron nail in amongst them, instead of being alarmed they crowded up to examine it.

Capt. Mair has sometimes observed a party of stragglers in Sulphur Bay, in the Rotorua Lake (about forty miles from the sea-coast), no doubt brought inland by the easterly gales, which sometimes prevail for a considerable time without intermission. On the Tauranga coast he has obtained large "bags" during the shooting-season; and on one occasion, at Cemetery Point, killed ninety-seven at a single shot with a heavy charge of No. 5 from an ordinary fowling-piece. This will give some idea of their numbers, and of the close manner in which they were packed together. Thousands were crowding upon each other on an insular sand-bank, and numbers more were hovering overhead in the vain attempt to find a footing among their fellows. As he was "shooting for the pot," he concealed himself with floating kelp, and crawled up under water till the birds were within easy range.

As may be supposed from the character of the bill, their manner of feeding is peculiar. Sometimes the birds may be seen thrusting their long pliant bills deep into the mud or sand, working them to the very hilt, and sometimes burying the fore part of the head in the soft ooze; at another time they may be seen taking three or four hurried steps forward, and then halting for a moment to pick up some small object from the surface; but generally speaking they walk along with much deliberation, picking as they go. It may be inferred from this that their food consists of aquatic insects, marine worms, small mollusks, and crustaceans. The objects, however, which they select must be very minute, for on opening their stomachs it is usual to find only a mass of comminuted matter having the appearance of mud or slime.

The natives catch large numbers of them by spreading flax snares horizontally on manuka sticks twelve or fifteen feet high, and arranged in the following manner:—A number of stakes are driven into the ground at equal distances so as to cover the area of the customary resting-place. A perfect network of flax loops or running nooses, about twelve or fifteen inches in diameter, are then spread or hung in such a way as to form a canopy or roof supported by the stakes. The birds on assembling in the evening fly low and take up their position on the resting-ground to wait for the ebb of the tide. At this conjuncture the natives spring out from their concealment with lighted torches. The birds at once rise vertically, in confusion and alarm, and large numbers become entangled and caught in the running loops, sometimes as many as 200 being captured at one time in snares covering a space of twenty by forty yards. These snares are only set on calm and dark nights, for the obvious reasons that, if there was any wind, the loops would become disarranged, and that on moonlight nights the birds would see the nets and avoid them. Sometimes during wet easterly weather in summer the feathers of these birds become so saturated that they are unable to fly. The natives take advantage of this and capture large numbers of them by running them down.

From what has been said, it may be inferred that they are esteemed good eating by both settlers and Maoris. The latter always cook the bird unopened, and devour the contents of the stomach with a relish. When very fat they are potted in the orthodox fashion and "calabashed" for future use.

In some localities these birds afford tolerably good shooting, although they are not much esteemed for eating. When spread over the sands or bare mud-flats in search of food they are somewhat shy and wary; but when the tide is high they consort together in large flocks near the water's edge, and may then be approached under cover and killed by scores, a pot shot into their close ranks, and another as the flock rises confusedly in the air, generally proving very destructive. "Curlew-shooting" (as it is termed in the colony) sometimes, however, becomes more legitimate sport, as may be gathered from the following passage in a letter to 'The Field,' from a New-Zealand correspondent:—"Curlew-shooting has just begun; I had a day last week (early in March). The best locality for this kind of shooting is the upper part of Auckland harbour, where the river Waitemata and the harbour of the Manukau are within a short distance of one another. The Manukau

being on the west coast and Auckland on the east coast, the tide is, of course, rising in one harbour when it is falling in the other. The Curlew feed on the mud-flats after the ebbing tide, and the best plan is to choose the time when the flight commences from one coast to the other. This is at the moment of low water at either side. At that time the shooter takes up his station behind a fence and watches for the flight of Curlew. If the day be stormy, so much the better; for then the birds fly low. If the shooter has taken up a good post, he will have a full hour's good fast shooting; and this will be the case at each turn of the tide. Last week was my first day this year, and in twelve shots I got nine and a half brace of Curlew. This was not very good sport; but the birds flew rather high and were not as closely packed as usual."

It is a common thing to see birds with a single leg, or with a broken or truncated bill. Captain Mair saw one with both legs shot away. It kept with the flock, supporting itself on the stumps of the tarsi when walking, and crouching on the ground when at rest, but mainly using its wings for purposes of locomotion. The maimed and injured birds, of which each flock contains many towards the close of the shooting-season, habitually keep apart from the main flock, confining themselves to the high beach, and are known to sportsmen as the "sick brigade."

At Katikati on the east coast, when their ordinary resting-places on the mud-flats are submerged by the high spring tides, these birds take refuge on the tops of the low spreading mangrove bushes; and thousands together may sometimes be seen in this position.

While resting on sand-banks at high tide, they always stand in the water so as to conceal the unfeathered tibia, and sportsmen say that they do this in order to keep themselves cool.

Great individual variation is observable, especially in the length of the bill and legs. There is also much difference in the plumage. The largest birds (probably aged ones) are generally much lighter than the rest of the flock, and are distinguished by the Maoris as the "kuaka-karoro." In the autumn generally about the proportion of one third of the birds in every flock present the rufous-brown colouring on the underparts, which is more or less conspicuous, and sometimes extends over the entire plumage. These birds are called by the Maoris "pohokura," in allusion to their bright colour, and both these and the "kuaka-karoro" are said to be always the fattest in the flock.

I have never met with a Maori who could tell me anything about the breeding-habits of this Godwit, and it has become a proverb amongst them: "Who has seen the nest of the Kuaka?"

For many years the egg of this bird was equally unknown in other parts of the hemisphere; but on the 18th January, 1868, Mr. Dall obtained two specimens at Kutlik, Alaska. "These differ," Mr. Harting states, in the 'Fauna of the Prybilov Islands' (p. 27), "as much from each other as eggs of this species do from those of other species. The ground-colour of one is greenish olive-grey, of the other pale olive-grey. In the former the markings are all subdued neutral tints apparently in the shell; in the latter the markings are nearly all on the surface and quite bright chocolate-brown. In both cases the markings are numerous and of indeterminate shape, mostly small and generally distributed, though tending to aggregate at the larger end, where alone they lose their distinctness in coalescing to form a splashed area."

As already mentioned in the Introduction, this species breeds in the high latitudes of Eastern Asia; but a few stragglers appear to remain with us all the year round. I have in my possession an egg obtained on the Island of Kapiti (Cook's Strait) which I am unable to refer to any other bird; it is of a regular ovoido-conical form, measuring 1.95 inches in length by 1.45 in breadth, and the colour is a dull stone-brown, with numerous obscure markings, as if under the shell, over the entire surface, which is finely granulate, but changing to pale brown, with a polished surface, at the smaller end.

NUMENIUS CYANOPUS.

(AUSTRALIAN CURLEW.)

Numenius cyanopus, Vieill. 2nd edit. du Nouv. Dict. d'Hist. Nat. vol. viii. p. 306 (1817).

Numenius major, Schl. (nec Steph.) Fauna Japonica, (see footnote) p. 110 (1850).

Numenius australis et *N. rufescens*, Gould, Proc. Zool. Soc. 1862, p. 286.

Numenius tahitiensis, Swinh. (nec Gmel.), Ibis, 1863, p. 445.

Ad. suprâ brunneus : pileo summo nuchâque nigro-fuscis, plumis fulvo marginatis : dorsi plumis conspicuè medialiter saturatiùs brunneis : tectricibus alarum minoribus dorso concoloribus, extùs cinereo angustè marginatis : scapularibus cinereo obscure transfasciatis : remigibus saturatè brunneis, scapis albidis, primariis interioribus cum secundariis irregulariter albo fasciatis : tectricibus majoribus conspicuè albo notatis : secundariis intimis fulvescenti-cinereo transfasciatis : uropygio et supracaudalibus nigricanti-brunneis, plumis lætè rufescenti-brunneo marginaliter fasciatis : caudâ nigricanti-brunneâ saturatè cinereo conspicuè transfasciatâ : gutture albedo : facie laterali et corpore subtùs pallidè fulvescenti-albis, collo undique et pectore summo cinerascens, plumis lineâ centrali nigrescenti-fuscâ notatis : subalaribus et axillaribus albis brunneo conspicuè transfasciatis : rostro brunneo, mandibulâ ad basin flavescens : pedibus olivaceis.

Adult. General upper surface dark cinereous brown, the feathers of the head and hind neck centred with blackish brown, which colour spreads and darkens on the back and mantle ; upper surface of wings more or less varied with greyish white, all the feathers having light spots or margins ; the first four primaries clove-brown with white shafts, and freckled with grey on their inner webs, the rest of them darker brown with broad interrupted transverse bars of white ; the outer secondaries and their large coverts similarly marked but not so distinctly ; the long inner secondaries blackish brown, both webs marked with numerous regular bars of obscure cinereous brown changing to white on the margin ; tail-feathers blackish brown with darker shafts and transversely barred in a similar manner ; so also are the scapulars, but in a less decided way ; rump and upper tail-coverts blackish brown, with broad interrupted bars of bright rufous brown ; chin and throat white ; sides of the head and fore neck, and the entire under surface, fulvous white, tinged with rufous, all the feathers except those on the abdomen and thighs having a narrow central streak of brown, which widens perceptibly on both sides of the chest ; under tail-coverts washed with rufous and obscurely barred with brown ; lining of wings and axillary plumes white, the former varied and the latter conspicuously barred with blackish brown ; the feathers of the flanks more or less crossed with arrowhead markings of the same. Irides black ; bill dark brown, changing to yellowish towards the base of the lower mandible ; legs and feet dark olivaceous ; claws black. Total length 29 inches ; wing, from flexure, 11.75 ; bill, along the ridge 8, along the edge of lower mandible 8.1 ; tarsus 3.5 ; middle toe and claw 2.2.

Female. Similar in plumage to the male, but of somewhat larger dimensions, and with a much longer bill. A specimen in Mr. Seebohm's collection from Victoria gives an extreme measurement of 8 inches. I have not yet met with an example of this sex in New Zealand.

Obs. The bird from which the above measurements were taken was shot in the early part of April by Mr. Robert Day on the Kaiapoi river-bar, north of Christchurch, and proved on dissection to be a male. Another of the same sex, which was obtained about three months later at the mouth of the Ashley river, gives the following smaller measurements :—Total length 25 inches ; wing, from flexure, 12 ; bill 6 ; tarsus 3.1.

Note. Gould's *Numenius rufescens* (*l. c.*) is undoubtedly this species in summer plumage. He thus describes

it:—"Head, neck, upper and under surface reddish fawn-colour, deepest and most conspicuous on the rump and tail-feathers; down the centre of each of the feathers is a streak of blackish brown, broadest and most conspicuous on the back, rump, and upper tail-coverts; primaries blackish brown, strongly toothed on their inner margins with greyish white; tail-feathers irregularly crossed with blackish brown; thighs light buff."

THIS fine Curlew, which is common on many parts of the Australian coast, occurs in New Zealand only as an occasional straggler.

A specimen was shot by Mr. Travers at the Wairau, in the provincial district of Nelson, in the summer of 1874-5, and was presented by him to the Colonial Museum. Another occurrence of the species in New Zealand was recorded by myself, on the authority of Sir James Hector, in the 'Transactions of the New-Zealand Institute' (vol. vii. p. 224); and a year later Sir Julius Haast reported the two specimens mentioned above as having been received in the flesh at the Canterbury Museum*.

Mr. St. C. Liardet, who is an experienced collector, informs me that he saw a flock of five (in March or April) near the bluff which stands between the Wairau and Awatere river-mouths. He shot one at Iron Bay, near the Wellington heads, about the end of February; this was in adult plumage and proved on dissection to be a female; bill, along the ridge 8 inches, along the edge of lower mandible 6.5.

From its habit of associating on the sands with the flocks of Godwits it is probable that this species visits our shores more often than is generally supposed and escapes detection in the crowd.

Mr. Gould found this Curlew very plentiful on the shores of Tasmania, but he was never able to discover its breeding-place; and he expressed his belief that it retires to the high lands of the interior for the purpose of reproduction.

Mr. Seebohm writes †:—"There are only two Curlews in which the rump scarcely differs in colour from the rest of the upper parts, instead of being pure white with or without streaks, in either case in strong contrast to the darker mantle. The Australian Curlew is one of these, and differs from the other (*N. longirostris*) in having the underparts, including the axillaries, nearly white, streaked and barred with brown. Both species are large, with tarsi more than three inches long. Like its ally in the New World, it is a migratory bird, but the migrations of the Curlews on the Asiatic shores of the Pacific are on a very different scale to those of their cousins on the American shores of that ocean. The Australian Curlew breeds somewhere in Eastern Siberia, since it occurs on migration from Lake Baikal to the mouth of the Amoor, and along the coasts of Japan and China. It crosses the line to winter in Australia, and has also been recorded from Tasmania, New Guinea, Borneo, and some of the smaller islands of the Malay Archipelago."

Dr. Ramsay says that in Australia it is "common everywhere in suitable places, and on muddy flats along the coast, and occasionally may be found on the margins of lakes and lagoons inland a considerable distance."

* Trans. N.-Z. Inst. vol. ix. pp. 427-429.

† 'Geogr. Distrib. of the Fam. Charadriidæ,' p. 326.

LARUS DOMINICANUS.

(SOUTHERN BLACK-BACKED GULL.)

- Larus dominicanus*, Licht. Verz. Doubl. p. 82 (1823).
Larus littoreus, Forster, Descr. Anim. p. 46 (1844).
Larus antipodus, Gray, Cat. *Anseres*, Brit. Mus. p. 169 (1844).
Dominicanus antipodus, Bruch, J. f. O. 1853, p. 100.
Clupeilarus antipodum, Bonap. C. R. xlii. p. 770 (1856).
Larus vociferus, Burm. Syst. Uebers. Th. Bras. p. 448 (1856).
Dominicanus azaræ, Bonap. Consp. Gen. Av. ii. p. 214 (1857).
Lestris antarcticus, Ellman, Zool. 1861, p. 7472.
Lestris fuscus, Ellman, Zool. 1861, p. 7472.
Larus antipodum, Gray, Ibis, 1862, p. 248.
Larus pacificus, Layard, Ibis, 1863, p. 245.
Larus azaræ, Pelz. Reise Nov. p. 151 (1865).

Native names.

Karoro ; the young bird distinguished as Ngoiro, Koïro, and Punua.

Ad. capite toto cum collo undique et corpore subtùs toto albis : interscapulio, scapularibus cum dorso summo et tectricibus alarum cinereo-nigricantibus : remigibus nigris, latè albo terminatis, secundariis latissimè, primario primo fasciâ subterminali albâ notato : dorso postico, uropygio, supracaudalibus et caudâ totâ purè albis : subalaribus cum axillaribus et secundariis intùs albis : rostro citrino, mandibulâ maculâ præapicali sanguineâ notatâ : pedibus viridi-flavicanibus vix grisescentibus : iride argenteo-albâ.

Juv. suprâ brunneus, dorsi plumis latè albido marginatis, dorso postico et uropygio albis brunneo irregulariter notatis et fasciatis : capite et collo postico brunneis albido striolatis : tectricibus alarum brunneis pallidiùs marginatis, medianis et majoribus albido terminatis : remigibus nigricanti-brunneis, secundariis pallidioribus, internis pallidiore brunneo marmoratis et albido terminatis : subtùs albicans, ubique brunneo maculatus aut semifasciatus : rostro cinerascanti-brunneo, versùs basin mandibulæ pallidiore, ad apicem corneo : pedibus saturatè brunneis.

Pull. ubique saturatè cinerascanti-brunneus, pileo nigricante marmorato : dorso obscuro brunneo notato : rostro nigro : pedibus plumbeis : iride nigrâ.

Adult. General plumage pure white ; back and upper surface of wings slaty black ; the secondaries and scapulars crossed by a broad terminal bar of white ; the primaries black, the first with a broad irregular bar across both webs, and beyond it a small terminal spot of white ; the rest are largely tipped with white, and on the inner web of some of them there is likewise a semilunate mark of greyish white. Irides silvery grey ; bill bright lemon-yellow, changing to red on the prominence of the lower mandible ; legs and feet greenish yellow, inclining to grey. Length 24.5 inches ; extent of wings 57 ; wing, from flexure, 16.5 ; tail 6.5 ; bill, along the ridge 2.25, along the edge of lower mandible 3 ; bare tibia 1.25 ; tarsus 2.5 ; middle toe and claw 2.5.

Young. General plumage dark slaty grey, obscurely mottled and freckled with white, especially on the underparts, and suffused on the shoulders and wings with brown ; the sides of the face uniform slaty grey, the

chin whitish, and the plumage below the cheeks and around the neck lighter than the surrounding parts, giving a slightly hooded appearance to the head when uplifted; the feathers of the upper surface margined with creamy white, producing a speckled effect, the margins of the wing-coverts, however, being darker; the rump and upper tail-coverts white, conspicuously marked with greyish black, each feather being crossed by several broad irregular bars, presenting a pretty spotted surface; the vent and under tail-coverts similarly marked; the quills and tail-feathers slaty black, the latter narrowly tipped with white. Irides and bill black; legs and feet dark brown.

More advanced state. General plumage dark brownish grey, varied more or less with white. On the head, neck, and underparts the grey and white are blended, presenting a mottled appearance; the feathers composing the mantle are barred and margined, and the wing-coverts are margined and vandyked with white; the primaries are brownish black and the secondaries dark brown, changing to white at the tips; the tail-feathers are blackish brown, the outermost one on each side spotted on its outer web, and all of them marbled towards the base with greyish white; upper and lower tail-coverts white, conspicuously barred with brown; axillary plumes uniform dark grey. Bill greyish brown, horn-coloured towards the tips of both mandibles; legs and feet dark brown.

Progress towards maturity. As the change of plumage is gradual, individuals present much diversity in their progress towards maturity, the tendency being towards a lighter grey in the ground-colours, with less of the spotted character. The following is a description of a well-advanced bird:—Upper parts dark grey, marked and obscurely spotted with white, lighter on the head, neck, and upper tail-coverts; on the scapulars a central spot of black; underparts light grey, mottled with darker; under tail-coverts white, transversely barred with black; primaries and secondaries black, the latter tipped with white; tail-feathers black, with a narrow terminal mark of white.

During the transitional state, birds are met with in very different conditions of plumage, as the following selected examples will show:—

No. 1. Has the mantle and upper surface of wings mottled grey as in the young bird; tail blackish brown; rest of the plumage pure white.

No. 2. Back and interseapular region slaty black as in the adult; upper surface of wings mottled grey; tail with a terminal band of black; rest of the plumage white.

No. 3. Similar to No. 2 but with a dark tail, and with the plumage of the wings much abraded and faded.

No. 4. Plumage as in adult, but having the head and neck marked all over with lanceolate touches of brown; the first primary with a broad spot of white on its inner web.

No. 5. Merging into the adult plumage, but retaining all the youthful markings on the wing-coverts.

No. 6. In adult livery, but with the tail black in its apical portion instead of being white.

No. 7. Upper surface as in adult; throat and fore neck white, but the whole of the underparts light mottled grey, the line of demarcation across the breast being well defined.

Nestling. Covered with thick down of a dark ash-grey, varied on the back with dull brown, lighter on the underparts; the head and nape marked with large irregular spots of blackish brown; irides black; bill black, with a whitish ridge; feet dark lead-colour.

Varieties. I have met with one pure albino, with another having a conspicuous white spot on each wing, and a third with a broad terminal band of black across the tail.

An example in the Otago Museum is stained with brown in irregular patches on the face and sides of the neck. One which I saw in Auckland harbour, in March, was in the greyish-white transition plumage, with a black tail and pure white back and rump, and exhibited a broad white spot on each wing. Another which I observed in Wellington harbour had what appeared to be a narrow pectoral band of blackish brown forming a conspicuous zone. And on four occasions I have seen, on different parts of the coast, an apparently adult bird with a dark fore neck and breast, as described above, the dark colour being, in one instance at least, as sharply defined as on the breast of a Wood-Pigeon. One pair in particular, which I scanned closely through a strong binocular, followed our steamer for many miles between Napier and Wellington; they left us as we entered the heads, although several others in the ordinary plumage followed us in. One of the former had the whole of the upper surface brownish black, except the rump, upper tail-coverts, and

basal portion of rectrices, which parts were conspicuously white, leaving a broad terminal band of black on the tail; no white edging to the wing; head, neck, and breast apparently sooty grey; underparts white, the pectoral line of contact between the two colours being even and well defined. The other was similarly marked, but with duller plumage; and I noticed that more than once these dark-breasted birds, acting in concert, attacked and dispossessed an adult bird of some garbage that had been thrown overboard. I felt a strong temptation to regard this as a new Gull; but I have seen so many phases of the transitional plumage that, in the absence of better evidence, I must register it under the above heading.

Obs. Mr. Edgar Layard was, I believe, the first to introduce *L. pacificus* into our list, stating in a communication to 'The Ibis' * that he had seen it on the wing off Fort Britomart, Auckland. Our bird, even after assuming the adult livery, sometimes retains for a season the dark terminal band on the tail; and Mr. Layard may have been misled by this, although *Larus pacificus* is a more robust bird with a bill nearly twice as broad as that of *Larus dominicanus*. Mr. Howard Saunders, in his 'Revision of the Laridæ,' has extended the range of the last-named species to our seas, but there is no satisfactory evidence that it ever occurs there. I am aware that there are now in the British Museum several specimens of *L. pacificus*, labelled as from New Zealand, in the collection brought home by the Antarctic Expedition; but I am persuaded that this is the result of some mistake, as the species has never turned up since on our shores, as it must otherwise have done.

THIS fine Gull, which ranges over the whole southern hemisphere, is extremely plentiful on all our coasts, preferring, however, the smooth sea-beaches and the sandy spits at the mouths of our tidal rivers; in these localities it is always to be met with either singly or associated in large flocks, and mixing freely with the smaller species of Gulls, Terns, Oyster-catchers, and other shore-birds. It frequents the harbours, and hovers around the vessels with much clamour, waiting to pick up any morsel that may chance to be thrown overboard †. It follows in the wake of the departing steamer as it quits the still waters for the stormy offing, and often accompanies it far out to sea, eagerly watching for stray bits of food as they float astern, and disputing their possession with the Albatros and Giant Petrel, on whose domain it has thus far trespassed. It is amusing to watch it on these occasions. A flock of a dozen or more will be hovering astern, with a vigorous motion of the wings, keeping up with the steamer, and one or two occasionally making a rapid circuit around the ship, although going at full speed. A piece of garbage is thrown out from the galleys, and is soon taken possession of by one of the Gulls, which "backstays" (as sailors express it) with its wings, drops down to the surface with back arched and legs spread, and lifts the object in its beak, with a cry like "Caliph." Instantly all the other Gulls make for the spot, clamouring for their share of the spoils, the younger birds uttering a shrill kind of squeal and the old ones a loud harsh cry sounding ridiculously like "Divide, divide"!‡

It is a pretty sight to watch these Sea-Gulls among the shipping anchored in our harbours or moored alongside of the piers. They assemble in flocks, and are to be seen struggling on the wing and screaming with excitement at the sight of any offal thrown into the water; and they exhibit

* Ibis, 1863, p. 245.

† The result of our protective legislation has been a perceptible increase in the number of Sea-Gulls frequenting our bays and harbours. At Pitone, at the northern extremity of Wellington harbour, where boiling-down works have recently been established, flocks numbering several hundreds are daily to be seen crowding on a narrow spit or hovering in the air, the pearly whiteness of their general plumage contrasting finely with the black of the upper parts, especially in the strong sunlight of the morning.

‡ It is notorious how early impressions often cling to one through life, even as to matters quite trivial in themselves; and I never see a flock of these birds crowding over an object in the water, in the manner described above—filling the air with their cries and with the rapid flutterings of their wings—but one of my boyish recollections of a picture in "Peter Parley's Tales" is vividly brought to mind. It was a scene on the ocean, and represented an eager crowd of sea-birds hovering over the floating carcase of a whale.

every transitional state of plumage from the dappled-grey "koiro" to the sharply contrasted black-and-white dress of maturity, and they present on these occasions a very pretty and ever-varying picture of bird-life on the wave.

The several species of Gull hover together promiscuously, and apparently on terms of perfect amity, although I have occasionally seen the larger species pursuing and persecuting its weaker congeners.

It is interesting to observe the extreme buoyancy of this bird on the water. It springs into the air and then downwards, head foremost, having apparently great difficulty in submerging the body at all.

When riding by moonlight along the sandy beaches I have often disturbed the sleeping Sea-Gull. It would always rise in the air without uttering a sound, wheel round overhead in a wide circle, and then alight again on the sands near the water's edge.

During very stormy weather it often travels some miles inland; and at the breeding-season it occasionally penetrates far up the river-courses in search of a secure nesting-place. It also frequents the pastures at a distance from the coast in quest of food, doing good service to the farmer by its large consumption of caterpillars and other insect pests. On the plains near Waitaki South I saw in the month of April a flock of these birds numbering, I should say, at least a thousand individuals, and nearly the whole of them in the adult plumage. Further on, near the banks of the river, I saw another flock of about four hundred*. To the agriculturist these birds, coming in such numbers and preying upon insect-life, must prove of incalculable service. It is said that on the sheep-farms they are destructive to the young lambs. This is quite possible, although I think it more likely that they confine their attention to the dead or dying; and the latter would undoubtedly be attacked by having their eyes torn out, because that is the habit of this bird.

It likewise frequents the mouths of all our tidal rivers. Near the outlet of the Whangarei there are extensive mangrove-flats which look dreary enough when the tide is out, but have a very pretty effect when the sea is at the full, the pale green tops of the bushes resting on the surface, with occasional spaces of open water. On the last occasion of my seeing this it was a bright summer's day with the water placid as a mirror, and the picturesque effect was greatly heightened by a flock of these Gulls, some of them playing joyously on the surface of the water, others resting on the floating mangrove tops, their white plumage showing conspicuously against the light green surroundings. In the distance beyond there was a high fern-ridge with a few clumps of bush in the hollows, and away to the right a lovely grove of young puriri (*Vitex littoralis*), the dark hue relieved by an edging of tree ferns, with their star-like crowns of soft pale green. I could not help thinking, as I watched the playful evolutions of these holiday-making Sea-Gulls, that the scene was in every respect very different to the stormy ones on the ocean wave with which these birds are so familiar and amidst which they spend so much of their existence.

On the sea-shore it subsists chiefly on a species of bivalve, and displays much ingenuity in breaking the hard shell to get at the contents: seizing it between its powerful mandibles, it runs a few steps, then spreads its wings, and mounts in the air to a height of thirty feet or more, when it lets the bivalve drop on the hard sandy beach, and descends to pick out the mollusk from the broken fragments. Should the first attempt to break the shell by this means prove a failure, the bird repeats the operation; and I once witnessed nine successive attempts before the firm shell yielded. On riding up to the spot, I found that the shell was of unusual thickness, and measured more than two inches across the surface. Small crustacea, sandhoppers, dead fish, and carrion of all kinds are also laid under contribution, as this Gull is both omnivorous and voracious. It will also, when opportunity offers, capture live fish. I saw one very cleverly secure in shallow water a flounder about the size of one's hand. The bird

* Mr. Cheeseman informs me that in January, 1883, when crossing the mountains from Hokitika to Christchurch, he observed, near Lake Pearson, a large number of these Gulls feeding amongst the tussock-grass. On watching them with a pocket-glass he made out that they were catching the large grasshoppers which were very plentiful there.

struggled for some time with its captive, but was compelled in the end to let it go, diving its head after it several times, but to no purpose. In a state of domestication it will feed freely on cooked vegetables, or on any thing that may be offered to it, although it always gives the preference to fresh meat of any kind.

In Napier, where the cultivated grounds were at one time infested with the introduced snail (*Helix hortensis*), this Gull was found to be quite invaluable. In Mr. Tiffen's beautiful garden a pair of them lived for a considerable time, subsisting entirely on the snail, and performing good service among the ferneries. In another place, however, the gardener complained that he was unable to keep them on account of their inquisitive habits, all the labels being torn out of the seed-beds as soon as they were put down.

I do not think it has ever been recorded yet that the Sea-Gull has a natural love for music. I have seen a tame one in a settler's garden run up to the house as soon as the children commenced their morning practice on the piano, enter at the open door and stand in the passage in a position of eager attention. I was assured that this was an invariable habit, showing incontestably that the bird was not insensible to music. On one occasion, long after dark, attracted by the strains of a lively waltz, it posted itself under the bay-window and began to scream as if in eager accompaniment!

It appears to be semi-nocturnal in its habits, for I have found it moving about on the sands long after dark. And often, when travelling by a coastal steamer, after the sun had gone down in his splendour behind the rugged crests of the mainland and the pall of night had settled down upon the waters, I have observed one or two of them still hovering in our wake. It certainly is the first of the shore-birds to be astir in the morning, and unless the frost-fish * hunter commences his search on the beach in the early dawn, he finds that the Sea-Gull has been before him and has mangled and partly devoured the object of his quest.

On the memorable 9th September, 1885, during the total eclipse of the sun, one of the objects that especially attracted my notice was a Gull of this species hovering in the sky. With many other eager spectators, I had been watching this grand phenomenon of nature through an astronomical telescope from a good point of observation on the slope of Mount Victoria. The progress of the eclipse was accompanied by an extraordinary exhibition of heavy dark shadows on the undulating hills at the back of Wellington, the appearance being wholly unlike anything one had witnessed before. As totality approached these shadows became fused or merged into a deep neutral tint, and the whole landscape was plunged in a livid, unnatural twilight. At the moment of total obscuration—when, although the corona presented a nimbus or luminous halo of lustrous beauty, the surface of the earth was overspread with an almost appalling, shadowless gloom—a flight of Sparrows, keeping close to the ground, swept past us in silence and disappeared in a hollow, whilst a solitary Sea-Gull, on firm pinion, was to be seen mounting high in the air, in the very line of vision; and when, after eighty seconds of indescribable emotion to the spectator, the solar orb, preceded by red flashes of lambent flame without the moon's periphery, burst forth in all his glorious effulgence of dazzling light, and nature assumed once more her wonted aspect, the Sea-Gull was still to be seen hovering high in the heavens as if in utter bewilderment at this unusual scene.

At the commencement of winter there are few birds, as a rule, to be seen at sea. I have made the voyage at this season from Wellington to Manukau, in fine weather, without seeing a single Petrel of any kind—only a solitary Gannet off Taranaki, a few Caspian Terns fishing around the Sugar Loaves, and a small flock of Tarapunga as we neared the Manukau heads. But this fine Gull was a constant attendant, one particular individual, with a peculiar mark on its breast, following us all the way from

* The frost-fish (*Lepidopus caudatus*), the most delicately flavoured of all New-Zealand fishes, is an inhabitant of deep water, and on frosty nights, owing probably to its air-bladders becoming choked, it is cast up by the surf on the ocean-beach. It often attains to a length of four feet, is shaped like a whip-snake, and its smooth skin has the sheen of burnished silver.

Wellington heads to Napier, a distance of more than a hundred miles. I have observed that it is only the bird in adult plumage that ventures far out to sea, in the wake of the steamer; the young birds prefer to keep near the shore—probably they lack the strength of wing necessary for a prolonged sea-flight.

The Hon. Mr. Ballance related to me an anecdote which has furnished my artist with material for the pretty woodcut at the end of this article. On the Wellington west coast Mr. James Gear had cut some large water-courses for the purpose of draining the Ngakaroro swamps. For some considerable time after they were opened, these drains carried out to the sea masses of swamp vegetation, clumps of negrohead, &c., and occasionally live eels of considerable size. This was in the old coaching days; and on one occasion when Cobbs' coach was passing this spot (my informant being one of the passengers) a Sea-Gull was observed tugging at some object on the beach and apparently in difficulty. The coach was stopped, and it was then found that the bird was held firmly by the bill and unable to make its escape, the captor being a large eel, weighing probably 6 lbs. or more. The Gull had evidently, in its inexperience, inserted its bill into the open mouth of the eel for the purpose of tearing out the tongue; when the jaws of the latter closed in upon it, the teeth becoming firmly fixed on the bird's forehead and rendering escape impossible. It was another illustration of "the biter bit," and all the unfortunate Sea-Gull could do was to flap its wings violently and by raising the head of the eel off the ground, drag its body slowly along the sands. The Native Minister of course liberated the bird, and the eel was consigned to the boot of the coach.

On the Otaki beach I once saw a Sea-Gull with only one leg. It moved about with apparent comfort and safety, using its wings pretty often to steady its body.

Simpkins, a publican at Whakatane, obtained a female of this species, when quite young, from White Island, a distance of some thirty-five miles. It became perfectly tame, answering to the name of "Hinemoa," and coming into the house at meal-times to be fed. When about two years old it suddenly disappeared, and after a lapse of six months it returned with two young ones, which have since become quite domesticated. By last advices both old bird and young were still inhabitants of the yard, and evinced no desire to leave it*.

The young bird has a very shrill cry, and as it grows older this changes to a prolonged squeal. It runs after its parents long after it is fledged and able to take care of itself; and it may be distinguished, almost at any distance, by the peculiar manner in which it arches its back and follows the movements of the older birds on the sands.

The adult bird utters a loud laughing note when alarmed or excited, and at other times a short peevish whistle like *keeo-keeo*. The last occasion on which I visited a nesting-ground of this species was on the island of Motiti, in the Bay of Plenty, on January 17, 1885. It was situated on the summit of a high table rock, covered thickly with native *Mesembryanthemum*. The nests were neatly formed of dry grass and placed right in the midst of the spreading plant, which, in this exposed position, was of very stunted growth. The young birds in their woolly jackets had left the nests but were still on the rock, and allowed us to handle them without any resistance. On our departure, however, they descended and hid themselves, whilst the old birds mounted guard on the highest crags, their snowy plumage gleaming in the sunlight and their forms strangely magnified against the background of blue sky. On our return, an hour later, the "woolly jackets" had commenced their ascent of the rock, but *paterfamilias* with a low note of *ko-ko-ko*, which was apparently quite intelligible to the young birds, warned them of impending danger, and they were immediately invisible.

* I remember, when I was a boy, having a tame one on the Mission Station at Tangiteroria, ninety miles up the Wairoa river. On reaching maturity it suddenly disappeared, and we supposed it had fallen a victim to some predatory hawk; but six months afterwards it returned, bringing with it a mate from the sea, and after sojourning a few hours took its final departure. This remarkable exercise of memory in the bird, for it could be nothing else, is very interesting and suggestive.

It is easily domesticated, and becomes much attached to those who show it any attention. Some years ago I saw a very beautiful albino, having the entire plumage of the purest white, in the possession of Captain Robinson at Manawatu. A similar albino was kept, for a long time, as a pet, by the Maoris at Tahoraiti. I have also seen one exhibiting a white border on both edges of the wings.

At Wi Parata's settlement at Waikanae I saw a tame one that had been in his possession for three years. It was perfectly domesticated and answered to the name of "Dick"—responding when called, taking food from the hand, and ruling the poultry-yard in a spirit of despotism. I saw it on one occasion valiantly attack a cocker-spaniel in order to dispute possession of a bone which it succeeded in carrying off. Another which I obtained from the nest in the month of February, and kept in my garden for more than five years, afforded me the opportunity of studying the habits of this species and of marking its successive changes of plumage before it finally assumed the adult livery of "black and white with yellow mountings" *.

The most remarkable phase of character it developed was the romantic attachment it formed for a large black-and-white Newfoundland dog. For more than two years it had enjoyed the constant companionship of a tame Skua (*Stercorarius antarcticus*) and seemed then to be perfectly happy; but on the death of the latter, the Sea-Gull moped for a time and then fixed her affections on "Crusoe" in a very unmistakable way. Whenever the dog appeared on the lawn the bird would run to meet him with loud clamour, and dance round him with every expression of delight; when the dog had coiled himself to rest, the bird would peck him all over in a loving way with its bill, and finally nestle down beside him or even squat upon his soft coat, and if disturbed would utter a long squealing note as if in mild protest. Early one morning, although previously seen by the gardener, it unaccountably disappeared and was never recovered. Its affection for the dog seems to have proved fatal in the end, for there is little doubt that the bird followed the dog out and fell a victim to the street larrikins. We had become familiar with its noisy clamour and many peculiar ways, as it had been an inhabitant of our garden for so many years, and as it was in perfect plumage it was decidedly ornamental to the grounds; consequently its sudden disappearance was a matter of general regret to the household.

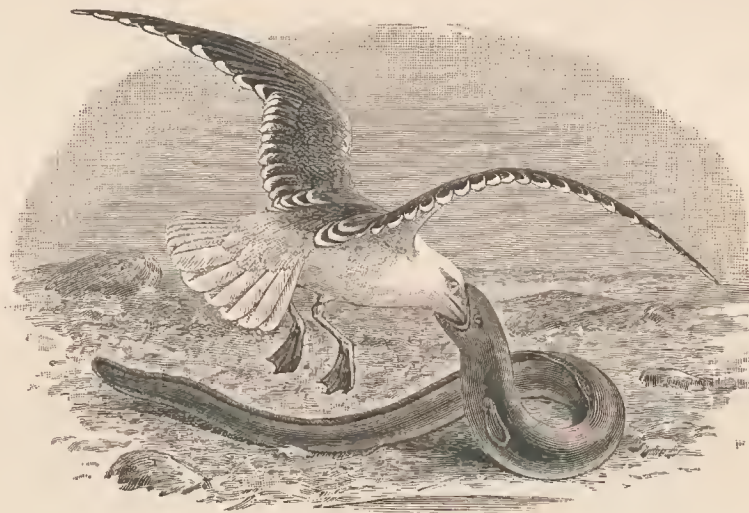
It breeds on the open sea-shore in remote or little-frequented parts of the coast, or on the shingle-banks far up the river-courses—nesting in large companies, and repairing to the same breeding-station season after season. The nest is formed with a tolerable amount of care, being constructed of dry

* The following particulars extracted from my note-book may be useful as marking the progressive history of the species:—It first began to show signs of a change of plumage in the month of April, the grey on the sides of the head and nape becoming lighter and imparting a slightly hooded appearance to the crown and face, whilst the scapulars began to present white terminal fringes. By the middle of June it had undergone a further change; the plumage of the shoulders and back had got perceptibly darker, the new feathers covering these parts being of a slaty-grey colour with darker centres, whilst the sides of the face, the fore neck, and breast had become lighter, the transition from dark grey to whitish grey having quite altered the expression of the face and given the eyes a fretful look. No change in the colours of the soft parts was observable till January, when the irides had turned to greyish brown, the legs had become tinged with pale green and the bill appreciably lighter in colour. At this period also the back was moulting, the new slaty-black feathers being very conspicuous. After an absence from home of several months I observed a considerable change, the condition of the bird at the end of December being as follows:—Head and neck white, somewhat clouded and spotted with brown; shoulders and underparts of the body white, more or less blotched with greyish brown; wings shaded with blackish brown; rump white; the interscapulars changing from blackish brown to the slaty-black colour characteristic of the adult bird; tail black; under tail-coverts white, broadly barred with blackish brown; bill greenish yellow, changing to reddish towards the symphysis of the lower mandible; legs pale greyish green; irides pale grey. In the following month there was a rapid whitening of the head and neck, and the primaries and secondaries, which had been cut short more than a year before, were replaced by new ones, black instead of brown, the broad white tips on the two middle secondaries being very conspicuous. By the end of February (the bird being then three years old) the adult livery had been fully assumed, except that there were some clouded markings of grey on the head, neck, and underparts; but as the latter rapidly diminished and finally disappeared it was evident that the change to perfect whiteness had taken place in the feathers themselves; the tail had become pure white, and the bill uniform dull yellow, washed with reddish brown on the symphyseal prominence of the lower mandible; the irides pearl-grey, and the legs and feet dull greenish grey.

seaweed, grass-tussocks torn up by the roots, and other rough materials, the interior being carefully lined with bent *. Some nests exhibit far less finish than others; and occasionally the eggs are deposited on the bare sand, a mere depression in the surface being considered sufficient: they are generally two in number (sometimes three), broadly ovoido-conical in form, measuring 2·8 inches in length by 2 in breadth, and they vary considerably in their style of colouring: generally speaking, they are of a warm greenish-grey colour, varied over the entire surface with spots, streaks, and blotches of dark umber; in some the ground-colour is tinged with light brown. Hardly two specimens can be found exhibiting the same markings, some being densely studded with minute spots, while others are covered with irregular streaks and blotches varying in density of colour from light brown to black. In one specimen, which came into my hands, an eccentric streak had assumed a curious resemblance to the letters **MD**. When disturbed in their nesting-ground, the old birds become very excited and clamorous, flying about high overhead in a very confused manner, with cries of *ha-ha-haro-haro*; while the young ones betake themselves at once to the nearest water, or squat and hide among the stones, where the protective colouring of their down is of the utmost service to them.

* A remarkable nest of this species, in the Canterbury Museum, affords, to my mind, an explanation of a point raised about the nesting-habits of *L. bulleri*, in my controversy with Captain Hutton in 1874 (Trans. N.-Z. Inst. vol. vi. pp. 126-138). In my account of the last-named species, I had stated that "its attempts at forming a nest are of the rudest kind, a few bents of grass or other dry materials loosely collected round the edges being deemed a sufficient preparation." Captain Hutton contradicted this, and stated that it "forms a very good nest." As a rule the Black-backed Gull likewise forms a somewhat indifferent nest, and as often merely deposits its eggs in a depression in the sand. In some localities, however, where the ground is damp or swampy, or liable to be overflowed, the bird appears to adapt its building to the requirements of the situation. The nest in question is a massive agglomeration of seaweeds, rushes, twigs, grasses, and other rubbish, closely pressed together, and forming a flattened globular cushion two feet in length by eighteen inches in breadth and nine inches in thickness; in the centre there is a slight depression, for the reception of the eggs. Mr. Enys (who was present when this nest was found) informs me that it was placed between the roots of a drift stump of totara, near a river-mouth (Milford Sound), being surrounded by water at every high tide.

In the Canterbury Museum there is a similar nest of the Mackerel-Gull (*L. scopulinus*) formed of dry twigs, grasses, and seaweed, a foot long by eight inches across, and raised five inches from the ground. This was found under similar conditions as the other. And we may fairly assume that the same would happen in the case of the closely allied species *L. bulleri*.



"The Biter Bit" (an incident of Bird-life in New Zealand).

LARUS SCOPULINUS.

(RED-BILLED GULL.)

Larus scopulinus, Forst. Descr. Anim. p. 106 (1844).*Larus novæ hollandiæ*, Gray, Voy. Ereb. and Terr., Birds, p. 18 (1844).*Lestris scopulinus*, Ellman, Zool. 1861, p. 7472.*Larus jamesoni*, Hutton, Cat. Birds of N. Z. 1871, p. 41.*Native names.*—Tarapunga, Makora, and Akiaki.

Ad. pileo undique albo : corpore suprâ clarè cinereo, tectricibus alarum dorso eoneoloribus, teetrieibus primariorum albis versûs apieem cinereo lavatis : primariis nigris, albo apicatis, duobus exterioribus subterminaliter plagâ magnâ albâ notatis, interioribus plerumque albis intûs cinereo lavatis nigro subterminaliter transfasciatis : secundariis dorso eoneoloribus : dorso postico cum uropygio eaudâque albis : subtûs purè albus, subalaribus cinereo lavatis : rostro eruentato, eulmine et apiee pallidioribus : pedibus pallidiûs eruentatis : iride argenteo-albâ : aunulo ophthalmico eruentato.

Juv. scapularibus et teetrieibus alarum brunneo maculatis et marmoratis : primariis albo minûs notatis, secundariis conspicuè brunneo lavatis.

Adult. General plumage pure white ; the back, scapulars, and upper surface of wings pale ash-grey ; anterior edge of wings and four of the large outer coverts white ; first primary white at the base, black in its median portion, the shaft and then the whole surface becoming white, finally banded near the tip with black ; the second similar to the first, but with more white at the base, the inner web being margined with black, the median black less extended, and the shaft wholly white, with the same extent of white beyond, but a broader subterminal band of black ; the third primary for two thirds of its length white, edged on the inner web with dusky black, the rest of the feather black, the white, however, being continued on the shaft till it spreads into a paddle-shaped mark on the inner web, about halfway down from the tip, which is also white ; the fourth primary white, with the inner web wholly covered towards the base and margined towards the end with dusky black, with a subterminal band of black fully an inch in width ; on the fifth quill the dusky black changes to dark ash-grey, which spreads over both webs towards the base, and the subterminal band is about half an inch in breadth ; on the next quill the extent of white is considerably diminished, and the subterminal band is not only less in breadth but is interrupted by a shaft-line of white ; the succeeding quills and the secondaries are wholly ash-grey, slightly paler at the tips. Irides silvery white ; bill dark arterial red, lighter on the ridge and towards the tip ; eyelids and feet pale arterial red, the claws brownish black. Length 14·5 inches ; extent of wings 34 ; wing, from flexure, 11·25 ; tail 5 ; bill, along the ridge 1·25, along the edge of lower mandible 1·75 ; bare tibia ·5 ; tarsus 1·75 ; middle toe and claw 1·75.

Obs. It should be observed that the markings on the primaries vary slightly in different individuals. The above description is taken from a fine specimen in perfect plumage.

In the nuptial season the male birds (if not both sexes) have the plumage of the breast and sides suffused with a delicate roseate tint. When the sun is shining on a group of these pretty birds, as they rest on the sands, this hue is visible even at a distance of twenty yards or more.

Young *. The young bird of the first year has the upper wing-coverts shaded and blotched more or less with

* Professor Hutton, in the "Critical Notes" appended to his 'Catalogue of the Birds of N. Z.' (p. 78), says that the young of *L. scopulinus* is similar in its colours to the adult, whilst the bird he distinguishes as *L. jamesoni* has brown feathers on the

brown ; scapulars even more so, the dark colour occupying the centre of the feather, the margins being whitish ; the first primary white at the base, then entirely black in its whole length, excepting only a fusiform spot of white about .75 of an inch in extent in its apical portion ; the next quill is similar, but with more white at the base and a much smaller apical spot ; the three succeeding quills white on their outer webs, in their basal portion, entirely black beyond ; the secondaries are ash-grey at the base, blackish brown in their apical portion, and tipped with lighter grey. Irides purplish brown ; bill yellowish brown, blackish at the tip ; legs and feet pale flesh-red.

Fledgling. The following series collected by myself, at one time and in the same nesting-place, exhibits the development of the fledgling :—

No. 1. Is just feathered, but with tufts of blackish-brown down still adhering to the plumage of the head and neck and above the tail ; the quills are about four inches long, and their coverts as well as the scapulars are blackish brown, edged with fulvous ; irides, bill, and legs black.

No. 2. More advanced but unable to fly ; has the irides black, the bill dull brown, with a darker tip, and the legs paler brown ; the first primary marked with a fusiform spot of white about the centre and having a minute terminal spot ; tail-feathers with a subapical bar of blackish brown on their inner web.

No. 3. Just able to fly ; has scarcely any indication of brown spots on the wings, but they are conspicuous on the scapulars, and reappear on the inner secondaries ; the first primary is marked as in No. 2, but, owing to the development of the feather from its sheath, being much nearer to the distal end, the second primary with a smaller white spot about an inch from the tip, and the third black, but all of them having white terminal points ; tail white.

No. 4. Similar to No. 3 and of same age ; but having the wing-coverts blackish brown largely margined with fulvous, and the dark markings on the scapulars reduced to a rounded subapical spot.

Obs. It ought to be mentioned that the size and form of the apical spots on the primaries, and the extent of the brown markings on the secondaries, are very variable in different examples. I have seen a young bird with the white apical markings described above entirely wanting in one wing, and represented in the other only by a small round spot on the inner web of the first primary.

THIS pretty little Gull is one of our commonest birds, frequenting every part of the coast and being equally plentiful at all seasons of the year. It is a bird of very lively habits, and its presence goes far to relieve the monotony of a ride over such dreary stretches of sand as the Ninety-mile Beach and the coast-line between Wanganui and Wellington. At one time you will meet with a flock of fifty or more in council assembled, fluttering their wings, chattering and screaming in a state of high excitement ; at another you will observe them silently winnowing the air, turning and passing up and down at regular intervals, as they cagerly scan the surface of the water. Here you find them ranged apart along the smooth beach like scouts on a cricket-ground ; there you see a flock of them packed together on a narrow sand-spit, standing closer than a regiment of soldiers—heads drawn in, one foot up, “standing at ease.” Then again, if you observe them closely, you may see them following and plundering the Oyster-catcher in a very systematic manner. Nature has furnished the last-named bird with a long bill, with which it is able to forage in the soft sand for blue crabs and other small crustaceans. The Red-billed Gull is aware of this, and cultivates the society of his long-billed neighbour to some advantage ; he dogs his steps very perseveringly, walking and flying after him, and then quietly standing by till something is captured, when he raises his wings and makes a dash at it. The Oyster-catcher may succeed in flying off with his prey ; but the plunderer, being swifter on the wing, pursues, overtakes, and compels a surrender. The gentleman of the long bill looks gravely on

wings at all ages. In this he is absolutely wrong, for I have traced the young of the former from its earliest condition as a fledgling, and there can be no question of the correctness of my diagnosis as given above. The *L. jamesoni* of Prof. Hutton's Catalogue is undoubtedly the young of *L. scopulinus*.

while his crab is being devoured; and having seen the last of it he gives a stifled whistle and trots off in search of another, his eager attendant following suit.

It frequents our harbours in large numbers, hovering round the shipping and associating freely with the Black-backed Gull; but although it often follows the vessel from its anchorage it does not venture so far out to sea as its larger congener. It also goes inland to feed, and large flocks, numbering several hundred birds, may sometimes be seen in the grass-paddocks, or following the plough on the settlers' farms, miles away from any sheet of water. In the month of March I met with a considerable flock of them at Sulphur Point in Lake Rotorua.

The light hovering flight and pretty aerial movements of this bird around and amongst the shipping at its moorings is quite a distinctive feature of our ports. Its ordinary cry is *cre-cre-cre*; but when alarmed or excited this becomes prolonged into *cr-e-e-ō cr-e-e-ō*.

At Maketu, near the ancient landing-place, there is a conspicuous grove of karamu (*Coprosma lucida*). The Maori tradition is that these trees sprang from the skids brought ashore from the Arawa canoe and used for hauling her up, when the first inhabitants landed on this coast some five hundred years ago. In deference to this widely accepted tradition, this clump of trees has, from time immemorial, been strictly *tapu*. About the year 1845 a native named Hororiri, in a fit of melancholy, hung himself on one of the karamu trees; but so sacred was the spot that none of his friends would venture in to cut him down. His body accordingly dangled there till it fell; and when I visited the place in 1880, human bones were still to be seen on the ground. My reason, however, for mentioning the place in the present connection is this: at the season when the karamu-berries are ripe hundreds of the Red-billed Gull resort to this clump of trees and, perching on the topmost twigs, eagerly devour the fruit—a circumstance in the history of this species which has not hitherto been observed elsewhere. Captain Mair assures me that he has often been an eye-witness of this himself. He adds:—"They were so tame that I could have knocked them down with my walking-stick. I also saw them in great numbers in the corn-fields at Maketu, and again near Tauranga yesterday (May 12). I saw a man ploughing up a grass-field; a flock of three or four hundred of these beautiful little creatures followed his furrow so closely that they seemed almost to settle between his feet."

By the end of January most of the young birds have started in life on their own account; although, owing to the gregarious instinct of the species, they often remain for months in association with the old birds. At Ohinckoau, a few miles south of Matata, I observed (as early as Jan. 17) a full-grown young bird following its parents. The latter were very tame, hovering within a few feet of us in an inquisitive fashion, whilst the young one, uttering a low whimpering cry, occupied itself in catching flies on a flowering shrub at the water's edge. This was at the very spot where, in 1864, our faithful ally, Winiata Tohiteururangi, badly wounded in both hip and shoulder, during an engagement with the Ngatiporou, breathed his last,—telling his panic-stricken followers to fight on bravely under the British flag. The magnificent pohutukawa tree against which rested the body of the dying chief is still pointed out to the traveller.

During the breeding-season, which extends over December and January, this Gull resorts to the river-beds and to the shores of lakes a short distance from the sea, often nesting in large colonies, and depositing its eggs on the bare ground with little attempt at preparation. About the middle of January I visited one of these breeding-places in the Bay of Plenty. The young at this time, although fully fledged, were unable to fly, but took readily to the water. On catching one of them it disgorged from its throat some small fish with which it had just been fed. This food was in a semi-digested state, and had doubtless undergone some process of deglutition in the crop of the old bird before being served. The eggs are generally three in number, broadly ovoido-conical in form, measuring 2.1 inches in length by 1.5 in breadth; they vary in colour from greenish white to a pale yellowish brown, spotted and marked with greyish purple and brown, more thickly towards the larger end.

LARUS BULLERI.

(BLACK-BILLED GULL.)

Gavia pomare, Bruch, J. f. Orn. 1855, p. 285 (not *G. pomarre* of 1853).

Bruchigavia melanorhyncha, Buller, Ibis, 1869, p. 43.

Larus (Bruchigavia) melanorhynchus, Finsch, tom. cit. p. 381.

Larus bulleri, Hutton, Cat. Birds of N. Z. 1871, p. 41.

Larus bulleri, Potts, Ibis, 1872, p. 38.

Native name.—Tarapunga.

Ad. suprâ dilutissimè cinereus : pileo eum collo postico et interscapulio, dorso postico uropygio et corpore subtùs toto, albis : plagâ nuchali indistinctâ brunncâ : tectricibus alarum dorso concoloribus, exterioribus et alá spuriâ purè albis : remigibus dilutissimè cincreis dorso concoloribus, apicem versùs albis, primariis albis, pogoniis ambobus et apice pennarum plus minusve latè nigro marginatis, hâc albo terminatâ : caudâ omninò albâ : rostro nigro : pedibus nigricanti-brunncis : iride argenteo-albâ.

Juv. dorso et scapularibus obscurè brunneo notatis, plumis albo terminatis subterminaliter grisescenti-brunneo fasciatis : tectricibus alarum medianis grisescenti-brunncis albido marginatis : secundariis intimis medialiter distinctè brunneo lavatis.

Adult. General plumage pure white; back, scapulars, and upper surface of wings delicate ash-grey; breast and sides of the body suffused with a beautiful rosy blush, which fades after death, or entirely disappears. The primary quills are white, eccentrically varied with black; the first primary is narrowly margined on its outer and marked diagonally on its inner web, and tipped with black; on the next the black increases, and forms a broad subterminal bar, which enlarges on the two succeeding ones, and decreases on the fifth; the sixth is ashy, with merely a subterminal interrupted bar of black. Irides silvery white; bill black, sometimes tinged with red towards the base; legs and feet blackish brown. Total length 15 inches; extent of wings 35; wing, from flexure, 11.75; tail 4.5; bill, along the ridge 1.5, along the edge of lower mandible 2; bare tibia .75; tarsus 1.5; middle toe and claw 1.5; hind toe and claw .3.

Young. Has the plumage of the back and mantle and the scapulars obscurely spotted with brown, each feather having a white tip bounded below by an irregular spot of greyish brown; the first two primaries black, with a longitudinal oar-shaped white mark covering both webs, the rest of the primaries white in their basal portion, then black, and with minute terminal spots of white; the median wing-coverts greyish brown with a whitish margin; the long inner secondaries largely marked in their central portion with greyish brown. In some examples there is a wash of brown on the crown. Bill black in its terminal portion, reddish brown towards the base; legs and feet dull reddish brown.

Obs. The extent of the black markings on the primaries is very variable; and in some examples the first quill is largely tipped with black. There appears to be a seasonal change in the colour of the bill and legs, the former becoming dull yellow, stained at the tips with brown, and the tarsi and toes changing to pale orange-red, with darker webs and black claws.

THE Black-billed Gull was originally described by myself, as already cited, under the name of



J.G. KEULEMANS DEL. & LITH

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BLACK-BILLED GULL.
LARUS BULLERI.

RED-BILLED GULL.
LARUS SCOPULINUS.

(TWO-FIFTHS NATURAL SIZE)

Bruchigavia melanorhyncha *; but as the retention of Bonaparte's subdivision is considered undesirable, I must now follow other authors in referring both this and the preceding species to the larger and better-defined genus *Larus*. Finding that the above title had already been bestowed on another member of the genus, by Temminck, Professor Hutton did me the honour to associate my name with the present species, which was figured for the first time in my former edition.

Another well-known local naturalist, Mr. T. H. Potts, paid me a similar compliment in proposing the name of *Larus bulleri* for a yellow-billed Gull, which he considered distinct. In treating of the latter bird (Birds New Zeal. 1st ed. p. 277) I stated that, whilst expressing my acknowledgments, I was unable to recognize the supposed specific distinction. On a careful comparison of the two birds, I found that they corresponded exactly in size, in the form of the bill, and in the colours of the plumage, even the eccentric markings on the primary quills being the same in both. The only difference, therefore, was in the colour of the bill and legs; and such a distinction could not be accepted as having any specific value till it had been shown that the difference of colour was constant in both birds all the year round. As opposed to the latter view, I mentioned that in the autumn of 1871 I had shot a specimen, on the sand-banks at Hokitika, in which the bill was pale coral-red in its basal portion, and brownish black beyond the nostrils, indicating, as it appeared to me, a transition to the black bill characteristic of the full winter plumage. Dr. Finsch, to whom I had forwarded skins of both for examination, concurred in this opinion; but he also went further, and referred the species to *Larus pomare* of Bruch (supposed to be from the Society Islands), although he complained of the extreme confusion and insufficiency of all Bruch's descriptions. While attaching great weight to the opinion of so careful an ornithologist as Dr. Finsch, I was unable to adopt his view in this case; for having visited the Museum at Mainz and examined the type of *Larus pomarre* for myself, I found that it had a more robust bill than our bird, and more black on the primaries; while the young, in addition to the spotted markings on the back and wings, which appear to be common to the whole group, had dark ear-coverts, and a brown terminal band across the tail.

Mr. Howard Saunders in his revision of the *Larinæ* (P. Z. S. 1878) has cleared up the confusion in the nomenclature of this species with *Larus pomare*. He states that during a recent visit to Bremen he went into the whole question with Dr. Finsch, who had previously studied the subject, and had made numerous and careful drawings of the primaries of Bruch's types of *L. pomare* in the Mainz Museum, and of many other specimens. He gives figures of the three outer primaries of *Larus bulleri*, and says "I have examined the type of Bruch's *L. pomare* of 1855, and it is undoubtedly of this species; but the type of his *L. pomarre* of 1853 is as certainly *L. novæ-hollandiæ*." (See woodcuts on page 62.) This explanation puts the matter in a perfectly clear light; and both *pomare* (Bruch) and *melanorhyncha* (mihi) having been previously employed for other species, our Black-billed Gull must stand as *Larus bulleri*, Hutton, under which name it is again described and figured here. I have recently visited Mainz again, and verified for myself the above observations.

On the habits of this species, as observed by Mr. Travers on Lake Guyon, in the provincial district of Nelson, I have much pleasure in quoting the following account from that gentleman's facile pen:—"The Black-billed Gull breeds on the main river-bed; and one or more pairs usually frequent

* Mr. Howard Saunders, in his revision of the *Larinæ*, in the Proc. Zool. Soc. 1878, p. 161, notices my having adopted Bonaparte's *Bruchigavia*, "a genus playfully made," for a New-Zealand species, this being, as he states, "its only claim to remembrance." He had apparently forgotten that Mr. Gould, in his 'Handbook to the Birds of Australia' (published in 1865), adopted Bonaparte's playful name for "a genus of Gulls the members of which are delicate in their structure, elegant in their appearance, and graceful in all their actions"—deliberately substituting that generic title for *Xema*, the one previously used in his folio edition. In 1869, in a communication to 'The Ibis,' I described a new species of this group from New Zealand, and provisionally referred it to that genus under the name of *Bruchigavia melanorhyncha*; but when I treated of the genus more exhaustively in my 'Birds of New Zealand' (1st ed., 1873), I adopted the generic division of *Larus* for this (= *L. bulleri*) and the allied species.

the lake after the breeding-season is over. On one occasion a pair of these birds, having by some means or other lost their own brood, returned to the lake earlier than usual. I brought up a young bird belonging to another brood, and placed it on the lake; and the bereaved parents at once took to it, tending it with the greatest care and solicitude. It is extremely interesting to watch these birds in their ordinary search for food during windy weather. The prevalent winds blow either up or down the lake; and when seeking food, the birds soar against the wind along the margin of the lake on one side, until they reach its extremity, when they at once turn and run down before the wind to the other end, where they recommence their soaring flight. But the most singular circumstance is that in the main valley they pursue various species of moths, which occur in large numbers amongst the tussock grasses, and especially in sedgy patches occupied by standing water. I could not for some time make out the object of their peculiar flight; but a friend of mine (Mr. R. W. Fereday, of Christchurch), who was lately on a visit with me for the purpose of collecting the lepidoptera of the district, whilst pursuing a large moth, observed one of these Gulls swoop at and capture it. We then noticed that some five or six of the birds were busily engaged in feeding on the moths, pursuing them very much as other insectivorous birds would do. The birds which frequent the lake become very tame, one pair in particular readily taking a worm from my outstretched hand, and constantly coming close to the house for food. Nothing can exceed the pureness and delicacy of their plumage when in full feather. It is doubtful whether this kind ever visits the sea-coast."

The specimens on which Mr. Potts founded his description of *Larus bulleri* were obtained near the mouth of the Waimakariri river; and, as already mentioned, I met with the same bird on the west coast. The Black-billed Gull is therefore not confined to the inland lakes, as was hitherto supposed, but also frequents the mouths of rivers and estuaries, where it appears to mingle freely with the flocks of *Larus scopulinus*, *Sterna frontalis*, and other birds having a community of interest. It is comparatively plentiful in Queen Charlotte's Sound and at Nelson. I have met with it frequently in Wellington harbour, as well as in ports further north; but it is far less common than the Red-billed Gull, from which it is easily distinguished on the wing by the black extremities of the primaries. It seems to be less social in its habits than the last-named bird, for I have generally noticed it associating in pairs when not commingling with flocks of the other species on their common feeding-ground. On the wing it is more Tern-like than *L. scopulinus*, and is generally less approachable.

Like the preceding species, the Black-billed Gull deposits its eggs on the bare ground, its attempts at forming a nest being of the rudest kind, a few bents of grass or other dry materials loosely collected round the edges being deemed a sufficient preparation. There are two examples of the egg of this Gull in the Canterbury Museum, both very handsome in appearance, but differing entirely in the style and distribution of their colours. One of these is of a narrow ovoid form, measuring 2.15 inches in length by 1.65 in breadth; it is of a dull yellowish white or pale buff, covered with numerous spots and irregular markings of dark brown; these markings are more numerous towards the thicker end, forming a broad zone and displaying fantastic shapes not unlike some of the characters in the Chinese alphabet; and on one side of the egg, commencing at the smaller end, there is a large blotch of rich umber-brown, varied with a darker brown, and covering more than half its surface. The other example is somewhat smaller and more rounded in form; the ground-colour is a delicate greenish grey; about the middle of the egg there is a narrow belt of a brighter tint of green; near the thick end there is a broad dark zone formed of obscure inky blotches, varied with irregular markings of blackish brown; and over the entire surface there are small scattered spots and markings of a rich dark-brown colour. A specimen in my son's collection, obtained at Preservation Inlet, measures 2.25 inches in length by 1.5 in breadth, being more elliptical in form than the eggs of *Larus scopulinus*. It is of a dark cream-colour, the surface covered with numerous irregular spots of purplish brown, some having the usual washed-out appearance, and ornamented with peculiar pencilled markings resembling Arabic characters, which form themselves into a broad zone near the larger end.

LARUS NOVÆ HOLLANDIÆ.

(BROWN-BILLED GULL.)

- Larus novæ hollandiæ*, Stephens, Shaw's Gen. Zool. xiii. pt. i. p. 196 (1826), ex Latham.
Larus jamesonii, Wilson, Ill. Zool. pl. xxiii. (1831).
Larus scopulinus, var. *major*, Forst. Descr. Anim. p. 106 (1844).
Xema jamesonii, Gould, Birds of Australia, vol. vii. pl. xx. (1848, nec Wils.).
Gavia jamesonii, Wils. Bruch, J. f. Orn. 1853, p. 102, et 1855, p. 285.
Gavia andersonii, Bruch, J. f. Orn. 1853, p. 102, et 1855, p. 285.
Gavia pomarre, Bruch, J. f. Orn. 1853, p. 103 (not *Gavia pomare* of 1855, p. 285).
Gelastes gouldi, Bp. Naumann. 1854, p. 216.
Gelastes corallinus, Bp. tom. cit. pp. 212, 216.
Gelastes andersonii, Bp. tom. cit. p. 212.
Gavia gouldii, Bp. Bruch, J. f. Orn. 1855, p. 285.
Bruchigavia gouldi, Bp. Consp. Av. ii. p. 228 (1857).
Bruchigavia pomare, Bp. tom. cit. p. 228 (1857).
Bruchigavia jamesonii, Bp. tom. cit. p. 228 (1857).
Bruchigavia corallinus, Bp. tom. cit. p. 228 (1857).
Larus scopulinus major, Schlegel, M. P.-Bas, *Larinæ*, p. 29 (1863).
Bruchigavia jamesonii, Gould, Handb. B. of Austral. ii. p. 387 (1865).
Larus scopulinus, Hutton, Cat. Birds of N. Z. pp. 40, 78 (1871).

Native name.—Tarapunga.

Ad. similis L. scopulino, sed primariis aliter notatis distinguendus.

Adult. This form differs from *Larus scopulinus* only in having the bill, which is somewhat narrower, together with the legs and feet pale brown instead of being arterial red, and in the different markings of the primaries, which are as follows: the first primary is black, with a subapical hatchet-shaped mark of white, and a white tip; the second and third have a narrow, somewhat irregular, elliptical mark of white, and a conspicuous white tip; on the succeeding primaries the black progressively diminishes, but on the sixth it is reduced to two approximating spots on the opposite webs, divided by a white shaft-line.

Variety. The Otago Museum contains a very perfect albino, obtained near Dunedin, and presented by Mr. J. C. Fulton: bill and feet pale yellowish brown.

Obs. It ought to be noted that the white markings on the primaries are somewhat inconstant, and taken alone would be an insufficient criterion for distinguishing the species. In an apparently fully adult specimen which I examined at Dunedin there was an insignificant white mark on the first and second primaries, and all the rest were black, answering pretty nearly to Mr. Saunders's figure of the first three quills in the young of *Larus novæ hollandiæ*.

MR. HOWARD SAUNDERS, in his revision of the *Larinæ* (Proc. Zool. Soc. 1878, p. 187), says:—
 "Although very close to *L. scopulinus* of New Zealand, I think this species may fairly be distin-

guished by its larger size throughout, and by the greater amount of white mirror in the pattern of the three outer primaries." My experience of the species does not exactly accord with this; for in all the specimens I have examined the size has not exceeded that of *L. scopulinus*, whilst the bill has been slightly narrower. As will be seen from my descriptive notes above, the markings on the primaries are somewhat variable, and therefore too inconstant, taken alone, to serve as a specific character. It appears to me that the pale brown colour of the bill and feet, which in the other species are arterial red all the year through, affords the safest criterion for distinguishing this bird.

All the examples of this Gull I have hitherto met with have been collected on the Otago coast, in the southern portion of the colony.

Mr. Saunders has courteously placed at my disposal the woodcuts by means of which he demonstrated the differences in the primaries of the three allied species.



Three outer primaries of *L. scopulinus*, old.



Three outer primaries of *L. nove hollandice*, old.



Three outer primaries of *L. bulleri*, nearly ad., from the type of *Gavia pomare*, Bruch, of 1855.



Three outer primaries of *L. bulleri*, old, from the type of *L. melanorhynchus*, Buller.

STERCORARIUS ANTARCTICUS.

(SOUTHERN SKUA.)

Lestris catarractes, Quoy et Gaim. Voy. de l'Uranie, Zool. p. 137 (1824).*Lestris antarcticus*, Less. Traité d'Orn. p. 616 (1831).*Stercorarius antarcticus*, Gray, Gen. of B. iii. p. 653 (1845).*Cataracta antarctica*, Bonap. C. R. xlii. p. 770 (1856).*Megalestria antarcticus*, Bonap. Consp. Gen. Av. ii. p. 206 (1857).

♀ *ad.* suprâ sordidè cinerascenti-brunnea : subtus pallidior : scapularibus et tectricibus alarum paullò cinerascenti-albido variis : pileo colloque longitudinaliter pallidè brunneo maculatis : collo postico flavicanti-brunneo terminato : remigibus et rectricibus obscurè nigris versùs basin albicantibus : rostro nigricanti-brunneo : pedibus nigris : iride nigrâ.

Adult. General colour dull cinereous brown, darker on the upper parts, but relieved by touches of grey and light brown, especially on the upper wing-coverts and scapulars ; head and neck largely marked with pale brown ; the feathers of the hind neck lanceolate in form, and with their terminal portion yellowish brown ; quills and tail-feathers dusky black, white in their basal portion ; in the closed wing the white is apparent on the primaries to the extent of an inch, but in the secondaries and tail-feathers it is concealed by the upper coverts. Irides and feet black ; bill blackish brown. Total length 25 inches ; wing, from flexure, 17 ; tail 7 ; bill, along the ridge 2.25, along the edge of lower mandible 2.5 ; bare tibia 1 ; tarsus 3 ; middle toe and claw 3.1 ; hind toe and claw .5.

Young. A bird of the year captured by Mr. Drew at the Wanganui heads differs in having the general plumage slaty brown, the scapulars only having terminal patches of light yellowish brown and whitish grey. There are no lanceolate feathers on the neck, and the basal white spot on the primaries is concealed by the overlapping coverts. Bill uniform bluish black.

Obs. The sexes are alike, but the amount of white on the primaries is variable, and some examples are more suffused with brown on the neck and upper surface than others. A specimen from Dusky Bay has the white alular spots very conspicuous even in the closed wing, and one from Stewart's Island is much lighter than ordinary examples, having the entire plumage tinged with brown, and the feathers of the nape and mantle broadly margined with yellowish brown.

My original description of this fine Skua was taken from a specimen procured by Sir James Hector, who furnished me with the following note respecting it :—"Female bird shot in Woodhen Cove, on the south side of Breaksea Sound. There was only one pair ; both were shot, but one skin was destroyed. Several others were seen at sea in company with the Albatros."

Numerous examples have since been obtained in both Islands.

I had a live one in my possession for several years, and as this bird afforded me an opportunity of observing the habits of the species, under new conditions of life, I will venture to reproduce here, with a few additions, an account of it which I communicated to the Wellington Philosophical Society in September 1878 * :—

"The living example of this fine Skua-Gull, referred to in last year's volume, is still an inhabitant

* Trans. N.-Z. Inst. vol. xi. pp. 373, 374.

of my garden, where, after much preliminary persecution, it now tolerates the companionship of a young Sea-Gull (*Larus dominicanus*). The history of this bird is somewhat remarkable. About a year and a half ago it was captured somewhere in the vicinity of Kapiti, and came into the possession of the Hon. Wi Parata, who kept it in his *marae* till it became quite tame. Being injured in the wing it was unable to fly, but having made its escape, it travelled some ten miles up the coast, and was recaptured by some natives at Otaki. It remained there some three months, and then made a fresh start northwards. Its next stage was Horowhenua, where it was caught and taken inland to Hector McDonald's homestead. Here it became an inmate of the farm-yard, and appeared to get quite reconciled to its changed mode of life. It fraternized with the dogs and poultry, sharing their food and occasionally devouring a chicken. But one day, after a fight with a rival turkey, in which it appeared to come off second-best, it travelled to the coast, a distance of some four miles, and then turned its head northwards again. A week or two later it was found near the mouth of the Manawatu river, and carried inland to Foxton. It commemorated its arrival by swallowing some ducklings and chickens. It was then passed on to a settler 'up in the bush,' where it killed and devoured a well-grown pullet. I arrived just in time to prevent its being sacrificed to the anger of the good housewife. Thence it was deported by coach to Wellington, making its escape on the Manawatu sands, *en route*, and detaining Her Majesty's mails while being recaptured. After keeping the bird caged for a few days I turned it loose in the garden, where it has remained for upwards of six months without any attempt to get away. Christened 'Peter' by the children, he has become quite tame and familiar, answering to his name and taking food from the hand. He has selected a sunny spot on high ground, as an outlook station by day and as a sleeping-place by night. He wanders over the place freely, looking for worms and grubs, and during the heat of the day seeks the shade of some bushy shrub. He is almost omnivorous, but gives the preference to fish and meat. On a dead bird being offered him he runs off with it in his beak, then holding it down with his feet, plucks the feathers off and devours the flesh. On throwing him a Blight-bird (*Zosterops lateralis*) he bolted it, feathers and all. On another occasion I gave him the body of a Dove Petrel (*Prion turtur*). He carried it off in his bill, tore off the feathers in an incredibly short space of time, crunched the wing-bones in his powerful bill, and then swallowed the whole, the extremities of the wings protruding from his mouth till the bird had fairly settled down in the Skua's crop. His capacity for swallowing fish is something astonishing, his crop becoming greatly distended. He has the power of regurgitating his food, and will sometimes reproduce from his throat a bone of marvellous size, the wonder being how he ever managed to swallow it. Although not habitually a nocturnal bird, he sometimes gets very excited after dark, hurrying about the garden with outstretched wings and uttering a peculiar cry as if being suffocated. At other times he emits at intervals a note like the crowing of a Pheasant. During the day Peter is noiseless, except when quarrelling with the Sea-Gull or disputing possession of a bone with the dog, when he has a short peevish note, quickly repeated. His first encounter with a tame Cockatoo in the garden was quite ludicrous. He first played the *rôle* of assailant, but the moment his opponent erected his crest, Peter quailed and ran away. After this they established friendly relations with each other, often basking together in the sun, and drinking from the same fountain*.

"I have mentioned before that this capture is the first known instance of the occurrence of the Southern Skua in the North Island. I have lately, however, met with another on the West Coast. Travelling by coach we found one, apparently a male in full plumage, on the sandy beach, not far from the Otaki river. He was evidently worn out with fatigue, and would not rise till the coach was within a few yards of him; then rising with a slow and laboured flight, he proceeded a few hundred

* To the above full record of his life, I have nothing to add but a notice of his death, a year later, which appeared to be the result of sheer old age. His obituary was communicated to me by my wife in the following terms:—"Like a sensible bird he first had a hearty breakfast, then a bath, and then laid himself down in a comfortable place on the lawn and quietly died."

yards and alighted again on the beach, repeating the operation again and again till the coach reached the Paikakariki, a distance of some twenty miles. Any bird of ordinary intelligence would have made a circuit and got behind the pursuing coach. But the Skua ashore was evidently out of his latitude; and this was made more apparent by the manner in which the Sea-Gulls (of both species), his hereditary victims at sea, pursued him in the air and buffeted him. As is well known, this bird usually subsists by plunder, pursuing the Gulls and compelling them to disgorge their food. Here, however, the conditions were changed, as I myself had an opportunity of observing from the box-seat. The Skua had alighted in a shallow beach-stream and was ducking its body in the water when a fine old Hawk (*Circus gouldi*), with hoary white plumage, suddenly appeared from the sand-hills and swooped down upon the intruder. The Skua, without making any show of resistance, instantly disgorged from its crop the entire body of a Diving Petrel (*Pelecanoides urinatrix*). The Hawk, balancing himself for a moment with outspread tail, dropped his long talons into the stream and clutched up his prey without wetting a feather of his plumage, and then disappeared among the sand-hills, while the terrified Skua hurried off, only to be pursued again by the clamorous Sea-Gulls. Thus we have examples of 'retributive justice' even among birds."

On the range of the three allied species of this larger form of Skua, Mr. Saunders writes:—"The northern species, *S. catarrhactes*, whose breeding-range stretches from the coast of Norway, the Faroes, and Iceland, away through the Nearctic region and the Pacific, appears to be nowhere numerically abundant, and is fast becoming exterminated in Europe. . . . It has occurred in California; but descending that coast, we find no trace of a large Skua until we enter the fish-abounding, and therefore Gull-frequented, waters of Humboldt's Current, which cools the coasts of Chili and Peru throughout a width of about 300 miles, and sweeps outwards to diminish the natural heat of the equatorial Galapagos Islands. In these productive waters is found a large Skua, *S. chilensis*, separable from the northern *S. catarrhactes* by its brighter and more chestnut underparts and axillaries—differences which are constant, although it is true that they are merely those of colour. Its bill is perhaps a trifle more slender than that of the northern bird, a point which should be borne in mind, because on passing through the Straits of Magellan, where this species appears to stop, we come at once to another large Skua, *S. antarcticus*, which, although in such close geographical proximity to *S. chilensis*, yet differs far more from it than *S. chilensis* does from *S. catarrhactes*! The Antarctic Skua ranges from the Falkland Islands down to the edge of the pack-ice, the shores of New Zealand, and up to Norfolk Island, and thence by way of the chain of Kerguelen Island, St. Paul's Island, the Crozets, &c., it reaches the Cape of Good Hope and, as a straggler, Madagascar. From the Cape it works round by Tristan d'Acunha and the South Atlantic islands, till the chain is completed at the Falklands again. *S. antarcticus* is a uniformly dusky bird, with stronger and shorter bill than either of its near relatives." (Journ. Linn. Soc., Zool. vol. xiv. pp. 392, 393.)

The flight of this bird is heavy, and performed by slow regular flappings of the wings, with the shoulders much arched. It possesses, however, the faculty of turning quickly in the air, as I observed when the Gulls were in pursuit. On the wing the white mark across the primaries is very conspicuous, but it is not sufficiently apparent to distinguish the bird when the body is at rest.

In the Otago Museum there are two eggs of this Skua, which differ appreciably. Although of similar size, one is narrower or more elliptical than the other, measuring 3.1 inches in length by 2 in breadth; of a pale, creamy-brown colour, blotched all over the surface, and pretty equally, with blackish and purplish brown. On one side these blotches are confluent, and they are generally darker towards the middle circumference. This specimen was collected at Campbell Island. The other, which came from Macquarie Island, is more ovoid, measuring 3 inches by 2.2, and is of a dull olive-brown sparingly blotched with dark brown, the intervening spaces being marked with small, irregular spots of the same colour, more or less distinct.

STERCORARIUS CREPIDATUS.

(RICHARDSON'S SKUA.)

Larus crepidatus, Gmelin, Syst. Nat. i. p. 602 (1788).*Stercorarius crepidatus*, Vieill. N. Dict. d'Hist. Nat. xxxii. p. 155 (1819).*Lestris richardsonii*, Swains. Fauna Bor.-Am. p. 433, pl. 73 (1831).*Lestris parasiticus*, Bonap. Consp. Av. ii. p. 208 (1857, nec Linn.).*Lestris longicaudata*, Finsch, J. f. O. 1872, p. 126 (nec Briss.).*Stercorarius parasiticus*, Buller, Birds of New Zealand, 1st ed. p. 268 (1873, nec Linn.).

Ad. (exempl. ex N. Z.) suprâ eineraseenti-brunneus, teetricibus alarum saturationibus, supraeaudalibus exterioribus versûs basin albicantibus: pileo summo pallidiûs brunneo, plumis albicante obsoletè terminatis: facie laterali, gulâ et collo postico albis, plumis versûs apicem brunnescentibus: corpore reliquo subtûs albo, hypocondriis cum erisso et subeaudalibus eineraseenti-brunneo lavatis: subalaribus et axillaribus eineraseenti-brunneis: remigibus brunneis, extûs nigricantibus, iutûs ad basin albidis, seapis brunnescenti-albis, exteriorum purè albis, secundariis intimis dorso concoloribus: caudâ saturatè brunneâ: rostro saturatè brunneo: pedibus eineraseenti-nigris: iride nigrâ.

Ad. Crown, nape, and sides of the head dull greyish brown; neck all round, breast, and sides of the body greyish white; shoulders, and all the upper surface, dark olivaceous grey of different shades; primaries and tail-feathers blackish brown, the former with white shafts; inner surface of wings, axillary plumes, and abdomen ashy grey tinged with brown; some of the under tail-coverts uniform ashy grey, others white barred with grey. Irides black; bill dark brown; tarsi and toes greyish black, the claws darker. Length 16.5 inches; extent of wings 38; wing, from flexure, 11.75; tail 5.5; bill, along the ridge 1.2, along the edge of lower mandible 1.7; bare tibia .5; tarsus 1.6; middle toe and claw 1.5.

Young (N.-Z. example). General upper surface blackish brown, more or less varied with pale brown and fulvous, many of the feathers having pale margins; crown of the head and hind neck brownish grey, the former with narrow linear black markings, and the hind neck washed with fulvous brown; the edges of the wings speckled with white; the upper tail-coverts fulvous white, each feather with two broad irregular bars of brownish black; primaries brownish black with white shafts, also white on their inner webs towards the base; tail-feathers brownish black, perceptibly darker towards the tips, and pure white at the base under the coverts; entire under surface greyish white, thickly speckled and freckled on the fore neck, breast, and abdomen with brown; the axillary plumes, the sides of the body, and the under tail-coverts washed more or less with fulvous, and marked with broad, transverse, somewhat unequal, bars of blackish brown. Bill greyish black; legs and feet brownish black, with a conspicuous yellow spot towards the base of the inner interdigital web.

Obs. In the adult example described above, the two middle tail-feathers are being reproduced, and present a remarkable denuded appearance (see woodcut in Trans. N.-Z. Inst. vol. xi. p. 358). In the young bird the tail-feathers are broad and acuminate, the two middle ones extending about half an inch beyond the rest.

THE above description of the adult is taken from an example shot by myself on the sea-beach at Horowhenua, in the provincial district of Wellington, on the 30th of April, 1864, and presented to the Colonial Museum with the rest of my original collection.

When I published my former edition this was the only known instance of its occurrence in New

Zealand. Three subsequent cases have been recorded. A young bird in the flesh, received by Sir James Hector at the Colonial Museum, was noticed by me at the time, in the 'Transactions of the New-Zealand Institute' (vol. vii. p. 225); another young bird was shot in Wellington harbour in January 1877; and a third example, in more mature plumage, was picked up on the beach at Cape Campbell, by Mr. C. H. Robson, in November 1877. The two last-mentioned specimens being in my collection, I was able to submit them to Mr. Howard Saunders, who unhesitatingly referred them to *Stercorarius crepidatus*, and I feel bound to accept the determination by one who has made this group of birds his special study*.

On comparing the two adult birds there is a manifest difference in the coloration, the one described above having the breast greyish white, and the abdomen ashy-grey tinged with brown, whilst the other has the entire under surface white, marked on the breast and sides with interrupted bars of sooty brown. In both, however, the under surface of the wings and the axillary plumes are of a uniform dark ashy grey. These individual differences are thus accounted for by Mr. Saunders in treating of *S. crepidatus* (P. Z. S. 1876, pp. 328, 329):—"It is now well known that there are two very distinct plumages to be found in birds of this species, even in the same breeding-places—an entirely sooty form, and one with light underparts,—and that white-breasted birds pair with whole-coloured birds as well as with those of their respective varieties. If this species is 'dimorphic,' the offspring of one particoloured and one white-coloured bird ought to resemble one or other of their parents without reference to sex; my examination of upwards of a hundred specimens from widely different localities and in all stages inclines me to the belief that this is not the case, and that the young of such union will be intermediate, whilst the offspring of two similar parents will 'breed true.' This point can only be solved by some ornithologist who will devote his attention to a colony during the breeding-season, observing the produce of all these unions, and, if possible, marking the nestlings before they take wing. . . . It is worthy of notice that in Spitzbergen, its most northern breeding-ground, neither Dr. Malmgren nor Professor Newton found a single example of the dark whole-coloured form; all those which Admiral Collinson's and Dr. Rae's Expeditions brought home from the far north are also white-breasted specimens, which looks as if the dark form was a more exclusively southern one."

* In my former edition I referred the first-named example to *Stercorarius parasiticus*, Linn., and added the following remarks:—"Dr. Finsch, to whom I submitted the skin, is of opinion that it is an immature bird; and Mr. Howard Saunders, who has made the *Laridæ* his special study, expresses his conviction that it is a new and hitherto undescribed species. I am rather disposed, however, to consider it an aged female of the species known as Buffon's Skua, with the plumage much faded and worn, indicating a sick or exhausted condition of body. I may add that the two middle tail-feathers are only partially developed, being encased in a sheath at the base. They extend only about an inch beyond the rest, and are much abraded, having a peculiar filamentous appearance."

Professor Hutton, adopting another view, wrote to me:—"Your *Lestris* is no European bird, but appears to be a representative of the Arctic Skua. I think it is a young bird."

Commenting on my account of this bird, Mr. Saunders, in his paper on the *Stercorariinæ* (P. Z. S. 1876, p. 330), said:—"His general description suits *S. crepidatus*; and he expressly states that the shafts of the primaries are *white*, the characteristic which particularly serves to distinguish it from Buffon's Skua, with which he has identified it. At the time that I examined the specimen in question I was not aware of this distinctive feature: the skin also had been badly preserved; and, to make matters worse, the plumage was so worn and abraded that it is a marvel that the bird was able to fly at all." Referring thereto, in a communication which I afterwards made to the Wellington Philosophical Society, I observed:—

"Mr. Saunders has evidently, in this case, trusted more to his memory than to the notes which, we may assume, he would make on examining a novel specimen—one which, in fact, he took to be 'a new and hitherto undescribed species.' It will be seen, at a glance, that the specimen now before the meeting (which passed through Mr. Saunders's hands in the same condition) instead of being a 'badly-prepared' skin is a first-class cabinet specimen, and that, instead of having 'the plumage so worn and abraded as to make it a marvel that the bird could fly at all,' the wings are in perfect plumage, the only abraded feathers being about the head and neck, which could not well affect the flying capabilities of the bird." (Trans. New-Zealand Inst. vol. xi. p. 356.)

STERNA FRONTALIS

(WHITE-FRONTED TERN.)

Sterna frontalis, Gray, Voy. Ereb. and Terr., Birds, p. 19 (1844).*Sterna albifrons*, Peale, U. S. Expl. Exped., Birds, p. 279 (1848).*Sterna atripes*, Ellman, Zool. 1861, p. 7473.*Sterna longipennis*, Finsch, J. f. O. 1867, p. 339.*Native name.*—Tara; “Sea-Swallow” of the colonists.*Ad. ptil. æstiv.* suprâ albicanti-cinereus, remigibus cano lavatis, primarii primi pogonio externo nigro, pennis minoribus ad apicem latè albis, reliquis intûs versûs apicem albis: caudâ albâ: capite et nuchâ nigris, fronte et facie laterali albis: subtûs albus: rostro nigro, ad basin brunnescente: pedibus rufescenti-brunneis: iride nigrâ.*Ad. ptil. heim.* similis ptilosi æstivæ, sed fronte albâ latiore et vertice plus minusve albo vario.*Juv.* capite cinerascanti-nigro, albido vario: suprâ dilutè cinereus, obscurè nigricante fasciatus et notatus: tectricibus alarum minimis nigricantibus.*Adult in summer.* Crown of the head and nape black; a band immediately over the bill, the lores, and cheeks pure white; back and upper surface of wings pale ashy grey; the rest of the plumage pure white; the breast and sides of the body often suffused with a delicate rosy tint, which fades after death. Iridis and bill black; legs and feet reddish brown. Length 16 inches; extent of wings 33; wing, from flexure, 11; tail 7 (the middle feather 3 inches shorter); bill, along the ridge 1.6, along the edge of lower mandible 2.25; bare tibia .4; tarsus .6; middle toe and claw 1.1.*Adult in winter.* Differs in having the white frontal band more extended, and the black crown more or less variegated or spotted with white.*Young.* Forehead, crown of the head, and nape greyish black, obscurely spotted or mottled with white; the whole of the back, the feathers composing the mantle, and some of the larger wing-coverts dark silvery grey, variegated with white, and handsomely mottled and barred with dusky or greyish black; the smaller wing-coverts uniform greyish black, except along the edge of the wing, where they become white; underparts silky white, as in the adult. The barred character is most conspicuous on the scapulars and long inner secondaries; and both these and the tail-feathers have crescent-shaped markings near the tips.*Nestling.* Covered with buffy-white down, tinged with fulvous on the head and neck, and mottled with grey on the back.*Fledgling.* Feathers of the back and the scapulars greyish white, with broad crescentic marks of black; wing-coverts prettily variegated with black; the down on the back buffy white, mottled and marbled with dark grey; wing-feathers (half an inch in length) silvery grey, broadly margined with white.*Obs.* I have noticed in a bird so young that it was unable to fly the same roscate tint mentioned in the description of the adult.

THIS elegant species is extremely abundant on our coasts, flocks of five hundred or more being often met



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WHITE-FRONTED TERN
STERNA FRONTALIS

BLACK-FRONTED TERN.
STERNA ANTARCTICA.

(ONE-HALF NATURAL SIZE)

with on the sand-banks at the river-mouths in association with Gulls and other shore-birds of various kinds. The term "Sea-Swallow," as applied to this Tern, is a very appropriate one; for on watching the evolutions of a flock of these birds one is forcibly reminded of a flight of Swallows coursing in the air. Their aerial manoeuvres are truly beautiful; and the apparent ease with which they dip into the water and capture their finny prey cannot fail to interest an observer. They usually alight on the sandy beach near the edge of the water, and stand, always facing the wind, so closely packed that thirty or forty may be obtained at a single shot. They shuffle about with a constant low twittering, and occasionally stretch their wings upwards to their full extent, presenting a very pretty appearance. When fired at, or otherwise alarmed, the whole flock rises simultaneously in the air in a vortex of confusion, crossing and recrossing each other as they continue to hover over the spot, producing at the same time a perfect din with their sharp cries of *ke-ke-ke*. But if approached quietly they mount into the air, not confusedly but commencing at the nearest point and rising in succession, like a lifting net, then hover in lines that intersect each other in all directions, but without any contact, their black caps conspicuous, and the snowy whiteness of their plumage making them gleam in the sunlight like a shoal of flying-fish. When passing from one feeding-ground to another they close their forked tails, and perform a direct and rapid flight, often at a considerable elevation.

Some years ago, when exploring among the shoals and sand-banks of the great Kaipara heads or basin, I observed thousands of these birds; and in this wild and unfrequented part of the coast they were so fearless that they coursed about our boat within a few feet of our heads, and the discharge of a gun among them only tended to increase their apparent interest in us.

This species of Tern breeds in large colonies, as many as 200 or more being sometimes associated together. My son Percy observed in December a vast crowd of them on a small rocky island near the Taranaki Sugar Loaves. This is a favourite breeding-ground, and the birds were so closely packed that from the deck of the steamer they presented the appearance of a fall of snow. On one occasion the crew of the 'Hinemoa' landed at this place, and collected several bucketsful of the eggs.

On the small island of Motiti I found a large community of them occupying one end of it, and the Red-billed Gull the other, the two nesting-places being as far apart as possible. On the high intervening ground *Larus dominicanus* had established a breeding-place, as already mentioned.

On its nesting-ground being invaded this Tern shows fight in a very determined manner, coming in a bee-line for the intruder's face, till within about a couple of feet, and then darting off at a sharp angle with a snapping cry of remonstrance. Captain Fairchild has known them even bolder, and has had his hat knocked off by the rapid action of their wings. By the end of February the young birds have joined the general community on the sand-banks, but they may be easily distinguished by the dark plumage of their upper surface and by their more sibilant cry. The eggs are deposited on the bare rock, often within reach of the sea-spray; and, as a rule, there are two eggs to each nest. They are usually of an elegant ovoido-conical form, measuring 1.9 inch in length by 1.3 in breadth; and they present great beauty and diversity in their colouring. The ground-tint varies from a clear greyish white to a delicate greyish green, and from a pale yellowish brown to a dark cream-colour. They are marked and spotted with purplish and dark brown in every variety of character: some have the entire surface studded with clear rounded spots, occasionally confluent; others have the marks broad and irregular; while in some examples they are spread into large dark blotches, covering a great portion of the surface. Some specimens are freckled all over with light brown, and splashed at intervals with darker brown; others have a smudged appearance, as though an attempt had been made to obliterate the markings. In the Canterbury Museum there is a curious example, having the entire surface covered with marbled veins of dark brown; and another (collected by Mr. Fuller on the Waimakariri beach) is of a delicate pinkish-brown tint, with a broad zone of confluent spots towards the larger end, and numerous scattered specks of a rich reddish-brown colour.

STERNA ANTARCTICA.

(BLACK-FRONTED TERN.)

Sterna antarctica, Wagler, Isis, 1832, p. 1223.*Hydrochelidon albostrata*, Gray, Voy. Ereb. and Terr., Birds, p. 19, pl. 21 (1844).*Sternula antarctica*, Bonap. C. R. xlii. p. 773 (1856).*Hydrochelidon albistriata*, Bonap. C. R. xlii. p. 773 (1856).*Sterna cinerea*, Ellman, Zool. 1861, p. 7473.*Hydrochelidon hybrida*, Finsch, J. f. O. 1867, p. 347.*Native name.*—Tara.

Ad. æstiv. suprâ saturatè cinereus, uropygio conspicuè albo: capite summo nuchâque nigris: lineâ faciali a rostri basi directè per regionem paroticam ductâ, albâ: genis et corpore subtùs toto pulchrè cinereis, subcaudalibus albis: remigibus extùs cinerascensibus, intùs albis, scapis albis, primario primo extùs nigricante: caudâ dilutè cinereâ, rectricibus versùs basin albis, rectrice extimâ ferè omninò albâ, versùs apicem cinerascens: rostro lætè flavo: pedibus lætè flavis, unguibus saturatè brunneis: iride nigrâ.

Ad. hiem. similis ptilosi æstivæ, sed fronte et pileo cinerascens-albis, nigro variis.

Juv. pileo summo et laterali saturatè cinerascensibus: lineâ a basi rostri per oculum ductâ et ad torquem nuchalem angustam conjunctâ nigricante, albo variâ: tectricibus alarum, scapularibus et secundariis intimis brunneo subterminaliter notatis: rostro nigro, versùs apicem brunnescente: pedibus sordidè flavis.

Adult in summer. Top and sides of the head and nape velvety black; from the gape a broad streak of white passes under the eyes, and is continued to the nape, forming a border to the black plumage; upper and lower tail-coverts pure white; the rest of the body beautiful pearl-grey, darker on the upper surface; wing-feathers darker grey, with white shafts, the first primary margined on the outer web with dusky black; tail-feathers dark pearl-grey, the outermost ones inclining to white, and all of them white on their under surface. Irides black; bill bright yellow, sometimes shaded with brown towards the base of the upper mandible; legs and feet bright yellow, the claws dark brown. Total length 12 inches; wing, from flexure, 10.25; tail 4.5 (middle feather 1.75 inch shorter); bill, along the ridge 1.1, along the edge of lower mandible 1.5; tarsus .6; middle toe and claw 1; hind toe and claw .2.

Adult in winter. Differs only in having the forehead and crown greyish white, mottled with black.

Young. Top and sides of the head dark ash-grey; the lores, a mark beyond the eyes (sometimes the vertex), and a narrow nuchal collar obscurely mottled with black; throat whitish; upper wing-coverts, scapulars, and long inner secondaries with a subterminal mark of brown, and with paler tips; the rest of the plumage as in the adult. Bill black, inclining to light brown towards the base; legs and feet dull yellow.

Younger state. Crown and nape greyish brown mottled with black; a small spot of black in front of the eyes, and a larger one behind covering the ears and spreading outwards; plumage of the upper parts much darker than in the adult; upper wing-coverts, scapulars, and inner secondaries blackish brown, darker towards the end and terminally margined with dull ochraceous yellow; tail-feathers blackish brown in their apical portion and narrowly tipped with white; underparts clouded with grey; throat, part of fore neck, and under tail-coverts pure white. Bill brown, changing to yellow towards the base of lower mandible.

THIS handsome Tern is very common in every part of the South Island, but is not so plentiful to the north side of Cook's Strait.

In the Canterbury Province it is particularly abundant, frequenting all the river-courses, and often spreading far over the plains. Within a few miles of the city of Christchurch I have observed it, in large flights, following the farmer's plough and picking up grubs and worms from the newly turned earth. I once saw a Hawk swoop down amongst a flock occupied in this manner and single out a bird for pursuit, but the active Tern easily evaded its enemy and then returned to its occupation behind the plough. It also frequents the cornfields and pastures, and, by devouring caterpillars and other insect pests, proves itself a valuable friend to the agriculturist.

It is remarkably active on the wing, performing very rapid evolutions, and often chasing its fellows in a playful manner and with much vociferation. When resting on the ground, the members of a flock stand closely packed together, and may be seen constantly stretching their wings upwards in the peculiar manner already noticed in treating of *Sterna frontalis*.

There is a spot of great beauty on the Waikato river where the Karapiro creek empties its placid waters into the turbulent stream of the "tua-whenua." The place I refer to is just below the bridge on the outskirts of the township of Cambridge—the furthest point on the river navigable for steamers. Immediately below this bridge there is a rocky obstruction in the bed of the river which causes an eddy of considerable force and velocity. The basin below is comparatively smooth, the river widening again at this point; and the banks, clothed with rank verdure, rise abruptly on both sides of the Waikato. Beyond are the well-kept homesteads of the settlers and far away in the background the rugged outlines of Maungakawa and Pukekura. In this picturesque spot, for the best part of a fine Sunday afternoon in spring, my thoughts absorbed "with the fairy tales of science and the long result of time," I watched a pair of these birds disporting in the air. For hours together they coursed up and down this little reach in the river, never once dipping to the stream—indeed the water was too rapid at this point to allow of surface fish being found there: high above the water, now with a winnowing Pigeon-flight, now hovering a moment in the air—rising and falling with the play of their changeful fancy—coursing first up stream to near the bridge, then wheeling round; sometimes skimming low at the place where the rapids were boiling over their rocky bed, as if to take a closer observation, and then, on reaching the bend in the river, sharply wheeling back again; and so on and on, now higher now lower, regulating their more rapid actions by a dexterous movement of their swallow-tails, and at every turn showing the snowy whiteness of their tail-coverts and their lovely coral bills. So these pretty fairy beings for hours together, without a rest and apparently for sheer enjoyment, continued to beat the air with their pointed pinions, seldom uttering a sound except when in close proximity to each other, and then *ke-e* was the simple watchword.

From watching these aerial performers in their fantastic flight till the sun had declined and its shadows had vanished, I ascended the high bank overlooking the river and witnessed one of those gorgeous sunsets on the Pirongia range for which this part of the North Island is so justly celebrated. No artist's brush can depict the glory nor human tongue describe the splendour of this sunset display. Presenting to the eye mountains of burnished gold in a sea of matchless colours and brilliant effects, the illusion lasts but a little while and then melts away in ever-varying coruscations of golden light till the sky is bathed in a soft grey twilight, to be quickly succeeded by the shades of night. Even Mr. Procter, the famous astronomer, declares that although in the sunset displays of America and Australia he has seen colours more striking, yet "for combined beauty and grandeur" the sunset which he once witnessed in New Zealand surpassed anything he had ever seen.

From Hamilton Bridge, lower down the river, on a subsequent occasion, I watched a pair of these Terns engaged in the more serious business of fishing. Here, again, nothing could be more pretty than the arrowy flight of this bird up and down the stream. Skimming near the surface and

almost touching the water, it would ever and anon poise itself in the air for a few seconds, as if to take steady aim, and then drop upon its finny prey—a small kind of *Galaxias*. Immediately on capturing this it would sweep upwards so as to have some play in the air as the little fish fell from its beak and had to be caught again in the right position for swallowing. Up and down the open reach these birds kept up this untiring flight for hours together, their lively grey and white plumage shown off to the best advantage against the dark banks and deep waters of the Waikato.

On one occasion, however, when travelling in the Lower Waikato, I observed a very considerable flock in a meadow quite close to the railway-line, where several ploughs were at work. I have also met with smaller flocks at Onehunga, Maketu, Hastings North, and at the mouths of the Rangitikei and Wanganui rivers.

Mr. Kirk writes that the local name of this bird, in the neighbourhood of Cape Kidnappers, is the “Plough-bird” or “Plough-boy,” given on account of the persistent manner in which it follows the farmer’s plough for the purpose of picking up the grubs and worms that are exposed in this operation.

On the habits of this species far inland, Captain Mair has sent me the following interesting note:—“During the calm summer evenings in December, 1879, I observed hundreds of these little birds flying round the clumps of black birch trees which here and there dot the course of the Takiahuru stream, running through the Murimotu-karioi plain on the S.E. base of Ruapehu mountain. My curiosity being aroused, I climbed to the top of one of these trees, just after sunset, and obtained a close view of these birds hovering round the trees, and ever and anon darting hither and thither, very much in the zigzag manner in which bats pursue their prey. I found that the birds were chasing small moths, beetles, &c., and now and then when a large green beetle came booming along in its flight from the plain seeking a resting-place in the trees, a score of these pretty little birds would dart after it, uttering soft plaintive cries, till one more lucky than the rest carried off the prize. Both in that month and in the preceding one I found numbers of the young of this species lying, or squatting, on the sand-banks far up the course of the Whangaehu river.”

Like the other Terns* this species breeds in colonies, placing its eggs (usually two in number) on the bare ground, without any attempt at forming a nest. It defends its breeding-place with a considerable amount of spirit, darting towards the intruder’s head, and uttering at the same time its harsh cry. The eggs are of an elegant ovoido-conical form, measuring 1.6 inch in length by 1.2 in breadth; and they present a considerable amount of diversity in their colouring and markings, varying from a pale yellowish brown to a dull olive, and marked over the entire surface with blackish brown, the spots being generally more numerous at the thicker end, but sometimes confluent in the middle, forming an irregular blotched zone. A specimen in the Canterbury Museum has the ground-colour of a pale greenish white, minutely speckled all over, but particularly at the thick end, with purplish brown; another (collected on the 22nd of October) has the entire surface covered with small round spots. One of the specimens in my son’s collection is somewhat ellipso-conical in form, measuring 1.9 inch in length by 1.25 in breadth, and is of a pale cream-colour, thickly and irregularly spotted with blackish brown, in different shades, over the entire surface.

* Respecting *Sterna frontalis* Mr. Percy Seymour writes to me:—“On the 22nd November I examined about a thousand nests of this species on Tomahawk Island, Otago Peninsula. Eggs two and three in number. This cannot be accounted for, as Mr. Potts suggests, by supposing that more than one bird laid in one nest. In one instance two very peculiar eggs were found in the same nest; they were of a pinkish colour, and spotted with red, very unlike the other eggs of this species. It is altogether outside the bounds of probability that the only two eggs of this description, out of more than two thousand eggs altogether, should by a coincidence have been laid by two different birds. A few of the nests contained only one egg each, but in these cases the eggs were usually fresh, while in the other nests they were more or less incubated.”

STERNA CASPIA.

(CASPIAN TERN.)

- Sterna tschegrava*, Lepechin, N. Comm. Petrop. xiv. p. 500 (1769).
Sterna caspia, Pallas, N. Comm. Petrop. xiv. p. 582 (1769).
Sterna megarhynchos, Meyer and Wolf, Taschenb. deutsch. Vögelk. ii. p. 457 (1810).
Thalasseus caspius, Boie, Isis, 1822, p. 563.
Hydroprogne caspia, Kaup, Natürl. Syst. p. 91 (1829).
Sylochelidon balthica, Brehm, Vög. Deutschl. p. 769 (1831).
Sterna schillingii, Brehm, tom. cit. p. 770 (1831).
Sylochelidon caspia, Brehm, tom. cit. p. 770 (1831).
Helopus caspius, Wagler, Isis, 1832, p. 1224.
Thalassites melanotis, Swains. B. of W. Afr. ii. p. 253 (1837).
Sylochelidon strenuus, Gould, P. Z. S. 1846, p. 21.
Sylochelidon melanotis, Bonap. C. R. xlii. p. 772 (1856).
Sterna melanotis, Hartl. Orn. Westafr. p. 254 (1857).
Sterna vulgaris, Ellman, Zool. 1861, p. 7472.
Thalasscus imperator, Coues, Pr. Phil. Acad. 1862, p. 538.

Native name.—Tara-nui.

Ad. ptil. æstiv. suprâ dilutè einereus, uropygio et supracaudalibus albis: caudâ albâ: tectricibus alarum dorso eoneoloribus: remigibus extûs canescentibus, primariis versûs apicem saturatoribus, scapis albis, pennis minoribus et secundariis dorsalibus pallidè einereis: pileo et nuclâ eristatâ nigris: facie laterali a narium basi ductâ eum eollo laterali et corpore subtûs toto albis: rostro latè corallino, flavo vario, versûs apicem brunnescente, apice ipsâ corneâ: pedibus nigricanti-brunneis: iride nigrâ.

Ad. ptil. hiem. similis ptilosi æstivæ, sed pileo albo minutè nigro striolato.

Adult in summer. Forehead and upper part of the head, described by a line from the posterior edge of the nasal groove, on each side, passing immediately under the eyes, and meeting in an acuminate point below the occiput, satiny black; back, rump, and upper surface of wings and tail delicate silvery grey; primaries darker grey, with white shafts; the rest of the plumage pearly white. Irides black; bill beautiful coral-red, mixed with yellow, and shaded with brown near the tips of both mandibles, which are horn-coloured; legs and feet blackish brown. Length 22 inches; extent of wings 53; wing, from flexure, 16.25; tail 6.25 (middle feather 1.5 shorter); bill, along the ridge 2.6, along the edge of lower mandible 3.6; bare tibia .5; tarsus 1.75; middle toe and claw 1.5.

Adult in winter. Differs in having the black plumage of the head largely spotted with white, especially on the forehead and lores.

Obs. At the breeding-season this bird has the plumage suffused with an extremely delicate roseate hue, which fades away after life is extinct, but does not wholly disappear from the preserved skin.

Young. Has the vertex and crown similar to the adult in winter, but the white preponderating, and the coronal cap extending halfway down the cheeks; the primaries are sooty grey, and the wing-coverts greyish brown with paler edges. Bill reddish brown.

Note. Dr. Elliott Coues, in his "Review of the Terns of North America" (Proc. Phil. Acad. *l. c.*), makes the following remarks on the synonymy of this species:—"The proper specific appellation of the Caspian Tern is not '*caspia*, Pallas,' but '*tshegrava*, Lepechin,' which latter name is proposed in the same work in which Pallas calls the bird '*caspia*,' but has priority by several pages. As, however, the word is not only barbarous, but exceedingly cacophonous, and especially as *caspia* has become so well established by common consent, I do not think it would be expedient to supersede Pallas's name in view of the very slight priority of that of Lepechin."

THE history of this fine Tern has already been so fully written that I deem it almost sufficient to record here that it occurs all round the New-Zealand coasts, where its habits are the same as in other parts of the globe. It inhabits the Palearctic and the greater part of the Nearctic Regions, also the African, Indian, and Australian coasts. It is a rare summer visitant to the eastern and southern shores of England.

It is usually met with in pairs; but I have occasionally observed parties of five or more resting on the sands near the mouths of our tidal rivers. It subsists entirely on small fish, for which it plunges into the water with considerable force; and at certain seasons it is accustomed to follow the shoals of sprats far up the river-courses, where it may be seen hovering lightly over the water in pursuit of its finny prey, and occasionally alighting to rest on a jutting stump or projecting point of rock. I have seen one capture a small flounder, and kill it by battering before swallowing it. It often makes several feints at the water before dropping into it; but the bird never misses its aim, and on rising again with a fish usually takes a wide sweep on the wing whilst stowing it away in its capacious crop. I have observed that, on the wing, this species does not move its head to and fro in the manner of the smaller Terns, but carries it vertically, with its powerful beak pointing downwards. When resting on the ground the apparently disproportionate head gives the bird an ungainly appearance; but this disappears the moment the wings are expanded; and the flight, which is generally performed in wide circles, may be described as very easy and graceful. It is less active, however, on the wing than the smaller Terns. Nevertheless it appears to have the most perfect self-control; for example, I observed one pursuing a direct flight up a river-course, at a high elevation, when it met another coming in the opposite direction at a lower level. Moved by some sudden impulse it abruptly and quickly wheeled right-about, dropped to the lower plane, and succeeded in overtaking the other bird. Writing of it, the Earl of Pembroke says: "The Tern, if the sea be smooth, has a neat little way of picking up small morsels from the surface, and, if necessary, makes a very respectable Gannet-like splash; never, however, as far as I have seen, immersing himself, and always keeping his wings in motion to get him up again." Its ordinary cry is harsh and unmusical, consisting of a loud rasping note, not unlike the low cry of the domestic Goose; at other times it utters a long peevish squeal or whistling cry, fairly represented by the syllables *queeá-queeá*. When resting on the sands it is habitually silent, but always utters its guttural cry when preparing to take wing.

The breeding-season of this species extends from November to January. The young birds, however, follow their parents up to the end of March, settling down with them on the sands, quivering their wings as if impatient of attention, and making an incessant squealing or whining cry. The eggs, usually two in number, are deposited on the bare sand, a slight hollow in the surface meeting the requirements of a nesting-place. They are ovoido-conical in form, measuring 2.7 inches in length by 1.9 in breadth, and varying from creamy white to a delicate greenish-white tint, the whole surface marked with spots and blotches of dark brown, intermixed with pale splashes of purple, these markings being most numerous at the thicker end. It should be mentioned, however, that, as in the case of other Terns, the eggs present some variety both as to size and colour; there is a specimen in the Canterbury Museum (of a pale yellowish-brown tint, thickly marked and spotted with dark brown) which measures only 2.4 inches by 1.6.

STERNA NEREIS.

(LITTLE WHITE TERN.)

Sternula nereis, Gould, P. Z. S. 1842, p. 140.*Sterna parva*, Ellman, Zool. 1861, p. 7473.*Sterna nereis*, Pelz. Verh. zool.-bot. Gesellsch. Wien, xvii. p. 318 (1867).*Sterna minuta*, Finsch, J. f. O. 1867, pp. 337, 347.*Native name.*—Tara-iti.

Ad. ptil. æstiv. suprâ dilutè cinereus, tectricibus alarum dorso concoloribus: remigibus intûs albis, extûs cano lavatis, primariis duobus externis extûs nigricantibus, scapis albis, pennis minoribus versûs apicem albis, sœcundariis intimis dorso concoloribus, dorso postico et uropygio cum supraudalibus albis: caudâ albâ: pileo postico et nuchâ cum regione oculari et supraparoticâ nigris: fronte latâ, genis et facie laterali et corpore subtûs toto albis: rostro lætè flavido: pedibus flavis, unguibus nigricantibus: iride nigrâ.

Ad. ptil. hiem. similis ptilosi æstivæ, sed pileo summo albo nigro vario: nuchâ nigrâ.

Juv. fronte et pileo cinerascenti-albis fuscescente variis: lineâ crescente ab oculo postico eirèa nucham productâ nigrâ: suprâ dilutè cinereus, plumis versûs apicem fasciâ irregulari brunneâ transnotatis: rostro flavicanti-brunneo: pedibus sordidè flavis.

Adult in summer. Forehead and along the base of upper mandible white; spot in front of each eye, crown of the head, and nape black; throat, fore neck, and all the under surface silvery white; hind neck, shoulders, back, and upper surface of wings delicate silvery grey, darker on the primaries; rump and tail, with the upper and lower coverts, pure white. Irides black; bill bright yellow; tarsi and toes yellow, the claws darker. Length 9 inches; wing, from flexure, 7.5; tail 3 (median feathers 1 inch shorter); bill, along the ridge 1.25, along the edge of lower mandible 1.35; tarsus .6; middle toe and claw .7.

Adult in winter. Differs in having the crown of the head white, mixed with black, darkening outwards, the nuchal collar being entirely black.

Obs. In some examples the first primary is margined on the outer web with black; in others it is of a uniform dark grey.

Young. Forehead and crown greyish white, mottled with dusky; from the eyes a crescent of greyish black, which encircles the occiput; the plumage of the upper parts silvery grey, mixed with white, and many of the feathers with an irregular wavy mark of dark brown near the tip; the smaller wing-coverts greyish brown; underparts white, as in the adult. Bill yellowish brown; feet dull yellow. The tail is less acuminate at the sides than in the fully adult bird.

THIS is the smallest of our Terns, and is the southern representative of the *Sterna minuta* of Europe. It is tolerably common on all our coasts, and occurs also very plentifully along the shores of Western Australia.

It is very active in its movements, flies high, turns in the air with facility, and dips into the water after its prey in a very adroit manner. When resting on the sands it appears, owing to the

shortness of its tarsi, to be actually lying on its breast; but it seldom remains long in this position, being far more restless than the other species. Rising silently, it mounts in the air, and having marked out a fishing-ground, hovers first to one end of it and then to the other, repeating the circuit with the most regular precision. It is less sociable than the other Terns, never assembling in flocks, but always associating in pairs, usually hunting together in silence but with an occasional call-note, sounding like *crek-crek*. Sometimes four are seen in company, but this only represents a family party, the additional members being the young birds of the year.

During the breeding-season it is very clamorous, especially when its nesting-ground is invaded or even approached. It deposits its eggs on the bare shingle, without any attempt at forming a nest, merely selecting a natural depression suited to its own size; and the colour of the eggs harmonizes in a remarkable manner with their surroundings.

There is nothing more interesting in the study of oology than the systematic way in which the colouring of eggs (and particularly those of sea-birds) is adapted to their natural environment.

Captain Mair has furnished me with a remarkable instance of this law of assimilative colouring for protective purposes. In December, 1875, he visited the Rurima Rocks, in the Bay of Plenty, and found large numbers of *Larus scopulinus* breeding there. In some localities the nests—roughly formed and lined with feathers—were placed in the thick masses of wild spinach or in the midst of “sand-fire.” In all such cases he observed that the eggs which these nests contained were splashed over their entire surface with large green blotches, thus assimilating their colour to the surrounding vegetation; whilst other eggs (belonging to the same species), deposited on the white sand in the immediate vicinity, had a totally different appearance, being of a light stone-colour, and so marked as to harmonize exactly with their sandy surroundings.

It is difficult, however, to account for the very intricate marking that distinguishes the eggs of *Larus bulleri* from those of its near allies, the breeding-habits of these birds not being, so far as I am aware, in any way dissimilar. An egg of the last-named species in my son’s collection is of a creamy stone-colour, with a broad irregular inky zone near the larger end, splashed on its edges with umber-brown, the rest of its surface marked, in a very eccentric way, with widely-spread hieroglyphics of the same dark colour. Possibly these markings are intended to simulate minute fragments of seaweed.

But assuming this protective resemblance to be a chief factor in determining the natural colours and markings on the surface, it is indeed very curious to observe how sometimes the eggs in one nest, produced at short intervals and all subject alike to the same conditions as to their future safety, differ from one another in their coloration. There can be no doubt that the colouring of birds’ eggs, which is chiefly due to animal matter deposited on the surface of the shell and capable of being rubbed or scratched off, must be to a large extent influenced by the state of the producer’s health and by any special sensations to which the bird may be subjected shortly before the extrusion, for it is well known that, even in the case of many birds that produce highly-coloured eggs, the hard shell is found to be perfectly white only the day before it is laid. Even Mr. Hewitson, who, in his ‘Eggs of British Birds’ (Intr. p. viii), declines to admit the general rule that the varied and beautiful hues which adorn the eggs of birds are given as a protection against discovery and destruction, is constrained to say:—“That there are several instances in which the eggs of birds are admirably adapted to and closely resemble in colour the ground upon which they are deposited, I have frequently found, much to my annoyance, when in search of them; and these are just the instances where such protection is most necessary, and where contrasting colours would lead to detection; such is the case amongst those birds which, making little or no nest, deposit their eggs, for the most part, upon the bare ground, or the shingle of the sea-beach, and leave them uncovered on the least alarm.”

This species usually lays two eggs; these are of a regular oval form, measuring 1.4 inch in length by 1.05 in breadth, and are of a yellowish white, the whole surface marked with obscure spots of purplish grey.

HYDROCHELIDON LEUCOPTERA.

(WHITE-WINGED BLACK TERN.)

- Sterna fissipes*, Pallas, Zoogr. Rosso-Asiat. ii. p. 338 (1811).
Sterna leucoptera, Meisner u. Schinz, Vög. d. Schweiz, p. 264 (1815).
Hydrochelidon leucoptera, Boie, Isis, 1822, p. 563.
Viralva leucoptera, Steph. Gen. Zool. xiii. p. 170 (1825).
Hydrochelidon nigra, Gray, Gen. of B. iii. p. 660 (1846).

Ad. ptil. æstiv. suprâ nitidè niger, dorso et scapularibus paullò fumoso lavatis : dorso postico et uropygio albis : caudâ albâ : tectricibus alarum minimis albis, medianis et majoribus pulchrè cinereis : remigibus nigris, primariis interioribus canis, secundariis nigris dorso concoloribus : facie laterali et corpore subtùs toto nitidè nigris : crisso et subcaudalibus albis : subalaribus nigris, extùs albo notatis : rostro nigro : pedibus pallidè rubris : iride nigrâ.

Ad. ptil. hiem. suprâ dilutè cinereus, collo postico nigricante notato : tectricibus alarum dorso concoloribus, quibusdam minoribus versùs basin brunnescentibus : remigibus nigricantibus, scapis ochraceis, primariorum pogonii interni dimidio albo, secundariis cinereo lavatis : tectricibus suprâ cinereis, externis albicantibus angustè albido limbatis : facie et collo lateralibus torquem interruptum collarem formantibus : subtùs omninò albus : rostro nigro, versùs basin rubescente : pedibus flavidis.

Adult in summer. Head, neck, and all the under surface shining black ; the whole of the scapulars, and the back, smoky black ; upper wing-coverts dark grey, becoming white towards the edge of the wing ; first two primaries greyish black, with white shafts, and broadly marked with white on their inner webs ; the rest of the primaries dark silvery grey, smoky on their inner webs ; secondaries sooty grey, the inner ones darker ; rump and tail, with upper and lower coverts, pure white. Irides and bill black ; legs dull red. Total length 8·5 inches ; extent of wings 21 ; wing, from flexure, 8 ; tail 2·75 ; bill, along the ridge ·9, along the edge of lower mandible 1·25 ; bare tibia ·25 ; tarsus ·75 ; middle toe and claw 1 ; hind toe and claw ·2.

Adult in winter. Forehead, sides of the head, and all the under surface pure white ; occiput, ear-coverts, nape, and hind neck greyish black ; upper surface of back, wings, and tail dark grey ; the small wing-coverts shaded with brown ; the primaries sooty black, with white shafts ; the secondaries with dark shafts, and tinged more or less with grey.

I KNOW of only one instance of the occurrence of this beautiful Tern in New Zealand. On the 12th of December, 1868, Mr. D. Monro shot a pair of them on the Waihopai river-bed in the provincial district of Nelson ; and one of these is now in the Colonial Museum. They were in full summer plumage, and were associating with a large breeding-colony of *Sterna frontalis* ; but whether they were actually nesting themselves, Mr. Monro was not able to ascertain. He mentions, however, that there was only a single pair of this species in the flock, and that they uttered at intervals a harsh croaking note.

This Tern has likewise been discovered in Australia since the publication of Mr. Gould's 'Hand-book' ; and, as it is unquestionably the same form as that inhabiting the Palæarctic Region, the species enjoys a wide geographical range.

ANOUS CINEREUS.

(THE LITTLE NODDY.)

Anous cinereus, Gould, P. Z. S. 1845, p. 104; id. B. Australia, vii. pl. 76 (1848).*Procelsterna albivitta*, Bp. Compt. Rend. xlii. 1856, p. 773.*Sterna cinerea*, Schlegel, M. P.-Bas, *Sternæ*, p. 38 (1863).*Anous albivittatus*, Finsch, P. Z. S. 1877, p. 776.*Pelecanopus pelecanoides*, Gray, List B. Brit. Mus. pt. iii. p. 180 (1844).

Ad. suprâ dilutè cinereus: pileo eum collo postico et eorporc subtùs toto albis: tectricibus alarum dorso eoncoloribus pallide brunneo paullò lavatis: primariis schistaceo-cinereis: secundariis conspicuè albo terminatis: caudâ omninò schistaceo-cinereâ: rostro nigro: pedibus nigricanti-brunneis, palmis sordidè flavis.

Adult (N.-Z. example). Head, neck, and underparts generally pure white; upper surface delicate French-grey, fading away to nothing on the hind neck, and deepening to dark ash-grey on the quills and tail-feathers; the outer web of the first primary blackish brown; the inner webs of all the primaries whitish on their anterior margin; the shafts dark brown above, whitish at the base, and entirely white on the under surface; the secondaries with a conspicuous terminal margin of white. Bill black; legs and feet blackish brown, with yellowish webs. Length 11.5 inches; wing, from flexure, 8; tail 4.25; bill, along the ridge 1, along the edge of lower mandible 1.4; bare tibia .25; tarsus .85; middle toe and claw 1.25.

Obs. On a comparison of this species with the more northerly *Anous cæruleus*, Mr. Howard Saunders remarks (P. Z. S. 1878, p. 212):—" *A. cæruleus* is smaller than *A. cinereus*, Gould, and is darker all over, especially on the underparts, which are blue-grey, whereas in *A. cinereus* they are nearly white. The differences are too great to be explained away as being due to age, and I admit the distinctness of the two species; but they are very closely allied. The fact of their being found in such close proximity within so limited an area is very remarkable."

THE unique New-Zealand example of this bird was obtained at Cape Maria Vandiemans in the early part of 1882. Mr. Robson, to whose kindness I am indebted for the skin, furnished me with the following account of it:—"After a heavy S.W. gale my sons were going through some large flax bushes and came upon this Tern in the middle of one of them. It was still living, but so much exhausted that it could only flutter a short distance, so that it was secured without difficulty. I may add that another was observed on the wing, one very calm day, there being very little doubt about the identification."

Dr. Crowfoot says of this species (Ibis, 1885, p. 265):—"These Grey Terns, called by the Norfolk-Islanders the 'Little Blue Petrel,' are fairly numerous during the breeding-season. They lay their eggs on Phillip and Nepean Islands and the neighbouring rocks. The eggs are usually placed on inaccessible ledges, but often on the sand, sometimes not many feet above the sea, but usually from 80 to 2000 feet. They make no attempt at a nest, and lay only one egg, which is the most easily broken of all the sea-birds' eggs found on these islands. The eggs much resemble those of the other species of Noddy, but the ground-colour is rather darker, and the spots are numerous, small, and more generally distributed over the whole surface than in the eggs of the other species. They measure on an average 1.6 inch in length by 1.12 in breadth, and vary but little either in size or in markings."



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SWAMP-HEN.
PORPHYRIO MELANONOTUS
(TWO-FIFTHS NATURAL SIZE)

PORPHYRIO MELANONOTUS*.

(SWAMP-HEN.)

Porphyrio melanotus, Temm. Man. d'Orn. ii. p. 701 (1820).*Black-backed Gallinule*, Lath. Gen. Hist. ix. p. 427 (1824).*Porphyrio melanotus*, Buller, Birds of N. Z. 1st ed. p. 185 (1873).*Native names.*—Pukeko and Pakura †.

Ad. supra nigricans, scapularibus et rectricibus vix brunneo externè lavatis : collo postico et laterali, tectricibus alarum, genis et corpore subtùs sordidè cæruleis : remigibus nigris, primariis extùs obscurè cæruleo lavatis : mento eum abdomine imo et cruribus nigris : subcaudalibus albis : rostro et pedibus pallidè coccineis : iride lætè coccineâ.

Adult male. Head and nape sooty black; back and upper surface of wings and tail shining black, glossed in some specimens with green; neck, breast, sides of the body, outer edges and lining of wings bright indigo-blue; abdomen and feathered portion of tibia sooty black, tinged more or less with indigo-blue; under tail-coverts pure white. Irides cherry-red; frontal plate and bill bright cherry-red, paler on the edges, yellowish towards the tips of both mandibles; legs and feet pale lake-red, brownish at the joints. Total length 21 inches; extent of wings 36.5; wing, from flexure, 11.5; tail 4.5; frontal plate, across the top, 1; from posterior edge of frontal plate to the tip of upper mandible 2.75; bill, along the edge of lower mandible, 1.75; bare portion of tibia 1.5; tarsus 4; middle toe and claw 4.75; hind toe and claw 2.

Female. Somewhat smaller in all its proportions, with the colours of the plumage duller and the bill and legs of a paler red.

Young. Has duller plumage, with the chin pale brown, the fore neck and breast more or less tipped, and the abdomen and flanks strongly suffused, with pale brown.

Younger states. The following descriptive notes on a series of specimens will exhibit at a glance the changes that take place in the young in their progress towards maturity:—

No. 1 (newly hatched). Covered with dense black down, the head, neck, wings, and back thickly sprinkled with white points; bill greyish white, black at the tip; legs purplish grey.

No. 2 (a few days older). Presents fewer of the white points, which are in reality terminal sheaths and are rapidly cast off.

No. 3 (about ten days old). Covered with sooty down; on the back and sides of the head, also on the wing, numerous stiff hair-like filaments with white apices; bill dusky black, greyish in the centre and white near the tip; frontal plate soft and of a reddish flesh-colour; crown of the head without any down, but covered with black thick-set bristles, which are continued over the eyes to the beak, and are long and

* The description of *Porphyrio cyanocephalus*, Vieill. N. Diet. d'Hist. Nat. xxviii. p. 28 (1819), appears to agree with the above, but no locality is assigned; and in the absence of more positive proof that it relates to the same bird, I am unwilling to sink so well-established a name as *P. melanotus*.

† So called by the Ngatipukeko tribe of Whakatane; just as the Ngatikahungunu called the *hapuku* "Kauaeroa" (long-jaw), in deference to the old chief to whom the name of that fish had been applied, and as the Ngapuhi changed the name of the Wood-Pigeon from *Kukupapa* to *Kuku*, out of respect to Te Tirarau's father, who had taken the former name.

recumbent along the frontal plate, evidently for the protection of its tender edges; cubitus perfectly bare and flesh-coloured; legs dusky cinereous.

No. 4 (more advanced stage). Body covered with sooty down; a line of soft pale blue feathers on each side of the fore neck and breast; stiff white filaments on the crown and sides of the head; bill black, with a whitish spot in its median portion and also at the tip of the upper mandible.

No. 5 (partially fledged). Head, nape, and upper parts generally blackish brown, edged with paler brown, tinged on the scapulars and wing-coverts with blue; throat and abdomen dusky brown; fore neck and breast pale blue; all the plumage fluffy, and with downy filaments adhering to the feathers; soft tuft under the rudimentary tail pale fulvous.

No. 6 (fully fledged). Head, hind neck, and upper surface blackish brown, with numerous touches of lighter brown, and tinged on the wings with blue; chin pale brown; fore neck, breast, and sides dull mazarine-blue, some of the feathers edged with fulvous brown; abdomen pale fulvous brown; under tail-coverts yellowish white; irides brown; bill brownish black, inclining to red towards the base and on the frontal plate; legs dark brown, with a reddish tinge.

Obs. As already shown, the colours of the bill and legs are regulated by conditions of age and sex; but they likewise differ somewhat in richness in individual examples of the male. The intensity of the blue colouring in the plumage is likewise variable; and in some specimens it extends right up to the bill, being perfectly bright on the cheeks and chin.

Varieties. The bird figured as *Porphyrio stanleyi* in Mr. Dawson Rowley's 'Ornithological Miscellany' is undoubtedly a mere albino of this species, exhibiting a few straggling feathers of a dark hue. There is a beautiful albino in the Colonial Museum, the entire plumage being snow-white, without even a tinge of colour in any part; bill and feet very pale red.

The following is the description of a partial albino obtained at Manawatu, and now preserved in the Colonial Museum:—The head, neck, and sides of the breast as in ordinary examples, except that the nape is freckled with pale brown and white; breast, sides of the body, abdomen, and flanks brownish white, clouded and obscurely banded with pale blue; under tail-coverts white; upper parts of the body brownish white, clouded and blotched with dark brown, excepting on the rump, where the brownish white is uniform; the primaries are dingy white, crossed at the base, and again in their apical portion, by a band of bluish brown, the inferior ones tipped also with brown; the coverts are white, washed with yellowish brown and obscurely banded with darker brown; outer edges of wings bright blue; tail-feathers brownish white, their coverts dark brown; bill and frontal plate as in ordinary examples; legs pale yellowish red.—Another, not unlike the last mentioned (also preserved in the Colonial Museum), has the plumage of the back, wings, breast, and abdomen entirely creamy white and brown, the former preponderating; tail-feathers and the under coverts pure white; bill and feet yellowish red. There is a similar sport of nature in the Canterbury Museum, differing, however, from the bird just described in the larger amount of white on the back and in the darker colour of its wings. In this specimen the head and neck are spotted with white, and the underparts are handsomely variegated with pale blue on a whitish ground.—Another, in the Otago Museum, has merely a few white feathers in the wings and tail; whilst a specimen in my own collection has the head and upper half of neck bluish black, with numerous scattered white feathers, which are thickest on the crown; the whole of the upper surface dull yellowish brown, clouded and barred on the mantle, wings, and tail with darker brown, and shading into blackish brown on the back and rump; the quills tawny white with broad transverse bars of brownish black flushed with blue; fore neck, breast, and sides dark brown, with obscure crescentic markings of lighter brown, and flushed all over with pale blue; abdomen and femorals dull tawny brown, with numerous rayed markings of darker brown; under tail-coverts white. Bill and legs pale red.

Another remarkable specimen, which I presented to the Colonial Museum, is somewhat similar to the above, but is several shades darker, except on the head and upper part of neck, the plumage of the breast and underparts being suffused with blue; the back and mantle blackish brown, with dull crescents of yellowish brown; the quills and their coverts more clouded with brown, and the wings at their flexure, as well as the bastard quills, washed with blue.

In both the last-mentioned specimens there is what may be termed a break in the plumage halfway down the neck, the head being appreciably darker than the body-plumage in one and as much lighter in the other.

Another abnormal example in my collection (represented by the distant figure in my Plate) has the wings pure white, with an occasional touch of colour, and the rest of the plumage as in the ordinary bird with here and there a single white feather.

THE Swamp-hen is widely distributed over Tasmania, the greater part of the continent of Australia, New Zealand, and the Chatham Islands. It occurs also in New Caledonia; and the Maoris have a tradition that tame ones were brought by their ancestors, in their migration from the historic "Hawaiki." It is abundant in our country in all localities suited to its habits, such as marshes, flax-swamps, and lagoons covered with beds of raupo and rushes. It also frequents the banks of freshwater streams; and in places contiguous to these haunts it is accustomed to resort, in the early morning, to the open fields and cultivated grounds in quest of food. It subsists principally on soft vegetable substances, but it also feeds on insects and grain. By the aid of its powerful bill it pulls up the inner succulent stems of the raupo, or swamp-reed, and nips off the soft parts near the root, holding the object in the toes of one foot while feeding, something after the manner of a Parrot. It is a noticeable fact that in many of the settled districts its numbers have perceptibly increased within the last few years, owing, no doubt, to the greater abundance of food afforded by the farms and plantations of the colonists*. Large flocks of them may often be seen spread over the stubble-fields, or diligently at work in the potato-grounds or among the standing corn. On being disturbed, they generally run to the nearest cover, only taking wing when pressed or when suddenly surprised. They rise from the ground rather awkwardly, the legs dangling and the wings being hurriedly flapped; by degrees the trailing legs are raised to the level of the body; and the flight then becomes more steady, but is nevertheless laboured and heavy. As a rule, they fly only a short distance, dropping into the nearest shelter that offers itself, and trusting for escape to their swiftness of foot; when fairly mounted in the air, however, they are capable of a rather prolonged flight, as I have sometimes had an opportunity of witnessing. They swim well, and dive when driven to it. Wounded birds invariably dive, and by this means conceal themselves till all danger has passed.

The late Mr. Henry Mair, in 1877, met with numbers of these birds in the kumara plantations, on Savage Island (Nieue), where there was no marshy ground for them to frequent. Indeed there was no water even on the island except what oozed from the sand between the tide-mark and that which could be found at the bottom of deep clefts or fissures, hardly accessible to these birds †.

The Swamp-hen may fairly be considered one of the best of our native birds. The brightness of its plumage and the extreme elegance of its movements at once arrest and please the eye, while, on the other hand, it is in very good repute as a game bird. It is interesting to watch it as it strides proudly about, balancing its body with ease on its long slender legs, jerking its head gracefully, and flirting its tail with every movement. Along the sedgy margins of the lagoons and swamps it affords good shooting, although it is impossible to flush it without a retriever; and, if hung sufficiently long and properly dressed, it makes an excellent dish. When stewed the flesh is hardly to be distinguished from that of the Capercaillie.

It is naturally shy and timid; and although I have on several occasions obtained very young ones from the swamps, and reared them with every care, I have never succeeded in completely subduing their wild nature. Some years ago, however, I had the pleasure of seeing, in the Government Domain

* Captain Mair informs me that at Whangarei (north of Auckland), during a period of fifteen years—from 1850 to 1865—he never saw one in that district. After that date they began to make their appearance, and now they are comparatively plentiful, being met with in flocks of twenty or thirty together.

† "We landed on Booby Island, a curious mass of coral rock with no other vegetation than a few stunted bushes and some coarse grass, where we nevertheless found some Quail and two or three kinds of Land-Rail, one of them identical with the Pukeko of New Zealand."—*Sir Tyrone Power*.

at Auckland, three or four of these birds so thoroughly domesticated that they would readily come at the call of the keeper and take food from his hand.

Its usual note is a short harsh cry, but when disturbed or frightened it utters a long, peevish scream; and as the bird is seminocturnal in its habits, this rather melancholy sound may sometimes be heard, at intervals, all through the night.

At Tokanu (at the southern extremity of Lake Taupo) the natives snare thousands of them in June and July, at which time they are very fat. They are caught by a very simple artifice. The natives, having marked their principal haunts, drive rows of stakes into the swampy soil at distances of a few feet. These are connected by means of flax-strings, from which are suspended hair-like nooses (made of the fibrous leaf of *Cordyline*) arranged in close succession, with the edges overlapping, and placed just high enough from the ground to catch the bird's head as it moves along the surface in search of food. As the Swamp-hen is crepuscular in its habits, being most active after dusk, it has less opportunity of avoiding the treacherous loops. It frequents the Maori plantations in considerable numbers and proves very destructive to the young crops, and later in the season it plunders the potato-fields and kumara-beds*. The snaring of these birds, therefore, on this large scale, answers a double purpose, inasmuch as the Maoris find them excellent eating when roasted in their own fat.

This bird often leaves its home in the marshes to travel over the sand-dunes amongst the tauhinu bushes in quest of grasshoppers. The footprints with their long toe-marks may be observed everywhere in the loose dry sand, testifying to the diligence of the search. At one season, when the little *Coprosma* is in berry, they come out of cover to feast upon it, the plant being a stunted one and the berries easily accessible to the Pukeko with its long neck and somewhat stilted legs.

A favourite resort of this bird is the swamp at Te Aute, in the Hawke's Bay district, one of the best shooting-grounds in the colony. Here there is a morass over three thousand acres in extent, more or less wet according to the season of the year, with a broad lagoon or mere in the centre, and swarming with wild fowl of every kind. At the time of my last visit to this familiar ground (14th December) the growth of raupo bulrush was young and vividly green, looking like an Egyptian "paddy-field." It was interesting to see the Pukekos come out in swarms on the adjoining meadows, accompanied by their young, some only the size of pullets, others more than half-grown, and all readily distinguishable by their dark bill and frontal shield. In this well-frequented place they have become quite accustomed to the railway traffic, and may be seen walking about in the most unconcerned manner within twenty or thirty yards of the passing train.

If pressed to take the water, they swim well, as I have often had an opportunity of seeing; and on this point Mr. Moore, of Waimarama, sends me the following note:—

"Several times when passing the Maraetotara, a deep limestone creek between rather high banks, I have seen these birds swimming across fifteen yards of water of about twelve feet deep. I told lots of people of this, but they would not believe it; but I have lately been able to convince several of my friends (Messrs. Frank Nairn and Mcinertzhagen among them) by actually showing them the Pukeko swimming in fifteen or twenty feet of water. The other day I was riding down to Napier, and when I came to the Maraetotara I saw some Pukekos swimming over to the other side, when all at once I

* The thievish propensities of this bird are traditional with the Maoris; and the following characteristic evidence in relation thereto was given in the Native Land Court at Marton during the hearing of the famous Rangatira case. The witness under examination, on behalf of the Ngatiapa claimants, was the old warrior, Matiaha Peko, who said:—"I was born at Te Ngeo and am the son of Takiau, the same man who, in company with Te Kapiti, killed Totohu at Te Karangi, on the banks of the Pourewa creek. This was long before the date of the Haowhenna fight on the coast (1826). They killed him for stealing the eels in that creek. Then they cut him up, cooked and eat him—eat the whole of him except the head, and that we preserved and dried in the old Maori fashion (*moko-mokai*). I helped to eat him. I saw the head. It was a huge head with crisp hair like a negro's (*poriki*), and had the face completely covered with 'tatoing.' We took the preserved head with us to Turakina, and then used it for a long time stuck on a pole, as a 'scare' to keep the Pukekos away from our potato-grounds."

heard a loud screaming, and on looking round I observed a great commotion among the birds. I then rode down to the bank, and there I saw an enormous eel fastened on to a full-grown Pukeko, which was making a strong fight for its life with beak and claws, the others helping when they got a chance. They took no notice whatever of me, although I was on horseback within ten yards of them. The contest went on for several minutes, and in the end the bird managed to free itself."

In January 1881 the following paragraph appeared in a Hawke's Bay paper:—"A Pukeko dashed through the window of a railway carriage the other day, between Kaikoura and Te Aute. The glass was a quarter of an inch thick, and the bird was killed by the force of the concussion." I happened to be travelling by the evening train and saw both the broken glass and the dead Pukeko, the author of the mischief.

The spread of this species into districts where it had hitherto been comparatively unknown, and its then becoming very abundant, is a very curious fact. Mr. Shrimpton tells me that at Amuri, in 1861, and at the Havea Lake, a few years later, they appeared first in small parties and then in considerable force, the bird having been previously quite a stranger to that part of the country. The increase was too rapid to have been the result of natural breeding, and must have been occasioned by a sudden migration from the swamps near the coast. The same thing has happened since at Whangarei, in the North Island, as already mentioned.

It usually breeds in swampy situations, the nest, which is composed of dry grass and flags, being in some instances entirely surrounded by water. In the Lake District they are everywhere abundant; and there they build their nests on the silica terraces, not in groups or colonies, but singly and without much attempt at concealment. In these localities Captain Mair has found as many as fourteen eggs in one nest, and eleven in another. Mr. T. H. Potts has described* a nest which he found in a swamp by Lake Ellesmere as being "firmly built of leaves of a *Carex*, and forming a compact mass some 8 inches in length, and not very easily to be distinguished, as the material of the nest was as green as the surrounding grasses." Mr. Donald Potts, a son of the former gentleman, has sent me the following note:—"The structure is often raised about a foot in height; and the young, on being disturbed, hide directly they are able to get out of the nest." The late Sir Julius von Haast informed me that he had observed a pair of these birds building their nest on a little pond near Mr. Hill's residence, in the Malvern Hills, on the 21st of September, that they brought forth their brood about the end of October, and commenced to form a new nest close to the old one about the middle of the following month; and eggs have been collected as late as the 13th of December. We may therefore assume that this species is accustomed to breed twice in the season.

Mr. Owen, of Wangaehu, informs me that he found a nest containing thirteen eggs. According to my experience the number of eggs in a nest varies from two to seven; but five may be considered the complement. They are broadly ovoido-conical in form, measuring 2.2 inches in length by 1.5 in breadth, and are usually of a pale yellowish brown, spotted and blotched with purplish and reddish brown; but while differing slightly from one another in size and form, they present also great individual diversity of colouring. The eggs from one nest, however many in number, generally preserve a common family likeness, and therefore admit of easy classification. A series of twelve specimens in the Canterbury Museum exhibits the following varieties of character:—A set of four (presumably from one nest) are of a pale greyish brown, marked over their whole surface with rounded spots of purplish brown; another set of four are of a warmer yellowish-brown tint, and more thickly studded with dark spots, especially at the larger end: a specimen showing a very narrow form has the entire surface covered with minute round spots, very equally distributed; another has the thick end blotched with dark purplish grey, as though the colours had been partially washed out; and another,

* Trans. N.-Z. Inst. 1870, vol. iii. p. 102.

which is of appreciably smaller size than ordinary examples, is delicately speckled all over, with here and there a larger spot, and with a dull irregular blotch of brown nearly an inch in extent towards the larger end. The last of the series to be noticed is an extremely handsome specimen: the ground-colour is a pale creamy brown, with widely scattered and obscure spots of darker brown; but the thicker portion of the egg presents numerous marbled veins of purplish brown, among which are fine pencilled markings and wavy lines of red, producing a very pleasing effect.

The series of eggs belonging to this species in my son's collection comprises upwards of twenty specimens. There is a slight variation in size and form, and also in the details of the markings. They vary from the true ovoid form to a decided ovoido-conical, the average size being 2 inches in length by 1.5 in breadth. One example differs from all the rest in being more rounded in form, measuring 1.8 inch in length by 1.45 in breadth. They are of a warm cream or stone colour, varied over the entire surface, but more particularly at the larger end, with scattered spots of reddish brown: in some the spots are rounded and widely scattered with minute specks between; in others they are irregular and smudgy; in others, again, they present underlying or washed-out spots similar to those in the eggs of *Ocydromus*. One has the entire surface covered with pretty evenly distributed roundish spots; another has the spots more thickly aggregated at the larger end; another exhibits them entirely confluent at the pole, having a smudgy appearance and ranging in tint from dull purple to chocolate-brown; whilst another, differing from all the rest, is conspicuously washed towards the larger end, and sparingly over the rest of the surface, with dark blots and smudges of yellowish and purplish brown.



Tribonyx mortieri (see Vol. I. Intr. p. xiv, and Vol. II. p. 88).



J. G. KEULEMANS DELT & LITH

JUDD & CO LIMITED, IMP

MOHO OR TAKAHE.
NOTORNIS MANTELLI.
(ONE-FIFTH NATURAL SIZE)

NOTORNIS MANTELLI.

(MANTELL'S NOTORNIS.)

Notornis mantelli, Owen, Tr. Zool. Soc. iii. p. 377, pl. lvi. figs. 7-13 (1848).

Native names.—Moho, Takahe, and Tokohea.

Ad. suprâ viridis: pileo et collo undique eum corpore subtùs toto nigrieantibus, ultramarino nitentibus: tectricibus alarum cyaneseentibus viridi lavatis: remigibus nigris, primariis extùs œerulco marginatis, secundariis intimis dorso concoloribus: eaudâ suprâ viridi dorso concolore: subcaudalibus albis: rostro latè rubro, versùs apicem flavicante: pedibus pallidè rubris: iride rubrà.

Adult male. Head and throat bluish black, passing into dark purplish blue on the hind neck; the whole of the back, rump, upper tail-coverts, lesser wing-coverts, and scapulars dull olive-green, tipped more or less with verditer-green, and of a darker shade towards the shoulders; fore neck, breast, sides of the body, and flanks beautiful purplish blue; a band of the same colour, half an inch wide, separates the dark blue of the nape from the olive-green of the upper surface; thighs, abdomen, and vent bluish black; under tail-coverts white; wing-feathers rich deep blue on their outer webs, dusky brown margined with blue on their inner; the greater coverts with broad terminal margins of verditer-green, forming crescentic bands in the expanded wings; tail-feathers dark olive-green, with brown shafts, dark brown on their under surface. The plumage of the back and rump is soft and thick, and on being disturbed is found to be dull greyish brown towards the base. Irides red; frontal plate and bill bright red, yellowish towards the tips of both mandibles; tarsi and toes lighter red; claws horn-brown. Total length 24 inches; wing, from flexure, 9.75; tail 4.5; from posterior edge of frontal plate to tip of upper mandible 3.25; from gape of the mouth, along the edge of lower mandible, 2; tarsus 3.25; middle toe and claw 3.75; hind toe and claw 1.7.

Female. A second specimen in the British Museum, which is supposed to be a female, is somewhat smaller than the above in all its dimensions, has the colours generally duller, and the olive-green of the upper parts shaded with brown.

Obs. A third example (now in the Dresden Museum) has since been captured in the Otago District. This bird, of which a detailed description will be found in the text below, is apparently a female, and differs noticeably from the two British-Museum specimens in the entire absence of the bright crescents on the wing-coverts, which are so conspicuous a feature in the latter, and particularly in the male.

THE name of Walter Mantell will ever be associated with the palæontology of the Postpliocene and Pleistocene deposits of New Zealand, as is that of his illustrious father (the late Dr. Mantell) with the palæontology of the Wealden formation of the south-east of England. Mr. Mantell was the first scientific explorer of the Moa-beds of Waikouaiti and Waingongoro, and he succeeded in forming some magnificent collections of fossil remains, which were forwarded to England and ultimately deposited in the British Museum. The value to science of these discoveries is amply demonstrated in Professor Owen's elaborate 'Memoirs' on *Dinornis* and its allies, read before the Zoological Society from time to time, and published in the 'Transactions.' Not only has Mr. Mantell contributed largely to our knowledge of the geology and palæontology of the country, but he has likewise made additions to our ornithology, the most important of these being his discovery of a living species of *Notornis*,

with which his name is now associated*. I cannot better describe this interesting ornithological event than by quoting Dr. Mantell's announcement of it in his address to the Zoological Society on the 12th of November, 1850:—

“Amongst the fossil bones of birds collected by my eldest son in the North Island of New Zealand, which I had the honour of placing before the Zoological Society in 1848 in illustration of Professor Owen's description of the crania and mandibles of *Dinornis*, *Palapteryx*, &c., there were the skull, beaks, humerus, sternum, and other parts of the skeleton of a large bird of the Rail family, which, from their peculiar characters, were referred by that eminent anatomist to a distinct genus of *Rallidæ* allied to the *Brachypteryx*, under the name of *Notornis* †—a prevision, the correctness of which is confirmed by the recent specimen that forms the subject of the present communication. Towards the close of last year I received from Mr. Walter Mantell another extensive and highly interesting collection of fossils, minerals, and rock-specimens, obtained during his journey along the eastern coast of the Middle Island, from Banks Peninsula to the south of Otago, in the capacity of Government Commissioner for the settlement of native claims. This series comprised also a fine suite of birds' bones from Waingongoro, the locality whence the former collection was chiefly obtained; and among them were relics of the *Notornis*, and crania and mandibles of *Palapteryx*. The results of my son's observations on the geological phenomena presented by the eastern coast of the Middle Island are embodied in a paper read before the Geological Society in February last, and published in vol. v. of the 'Quarterly Journal.' It will suffice for my present purpose to mention that they confirm in every essential particular the account given of the position and age of the ornithic ossiferous deposits in my first memoir on this subject ‡. The only fact that relates to the present notice is the nature of the bone-bed at Waikouaiti, whence Mr. Percy Earl, Dr. Mackellar, and other naturalists procured the first relics of the gigantic birds, sent by those gentlemen to England, and which are figured and described in the 'Zoological Transactions.' This so-called tertiary deposit is situated in a little bay south of Island Point, near the embouchure of the river Waikouaiti, and is only visible at low water, when bones more or less perfect are occasionally observable projecting from the water-worn surface of the bog. This deposit is about 3 feet in depth and not more than 100 yards in length; the extent inland is concealed by vegetation and a covering of superficial detritus, and is supposed to be very inconsiderable. This bed rests upon a blue tertiary clay that emerges here and there along that part of the coast, and which abounds in shells and corals, of species existing in the adjacent sea. This bone-deposit was evidently a morass or swamp, on which the New-Zealand flax (*Phormium tenax*) once grew luxuriantly. Bones of the larger species of Moa have from time to time been obtained from this spot by the natives and European visitors; and, as in the menaccanite sand-beds at Waingongoro, they are associated with bones of one species of dog and two species of seal. My son also collected crania and other remains of a species of *Apteryx* (probably *Ap. australis*), Albatros, Penguin,

* At a Meeting of the Wellington Philosophical Society on September 3, 1881, after the reading of a paper by the Author on the capture of another example, as narrated on p. 89, during the discussion that followed, Mr. Mantell disclaimed any credit for the discovery of the original bird with which his name had been connected. He observed it hanging in a whare at a native settlement in Otago, along with Kakapos and Kiwis that had been brought from the west coast, and, recognizing it to be new, obtained it from the owner. The second specimen was sent to him by Captain Howell of Riverton.

The Author, in reply, vindicated the name by which this bird was now distinguished (*Notornis mantelli*), and stated that more than a year before the discovery of the bird itself on Resolution Island, Professor Owen had drawn the generic characters of a large breviponate Rail, then supposed to be extinct, from the fossil remains collected by Mr. Mantell, and had named it *Notornis*, dedicating the species to the discoverer of the bones. It was somewhat curious that it should have fallen to the lot of the same scientific explorer to discover the living bird itself; and although Mr. Mantell now modestly disclaimed any merit, it seemed peculiarly fitting and right that, in commemoration of his services, his name should be permanently associated with the species. (See Report of Proc. W. P. S.)

† Zoological Transactions, vol. iii. p. 366.

‡ Geological Journal, vol. iv.

and of some smaller birds, whose characters and relations have not yet been fully ascertained: no bones of the *Notornis* were observed in this locality. . . . It was in the course of last year, on the occasion of my son's second visit to the south of the Middle Island, that he had the good fortune to secure the recent *Notornis* which I have the pleasure of submitting to this Society, having previously placed it in the hands of the eminent ornithologist, Mr. Gould, to figure and describe, as a tribute of respect for his indefatigable labours in this department of natural history.

"This bird was taken by some sealers who were pursuing their avocations in Dusky Bay. Perceiving the trail of a large and unknown bird on the snow with which the ground was then covered, they followed the footprints till they obtained a sight of the *Notornis*, which their dogs instantly pursued, and after a long chase caught alive in the gully of a sound behind Resolution Island. It ran with great speed, and upon being captured uttered loud screams, and fought and struggled violently; it was kept alive three or four days on board the schooner and then killed, and the body roasted and ate by the crew, each partaking of the dainty, which was declared to be delicious. The beak and legs were of a bright red colour. My son secured the skin, together with very fine specimens of the Kakapo, or Ground-Parrot, a pair of Huias, and two species of Kiwi, namely *Apteryx australis* and *Ap. oweni*; the latter very rare bird is now added to the collection of the British Museum.

"Mr. Walter Mantell states that, according to the native traditions, a large Rail was contemporary with the Moa, and formed a principal article of food among their ancestors. It was known to the North-Islanders by the name of 'Moho,' and to the South-Islanders by that of 'Takahe;' but the bird was considered by both natives and Europeans to have been long since exterminated by the wild cats and dogs, not an individual having been seen or heard of since the arrival of the English colonists. To the natives of the paha or villages on the homeward route and at Wellington the bird was a perfect novelty, and excited much interest. I may add that, upon comparing the head of the bird with the fossil cranium and mandibles, and the figures and descriptions in the 'Zoological Transactions' (pl. 56), my son was at once convinced of their identity; and so delighted was he by the discovery of a living example of one of the supposed extinct contemporaries of the Moa, that he immediately wrote to me, and mentioned that the skull and beaks were alike in the recent and fossil specimens, and that the abbreviated and feeble development of the wings, both in their bones and plumage, were in perfect accordance with the indications afforded by the fossil humerus and sternum found by him at Waingongoro, and now in the British Museum, as pointed out by Professor Owen in the memoir above referred to. In concluding this brief narrative of the discovery of a living example of a genus of birds once contemporary with the colossal Moa, and hitherto only known by its fossil remains, I beg to remark that this highly interesting fact tends to confirm the conclusions expressed in my communications to the Geological Society—namely, that the *Dinornis*, *Palapteryx*, and related forms were coeval with some of the existing species of birds peculiar to New Zealand, and that their final extinction took place at no very distant period, and long after the advent of the aboriginal Maoris."

In the paper which Mr. Gould read at the same Meeting, he prefaced his detailed description of the bird with the following remarks:—

"Dr. Mantell having kindly placed his son's valuable acquisition in my hands for the purpose of characterizing it in the 'Proceedings' of this Society, and of afterwards figuring and describing it in the appendix to my work on the birds of Australia, I beg leave to commence the pleasing task he has assigned me.

"The amount of interest which attaches to the present remarkable bird is perhaps greater than that which pertains to any other with which I am acquainted, inasmuch as it is one of the few remaining species of those singular forms which inhabited that supposed remnant of a former conti-

ment—New Zealand, and which have been so ably and so learnedly described, from their semifossilized remains, by Professor Owen; who, as well as the scientific world in general, cannot fail to be highly gratified by the discovery of a recent example of a form previously known to us solely from a few osteological fragments, and which, but for this fortunate discovery, would in all probability, like the Dodo, have shortly become all but traditional. While we congratulate ourselves upon the preservation of the skin, we must all deeply regret the loss of the bones, any one of which would have been in the highest degree valuable for the sake of comparison with the numerous remains which have been sent home from New Zealand.

“Upon a cursory view of this bird it might be mistaken for a gigantic kind of *Porphyrio*; but on an examination of its structure it will be found to be generically distinct. It is allied to *Porphyrio* in the form of its bill and in its general colouring, and to *Tribonyx* in the structure of its feet, while in the feebleness of its wings and the structure of its tail it differs from both. From personal observation of the habits of *Tribonyx* and *Porphyrio*, I may venture to affirm that the habits and economy of the present bird more closely resemble those of the former than those of the latter; that it is doubtless of a recluse and extremely shy disposition; that being deprived, by the feeble structure of its wing, of the power of flight, it is compelled to depend upon its swiftness of foot for the means of evading its natural enemies; and that, as is the case with *Tribonyx*, a person may be in its vicinity for weeks without ever catching a glimpse of it. From the thickness of its plumage and the great length of its back-feathers, we may infer that it affects low and humid situations, marshes, the banks of rivers, and the coverts of dripping ferns, so abundant in its native country: like *Porphyrio*, it doubtless enjoys the power of swimming, but would seem, from the structure of its legs, to be more terrestrial in its habits than the members of that genus. I have carefully compared the bill of this example with that figured by Professor Owen under the name of *Notornis mantelli*, and have little doubt that they are referable to one and the same species; and as we are now in possession of materials whence to obtain complete generic characters, I hasten to give the following details, in addition to those supplied by Professor Owen. I cannot conclude these remarks without bearing testimony to the very great importance of the results which have attended the researches of Mr. Walter Mantell in the various departments of science to which he has turned the attention of his cultivated, intelligent, and inquiring mind, nor without expressing a hope that he may yet be enabled to obtain some particulars as to the history of this and the other remarkable birds of the country in which he is resident.”

Mr. Mantell was fortunate enough to secure a second specimen of the *Notornis*; and these examples, the only two then known, having been carefully mounted by Mr. Bartlett, were placed side by side in the National Collection of Great Britain, and, like the remains of the Dodo in the adjoining gallery, have continued to the present time to attract the attention of thousands of daily visitors!

Sir George Grey tells me that in 1868 he was at Preservation Inlet and saw a party of natives there who gave him a circumstantial account of the recent killing of a small Moa (? *Palapteryx*), describing with much spirit its capture out of a drove of six or seven. The same natives pointed out to him a valley where the *Notornis* was said to be still plentiful. This was at the head of Preservation Inlet. Besides being swampy, the ground was covered with vegetation so close and thick that it was impossible to penetrate it on foot, and under this cover the *Notornis* might roam about in perfect security; for the recluse habits of such a bird, as long ago pointed out by Mr. Gould, would in these localities be its best protection.

Sir James Hector informs me that, when exploring on the south-west coast of Otago in 1863, he discovered the Maori who actually caught the first-recorded *Notornis*; and this man assured him that “there were plenty of them at the head of the N.W. arm of Te Anau Lake, near a small lake in the valley that leads to Bligh Sound.” In confirmation of the above report about the Moa, Sir J. Hector

states that, in 1862, during a visit to the Matukatuka river, he heard a singular booming noise which was followed by a shrill whistle. The same cries were afterwards heard by another exploring party, and he feels convinced that they came from some small species of Moa, of which there may yet be survivors in the six hundred square miles of "unexplored interior."

In my former edition I said:—"Although no examples of the *Notornis* have since been obtained, it does not necessarily follow that the species is absolutely extinct. The recluse habits of such a bird, as already pointed out by Mr. Gould, would account for its hitherto escaping notice in the only partially explored portions of the country; and the following extract from a letter, addressed to me by Dr. Hector in December 1866, would lead us to hope that at least one specimen more may yet be found to grace a shelf in the Colonial Museum:—"At Motupipi, about three months ago, Mr. Gibson, who is a really good careful observer, a capital botanist, and a new comer to the country, saw a bird within a few feet of him, in tall swamp-grass, which, from his description, I have no doubt was a *Notornis*!! He had never seen the plate or description of the *Notornis*; and as he knows the Pukeko (*Porphyrio melanonotus*) quite well, there is no other bird that would answer to his account. I am going back there, and will get further particulars about it."

"Dr. Hector likewise informs me that, during his exploration of the South-western portion of the Otago Province in 1861-62, he met with some traces of the *Notornis* near Thompson Sound and on the middle arm of the Anau Lake."

Since the above was written, another example has been obtained; and as a special interest always attaches to a species on the verge of extinction, I will reproduce here portions of a paper on the subject which I read before the Wellington Philosophical Institute on September 3, 1881:—

The capture of a specimen of the rare *Notornis mantelli* in the South Island is an event of sufficient importance to warrant a special memoir in our 'Transactions,' and I have therefore much pleasure, at the request of our President, in bringing before you this evening all the information I have been able to collect on the subject.

I may here mention—and I do so with regret—that the specimen which I am about to describe is no longer in the colony, having been despatched by the 'Waitangi' about three weeks ago for sale in England. It will be interesting to watch its ultimate fate; but as there are already two fine examples in the National Collection, it will most probably find its way into one of the continental or American museums*. Although we have failed to detain the prize, there is every reason to believe that the species still survives in the land, and that it will yet be added to the type collection in the Colonial Museum. It is a curious fact, illustrating the wide range of a bird supposed to be nearly extinct, that the three known examples have been obtained at localities nearly a hundred miles apart from each other, and over an interval of thirty-five years. As the species belongs to a gregarious family, and as the general character of its habitat is rough and inaccessible in the extreme, I think it may be fairly inferred that many yet survive to reward the future search of the Southern naturalist.

The two fine specimens now in the British Museum (supposed to be male and female) were obtained through the exertions of our former President, the Hon. Walter Mantell, after whom the bird was named. The first of these was captured alive in 1849 by a party of sealers at Duck Cove, on Resolution Island, Dusky Sound; the second was caught by the Maoris on Secretary Island, opposite to Deas Cove, Thompson Sound.

The third specimen, to which I have now specially to refer, was recently obtained on what are called the "Bare-patch Plains" (between the Maruia and Upokororo rivers), on the eastern

* The specimen was offered to public competition at Stevens's Rooms, in Covent Garden, and purchased for the Dresden Museum at £105, the representative of the Cambridge Museum having unfortunately ceased his bidding at £100. Its bones have since been described by Dr. Meyer, the Director of that Museum, who proposes to refer it to a new species under the name of *Notornis hochstetteri*.

side of Te Anau Lake. The circumstances of the capture were thus narrated to me by Captain Hankinson, on whose property it occurred. A man who was engaged "rabbiting" on the run had camped on the Maruroa Flat, not far from the homestead. One day his dogs ran down a large bird, and on coming up he found it alive and unharmed. Taking the bird from the dogs, he deliberately killed it, took it to his tent, and hung it up to the ridge pole. On the following day the station-manager (Mr. J. Connor), in making his customary round, visited the camp. The rabbitier had just struck his tent, and calling his manager's attention to the dead bird, still suspended to the ridge pole, told him he might have it. Mr. Connor, who was intelligent enough to suspect that he had found a *Notornis*, at once accepted the offer and took the bird home to the station, where he carefully and very successfully skinned it, preserving also all the bones of the body.

The weather had been exceptionally severe, and it is supposed that this was how the *Notornis* came to be found on the flats, having been driven down from the high country. The man who caught it said that it seemed quite tame, whereas Mantell's bird (as already mentioned) made a vigorous resistance on being taken.

Professor Parker having undertaken to describe the skeleton for our 'Transactions,' Dr. Hector invited me to undertake the same duty in regard to the skin, in order that, in default of the specimen itself, we might have on record in the colony as complete a monograph as possible of this interesting bird. I cheerfully undertook the task, and made a visit to Dunedin specially for this purpose.

On being introduced to this *rara avis* I experienced again the old charm that always came over me when gazing upon the two examples in the British Museum—the lingering representatives of a race co-existent in this land with the colossal Moa! Then, retiring to the Museum library, I shut myself in with *Notornis*, handled my specimen with the loving tenderness of the naturalist, sketched and measured its various parts, and made a minute description of its plumage.

Like many other New-Zealand forms of an earlier period, the *Notornis* is the gigantic prototype of a well-known genus of Swamp-hens. It is, in fact, to all appearance a huge Pukeko (*Porphyrio*), with feeble or aborted wings and abbreviated toes, the feet resembling those of *Tribonyx*—a bird incapable of flight, but admirably adapted for running. Similar, no doubt, was the relation borne by the powerful *Aptornis* to our present Woodhen (*Ocydromus*); but in that case the prototype has disappeared, leaving only its fossil bones for the study of the scientist, and its place in nature to be filled by its existing diminutive representatives.

The interest attaching to *Notornis* has been greatly enhanced by the discovery that the white Swamp-hen, of Norfolk Island, belongs to the same genus, as this has an important bearing on the study of geographic distribution*.

The characters of the genus *Notornis* were first determined by Professor Owen, in 1848, from certain fossil remains collected by Mr. Mantell in the North Island of New Zealand, and consisting of the skull, beaks, humerus, sternum, and other parts of the skeleton of a large brevipennate Rail. The sagacity with which the learned professor had interpreted these bones, and the absolute correctness of his prevision, were exemplified in the discovery which enabled Mr. Gould, in 1850, to communicate to the Zoological Society the complete generic characters of the bird, already known to science as *Notornis mantelli*, Owen. In illustration of these, Mr. Gould furnished to the Society a coloured sketch of the head of *Notornis*, in his usual artistic style; and at a later period he published, in the Supplement to his 'Birds of Australia,' a full-sized drawing of the bird. These plates are very beautiful, but on a close comparison with the specimen to which these notes more especially refer, I find that some of the minor features have been overlooked by the artist, or sacrificed to pictorial effect.

* *Notornis alba* is established, by Herr von Pelzeln, on a specimen acquired at the sale of the Leverian Collection, which was without doubt the type of *Fulica atra* of White's 'Voyage' and the *Gallinula alba* of Latham. This bird had been erroneously considered by Temminck and G. R. Gray to be an albino variety of the well-known *Porphyrio melanotus*.

In the following descriptive notes I have therefore deemed it best to record the characters (generic as well as specific) with some minuteness of detail.

The bill is somewhat shorter than the head, greatly compressed on the sides, and much arched above, the culmen having a convex or rounded aspect, with a uniform width of three eighths of an inch from above the nostrils to within half an inch of the tip, when it rapidly diminishes, terminating in a rounded point. Where it merges into the frontal shield, the culmen is five eighths of an inch in width. Gould has somewhat exaggerated in his drawings the angle of declination towards the corners of the mouth, also the serrated edge of the upper mandible. In this specimen there is only the slightest indication of pectination. The cutting-edges of both mandibles are sharp to the touch. The horny covering of the bill rises on the forehead to a line with the posterior angle of the eye, forming a depressed frontal shield (not arched as in the drawing). Nostrils oval, placed in a depression near the base of the bill, and forming an oblique opening, nearly twice as large as shown in Gould's sketch of the head (Proc. Zool. Soc.). Wings short, rounded, and slightly concave; ample in appearance, but useless for purposes of flight; first quill shortest, second half an inch shorter than third; third, fourth, and fifth longest and about equal; sixth scarcely shorter than fifth. On examining the wing-feathers they are found to be feeble and pliant, the outer webs being almost as broad as the inner. The tail-feathers are likewise soft and pliant, with disunited filaments, much worn at the tips. The tarsi are long, strong, and well proportioned to the bird; longer than the toes (exclusive of claws), rounded in form, and armed in front with fourteen more or less broad, regular, transverse scutellæ, forming an effective shield; on the middle toe there are twenty-three transverse scales, all very regular, but narrowed at the joints; on the inner toe fifteen, and on the outer toe twenty-one. On the hind toe there are five scales. The claws are strong, thick, not much arched, rather sharp on the edges, but with blunted points, especially on the hind toe. The palate is deeply grooved.

Head and upper part of neck very dark blue, changing according to the light into brownish black on the crown and nape, brighter on the cheeks and sides, and passing into dark purplish blue on the lower part of the neck; the whole of the back, rump, and upper tail-coverts rich olive-green, varied more or less, and particularly on the shoulders, with dull verditer-green, the feathers shading off into that colour at the tips, the general olive hue, however, predominating towards the sides of the body; fore neck, breast, sides of the body, and inner portion of flanks beautiful purplish blue; the lengthened pectoral plumes which overlap the sides and the outer portion of flanks vivid purplish blue, mixed and varied, especially on the former, with verditer-green; abdomen, thighs, and vent dull indigo or bluish black, more or less mixed with brown; under tail-coverts pure white. The general upper surface of the wings is a rich mixture of blue and verditer-green, very difficult to express exactly in words, the combination having something of the effect, in certain lights, of *lapis lazuli*.

On a close examination of the larger coverts it is found that they are marked transversely with numerous delicate rays of a darker purplish blue, adding much to the beauty of the plumage. On the lesser coverts this rayed character, although present, is less conspicuous, and the olive hue is more pronounced, while on the scapulars it becomes predominant, resembling the plumage of the back. The outer edges of the wings and the tertial plumes are very rich purplish blue or obscurely rayed with green. The outer primaries are blue on their outer webs, but this rapidly changes to dull sea-green, which colour prevails on both webs of the secondaries, only washed with a brighter tint on the outer vane. This colour deepens again into olive on the inner secondaries and their coverts, thus harmonizing with the plumage of the back. The under surface of the quills is uniform blackish brown, and the shafts are white towards the base; the axillary plumes and the larger inner coverts are of the same colour, tipped on their outer aspect with blue, and the smaller coverts, which are of very soft texture,

are entirely blue. The tail-feathers are dark olive, mixed with verditer-green on the upper surface and changing to dull olive-brown, with lighter shafts, on their under surface*.

The bill has lost its original colour through being dried. On the frontal plate and along the basal edges of both mandibles it appears to have been dark red, fading outwards. The culmen still has traces of its original pinky colour; but the sides of both mandibles, in the present condition of the specimen, are reddish horn-colour, fading to whitish horn along the cutting-edges. The tarsi and toes appear to have been originally light red, having now faded to a transparent reddish brown, paler on the toes. Claws dull brown, lighter towards the tips.

The texture and general appearance of the plumage on the head, neck, and underparts generally is very similar to that of the Pukeko (*Porphyrio melanonotus*), although the latter bird lacks the produced bright-coloured pectoral plumes which overlap the sides of the body, under the wings, in *Notornis*. The plumage of the back is very long and thick, but at the same time soft and somewhat silky to the touch, being evidently adapted to haunts where the bird is constantly subject to drippings from wet herbage. On moving this plumage with the hand it is found that the basal portion, comprising more than two thirds of the feathers, is of a uniform blackish brown, whereas the basal plumage on the other parts of the body is dark grey. The plumage of the head and neck is short and close, as in *Porphyrio*, the feathers having a soft texture. The whole of the upper surface has a slight sheen upon it (amounting almost to a glint on the tips of the shoulder-plumage), and the bright hues of colour on the back and wings change slightly under different lights. The plumage covering the flanks and overlapping the thighs is dense and long, while its brilliant blue and green colours contrast strongly with the olive plumage of the back and rump. When looked at in front, with the wings closed in against the body, the purplish vivid blue already described is very conspicuous. The carpal spur is shaped like the claw of the hind toe, but is less arched; it is nearly one eighth of an inch thick at the base, and is dark brown, fading into horn-colour at the tip.

Measurements.—Approximate length (measuring from tip of bill, following its curvature, and from the forehead to the end of the tail) 24·5 inches; wing, from flexure, 10; from humerus to flexure 3·75; carpal spur ·4; tail (to extreme tip) 4·75; bare part of tibia 1; tarsus 3·5; middle toe 3, its claw 1·1; inner toe 2·2, its claw 1; outer toe 2·4, its claw ·8; hind toe ·75, its claw ·75. Bill, from posterior edge of frontal plate to tip of upper mandible 3·4, from gape along edge of upper mandible 2·5, along edge of lower mandible 2·25; greatest width of bill, measuring across from the summit of the arch, or culmen, to the junction of the rami 2.

Observations.—Taken altogether, the specimen is a very fine one—probably an adult female. The plumage is somewhat worn, the primaries and tail-feathers having their webs more or less abraded on their outer edges and tips. The edges and sides of the mandibles are considerably worn, indicating a fully adult state. The claws of the toes, and particularly that of the hind toe, appear to be much blunted by use. The colours of the plumage generally are brighter than in the supposed female specimen in the British Museum, but they are, I think, less brilliant on the whole than in the British-Museum male: notably there is an entire absence of the well-defined terminal margins of verditer-green on the wing-coverts which form crescentic bands in the type specimen. There are, however, as mentioned above, different blending shades of green and blue on the plumage of the

* According to Radde's 'Nomenclature of Colours,' my "olive-green" of the back in the above description is grass-green No. d mixed with yellow-green No. d; my shades of "verditer-green" on the shoulder-plumage &c. correspond to blue-green No. P, or come between that and No. Q, with a mixture of grass-green No. K, although brighter; but there is no standard in the whole of Radde's formulary that realizes my "vivid purplish blue"—No. G comes nearest, but it lacks the depth and brilliancy. It is quite obvious that where the colours run from one shade of brilliancy into another on the same feather and the general tone and effect vary in different parts of the same plumage, it is quite impossible to make any standard of colours exactly applicable for purposes of minute description.

wings, which impart to it a very beautiful appearance. My recollection of the female specimen in the British-Museum collection is that it has these crescentic markings far less conspicuous than in the male.

Note.—There appears to have been originally very little colour in the beak except on and below the frontal shield and along the basal edges of both mandibles. The legs are in much the same condition as that presented by the legs in a dried Pukeko skin, the colours having faded out; but there is enough colour left in the tarsi to show that the legs and feet were originally, as described above, a light (probably pinkish) red. The skin is much stretched by unskilful treatment after being removed from the body; but I have allowed for the stretching in taking the measurements given above.

I remarked to Professor Parker, on first taking up the specimen, that the legs appeared to be more attenuated than in the British-Museum examples, and the measurements which I afterwards made, as given above, prove that the toes are somewhat longer proportionately to the size of the bird, which is altogether slightly larger than the type-specimen. The frontal shield is, however, somewhat smaller, being just one inch across in its widest part, and ascending barely half an inch from the base of the culmen; it has a corrugated shrivelled appearance in the dried specimen, and from the sides of the bill, at its base, the cuticle is inclined to peel off. The skin (in the dried state) is very tough, having the appearance and consistency of fine leather.

Hab. South-west portion of South Island. As already mentioned, the first recorded specimen (in 1849) was obtained on Resolution Island, the second, nearly three years later, on Secretary Island in Thompson Sound, and the third, which has formed the subject of this paper (in December 1879), on the eastern side of Te Anau Lake*. Taking these three localities as marking the points of a triangle describing the ascertained limits of its occurrence, we have before us the present range of *Notornis* over a considerable area of very broken and rugged country. As its fossil remains testify, its ancient range was far more extensive, including the North Island, and in prehistoric times probably reaching much further.

Since the casual discovery of the third example of *Notornis mantelli* mentioned above, an active search for this bird has been prosecuted in many parts of the South Island, but hitherto without success. The most enthusiastic of these *Notornis* hunters is undoubtedly Mr. A. Reischek, who has now spent the best part of a year in the fruitless quest, having had, for months together, no other companion in these mountain solitudes than his well-trained dog Cæsar. The last report received from him—just as these pages were going to press—records his continued disappointment as regards *Notornis*, and also affords at the same time a glimpse of the hardships he has gone through in his persistent search for the bird, as the following passages will show:—

“I again write to you something more from my diary. This time it will be a trip from the Paringa Station to the glacier region in the Alps behind. The weather had been wretchedly bad—nothing but a continuation of rain, snowstorms, and gales, lasting a long time, which caused very heavy floods; but on December 12, in the evening, I was rejoiced to find the glass rising, and, with the hope that there would now be a few fine days, I at once packed my swag with provisions, ammunition, blanket, &c., and made an early start at 3 A.M. next morning, my dog Cæsar being my companion. I took a south-westerly direction up the mountain, following an overgrown track which

* Still more recently a fresh skeleton of *Notornis* has been found, the event being thus recorded in ‘The Dunedin Herald’:—“Curiously enough close to the spot in the Mararoa district where the live Takahe was caught, a skeleton very nearly complete has been found. There are all the large bones, with the beak and thirteen of the vertebræ. Most of the ribs, toes, and tips of the wings are missing. The longest leg-bone measures $6\frac{1}{4}$ inches. The head is nearly 5 inches, measured round the curve of the beak.” The skeleton was subsequently secured by Professor Parker, and is now in the Otago Museum.

had been cut to get sheep to the grass country above, but was now quite abandoned. The track led through dense forest, and in places was blocked by trees lying across. These giants, in some parts near the track, had been torn up and broken by some whirlwind, and lay like fallen men on a battle-field. You can easily imagine that this, together with the undergrowth which had sprung up, made travelling with a heavy swag rather laborious work. Only those who have travelled with swag and gun through such country and up steep hills have any idea of the labour required.

“In the evening the track got to an end, when I came out on the grass country, at 3500 feet above sea-level. Here I camped. Three dwarf birch-trees formed the roof of my shelter, and a few tussocks formed my bed. After lighting a good fire, I searched for water, which is generally found on these Alps clear and good; but in this case I was doomed to disappointment, for all I could get was stagnant water full of insect-life. In spite of my fire and shelter, I found it bitterly cold; a sharp wind came from across the ice and snow of the glaciers which chilled me to the marrow. Sleep was out of the question; and as the moon had now risen, I took some provisions and a gun and ascended higher.

“It was a lovely night indeed, and Nature had put on her most romantic garb. How I wish I could describe it to you! Imagine the silver shimmer of the moon lighting up the landscape, causing endless shades and reflections of the hills and vegetation; the valleys covered with a silver-grey mist, the sparkling stars competing with the glaciers in brightness, and the dark cliffs dotted over with patches of snow. All this grandeur and the solemn silence of the scene put me in mind of the fairy tales of my childhood. Yes! here is loveliness enough, but the fairies have gone. I walked on for about three hours, up and down these mountains and gullies, when I heard the booming noise of some bird. Thinking I had now come on the bird I had so anxiously searched for on all my West Coast trips (*Notornis mantelli*), I carefully followed up the sound, which led me to a lagoon; but my disappointment was complete, for instead of a *Notornis* it proved to be a Bittern. Through the silence the booming appeared to be far louder than the usual sound of the Bittern. I was indeed much surprised to find this bird at an altitude of about 4000 feet. Journeying over huge blocks of rocks (which lay as if they were on purpose thrown together) on one side and deep precipices on the other, I came to a stop, and there was nothing for it but to await daylight. There being no vegetation, I could not light a fire, so had to walk about to keep warm. Dawn at last appeared, and no Laplander ever welcomed the glorious sun more joyfully than I did in this region. Still ascending, I crossed snow-fields which were of considerable depth in some places. The snow had been blown together, and was frozen so hard that I had to take my tomahawk to chop it down so as to get softer snow to refresh myself with a wash. My breakfast was snow dissolved in my mouth, with a little oatmeal and a few biscuits. The walking now became easier over the snow, and I was able to travel much faster. At last I arrived at the source of the left branch of the Paringa river, and a short distance from the Hooker Glacier. The grandeur of the scene caused me to stop, and although I have travelled through many of the mountainous parts of Europe, and have ascended some of the glaciers, I never beheld anything more beautiful than this charming scene before me. The sky was clear and cloudless. The Paringa river was seen winding its course, like a huge eel, through the valley in a northerly direction to the ocean; N.W., Lake Paringa, like a horseshoe, and Lake Roskill lay buried in the dense forest below; W.S.W., the Blue river with its oblong lake; S. and S.E., a large extent of forest with dark cliffs and enormous fissures, and rugged snow-clad peaks. Then Mount Cook came in full view with his companion snow-capped mountains, and their network of glaciers stretching out for miles. It was bitterly cold and freezing. Then the sun rose higher, throwing his rays on the masses of ice and snow, and making them scintillate like mountains of diamonds. This imposing scene did not last long, I am sorry to say, for the heat of the sun caused a vapour to rise which soon covered up this lovely panorama.”



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LAND RAIL
RALLUS PHILIPPENSIS.

(THREE-FOURTHS NATURAL SIZE)

RALLUS PHILIPPENSIS.

(BANDED RAIL.)

- Rallus philippensis*, Linn. Syst. Nat. i. p. 263 (1766).
Râle rayé des Philippines, Buff. Pl. Enl. 774 (1784).
Philippine Rail, Lath. Gen. Syn. iii. pt. 1, p. 231 (1785).
Rallus assimilis, Gray, App. Dieff. Trav. ii., App. p. 197 (1843).
Rallus pectoralis, Gould, B. of Austr. vi. pl. 76 (1848, nec Less.).
Rallus forsteri, Hartl. Arch. f. Naturg. 1852, p. 136.
Hypotænidia philippensis, Bonap. C. R. xliii. p. 599 (1856).
Rallus hypotænidia, Verr. Rev. et Mag. de Zool. xii. p. 437 (1860).
Rallina philippensis, Wall. P. Z. S. 1863, p. 36.
Rallus (Eulabeornis) philippensis, Martens, J. f. O. 1866, p. 28.
Rallus pictus, Potts, Trans. N.-Z. Inst. iv. p. 202 (1871).
 ? *Rallus macquariensis*, Hutton, Ibis, 1879, p. 454*.

Native names.

Patatai, Popotai, Mohotatai, Moho-patatai, Moho-pereru, and Puohotata; "Land-Rail" of the colonists.

Ad. suprâ brunneus, interscapulio saturatiore, plumis omnibus latè olivaceo-fulvo lavatis et marginatis, plerisque albo maculatis aut interruptè transfasciatis, uropygio tantùm unicolore, supracaudalibus minùs albo notatis:

* Note on *Rallus macquariensis*, Hutton, Ibis, 1879, p. 454 (♀, obtained at Macquarie Island).—Is this form specifically distinct, or is it a mere variety of the widely-spread *R. philippensis*? Compared with some New-Zealand examples of the latter it might perhaps pass for a distinct species; but on being judged along with a series exhibiting much variation in the plumage, its claims to separate recognition are seriously damaged. The nuchal colour is indicated by a wash of rufous among the plumage, and I observe, on moving the feathers, that this colour is more pronounced on one side than on the other, indicating, it would seem, a transitional state, or at any rate an indeterminate condition of plumage. The rufous colouring shades into brown on the bar which crosses the eyes and fills the lores, exhibiting only a tinge of rufous on the ear-coverts; but the shape of that bar, spreading as it does below the eye, is the same as we find it in Australian examples of *Rallus philippensis*. The grey superciliary stripe is certainly indistinct, but it is nevertheless present, forming a mere line immediately over the eyes, but spreading out beyond. The banded markings on the sides and flanks are far less pronounced than in the bird of which I have given a figure; but I have in my possession younger specimens with even less of this character than the Macquarie Island bird. At first glance the upper surface of the body would seem to be entirely without spots, but on moving the plumage it will be seen that there are very distinct round white spots on some of the feathers composing the mantle, while on the primary-coverts they are of a tawny colour, and blend with the surrounding plumage. The quills are barred with chestnut, exactly as in *R. philippensis*, and the plumage on the crown of the head, throat, fore neck, and abdomen is the same; there are slight indications of white spots on the lower sides of the neck, and there is a wash of rufous chestnut forming a broad band across the breast. There are no structural characters by which to differentiate the species. Slight differences in the plumage are observable, but these are less than are to be found on a comparison of the New-Zealand bird with that inhabiting Fiji, and certainly not more than those existing between our bird and that from the Pelew group. Judging by the indistinct character of the markings on the sides and flanks, and the general softness of the plumage, I should conclude that Prof. Hutton's type is a somewhat immature bird; and, for the reasons I have stated, I doubt very much its being more than a local variety of *Rallus philippensis*.

pileo summo olivascenti-brunneo, unicolore : strigâ superciliari angustâ anticè albidâ, posticè cinereâ : strigâ alterâ a basi maxillæ per oculum ductâ ad collum laterale conjunctâ, sordidè castaneâ, torquem collarem distinctam vix formante : tectricibus alarum dorso concoloribus et eodem modo albo notatis, majoribus extis fulvo, intùs castaneo conspicuè maculatis : alâ spuriâ remigibusque brunneis castaneo transfasciatis, primariis extùs fulvescente notatis et albo angustè transversim lincatis : caudâ brunneâ olivascente lavatâ : mento albo : genis et gutture toto cinereis, parte inferiore paullò olivascente lavatâ : corpore reliquo subtùs cinerascenti-brunneo, fulvo aut albido crebrè transfasciato : torque pectorali pallidè ferrugineâ, plus minusve distinctâ : hypochondriis et subcaudalibus nigricantibus albo distinctè fasciatis et fulvescente terminatis : abdomine imo fulvescenti-albo : rostro flavicanti-brunneo, ad basin rufescente : pedibus pallidè brunneis : iride rufescenti-brunneâ.

Adult. Crown of the head and all the upper surface brownish olive ; the feathers of the back and the inner scapulars broadly centred with brownish black ; the feathers of the hind neck and upper part of the back, as well as the upper wing-coverts, marked on both webs with two spots of white, surrounded more or less distinctly with blackish brown ; streak over the eyes, chin, and throat greyish white, deepening into dark grey on the sides of the head and on the fore neck ; a band of chestnut-red, commencing at the base of the upper mandible, passes through the eyes and down the neck, uniting on the nape in a broad patch of the same colour varied with brown ; breast and sides of the body brownish black, crossed by numerous narrow well-defined bars of white, tinged more or less with fulvous, and tipped with olive-grey ; on the sides and flanks the ground-colour is darker, and the bars are further apart ; across the breast a broad zone of reddish buff ; abdomen, thighs, and vent buffy white ; under tail-coverts black, barred with white and largely tipped with buff ; primaries dark brown, the two outer ones crossed by narrow interrupted bars of fulvous white, and the rest broadly barred on both webs with dull chestnut-red, varied more or less on the third quill with white ; secondaries barred in a similar manner, but with a whitish spot near the extremity of both webs ; outer scapulars brownish black, with numerous elliptical spots of white on both webs, and edged with pale olive-brown ; tail-feathers olive-brown, with darker shafts. Irides reddish hazel ; bill reddish brown at the base, fading into yellowish brown at the tip ; tarsi and toes light brown. Total length 12 inches ; extent of wings 17.5 ; wing, from flexure, 5.5 ; tail 2.5 ; bill, along the ridge 1.6, along the edge of lower mandible 1.75 ; tarsus 1.5 ; middle toe and claw 2 ; hind toe and claw .65.

Female. The colours generally are duller, the nuchal collar is indistinct, the pectoral band is reduced to a narrow indeterminate zone of yellowish brown, and the bars on the underparts of the body are far less conspicuous than in the male, being much interrupted or broken.

Young. Differs from the adult in having the upper surface lighter, the feathers having broader margins of fulvous brown, with very small white spots, and these widely scattered. The facial streak and nuchal collar are dull chestnut-brown, and not well defined. On the breast there is a mere wash of pale chestnut ; and the underparts and flanks, instead of being striped or banded, present only obscure broken bars, the whole plumage of the under surface being several shades lighter than in the adult, and suffused with pale fulvous. The axillary plumes, however, are perfectly black, with widely separated narrow white bars. The barred markings on the wing-feathers are even more pronounced than in the old bird, and extend higher on the coverts. Bill and legs pale brown.

Chick. Covered with sooty black down of silky texture, but without any gloss ; bill greyish white ; legs blackish brown, darker behind.

Var. At Napier I examined a partial albino which had been shot in the vicinity of the town :—The vertex, broad line over each eye, the cheeks and throat, also a broad irregular patch on the breast, nearly covering the place of the chestnut band, pure white ; on the neck and shoulders likewise some touches of white ; the rest of the plumage normal.

Remarks. Like other members of the group to which it belongs, this form is liable to considerable variation of plumage. In the numerous examples which have come under my notice, the pectoral band, although never entirely absent, has varied both in extent and colouring from a narrow interrupted line of sandy buff to a broad zone of rich chestnut. Drs. Finsch and Hartlaub, in a communication to the Zoological Society

(November 26, 1869), state that "in a set of specimens from the Pelew Islands, some had the rufous pectoral band, in two others it was entirely wanting, and in one bird there was only to be seen a faint trace of it;" and they therefore conclude that their so-called *Rallus forsteri* is nothing but a state of plumage due to age or season. The extent and colour of the facial band is likewise variable: in some it is of a rich dark brown with well-defined edges, the grey plumage above forming a long narrow streak, while in others it is diffused, largely mixed with rufous, and spreading considerably on the hind neck. The distinctness of the white bars on the underparts varies in different individuals; but this seems to be in some measure dependent on the age of the bird. An example which died in the Zoological Society's Gardens, and was kindly forwarded to me by Dr. Selater for examination, had the whole of the upper surface spotted with white, largely tinged on the wings with fulvous; others, again, I have seen in which the spotted markings were almost entirely confined to the hind neck and shoulders; but as it would be easy to bring together a complete intermediate series, this is of no value as a distinguishing feature. Mr. Potts's so-called *Rallus pictus*, characterized by its decidedly superior size, would certainly be entitled to recognition but for the great variation in this respect to which this species is subject. The garter, or bare tibia, mentioned by Mr. Potts in his description of *Rallus pictus* (*l. c.*), is to be found also in ordinary examples of our *R. philippensis*, although, of course, this feature is proportionally more conspicuous in the larger birds. No weight can be attached to the slight peculiarity in the shape of the bill, unless it should prove to be a constant character; for I can give an instance within my own experience of a very manifest modification in the bill of a Rail through purely accidental causes. On this point Dr. Finsch writes to me as follows:—"I received in Haast's last collection a specimen of the so-called *Rallus pictus* from the Okarita lagoon; but I find that it differs in no way from those collected in the Pacific and elsewhere." Mr. Gould also, in treating of this species*, regards the birds received from Southern and Western Australia, "which are rather smaller and have more attenuated bills," as mere local varieties.

Among those in the Colonial Museum collection, one has the narrow superciliary streak perfectly white in front; another has the pectoral band of a rich buff colour, and about an inch in width, with the banded markings of the underparts very pronounced and extending up to the commencement of the fore neck.

Notwithstanding this extreme tendency to variation, I have never met with any instance of albinism except the one mentioned above.

I have examined and compared a pretty extensive series from different regions with the following result:—An example of *Rallus philippensis* from Fiji is more spotted than our bird, the round white spots spreading all over the mantle, wings, and upper tail-coverts; there is absolutely no pectoral band, not even an indication of it; the nuchal collar of chestnut is very much enlarged, being about an inch and a half in depth, blending with the brown colour on the nape, but giving a rufous blush to the crown and forehead, and extending in a broad bar across and somewhat under the eyes to the base of the upper mandible. In this tendency of the chestnut colouring to overrun the crown and vertex this bird shows an approach to *Rallus striatus* of India, in which the rufous crown and nape is a distinguishing feature. There is a further resemblance in the absence of the pectoral band; but the striated character is entirely different, the wings of the latter being adorned with transverse and wavy lines or bars of white, which at once distinguishes this bird from all the others. In a bird from Pelew Island, on the other hand, there is only the slightest indication of a nuchal collar, and the crown is faintly suffused with chestnut; whilst a bar of dull chestnut brown covers the lores, passes through and under the eyes, and then becoming narrower, passes over the ears and fades away on the nape; the spotted markings on the back and wings are less distinct, and in place of the pectoral band there is a mere wash of rufous yellow, forming a narrow zone. Moreover, the bill is decidedly more slender than in any of the preceding forms. The Australian bird is similarly marked to ours, the pectoral band and the banded markings on the underparts being very conspicuous, the former measuring more than half an inch in width, and being of a rich chestnut-brown. Owing to the absence of this interrupting pectoral band in the Fijian bird, the striped appearance of the underparts is very pronounced, especially as it reaches almost to the fore neck. In addition to this special feature, the bill, legs, and toes are appreciably stronger than in any of the other forms enumerated above.

* Handbook to the Birds of Australia, vol. ii. p. 384.

WE are standing on the banks of the Horowhenua Lake, perhaps the most picturesque sheet of water in the North Island. Shaded by a lofty forest, and its banks clothed with beautiful evergreens to the water's edge, studded with lovely wooded islets, and along the shore fringes of raupo alternating with overhanging bush and charming little beaches, it is the perfection of a New-Zealand lake and a favourite resort for numerous waterfowl. We have just quitted our canoe, after a long day's duck-shooting, and our Maori attendant is now securing it to a stake in the bank. The evening is advancing and all is still. A string of Black Swan, high in the air, are winging their way to some favourite feeding-ground near the coast; a pair of Papango, having just emerged from a bed of reeds, are floating on the placid waters; a small Black Shag with much awkward fluttering is settling itself for the night in a kowai bough overhanging the lake; a solitary Pekapeka is flitting silently overhead, chasing in zigzag lines the minute insect-life upon which this bat subsists; the locust has ceased his drumming, and the melancholy note of the Fern-Sparrow, calling to his fellows among the rushes, has grown languid and finally died away; now, with the deepening shade comes the doleful cry of the Morepork, and at intervals of five minutes the Kockoea, from a distant clump of bush, sends forth one long and plaintive scream, and then all is quiet again. We listen, and in the stillness of the evening there falls upon the ear, with peculiar effect, a sharp, shrill cry, like the scream of a startled sea-bird. Still we listen, and the cry is repeated over and over again before we are able with any certainty to locate the sound; at first it seems in front of us, then to the left of us, then to the right; and whilst we are still in doubt it ceases altogether. This is the cry of the Patatai, the subject of this article. It is a difficult sound to denote by syllables, but easily distinguished from all the other voices of the field and forest.

That the bird is semi-nocturnal in its habits I have no doubt, for on one occasion in the Here-taunga district I heard its unmistakable cry long after darkness had set in. It is also frequently heard in the early morning.

Allowing that the varieties enumerated above are all referable to one and the same species, we find that this Rail enjoys a very extensive territorial range. It is found all over the southern portion of the Australian continent; and, unless Mr. Gould's specimens from the north coast and from Raine's Islet should hereafter prove to be a distinct species, it has an almost unlimited range northwards, migrating from one part of the country to another with the changes of season. It occurs also in Polynesia proper, the Celebes, the Navigators', the Caroline Islands, New Caledonia, and the Philippine Islands*. It is spread throughout New Zealand in all suitable localities; but owing to its extremely shy disposition, it is far oftener heard than seen. It rarely takes wing—and when it does, flies low and straight, with the legs trailing behind, and soon drops under cover again. But it is a nimble runner, and glides through the dense herbage with amazing facility. It feeds on insects, seeds, and the succulent parts of various native grasses; and its habits generally are very similar to those of the Land-Rail (*Crex pratensis*) of Europe.

It is also to be met with in the mangrove-swamps, in the branches of the Waitemata and Kaipara, at the Whangarei heads, and in other similar localities.

This is one of the few native birds that have perceptibly increased with the progress of settlement, the new conditions of life being favourable to their existence. Twenty years ago it was an extremely rare bird in all parts of the country; now it is to be met with in suitable localities everywhere, and especially in the settled and cultivated districts. I have even heard its unmistakable cry on quiet evenings, from my own garden on Wellington Terrace, and very recently the local newspapers recorded the capture of one in the Union Steamship Company's Offices in the very heart of the city.

* The Otago Museum contains a veritable example from Macquarie Island, a fact of considerable interest from a zoogeographical point of view.

I had a live one in my possession for several months; but it was so incessantly active in its movements that I had the utmost difficulty in making a life-sketch of it. This bird was brought to me in the early part of March, and the plumage was then old and faded; but the seasonal moult had already commenced, and about the end of May it was in beautiful feather. On being turned loose in a room it ran swiftly from one corner to another seeking concealment, and occasionally stretched its body upwards in a very grotesque attitude, as if surveying its new quarters. It partook readily of cooked potato, and drank freely from a saucer of water, after which it stalked about the room in an inquisitive manner, and several times flew upwards to the window. It was afterwards placed in a wooden cage; but it seemed very impatient of this restraint, and manifested remarkable perseverance in its efforts to escape. It could be heard night and day tapping the bars with its slender bill as it wandered up and down its little prison, and it seemed never to relinquish for a single moment the hope of delivery from its unnatural bondage. Although always timid, it became sufficiently tame to take food from the hand; and when in the act of feeding, especially if supplied with fresh meat or insects, it often expressed its satisfaction in a low chuckling note. It frequently thrust its head into the water-vessel, but never bathed itself.

Long afterwards I had another captive "Land-Rail," for which I was indebted to Mrs. Mountfort, of Feilding. Although shy before strangers, it had become familiar with the inmates of the household, taking food from the hand, &c. I observed that after every mouthful of food thus administered the bird would run to its trough and take a sip of water. It also exhibited the restless habit, already described, of running up and down in the front of its cage, trying each bar with its bill, as if endeavouring to escape. I had this bird in my possession for about six months; but owing to its being kept in a solitary part of the conservatory, it soon relapsed into wildness, and ultimately made such vigorous and persistent attempts to get through the cage that the top of its head became completely abraded and so bruised and injured that the bird actually died. It was almost carnivorous, but seemed to prefer fresh meat minced up to any other diet.

In its wild state it loves to climb the kiekie (*Freyinetia banksii*), which clings to the trunks of forest trees, and feed on its ripe *tawhara*. Indeed this particular bird was caught in the act, and secured by the hand before it had time to escape.

Another which was kept for some time in the Colonial Museum, shut up in the same cage with a *tuatara* lizard, exhibited a like spirit of restlessness, in strange contrast with the sluggish movements of its reptilian companion. In the centre of its capacious cage a large *Asplenium bulbiferum* had been planted, and when not prancing up and down its chamber, the bird appeared to spend its time digging with its bill around the roots of this fern, thus affording an indication of its habits in the wild state, where grubs and earthworms no doubt contribute to its sustenance.

The eggs of the Banded Rail, which are placed in a rude nest on the ground, are from four to six in number, and sometimes even more; they are of a very rounded form, measuring 1.5 inch in length by 1.2 in breadth, with a polished surface, and of a creamy-white colour, marked all over, but more conspicuously at the larger end, with rounded spots of chestnut-red. There are three specimens in my son's collection, all of similar size, being exactly of the measurement given above. They vary from pure white to a warm stone-colour with a pinkish tinge, spotted thickly at the larger end, and sparingly over the entire surface, with reddish brown. In the finest coloured of these specimens the spots are rounded and distinct, varying from dark purple to reddish umber, thickly set and sometimes confluent at the larger end, scattered in the middle circumference of the egg, and almost entirely absent at the smaller end. In the second specimen the markings are not so distinct, of paler colour, and not so thickly set at the larger end. The third, which has a white ground, presents only a few purplish-brown markings at the larger end, the rest of the egg being almost entirely clear, with the exception of a few washed-out looking specks, which are widely scattered over the surface.

RALLUS BRACHYPUS.

(SWAINSON'S RAIL.)

Rallus brachypus, Swains. Anim. in Menag. p. 336 (1838).*Rallus lewinii*, Swains. ibid. p. 336 (1838).*Rallus lewinii*, Gould, Birds of Australia, fol. vi. pl. 77 (1848).*Lewinia brachypus*, Bonap. Compt. Rend. de l'Acad. Sci. tom. xliii. (1856).

Ad. similis R. philippensi, sed minor et saturior et dorso haud albido maculato, primariis concoloribus: supercilio cineracco nullo, facie laterali et colli lateribus saturatè cinereis, minimè rufis, fasciâ pectorali cervinâ nullâ distinguendus.

Adult. Crown and sides of the head and hind neck dark rufous, each feather centred with black; chin greyish white; cheeks, fore neck, and breast olivaceous grey tinged with rufous; upper surface dark olivaceous brown, the interscapulars largely centred with glossy brownish black; the whole of the upper wing-coverts, the sides of the body, and the upper part of abdomen brownish black, fasciated with narrow and pretty regular bars of white; quills and tail-feathers dark brown, the scapulars black with olivaceous-brown margins; flanks and lower part of abdomen with broken transverse bars of fulvous; under tail-coverts crossed and tipped with white; bill and feet dark brown. Total length 8.75 inches; wing, from flexure, 4; tail 1.5; bill, along the ridge 1.3, along the edge of lower mandible 1.6; tarsus 1.2; middle toe and claw 1.5.

Young. Has the head very similar to *R. philippensis* in its immature state; plumage generally duller; there is very little rufous on the head, and only a dull wash of rufous on the hind neck; the fore neck and breast paler than in the adult, whitish on the throat and abdomen.

BARON A. VON HÜGEL thus records (in a letter to 'The Ibis,' 1875, pp. 392, 393) his good fortune in obtaining a specimen of this Rail from the Auckland Islands, this being indeed my only authority for including the species in the Avifauna of New Zealand:—

"I have received a Rail killed on the Auckland Islands by the unfortunate Captain Musgrave of the 'Grafton.' As soon as I got the bird I was struck with its resemblance to one of the Rallidæ I was acquainted with, but for some time could not make out which. At last it struck me that it must be the Australian *Rallus brachypus*; and on comparing the Auckland with the Australian bird, I found them to agree very closely, though the colouring seemed different; but as the Canterbury-Museum specimen appears to be very old and faded, it is impossible to judge. I shall be able to determine if my Rail is *Rallus brachypus*, or new, as soon as I get to Melbourne, there being a good series there. At all events it is the first Rail known to have been procured in the group."

The Baron has since informed me that a further comparison of specimens confirms his first conjecture. The specimen is now packed away with the rest of his collection, so that I have not yet had an opportunity of examining it; but I feel no hesitation in accepting his identification of the species.

ORTYGOMETRA TABUENSIS.

(SWAMP-RAIL.)

- Tabuan Rail*, Lath. Gen. Syn. iii. pt. 1, p. 235 (1785).
Rallus tabuensis, Gm. Syst. Nat. i. p. 717 (1788, ex Lath.).
Crex plumbea, Gray, in Griffith's Anim. Kingd. iii. p. 410 (1829).
Gallinula immaculata, Swains. Classif. of B. ii. p. 358 (1837).
Rallus minutus, Forst. Descr. Anim. p. 178 (1844).
Corethrura tabuensis, Gray, Gen. of B. iii. p. 595 (1846).
Zapornia spilonota, Peale, U. S. Expl. Exp. p. 244 (1848).
Porzana immaculata, Gould, B. Austr. vi. pl. 82 (1848).
Porzana tabuensis, Hartl. J. f. O. 1854, p. 169.
Zapornia umbrina, Cass. Pr. Phil. Acad. viii. p. 254 (1856).
Zapornia umbrata, Hartl. Wieg. Arch. 1858, p. 29.
Rallus minor, Ellman, Zool. 1861, p. 7470.
Porzana? tabuensis, Gould, Handb. B. of Austr. ii. p. 341 (1865).
Ortygometra tabuensis, Finsch & Hartl. Beitr. Faun. Centralpolyn. p. 167 (1867).
Zapornia tabuensis, Gray, Hand-l. of B. iii. p. 63 (1870).

Native names.—Pueto and Putoto.

Ad. suprâ obscure chocolatinus, alis dorso concoloribus, primariis nigricantibus, extûs dorsi colore lavatis: caudâ nigricante vix dorsi colore lavatâ: pilco sordidè plumbescence, obscure brunneo adumbrato, facie laterali paullò pallidiore: corpore subtûs sordidè cinereo, hypochondriis crissoque obsoletè, subcaudalibus latiûs et magis conspicuè albo transfasciatis: subalaribus cinerascanti-brunnis albo variis: rostro nigricanti-brunneo: pedibus pallidè rubris: iride saturatè rubrâ.

Adult. Head, neck, and all the under surface dark slate-grey, shaded on the crown with dull brown, and fading into light cinereous grey on the chin; the whole of the back and upper surface of wings chocolate-brown, becoming darker on the rump and upper tail-coverts; wing-feathers blackish brown, dusky grey on their under surface; the first primary narrowly margined on the outer web with greyish white; tail-feathers dull brownish black; inner lining of wings slaty brown, largely varied with white; axillary plumes and feathers covering the flanks tinged with brown, the former presenting obsolete bars and the latter minutely tipped with white; under tail-coverts dark brown, with numerous transverse bars of white. Irides and cyclids bright red; tarsi and toes paler red; bill uniform brownish black. Total length 7.25 inches; wing, from flexure, 3.3; tail 2; bill, along the ridge .7, along the edge of lower mandible .8; bare tibia .4; tarsus 1; middle toe and claw 1.4; hind toe and claw 1.55.

Young. Plumage darker and with less brown on the upper parts. Irides, bill, and feet black.

Chick. Covered with black down of a silky texture and delicately glossed with green. Bill black, with a minute white spot near the tip of upper mandible; irides and legs black.

Obs. The sexes are precisely alike in plumage.

Variety. An example in the Otago Museum has the throat white, with slight indications also of white down the fore neck and breast.

This elegant little Rail has a wide geographical distribution. According to Mr. Gould it is universally spread over the whole of Australia, Tasmania, and the islands in Bass's Strait. It also occurs in the Society, Tonga, and Fiji groups, and probably over the whole extent of the Polynesian archipelago. It is sparingly dispersed with us over both Islands, frequenting wet and swampy localities, and especially the dense beds of raupo (*Typha angustifolia*), which afford it abundant shelter. Its compressed form enables it to thread its way among the close-growing reed-stems with wonderful celerity; and although its low purring note (resembling that of a brood hen) may sometimes be heard on every side, it is extremely difficult to obtain a glimpse of the bird. Its body weighs only two ounces; and its attenuated toes are well adapted for traversing the oozy marsh in search of its food, which consists of small fresh-water mollusks, insects, seeds of aquatic plants, and the tender blades of various grasses. It seldom takes wing, and then only for a very short distance; but it runs with rapidity, swims very gracefully, and often dives to escape its enemies.

Mr. Cheeseman writes to me:—"I had supposed that this bird had disappeared from the vicinity of Auckland, but only a few months ago (1881) Mr. Symons sent me a specimen shot in the mangrove-swamps of Shoal Bay, quite close to Devonport. He assures me that he frequently sees the bird there. I have received specimens from Raglan and the Waikato."

It is still comparatively plentiful in a marshy spot near the mouth of the Ngaruhe creek, in the Hawke's Bay district. After leaving the Petane village for the Maori settlement a few miles inland, the traveller passes over a sandy belt of some extent separating the ocean from a picturesque lagoon called Tangoio, deeply fringed and almost choked in some places with the luxuriant raupo vegetation. At the time of my last visit the weather was beautifully fine, there being not a breath of wind to ripple the surface of the lake, on the glassy face of which the fern-clad hills above, with their patches of native evergreen, were reflected as in a natural mirror. Amongst these raupo sedges the Swamp-Rail has its home, and may be heard, on every side, producing the peculiar purring note which denotes its presence, although the bird itself is so rarely visible. From this locality I have received some fine specimens through the courtesy of Mr. Hamilton, who resides in the neighbourhood.

Mr. Gould was never able to find the nest or eggs in Australia, nor have I been more successful in New Zealand; but on one occasion I was fortunate enough to secure a brood of four newly hatched chicks. The old birds took refuge in a bramble-bush; but on hearing the feeble *cheep* of their captured offspring they left cover, and, under a good running shot, I secured them both. The young birds, before they were caught, ran briskly, and, taking immediately to a ditch of water, endeavoured to elude further pursuit by diving.

For specimens of this bird I have been chiefly indebted to a good-natured household cat, who was accustomed to bring them in killed, but otherwise undamaged, and allow herself to be robbed of her prey. Surely this cat merits an apotheosis in the Colonial Museum!

An egg of the Swamp-Rail in the Canterbury Museum is broadly elliptical in form, measuring 1.3 by .95 of an inch, and is of a uniform pale creamy brown, minutely and obscurely freckled over the entire surface with a darker tint. The shell is slightly glossed.

ORTYGOMETRA AFFINIS.

(MARSH-RAIL.)

Ortygometra affinis, Gray, Voy. Ereb. and Terror, Birds, p. 14 (1844).*Porzana affinis*, Bonap. C. R. xliii. p. 599 (1856).*Rallus punctatus*, Ellman, Zool. 1861, p. 7470.*Ortygometra pygmaea*, Finsch, Trans. N.-Z. Inst. vol. viii. p. 202 * (1876).*Native name.*—Koitareke.

Ad. supra ochraceo-olivaceus, dorsi plumis medialiter nigris et albo vermiculatis aut irregulariter notatis vel marginatis: pileo paullulum obscuriore, nigro notato: tectricibus alarum dorso concoloribus ferè immaculatis, majoribus autem versus apicem albo ocellatis: remigibus brunneis concoloribus, primario extimo albido angustè marginato, secundariis medialiter nigricantibus dorsi colore marginatis et extus maculis albis notatis: caudâ nigrâ saturatè ochraceo lavatâ: supereilio distincto, facie laterali et corpore subtus toto cinereis, abdomine imo eum hypochondriis et subcaudalibus nigricantibus, albo aut maculatis vel transfasciatis: subalaribus cinerascens, albo notatis: rostro et pedibus pallidè brunneis olivaceo tinctis: iride sordidè rubrâ.

Adult. Crown of the head, nape, and all the hind neck rusty brown, with a broad mark of black down the centre of each feather; lower sides of the neck and the upper wing-coverts pale rusty brown, some of the feathers tipped with white; back and mantle brownish black, varied with white and broadly margined with rusty brown; the secondary wing-coverts conspicuously ocellated on both webs, and terminally margined with white; upper tail-coverts dark rusty brown; sides of the head, throat, fore neck, and the whole of the breast pale cinereous grey, fading to silvery grey on the chin; sides of the body, flanks, abdomen, and under tail-coverts blackish brown, crossed by numerous irregular bands of white; wing-feathers dull olive-brown, dusky grey on their under surface, the first primary narrowly margined on the outer web with white; lining of wings greyish brown, obscurely marked with white; tail-feathers blackish brown, with rusty margins and obsolete spots of white. The tongue is furnished with a horny tip. Irides dull red; bill, tarsi, and toes pale brown, tinged with olive. Total length 7.5 inches; wing, from flexure, 3.25; tail 1.6; bill, along the ridge .7, along the edge of lower mandible .8; bare tibia .5; tarsus 1.05; middle toe and claw 1.5; hind toe and claw .6.

Young. Differs from the adult in having the plumage of the upper surface generally lighter and the sides of the neck and upper parts of the breast much suffused with pale rufous; the banded markings on the flanks are less distinct, the white bars being broken and the black more or less suffused with brown. Irides bright reddish brown; bill pea-green shading into black on the upper mandible; tarsi and toes pale olive, the joints and claws brownish; tongue bluish green. Total length 7 inches; extent of wings 10; wing, from flexure, 3.2.

Obs. The bands on the flanks are more conspicuous in the male, and the ferruginous of the upper parts is brighter; in other respects the sexes are alike. There is no appreciable difference in size.

This species closely resembles the Australian *O. palustris*, but is distinguishable by its somewhat larger size and the absence of white markings on the primaries.

* Dr. Finsch says:—“*Ortygometra pygmaea*, Naum. A specimen received from Dr. Haast, under the name of *O. affinis*, belongs really to this widely-distributed species. I compared it with specimens from various parts of Europe, Australia, and Japan, and cannot detect the slightest constant character to keep it separate.”

Ortygometra pygmaea (another Australian species) differs from our bird only in having the chin, lower part of breast, and abdomen almost pure white.

Note. On comparing a specimen from Oamaru in the South with one from North Waikato, the former differed only in having the cheeks and the abdomen lighter.

THIS handsome little Rail is found in both Islands; but it is everywhere extremely rare and difficult to obtain. It frequents the sedgy banks of creeks and rivers and the reed-covered lagoons near the sea-coast. It swims with great facility, and, like other members of the genus, often eludes pursuit by diving. Its food appears to consist principally of aquatic insects and small freshwater mollusks, in the pursuit of which its compressed form enables it to pass deftly among the close-growing vegetation of the swamps. It is also light on its feet; and I have observed it on the Hotuiti lagoon run nimbly along a floating raupo-flag without even dipping its feathers. Except that it nests early in the season (probably about August or beginning of September), very little is at present known of its breeding-habits; but it may be safely inferred that they are in no respect different from those of the closely-allied species inhabiting Australia.

This is, however, one of those recluse species that may exist for years in an inhabited district without ever being detected; such birds, for example, as the Tristan d'Acunha Rail (*Gallinula nesiotis*), of which Sir George Grey gave me the following interesting account. He had incidentally heard of the existence of a flightless Swamp-hen in that island, and, at his instance, both Mr. Percy Earl and Mr. Edgar Layard had made a thorough search for it, without being able to find it or even to hear anything about it from the residents, who declared that the bird they described was a myth. In course of time a deputation from the inhabitants came to Cape Colony to seek relief from the Governor on account of a general failure in the crops, and a young girl (a native of the island), who had accompanied the party, remained behind as a servant at Government House. After several years' service she was seized with a yearning to revisit the island of her birth, and begged for permission to go. Sir George told her she might go, but that he would never take her back again unless she brought with her some of the flightless Rails, with which she had professed to be quite familiar. A year afterwards the girl presented herself at Government House, bringing with her a cage containing five of these birds. They were put at once into the aviary, and during the night two of them had their heads torn off by jackals in an adjoining compartment. The three survivors were forwarded to Dr. Sclater, who then characterized and named this hitherto unknown species*.

Unlike the Banded Rail, which is on the increase, this bird is becoming almost extinct. At one time it was comparatively plentiful in the Hawke's Bay district and further south. The only one I have heard of for some years past was captured alive at Waipawa. The frightened little creature had taken refuge in a bunch of tussock, where it attempted to conceal itself, but was caught by the hand without any difficulty.

It has always been very rare in the far north. The description of the young bird is from a specimen caught by my son's dog when Pheasant-shooting in the Upper Waikato in November 1882. On dissection it proved to be a male. The stomach contained seeds and black comminuted matter, among which I detected insect-remains and an aquatic grub an inch long. There is a single specimen in the Auckland Museum which was obtained at Whangarei.

A broken specimen of the egg of this species, recently brought by Mr. Henry Travers from the Chatham Islands, is described by Hutton as .77 inch in breadth, of an olive-brown colour, and highly polished.

* Proc. Zool. Soc. 1861, p. 260, pl. xxx.



NORTH-ISLAND WOODHEN.
OCYDROMUS GREYI.

BLACK WOODHEN.
OCYDROMUS FUSCUS.

(ONE-HALF NATURAL SIZE.)



OCYDROMUS GREYI.

(NORTH-ISLAND WOODHEN.)

Ocydromus earli, Buller, Birds of New Zealand, 1st ed. p. 165 (nec G. R. Gray, 1873) *.

Native name.—Weka.

Ad. ♂ rufescenti-fulvus: plumis corporis superioris medialiter nigricantibus, rufescenti-fulvo marginatis: pileo summo et oculo postico saturatè rufescenti-fulvis indistinctè nigro variis: supercilio distincto sordidè cinereo, parte antièâ fulvescente: facie laterali rufescente, regione parotièâ fulvo variâ: genis eum collo laterali imo et gutture toto sordidè einereis: pectore superiore et laterali rufescente: corpore reliquo subtùs lætiùs einereo, hypochondriis rufescenti-brunneis: rostro brunneo, versus apicem einerascenti-corneo, culmine saturatiore: pedibus pallidè brunneis: iride rufescenti-brunneâ.

Ad. ♀ mari similis, sed valdè minor et obscurior.

Adult male. Upper parts rufous fulvous, darkest on the crown and nape, each feather shaded with black in the centre; throat, fore neck, a superciliary streak widening outwards and extending to the nape, lower part of breast and the abdomen dull eincreous, tinged more or less with rufous; lores, sides of the head and neck, upper part of breast and surface of wings bright rufous fulvous; lower part of back, rump, sides of the body, and thighs obscure rufous brown; wing-feathers fuscous black, with rufous-brown edges, the primaries banded on their inner vane with bright rufous; tail-feathers fuscous black, with paler edges; under tail-coverts fuscous, banded with bright rufous. The feathers of the body are plumbeous at the base, with pure white shafts. Irides bright reddish brown; bill reddish brown, darker on the ridge, and changing to horn-grey at the tip; tarsi and toes pale brown, claws darker. Total length 21 inches; extent of wings 22.5; wing, from flexure, 7.75; tail 4.75; bill, along the ridge 2, along the edge of lower mandible 2.25; tarsus 2.5; middle toe and claw 3; hind toe and claw 1.

Adult female. Plumage similar to that of the male, but generally of a darker shade, and with the barred markings on the primaries more regular and distinct. It may readily be distinguished by its smaller size. An example taken on the nest (with egg and young bird) gave the following measurements:—Length 17 inches;

* On the synonymy of this species Professor Hutton has sent me the following note:—

“I am sure that you are right about the identification of *Ocydromus earli*. I always agreed with you, and I do not understand how Finsch thinks otherwise. I think the following is about right:—

“1. *O. earli*, Gray; ‘Ibis,’ 1862, p. 26; also, *O. australis*, Gray, *ibid.* in part; Buller, ‘Birds of New Zealand.’ Whether or not it is the *Rallus rufus* of Ellman I have no means of judging.

“2. *O. fuscus*, Dubus; *R. troglodytes*, Forster, ‘Descr. Au.’ p. 110; *R. fuscus*, Ellman?; Buller, ‘Birds of New Zealand.’

“3. *O. australis*, Sparrm.; Gray, in ‘Voyage of the Erebus and Terror’ (young only); Buller, ‘Birds of New Zealand,’ in part (not the figure).

“4. *O. troglodytes*, Gmel.; *O. australis*, Gray, ‘Voyage of the Erebus and Terror’ (adult); and Buller, ‘Birds of New Zealand,’ in part, with figure.

“I doubt *O. brachypterus*, Lafr., being a synonym of either of these. Finsch thinks it is the same as *O. hectori*, mihi, which is very probable. I have had two specimens of *O. fuscus* sent to me from the Waiau district, on the eastern side of the Alps—the region of *O. finschi*, mihi; so I now think that *O. finschi* is probably only the young of *O. fuscus*.”

I do not admit *O. troglodytes* as a species; my plate in the former edition therefore represents a highly coloured example of *O. australis*.

extent of wings 19.5; wing, from flexure, 7; tail 4; bill, along the ridge 1.75, along the edge of lower mandible 2; tarsus 2; middle toe and claw 2.5; hind toe and claw .75.

Young. The colours of the underparts duller and more blended than in the adult; upper parts darker and more uniform in colour. Throat, breast, and under surface generally dull brownish grey, paler on the throat, washed with ferruginous on the lower part of fore neck and on the sides of the body; no rufous band on the sides of the face.

Fledgling. The whole of the plumage of a dingy rufous brown, the feathers of the upper parts shaded in the centre with fuscous black; paler on the underparts; tinged on the sides of the head and breast with cinereous; feet pale brown. In the specimen above described there is no appearance yet of quills, and there is much fluffy down still adhering to the plumage, especially on the head, lower part of back, and flanks.

Chick. Covered with soft down of a brownish-black colour; bill dark brown, with a small white speck near the tip of the upper mandible.

Obs. Individuals vary considerably in the general tone of their plumage, as well as in the details of their colouring, seldom two specimens being found exactly alike. The ground-colour of the upper parts varies from a dingy rufous brown to a bright reddish fulvous. In some specimens the soft overlapping plumage of the wings is banded on both webs with light fulvous brown. The extent of the rufous colouring on the breast likewise varies very much, and in some specimens is entirely wanting, while in others in which this feature is conspicuous the rufous bands on the under tail-coverts are absent. This individual variability of colour, although due in some measure to conditions of age and sex, is characteristic of the genus.

Partial albino. The following is the description of a very singular specimen obtained in the Manawatu district, and presented to me by Mr. J. T. Stewart, the Provincial Engineer:—Ground-colours as in the ordinary bird, but the whole body covered with straggling pure white feathers, especially on the crown, back, wings, breast, and sides; primaries black, with numerous regular bars of chestnut-brown on both webs; under tail-coverts obscurely barred with pale brown; bill pale yellow, greyish at the tip of upper mandible; legs pale yellowish brown.

There is another somewhat similar specimen in the Colonial Museum, but more largely marked with white on the back, breast, and flanks.

THE Weka Rail or Woodhen is one of the few New-Zealand birds that already possess a literature. Cook mentions it in his 'Voyages;' the naturalists who accompanied him figured and described it, but without being able to discriminate the different species*; and nearly every general writer on New Zealand since that time has honoured it with, at any rate, a passing notice; while by some of them, as well as in the columns of various periodicals, its habits have been more or less fully narrated. No connected history of this bird, however, has yet been attempted; and lest the present one should appear of unnecessary length, it must be borne in mind that this is one of those doomed species whose habits and economy I am bound, as a faithful historian, to describe in detail—not so much on account of their intrinsic importance as for the benefit of naturalists of a future day, who will seek in vain for the birds themselves, and to whom, as we may readily imagine, every recorded particular of this sort will possess the same interest that now attaches to Leguat's rude account of the Didine bird of Rodriguez.

In my former edition, I treated the North-Island Woodhen (as every one else had done before) as the *Ocydromus earli* of Mr. G. R. Gray's 'List' of 1862, and under that name I both described and figured it.

Dr. Finsch was the first naturalist to raise any question about it; for in a communication to

* Forster's description of *Ocydromus australis*, in his MS. account of the Voyage, was published by Sparrman in 1786.

the Otago Institute, in June 1874*, he said:—"Dr. Buller, in his great work, unfortunately does not mention the typical specimen of *O. earli*, Gray, and not having compared it myself, I am unable to make out whether the true *earli* is indeed the bright cinnamon-red bird as Captain Hutton and I believe, or whether it is the same as *O. australis* figured under the name of *earli* by Dr. Buller."

In 1878 I published † a revision of the group (see *infra*, p. 120), in which I adhered to the nomenclature I had adopted, and added a fourth species (*O. brachypterus*) to the list.

In the autumn of 1885 I had an opportunity of examining at Auckland a large collection of birds brought by Mr. Reischek from the South Island. Among the most interesting of these was a species of Woodhen, closely resembling the North-Island bird, but distinguishable by its more cinnamon-coloured plumage and its brighter legs and feet. Of this Woodhen, Mr. Reischek had obtained five specimens, two of which (male and female) I was fortunate enough to secure.

On coming to England I hunted up the type of Mr. G. R. Gray's *Ocydromus earli* at the British Museum, and then discovered to my surprise that this was identical with the new bird brought by Reischek from the South Island, which must therefore stand as *Ocydromus earli*. This specimen was brought from New Zealand by Mr. Percy Earl, in 1845, but there is no locality assigned to it in the British-Museum register; and its general similarity in plumage to the present species has led to a very natural mistake.

It thus follows that the common Woodhen of the North Island is still without a distinctive name.

I find, on looking over the old type-collection of birds in the British Museum, that Sir George Grey, K.C.B., was one of the earliest and most liberal contributors of specimens from New Zealand. I have therefore decided to distinguish this form as *Ocydromus greyi*. In thus dedicating the species to that veteran statesman and scientist, I feel sure that I shall have the approval of my ornithological brethren, both in this country and abroad. I do this the more readily because I have been compelled (as stated in Vol. I, p. 178) to destroy the only other connecting-link of the kind by expunging *Stringops greyi* from our list of species ‡.

The range of this species is strictly confined to the North Island. Speaking generally, it is a rare bird in the country lying north of Auckland, is sparingly dispersed over the Waikato district, and is very abundant in the southern parts of the island. In former times, according to the accounts of

* Trans. N.-Z. Inst. vol. vii. p. 231.

† *Ibid.* vol. x. pp. 213-216.

‡ To myself personally it is very gratifying to be in a position to pay this compliment to Sir George Grey. He was the valued friend of my late honoured father and, in the early days of the colony, encouraged and aided him in his laborious missionary work. Moreover, I have a grateful recollection of many personal acts of kindness to myself in my younger days. But his real claim to special mention here is that, while holding high office, he has always taken an active interest in the furtherance of Ornithological science. In illustration of this I may mention that, as far back as 1863, when Governor of New Zealand, he urged upon me the preparation of a handbook on the subject for the use of colonial students. When, some ten years later, I published my 'History of the Birds of New Zealand,' he was the first of my many colonial friends to send me a cordial letter of congratulation. And when, at a subsequent date, at the request of the Colonial Government, I produced an illustrated 'Manual of the Birds of New Zealand,' he sent me the following appreciative note:—

"Kawau, Jan. 28, 1885.

"MY DEAR BULLER,—

"I am very much obliged to you for the copy of your 'Manual of the Birds of New Zealand,' which you have been good enough to send me. I regard it as being in every respect a work of great value; and it possesses this great advantage, that from the Diagram of a Bird which you have introduced into it, to illustrate the technical terms used in describing the various species, and from the lucid language in which each bird is described, you have rendered your work a most valuable introduction to the study of the science of ornithology, with the aid of which any student may readily master that subject in so far as it relates to New Zealand, and thoroughly understand any other ornithological work that he may read. In this respect you have rendered a great benefit to the youth of New Zealand.

"Truly yours,

"G. GREY."

P 2

"W. L. Buller, Esq., C.M.G.:"

the natives, it was extremely plentiful in every part of the country; but for a period of more than thirty years it has never been met with in some of the districts far north. Its last refuge in the Kaipara was a small marshy island near Mangawharc, where in 1855 a few of them still existed; and in the Whangarei district they were known to linger on the mangrove-flats near the present settlement as late as the year 1866. A specimen procured for me in this locality by Mr. Henry Mair enabled me to establish the identity of the species. In the provincial district of Wellington it is very generally dispersed, frequenting alike the woods and the open country. In the deep gullies of the Rimutaka ranges, on the marshy banks of the Manawatu river, in the low kahikatea swamps, and among the dry sand-duncs bordering on the sea I have at all times found it tolerably abundant.

Among the farmers it has rather a bad reputation. There can be no doubt that it does sometimes commit depredations. A friend of mine living in a country place was continually missing eggs from his poultry-yard; and he determined to set a watch, when it was discovered that the Woodhen was the culprit. He observed the bird make straight for a nest full of eggs, tap a hole with its bill in each of them in succession, and suck up the contents.

The Woodhen is furnished with ample wings, but they are so feebly developed as to render the bird quite incapable of flight. The quill-feathers have broad webs, but are soft and flexible, while the long inner secondaries take the form of a loose overlapping mantle. The legs, on the other hand, are very strongly developed, and the bird is, in some measure, compensated for its disability of wing by being able to run almost with the swiftness of a rat. Its anterior extremities, although useless for the ordinary purposes of flight, appear to be of some assistance to the bird when running, as they are briskly fluttered, apparently for the purpose of steadying the body. Like most other Rails, its wings are armed below the carpal joint with a sharp spur, the object of which, unless as a means of defence, it is not easy to divine. Even in very young birds it is strong and sharp, and at maturity attains a length of $\cdot 25$ of an inch. I have observed that when two of these birds are fighting they often buffet each other with their wings; and I have frequently myself been made aware of the existence of this spur on seizing the bird with the hand. As, however, in the case of the smaller Rails, the spur is too diminutive to be at all effective as a weapon of defence, it may serve some other useful end in the economy of the bird, which has hitherto escaped discovery.

It is a notorious fact of late that this species, notwithstanding its feebly developed wings, rendering it quite incapable of flight, is getting every year more plentiful in the settled districts of the North Island. The reason is doubtless to be found in the fact that while its natural enemies, hawks and wild cats, diminish with the progress of settlement, the cultivation of the country increases its advantages in the every-day struggle for existence. The nocturnal cry of the Woodhen is now very familiar in districts where a few years ago it was quite unknown.

In discussing the osteology of this highly aberrant form of Rail, a curious fact was pointed out by Professor Newton, in a communication to the Zoological Society, namely that the New-Zealand *Ocydromus* and the Dodo of the Mauritius are the only two known forms (excepting, of course, the *Struthiones*) in which the angle formed by the axes of the coracoid and scapula is greater than a right angle*—a feature of such importance that Professor Huxley has since adopted it as one of the

* Referring thereto, Professor Newton has favoured me with the following note:—"This I pointed out at a meeting of the Zoological Society, held 12th December, 1865, when I described, for the first time in public, a portion of the scapular arch in *Didus*, in which the same thing occurs, and stated that, so far as I then knew (and, for the matter of that, still know), this feature was peculiar to these two genera *alone* among non-struthious birds. The remarks I made at this meeting were never printed; for, learning that Prof. Owen wished to describe those portions of the skeleton of *Didus* which Mr. George Clark had discovered, I caused my paper to be suppressed. (Cf. Phil. Trans. 1869, p. 341, note.) I cannot attempt to give any reason that would plausibly account for this singular deviation of structure from the normal Carinate form in two birds so unlike as *Ocydromus* and *Didus*: there the matter is, and one must leave it at present."

distinguishing characters in his proposed scheme for the classification of birds, under the two divisions of *Carinatae* and *Ratitae**.

The Woodhen is seminocturnal in its habits, and during the day usually remains concealed in the thick fern or scrub which covers its haunts, or takes refuge in a hollow log or other natural cavity. Sometimes, however, it excavates a home for itself underground, the work being performed entirely with the bill and with great rapidity, as I have frequently had an opportunity of observing. These subterranean burrows are often of considerable length, and not only serve as a diurnal retreat, but furnish also a convenient breeding-place.

This species is comparatively plentiful in the snow-country adjacent to Ruapehu and Tongariro, notwithstanding the severity of the climate at this altitude during a large portion of the year. As is well known, several berry-producing trees, such as the totara and the kahikatea, reappear on these mountain-heights in a remarkably dwarfed form, being indeed little more than scrub spreading over the ground. These diminutive representatives of forest-growths nevertheless produce berries of the full size, and these being accessible from the ground are eagerly sought after by the Woodhen, which becomes at this season excessively fat, and is in great demand among the Maoris in consequence. When proving, in the Native Land Court, the tribal title to this country, where, owing to the extreme poverty of the soil, it was difficult to discover the necessary acts of ownership in former times on the part of the claimants or their ancestors, I was always glad to fall back upon evidence of Weka-hunting within the disputed boundaries, as affording proof of ancient title.

As we descend from the mountain-slopes to the Murimotu downs—the land of the snow-grass and tussock—the Woodhen becomes less numerous, but in the widely scattered clumps of bush a few of them are always to be met with. In one of these localities, at the back of Mr. Moorhouse's station, I found that they had been digging up and feeding upon the so-called vegetable caterpillar (*Cordiceps robertsii*), which was unusually abundant there.

As the evening shades begin to cover the land, the first note to be heard in the scrubby plains or at the edge of the darkening forest is the cry of the Weka, two of them invariably calling in concert. The female leads off with a sharp shrill whistle, followed before she has half finished by the male, the cry commencing with a peculiar growling note, like *c-r-r-u*, which breaks into a whistle. These cries are repeated by both several times in rapid succession, and then for a few minutes the birds are quiet; again the shrill clamour and a pause; and so on till the darkness of advancing night has silenced for a time even the vigilant Weka, and all around is still.

* The late Professor Garrod sent me the following valuable communication on the same subject:—"In its osteology and visceral anatomy, as well as in its myology, *Ocydromus* agrees completely with the Rails; and its close relationship to *Tribonyx* is undoubted. The peculiarities depend on the reduction in the development of the anterior extremities, which causes the typically ralline sternum to be much reduced in size and the coracoid bones to be separated at their lower ends. The slenderness of the furcula, which is also peculiarly large, depends on the same cause. As in the typical Rallidae, the skull is schizognathous and holorhinal; in other words, the maxillo-palatine bones of either side do not ankylose along the middle line, and the nasal bones are not split up as in the true Waders or the Gulls. The vomer is well developed, and reaches forward, as far as the anterior border of the maxillo-palatines; it is bifid behind. The wing-bones are feebly developed, and those of the leg are unusually strong. The pollex carries a long claw; the hallux is small and raised at its base.

"There are two carotid arteries as in the Rails; and the caeca of the intestine are just three inches long, the intestine itself being a little over two feet from pylorus to anus. The gizzard is weak; the oil-gland on the coccyx carries a densely feathered tuft at its apex.

"So many features have they in common, that it would be difficult for any one to bring convincing arguments against the statement that *Ocydromus* is one of the nearest allies of the *Apteryx*. This similarity may be the simple result of similar influences acting on different natures, the diminished necessity for the use of the anterior limbs allowing them to dwindle in both. But, with the facts of geographical distribution to back it, the opinion may be fairly maintained that *Apteryx* and *Ocydromus* had the same ancestor not far back in time. It may be said that the pelvis is very different; but the same remark partly applies to *Tinamus*, an undoubted ally, and a bird also most probably of the same stock, though residing so far off."

As will appear further on, the Woodhens inhabiting the South Island belong to several totally distinct species, although closely resembling the present one both in form and habits of life. Now it is a curious fact that while all the southern species are remarkably bold and fearless (so tame, indeed, as to visit the farmer's yard, and sometimes even to enter the house), the northern bird is naturally shy and recluse—a development of character which Sir James Hector attributes to its “greater experience of the treachery of man,” the North Island having always possessed a large Maori population. So shy, indeed, is the latter species, that, notwithstanding its loud shrill cry, it is quite impossible to find it without the aid of a good dog.

I have on several occasions kept caged Woodhens for a considerable time; but, although I persevered in one instance for more than two years, I could never succeed in completely domesticating them. I was thus afforded, however, an opportunity of studying their character, which may be summed up in two words—pugnacious and gluttonous. The introduction of a piece of red cloth, or other brightly coloured object, was generally sufficient to excite the bird and make its feathers rise; but the presence of another Weka, whether male or female, would instantly provoke a display of hostility, and after some light skirmishing a fight would ensue, which generally, in the end, proved fatal to the intruder. On one occasion I introduced into the cage a small mirror, and watched the effect: ruffling its feathers and stretching out its neck, the Weka advanced slowly towards the glass, and then made a sudden dash at its supposed adversary, and continued to repeat the attack with so much passion and violence, that I thought it prudent to remove the exciting object, to save the bird from injuring itself. On the charge of gluttony I may say that not only were my captives omnivorous, devouring fish, flesh, and fowl, whether cooked or raw, boiled potato and other vegetables, green fruit, and, in short, every thing within the digestive power of the gizzard, but they also had a most inordinate and voracious appetite. As a proof of this, I may state, by reference to my note-book, that a single bird in the course of two months consumed nearly a hundredweight of cooked potatoes! In a wild state it subsists on berries of various kinds, with earthworms, grasshoppers, and other insects, while it never loses an opportunity of entombing in its capacious stomach a mouse or lizard. In the South Island Sir James Hector has observed the Woodhens attacking full-grown rats, and Sir Julius Haast has frequently seen them capture and devour small birds. That they are given to plundering the nests of other birds that build on the ground, devouring alike the eggs and young, is now a well-known fact; and on this account Sir George Grey has found good reason to regret his too successful attempt to stock his beautiful island-home at Kawau with Woodhens from the mainland! Even here this doomed species will now no longer find an asylum.

In the daytime it moves about under thick cover with a stealthy gait, and continually flirts its tail upwards after the manner of the true Rails. The tail-feathers are of peculiar texture, having stiff shafts with loose disunited barbs; and in some specimens the shafts are found denuded at the tips for the space of nearly an inch. In skinning this bird, one is struck with the extraordinary development of the tibial muscles as compared with the humeral, betokening at once the habits of life already described. The skin is very tough, and adheres firmly to the body, especially on the thighs. There is another circumstance worth mentioning—namely that some Wekas have a strong inherent odour, which communicates itself to the hand if rubbed along the plumage, and does not entirely leave the dried skin, while others are wholly free from it. It is not dependent on sex, nor is it peculiar to any season of the year; but where it does exist, it differs perceptibly in degree in different examples. Possibly this may result from the long-continued occupation of a burrow rendered foul by the omnivorous habits of the bird.

It commences to breed early in September; for on the 30th of that month I saw a fine Weka chick at Archdeacon Hadfield's house, at Otaki, and another at Wanganui some days earlier.

The sharp whistling cry of the Woodhen is a familiar sound to the benighted traveller as he

toils through the high fern, or seeks a camping-place at the edge of the forest. Long after the twilight has faded away he may hear at intervals the peculiar toll-note of the Tui, *chop-chop-chop*, or the far-off cry of the Koheperoa; but the note that will last, at intervals, through the long watches of the night is that of the Weka, generally thrice repeated and followed by a shriller one, the two sexes, as already stated, performing in concert. In the dark *Fagus*-forests of the hills, where even Owls are scarce, the cry of the Woodhen is the only sound that breaks the stillness of the night; and, owing to its peculiar shrillness, it may be heard to a considerable distance. In some conditions of the atmosphere, indeed, it is almost impossible to distinguish it from the piercing call of the *Apteryx*.

During certain seasons of the year the Weka keeps strictly to the woods, seeking its subsistence among the fallen débris of the forest vegetation, and digging for worms and grubs in the loose vegetable mould that accumulates around the roots of the trees. It may often be seen leisurely crossing the narrow bush-path, or turning over the fallen leaves in the more open parts of the forest; but in these localities it is always difficult to procure because of the abundant cover, and the impossibility of hunting it far even with a dog. In the soft sunshine of November, when the noisy hum of insect life betokens the presence of midsummer—when the low underwood is spangled with the snow-white flowers of the wild convolvulus and the air is laden with a delicious perfume from the waxy blossoms of the small *Clematis*—the Weka leaves the dark shade of the forest and comes forth with her well-grown brood to feed on the ground-berries that ripen at this season, and to feast on the crickets and beetles that are brought into activity by the genial warmth of the sun. Here it may be easily hunted down and captured with the aid of a dog.

As already stated, the Woodhen often converts its burrow into a breeding-place; but the following description of a nest found on the banks of the Manawatu river will show that other situations are sometimes selected. An aged kahikatea in tumbling to the ground had fallen athwart a huge gnarled stump, and remained in that position. Under the shelter afforded by the overlying trunk and among the knotted roots of the supporting stump the Weka had placed her nest, forming it of dry flags of the puwharawhara (*Astelia cunninghamii*) loosely arranged. The nest was so admirably concealed by a growth of ferns that nothing but accident could have led to its discovery. It contained two eggs, which is the usual number, although I have occasionally met with a nest of three. These are slightly ovoido-conical in form, measuring 2·4 inches in length by 1·7 in breadth, and are of a creamy white colour, marked all over, but especially at the larger end, with small obscure spots of purple and brown. Examples differ slightly both in size and form; and in some the markings at the thick end assume a rounded well-defined character, similar to those which adorn the eggs of *Rallus philippensis*.

On the outskirts of the woods this Rail may sometimes be seen consorting with the half-wild barndoor fowls from the Maori villages, and there is a widespread popular belief that they often interbreed, producing a hybrid offspring with hairy plumage and aborted quill-feathers. One of these supposed hybrids (a fine male bird) was sent to me by Dr. Lewis, the Medical Superintendent at Rotorua, and having brought the specimen to England, preserved in spirits, I placed it in the hands of the well-known comparative anatomist, Dr. Murie, for examination. He made a careful dissection and sent me a full report, showing that, notwithstanding a certain outward or superficial resemblance to a Weka, all the characters are Galline and not Ralline. Another specimen (an adult female), which I obtained at Manawatu, was submitted to Mr. Frank Beddard, the Prosecutor to the Zoological Society, and with a like result. This question may therefore be regarded as finally set at rest.

OCYDROMUS FUSCUS.

(BLACK WOODHEN.)

Gallirallus fuscus, Du Bus, Esquisses Orn. pl. 11 (1847).*Ocydromus nigricans*, Buller, Trans. N.-Z. Inst. i. p. 111 (1868).*Ocydromus fuscus*, Finsch, J. f. O. 1870, p. 354.*Ocydromus finschi*, Hutton, Trans. N.-Z. Inst. vol. vi. p. 111 (1873).*Native name.*—Weka-pango.

Ad. brunnescenti-niger, plumis plus minusve rufescenti-brunneo marginatis : gutture et facie laterali cinereis vix brunneo tinctis : abdomine medio sordidè cinereo : remigibus brunnescenti-nigris, intùs rufescenti-brunneo maculatis : caudâ nigrâ : subcaudalibus ferrugineo transfasciatis : rostro nigricanti-brunneo : pedibus pallidè brunneis : iride saturatè brunneâ.

Adult. General plumage brownish black, each feather margined more or less with rufous brown; throat and sides of the head cinereous, slightly tinged with brown; middle portion of abdomen dull cinereous; quills brownish black, obscurely banded or spotted on the inner webs with rufous brown; the soft feathers lining the wings faintly margined with rufous; tail-feathers black; under tail-coverts transversely barred with rufous. Irides bright reddish brown; bill dark brown, tinged with red towards the base; legs bright reddish brown; darker on the hind part of tarsi and on the under surface of toes. Total length 22 inches; extent of wings 23.25; wing, from flexure, 7.25; tail 5.25; bill, along the ridge 2, along the edge of lower mandible 2.4; tarsus 2.25; middle toe and claw 3; hind toe and claw 1.

Young. In young birds the plumage of the upper surface is more or less varied with rounded spots of rufous brown, and the primaries are obscurely banded with rufous. These quill-markings disappear after the first or second moult, the spots vanish, and the rufous streaks on the upper surface diminish as the bird gets older.

Obs. Examples vary in the amount of rufous colouring that pervades the plumage, some being almost wholly black and without any markings on the quills. A specimen in Sir James Hector's collection of birds in the Otago Museum has no bars on the under tail-coverts; and another, in my own collection, has the fore neck and breast largely suffused with fulvous brown. The measurements given above were taken from a freshly killed male bird. Another male measured 21 inches in length and 22.5 in extent.

An apparently adult female specimen of this bird in the Canterbury Museum (obtained at Preservation Inlet) has the general plumage brownish black; throat dark grey mixed with smoky brown; the plumage of the fore neck, lower hind neck, and upper surface of wings presenting dull streaky marks of rufous, each feather being irregularly touched with this on each web; tail-feathers black; under coverts obscurely marked with rufous. On the underside of one of the primaries (an old feather which came out on being handled) there are obsolete rufous bars; and the scattered new feathers appearing on the upper surface of the body are almost entirely black; bill bright reddish brown at the base, horn-grey towards the tips of both mandibles; legs and feet reddish brown. It may be inferred from this state of plumage that the tendency of this species is to darken towards maturity.

Remarks. The type of Hutton's *Ocydromus finschi*, with a label in his handwriting attached, is now in my collection. Prof. Ward, of Rochester, obtained it by exchange from the Otago Museum, and I was fortunate enough to get it back from New York six months afterwards. In this bird the primaries are very distinctly

barred, the loose feathers overlapping them have series of yellowish-buff spots on both vanes, and the feathers covering the flanks are barred or fasciated in the same manner. Besides this, the feathers have paler margins, the throat and cheeks are of a purer grey, and the breast is dark chestnut-grey. In the type of *O. fuscus* the breast is like the rest of the plumage; but I have had specimens in which this grey feature was quite conspicuous. I have come to the conclusion, therefore, that these differences merely denote transitional states of plumage.

There is a similar specimen in the Canterbury Museum from the West Coast (South Island), and there is another from Preservation Inlet (marked ♂, Jan. 1873), in which the plumage is intermediate between the type of *O. finschi* and ordinary examples of *O. fuscus*, the general coloration being black with brown edges to the feathers. Judging by analogy I feel no hesitation in pronouncing this the immature condition of the Black Woodhen. Professor Hutton himself has already conjectured that his "*O. finschi* is only the young of *O. fuscus*"; and Dr. Finsch, to whom he had dedicated the supposed new species, has expressed a strong suspicion that one was a mere variety of the other. I think we may now take it that the matter admits of no further doubt.

THIS species of Woodhen, which is quite distinct from all the others, although for a long time confounded with them, inhabits the sea-shore and feeds among the kelp and seaweed. Hitherto it has only been found on the south-west coast of the South Island, where it is said to be extremely abundant. There can be no doubt that this is the bird referred to by Captain Cook in the following passage:—"Although they are numerous enough here [Dusky Bay], they are so scarce in other parts that I never saw but one They inhabit the skirts of the woods, and feed on the sea-beach, and were so tame or foolish as to stand and stare at us till we knocked them down with a stick They are a sort of Rail, about the size and a good deal like a common dunghill hen. Most of them are of a dirty black or dark brown colour"*. A description and figure of this species, under the name of *Gallirallus fuscus*, appeared (*l. c.*) in 1847; but, owing to a doubt as to its native habitat, it was not admitted into the accepted list of New-Zealand birds. More recently, however, it was rediscovered by Dr. (now Sir James) Hector, and described by myself (*l. c.*) under the name of *Ocydromus nigricans*. Dr. Finsch having, at my request, compared one of my specimens with the type of *Gallirallus fuscus* (Du Bus), there could no longer be any doubt about their identity.

Sir J. Hector informs me that he never met with this kind of Woodhen at any distance from the sea-coast, and that it appears to subsist entirely on shell-fish and other marine productions.

Like its congeners, it may be easily snared by dangling a small bird or a mouse at the end of a stick, about a yard long, and then, by means of another stick somewhat longer, slipping a noose of green flax over the bird's head as it attempts to seize the bait, the operator partially concealing himself by lying in the fern or grass.

The following record, in Hammett's Journal of the West-Coast exploration in 1863, refers apparently to the same bird:—"Thursday, August 20 [after being on the verge of starvation for forty days]. Still raining in torrents! My blankets and my clothes are saturated. All that I can do is to stand in the pitiless rain, which can make me no wetter, and watch the surf as it rolls towards my feet. It is impossible to get a fire. I have caught two Woodhens; for as God sent the Ravens to feed Elijah, so these birds came to me, and my faithful dog caught them. I am thus provided with food for a day or two; but unless I can manage a fire to cook them, I must even eat them raw. I live in hope that the weather will clear, as the wind has changed. My faithful dog, how serviceable in many ways have you been to me!" Thus poor Hammett records his gratitude for the gift of Woodhens—the only inhabitants, besides rats, of this inhospitable coast. The occasional capture of one of these birds sufficed to keep him from absolute starvation, and through much suffering and privation Hammett survived to tell the melancholy fate of the rest of his party.

* Cook's Second Voyage, edit. 4to, i. p. 97.

My late brother, Mr. John Buller, obtained a pair of these birds from a dealer in Dunedin in 1869; and they lived in my aviary for more than a year. In captivity their habits differ in no respect from those of the species already described. I remarked, however, that one of them had a practice of mounting to a particular spot on the ledge of the aviary almost every day, and remaining in a perfectly motionless attitude for hours together. On one occasion a large brown rat effected an entrance by undermining the aviary, and was killed and partly devoured by them; and at another time a North-Island Woodhen (*Ocydromus greyi*), which I had introduced, met with a similar fate. In fact, when deprived of its marine bill of fare, this species is quite as omnivorous as the others. In connexion with this, the 'Canterbury Mail' records the following case of anthropophagism:—"A returned digger relates that he captured a Woodhen in the act of feeding on the remains of a man, and being himself almost famished he quickly devoured the bird. To use the words of a well-known banker in London, who is the *gourmet par excellence* of the day,—'That man, Sir, would eat his own father; he has the stomach of an Ostrich.'"

Lady Barker, in her charming little book, 'Station Life in New Zealand,' gives the following amusing account of her first acquaintance with the Woodhen:—"I lay back on a bed of fern watching the numbers of little birds around us. They boldly picked up our crumbs, without a thought of possible danger. Presently I felt a tug at the shawl on which I was lying. I was too lazy and dreamy to turn my head; so the next thing was a sharp dig on my arm which hurt me dreadfully. I looked round, and there was a Weka bent on investigating the intruder into its domain. The bird looked so cool and unconcerned, that I had not the heart to follow my first impulse and throw my stick at it; but my forbearance was presently rewarded by a stab on the ankle which fairly made me jump up with a scream, when my persecutor glided gracefully away among the bushes, leaving me, like Lord Ullin, 'lamenting.'" The same pleasing writer, in giving an account of the Island of Wekas in Lake Coleridge, observes:—"No one can imagine how these birds came here; for the island is at least two miles from the nearest point of land; they can neither swim nor fly; and as every man's hand is against them, no one would have thought it worth while to bring them over; but here they are in spite of all the apparent improbabilities attending their arrival, more tame and impudent than ever! It was dangerous to leave your bread unwatched for an instant; and, indeed, I saw one gliding off with an empty sardine-tin in its beak; I wonder how it liked the oil and little scales! They considered a cork a great prize, and carried several off triumphantly."

Mr. Reischek informs me that, at the West Coast sounds, long after dark, he observed a bird swimming near the shore and sent his dog into the water after it. On being pursued the bird dived; and on being captured it proved to be a Black Woodhen. It is as mischievous as its cousin of the plains. An enterprising one entered Reischek's tent during the night and carried off his last candle; and he surprised another, in the early dawn, carrying off one of his slippers.

Although, as already mentioned, it frequents the sea-shore and feeds on the kelp, the last-named naturalist met with it also, but only on rare occasions, at an elevation of 3000 feet above the sea. From a place of concealment he once watched a Black Woodhen hunting for its food; he observed that it scratched up the ground with its feet, just as a domestic fowl would do, and then picked it over with its bill. In illustration of its hardy nature, he told me that one which he had shot and hung up for a specimen soon revived and made its escape. Three days afterwards the dog caught it, and he found the body marked all over with shot. As might have been expected, his collection contained specimens in every condition of plumage. He found it very plentiful on the shores of Dusky Sound and of the Acheron passage; those which he collected at a higher elevation appeared to be larger birds and in much finer plumage than those frequenting the sea-shore.

OCYDROMUS EARLI.

(BROWN WOODHEN.)

Ocydromus earli, Gray, Ibis, 1862, p. 238.

Ad. similis *O. greyi*, sed pallidior, et tergi colore minus nigrescente: fasciâ pectorali castaneâ vix obsoletâ: hypochondriis subalaribusque fulvo minutè terminatis et fasciatis: rostro rufescenti-brunneo: pedibus aurantiaco-flavis.

Adult. Similar to *Ocydromus greyi*, but generally lighter, having less black on the upper surface, and the plumage suffused with warm cinnamon-brown; the primaries are more distinctly barred; there is little or no pectoral band, the plumage of the breast being irregularly stained with cinnamon; there is less grey on the underparts; the under wing-coverts and the flanks are obscurely barred and tipped with fulvous brown; and the markings on the under tail-coverts are obsolete. Irides yellowish brown; bill pale reddish brown; legs and feet beautiful pale lake-red. Total length 18.5 inches; wing, from flexure, 8; tail 4.5; bill, along the ridge 2, along the edge of lower mandible 2.1; tarsus 2.4; middle toe and claw 2.6.

Obs. The plumage is perceptibly softer to the touch than in *O. greyi*, and has a more delicate appearance.

Mr. G. R. Gray, in his original description (*l. c.*), says that the bill and feet are "horn-coloured." This is applicable to the dried specimen from which his description was taken, but it is obvious, at a glance, that the colours of these parts have faded out in drying.

I HAVE already mentioned (at p. 107) the circumstances under which I discovered that this bird, which belongs really to the South Island, had been, for many years, confounded with the North-Island Woodhen under the above name.

It is, indeed, a strange fact, in the local distribution of species, that a Woodhen so closely resembling in plumage the form inhabiting the North Island should have been met with in two far distant localities on the western side of the South Island. In 1877, Mr. Reischek obtained one of these birds on the summit of Mount Alexander. His dog had caught a downy chick, whose cries attracted the parent, which, on being shot from the camp fire, proved to be a female of this species, with pale reddish-coloured legs. He forwarded the specimen to the late Sir J. von Haast, who sent it on to the Imperial Museum at Vienna. Some years later Reischek met with this bird again in the vicinity of Milford Sound, and two of the specimens then collected by him (male and female) are now in my collection. It may be readily distinguished from the northern bird by the warmer tints of its plumage and the brightness of its irides, bill, and feet.

Its occurrence under the conditions I have mentioned is a very curious and suggestive fact, especially when we remember that at least three other well-marked species of Woodhen occur in the South Island, although not met with in the North Island.

The peculiar whistling cry of the Woodhen, which is usually commenced at sunset and is continued, more or less, all through the night, is very pleasant to hear. A pair of them usually perform together, calling alternately and in quick succession, the female always taking the lead. She commences with a low whistle, preceded by a guttural sound from the chest (only heard on a very near approach), and the call increases in force till it becomes a shrill whistle, the responsive call of the male being pitched in a different key.

Of the five specimens brought by Reischek (three males and two females) one pair was obtained on Cooper's Island, separated from the mainland by half a mile of sea, and the others in a clump of native fuchsia at an elevation of 1000 feet.

OCYDROMUS AUSTRALIS.

(SOUTH-ISLAND WOODHEN.)

Troglodyte Rail, Lath. Gen. Syn. v. p. 229 (1785).*Rallus australis*, Sparrm. Mus. Carls. t. 14 (1786).*Rallus troglodytes*, Gm. Syst. Nat. i. p. 713 (1788).*Ocydromus troglodytes*, Wagler, Syst. Amph. p. 98 (1830).*Ocydromus australis*, Strickl. Ann. N. H. vii. p. 39 (1841).*Native name.*—Weka.

Ad. suprâ lætè stramineus, dorsi plumis medialiter brunneis, quasi latè striatis : pileo saturatiore, magis rufescente : supereilio distincto sordidè albicante, posticè cinereo : facie laterali brunneâ vix cinerescente : genis et gutture toto clarè et pallidè cinereis : scapularibus lætè stramineis, medialiter brunnescentibus et irregulariter saturatè brunneo transfasciatis : alis et caudâ rufis, stramineo marginatis, nigro irregulariter transfasciatis, secundiis magis stramineo lavatis, dorso concoloribus : pectore superiore aurantiaco-fulvo, laterali stramineo, plumis medialiter brunnescentibus : pectore medio cinereo lavato : abdomine cinerascenti-olivaceo : hypochondriis et subcaudalibus stramineis, brunneo vel nigro transfasciatis : subalaribus olivascenscentibus, imis rufescentibus nigro transfasciatis : rostro brunneo, versus basin rufescente : pedibus pallidè coccineis : iride lætè rufescenti-brunneâ.

Adult male. Upper parts generally yellowish buff, varied on the back with a broad dash of black down the centre of each feather, and on the scapulars and wing-coverts with irregular transverse markings of reddish brown and black ; crown of the head and nape rufous brown varied with black ; the primaries with their superior coverts and the secondaries bright rufous, beautifully marked with regular transverse bars of black ; the tail-feathers dark rufous barred and margined with black, and edged near the base with fulvous ; upper part of chin, and a line from the base of the upper mandible passing over the eyes, dull greyish white ; lores and region of the ears dull rufous brown ; throat and sides of the head cinereous grey ; sides of the neck, the whole of the fore neck, and upper part of breast bright fulvous, obscurely marked and shaded with brown ; lower part of breast, and the whole of the abdomen, cinereous brown, varied more or less with grey, especially on the former ; the soft plumage covering the tibiæ pale umber ; sides of the body, flanks, and under tail-coverts yellowish brown, conspicuously barred all over with brownish black. Irides bright reddish brown ; bill pale reddish brown at the base, brown at the tip ; tarsi and toes pale lake-red, claws brown. Total length 24 inches ; extent of wings 24 ; wing, from flexure, 8 ; tail 7 ; bill, along the ridge 1.75, along the edge of lower mandible 2 ; tarsus 2.75 ; middle toe and claw 3.25 ; hind toe and claw 1.25.

Female. Smaller than the male, with darker plumage and duller-coloured legs. Total length 21 inches ; extent of wings 21 ; wing, from flexure, 7 ; tail 5.5 ; bill, along the ridge 1.75, along the edge of lower mandible 2 ; tarsus 2.25 ; middle toe and claw 2.75 ; hind toe and claw 1.

Young. In immature birds the tints of the plumage generally are lighter, the transverse markings are less distinct, and the colours of the bill and legs are paler ; the irides are dark brown ; there is less rufous on the head, and often considerably more of the cinereous grey colour on the breast and abdomen.

Chick. Covered with thick but soft tawny-brown down, which changes to smoky brown as the chick gets older darker on the sides of the face.



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SOUTH-ISLAND WOODHEN.
OCYDROMUS AUSTRALIS

BUFF WOODHEN
OCYDROMUS BRACHYPTERUS.

(ONE-HALF NATURAL SIZE)

Varieties. Examples from different localities exhibit so much variety in size and plumage as to suggest the existence of another, closely allied species. Mr. Potts says that when he was "camping in one of the gorges of the Rangitata, a very striking variety used to visit the tent constantly: the individuals of either sex were above the average size; the general colour of the plumage light greyish brown, the feathers marked or barred with shades of dark brown; the rump, and in some instances the tips of the primaries, rich chestnut; throat and cheeks grey."

Albinos, more or less pure, are occasionally met with. The 'Canterbury Press' recorded the capture of one, on the Four-Peaks run, by one of Mr. Walker's shepherds. This beautiful bird had the entire plumage ashy white, with obsolete spots and markings of pale grey, the bill and legs pale red, and the irides reddish brown. It was forwarded to England by the Canterbury Acclimatization Society as a gift to the Zoological Society, but did not long survive its arrival in the Gardens.

In the Otago Museum I examined a beautiful series of albinos:—No. 1, obtained near Lake Wakatipu, has the whole of the plumage creamy white, being very soft and silky to the touch; on close examination, and on moving the covering plumage aside, there is the faintest indication of colour, with obsolete markings on the webs but very indistinct; the shafts of the quills pure white. Bill whitish horn-colour. Feet appear to have been originally red, with paler toes; irides stated as red. No. 2 is a less pure albino, also from Lake Wakatipu, presented to the Museum by Miss White. General plumage silver-grey, shading into greyish brown on the head and throat, and again on the breast and abdomen; all the markings that are brown and black in the ordinary bird are represented in this by darker shades of grey, having a washed-out appearance, but not faded, the whole of the plumage being delicately harmonized. On the quills there is a faint wash of chestnut, and, in a lesser degree, on the under surface of the tail-feathers. Bill and feet as in ordinary examples. No. 3 (from South land) shows a progressive step, the whole of the plumage being of a rich tawny colour, brightest on the forehead and breast, and shading into grey on the abdomen; the quills are handsomely barred with chestnut-brown; the plumage of the flanks and under tail-coverts similarly marked, but obscurely; the lores are whitish, and around the eyes there is a shade of grey which imparts to the face a very expressive look. Bill light horn-colour; feet as in the ordinary bird. No. 4 is similar to the last, but of a somewhat darker shade, with the obsolete markings on the plumage more pronounced, although the bars on the quills are not quite so distinct, whilst on the tail-feathers these markings are hardly perceptible. The dark shade around the eyes is absent, and the face has consequently a less coquettish look about it. Bill uniform yellow horn-colour; feet as in the last.

I have seen an example in pied plumage, similar to the partial albino of *Ocydromus greyi* mentioned at page 106, that is to say, with straggling pure white feathers all over the body.

A specimen obtained by M. Filhol, and now in the Natural History collection at the Jardin des Plantes, has the entire plumage pale cinnamon-brown, shaded with dull rufous.

MUCH of what I have said in treating of the North-Island Woodhen is equally applicable to the present species, which is spread all over the South Island, being extremely plentiful in certain localities. It has never been met with in the North Island as an indigenous bird, although of late years it has been successfully acclimatized by Sir George Grey at Kawau, where, on account of its predatory habits, it has already become a nuisance.

The tendency of this bird to vary, in a very remarkable degree, has occasioned much difficulty in discriminating the form. The North-Island species, on the contrary, is very distinct in character from the other species, exhibiting only a slight degree of individual variation.

It has the same general habits as the North-Island Weka, and its cry is exactly similar. It differs, however, conspicuously in its nature, being as bold and fearless as the former species is timid and retiring. It frequents the settler's homestead, enters the farmyard, and occasionally ventures inside the shepherd's hut, in its prosecution of certain thievish propensities. Many amusing stories are told of its carrying off, out of pure inquisitiveness, such things as forks and spoons, tin pannikins, clasp-knives, and meerschaum pipes, &c. At Alford Forest it is said to have levanted with a silver watch (afterwards accidentally recovered) from a bushman's hut; and on another occasion one of these

birds stole, among other movable property from a surveyor's tent, a valuable little aneroid, which was hopelessly lost. Smoking-caps, slippers, and other bright-coloured objects of the kind, if within reach, are equally insecure when this mischievous marauder is about.

It is more diurnal in its habits than *O. greyi*, and may often be seen in the broad sunshine feeding about among the tussock-grass and stunted vegetation in the localities it inhabits. It is very pugnacious in character, rival males fighting freely when they meet, each bird spreading forward first one wing and then another, to present a better front to the adversary, and to receive the aimless thrust of his beak in a shield of pliant feathers. It has the same shrill whistling cry as the former species, uttered by a pair in concert or responsively; and on a near approach a loud drumming note may be distinguished as a prelude to the cry. Its food consists of lizards, mice, insects of every sort, certain berries when in season, eggs of all kinds, and the offal round about the stations. When it visits the farmyard it proves very destructive to the chickens, and has even been known to attack and kill a Spanish pullet, six weeks old.

Mr. W. W. Smith writes to me:—"In your first edition you mention the circumstance of very large birds having sometimes been met with in the hills. I was lately among the ranges in the Ngapara district and discovered a huge pair. As they were quite isolated in a bleak spot, I was puzzled for a time to know what they fed on. After searching for some time I found some large worm-castings of the *Lumbricus uliginosus*, Hutton. This species measures 12 and 14 inches in length, and is of sluggish habits. As both worms and Wekas are of nocturnal habits, the latter will have no trouble in seizing the worms and dragging them from their burrows. They are superior food to any other the Woodhen could obtain. These worms, I may observe, are limited in their distribution; but where they do exist they are found in considerable numbers. I have no doubt that the excessive size and fatness of the birds I have mentioned may be accounted for by the abundance of this particular food."

The breeding-habits of this species are in no respect different from those of the North-Island Woodhen; but the eggs, which are from five to seven in number, are more richly coloured. There is a fine series of these in the Canterbury Museum, all of which were collected between the 20th of October and 25th of November. Ordinary examples measure 2.4 inches in length by 1.6 in breadth, and are white, sometimes with a yellowish tinge, marked over the entire surface, but particularly at the larger end, with irregular spots and blotches of pale reddish brown, among which are spots of purplish grey having the appearance of markings under the surface. In some specimens the reddish-brown spots are very rounded and distinct; in others they are splashed or smudgy; and one specimen has a broad irregular blotch of purplish brown near the thicker end.

A nest of this bird (in the Canterbury Museum) from Ohinitahi is a massive bed of dry grass, measuring 20 inches by 14, with a uniform thickness of about $4\frac{1}{2}$ inches. In the centre there is a slight depression, which contains five eggs. These are yellowish-white, irregularly spotted and marked with yellowish-brown and pale washed-out markings of purple. In form they are slightly ovoid-conical, measuring 2.25 inches by 1.6, and presenting very little variety in colour, the spotted markings being generally thickest at the larger end. Mr. Enys states that the ground-colour varies in specimens from different localities, from a pure white to a rich cream-colour. I have observed that they are often much soiled, probably from contact with the bird's feet during incubation.

My son's collection contains upwards of twenty specimens exhibiting a considerable amount of individual variation, some of them being very richly marked with reddish brown, particularly at the larger end, others having widely scattered round spots over the entire surface (like the egg of *Rallus philippensis*), while others, again, have the larger pole washed with reddish brown, irregularly blotched and spotted with purplish brown, diminishing in the middle circumference, and disappearing entirely towards the smaller end, where the shell is creamy white.

OCYDROMUS BRACHYPTERUS.

(BUFF WOODHEN.)

Ocydromus brachypterus, Lafr. Mag. de Zool. 1842, pl. 42.

Ocydromus hectori, Hutton, Trans. N.-Z. Inst. vol. vi. p. 110 (1874).

Ocydromus brachypterus, Buller, Trans. N.-Z. Inst. vol. x. p. 214 (1878).

Ad. similis *O. australi*, sed pallidior : supracaudalibus et scapularibus nigricanti-brunneo conspicuè transfasciatis : pectore superiore lætè stramineo : pectore medio cinereo tineto : hypochondriis et subcaudalibus distinctè transfasciatis.

Adult. Of similar size to *O. australis*, but having the plumage of a more uniform buff or pale olivaceous brown colour, with the wings, sides of the body, and flanks more conspicuously barred with brownish black.

Young. There is a specimen in the Otago Museum, just fledged, in which the distinctive characters described above are sufficiently marked. On comparing it with a fledgling of *Ocydromus australis* this became the more apparent, the former having obscure barred markings on the flanks, which were entirely absent in the other.

Varieties. A specimen which I refer to this species, on account of the pronounced character of the barred markings on the wings, is a singular example of partial albinism ; the entire plumage is pure white, slightly shaded with cream on the nape, excepting only the wing-feathers which are of the normal colours, and completely covered with transverse markings, the bars being very regular and distinct ; the tail-feathers are like the body-plumage, pure white ; bill whitish horn-colour, tinged with yellow at the base ; legs and feet pale brown.

My late brother, Mr. John Buller, assured me that he invariably found the Alpine bird considerably larger in size than those inhabiting the plains, and of a much lighter colour.

A specimen brought by Mr. Henry Travers from the interior of the Marlborough Province has the general plumage of a yellowish-buff colour, very obscurely marked and spotted with brown ; and among those obtained by Sir George Grey in the Otago hills, for the purpose of stocking the Kawau Island, I observed that one (apparently a young bird) had similar plumage, although it was more distinctly banded on the sides and flanks. Sir G. Grey informed me that these birds were taken by himself at an elevation of 6000 feet, where they were found concealed under the tussocks or hiding among the loose rocks, the assistance of a dog being required to dislodge them. A specimen in my collection has the whole of the upper surface light fulvous shaded with brown, each feather having a subterminal spot of that colour ; the primaries and secondaries are dark rufous brown barred with black, and the soft overlapping feathers are fulvous, stained more or less with rufous and barred with black in their middle portion, margined and spotted towards the end with cream-yellow ; the throat, fore neck, and breast pale cinereous brown, mixed with fulvous on the crop ; the lower parts dull cinereous brown, fasciated on the sides and flanks with narrow markings of fulvous.

Professor Hutton regards this bird as distinct (*Ocydromus troglodytes*, Wagler), and says of it :—“ The distinguishing marks of this species are its large size, the general olivaceous tints of its plumage, the middle tail-feathers having generally a black streak down the shaft, and the primary feathers of the wing tapering towards the point.”

Obs. All the Woodhens in the Canterbury Museum (excepting *O. earli* and *O. fuscus*) appear to me to belong to *O. australis*. There is one marked (in Prof. Hutton's handwriting) *O. troglodytes*, but it does not differ from the rest in any essential respect, although it is an unusually large example, and pale in all its colours.

It is with some hesitation that I accord specific rank to this bird, for although my collection contains some beautifully marked specimens, they intergrade to such an extent that it is extremely difficult to draw any distinct line between this species and *O. australis*.

I have thought it best, however, to give a figure and description of my most characteristic specimen, and to leave ornithologists to choose for themselves whether they will recognize this form as distinct, or as being only an extreme variety of the highly variable South-Island Woodhen.

My own revision of the group was thus stated in a paper which I read before the Wellington Philosophical Society in January 1878* :—

“Although as a group the limits of the genus *Ocydromus* are sufficiently well defined, considerable difficulty has been experienced in determining the species. Every naturalist who has studied the subject appears to have arrived at some different conclusion as to the number of constant forms; and where the variances as to size and plumage are so well maintained it is difficult to avoid drawing specific distinctions. If, however, it can be shown that all these extreme forms graduate in a series, or, in other words, run into one another, it becomes impossible to find any fixed aberrant characters. Without professing to be able yet to place the matter beyond all dispute, I venture to think that the series of specimens which I have the honour to exhibit this evening affords pretty strong evidence that several of the so-called species in the South Island must be united under the name of *Ocydromus australis*.

“In my ‘Birds of New Zealand’ (1st ed.), I admitted only three well-ascertained species as inhabiting New Zealand—namely, *O. earli*, *O. australis*, and *O. fuscus*. I mentioned in the introduction to that work that, although Dr. Finsch recognized a fourth (*O. troglodytes*, Gmel.), I was unable to draw any specific line. Nevertheless, I pointed out very fully, in my account of the South-Island Woodhen, the great variation both as to size and markings which that species exhibits, especially among birds from different localities.

“Captain Hutton, in an article on the New-Zealand Woodhens, read before this Society † in September, 1873, agreed with Dr. Finsch in admitting *O. troglodytes*, and added two more species of his own under the names of *O. hectori* and *O. finschi*. He further described a ‘variety or immature’ example of this last-named species, which he suggests may ‘possibly be identical with *Gallirallus brachypterus*, Lafr.’

“Dr. Finsch, in a paper ‡ written the year following, professes to identify *Ocydromus troglodytes* with the *O. australis* of my text, page 170, but not the plate; of *O. hectori* he remarks, ‘I consider this a good species after having compared a typical specimen;’ and of *O. finschi* he says that, having examined the type, he considers it a good species, although not without some suspicion that it may prove to be a variety of *O. fuscus*. He confuses *Ocydromus australis*, Sparrm., with the well-known *O. earli*; and with respect to the latter in Hutton’s list, he makes the following singular statement:—‘Dr. Buller, in his great work, unfortunately does not mention the typical specimen of *O. earli*, Gray, and not having compared it myself, I am unable to make out whether the true *earli* is, indeed, the bright cinnamon-red bird as Captain Hutton and I believe, or whether it is the same as *O. australis*, figured under the name of *earli* by Dr. Buller’ §. Captain Hutton, on the other hand, writes me:—‘I am sure that you are right about the identification of *O. earli*, and I don’t understand how Finsch thinks otherwise’ ||.

“Baron A. von Hügel, who has lately been on a scientific tour through the colonies, writes thus in ‘The Ibis’ ¶:—‘Of New-Zealand things I have got a very fair collection—some 300 specimens already. *Ocydromus* I have, of course, gone in for, and have a lot of notes about it. I don’t believe in more than three good species—*O. australis* (with endless varieties), *O. fuscus*, and *O. earli*. The last two are difficult to procure, although I shall doubtless get a series of the latter in the North Island; but of *O. australis* one could get a shipload in a very short time. I have got a splendid series, showing every age from embryo to adult, and varieties to perfection.’ It will be seen, therefore, that the Baron, who comes to the subject with a totally unprejudiced mind, adopts my published division of the species in a very positive manner.

“If, on further investigation, it should be found necessary to add a fourth species, this must be *Ocydromus brachypterus*, Lafresnaye; for Dr. Finsch, who appears to have examined the type specimen, affirms distinctly ** that it is the same as Hutton’s *O. hectori*; and Captain Hutton himself admits that this is ‘very probable’ ††. This is of course the bird referred to at page 171 of my ‘Birds of New Zealand’ (1st ed.), in the following passage:—‘Dr. Hector informs me that on all the high mountains of the Otago province he met with a “cream-coloured variety,” very readily distinguishable from the common bird. Mr. Buchanan confirms this observation, and states that on the Black Peak, at an elevation of 6000 feet, he found this light variety very abundant, but none of the other birds; the former, indeed, were so numerous as to prevent his getting any sleep.’ It seems unfortunate that, in obedience to the law of priority in nomenclature, we must sink a name, very fittingly bestowed, in favour of *brachypterus*, which expresses no distinguishing specific character, being equally appropriate to all the forms of *Ocydromus*.”

* Trans. N.-Z. Inst. vol. x. pp. 213-216.

† *Op. cit.* vi. p. 110.

‡ *Ibid.* vii. pp. 226-236.

§ *Ibid.* vii. p. 231.

|| *Id. ibid.* ix. p. 330.

¶ ‘The Ibis,’ 1875, p. 393.

** Trans. N.-Z. Inst. viii. p. 202.

†† *Loc. cit.* ix. p. 330.

CABALUS DIEFFENBACHII.

(DIEFFENBACH'S RAIL.)

Rallus dieffenbachii, Gray in Dieff. Trav. ii., App. p. 197 (1843).*Ocydromus dieffenbachii*, Gray, Voy. Ereb. and Terror, p. 14, pl. 15 (1844).*Hypotaenidia dieffenbachii*, Bonap. C. R. xliii. p. 599 (1856).*Hypotaenidia dieffenbachii*, Gray, Ibis, 1862, p. 238.*Rallus dieffenbachii*, Buller, Birds of New Zealand, 1st ed. p. 179 (1873).*Native name.*—Moeriki.

Ad. suprâ brunnescenti-olivaceus, ochraceo et nigricante irregulariter transversim fasciatus: dorso postico et uropygio olivaseenti-brunneis, supracaudalibus aureo-fulvo transfasciatis: pileo summo brunneo unicolore: strigâ longâ superciliari, genis et gutture toto einercis: strigâ alterâ a basi maxillæ per oculum ductâ brunnescenti-castaneâ: tectricibus alarum dorso concoloribus: remigibus castaneis, nigro transnotatis, versus apicem brunnescentibus, secundariis intimis dorso concoloribus, fulvo notatis: rectricibus olivaseenti-brunneis, unicoloribus: collo laterali inferiore et pectore superiore nigris albido transfasciatis: pectore fulvescenti-ochraceo, nigro transfasciato: corpore reliquo subtus nigro, albo transversim lineato: subcaudalibus latius fulvo transfasciatis: rostro brunneo, versus basin saturatiore: pedibus pallidè brunneis: iride rufescenti-brunneâ.

Adult. Crown and nape dark rusty brown; sides of the head and the whole of the throat pale ash-grey, the former traversed by a broad band of rusty brown, which, commencing at the base of the upper mandible, passes across and under the eyes and thence downwards, changing on the ear-coverts to chestnut, and meeting in a broad band of that colour on the lower part of the hind neck; towards the base of the lower mandible, and a streak over the eyes, greyish white; on the fore neck a zone of black with rayed lines of white, bordering the ash-grey, and widening out on the sides into a rounded patch; neck beyond and the whole of the breast bright rufous brown, with narrow transverse bands of black; shoulders and all the upper part of the back fulvous brown varied with black, beautifully barred and spotted with pale rufous brown; lower part of back and rump dark fulvous brown, plumbeous beneath; underparts black, handsomely fasciated with white on the upper part of the abdomen, sides of the body and flanks, less distinctly so and tipped with fulvous on the lower part of abdomen and soft ventral feathers; under tail-coverts black, broadly barred with rufous brown; primaries bright chestnut, with numerous transverse bars of brownish black and tipped with olive-brown; secondaries much browner, with the chestnut considerably diminished and assuming the form of broad toothed markings on both vanes; wing-coverts similar to the plumage of the back, but largely tinged with chestnut; tail-feathers dark rusty brown, with rufous margin in their basal portion. Examined individually, the feathers of the back are blackish brown, crossed by two broad undulating bands of fulvous; those of the breast have the bands broader and more regular; those covering the abdomen and sides of the body are black, with two equidistant bars and a narrow terminal margin of white. Irides reddish brown; bill light brown, darker towards the tip; tarsi and toes light brown. Total length 12.25 inches; wing, from flexure, 4.75; tail 3.25; bill, along the ridge 1.45, along the edge of lower mandible 1.5; tarsus 1.5; middle toe and claw 1.75; hind toe and claw .6.

THIS beautiful Rail was brought from the Chatham Islands by Dr. Dieffenbach in 1842, and named by Mr. Gray in compliment to this enterprising naturalist. The adult specimen in the British Museum, from which my description was taken, is unique, and seems likely to remain so.

In answer to my inquiries, a Chatham-Island correspondent, Kirihipu Roiri Te Rangipuahoa, wrote as follows in August 1863:—"Na, ko to kupu mo te manu. I ngaro tera manu, to Moeriki, i te toru o nga tau i noho ai nga Maori ki tenei moutere. Mehemea kei te ora taua manu, maku e hopu atu mau. He manu pai taua manu. I kite au imua i taku tamarikitanga. Ta nga Maori ingoa o taua manu he Popotai." [TRANSLATION.—Now with regard to the bird. This bird, the Moeriki, disappeared in the third year after the occupation of this island by the Maoris. If the bird still survives I will catch you some. It was a beautiful bird. I remember seeing it when I was a boy. The Maoris called it a Popotai.] But my friend Roiri, although he had the stimulus of a handsome reward, never succeeded in finding the Moeriki; and we may therefore conclude that it is extremely rare, if not quite extinct, on the main island.

In this very interesting form the plumage bears a strong family likeness, in the style and distribution of the markings, to that of the well-known *Rallus philippensis*; but, as will be seen from the figures given below, its bill is more Ocydromine in its character.

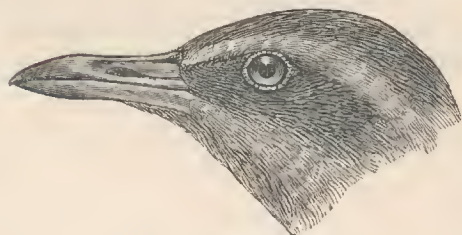
It has been conclusively shown that the skeleton of the Rail described by Hutton under the name of *Cabalus modestus* (regarded in my former edition as the young of *Rallus dieffenbachii*) differs widely from that of *Rallus*, especially in the character of the sternum; and as we find here the same modification in the bill, I think the proper course will be to place Dieffenbach's Rail in Hutton's new genus, as indeed Mr. Sharpe has already done in his Supplement to the Birds of the 'Voy. Ereb. and Terr.' (p. 29). It ought, however, to be remembered that Mr. G. R. Gray had long before proposed to refer this form to the genus *Ocydromus*.

Of the last-named group I have treated fully in my accounts of the five species inhabiting New Zealand.

Another allied species, *Ocydromus sylvestris* (Sclater), is confined to Lord Howe's Island, a small insular district whose zoological relation to New Zealand has already been discussed in my Introduction.

It is very curious that at the Chatham Islands, lying, as it were, between these points, a generically different Ocydromine form should present itself. The New-Caledonia Rail (*Eulabeornis lafresnayanus*), although aberrant, comes even nearer to our *Ocydromus* *. The bill is more attenuated, and the tail (in all the specimens I have examined) is very inconspicuous, but the general characters are very similar, and the legs and feet are the same, although somewhat more slender.

* In general appearance it is not unlike *Ocydromus fuscus* in plumage, but it has a much larger bill, which is slightly curved as in *O. sylvestris* from Lord Howe's Island. Layard writes (*Ibis*, 1882, p. 535):—"This queer Rail is, though generally distributed, a rare bird in New Caledonia. It appears to inhabit much the same localities as the Kagou, and is, in fact, a 'Woodhen,' like the Weka, and not a swamp-bird. We have kept it in confinement, feeding it on *Bulimi*, raw meat, and garbage. It is nocturnal, and runs with great rapidity. In walking it elevates the tail with the peculiar flip common to the Rails, and it can climb and jump like a cat. If alarmed it will squeeze itself into the smallest holes and crevices and lie 'perdue' and motionless, feigning death for a long time."



Rallus philippensis.



Cabalus dieffenbachii.

CABALUS MODESTUS.

(HUTTON'S RAIL.)

Rallus modestus, Hutton, Ibis, 1872, p. 247.*Rallus dieffenbachii* (young), Buller, Birds of New Zealand, 1st ed. p. 180 (1873).*Cabalus modestus*, Hutton, Trans. N.-Z. Inst. vol. vi. p. 108 (1874)*.*Cabalus dieffenbachii* (young), Sharpe, App. Voy. Ereb. and Terror, p. 29 (1875).

Ad. olivaseenti-brunneus, unicolor, plumis quibusdam interseapulii et tectricibus alarum majoribus paucis indistinctè fulvo fasciatim terminatis : supracaudalibus fulvo magis distinctè transfasciatis : facie laterali vix cinerascete : gutture sordidè cinereo, brunnesecute obscurato : corpore reliquo subtùs brunneo, dorso concolore, sed angustè et magis distinctè fulvo transfasciato : rostro et pedibus pallidè brunneis : iride pallidè brunneâ.

Adult. General plumage dull olive-brown, plumbeous at the base ; throat greyish, each feather tipped with brown ; feathers of the breast narrowly fringed with pale fulvous ; those covering the upper part of abdomen and sides of the body, as well as the under tail-coverts, crossed by two narrow bars of the same colour ; the first three primaries very faintly barred with reddish fulvous ; tail-feathers, rump, and thighs obscurely freckled with fulvous. Irides, bill, and legs light brown. The plumage is very soft in texture, and the markings have the indeterminate character peculiar to young Rails.

Young. Covered with thick down of uniform brownish black.

THIS small Ocydromine form (which I treated in my former edition as the young of *Cabalus dieffenbachii*) was obtained by Mr. Henry Travers in the small island of Mangare (one of the Chatham Isles) in 1872 ; and Mr. Walter Hood informs me that it may still be obtained there, although difficult to procure, owing to its semi-nocturnal habits.

Prof. Hutton writes :—“ Both the birds obtained by Mr. H. Travers were full-grown, one accompanied by her young one, and the other containing well-developed ova ; they were both exactly alike in colour and dimensions, in neither of which do they show any approach to the colour and dimensions of *R. dieffenbachii*, as may be seen by comparing descriptions of the two ; while in all known Rails the young soon acquire a plumage approaching in colour to that of the adult, and always attain their adult plumage before breeding. In its body, tail, wings, legs, and feet, *C. modestus* is a smaller bird than *R. dieffenbachii*, while the bills of the two are of nearly the same length ; but in all Rails the legs and feet attain the full size very early, and long before the bill acquires its full length.”

* I have been favoured with the following interesting note :—“ I have found the MS. of a paper all but completed, but never published, ‘ On a comparison of the skeletons of *Cabalus* (= *Rallus*) *modestus* and *Rallus philippensis* ’ ; and I take the present opportunity, through Sir Walter Buller’s kindness, of adding this footnote in support of the very distinctive characters of the bird in question—*Cabalus modestus*, Hutton. In the MS. above referred to I incidentally alluded to ornithologists’ recognized genera, which sometimes, when critically examined by the light of their osteology, do not furnish convincing data of stable bony characters in support of their attributed generic rank. In the instance of the Rail here mentioned, I then wrote :—‘ In anticipation of what follows as a matter of fact, I shall adduce proofs of differentiation such as not only indicate specific separation, but warrant generic relegation.’ I then give proofs of the bird being an adult, or nearly so, and of its being relatively flightless. Then followed comparisons of the bones &c., whereof I may mention, as an epitome of results and as the drawings elucidate, that trenchant distinctions obtain in the sternum and furcula, in the pelvis, and in the cranium and mandible, &c. The octavo plate of illustrations thereof has been lying finished since 1874 ; and at the recommendation of Sir W. Buller I intend forwarding the same with a revision of the MS. to date to the New Zealand Institute, in whose publications first notice of the bird appeared.”—JAMES MURIE.

ARDEA EGRETTA.

(WHITE HERON.)

- Ardea egretta*, Gm. Syst. Nat. i. p. 629 (1788, ex Lath.).
Ardea flavirostris, Wagl. Syst. Av. p. 177 (1827).
Herodias flavirostris, Gray, Voy. Ereb. and Terror, Birds, p. 12 (1843).
Herodias syrmatophorus, Gould, B. of Austr. vi. pl. 56 (1848).
Ardea alba, Ellman, Zool. 1861, p. 7469.
Ardea flavirostris, Gray, Ibis, 1862, p. 235.
Herodias alba, Gould, Handb. B. of Austr. ii. p. 301 (1865).
Ardea intermedia, Finsch, J. f. O. 1867, p. 332.
Ardea syrmatophora, Buller, Birds of New Zealand, 1st ed. p. 226 (1873).
Ardea egretta, Finsch, J. f. O. 1874, p. 194.

Native name.—Kotuku; “White Crane” of the colonists.

Ad. ubique alba: scapularibus plumis elongatis filamentosis ornatis: rostro lætè flavo: pedibus nigris: iride flavâ.

Adult male. The whole of the plumage snowy white. Irides yellow; loral skin greenish yellow; bill bright yellow, with a polished surface, sometimes inclining to brown towards the point of the upper mandible; legs black, tinged on the tibia and tarsal joints with yellow. Length 40 inches; extent of wings 51.5; wing, from flexure, 17; tail 7; bill, along the ridge 5, along the edge of lower mandible 6.5; bare tibia 4; tarsus 6.25; middle toe and claw 4.75; hind toe and claw 2.6.

Female. Similar to the male, but smaller in all its dimensions.

Nestling. Covered with thick yellowish-white down, which is lengthened on the crown, and being stiff and cretite gives the young chick a very striking appearance. Bill dull yellow with black tip; legs black, more or less tinged with yellow. In the Colonial Museum there are two chicks (apparently from the same nest), one, however, being nearly double the size of the other. The smaller of the two seems a mere mite in comparison with the parent bird; but with the members of this family the development of the young is always very rapid.

Varieties. I have already mentioned that in our bird the bill is yellow all the year round. I have now, however, to record an example with a black bill. I was first informed of it by Mr. W. Sparkes of the Canterbury Museum, who wrote to me in November 1884, saying:—“In your remarks upon the White Heron (Birds N. Z. 1st ed. p. 226) you state that you have never seen one with a black bill. A very fine bird was sent me last Sunday, in the flesh, for mounting, of which the bill is quite black, slightly olive-tinted at the points of both mandibles. The legs are of a dark purple colour on the lower portion, changing to a light plum above the tarsal joint.” I afterwards had an opportunity of examining this specimen, which was an exceptionally fine male, in full breeding-plumage, with about seventy beautiful dorsal plumes, the longest of which measured 18 inches, extending fully seven inches beyond the tail. It differs from all other examples I have seen in having a perfectly black bill, becoming yellowish towards the extreme tips of both mandibles. The loral skin is greenish, changing to yellow around the eyes; and the irides are bright yellow. I observed that in this specimen the filamentous dorsal plumes, which are usually snowy white, were tinged with yellow at the tips.

There is a peculiar specimen in the Colonial Museum; the bill is tinged with brown in its apical



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BLUE HERON.
ARDEA SACRA.

WHITE HERON.
ARDEA EGRETTA.

(ONE THIRD NATURAL SIZE)

portion; across the shoulders and covering the flexure of the wings is a broad band of slaty brown, having the appearance of a yoke; there is a large smudge of the same colour on the fore neck, halfway down, also a shade on the crown of the head, pectoral plumes, and under tail-coverts; the legs are tinged with yellow on the tibia and upper part of tarsus.

Another specimen, which was afterwards submitted to me, and said to have been killed in winter, had the bill of a beautiful orange-yellow, with a narrow mark of black at the extremity of the upper mandible. This bird measured 46 inches in extreme length; bare tibia 4; tarsus 6.5. The legs and feet were perfectly black.

I examined three specimens in the Canterbury Museum. One of these (killed on the West Coast) was an unusually large one, with abundant dorsal plumes, and having the apical portion of the mandibles blackish brown, shading off downwards, and deepening to black at the tip; the tibiae and tarsi brown, tinged with yellow. Bill, along the ridge 5 inches, along edge of lower mandible 6; bare tibia 3.75; tarsus 6; middle toe and claw 4.1. The second bird is of smaller size, but with ample plumes, the upper mandible exhibiting a line of black along the ridge; and the third, which is entirely destitute of the dorsal adornment, has the bill perfectly yellow, with a tinge of the same colour at the base of the tibia.

A live example in the possession of Mr. J. W. Hall (who sent me a coloured drawing of the head) exhibits a pale blue tint about the orbits of the eyes; the bill is bright yellow at the base, pale lake in its entire length, but black towards the tip of the upper mandible.

Obs. This species exhibits considerable variation in size. A specimen obtained by Mr. Travers in the South Island has the bill longer and more robust than in ordinary examples, while the legs are remarkably short as compared with others, the tarsus measuring only 5 inches in length.

Both sexes are adorned with the dorsal plumes during the breeding-season; but in the female they are not so fine as in the other sex.

Remarks. The fully adult bird of both sexes has the back adorned by a number of long filamentous plumes, which have their origin near the roots of the scapulars, extending from four to six inches beyond the tail and forming a beautiful train; but this is peculiar to the breeding-season. The plumes are about 15 inches in length, extending fully three inches beyond the tail; and they consist of a rigid tapering shaft, with lateral filaments of extreme fineness, placed about half an inch apart, being, for the most part, five inches in length, but becoming shorter towards the extremity of the shaft. The whole of this ornamental plumage is, like the body, pure white. In some examples (either females or immature birds) these dorsal plumes are very much reduced, a few of the feathers forming the mantle having their shafts produced as far as the end of the tail and furnished with loose filamentous barbs.

As already stated, the bill is of a rich yellow colour. With the rare exceptions mentioned above, I have never seen any with a black bill or in a transitional state, although I have examined scores obtained at all seasons of the year; and I do not believe that any regular seasonal change of colour takes place, in which respect our bird appears to differ from the other closely allied species. My friend Dr. Finch first of all referred it to *Ardea intermedia*, then to *A. alba*, and lastly to *A. egretta*; and, although I kept it distinct in my former edition, I feel bound now to adopt the last of these names. Mr. Gould, in surrendering his own appellation of *symmatophorus*, quotes Blyth's remarks on the subject (*Ibis*, 1865, p. 36); but I was informed by Mr. Blyth himself that in the Indian bird the change in the colour of the bill, from yellow to black, and *vice versa*, always takes place with the change of season.

THE White Heron occurs so sparingly in most parts of New Zealand, that "rare as the Kotuku" has passed into a proverb among the Maoris; while in the North Island it is said to occur only once in a lifetime (He Kotuku rerenga tahi).

The first North-Island example I heard of was at Whaingaroa (Raglan) about the year 1853. In 1856 I examined a fine specimen which had been shot at Hurley's mill-reservoir near Wellington. A year or two later I saw another from the Wairarapa district. In the summer of 1865 a pair visited the mangrove swamp at Whangarei, and remained there several weeks. The year before a pair was seen at Whangape Lake in the Lower Waikato; in 1867 another pair frequented, for some time, the marshy ground at the mouth of the Maketu river, and again in 1867 a pair visited the

banks of the Waihi in the same district. The natives made every possible effort to obtain these birds for the sake of the white plumes. In both of the last-mentioned cases they succeeded in killing one of them, the survivor remaining in the locality for several months, leaving only on the approach of winter. In former years it was always to be met with singly or in pairs in certain districts in the South Island, but with the extension of settlement it has disappeared. In the summer of 1859 (after stalking him for two hours), I shot a beautiful adult male at the sea-shore lagoon near Timaru, and saw another pair feeding among the sedges of Lake Ellesmere.

Mr. Cheesman writes to me from the Auckland Museum:—"I have in the Museum a small specimen of this Heron shot by Mr. Lewis Rye in the Otamatea district, Kaipara. About two years ago one was killed in the swamps by the Thames river and exhibited for a few days at the Thames. Quite recently (1881) Mr. James Stewart, C.E., has informed me that one had been shot by his survey party employed on the Rotorua railway."

Subsisting almost entirely on eels and small freshwater fish, it frequents the sedgy shores of lagoons and the banks of tidal streams; but it sometimes resorts also to the open sea-beach, where I have myself shot it.

It is very interesting to watch this stately bird stalking about in its haunts, or fishing in the shallow water, its snow-white plumage rendering it a very conspicuous object. I have always found it very shy and difficult to approach, the slightest sound exciting its suspicion and making it take wing. It flies high and in wide circles, the wings performing slow and regular flappings, the head being drawn in upon the shoulders, and the legs trailing behind.

None of our birds enjoy a wider geographic range. Major Legge, in his 'Birds of Ceylon,'* has traced its course with a very skilful hand, and I cannot do better than reproduce his account in a condensed form:—It is to be found in all large marshes and tanks throughout the northern half of Ceylon, and in the southern districts also wherever there are extensive tracts of wild paddy-land. In India it is a very common bird, being of course most abundant in the better-watered districts, but may be found everywhere, feeding by rivers and tanks. It is said to be very plentiful in the region between the Ganges and the Godaveri. About Calcutta it is only occasionally met with. Passing eastward, it is found generally distributed throughout the plains portion of Tenasserim. It is likewise found in the Andamans. Returning to India, it is recorded by Dr. Scully as occurring in the valley of Nepal in the winter; and evidently is found all along the base of the Himalayas, as also in the plains westward to the Punjab. In Sindh it is common and is distributed, less numerous, throughout the entire surrounding region. In Kashgharia it is plentiful in winter, migrating northward in the spring to breed. According to Severtzoff it breeds throughout Turkestan and winters in the western portions of that country. It is spread throughout the Chinese empire, breeding in large numbers near Peking; and Swinhoe met with it in Formosa. In the Malay archipelago, through which it extends to Australia, it is found in Borneo, Celebes, Ternate, Timor, and the Aru Islands. It has been recorded from every settlement in the north of Australia, and from most parts of the East Coast down to Victoria; also from South Australia and Tasmania. In Asia Dr. Radde observed it in the Central Argunj valleys and again in Siberia. Major St. John met with it in Persia, and Mr. Blanford in Baluchistan; while Canon Tristram found it to be a spring and summer visitor to Palestine. In Asia Minor it is common, and in Greece slightly less numerous, though abundant in the marshes of Macedonia. In south-eastern Europe it is much more numerous than further west; rare in Spain,

* Writing of this bird in Ceylon, Major Legge says:—"Breeding-plumage. Iris bright pale golden yellow; bill blackish; loreal skin and space round eye greenish yellow; legs and feet black; tibia paler than tarsus. . . . The bill remains black a very short time, turning yellow long before the dorsal train is moulted; the tip, however, is black at this stage."

The late Dr. Jerdon, writing of the closely allied *A. modesta* in India, says:—"The bill becomes black before the train is developed, and changes again to yellow before the train is shed; so that both black-billed and yellow-billed individuals may be obtained with or without the dorsal train, and others with the bill changing colour in all stages of progress."

and absent from Portugal, although occurring in the Azores. It is likewise rare in Malta, though tolerably common during the winter season in Sicily and Sardinia; and scarce again in Northern Italy. In Transylvania it is found on migration; but it breeds in the marshes of Hungary and in the countries skirting the Danube. It is met with rarely in Southern Germany and in Poland; but is common in parts of Russia, particularly in the southern districts. Passing westward, it is rare in France and has only once been killed in the Netherlands. It strays still further north into Scandinavia and has often occurred as a straggler to Great Britain. In parts of the continent of Africa it is abundant, particularly in the north-east, being very plentiful in Lower Egypt, where it breeds in the Nile delta. In Abyssinia it winters, frequenting the Blue and White Nile, and ranging into the highlands to an altitude of 10,000 feet. Canon Tristram met with it in small flocks in various parts of Algeria, and found it wintering in the Sahara. Down the east coast it has been observed at Mozambique and Natal; Layard met with it in South Africa, and Newton at Madagascar. Westward, again, it has been recorded from Damara Land, Benguela, and the Gold Coast.

I have already mentioned that in this species the bill does not undergo any change in the breeding-season, being yellow all the year round. In confirmation of this I may quote a letter which I have received from Mr. J. W. Hall, of the Thames, who had a captive one for a considerable time. He writes:—"As regards the bill of the Kotuku, I observed no seasonal change. The colour was pale yellow, black towards the tip. A remarkable peculiarity was that the mandibles do not quite close except at the tip. This peculiarity was verified after death; indeed when seated on the branch of a tree, in exactly the right position, you could see right through the slit or opening, which was not wider than sufficient to admit a *very* thin sixpence. You will no doubt have observed that the eye is not set in a line, or parallel with the bill, but at an obtuse angle, perhaps about 70°.

"My Kotuku at first used to roost on a box in an outhouse; but, after a fight with a hen with chickens that was running in the same garden (or wilderness), took to sleeping about 20 feet up a karaka tree, to attain which elevation it made use of some passion-flower vines that were growing up the karaka tree, as one of its wings had been cropped to prevent escape. Its actions while ascending this natural ladder were not very graceful. During sleeping hours it was completely hidden among the boughs, but in the early morning, especially after a frost, it would come out to the extreme edge of the boughs and sun itself for hours. When the long filamentous dorsal plumes were fully or partially erected it was a really beautiful sight; for though a female it had a very fine train. During its fights with the brood hen the Kotuku would throw itself nearly on its back and dart out its long bill with such vigour that it seldom came off second best. It rarely came down to breakfast, which was put into a large crock of clean water, till the morning was well advanced, and, to my surprise, seemed to prefer beef, or sheep's liver, to fish."

The beautiful snow-white plumes from the back of this bird have always been greatly prized by the Maoris, for the personal adornment of both the living and the dead, and their ancient poetry abounds in references to this valued *taonga* *.

* Take, for example, the pathetic lament for Te Hiakai, as given in Sir George Grey's 'Poetry of the New Zealanders,' p. 162:—

Tera te haeata, hapai ana mai,	Tena te kakahi,	Ki te kawē a riri.	Waiho ki muri nei,
Me he mea ko te tau,	Ka tere ki te tonga,	Whakahaerea ra,	Ka ru te whenua,
Tenei ka ora mai;	I whiuwhiua koe,	Kia rato nga iwi	Ka timu nga tai,
E Hia' rongo nui,	Te hau ki a Tu.	Kia kite Taupo,	I roto Waikato.
Ki te taha o te rangi,	Mei ona ahua,	Kia kite Rotorua.	Taku koara,
Ka whati ra e,	Te hoki ki muri ra,	Kia werohia koe,	Te uira i te rangi,
Te tara o te marama	Kei whea to patu?	Ki te manu kai miro,	Whakahoki rua ana,
Taku ate hoki ra,	E hoka i te rangi,	I runga o Titi,	Na runga o Hakari,
Taku piki Kotuku.	Hei patu whakatipi,	Hoki mai e Pa,	Ko te tohu o te mate na, i.
	Ki mua ki te upoko.	Ki to waka ka tukoki.	

Sir William Fox sent me the following very interesting note, under date of April 17, 1872 :—
 “Do you know of the existence of a ‘Cranery’ of the White Crane at Okarita, on the West Coast? There is a regular colony of them; they build and breed in the trees (white pine, I believe) above the river or creek, a few miles (say half a dozen) from the sea. My informant, who was the discoverer, Moeller, Hokitika surveyor, counted 65 on first visit. I did not get up the river so far, but saw a dozen sitting in trees lower down the creek. Many years ago I saw numbers of them at Tokomairiro, Otago, where now they are, I believe, extinct. The Okarita ‘Cranery’ is, I suspect, nearly the last; at least no other is known. . . . I have been spending two months on the West Coast, Middle Island, and exploring Mount Cook and its glaciers, which are equal in beauty to those of Switzerland. It is a pity the Alpine Club does not send out some of its members to explore the grand scenery of our Southern Alps.”

Referring to the above, Mr. Leonard Reid writes to me :—“I can endorse Sir William Fox’s remarks as to the existence of a ‘Cranery’ at Okarita about the time he mentions. I visited the locality in February, 1870, on my way to the Francis Joseph Glacier. The note I have (speaking of the Okarita lagoon) is as follows :—White Cranes were abundant on the flats, but too wary to approach within gunshot. The boatman informed us that there was a ‘Cranery’ on the cliffs, and also a breeding-place for Shags, but we had no time to visit the locality.”

Another visitor to this heronry states that one of the breeding-stations is situated about three miles inland from the sea, on the banks of the Waitangituna stream. He found about twenty-five nests there, placed on trees overhanging the water, at elevations varying from eight to forty feet, and in close association with those of the White-throated Shag, the latter being five or six times as numerous, often forming complete clusters around the larger structures occupied by the White Heron; these were coarsely built of sticks, placed in such a manner as to form a strong platform, above which was a layer of smaller sticks, but without any softer lining, the whole structure measuring about seventeen inches in diameter. The eggs are usually three, but often four, in number, of a pale green colour, rather elliptical in form, and measuring 2·2 inches in length by 1·6 in breadth.

Another breeding-place of the White Heron is supposed to exist at a place about twelve miles north of the Buller River; but there is no positive evidence of this; and Sir William Fox is no doubt right in considering the Okarita heronries as very nearly, if not actually, the last of their kind.

The nest of the White Heron is a rather massive structure, with a flattened top (no appearance whatever of a cup or hollow), rounded in form, and measuring eighteen inches across. It is composed almost entirely of fern-fronds by way of foundation, with a thick rough layer of dry twigs above. It seems difficult to understand how the bird can incubate the eggs without their falling out of this rude flat nest or getting broken against the rough twigs on which they lie, without lining or protection of any kind; for on this structure are deposited the eggs, which are three in number, differing very slightly in size, the largest measuring 2·2 inches by 1·6 inch, of a regular ovoid form, of a uniform pale green colour, and without any gloss.

ARDEA SACRA.

(BLUE HERON.)

- Sacred Heron*, Lath. Gen. Syn. iii. pt. 1, p. 92 (1785).
Ardea sacra, Gm. Syst. Nat. i. p. 640 (1788, ex Lath.).
Blue Heron, var. β , Lath. Gen. Syn. iii. pt. 1, p. 79 (1785).
Ardea cœrulea, var. γ , Gm. Syst. Nat. i. p. 631 (1788, ex Lath.).
Ardea matook, Vieill. Nouv. Dict. d'Hist. Nat. xiv. p. 416 (1817).
New-Zealand Heron, Lath. Gen. Hist. B. ix. p. 128 (1824).
Ardea jugularis, Wagl. Syst. Av. *Ardea*, sp. 18 (1827, ex Forster MS.).
Ardea asha, Sykes, P. Z. S. 1837, p. 157.
Herodias matook, Gray, in Dieff. Trav. ii., App. p. 196 (1843).
Ardea novæ hollandiæ, "Lath.," Licht. ed. Forst. Descr. An. p. 172 (1844).
Herodias jugularis, Gray, Cat. *Grallæ* Brit. Mus. p. 80 (1844).
Demiegretta concolor, Blyth, J. A. S. B. xv. p. 372 (1846).
Herodias pannosus, Gould, P. Z. S. 1847, p. 221.
Ardea pannosa, Gray, Gen. of B. iii., App. p. 25 (1849).
Ardea concolor, Gray, Gen. of B. iii., App. p. 25 (1849).
Herodias asha, Blyth, Cat. B. Mus. A. S. B. p. 280 (1849).
Ardea atra, "Cuv.," Puch. Rev. et Mag. de Zool. 1851, p. 375.
Herodias pannosa, Bonap. Consp. Gen. Av. ii. p. 120 (1857).
Herodias atra, Bonap. Consp. Gen. Av. ii. p. 121 (1857).
Herodias sacra, Bonap. Consp. Gen. Av. ii. p. 121 (1857).
Herodias concolor, Bonap. Consp. Gen. Av. ii. p. 121 (1857).
Ardea (Herodias) albolineata, Gray, P. Z. S. 1859, p. 166.
Ardea cinerea, Ellman, Zool. 1861, p. 7469 (nec Linn.).

Native names.

Matuku-tai, Matuku-nuia, and Matukutuku.

Ad. suprâ fuliginoso-schistaceus, pilco laterali, collo postico et scapularibus elongatis clariùs cinercis : alâ et caudâ fuliginoso-schistaccis, tectricibus alarum et remigibus extûs clariùs cinereo lavatis : subtûs omuinò fuliginoso-schistaceus, gutture purè albo : subalaribus paullò dilutioribus : regione oculari virescenti-flavâ : rostro sordidè flavo, culmine brunnescente ad apicem corneo : pedibus viridescenti-flavis : iride flavâ.

Adult male. General plumage slaty grey, darker on the upper parts, tinged on the lower with brown ; a broad line of white down the middle of the throat, and extending, in some examples, down the fore neck. The back is ornamented with a number of narrow lanceolate feathers of a bluish-grey colour, often 7 inches in length, overlying the scapulars ; and there are a few similar feathers on the lower part of the neck, overlapping the breast. The feathers of the nape are long and silky, and of a brighter tint than the surrounding plumage. Irides yellow ; loral skin greenish yellow ; bill dark yellow, shaded with brown on the ridge and sides, horn-coloured at the tip ; tarsi and toes greenish yellow, the claws brown. Length 25 inches ; extent

of wings 40; wing, from flexure, 11.5; tail 4; bill, along the ridge 3.5, along the edge of lower mandible 4.25; bare tibia 1.5; tarsus 3; middle toe and claw 2.75; hind toe and claw 1.75.

Female. Has the pectoral and dorsal plumes smaller and duller in colour, with a brown tinge over the entire plumage.

Young. In the young of the first year the plumage is largely stained with brown, especially on the upper parts; all the wing-coverts are shaded with brown towards the tip, with a narrow terminal edging of a lighter tint; and, in certain lights, the entire plumage presents an appearance of vinous brown. There are no pectoral plumes; the gular streak of white, instead of being narrow throughout, expands in the middle; and the bill is dark brown, blackish on the ridge.

Nestling. Covered with slate-coloured down.

Albino. There is an albino in the Otago Museum; general plumage pure white, but with slate-coloured feathers cropping out irregularly all over the body, and more abundantly on the crown and back; the primaries pure white, with only a few touches of colour near the tips, whilst some of the secondaries are almost wholly slate-coloured; tail-feathers parti-coloured, the white, however, being entirely absent on two or three of them; bill and feet as in ordinary specimens. Professor Hutton has marked this as the young state of *A. sacra*, from the Society Islands. This, however, is a mistake. I have already described the young of that species from the nest. This is undoubtedly another example of albinism with the normal colour persistently endeavouring to assert itself.

Obs. A specimen in my collection (adult ♂) obtained at Kaiwara, near Wellington, has the occipital plumes continued fully two inches beyond the head.

Remarks. The history of this species has been worked out in an exhaustive manner by Drs. Finch and Hartlaub, to whose labours I am in a great measure indebted for the very complete synonymy at the head of this article. I am unable, however, to follow these authors in considering Mr. G. R. Gray's *Ardea greyi* (Cat. Brit. Mus. *Grallæ*, p. 80) the same species in the condition of an albino. Mr. Gould once entertained that opinion, but was induced to alter it; and in his 'Handbook' (ii. p. 309) he quotes Macgillivray's observations to the following effect:—"From the circumstance of my having always found this and the dark-coloured species in company, I considered them as the same bird in different states of plumage, their size and proportions being so similar, and was surprised that individuals exhibiting a change from blue to white, or *vice versa*, never occurred. At length, while on Dugong Island, I was convinced they were specifically distinct by seeing that the half-grown young from the nest had assumed the distinctive colour of the parents. This was first pointed out to me by Dr. Muirhead, R.N., whose attention I had previously drawn to the subject. The habits of both species are similar; and they procure their food in the same manner at low water on the coral-reefs surrounding the low islands they frequent. The nest and eggs are precisely similar; but the young of this bird is white from the nest." Although this white form is "abundantly dispersed over the northern and eastern coasts of Australia wherever low islands and reefs of coral running parallel to these coasts occur," it has never yet been met with in New Zealand, which is a further reason for our refusing to consider it an albino of the common species.

THE Blue Heron is not confined to New Zealand, but is found along the whole of the Australian coasts and throughout the Polynesian archipelago; its range extends also to India and Japan, the differences in examples from those countries being too trifling to warrant a specific separation.

In our country the Blue Heron frequents the rocks under the sea-cliffs, and the shores of the sheltered bays and estuaries, where it may be observed moving actively about in search of its food, which consists of small crabs and shell mollusks; or perched on some prominent point of rock, where its constant vigilance renders it difficult of approach except under cover. When disturbed it rises slowly and rather awkwardly, and makes a detour seaward, returning to a neighbouring station on the rocks, or, if alarmed, wings its way slowly across the bay or to some more remote part of the

coast. When on the wing the long neck is doubled in, forming a protuberance in front, and the legs are trailed behind. When hunting for food among the rocks they walk briskly, with the body horizontal and the head drawn in, ready for action.

It is found all round the coasts of the North Island, but appears to be more plentiful on the eastern side.

It does not, as a rule, leave the coast, but a pair was seen on the Taupo Lake in October 1875, and I observed one on the wing at Lake Rotoiti in October 1884. It is tolerably common along the shores of the Bay of Plenty. My son found these birds particularly plentiful during a visit to Raglan in the summer of 1883-84. He writes:—"On one occasion I saw as many as seven flying in company. They kept well together, and about four feet above the water, performing their flight by a regular slow flapping of the wings, never swerving to one side or the other, and presenting a very curious appearance with their heads drawn in upon their shoulders."

They appear to become attached to particular localities; and I remember a pair of them frequenting a rocky point in the Porirua harbour for several years. Another pair took up their station on the rocks near the Hutt Road in Wellington harbour. These birds, which were always a source of interest to me when travelling on this road, have attracted the notice of others, and are thus pleasantly referred to by Mr. Edward Wakefield, in a "Science Gossip" article, in the 'Wellington Evening Press':—

"Railway passengers, as a rule, do not take much notice of objects which they pass. They read papers or books, or stare at one another, or most commonly gaze into space in a melancholy way, evidently thinking of nothing but how soon the journey will be over. Yet it is often worth while to look out of window and observe natural features or peculiarities, if only for a moment or two, as the train creeps past them. We wonder how many travellers by the Hutt train have seen what I have seen, namely, a pair of Herons which frequent the rocks on the harbour beach about midway between Ngahauranga and Petone. These beautiful and uncommon birds have been there for months past and they seem to have taken up their abode there permanently. . . . It is usually regarded as an extremely shy and wary bird, having its wits wide awake against danger on all sides, and rising heavily and flapping a circuit out to seaward long before man can approach it. But circumstances seem to alter its habits. I have read somewhere an account by a traveller and a naturalist who said he had seen Blue Herons on an island off the Australian coast so numerous and so tame and fearless that he could, and did, knock them over with a stick. Many birds, of course, which are not in the least shy when first found in lonely places, become so as soon as they know what a cruel destructive animal man is. I can remember when Shags and Sandpipers in New Zealand were so unsophisticated that they would allow themselves to be caught by the hand, and even Redbills would let us come so close that we could kill them with stones. Thus there is nothing in the story of the Blue Herons' tameness on a desert island at all incompatible with their present reputation for wariness. The boldness of the pair I have seen near Petone is more remarkable, because not only do trains pass close to them many times a day, but the Hutt road is only distant from their haunt a few chains, and fishermen, children, and other intruders are always about. It seems to me a most extraordinary thing that these shy birds should remain there day after day, week after week, month after month, disturbed as they often must be by various visitors to the beach, without apparently betraying the least uneasiness. . . . But to me the poor, harmless, beautiful comical creatures are very charming on their own account, popping about among the rocks, pecking here, stalking there, prying into a crevice a little further on, attitudinising gracefully on a rock close by—surely, surely, they are interesting enough in themselves, well worth observing, and—oh, ye pothunters—well worth preserving also!"

Mr. Layard writes from Levuka:—"I have just obtained (2nd November) a pair of young ones

(male and female) from the nest of the species that inhabits this island, and they are dark slate-coloured—much blacker and glossier, in fact, than a slate-coloured bird in full plumage, although long filaments of white down still remain on the head &c. Europeans and natives assure me that they breed in both phases of plumage, and that sometimes a white bird will be mated with a blue one. It nests indifferently on rocks, on the ground, or in the mangrove or other trees that line the sea-shore. . . . Now, if the Indian bird is always *white* when young, as alleged, and our bird is *slate-coloured*, may not that fact indicate that the two are distinct? Or are the white and slate-coloured birds only dimorphic varieties? Has any one seen the Asiatic race slate-coloured when in the nest, or observed the slate-coloured and white birds breeding together in India?”*

In ‘The Ibis’ for 1879 (p. 221) there appears a letter from the same naturalist (dated Nonmea, New Caledonia, 5th December), in which, after referring to Mr. S. B. Dole’s ‘Synopsis of the Birds of the Hawaiian Islands,’ and to the author’s statement respecting *A. sacra*, “the young birds are wholly white, and the female whiter than the male,” he says:—“Now this is quite in direct opposition to my experience of the bird in Fiji, and accords with my statement of the Ceylonese species (*cf.* ‘Ibis,’ 1876, p. 176). This opens this very curious question once more, Are they distinct races or species, or are the young in some places *white*, and in others *blue*? I hope my brethren of ‘The Ibis’ will, as their opportunities permit them, keep this subject in view. We have the species here; but I do not yet know of any breeding-place.”

Canon Tristram, writing on a collection of birds from the New Hebrides, collected by the Rev. J. Inglis (‘Ibis,’ April 1876, p. 265), says:—“Two specimens in good state from Aneiteum are in the collection. They are considerably larger than *Ardea sacra* from Samoa. I observe that they sustain the remarks made by Mr. G. R. Gray, who would have separated them under his name of

* Hume says (‘Stray Feathers,’ vol. i. p. 254):—“Professor Schlegel and Mr. Gray are certainly wrong in uniting *asha*, Sykes, with *jugularis*, Forster; they are probably right in considering *concolor*, Blyth, as identical with this latter; but *asha* of Sykes is *gularis*, and not *jugularis*. The fact is there are two nearly allied species; the one occurs along the eastern and north-eastern coast of Africa up to Suez down the Arabian Coast, and has now been observed by me at Muscat, along the Mekran Coast, and at Kurrachee, and again on the Bombay Coast at Teetul, near Bulsar; and Dr. Jerdon’s description shows clearly that this is the bird which he and Sykes found down the western coast of India. This is *gularis*; on the other hand, the second species is found in New Zealand, Australia, throughout the Indian Archipelago, and, I have reason to believe, though I have no specimens with me to compare, throughout Burma, up to Ramree Island, in the Nicobars and Andamans, and possibly on the eastern shores of the Bay of Bengal. This latter is *jugularis*, Forster, *pinnosa*, Gould, *concolor*, Blyth, and probably *sacra*, Gmelin, the name by which it should, according to Mr. Gray, stand. Both species are typically, when adult, deep slaty blue, becoming more or less black in old birds; both seem to have an allotropic white form, which is not necessarily the young, these having been taken from the nest of the same dark colour as the typical adult, and both have a light slaty grey stage, which appears to me to indicate immaturity, in which a good deal of the centre of the abdomen, vent, and lower tail-coverts are white. . . . A very great deal remains to be ascertained in regard to the changes of plumage of both these species, and it is possible that *jugularis* or *sacra* may be found to include two species, but *gularis* and *jugularis* are clearly distinct, and can be separated at once. . . . *Gularis* has the whole chin, throat, and sides of the head nearly to the gape, and quite to the base of the ear-coverts, white; *jugularis* or *sacra* has only a narrow white stripe down the centre of the throat.”

And again (*op. cit.* vol. ii. p. 304):—“This species is no doubt very variable alike in size and in plumage, even supposing that the white race, of which I shall speak hereafter, be separated as a distinct bird; but it is quite clear, with this very large series that we now possess of the ashy bird, that all those inhabiting the islands of the Bay of Bengal and its eastern coast belong to one and the same species. . . . Colonel Tytler notes:—“A distinct species, which I call provisionally *Demiagretta candida*, but which may prove identical with *D. greyi*, and which precisely resembles *D. concolor*, Blyth, has erroneously been assumed to be the young of this latter. I have had them from the nest, and can certify that the plumage is at all times white, just as that of *concolor* is always ashy. . . .” And Macgillivray remarks of the bird in Australia:—“I was convinced that they were specifically distinct by seeing that the half-grown young from the nests had assumed the distinctive colour of the parents.”

As regards the white variety, Davison says:—“This species, if it really is a species, and not merely an albinoid variety of *H. sacra*, is not uncommon about the Andamans and Nicobars. It usually associates with *H. sacra*; but is so shy and wary that it is almost impossible to get a shot. In size, gait, habits, &c. it is identical with *H. sacra*, differing only in colour.”

A. albolineata (P. Z. S. 1859, p. 166). The difference seems to be too slight and uncertain on which to found a species; but if not two species, there are certainly two races in these Pacific Islands, a larger and a smaller, and the two do not appear to be found in the same locality anywhere. Native name 'Inpaing.' Mr. Inglis observes that it wades in the sea rather than in streams."

In the breeding-season I have heard these birds mcwing like kittens as they hovered overhead, and were evidently concerned about their nests. On one occasion, when exploring the Rurimu rocks, in the Bay of Plenty, a Heron thus employed was fiercely beset by a colony of Terns (*Sterna frontalis*), who were themselves under some excitement about their nesting-ground and appeared to regard with suspicion this uncanny mcwing in their midst. The Heron was speedily discomfited and put to flight.

Macgillivray states that it "inhabits the islands of the north-east coast of Australia and Torres Strait, and is abundantly distributed from the Capricorn group in lat. 23° 30' S., as far north as Darnley Island in lat. 9° 35' S. It procures its food at low water on the coral-reef surrounding the low wooded islands it loves to frequent. Although generally a wary bird, even when little disturbed by man, yet on one occasion on Heron Island I knocked down several with a stick. The nest is usually placed on a tree; but on those islands where there are none, such as Raine's Islet and elsewhere, it breeds among the recesses of the rocks; where the trees are tall, as at Oomaga or Keat's Island, the nests are placed near the summit; on Dugong Island they were placed on the root of a tree, on a low stump, or half-way up a low bushy tree. They are shallow in form, eighteen inches in diameter, and constructed of small sticks, and lined with twigs; the eggs are two in number, and of a pale bluish white." Gilbert, who found this species nesting at Port Essington, says:—"On one small rock I found at least fifty of these nests, some of which were so close as nearly to touch each other. The eggs were sometimes two, and at others three, in number."

Captain Mair writes:—"On Whale Island I saw some thirty of these birds, and I found a number of their nests in a cave. Those that were fully fledged were a beautiful light blue colour, with bright yellow legs. It was very funny to watch them flying into the high trees, perching among the Shags, and looking very gawky; then, presently, the Shags, with loud guttural noises, would sally forth, chasing them far and wide."

The "Cranes' cave," as it is called, is open to the sea at the entrance, but it extends inwards some 30 feet, and has an elevated or arched roof, and the nests of the Herons are placed on the projecting ledges of rock.

Mr. S. H. Drew, of Wanganui, sends me the following:—"On my last visit to Kapiti I noticed a pair of Blue Herons flying short distances near where we were camped, and from the general demeanour of the birds I concluded that we were not far from their breeding-place. We accordingly proceeded in our boat to a high rocky point protecting a cave into which the sea rolled even at low water. I climbed up about thirty feet, and there found the nest—a rudely constructed clumsy thing with three beautiful light blue eggs in it, one of which I send you. The nest was made of coarse grass and thin sticks, without lining of any sort, and the wonder to me was how the birds with their long legs could sit in such a nest without breaking the eggs, the shell of which is so fragile."

There is a single egg of this species in the Canterbury Museum; it is of a regular ovoido-elliptical form, measuring 1.9 inch in length by 1.3 in breadth, and of a delicate greenish white. Another received from Hawke's Bay is of a narrow oval form, measuring 1.9 inch by 1.35 inch, very finely granulate on the surface, and without any gloss. The colour in the dried shell is a delicate pale green, but it was no doubt brighter when fresh. The one in my son's collection obtained on the Island of Kapiti, as mentioned above, is slightly smaller and of a pale blue colour.

ARDEA NOVÆ HOLLANDIÆ.

(WHITE-FRONTED HERON.)

White-fronted Heron, Phillip, Voy. Bot. Bay, i. p. 163, pl. 27 (1789).*Ardea novæ hollandiæ*, Lath. Gen. Ind. ii. p. 701 (1790, ex Phillip).*Ardea leucops*, Wagl. Syst. Av. *Ardea*, sp. 17 (1827).*Herodias novæ hollandiæ*, Gray, Cat. *Grallæ* Brit. Mus. p. 80 (1844).*Demiegretta novæ hollandiæ*, Gray, Hand-l. of B. iii. p. 28 (1871).*Native name.*—Matuku-moana.

Ad. suprâ dilutè sehistaceo-cinereus, pileo cristato saturatiore : interscapulio scapularibusque pallidioribus, cinereis, quasi strigatis : tectricibus alarum dilutè cinereis : remigibus sehistaceo-nigricantibus, secundariis clarè cinereo lavatis : reetricibus sehistaceo-cinereis, versus apicem brunnescentibus ; fronte et supereilio lato, facie laterali et gutture toto albis : regione parotiæ et collo laterali cinereis : subtùs pallidè cinereus, eollo undique saturatiore, jugulo medio et imo pallidè rufescente : subalaribus pallidè cinereis, albicantibus : regione oculari pallidè virescenti-flavâ : rostro nigro, versus basin mandibulæ albicante : pedibus flavicantibus, tarsis imis digitisque virescentibus : iride lætè flavâ.

Adult. Forehead, space round the eyes, and throat white ; crown of the head dark cinereous or bluish grey, the occipital feathers rather elongated, and lighter ; sides of the head, neck, and all the upper parts bright cinereous, with a warm purplish tinge ; the back ornamented with a series of long lanceolate plumes of a lighter colour, some of which extend beyond the scapulars ; down the fore neck a stripe of buff, changing below to yellowish brown ; the long plumes overlapping the breast very soft in texture, and of a roseate purple tint ; underparts generally pale cinereous brown, slightly tinged with purple ; quills and tail-feathers dark slate-grey. Irides bright yellow ; edges of eyelids, bare part of lores, and membrane surrounding the angle of the mouth pale greenish yellow ; bill black, the lower mandible whitish towards the base ; legs yellow, tinged more or less with dusky green on the toes and lower part of tarsi ; claws pale brown. Length 25.5 inches ; extent of wings 42 ; wing, from flexure, 12 ; tail 5 ; bill, along the ridge 3, along the edge of lower mandible 4 ; bare tibia 2 ; tarsus 3.5 ; middle toe and claw 2.6 ; hind toe and claw 1.75.

Young. Differs from the adult in having more white about the head and neck, and a darker tinge of brown on the underparts ; the dorsal plumes, moreover, are scanty, and the delicate purplish tint on the breast is altogether wanting.

THE White-fronted Heron is very sparingly dispersed over the New-Zealand coasts, being extremely rare at the far north ; but, according to Gould, it is very abundant over every part of Tasmania, the Colonies of New South Wales, South Australia, and Swan River. "Low sandy beaches washed by the open ocean, arms of the sea, and the sides of rivers and lagoons, both in the interior of the country and near the coast, are equally tenanted by it ; consequently it is one of the commonest species of the genus in all the countries above mentioned, and may frequently be seen walking knee-deep in the water of the salt marshes in search of food, which consists of crabs, fish, and marine insects. Its flight is heavy and flapping, like that of the other Herons ; but it runs more quickly over the ground, and is continually moving about when searching for food, and never stands motionless in the water

as the true Herons do: these active habits are, in fact, necessary to enable it to capture insects and crabs, upon which it mainly subsists."

In the Hairini bay, at Tauranga, I saw a pair of these birds on the flats just above the bridge. They stalked about with a loftier mien than *Ardea sacra*, and were readily distinguishable, even at some distance, by the lighter grey of their plumage*.

The Blue Heron seems to prefer the rock-bound coast, springing from one jutting stone to another as it searches for its prey. The White-fronted Heron, on the other hand, is generally to be seen on the hard sandy beaches and mud-flats within the river-mouths and estuaries. You will see him stalking about alone on the beach, as if for the mere pleasure of exercising his limbs; then he flies off to a small rock standing out of the water and takes up a position for fishing. He balances his body horizontally, holds back his head and watches; then with the rapidity of thought he strikes forward, plunging his head into the water and bringing out a struggling victim. I have watched one thus engaged for a considerable time through a powerful binocular, and I have seen it catch minnows fully five inches in length, and in the intervals turn its attention to smaller fry, by snatching at flies or other insects passing within its reach. I have observed the same thing on watching some captive ones in the Acclimatization Gardens at Sydney; for they were perpetually chasing flies and other insects that came within their enclosure.

A pair of these birds which I obtained in the Porirua Harbour, near Wellington, in the month of April, had their stomachs filled with shrimps.

It is strange that although the Blue Heron breeds freely on the small islands lying off the Bay of Plenty, this species is never found nesting there. This may, however, be due to the relative scarcity of the bird.

"Some nests," writes Mr. Gould (Handb. B. Austr. ii. p. 299), "I observed in the month of October 1838, on the banks of the Derwent, were placed on the tops of the smaller gum-trees, and most of them contained newly hatched birds. Mr. Kermodé informed me that it annually breeds in the neighbourhood of his estate, near the centre of Tasmania. The nest is of a moderate size, and is composed of sticks and leaves. The eggs are four in number, of a pale bluish green, one inch and seven eighths long by one inch and a quarter broad."

* Mr. Edward Wakefield, under the head of "Science Gossip," writes:—"There is another bird, the White-fronted Heron (*Ardea novæ hollandiæ*), which is much rarer in New Zealand than the Blue Heron, but which is, nevertheless, not only not unknown here, but fairly well known. It is only found by accident, as it were, here and there. It is not properly a New-Zealand bird at all. It is a very common Australian bird, and is a mere passing visitor in this country. Still, it is a New-Zealand bird, in a sense, because it breeds here sometimes. But it is only very sparsely distributed on our coasts. A friend of mine at Collingwood, a digger, who knew a good deal about natural history, told me that he had observed these birds in the southern estuaries of Blind Bay for years, and gave me a description of their habits, which left me no doubt in my mind of the truth of his statements. I am quite prepared to admit, however, that the White-fronted Heron is a very uncommon bird, and that is why I bring it into notice here. It is very like the Blue Heron, except that it has a white forehead, space round the eyes and throat, and the colour of its plumage all over is over so much lighter than that of the Blue Heron. To sum it up, I should say that *Ardea novæ hollandiæ* is like a washed-out specimen of *Ardea sacra*."

Mr. C. H. Robson writes to me from Portland Island:—"I ought to inform you that a peculiar-looking Heron comes to catch fish on some rocks at our landing-place, and I have a fine view of him from a cliff close to the house, about 250 feet high: he seems to me much larger than either *Ardea sacra* or *A. novæ hollandiæ*; his head and neck are much darker than in those birds, being almost black, and, except a white line over the bill, there seems to be no more white about him; the wings and back are a light slate-grey; legs and feet yellow. I should think he must be quite 4 feet long. Do you know such a bird? I shall make every effort to secure him. In the mean time I study his habits with a good binocular race-glass."

ARDEA MACULATA.

(LITTLE BITTERN.)

- Spotted Heron*, Lath. Gen. Syn. Suppl. ii. p. 305 (1801).
Ardea maculata, Lath. Ind. Orn. Suppl. ii. p. lxiv (1801, nec Bodd., nec Vieill.).
Ardea pusilla, Vieill. N. Dict. d'Hist. Nat. xiv. p. 432 (1817).
Ardetta punctata, Gray, Cat. *Grallæ* Brit. Mus. p. 83 (1844).
Ardetta pusilla, Gould, Birds of Austr. vi. pl. 68 (1848).
Ardeola pusilla, Bonap. C. R. xl. p. 722 (1855).
Ardeola novæ zealandiæ, Purdie, Trans. N.-Z. Inst. iii. p. 99 (1870).
Ardetta maculata, Buller, Birds of New Zealand, 1st ed. p. 235 (1873).

Native name.—Kaoriki.

- Ad.* ♂ pileo cæruleo-nigro: supereilio distincto, facie et collo lateralibus sordidè ferrugineis, regione paroticâ stramineâ: dorso toto nigro, plumis quibusdam brunneo, ferrugineo aut stramineo extûs lavatis: tectricibus alarum ochrascentibus, minoribus dorsalibus et exterioribus ferrugineis nigro medialiter notatis: alâ cærulescenti-nigrâ, tectricibus majoribus, alâ spuriâ et remigibus ferrugineo limbatis aut apicaliter maculatis: caudâ cærulescenti-nigrâ: gutture toto albo, utrinque ferrugineo, plumis medialiter saturatiùs brunneis et stramineo conspicuè lavatis: corpore reliquo subtûs albicante, hypochondriis plumis medialiter nigris, quasi striatis, ferrugineo aut stramineo marginatis: subalaribus ochrascentibus, medialiter brunneis, margine alari undique albo: regione oculari flavicanti-viridi: rostro saturatè brunneo, lateraliter et versus basin flavicanti-viridi: pedibus latè viridibus, tarso superiore digitisque brunneo tinetis: iride aureâ.
- Juv.* ♂ mari similis sed sordidior: tectricibus medianis alarum stramineis medialiter brunneis: gutture minus distinctè notato.

Adult. Forehead, crown of the head, and nape bluish black; throat and front of the neck tawny buff, each feather shaded in the centre with brown; from the chin and down the fore neck an irregular streak of reddish brown; on the sides of the neck the buff passes gradually into a rich chestnut; and this colour is continued on the sides of the head, forming a broad streak over the eyes, and another, less distinct, to the angles of the mouth, mixed with tawny yellow on the ear-coverts; underparts pale buff, each feather centred more or less with black; on each side of the chest the black predominates, forming broad acuminate stripes; the whole of the back and the feathers composing the mantle bronzy black, tinged more or less with chestnut, the scapulars margined with tawny buff; quills and tail-feathers bluish black, slaty on their under surface, the inner primaries, as well as their coverts and most of the secondaries, tipped with chestnut-brown; the primary coverts and a patch of feathers near the flexure pale chestnut, edged with fulvous, the former centred more or less with black; the small wing-coverts and the whole of the secondary coverts blackish brown, broadly edged with yellowish buff, and presenting a handsome appearance. Irides golden yellow; eyelids and bare space in front of the eyes yellowish green; bill dark brown along the ridge and at the tip, yellowish green on the sides and towards the base of both mandibles; legs and feet bright green, stained at the tarsal joint and along the toes with dark brown. Length 15 inches; wing, from flexure, 6.25; tail 2; bill, along the ridge 2.2, along the edge of lower mandible 2.75; bare tibia .5; tarsus 2.1; middle toe and claw 2.5; hind toe and claw 1.5.

Young. Differs from the adult in having the plumage of the back darker, and the wing-coverts of a rich tawny buff, shading into chestnut on the secondary coverts and towards the flexure.

Obs. The Otago Museum contains two specimens—one from Jackson's Bay, the other from Lake Wakatipu. They are adult birds, but not "sexed," and both are in the same plumage, all the wing-coverts having a broad wedge-shaped mark of brownish black down the centre. One has the neck-plumes a little brighter than the other, but they are alike in size and in every other respect.

Remarks. Mr. Gould, in his account of this species in Australia, states that "the sexes differ considerably from each other, the female being mottled and of a smaller size than the male;" and he gives the following description of the former:—"Head and back chestnut; wing-coverts very deep tawny, passing into chestnut on the tips of the coverts and secondaries; primaries grey, tipped with brown; tail black; sides of the neck pale chestnut; front of the throat and the under surface white, with a stripe of tawny down the middle, and a small streak of brown in the centre of each feather, the brown hue predominating and forming a conspicuous mark down the throat"*. No specimen has yet been obtained in New Zealand answering to the above account; but, so far as I can learn, the supposed example of the female in the Canterbury Museum (corresponding more nearly in plumage to the young as described above) was not dissected; and without this it would of course be impossible to determine the sex. The young bird from which I have taken my description exhibits one or two new feathers among the wing-coverts, marked, as in the adult, with a broad central streak of blackish brown, thus indicating a transition to the more handsome variegated plumage; and Dr. Garland, who dissected the specimen, informs me that it proved to be a male. The bird described by Mr. Purdie (*l. c.*) with "rufous-brown eyes and buff wing-coverts" was evidently in an immature state.

Note. Since the publication of my first edition, two more specimens have been received at the Canterbury Museum, and these proved on dissection to be male and female. If the "sexing" in these cases is to be relied on, it would seem that, in our New-Zealand bird, the sexes are alike, the plain tawny wing-coverts being only a sign of immaturity.

THIS Little Bittern is undoubtedly the true representative in our hemisphere of the *Ardea minuta* of Europe, to which it bears a very close resemblance both in appearance and in habits. It is a very rare species in Australia, where, according to Gould, only a few individuals have as yet been procured, and all of these from one locality. It is equally rare in New Zealand, and appears to be scarcely less local in its distribution. The first recorded specimens (two in number) were obtained by Mr. Shaw at Kanieri, on the west coast, in March 1868, and forwarded to the Canterbury Museum, where they are still preserved. Subsequently a third specimen was obtained in one of the swampy creeks that feed the Okarita lagoon—and another at the head of the Whakatipu Lake, above Queenstown, in the Province of Otago. I am indebted to the kindness of Mr. Clapcott and Dr. Garland respectively for the specimens of the adult and young from which the above descriptions are taken; both of these were obtained in the vicinity of the Hokitika township, in the autumn of 1871 †.

Mr. Docherty, who collected some of the examples enumerated above, has furnished the following interesting notes on the subject:—"They are to be found on the salt-water lagoons on the seashore, always hugging the timbered side of the same. I have seen them in two positions, viz.:—standing on the bank of the lagoon, with their heads bent forward, studiously watching the water; at other times I have seen them standing straight up, almost perpendicular; I should say this is the proper

* Writing of the Dwarf Bitterns in India, Blyth says:—"The male acquires his final livery at the first moult, the female not before the third or fourth moult; in the meanwhile she presents an intermediate garb, which is ultimately exchanged for the same livery as that of the male."

† I am indebted to the Rev. W. Colenso, F.R.S., for the following note:—"As far back as the year 1836 the Rev. Mr. Stack obtained at Tauranga a specimen of the Little Bittern, and sent it to the late Gilbert Mair, Esq., J.P., who presented it to me. It was alive in my possession for some time, and I ultimately sent the skin to the Linnean Society. None of the natives in the district knew the bird."

position for the bird to be placed in when stuffed. When speaking of lagoons as the places where they are to be found, I may mention that I caught one about two miles in the bush, on the bank of a creek; but the creek led to a lagoon. They live on small fishes or the roots of reeds; I should say the latter, because at the very place where I caught one I observed the reeds turned up and the roots gone. They are very solitary, and always found alone, and they stand for hours in one place. I heard a person say that he had opened one and found a large egg in it. They breed on the ground in very obscure places; I never heard their cry."

Dr. Ramsay writes of this bird in Australia:—"This beautiful little species is still plentiful in the neighbourhood of Cleveland Bay, and also in the Herbert river district; from both these places have I received specimens. The species was once tolerably numerous near Sydney; and there are still specimens in the Dobroyde collection which were shot at Botany Bay and near Newtown. I observe no difference in plumage or size in the Northern Queensland specimens and those shot near Sydney."

Mr. Potts, in his account of the specimens in the Canterbury Museum, states that "they were taken alive without any very great difficulty, after which they were turned loose amongst the fowls in a poultry-yard. They were found dead shortly afterwards—it is alleged, from exposure to the keen frosty night air, being deprived of the accustomed protection afforded by the thickly-growing sedgy vegetation of their swampy habitat. They had been observed standing motionless on a bare stem or stalk, from which they overlooked the water. . . . It is stated that the Little Bittern is so quiet in his habits that it will remain still when approached, and almost suffer itself to be taken by the hand."

I had an opportunity of observing one of these birds in a state of captivity at Hokitika, in May 1871. It had been taken only a few days before, and was already comparatively tame. Its usual posture was one of repose, with the head drawn in and resting on the shoulders; but when alarmed or excited it assumed a very different attitude, standing almost bolt upright, with the body resting, as it were, on the tarsal joints, these being brought close together, the neck stretched upwards to its full extent and perfectly rigid, the beak elevated, and the eyes directed outwards and downwards in such a way as to command a full view in front without having to move the head. On being turned out in the verandah it ran quickly and spread its wings, but did not make any attempt to fly, and after a short interval endeavoured to re-enter its cage. It evinced great alarm on the appearance of a cat, stretching up its neck and emitting a peculiar snapping cry. At other times when molested it uttered a cry not unlike that of the Kingfisher, although not so loud. Mr. McNee, to whom the bird belonged, informed me that he could not get it to eat any thing till he produced a dish of water containing some "mudfish," which it instantly seized and devoured. This singular fish (named by Dr. Günther *Neochanna apoda*) is very common in the Hokitika district, being found in all the creeks and surface-ponds in the woods which here cover the whole face of the country. The remarkable part of their history is that on the pools becoming dry these mudfish burrow into the moist soil or clay, often to the depth of two feet, remaining there for an indefinite time, or till the return of rainy weather has rendered their pools habitable again. Archdeacon Harper informed me that he himself dug up two of these mudfish in comparatively hard clay in his garden, at a depth of more than three feet from the surface, where they were occupying artificially formed chambers. Another curious fact, which I give on the testimony of Mr. McNee, is that several of these mudfish after being exposed in his verandah for a whole night, and apparently lifeless, recovered their vitality on being restored to a basin of water; and when shown to me on the following day they certainly exhibited a great amount of activity. I think it highly probable that the mudfish constitutes the chief food of the Little Bittern; for as many of the surface pools are never dry, there would be no difficulty in finding a supply all the year round. I may mention also that Mr. Clapcott's bird, while alive in his possession, was fed on worms, and that it would only take them when placed in a saucer or other vessel containing water.

NYCTICORAX CALEDONICUS.

(NANKEEN NIGHT-HERON.)

- Caledonian Night-Heron*, Lath. Gen. Syn. iii. pt. 1, p. 55 (1785).
Ardea caledonica, Gm. Syst. Nat. i. p. 626 (1788).
Ardea novæ hollandiæ, Vieill. N. Dict. d'Hist. Nat. xiv. p. 436 (1817).
Nycticorax caledonicus, Steph. Gen. Zool. xi. p. 613 (1819).
New-Holland Night-Heron, Lath. Gen. Hist. ix. p. 62 (1824).
Ardea sparrmannii, Wagl. Syst. Av. *Ardea*, sp. 32 (1827).
Nyctiardea caledonica, Gray, Hand-l. of B. iii. p. 33 (1871).

Ad. suprâ dilutè cinnamomeus, dorso postico et uropygio paullò pallidioribus: pileo cristato et nuchâ nigris: plumis tribus occipitalibus pendentibus albis: strigâ superciliari, regione oculari et genis anticis albis: facie reliquâ et collo laterali delicatè cinnamomeis: alis et caudâ cinnamomeis omninò dorso concoloribus: subtùs albus, gutture antico et laterali delicatè cinnamomeis: regione oculari virescenti-flavâ: rostro nigro, versus apicem corneo, gonyde corneâ aut flavicante: pedibus sordidè flavis: iride aurantiacâ.

Adult. Crown of the head and the nape glossy black; three occipital plumes, consisting of extremely fine feathers, rolled in the form of a pointed queue, six inches long, pure white, with a narrow shaft-line of brown; sides and hind part of the neck, and the entire upper surface rich cinnamon-brown, this colour being deepest on the shoulders, quills, and tail-feathers; throat, streak over the eyes, sides of face, fore neck, and all the under surface pure white; on the sides of the neck and on the lower part of the body the cinnamon and white are gradually blended. Irides orange; the bare space surrounding them greenish yellow; bill black, horn-coloured or yellowish at the tip and along the lower edge of the under mandible; tarsi and toes dull yellow; claws dark brown. Total length 21 inches; wing, from flexure, 11; tail 4; bill, along the ridge 2.75, along the edge of lower mandible 3.5; bare tibia 1; tarsus 3; middle toe and claw 3.25; hind toe and claw 2.25.

Young. Mr. Gould states that the young bird of the first year has the whole of the upper surface striated with buff and blackish brown, narrow and lanceolate on the head and neck, broad and conspicuous on the back and wings; primaries and tail-feathers dark chestnut-red, deepening into black near the extremity, and tipped with buffy white; all the under surface buffy white, with a stripe of brown down the centre of each feather; irides yellow.

Obs. In some specimens the occipital plumes are tinged with buff and have black tips; in others, again, they are entirely absent; these differences being apparently due to age and season.

THIS species can only be included in our list as an occasional straggler from Australia, where it is said to be universally dispersed, although less abundant on the western coast than elsewhere. A specimen, now in my collection in the Colonial Museum, was shot in the Wellington Province thirty-one years ago; and several instances have since been reported of its occurrence in the South Island*.

* Referring to these cases, Sir George Grey has lately informed me that, when Governor of the Colony, in 1852, he imported some of these birds from Australia and liberated them at Wellington; from which it might fairly be inferred that the stray birds

Layard, writing on the birds of New Caledonia (Ibis, 1882, p. 531), says of this species :—"This Night-Heron is found sparingly wherever we have been ; but it is a curious fact that, though perhaps a dozen specimens have come into our hands to be skinned, not one has possessed the long white occipital plumes which have garnished the heads of all those we saw in Australia. It may be that they are only assumed during the breeding-season, and that they breed only in the north of this island."

I quote the following interesting account of this Night-Heron from Gould's 'Handbook to the Birds of Australia' (vol. ii. pp. 311, 312):—"In the southern latitudes it is only a summer visitant, arriving in New South Wales and South Australia in August and September, and retiring again in February. As its name implies, it is nocturnal in its habits ; and from its frequenting swamps, the sedgy banks of rivers, and other secluded situations, it is seldom seen. On the approach of morning it retires to the forests and perches among the branches of large trees, where, shrouded from the heat of the sun, it sleeps the whole day, and when once discovered is easily shot ; for, if forced to quit its perch, it merely flies a short distance and again alights. Its flight is slow and flapping ; and during its passage through the air the head is drawn back between the shoulders, and the legs are stretched out backwards, after the manner of the true Herons. When perched on the trees, or resting on the ground, it exhibits none of the grace and elegance of those birds, its short neck resting on the shoulders. When impelled to search for a supply of food, it naturally becomes more animated, and its actions lively and prying ; the varied nature of its food in fact demands some degree of activity—fishes, water-lizards, crabs, frogs, leeches, and insects being all partaken of with equal avidity.

"It breeds in the months of November and December, and generally in companies, like the true Herons, the favourite localities being the neighbourhood of swampy districts, where an abundant supply of food is to be procured ; the branches of large trees, points of shelving rocks, and caverns are equally chosen as a site for the nest, which is rather large and flat, and generally composed of crooked sticks loosely interwoven. The eggs, which are usually three in number, are of a pale green colour, and average two inches and five eighths in length by one inch and a half in breadth."

captured here, although at intervals of many years, were only the introduced stock or their descendants. However, I find the following passage, evidently relating to the above species, in an interesting paper by the Rev. W. Colenso, F.R.S., published in 'The Tasmanian Journal of Natural Science' as far back as 1845 :—"In crossing a very deep swamp [in the Waikato district] a beautiful bird, apparently of the Crane kind, rose gracefully from the mud among the reeds and flew slowly past us ; its under plumage was of a light yellow or ochre colour, with a dark brown upper plumage. None of my natives knew the bird, declaring they had never seen such an one before." For this reason I have the less hesitation in treating the Nankeen Night-Heron as a voluntary visitant.

In the same paper Mr. Colenso gives the following account of another bird, seen by him in 1845, which has never since been recorded in New Zealand :—"A little below Ngaruawahia (on the Waikato river) we met a man in a canoe with a live and elegant specimen of the genus *Fulica*. I hailed the man and purchased the bird, which he had recently snared, for a little tobacco. It was a most graceful creature, and, as far as I am aware, an entirely new and undescribed species. Its general colour was dark, almost black ; head grey and without a frontal shield ; fore neck and breast ferruginous red ; wings barred with white ; bill produced and sharp ; feet and legs glossy olive ; toes beautifully and largely festooned at the edges ; eye light coloured and very animated. It was very fierce and never ceased attempting to bite at everything within its reach. I kept it until we landed, intending to preserve it, but as it was late, and neither material at hand nor time to spare, and the animal, too, looking so lovely that I could not make up my mind to put it to death, I let it go. It swam, dived, and disappeared . . . Not a doubt, in my opinion, can exist as to its being naturally allied in habit and affinity to the *Fulica* ; I have therefore named it *Fulica novae zealandiae*. In size it was somewhat less than our European species, *F. atra*."



W. K. HILLMAN DEL.

JUDD & CO LIMITED IMP.

NEW-ZEALAND BITTERN.
BOTAURUS PŒCILOPTILUS.
(ONE-THIRD NATURAL SIZE.)



BOTAURUS PÆCILOPTILUS.

(BLACK-BACKED BITTERN.)

Ardea poiciloptila, Wagl. Syst. Av. *Ardea*, sp. 28, note (1827).*Botaurus melanotus*, Gray, in Dieff. Trav., App. p. 196 (1843).*Botaurus poiciloptilus*, Gray, Gen. of B. iii. p. 557 (1847).*Botaurus australis*, Gould, B. of Austr. vi. pl. 64 (1848).*Botaurus pæciLOPTILA*, Bonap. C. R. xl. p. 723 (1855).*Botaurus poicilopterus*, Gray, Ibis, 1862, p. 236.*Ardea pæciOPTERA*, Finsch, J. f. O. 1870, p. 348.*Ardea poiceloptera*, Hutton, Cat. Birds of N. Z. p. 28 (1871).*Native name.*—Matuku-hurepo.

Ad. suprâ nigricanti-brunneus, interseapulii plumis paucis et scapularibus exterioribus irregulariter fulvescente transversimiculis: uropygio imo et supracaudalibus clariùs fulvescentibus latiùs brunneo transnotatis: tectricibus alarum brunnescentibus ubique fulvescente transversim vermiculatis, minimis omninò nigricanti-brunneis: remigibus et rectricibus nigricanti-brunneis, sparsim fulvescente irregulariter notatis, illis intùs vix fasciatis: pileo summo et collo laterali saturatè brunneis, indistinctè fulvo transversim terminatis: supercilio lato cum regione paroticâ, genis gulâque fulvescentibus: lincâ latâ ab oculo postico ad collum laterale ductâ brunneâ: corpore reliquo subtùs ochrascenti-fulvo, plumis brunneo irregulariter notatis vel transfasciatis, interdum quasi latè longitudinaliter strigatis, gutture et pectore superiore pallidè brunneo marmoratis: subcaudalibus fulvis: subalaribus fulvis ubique brunneo irregulariter notatis: rostro saturatè brunneo: regione oculari et pedibus pulchrè dilutè viridibus: iride flavâ.

Adult. Head and nape dark brown; superciliary streak and region of the ears tawny, the former freckled with brown; back of neck and lower part of back dark purplish brown varied with buff; mantle, scapulars, and secondaries dark brown with purplish reflexions, freckled, and mottled on the edges with tawny yellow; upper surface of wings pale buff, the longer coverts with broad arrow-head marks along their whole extent, and the shorter ones freckled and mottled with different shades of brown; primaries purplish brown, with dark shafts, marbled on their inner webs with buff; secondaries darker brown, marbled on both vanes, but more conspicuously on the inner; tail-feathers dark brown, margined and freckled with buff, especially on the outer ones; throat, front and sides of the neck, and all the under surface tawny buff, variegated with dark brown; on the throat the brown markings are very indistinct, being limited to a narrow freckled line down the middle; on the fore neck each feather has a broad mark of yellowish brown down the centre, with vandyked edges in some and lateral continuations in others; on the long neck-plumes which overhang the breast, and on the overlapping femorals, these markings assume the character of narrow zigzag lines and arrow-heads. The broad feathers covering the upper part of the breast are blackish brown in the centre with tawny-white sides; but these are usually concealed by the overhanging plumes of the fore neck; on the sides of the body there are irregular longitudinal streaks of dark brown; abdomen, inner sides of the tibia, and under tail-coverts yellowish buff without any markings; outer sides of the tibia tawny variegated with brown; lining of wings and axillary plumes pale buff, barred and mottled with purplish brown. Irides yellow; bill dark brown, whitish on the sides and towards the base of lower mandible; eyelids, naked loreal membrane, legs, and feet beautiful pale green; the claws dark brown, with horn-coloured tips. Total length 30 inches; extent of wings 48; wing, from flexure, 14.5; tail 5; bill, along the ridge 2.75, along the edge of lower mandible 4; bare tibia 1; tarsus 4; middle toe and claw 5.25; hind toe and claw 3.75.

Female. I think Mr. Gould is in error in his statement (Handbook to the Birds of Australia, ii. p. 314) that "the sexes are alike in plumage, but the female is smaller than the male." So far as my observation goes, the female is invariably *larger* than the male, and is further distinguishable by its much duller plumage.

Varieties. A partial albino was shot at Moutoa, near Foxton, in the autumn of 1884, and I had an opportunity of examining it whilst in the hands of the taxidermist. The head and fore neck were pure white, the long neck-plumes overhanging the breast, as also the shoulders and the fore part of breast, largely but irregularly marked with white; the rest of the plumage as in ordinary examples.

A specimen which I obtained from Christchurch and presented to the Colonial Museum is of unusually large size, and has the whole of the fore neck and ruff tawny yellow, shaded with pale brown on the sides of the latter, all the markings being much obliterated, the plumage having a "washed out" appearance; the whole of the underparts dingy yellowish white, the axillary plumes and the femorals irregularly barred with brown; cheeks and sides of the head pale tawny brown, the plumage of the upper surface as in ordinary examples.

Obs. Individuals differ not only in size but in the details of their colouring—so much so, indeed, that the natives believe in the existence of two species, the smaller and darker of which they distinguish as "Matukukarourou;" but having now before me a series of thirteen specimens exhibiting a considerable amount of individual variation, I am unable to recognize any such distinction.

Remarks. This bird has the faculty of expanding the plumage of the neck laterally; and the hind part of the neck, which is exposed by this action, is covered with a long fluffy or downy growth. When the body is quiescent the long side-feathers overlie this downy plumage and effectually conceal it. The claw of the middle toe is strongly pectinate on its inner margin, and in old birds the edges are often much worn and broken.

THE Common Bittern is very generally distributed over the country, in places suited to its habits of life, such as raupo swamps, sedgy lagoons, and those "blind creeks," covered over with a growth of reeds and tangle, which are so numerous in all the low districts. In some localities it is comparatively abundant—for example, along the whole extent of swampy flats lying between Waikanae and Rangitikei, on the west coast of the Wellington provincial district, where I have obtained half a dozen in the course of a single afternoon. It is likewise met with in all parts of the Australian continent, although very few specimens appear to have been sent to Europe; and Captain Sturt reports that he found it very plentiful in the marshes of the interior. It is said to occur also in the Chatham Islands; and there is reason to believe that its range extends to Polynesia.

It is a true Bittern in all its habits, being, in fact, the southern representative of the *Botaurus stellaris* of Europe. It appears to love a solitary life, being always met with singly; it remains concealed during the heat of the day, and at eventide startles the ear with its four loud booming notes, slowly repeated, and resembling the distant roar of an angry bull. It subsists on mice, lizards, eels, and freshwater fish, of various kinds; from the gullet of one that I had shot I extracted two headless eels, each measuring 16 inches in length, from which some idea may be formed of the capacity of a Bittern's stomach!

It is interesting to steal up, under cover, and watch this Bittern alternately feeding and reposing in its sedgy haunts. When in a quiescent posture the body is nearly erect, the head thrown back and resting on the shoulders, with the beak pointed upwards, and the contracted neck forming a broad curve with the closed ruff depending, the attitude altogether being rather grotesque. The instant, however, any sound causes it alarm the whole character of the bird is changed: the neck is stretched to its full length, and every movement betokens caution and vigilance; unless immediately reassured, it spreads its broad wings and raises itself into the air in a rather awkward manner, with the legs dangling down, but gradually raised to a level with the tail; the flight then assumes a steady course, often in

a broad semicircle, and is maintained by slow and regular flappings. If unmolested, it may be observed stalking knee-deep in the water in search of food, with its neck inclined forward, raising its foot high at every step, as if deliberately measuring the ground. A live one brought to me by a native, enclosed in an eel-basket, lived in my possession for a week; but it refused to take food of any kind, and died of sheer starvation, remaining fierce and untamable to the very last. On being approached it would erect or spread the feathers of the neck and throw forward the wings, thus presenting a very bold front to the enemy. On any object being placed near it, the bird would strike furiously with its pointed bill; and it made frequent assaults of this kind on the network of its temporary cage.

Layard writes from New Caledonia (Ibis, 1882, p. 531):—"We had heard of a wonderful bird that inhabited the swamps, even in the neighbourhood of Noumea, which frightened belated travellers and 'made night hideous' with its unearthly cries, and were therefore not astonished when our friend M. Saves presented us with a fine specimen of the Australian Bittern, shot at Ansevata. We subsequently obtained a few other examples; and we suspect that it is not very rare in suitable localities. From its retiring habits, however, it is seldom procured, unless purposely hunted, there being here no Snipe to tempt the shooters into swamps."

Dr. Ramsay writes of this bird in Australia:—"It is far more plentiful in the Illawarra and southern districts of New South Wales than in any other part of the country I have visited. I have seen specimens from the lakes and marshes in the southern parts of Victoria, near Ballarat, and have also noticed it on the Herbert river, in the Rockingham Bay district, where it is considered a rare bird, although that part of the country is admirably adapted for its habits, abounding in extensive swamps and lagoons. They are still found to be not rare within a few miles of Sydney; but the Illawarra district is the great stronghold of this species."

I have a note from Mr. A. G. Nicholls giving an account of the manner in which he was attacked by a pair of Bitterns whose nest he had unconsciously approached when eel-fishing one evening at Kaipara. The birds made determined thrusts at his face with their bills, ruffling up their feathers and quivering their wings in a state of the highest excitement; and so persistent were they that he at length seized one of them by the head and despatched it. On examining the place he found two well-grown nestlings, whose safety had undoubtedly been the cause of this unusual exhibition of temper on the part of birds habitually shy and recluse.

The Bittern breeds in swamps, forming its rude nest of raupo and other aquatic vegetation loosely placed together, and sometimes completely surrounded by water. The eggs are usually four in number, although Mr. French, who is an excellent observer, informs me that he once found a nest of five near the Kaiapoi river; they are generally of an even or regular ovoido-elliptical form, measuring 2.1 inches in length by 1.5 in breadth, and of a uniform pale brownish-olive colour.

A nest of this species in the Canterbury Museum is small, flat-topped, and rounded, with a diameter of about 9 inches and a depth of 3 inches. It is composed entirely of dry rushes and flags, and contains three eggs of a uniform delicate creamy stone-colour. There is a specimen of the egg, however, in the Museum, of a delicate dull green, and three others of a greenish-cream colour. The green tinge is no doubt more pronounced in the shell when fresh.

PLATALEA MELANORHYNCHA.

(ROYAL SPOONBILL.)

Platalea melanorhynchos, Reich. Av. Syst. Nat. pl. lxxxiv. *Grall.* (ex A. B. Reich. 1834).*Platalea regia*, Gould, Proc. Zool. Soc. part v. p. 106 (1837).*Platalea latirostrum*, Ellman, Zoologist, 1861, p. 7469.*Platalea regia*, Buller, Trans. N.-Z. Inst. vol. ix. p. 337 (1877).*Native name.*—Kotuku-ngutupapa.

Ad. omninò albus : occipite et nuchâ cristatis, plumis pendentibus ornatis : fronte, facie anteriore et gulæ plumis anticè nudis : maculâ supraoculari et alterâ frontali aurantiacis : pectore flavo lavato : iride rubrâ : rostro et pedibus nigris.

Juv. similis adulto, pectore excepto, sed minimè cristatus.

Adult. The whole of the plumage pure white, with a wash of yellow on the breast. Irides red; on the bare crown and over each eye a crescentic mark of orange; bill, bare membrane on the face, legs, and feet black. Total length 37 inches; extent of wings 50·5; wing, from flexure, 15·5; tail 5; bill, along the ridge 8, along the edge of lower mandible 7·5, width at base 1·3, widest part 2·2, narrowest part ·7; bare tibia 4; tarsus 5·5; longest toe and claw 4·25.

Obs. Some adult examples have no tinge of yellow on the breast. In the nuptial season both sexes are adorned with a full occipital crest of gracefully drooping plumes five inches in length. The young are entirely crestless.

MR. ELLMAN, in 1861, reported that a Spoonbill was known to the Maoris residing at Castle Point under the above native name, signifying the "White Heron with a flat bill," and he proposed, but without sufficient authority, to give it a distinctive title as *Platalea latirostrum*.

The Royal Spoonbill is tolerably common on the eastern and northern coasts of Australia, and (according to Gould), although a very rare visitant, it has also been killed within the colony of New South Wales. The first authentic record of the occurrence of this fine bird in New Zealand was furnished by myself at a meeting of the Wellington Philosophical Society on the 29th July, 1876, when I exhibited a fresh-skinned specimen and made some remarks upon it (*l. c.*).

This bird, which I afterwards presented to the Colonial Museum, was obtained at Manawatu, and kindly forwarded to me by Mr. Charles Hulke, of Foxton, accompanied by the following interesting notes:—"This Spoonbill was shot in April last, near the mouth of the Manawatu river, by Mr. Blake. It was sitting on the sand in company with three Paradise Ducks (*Casarca variegata*). . . . This bird had been seen for some five or six months about the lagoons in the vicinity of Mr. Robinson's homestead. By his sons it had been taken for a White Shag. Only one had been seen by them, but I have been informed by a person who is in the habit of crossing the country between Foxton and Rangitikei, that he is confident he has seen another specimen near the Rangitikei river. No other specimen was, however, seen in company with that sent herewith."

PHALACROCORAX NOVÆ HOLLANDIÆ.

(BLACK SHAG.)

- New-Holland Shag*, Lath. Gen. Hist. B. x. p. 431 (1824).
Phalacrocorax novæ hollandiæ, Steph. Gen. Zool. xiii. p. 93 (1826).
Phalacrocorax carboides, Gould, P. Z. S. 1837, p. 156.
Graucalus carboides, Gray, in Dieff. Trav. ii., App. p. 201 (1843).
Graculus carboides, Gray, Voy. Ereb. and Terror, Birds, p. 20 (1844).
Graculus carboides, Gray, Ibis, 1862, p. 251.
Graculus carbo, Finsch, J. f. O. 1870, p. 375.
Graculus novæ hollandiæ, Gray, Hand-l. of B. iii. p. 127 (1871).

Native name.—Kawau.

Ad. sordidè indigotico-niger, nuchâ cristatâ, pileo summo et colli lateribus fasciis filamentosis parvis ornatis: scapularibus cum tectricibus alarum et secundariis interioribus clarè bronzino-brunncis, viridi-uigro marginatis: primariis nigricanti-brunneis: caudâ nigrâ, suprâ vix einerascente lavatâ: plagâ latâ ab oculo postico et snbter gulam conjunetâ albidâ: corpore reliquo subtùs indigotieo-nigro, viridi nitente, plagâ hypochondriacâ maximâ albâ: rostro albedo, eulmine et apice brunneseentibus: plagâ ophthalmicâ gnâque nudis lætè flavis: pedibus nigris: iride thalassino-viridi.

Adult male. Upper part of the head, neck all round, back, rump, and all the under surface of the body shining greenish black; shoulders, scapulars, and wing-coverts bronzy or coppery brown, broadly margined with shining greenish black; a broad patch crossing the throat and connecting the eyes buffy white, sometimes tinged with yellow; on each thigh a large rounded spot of white, more or less conspicuous in different examples; quills and tail-feathers black. Irides sea-green; skin round the eyes and on the gular pouch rich yellow, and studded with short scattered feathers; bill whitish horn-colour, shading into brown on the culmen and towards the tips; legs and feet jet-black. Total length 34.5 inches; wing, from flexure, 13.5; tail 7; bill, along the ridge 2.75, along the edge of lower mandible 3.5; tarsus 2; longest toe and claw 3.75.

Obs. In summer the male is adorned with numerous white linear feathers, scattered over the throat and neck, and extending about half an inch beyond the permanent feathers; but these white plumes never assume the dense character exhibited in the summer plumage of *P. carbo*, in which these parts, as well as the crown, appear almost entirely white. The thigh-spot is present in summer and winter alike, but owing to the presence of long white filaments it is more conspicuous in the breeding-season. I have seen males without the thigh-spot, from which I conclude that it is not acquired till after the first moult. The occipital feathers are somewhat produced, forming a very slight crest.

In the middle of autumn I observed a party of five at the mouth of the Waikanae river, and in another locality seven, not one of them exhibiting the white thigh-spot, from which it may be inferred that the sexes separate themselves at this season.

Female. Has the plumage generally duller and without the white thigh-spot; crown of the head and neck all round blackish brown, minutely stippled or speckled with pale brown, particularly on the fore neck; breast fulvous white mixed with brown, having an indeterminate appearance; rest of the underparts and under surface of wings greenish black slightly glossed; quills and tail-feathers black with greyish shafts. Irides dull grey. Total length 32 inches; extent of wings 48.

Obs. In some examples (apparently very old birds) the white spreads over the abdomen.

Young. Upper parts brown with a greenish gloss, deepening into greenish black on the lower part of back and rump; mantle and wing-coverts dingy coppery brown with darker margins, the longer coverts tipped with creamy white; throat pale buff; sides of the head, front and sides of the neck dark brown mottled with pale buff; centre of the breast and the abdomen yellowish white; the sides of the body largely mottled with brown, varied more or less with greenish black; quills and tail-feathers black.

Nestling. The nestling attains to a considerable size before the downy covering makes its appearance. This is of a uniform sooty brown, and as the bird advances becomes thick and woolly.

Albino. Among birds of this class it is a rare thing to find any conspicuous departure from the ordinary plumage. The following is the description of a fine albino obtained at Sumner, near Christchurch:—General upper surface dark cream-colour; the crown, hind neck, lower part of back, and flanks stained and shaded with brown; the scapulars and wing-coverts broadly margined with yellowish brown; sides of the head, throat, fore neck, and all the underparts pure white; the wing-feathers are yellowish white, more or less clouded and freckled with brown; the old tail-feathers are yellowish white, the new ones ashy; and interspersed with the plumage of the upper parts there are numerous new feathers of a brownish ash-colour with darker edges, thus indicating a transition to a darker state of plumage. The bare facial membrane is flesh-coloured, with an obsolete yellow spot in front of the eye; bill black; legs and feet dark brown.

Note. In my "Further Notes on the Ornithology of New Zealand," read before the Wellington Philosophical Society on the 12th of November, 1870, and published in the 'Transactions of the New-Zealand Institute' (vol. iii. pp. 36-56), I stated my reasons for adopting the generic title of *Phalacrocorax* (Brisson) in preference to *Graculus*; and a further consideration of the question has only tended to confirm me in that decision. I have thought it right to make this statement, inasmuch as I find the latter name adhered to both in Dr. Finsch's latest revision of the nomenclature in the 'Journal für Ornithologie' (July 1872) and in Professor Hutton's 'Catalogue.' Not only is *Phalacrocorax* the older title, and therefore entitled to recognition; but, as I have already pointed out (*l. c.*), there seems to be no finality about the other name. In Mr. G. R. Gray's first list (App. to Dieff. N. Z. vol. ii. p. 201) it was written *Graucalus*, in his "Birds of New Zealand" (Voy. Erech. and Terr. p. 20) it was changed to *Graculus*; and in his later list (*Ibis*, 1862) it became *Graculus*, a term originally applied specifically by Linnæus to the Green Cormorant of Europe, *Pelecanus graculus* (Syst. Nat. vol. i. p. 217).

I STATED in my former edition of this work that, after comparing a large number of specimens, I felt no hesitation in keeping this form distinct from the well-known *Phalacrocorax carbo* of Europe, although the two species were closely related and had doubtless sprung from a common ancestor. In thus separating it, I was supported by the late Mr. Gould, who had enjoyed frequent opportunities of investigating the subject in Australia and Tasmania, where this bird is very generally dispersed. The same view was taken by the late Mr. G. R. Gray in his latest arrangement of the group (Hand-list of Birds, 1871); and Mr. R. B. Sharpe afterwards adopted it in his classification of the specimens in the British Museum*. Dr. Finsch, on the other hand, adhered at that time to his opinion that the New-Zealand bird was not separable from the European form; and I am not aware that he has since changed his views. Professor Hutton has declared himself of the same opinion.

The Black Shag is very common on our coasts and within the mouths of our tidal rivers. Along the ocean-beach it is generally dispersed singly or in pairs, but on the sand-banks it often congregates

* Captain Mair states that this species is rarely seen in the Bay of Plenty. But he distinguishes from this what he terms the "Large Brown River Shag," the Mapo or Matapo of the Maoris. He describes this bird as "brown all over with a yellow tinge on the throat," and says that it frequents lakes and the upper courses of rivers and is never met with on the sea-coast. A colony of them, numbering about a dozen individuals (exclusively of this kind), breed every year in a kahikatea forest near the shores of Lake Rotorua.

to the number of twenty or thirty. It walks with an awkward waddling gait, supporting itself in part with its tail, which is moved alternately to the right and left at every step. It has a very fetid odour; and a person approaching a flock of these birds on the leeward side is made sensible of this at a hundred yards or more. Its usual attitude on the beach is one of repose, with the body inclined forward, the tail resting at full length on the ground, and the head drawn in upon the shoulders. When disturbed, it instantly stretches up its neck, listens, and watches attentively for a short time, and then, after a few ungainly steps, shoots its white ordure along the sands, then rises into the air with a laboured flapping of its wings, and flies off in the direction of the sea, into which it speedily plunges. For some yards' length after rising it almost strikes the ground with the tips of its quill-feathers, and I am assured that it may easily be captured by a kangaroo-dog or greyhound before it fairly takes wing. When associated in pairs, they rise simultaneously and fly off in company. Sometimes a large flight of them may be observed high in the air, performing apparently a migratory passage, and deployed in the form of a wedge, like a flight of Swans.

Like all the other members of the group, the Black Shag is an accomplished diver, and obtains all its food in this manner. Twenty-five seconds appears to be the average duration of each dive, although the bird is capable of remaining under water for a much longer time. It is interesting to observe it facing a strong rolling surf and diving under the breakers to avoid their force. When swimming in smooth water, it sometimes amuses itself by slapping its broad wings upon the surface, producing a sound that may be heard to the distance of half a mile. It rises from the water with apparent difficulty, and till it is fairly in the air it continues to strike the surface violently with the tips of its wings; this will doubtless account for the ragged appearance often presented by the ends of the primaries. It subsists on fish of various kinds; and I have observed one capture a good-sized flounder, and after killing it by nipping with its bill, and battering on the water, swallow it whole, the throat of this bird being capable of great expansion.

There is an interesting mounted group in the Canterbury Museum, illustrating the gular capacity of this Shag. The principal figure is that of a bird holding in its bill a brown trout which had actually been taken from its throat when shot in the Avon river; the fish measured $14\frac{1}{2}$ inches in length, with a girth of $7\frac{3}{4}$, and weighed $1\frac{1}{4}$ lb.

A Canterbury sportsman records another instance of the kind as follows:—"Some idea of the size of the fish a Shag can provide accommodation for will be gained when it is mentioned that a few days since one of a trio of Rangiora sportsmen out shooting at the Ashley river killed a bird of the species, which, on being picked up, dropped from its gullet an eel 21 in. long, and within an ounce or two of a pound in weight" *.

The stomach of another which I myself opened contained an eel 27 inches in length and measuring 5 inches in circumference in its thickest part.

On the occasion of a visit which I paid to Sir George Grey in his lovely island home at Kawau, he led me to a small promontory from which you look down upon a shell-beach of exquisite beauty, fringed to its very edge with pohutukawa trees covered with a mass of crimson flower. From this beach, for some fifty yards or more, the water is so shallow that the pebbly bottom is clearly visible, and Sir George told me that from this point of observation he has often watched this Shag in its fishing-operations coursing like a greyhound under the surface, and using its wings and tail as propellers. He also told me an interesting story of one he obtained from the nest and succeeded in

* The following appeared in one of the local newspapers:—"Shags are stated to be more than usually destructive to young fish in the Wairarapa district this year, and it would be well if the local bodies offered a reward per head for each of these birds before they decimate the creeks of the valley. On Friday last, Mr. F. Liardot found a dead Shag on the beach with an eel in its beak. The fish, which was a very large one, had been partially swallowed, and the head being too large for the gullet had stuck in the Shag's maw, through which it crawled. When found, the eel had formed a complete circle round the bird's beak."

rearing. Although allowed its freedom, it always remained in the neighbourhood, fishing in the little bays, resting and sunning its wings on the stone pier leading to the "great pro-consul's" residence, or on the rocks which bound the little cove; and so tame did it become that whenever Sir George went out in his boat it followed him from place to place, and occasionally uttered a peculiar cry to attract attention. But one day it was missing, and on search being made the keeper found its dead body on the beach, but to all appearance uninjured.

It is interesting to observe the readiness with which it dives under water for protection. On one occasion I was watching one of these birds floating lazily on the surface in Porirua harbour. Something in its appearance seemed to irritate a Red-billed Gull which, after coursing about overhead, made a swoop down upon the Shag. The latter bird, by an adroit movement, immediately disappeared under water and came up again some yards off*.

It breeds in companies, and frequently in association with another species of Shag (*P. brevirostris*), resorting for this purpose to the deep swamps in the vicinity of the sea-coast, and placing its rude nest on the "negro-heads" or swamp-tussocks, just above the surface of the water: this structure is often three feet in diameter, and is composed of raupo flags, dry leaves, and twigs roughly placed together, and rendered compact by the weight of the sitting bird. A nest in the Canterbury Museum is a massive bed of flax-leaves, toetoe, and dry grasses pressed together into a thick flat layer, measuring about 20 inches by 15 inches, with a thickness of 3 to 4 inches, and with a slight depression on the top. The eggs, which are usually three in number, are of a perfectly elliptical form, measuring 2.5 inches in length by 1.6 in breadth, and are greenish white, with a thin covering of chalky matter.

* "THE BATTLE OF THE BIRDS."—The following is a translation of the Maori fable, as related to me by a Ngatiawa chief. It is a fair specimen of this class of Maori fables, and is interesting as showing how many of the names of the birds are derived from their cries:—"The earse was an eel. The river Shag had a swamp of its own; the ocean Shag lived on the water. The two Shags contended about the respective merits of their feeding-grounds. The river Shag lived on eels, the sea Shag on snapper. The river Shag said to the other, 'Come along with me on shore and see what a fine feeding-ground I have.' The sea Shag agreed, and they went together. The former, who was standing on a 'uegro-head' in the swamp, called to his visitor 'Now, dive!' Down he went, and up he came again with an eel in his beak. 'Now, then, swallow it!' Down went the slippery eel into the crop of its captor. 'Now, then, throw it up again!' cried the river Shag, and up came the slippery eel from the depths of his captor's throat. 'See,' exclaimed the river Shag, 'that is the beauty of my food; you can do what you like with it.' 'Well, let us go to the sea,' said the ocean Shag, 'and I will show you what we can do.' Accordingly they went. 'Now,' said the ocean Shag, 'let me see you dive.' 'Not so,' replied the river Shag, 'for I have come to see what food you can produce.' So down the former went; up he came with a snapper in his bill. 'Good!' cried the river Shag; 'now swallow it.' Down it went, disappearing entirely in the stomach of the bird. 'Now, then, throw it up again!' He tried, but tried in vain. The sharp spines on the snapper's back stuck fast in the Shag's throat. The river Shag jeered at him, saying, 'Death lurks in the food you gather;' and so it was, for the ocean Shag struggled till it died. This was the cause of the battle; for the sea-birds had now discerned how superior was the food on shore, and were determined to make an invasion, so they collected all their forces for that purpose. When the land-birds heard that their ocean brethren were contemplating a descent upon their feeding-grounds, they, too, began to collect their forces to oppose the intruders. The Huia was the bird who called the tribes together with his cry, *huia-huia!* (assemble, assemble!). The one who kept the fighting-party on the alert during the night was the Pipi-warauoa, his watchword being *koia-koia-whitiora-whitiora-whiti-whitiora*. This was a warning-ery to keep the party wakeful. The Tui did all the talking, urging them to be brave and big-hearted. The Owl was selected to offer the challenge, and he did the *pukana* (staring defiantly), and that is how his eyes are so large. The one who threw the last challenge-spear was the Tiwaiwaka. Having thrown the stick, he came dancing backwards, exposing his rear, first on one side, then on the other (just as you see the bird gesticulating, with its tail erect and spread, now-a-days). When the forces from the sea approached it was seen that the Gannet was put forward to answer the challenge. And as the Gannet followed up the defiant Tiwaiwaka, the Oyster-catcher called out *keria-keria-keria rawatia* (follow him up to the end). And so he did follow him up, and made a thrust forward with his bill, and thought he had speared his enemy, when, lo! his spear went through to the other side, for it was all tail! The Pigeon then commenced to coo; the Kaka cried *arara-arara*; the Sea-Gull sounded his alarm of *haro-haro*. Then the two forces came into general conflict, and the tribes from the sea were defeated and driven back. That is why they still remain there, whilst the land-birds enjoy their forests and swamps."



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PIED SHAG.
PHALACROCORAX VARIUS.

EMPEROR SHAG.
PHALACROCORAX IMPERIALIS.

(TWO FIFTHS NATURAL SIZE.)

PHALACROCORAX VARIUS.

(PIED SHAG.)

- Pied Shag*, Lath. Gen. Syn. iii. pt. 2, p. 605 (1785).
Pelecanus varius, Gm. Syst. Nat. i. p. 576 (1788).
Carbo hypoleucus, Brandt, Bull. Acad. Imp. Pétersb. i. p. 55 (1837).
Phalacrocorax leucogaster, Gould, P. Z. S. 1837, p. 156.
Graucalus varius, Gray, in Dieff. Trav. ii., App. p. 201 (1843).
Graculus varius, Gray, Voy. Ereb. and Terror, Birds, p. 19 (1844).
Pelecanus pica, Forst. Descr. Anim. p. 104 (1844).
Phalacrocorax hypoleucus, Gould, B. of Austr. vii. pl. 68 (1848).
Carbo fucosus, Peale, U. S. Expl. Exp., Birds, p. 268 (1848).
Hypoleucus varius, Reich. Syst. Av. p. vii (1852).
Carbo leucogaster, Cass. U. S. Expl. Exp. p. 373 (1858).
Graculus varius, Gray, Ibis, 1862, p. 251.
Graculus leucogaster, Gray, Hand-l. of B. iii. p. 128 (1871).

Native name.—Karuhiruhi.

Ad. pileo colloque toto, dorso postico eum uropygio et supracaudalibus sordidè indigotico-nigris : interscapulio, scapularibus et tetricibus alarum saturatè cinerascentibus, plumis omnibus angustè viridi-nigro marginatis : remigibus brunneis, extùs cinerascentibus, secundariis interioribus cinerascensibus externè viridi-nigro marginatis : caudâ nigrâ : loris nudis lætè aurantiacis : facie laterali totâ et corpore subtùs albis, pectoris lateribus et hypochondriis imis tibiisque indigotico-nigris : subalaribus brunneis viridi lavatis : rostro saturatè corneo, versus apicem et ad basin mandibulæ pallidiore : pedibus nigris : iride pallidè thalassinoviridi : regione ophthalmicâ nudâ lætè indigoticâ : maculâ antecoculari aurantiacâ : gula flavâ, nudâ.

Juv. similis adulto, sed corpore subtùs et collo laterali brunnescenti-nigro variis.

Adult. Top of the head, back of the neck, lower part of back, rump, flanks, and thighs shining greenish black ; shoulders, mantle, scapulars, and upper wing-coverts deep bronzy grey, each feather bordered with velvety black ; quills and tail-feathers black, with polished shafts ; under surface of wings and axillary plumes black, slightly glossed with green ; sides of face, throat, front and sides of neck, and all the under surface pure white. Irides pale sea-green ; in the bare space in front of the eyes a bright yellow spot ; eyelids and naked skin below indigo-blue ; gular membrane yellow ; bill dark horn-colour or brownish yellow, paler at the tips and towards the base of lower mandible ; legs and feet black. Total length 33.5 inches ; wing, from flexure, 12.25 ; tail 6 ; bill, along the ridge 3, along the edge of lower mandible 4 ; tarsus 2.5 ; longest toe and claw 4.25.

Young. Differs from the adult in having the plumage duller, the feathers composing the mantle and the scapulars being narrowly margined with brown ; also in having the fore neck and underparts of the body irregularly spotted with blackish brown, this appearance being caused by the apical portion of some of the feathers being of that colour. In some instances the brown assumes the character of clouded markings over the entire under surface.

Nestling. Covered on the upper surface with thick sooty-brown down, and on the lower sides of the face, throat,

fore neck, and all the underparts with thick, cottony, white down; bare space round the eyes and rictal membrane bright yellow. Bill dull yellow, veined with brown, which colour prevails on the culmen; legs and feet black. The newly-hatched chick, before the down appears, looks as if burnished with black-lead.

Fledgling. The first plumage to appear is on the wings and that composing the mantle, these feathers being very acuminate in form, with a filamentous fringe, of a slaty-brown colour, very slightly glossed and narrowly margined with an edging of velvety brown; also the tail-feathers and their upper coverts, which are black, the latter being glossed with green; next the feathers of the underparts appear, coming up for the most part pure white, but with an admixture of brown as described above.

Obs. The sexes are precisely alike in plumage, but differ slightly in size.

The adult colours are acquired in the nest, but undergo a subsequent change. The nestling has the upper parts covered with blackish-brown down, which deepens into black on the hind neck, whilst the down covering the fore neck and all the underparts is pure white. But on the fledgling the colours are not so well marked, the dark plumage of the upper surface being suffused with grey, and the white of the underparts being lightly streaked and freckled all over with greyish brown. In addition to this the feathers have a frayed-out appearance.

THIS species frequents the lakes and freshwater rivers, and is seldom met with on the sea-coast except during the breeding-season. In other respects its habits do not appear to differ in any material point from those of the preceding bird. Its usual station is a fallen tree or a stump projecting from the water; and it may frequently be seen spreading its wings to the sun, and sometimes remaining in that position for a considerable time.

It is far more plentiful on the shores of the North Island and particularly so in the provincial district of Auckland, becoming scarce in Hawke's Bay, and very rare indeed south of Cook's Strait.

On the wing, its snow-white underparts gleaming in the sunshine, or artistically posed on some projecting stump near the river-bank, it is always a conspicuous object.

They are very destructive to the introduced carp in the lakes and lagoons in the neighbourhood of Auckland. Their crops are often found completely crammed with them, and in one instance a carp measuring 10 inches in length was taken from a Pied Shag's throat. From time to time the Acclimatization Society prosecutes an active crusade, but the Shags appear to be as plentiful as ever in all suitable localities.

Sir J. von Haast writes:—"They are capital fishers; and one day I was witness how well they understood how to procure their food. It was near the spot where one of the northern spurs of Mount Murchison slopes down to the Buller, which here forms small falls and rapids. A Cormorant was standing on an isolated rock, round which the foaming waters dashed down; and I was not a little surprised to see him jump down into the white foam. In the first instance I thought he would not get out again, but would be dashed to death by the whirling waters; but soon he reappeared, swimming rapidly towards the edge, and then flying on to his old observatory to continue his sport. It is probable that small fishes are taken down by the falls, and, being stunned by the force of the water, are easily caught by the courageous bird. This is a new proof that nature has given to every animal the requisite physical strength to contend with the elements in which it has to look for its subsistence."

This species nests in trees in the vicinity of water and always in communities. Far up the courses of the freshwater rivers, on a single tree overhanging the stream, five or six pairs may be found associated, their nests formed of twigs and other dry materials pressed into a compact structure and fixed firmly among the branches. Many such places are known to me, and one in particular, some fifty miles up the Wairoa river, north of Auckland, was occupied, within my own knowledge, for ten or twelve years in succession, in spite of repeated molestation by the natives. In other suitable

localities on the shores of large inland lakes, on wooded islands, or on the sea-shore much larger communities are often formed—sometimes as many as fifty or a hundred pairs—and a breeding-place of this kind once selected is seldom deserted. I visited one of these “shaggeries” on the Rurima rocks, off Whakatane, about the middle of January, just at the most interesting time, the young birds being then fledged and preparing to take their flight.’

The Rurima rocks, which are situated about five miles from Whale Island and four from the mainland, consist of three small semi-conical hills, which have so far resisted the erosive or wasting forces of the ocean, two of them being connected together by a low-lying area of rock and sand-drift forming a sort of atoll. The detached one is known as Motoki, and this is one of the few last refuges of the expiring *tuatara* lizard, the wonderful *Sphenodon punctatum*. It is a long flat rock with a cone in the centre covered with beautiful pohutukawa trees (*Metrosideros tomentosa*). Around the base of this cone there is a dense growth of stunted angiangi (*Coprosma lucida*) looking very fresh and green. Among the rocks and in the burrows under the shade of this dense vegetation the *tuatara* may still be found in considerable numbers. Rurima proper is of similar formation, and the central cone is thickly covered with pohutukawa. On the side toward Whale Island the birds have established a shaggy of considerable extent. The trees on this side are whitened and leafless, being apparently killed by the excessive amount of ordure which covers them. As our boat approached we could see scores of the birds perched on the trees, above and around their nests, and scores more standing in ranks on the hard beach below.

We found the Shags in great force, and it was most interesting to watch the operations of both old and young birds. There were perhaps 80 or 100 nests, many of which were vacant owing to the lateness of our visit, the breeding having commenced in October. The nests are large, round structures, composed, as already mentioned, of dry sticks and twigs and other loose materials, bound together by means of a peculiar kind of kelp, for which the Shags may be observed diving in the sea, sometimes in four fathoms of water. They have a somewhat compact appearance and are usually placed in a thick fork among the branches or between two limbs of a tree lying close together. In each of those still tenanted there were two fully-fledged young birds; and these youthful Shags kept up a constant “squirling” noise, accompanied by a perpetual swaying of the head from side to side, in an impatient sort of way. The old bird comes up from the sea with her gullet full of small fish, and takes up her station on a branch adjoining to or overlooking the nest. The young birds, after craning their necks almost to dislocation, quit their nest and mount up alongside the parent, when the peculiar feeding-operation commences. The mother bends down her head in a loving way, opens wide her mandibles, and the young Shag, with an impatient guttural note, thrusts his head right down the parental throat and draws forth from the pouch, after much fumbling about, the first instalment of his dinner. No sooner has he swallowed this than he begins to coax for more, caressing the mother’s throat and neck with his bill in a very amusing fashion. The old bird waits till she has recovered the discomfort of the last feed, then opens her mouth again, and the action is repeated, first by one young Shag, then by the other. When the pouch is emptied, the mother spreads her ample wings and goes off for a fresh supply of *auas*, whilst her offspring shuffle themselves back again into their nest to await her return. But this feeding-process and the squirling cries which herald it are going on at the same time all over the camp, and as a consequence there is a perfect din of voices. In the midst of these may be heard deep guttural cries; but these are probably the occasional scoldings of the old birds to repress the inconsiderate eagerness of their young ones, for during the operation of feeding there is sometimes a good deal of apparent squabbling among the young fraternity for the first attention, accompanied by a vigorous fluttering and flapping of the wings. In one of the nests, where the young birds were not sufficiently advanced to leave it, I observed that the occupants during the intervals when their parents were absent kept up an incessant flapping of their wings and swaying of

their long necks, first to one side then to the other, with a never-ceasing cry as if in great bodily distress. Poor little Shags!

This breeding-colony consisted exclusively of *P. varius* *. I noticed a single Spotted Shag (*P. punctatus*) consorting with the flock, but none of any other species.

At a place called Whakarewha, near Matata on the East Coast, there is a colony of the Pied Shag where many hundreds of them breed together. The nests are crowded together on the branches of a clump of pohutukawa trees growing on the cliff; and at the commencement of the breeding-season, when the Shags assemble to refit their nests, the old birds may often be seen fighting fiercely for the possession of a dry stick or piece of seaweed, required for building-purposes, or endeavouring to dispossess each other of nests already made. Owing probably to the crowding, the young birds are not unfrequently knocked out of the nests, and numbers of dead ones are found lying on the beach at the base of the cliff. The Harrier (*Circus gouldi*), attracted by these dead bodies, hovers about this breeding-place and makes an occasional attempt to carry off a young Shag from the nest by boldly attacking it; whereupon numbers of the old birds sally forth with loud guttural cries and chase the intruder to a considerable distance.

Captain Mair visited a similar shaggery on Whale Island, on the 10th November, and sent me the following report:—"I found the young in every stage, from partly developed ones in the egg to young birds just ready for flight."

The eggs, which are elliptical in form, and greenish white, are generally two in number; but there are sometimes three, and Mr. Reischek informs me that he has occasionally found as many as four in one nest.

* As far back as 1841 the Rev. Mr. Colenso wrote:—"On a tall, branching pohutukawa tree (*Metrosideros tomentosa*), which grew on the rocky cliff at the northern end of the beach at Owae (a small village in Wangaruru Bay), I observed several Cormorants had built their nests. These birds had inhabited this tree for many years; yearly increasing the number of their nests, which they build of dry *Algae*, sticks, and small plants. Their social habits and large nests forcibly reminded me of an English rookery. Two species inhabit these shores; one, with entirely black plumage, which the natives call Kawau—the other with white fore neck, breast, and belly, and olive-black neck, back, and wings, called by them Karuhiruhi; this last is the most common."



Shag feeding young.

PHALACROCORAX IMPERIALIS.

(EMPEROR SHAG.)

- Phalacrocorax imperialis*, King, Proc. Z. S. 1831, p. 30.
Phalacrocorax cirrhatus, Scl. & Salv. Ibis, 1868, p. 189.
Graculus carunculatus, Finsch, J. f. O. 1870, p. 375.
Phalacrocorax carunculatus, Scl. & Salv. Ibis, 1870, p. 500.
Phalacrocorax carunculatus, Buller, Birds of New Zealand, 1st edit. p. 332 (1873).
Graculus carunculatus, Sharpe, App. Voy. Ereb. and Terr. p. 34 (1875).
Phalacrocorax imperialis, Scl. & Salv. Proc. Z. S. 1878, p. 652.
Phalacrocorax cirrhatus, Hutton, Trans. N.-Z. Inst. vol. xi. p. 336 (1879).

Ad. pileo eristato eum collo postico, dorso postico, uropygio et supraeaudalibus nitidè purpuraseentibus : interseapulo, seapularibus alarumque teetrieibus sordidè olivaceo-viridibus, illo purpuraseente lavato, teetrieibus alarum minimis interioribus albis, faseiam albam eonspieuam formantibus : remigibus brunneis, seeundariis olivaceo lavatis : caudâ sordidè nigrâ, rectrieibus duabus centralibus medialiter cano lavatis, seapis ad basin albis : faeie et collo lateralibus purpuraseenti-nigris pileo coneoloribus : corpore reliquo subtûs purè albo : hypoehondriis imis purpuraseenti-nigris : subalaribus brunneis : rostro saturatè brunneo, ad apicem albido : pedibus pallidè brunneis : iride pallidè brunneâ : plagâ nudâ anteoulari papillosâ aurantiaeo-rubrâ.

Adult. Head, including the crest, cheeks, hind part and sides of neck, back, rump, thighs, and upper tail-coverts dark purplish or steel-blue with a beautiful gloss ; shoulders and seapulars dull shining olive-green, the feathers of the former with burnished edges ; upper wing-coverts dull olive-green, washed more or less with purplish or steel-blue, the middle ones largely tipped with white, forming a conspicuous alar bar ; on the back a square patch of white (which is not always present, being probably characteristic of the breeding-season) ; throat, fore neck, and all the under surface of the body pure white ; wing-feathers blackish brown ; the secondaries washed with olive ; under surface of wings dusky black ; tail-feathers dull black, the two middle ones inclining to grey, and all having the shafts white at the base. Irides light brown ; papillæ in front of the eyes and bare skin at the base of lower mandible orange-red ; bill dark brown, whitish at the tips ; legs and feet pale brown. Total length 26 inches ; wing, from flexure, 10.75 ; tail 5 ; bill, along the ridge 2.25, along the edge of lower mandible 3 ; tarsus 2.25 ; longest toe and claw 4.25.

Young. There is a specimen in the Otago Museum obtained from the Chatham Islands (marked ♂) which is apparently in an immature state ; dorsal patch broken and mixed with brown ; alar bar much narrower than in the adult bird and likewise intermixed with brown feathers, the white ones appearing to be new plumage ; general gloss on the upper parts less pronounced ; lower back and rump glossed with steel-blue, instead of green as in the adult ; there is likewise a blue gloss intermixed with the green on the head and hind neck. There are some old and dingy brown feathers on the mantle, from which it may be inferred that the plumage described above exhibits a change from a still more youthful state.

Obs. The above description and the accompanying figure are taken from a fine male bird obtained by Mr. Henry Travers at the Chatham Islands in August 1871. The colours of the soft parts were carefully noted by him while the specimen was fresh.

UNDER the head of *Phalacrocorax imperialis*, King, Dr. Sclater writes (' Voyage of Challenger,' Zool. vol. ii. Birds, p. 121):—" This Cormorant, which has been usually united to *Phalacrocorax carunculatus*

of New Zealand, appears to be quite distinct. It has a broad white patch on the middle of the back in the adult plumage, no crest, and the white extending over the cheeks up to the naked skin round the eye. It has a broad white bar on the upper wing-coverts." He then gives a coloured figure of the bird which he takes to be *Phalacrocorax imperialis*, and formulates the following synopsis of the group:—

- a. Dorsi postici fascia alba : crista nulla 1. *imperialis*.
- b. Dorsi fascia nulla :
 - a'. Crista nulla 2. *verrucosus*.
 - b'. Cristati {
 - Gula tota nuda 3. *albiventris*.
 - Gulæ linea media plumosa 4. *carunculatus*.

I am sorry to differ from so expert an ornithologist, but I cannot follow Dr. Sclater in this identification. He makes the absence of a crest and the presence of the dorsal patch of white the distinguishing characters of *Phalacrocorax imperialis*, but on turning to Captain King's original description (*l. c.*) I find that his bird is a *crested* one. His description is as follows:—

Phal. capite cristato, collo posteriori, corporeque suprâ intensè purpureis : alis seapularibusque viridi-atris : remigibus reatricibusque duodecim fuseo-atris : corpore subtùs, fasciâ alarum, maculâque dorsi medii sericeo-albis : rostro nigro : pedibus flavescentibus.

From this it is evident that the 'Challenger' specimen figured and described by Sclater is not the bird to which King gave the name of *imperialis*, unless we suppose that it sometimes acquires a crest; but Dr. Sclater himself calls it, by way of distinction, the uncrested form. Nor does the formula *b* fit *P. carunculatus*, which, as I shall show when treating of that species, is never crested, whilst it does exhibit, in the breeding-plumage, the patch of white on the back. It is perfectly clear also that the crested Chatham-Island form, of which I have given a figure, is distinct from the uncrested *P. carunculatus*. It cannot be *P. cirrhatus* of Gmelin, because his bird is larger than *P. carunculatus*, whilst this is decidedly smaller.

After a careful investigation of the subject, and a comparison of all the specimens within my reach, I have decided to treat the crested bird from the Chatham Islands as the true *Phalacrocorax imperialis*, and the uncrested New-Zealand form as Gmelin's *P. carunculatus*. It would perhaps be safer to give to this form a new distinctive title; but I am unwilling to add another name to the already somewhat tangled synonymy of this species and its allies. I am aware that it is "a long cry" from the Straits of Magellan to the Chatham Islands; but experience teaches us that it is impossible to lay down any strict geographical rules of distribution for birds of this class. As a case in point, I may mention an occurrence reported to me by Sir James Hector:—"When 100 miles off the Horn, a specimen of the White-throated Shag (*Phalacrocorax brevirostris*) flew on board our ship"!

Even in the countries which these birds inhabit their distribution is often very eccentric and unaccountable. Take, for example, *P. punctatus*, a species which is extremely common on the coast of the South Island, but is rarely met with north of Cook's Strait. Mr. Adams, late taxidermist to the Auckland Museum, informed me that he found a colony of these birds on the coast near Waiheke and shot six of them. To my great surprise I saw one in the Taupo Lake in March 1877; in July 1883 I saw a flight of six in the Hauraki Gulf; and in January 1886 I found a solitary pair breeding in the midst of hundreds of the Pied Shag on some pohutukawa trees on the Rurima rocks, in the Bay of Plenty. Referring to the same species, Mr. T. W. Kirk says (*Ibis*, 1888, p. 44):—"I was lately informed by Mr. J. C. McLean that a colony of fifteen or sixteen of these birds has for more than five years been established on a reef inside Cape Kidnappers. The latter gentleman states that he has collected the eggs, but never found more than two in a nest. In December 1885 there were five nests (composed of seaweed), placed at equal distances apart, along the ledge which runs on one side of the rock about three feet from the top."

PHALACROCORAX CARUNCULATUS.

(ROUGH-FACED SHAG.)

Carunculatus Shag, Lath. Gen. Syn. iii. pt. 2, p. 603 (1785).*Pelecanus carunculatus*, Gm. Syst. Nat. i. p. 576 (1788, ex Lath.).*Carbo purpurascens*, Brandt, Bull. Sci. Acad. Imp. Pétersb. iii. p. 56 (1831).*Leucocarbo carunculatus*, Bonap. Consp. Av. ii. p. 176 (1857).*Leucocarbo purpurascens*, Bonap. Consp. Av. ii. p. 177 (1857).

Ad. similis *P. imperiali*, sed conspicuè major : fronte plus minusve carunculatâ : cristâ absente : dorso postico fasciâ albâ ornato : caruenculis rubris : regione ophthalmicâ nudâ cyanescenti-purpureâ : pedibus flavescenti-brunneis.

Adult male. Similar to *P. imperialis*, but considerably larger and wanting the crest ; it is furthermore distinguishable by the two large square spots of white which cross the back under the wings, by the larger extent of the white alar bar, and by a patch of white on the outer scapulars. The rows of papillæ along the forehead are red, and the naked space around the eyes bluish purple ; feet yellowish brown. Total length 32 inches ; wing, from flexure, 12·5 ; tail 5·75 ; bill, following the curvature 3, along edge of lower mandible 3·75 ; tarsus 3 ; longest toe and claw 5.

Female. The sexes are exactly alike in plumage, the fine metallic tints being as bright in the female as in the male. The former is, however, somewhat smaller in size :—Extreme length 27·5 inches ; wing, from flexure, 11·75 ; tail 5·5 ; bill, along the ridge 2·75, along the edge of lower mandible 3·5 ; tarsus 2·25 ; longest toe and claw 4·5.

Young. General upper surface dull greenish black, with a slight gloss in certain lights, the feathers on the shoulders margined with a darker shade ; the whole of the wing-coverts and the outer scapulars greyish brown with whitish margins ; tail-feathers greyish black, with whitish shafts and margins.

Fledgling. The larger wing-coverts and the rectrices are the first to make their appearance, the former having the acuminate shape peculiar to young birds, with filamentous tips. In the downy state of *P. varius*, as already stated, the distribution of colours is the same as in the adult, the whole of the fore neck and underparts being white ; and when this is succeeded by the covering of feathers some spotted brown markings, more or less distinct, present themselves but disappear altogether with the first moult. In this species, on the contrary, the downy condition is dark, and is immediately succeeded by the pure white plumage. A specimen in Mr. Silver's collection has the head and the whole of the neck still clothed in sooty-brown down, sprinkled with a few white filaments ; the breast and all the under surface white, with vestiges of brown down still adhering to the feathers ; the triangular rictal spot much darker but still visible ; legs and feet reddish brown.

Nestling. Covered with blackish brown down, very thick and even. No papillæ on the forehead ; lores and bare space surrounding the eyes and encircling the bill black. Upper mandible dark brown ; lower mandible pure white, changing to brown at the tip ; irides and feet blackish brown, with whitish claws. Down the middle line of the abdomen there is a narrow bare space, flesh-white, paddle-shaped, and about two inches long.

Obs. A specimen in the Otago Museum, from Shag river, has a very broad white patch on the wings, measuring 6 inches long by 2 in width. The colours of the soft parts as restored are :—Line of papillæ fringing the forehead red ; bare facial membrane blue ; gular sac red. This bird has a broad white patch

across the back 3 inches in extent by nearly 2 in width. The crown, sides of the head, and hind neck are beautifully glossed with purplish green, and less so on the back, rump, and upper tail-coverts.

There is a specimen in the British Museum (brought by the Antarctic Expedition from New Zealand) marked "young"; and the presence of numerous scattered brown feathers on the abdomen and sides of the body attest the fact. In this bird the white of the fore neck, instead of running up in a narrow strip to the chin, spreads outwards immediately under the checks, and covers the sides of the neck. There is no white alar bar, nor is there any appearance of the white dorsal patch.

Note. A Shag in the Otago Museum from Macquarie Island (marked ♂), collected by Dr. Scott in December 1880, differs from ordinary examples of *P. carunculatus* in these respects:—It is a smaller bird; the gloss on the head, hind neck, back, and rump is metallic blue instead of green; on the wings it changes to dull green; there is an entire absence of the white dorsal patch; the alar bar or strip is much less conspicuous, being scarcely more than half an inch wide in any part, and only about 3.5 in longitudinal extent; instead of the narrow frontal line of papillæ there are two warty patches, more deserving the designation of caruncles (each measuring an inch in extent with a maximum breadth of .4 of an inch), which meet at the base of the bill and cover the anterior part of the forehead. This bird has likewise a small or scant vertical crest, composed of narrow linear feathers of the same colour as the surrounding plumage, and an inch and a half long. The caruncles appear to have been originally orange, and the bare membrane on the face bluish. It appears to come very near to *P. verrucosus*, but is separated by the white transalar bar.

To the same species doubtless belongs a Shag recently received at the Otago Museum, of which Prof. Parker has kindly sent me the following note:—"A *Phalacrocorax*, shot at Otago heads, which does not correspond with any of the species in your 'Manual.' The following are its chief characters:—Above blue-black; below, oblong patch (4 inches by 2 inches) on upper side of wing, and squarish patch (2½ inches by 2 inches) in middle of back between bases of wings, white; no white feathers over eye; large orange wattle on each side of base of lower mandible, the two separated by a narrow white streak; small orange patch on each side at base of upper mandible; blue ring round eyes; legs orange."

IN his 'Report on the Birds of the Challenger Expedition' (Zool. ii. p. 121), Dr. Selater says:—"Professor Hutton has lately written an article on *Phalacrocorax carunculatus* of New Zealand (commonly so called), in which, after a review of the literature of this subject, he points out the differences between the birds of New Zealand and the Falklands, and proposes to call the former *cirrhatus* (Gm.), and the latter *carunculatus* (Gm.). To follow this course would, in my opinion, only add further to the confusion, the names *cirrhatus* and *carunculatus* having been long considered synonymous. Professor Hutton is likewise unaware that the next following species of Kerguelen Island (*P. verrucosus*) is distinct*, and unites it to his *Phalacrocorax carunculatus*."

But the question still remains, What is the true *Phalacrocorax carunculatus*?

Latham's original description (*l. c.*) is as follows:—"Sides of the head bare of feathers; between the bill and eye much carunculated and red; the rest of the space round the eye ash-colour; the

* *PHALACROCORAX VERRUCOSUS*, Cab. Journ. f. Orn. 1875, p. 450.—Referring to a specimen brought by Dr. Kidder from Kerguelen Island, Coles says (Bull. U. S. Nat. Mus. 1875, no. ii. p. 7):—"I have no hesitation in identifying this species as above (*i. e.* *P. carunculatus*), although the single adult specimen collected does not show the white transalar fascia spoken of by authors. Schlegel, however, quotes it from the present locality. The caruncles, which are conspicuous features of the adult breeding-bird, constitute two prominent yellow masses symmetrically disposed on the naked forehead at each side of the base of the upper mandible. The head and neck are lustrous, deep steel-blue, with purplish and violet reflections, contrasting notably with the rich dark-green back, the colour of which is uniform, the feathers having no differently coloured edges. The entire underparts, from the bill, on a line along each side of the neck, are pure white." He adds:—"During the breeding-season the bird carries an erectile crest of about a dozen small plumes upon the top of the head."

Dr. Selater writes (*l. c.* p. 122):—"The series of this Shag is quite sufficient to warrant us in adhering to the species as distinct. The principal characters are clearly pointed out by Dr. Cabanis in his original description; and a good figure is given of the adult male under the reference given above. Not one of the six specimens, of which two, and apparently a third, are adult, shows any traces of the white line along the upper wing-coverts, or of the white spot in the middle of the back which distinguish *Phalacrocorax imperialis*."

orbits of a fine mazarine blue, and elevated; and over the eye is a tubercle larger than the rest." He does not say it is crested, but that "the crown is rather full of feathers." The colour he describes as follows:—"The top of the head, and sides of it, the hind part of the neck and all the upper parts of the body, the wings and tail, are black, except a longish patch of white on the wing-coverts; the forehead, chin, and all beneath, white; the legs are flesh-colour, or very pale brown."

He distinguishes this bird as the Carunculated Shag, and says that it inhabits New Zealand (as well as South America), being "found in Queen Charlotte Sound but not in plenty."

The reference in this description to white on the forehead is a little puzzling, but may perhaps be accounted for by the fact that in the breeding-plumage these birds sometimes exhibit some white linear feathers above the lores; and Prof. Parker's bird, described on page 156, has earunculated patches "separated by a narrow white streak," which may be a seasonal character.

There can, however, be no reasonable doubt that the bird here described is the same as that now inhabiting Queen Charlotte Sound, and although the specific name may not seem the most appropriate there can be no possible excuse for disturbing it. Although, as a rule, the so-called earuncles are mere papillæ, it will be seen from the descriptions given on the preceding page that examples sometimes occur (if they are indeed referable to this species) in which the earuncles and wattles are quite a conspicuous feature. Even Latham, in describing the species, mentions that "over the eye is a tubercle larger than the rest."

There is no mention in the original description of the conspicuous white patch on the back; but I attach no importance to that, because (as Dr. Scater has already suggested) this may be a character peculiar to the breeding-season. "On two skins from Chiloe in the collection of Salvin and Godman, one has the white dorsal patch broader and more distinct than in the 'Challenger' specimen, in the other it is altogether absent."

But Latham described at the same time another species, under the name of the Tufted Shag (afterwards *Pelecanus cirrhatus* of Gmelin), a specimen of which, then in the Hunterian Museum, is said also to have come from Queen Charlotte Sound.

I think, however, with Dr. Finsch, that there is a mistake in the locality, and that the true habitat of Gmelin's *Phalacrocorax cirrhatus* was Magellan Straits.

Dr. Scater deprecates separating this name from *carunculatus* because they have so long been regarded as synonymous; but it must be clear from what I have said that Latham's two descriptions of a crested and uncrested bird could not have related to one and the same species. His description of the Tufted Shag is as follows:—"Length 2 feet 10 inches. Bill $2\frac{1}{2}$ inches long. Colour dusky yellow; round the eye bare; the head and sides above the eye, the hind part of the neck, and all the upper parts of the body, wings and tail black; the feathers on the top of the head very long, forming a pointed upright tuft or crest, somewhat tending forwards; on the wing-coverts is an oblong patch of white; and the underparts, from chin to vent, are also white; the tail is $4\frac{1}{2}$ inches in length, rounded in shape and composed of fourteen feathers; the legs pale yellow-brown."

Dr. Finsch says that "*Phalacrocorax carunculatus* may be easily distinguished from *P. cirrhatus*, Gmelin, from Magellan Straits, in having the sides of the head and neck dark, and by having a feathered stripe along the naked gular and chin-regions, which parts are totally naked in *cirrhatus*."

Professor Hutton has given (Trans. N.-Z. Inst. vol. xi. pp. 332-337) an excellent history of the nomenclature of *Phalacrocorax cirrhatus* and *P. carunculatus*. He sums up the results of his investigation as follows:—"Dr. Kidder gives the length of a Kerguelen's Land bird at $23\frac{1}{2}$ inches; the specimen in the Otago Museum is rather larger. Dr. Buller gives the length of birds from New Zealand as 32 inches, and of birds from the Chatham Islands at 27 inches. The Chatham-Island birds are evidently smaller than those from New Zealand, but neither Latham, Gmelin, Brandt, nor Bonaparte had seen birds from the Chatham Islands. Brandt or Bonaparte appear to be the first to

state that both species came from South America, and when Dr. Finsch had to transfer one back again to New Zealand, he took *carunculatus*. The evidence is, however, I think, in favour of the New-Zealand bird being *cirrhatus*; but as the Magellan Straits bird truly merits the name of *carunculatus*, while the New-Zealand bird does not, I think it would be better to change Dr. Finsch's nomenclature."

On one point, however, there is still some difficulty; for Professor Hutton says (*l. c.* p. 335):—"Gmelin was the first to name the birds, and he gave the name *carunculatus* to the smaller carunculated bird without a crest, and *cirrhatus* to the larger and crested bird. Gmelin says that both birds came from New Zealand only; but he took his birds from Latham, and Latham says that *cirrhatus* occurs in New Zealand only, while *carunculatus* is rare in New Zealand, and common in South America. The smaller size, the caruncles, and the locality, would all point to *carunculatus* as the South-American bird; but, on the other hand, the New-Zealand bird appears never to get a crest The statement that the Chatham-Island birds are crested, while the New-Zealand birds are not, must be taken with caution. I have certainly never seen a crested bird from New Zealand myself, but they are very rare, and I have not seen many; and *P. cirrhatus* appears to have been founded on a crested bird from New Zealand; consequently the question as to the crest must be considered as unsettled. However, it appears that the Chatham-Island birds are decidedly smaller than those from New Zealand."

In a paper which I communicated to the Wellington Philosophical Society in November 1876* I gave a table of measurements showing a considerable difference in size between the Chatham-Island bird figured in my former edition under the name of *Phalacrocorax carunculatus*, and a series of specimens (male, female, and young) which I had received from Queen Charlotte Sound, all of which were without a crest, and I added the following remarks:—

"Mr. Henry Travers (who collected the birds now exhibited) assures me that these characters are constant. He met with *P. carunculatus* † in large numbers at the Chatham Islands, and there was always a crest, or some indications of it, in both sexes. The other bird he found nesting on the White Rocks in Queen Charlotte Sound; and although it was the height of the breeding-season, in a colony of some forty or fifty nests, with birds of both sexes and of all ages frequenting them, he did not observe a single example with a crest, or anything approaching it.

"On comparing the heads it would be seen that the bill is much larger and stronger in one than in the other; and although the colours of the soft parts are no safe criterion in dried specimens, it would appear that the naked spaces which in *P. carunculatus* are orange-red, are of a bluish colour in the other bird, with the exception of the patch of papillæ extending from the base of the upper mandible towards the crown.

"The general style of colouring is the same in the two birds, although the tints altogether are duller in the uncrested form. There is the same conspicuous alar bar of white, formed by the middle wing-coverts; but in addition to this the uncrested bird has a patch of the same on the outer scapulars. All the specimens of the latter which I have examined have two closely approximating spots of white, nearly of the size of a crown-piece, about the centre of the back."

In a letter which I received from Mr. Travers after coming to England (dated 3rd May), he says:—"I have just procured from Queen Charlotte Sound a number of these Shags in fine condition, and a few in immature plumage (in all, about twenty specimens). None of the old birds show any sign of a crest."

It is evident from the date of the letter that these last-mentioned specimens were collected in winter; so that the evidence as to the absence of a crest is not so conclusive as in the former case, for it might be fairly argued that it would be assumed only in the nuptial season.

* *Trans. N.-Z. Inst.* vol. ix, p. 339.

† *Phalacrocorax imperialis* of the present edition.

On the other hand, Mr. Liardet, of Wellington, who has shot these birds at Queen Charlotte Sound at all seasons of the year for the purpose of converting their beautiful skins into ladies' muffs, assures me that he has never seen a crested one. The three specimens which I purchased from him (all of them apparently in bright summer plumage) were certainly without the slightest indication of a crest or occipital tuft of any kind.

Of the Kerguelen-Island bird Dr. Kidder gives the following account (Bulletin of the U.S. National Museum, 1875):—"Only a single adult skin of this Cormorant was preserved and brought home, a female in nuptial plumage. There is no better reason, I am afraid, for this omission than the fact that the birds were exceedingly plentiful, and the preparation of the skins a very tedious job, so that it was put off from day to day for rarer specimens, until, in the haste of an unexpectedly hurried departure, it was omitted altogether. From memory I can only say that the young birds were of much more sober plumage than the females, destitute of the crest and brilliant blue eyelid, and generally rather smaller. All had white breasts and bellies; but there were many minor variations in plumage, which I suppose went to indicate differences in age. . . . They do not differ materially in habits from other species of Cormorant, diving and swimming well, feeding entirely on fish, and often congregating for hours upon a projecting rock or headland, where, in pairing-time, they enact various absurd performances, billing and curvetting about one another in a very ridiculous manner. The note is a harsh croak, which never varies, so far as I have observed. They seem to be on particularly good terms with the *Chionis*, and are often joined by Gulls when sunning themselves. They build upon shelves, for the most part in the precipitous faces of cliffs overlooking the water, the base of the nest being raised sometimes as much as 2 feet, and composed of mingled mud and excrement. Upon this pedestal is constructed a rather artistic nest of long blades of grass. Apparently they continue to use the old nests year after year, adding a new layer each season, and thus building the nest up. The first eggs were found November 5th, there being sometimes two and sometimes three in a nest. They were procured at first by the kind assistance of Mr. Stanley, and a length of rope which tied us together, one end being knotted round the waist of each. One would then remain above and hold on, while the other clambered a little way down the face of the cliff and secured the eggs. After a time, however, I discovered a lot of nests, near a 'rookery' of Rock-hopper Penguins, accessible from below, where (on December 4th) the young birds were first observed. Eggs green, with white chalky incrustation. The young are most ridiculous-looking objects, being pot-bellied, naked, and perfectly black, and seem to be less advanced in development at the time of hatching than most birds, the bones of the tarsus and foot being not yet ossified. Small fish were generally lying by the nests. The old birds were very solicitous about their young, hissing and stretching out their necks, and refusing to leave their nests until pushed off. Yet, when I took one of the young away from the nest, and placed it close by on the rock, the mother seemed neither to recognize its constant chirping nor to be aware that one of her brood was missing. Certainly she paid no attention to it."

I am indebted to Mr. Percy Scymour for the following notes on the breeding-habits of this and a closely-allied species:—

"*Phalacrocorax cirrhatus** and *P. chalconotus*.—A large colony of these two species in company have built on a terrace at the foot of a small cliff on Otago Peninsula. The nests and eggs of the two species can only be distinguished by observing the birds sitting on the nests. The latter are constructed of tussock-grass, but the outside of the nest soon becomes plastered over with the excrement of the old and young birds. This hardens into a substance resembling stucco, which protects the nests against the destructive influence of the weather, and gives them the appearance of having been constructed of clay. By the accumulated layers of successive seasons, the nests are raised in some cases

* *Phalacrocorax carunculatus* of the present edition.

to as much as 18 inches above the surface of the rock. The diameter varies from 18 to 24 inches. The birds did not all commence laying at the same time, as nests in process of construction were found at the same time with others containing young birds. The number of eggs or of young birds is usually three. The eggs vary in size, but are all of the usual Cormorant type, being bluish white, covered with a chalky incrustation.

“I noticed three variations in the colour of the birds which I have spoken of as *P. cirrhatus*:—

“(a) Black, with following parts white: throat, breast, abdomen, conspicuous alar bar, and large double spot on the back. Nearly all the birds were of this type.

“(b) Like *a* in every respect, except that the alar bar was not nearly so conspicuous, and that there was no visible spot on the back. There were only two or three of these.

“(c) Black, with only the abdomen and beneath the wings white. I saw only one, I think, of this description. When sitting, it exactly resembled *P. chalconotus* (from a little distance), as the white parts were then covered. It sat on a nest and extended its neck, with mouth open, when approached by other birds, but I did not see it receive any food. I suppose it to be a young bird. It could fly as well as the adult birds.

“All three of the birds described were without visible crest. Their feet appeared, from a distance of a few yards, to be reddish or brownish.

“I did not succeed in conveying home any young birds except about half a dozen very small ones. Some of these had a little down on them and the rest were perfectly bare, their skin resembling in appearance black kid gloves. They were just hatched. I have put them into spirits instead of skinning them. Some of them I carefully identified as belonging to *P. cirrhatus**, but I could not see the slightest difference between the young of the two species at that stage. In the case of the older birds, there is white down on the underparts of *one* and not of the others, so I suppose that one is certainly *P. cirrhatus*. There were plenty of larger young birds, but they flopped about in the dirt and made themselves in a frightful mess. As the road was very rough and we had a heavy load to carry I did not take them. A resident near the spot has promised to send me some if there is another batch of eggs and young ones this season.”

In November 1885 Captain Fairchild visited a nesting-place of this species on the White Rocks near the entrance to Queen Charlotte Sound. The birds were breeding in a colony by themselves, all the surrounding rocks being occupied by the Black Shag (*P. novæ hollandiæ*). They were nesting on the bare rocks, whereas the latter species had formed large nests of leaves and seaweed, but had not yet commenced to lay. Many of the young birds on the White Rocks were of full size, but still covered with down. Captain Fairchild brought a number of them, of different ages, to Wellington, and I was thus afforded an opportunity of describing the nestling. The more advanced birds were continually fighting or squabbling, with loud cries of *craao-craao-craao*. The cry of the younger ones was *kek-kek-kek*.

Dr. Scater writes (Voy. Chall., Zool. vol. ii. Birds, p. 121:—“All Dr. Cunningham’s examples (Mus. Cantab.), which we called *Phalacrocorax carunculatus* in our reports on his collection (Ibis, 1870, p. 500, *et aliter*), appear to be referable to *Phalacrocorax albiventris*, of which the range is thus extended to the Magellan Straits.”

* *Phalacrocorax carunculatus* of this edition.

PHALACROCORAX COLENSOI.

(AUCKLAND-ISLAND SHAG.)

Ad. similis P. carunculato, sed conspicuè minor : haud carunculatus : dorso postico minimè plagâ albâ notato.

Adult. Crown of the head, shoulders, feathers composing the mantle, wing-coverts, and scapulars bronzy brown, with a green gloss in certain lights; hind part and sides of neck, lower portion of back, rump, and thighs blue-black with a fine metallic gloss; the median wing-coverts white, forming a broad alar bar extending nearly the whole length of the eubitus; a line from the chin, widening into a broad stripe down the fore neck, and the whole of the underparts pure white; quills and tail-feathers and the under surface of wings blackish brown; bill yellowish brown; legs and feet orange-yellow. Extreme length 28 inches; wing, from flexure, 10·5; tail 6; bill, along the ridge 2·5, along the edge of lower mandible 3; tarsus 2; longest toe and claw 4·25.

Young. Differs from the adult in having the whole of the upper parts blackish brown, glossed with green only on the mantle, lower part of back, and rump, the blue metallic gloss being entirely wanting; the crown of the head, back and sides of the neck, interscapular region, and upper surface of wings paler brown; the median wing-coverts and the scapulars fading to brownish white at the tips, but without any appearance of an alar bar; remiges and tail-feathers dark brown, the latter largely margined on both webs with brownish white; the streak of white down the fore neck interrupted in its middle portion by the dark colour which spreads across in a cloudy pale brown wash. Bill dark yellow, brownish on the ridge; legs and feet dull orange.

Obs. It is clear that the states of plumage are as described, because my adult bird betrays vestiges of the adolescent garb in the wings and tail, the moult not having been quite completed.

THIS Shag is readily distinguishable from *P. carunculatus* by its much smaller size, by its smooth face, and by the absence of the white dorsal marks. It has less of the green metallic gloss on the head and neck, the green on the mantle is duller, and the back, rump, and thighs are decidedly bluer than in the last-named species. In *P. carunculatus* the pointed stripe of white feathers between the crura of the lower mandible widens rapidly on the throat and fore neck, occupying a larger surface than the dark plumage before reaching the breast; in the present species it presents only a broad stripe down the centre of the fore neck, which spreads out abruptly just above the breast. The white alar bar, although narrow, is far more conspicuous than in *P. carunculatus*, being fully six inches in length.

The only two specimens in my possession—the adult and young described above—were received by me from the Auckland Islands in 1885, having been collected by Mr. Burton, of the Colonial Museum, who found hundreds of these Shags frequenting the rocks, and collected twenty or more specimens, many of which I examined. One of these (marked ♀), apparently a younger bird, had the colours much duller than in my example.

In the British Museum there are two examples (in moulting condition) obtained by Baron A. von Hügel at the Bluff, in the provincial district of Southland.

Having to select a distinguishing name for this species, I have much pleasure in dedicating it to my friend the Rev. William Colenso, F.R.S., who, as I have already shown on page 152, recorded his observations on the Shags inhabiting New Zealand nearly fifty years ago, and who has been ever since an active contributor to the scientific literature of his adopted country.

PHALACROCORAX CHALCONOTUS.

(GRAY'S SHAG.)

Graucalus auritus, Gray, in Dieff. Trav. ii., App. p. 201 (1843).*Graculus chalconotus*, Gray, Voy. Ereb. and Terr., Birds, p. 20, pl. xxi. (1845).*Graculus glaucus*, Bonap. Consp. Gen. Av. ii. p. 171 (1857).

Ad. pileo cristato colloque toto, dorso postico et uropygio purpurascanti-nigris, vix viridi lavatis : interscapulio, scapularibus et tectricibus alarum brunneis, plumis sordidè viridi marginatis, tectricibus minimis purpurascante lavatis : remigibus brunneis, secundariis olivaceo-viridi lavatis : caudâ nigrâ, scapis ad basin albis : subtùs sordidè nitidè viridis, jugulo vix purpurascante : rostro cinerascanti-brunneo, culmine saturatiore : pedibus sordidè flavis : iride thalassino-viridi.

Adult. Head, including the crest, and the whole of the neck, back, rump, and upper tail-coverts shining purplish black, glossed with green in certain lights ; mantle and upper surface of wings purplish brown, each feather margined with dull shining green ; the whole of the under surface shining purplish black, but not so highly glossed as the upper parts ; quills dark brown, the secondaries tinged with olive ; tail-feathers black, the shafts white towards the base. Irides green ; bill greyish brown, darker on the ridge ; legs and feet dull yellow. Total length 28 inches ; wing, from flexure, 12 ; tail 5.5 ; bill, along the ridge 2.6, length from gape to extremity of lower mandible 3.5 ; tarsus 2.25 ; longest toe and claw 3.25.

Nestling. Covered with extremely thick, long, woolly down of a dull sooty-brown colour ; bill dark brown, yellowish on the under mandible ; lores, cheeks, and sides of the chin perfectly bare and dark coloured (black in the dried specimen) ; on the membrane at the base of the lower mandible, on each side, a triangular spot of orange extending from the angle of the mouth to the strip of down which passes up between the crura of the lower jaw ; over the oil-gland a tuft of rather stiff, filamentous feathers of the same colour as the down.

THIS species is comparatively rare in New Zealand, and it has not yet been met with elsewhere.

My description of the adult is taken from Mr. Gray's type specimen in the British Museum, which was obtained by Mr. Percy Earl at Otago, in the South Island ; and more recently Dr. Finsch has identified an example of this species, forwarded to him by Prof. Hutton from the same locality.

There are several examples in the Otago Museum, and my own collection contains both adult and young.

I believe I am right in referring to this species a pair of Shags which I observed at the mouth of Port Chalmers in February 1865. I saw one of them dive, and, after a considerable interval, come to the surface with a small sea-lobster, which the bird battered to death on the surface of the water before devouring it.

On the ocean-beach near Waikanae, in the North Island, I saw in the autumn of 1882 a pair of Shags which I have no hesitation in referring to this species, as they allowed me to approach near enough to observe their burnished plumage.

Mr. Percy Seymour writes to me that he found *Phalacrocorax chalconotus* and *P. carunculatus* breeding together in the same shaggery on the Otago coast. He visited the place in August and found the young hatched out.

PHALACROCORAX GLAUCUS.

(BROWN SHAG.)

Phalacrocorax glaucus, Homb. & Jacq. Voy. Pôle Sud, Zool. iii. p. 127 (1853) *.

Ad. omninò brunneus, suprà saturatior : remigibus et rectricibus nigris : rostro grisescenti-brunneo : pedibus flavis.

Adult male. General plumage deep vinous brown, darker on the upper surface ; the shoulders and the mantle glossed with green, and each feather having a scarcely perceptible darker margin ; the lower part of back, rump, and thighs glossy dark olive ; quills and tail-feathers blackish brown, the shafts of the latter white in their basal portion. Lores feathered. Bare space encircling the eyes orange ; bill greyish brown ; legs and feet dull orange-yellow. Total length 31 inches ; wing, from flexure, 12.25 ; tail 7 ; bill, along the ridge 2.25, along the edge of lower mandible 3 ; tarsus 2 ; longest toe and claw 4.

Young. Has no gloss on the upper surface ; the feathers composing the mantle are pale yellowish brown ; the back, rump, and thighs dull blackish brown ; and the plumage of the under surface much suffused with chocolate-brown.

Obs. The immature condition of the bird described above is shown by the acuminate tips of the scapulars ; while some of the pale brown feathers have been replaced by the glossy dark brown of the adult, indicating a transitional state of plumage. A specimen in the Otago Museum (which is marked ♀) is darker in plumage than the larger of my two examples and it has brown legs ; there are also the faintest indications of white filaments on the fore neck. This was obtained near Dumedin, in February 1877.

OF this rare species I have two fine specimens (adult and young) in my collection, both of which were obtained on the Otago coast by the well-known local taxidermist Mr. W. Smythe, and very carefully prepared by him.

Dr. Finsch states (Trans. N.-Z. Inst. vol. vii. p. 203) that a specimen in the Leyden Museum labelled *Graculus glaucus*, and (probably erroneously) 'Terre Magellanique,' is referable to *Phalacrocorax chalconotus*, Gray. He consequently disallows this species, regarding it as the immature state of the last-named form. Even the original describer had doubts on this point :—"Je regarde cette espèce comme décrite d'après un jeune, et un jeune de l'espèce dont M. G. R. Gray a donné, plus tard, la diagnose, sous le nom de *Graucalus chalconotus*. Si cette assimilation est exacte, cette dernière dénomination devra constituer un synonyme." That cannot be the case, however, for one of my birds is perfectly adult ; and whether this was the Shag described under the name of *glaucus* or not, it is to all appearance a good species. I admit that it is not unlike the young of *Phalacrocorax chalconotus*, but it differs in the following respects : it is somewhat smaller in size, there is far less gloss on the plumage, which is altogether browner in colour, the lores are naked instead of being thinly feathered, and the superciliary line of minute caruncles is entirely absent. A specimen which I examined in the Natural-History Museum at the Jardin des Plantes is in exactly similar plumage to that described above, but with blackish-brown feet.

As already mentioned, there is an example in the Otago Museum exhibiting signs of white filaments on the fore neck, thus affording a presumption that the bird was in nuptial plumage.

* "Atlas, Pl. 31. fig. 1 (juin 1845). L'individu figuré est originaire de la Nouvelle Zélande (Otago). Il est d'un bronzé un peu cuivré sur le milieu de la région dorsale supérieure, d'un vert bouteille plus saisissable sur la partie inférieure de cette même région."

PHALACROCORAX PUNCTATUS.

(SPOTTED SHAG.)

- Spotted Shag*, Lath. Gen. Syn. iii. pt. 2, p. 602 (1785).
Pelecanus punctatus, Sparrm. Mus. Carls. t. 10 (1786).
Pelecanus nævius, Gm. Syst. Nat. i. p. 575 (1788).
Phalacrocorax nævius, Cuv. Règn. An. i. p. 525 (1817).
Hydrocorax dilophus, Vieill. N. Dict. d'Hist. Nat. viii. p. 85 (1817).
Phalacrocorax punctatus, Steph. Gen. Zool. xiii. p. 88 (1825).
Graculus punctatus, Gray, in Dieff. Trav. ii., App. p. 201 (1843).
Graculus punctatus, Gray, Voy. Ereb. and Terr., Birds, p. 20 (1844).
Sticticarbo punctatus, Bonap. C. R. xliii. p. 574 (1856).
Graculus punctatus, Gray, Ibis, 1862, p. 252.

Ad. fronte et nuchâ valdè eristatis : pileo et collo toto postico sordidè cinerascensibus, viridi-nigricante lavatis, hâc lateraliter plumulis albis ornato : fasciâ latâ albâ ab oculo per collum laterale decurrente et ad pectus laterale productâ : facie laterali reliquâ et jugulo toto viridi-nigricantibus vix cinerascensibus, hâc plumulis parvis albis ornato : interseapulio, seapularibus et tectricibus alarum pulchrè cinerascensibus, plmms omnibus apicaliter nigro minutè punctatis, tectricibus minimis nigro marginatis : remigibus saturatè brunneis, primariis extûs ad basin cinerascensibus lavatis, secundariis omninò pulchrè cinerascensibus : dorso postico, uropygio et supraeandalibus viridi-nigricantibus : dorso imo lateraliter plumulis albis ornato : caudâ nigrâ, suprâ obscurè cinerascensibus lavatâ : subtùs pulchrè grisescensibus-cinereis : abdomine imo et subcaudalibus viridi-nigricantibus : subalaribus brunneis, nigricante lavatis : rostro brunnescenti-flavo : pedibus aurantiacis : iride viridi.

Juv. pallidior, dorsi plumis minùs distinctè apicatis : dorso postico et uropygio cinerascensibus : pileo et collo postico toto cinerascensibus : facie et collo lateralibus et corpore subtùs toto albidis, pectoris lateribus et hypochondriis imis cinerascensibus.

Adult. Crown of the head, with vertical and occipital crests, glossy greyish black ; sides of the head, throat, and anterior portion of fore neck sooty black ; a white stripe, commencing at the nostrils, passes over the eyes and increases beyond, being about an inch wide under the occipital crest, then gradually diminishes and passes down the sides of the neck to the roots of the wings ; lower part of the neck in front, the breast, sides of the body, and upper part of abdomen uniform delicate leaden grey ; lower part of hind neck, shoulders, mantle, and upper surface of wings brownish ash, all the feathers, excepting the quills and long scapulars, with a terminal spot of velvety black : these spots are most conspicuous on the interseapulars, and impart to the plumage a very lively effect ; the small coverts along the edges of the wings and at the humera flexure are merely shaded with purplish brown at the tips ; primary quills dark brown, burnished with silvery grey on their outer webs ; inner surface of wings dark ashy brown ; tail-feathers black, the shafts bluish white towards the base. The vertical and occipital crests consist of soft, narrow, silky feathers, the longest occipital measuring two inches, and the longest vertical about half that length. The sides of the head and the neck in front and behind are further ornamented with projecting plume-like white feathers of a silky texture, and varying in length to about an inch ; the thighs also are ornamented in a similar manner, but to a less extent, the effect being produced by minute white feathers at the extremities of fine hair-like stalks, the web alone appearing above the surface of the surrounding plumage. Irides green ; bare skin in front of the eyes dark blue ; bill brownish yellow, horn-coloured at the tips ; legs and feet bright orange-yellow. Total length 27.5 inches ; wing, from flexure, 10 ; tail 3.75 ; bill, along the ridge 2.4, along the edge of lower mandible 3 ; tarsus 2.25 ; longest toe and claw 3.75.



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SPOTTED SHAG
PHALACROCORAX PUNCTATUS

CHATHAM-ISLAND SHAG.
PHALACROCORAX FEATHERSTONI.

(TWO-FIFTHS NATURAL SIZE)

Obs. The size of this species is very variable; and a female specimen in the Auckland Museum gives the following measurements:—Total length 34 inches; wing, from flexure, 12; tail 5; bill, along the ridge 3.2, along the edge of lower mandible 4.5; tarsus 2.25; longest toe and claw 3.5.

Young. Crown of the head, back of the neck, mantle, and upper surface of wings dull brownish ash, silvery on the head and neck, tinged with light brown on the mantle and wing-coverts; back, rump, and thighs dull ashy brown glossed with green; the spotted character is absent, but the feathers composing the mantle and the smaller scapulars are obscurely marked at the tips with ashy brown; throat, fore neck, and all the underparts, including the abdomen and under tail-coverts, ashy white tinged with buff; under surface of wings dull brownish ash; tail-feathers greyish brown, with whitish shafts. It has no crest, nor has it any of the ornamental white plumelets. Bill dark yellow, brownish on the culmen; loral membrane orange; legs and feet orange-brown.

Nestling. In the very young nestling the skin is entirely bare, nothing being visible but the roots of the downy plumelets. When more advanced the body is covered with thick down, dark ash-grey on the upper surface and white on the underparts; the forehead, fore part of crown, and a portion of the face and throat perfectly bare. In the next stage the quills and tail-feathers are the first to appear.

Progress towards maturity. In my collection there are two specimens in transition plumage. They have neither occipital nor vertical crests; the crown of the head and back of the neck are sooty grey glossed with green; an indistinct streak of white passes from the eyes down the sides of the neck to the roots of the wings; the upper part of the fore neck is dark leaden grey mottled with black, indicating a change of plumage; upper surface as in the adult, but more tinged with brown, and having the spots less distinct; back, rump, and lower part of abdomen greenish black; a few scattered filamentous white plumes on the thighs; fore neck and all the under surface dark leaden grey. In one of these specimens the throat and fore neck are more largely mottled with black, the grey of the underparts is much lighter, and the thighs are deeply stained with brown; on the wings, where the plumage shows a transitional condition, the black-tipped coverts are taking the place of the light-brown feathers with white edges, these latter being characteristic of the young.

Obs. The plumage of the adult is exactly the same in both sexes. The vertical and occipital crests are present all through the year, but as the breeding-season approaches they become larger and more conspicuous, while the hind neck and the flanks are profusely ornamented with loose white plumes three quarters of an inch in length.

This beautiful representative of the Crested Shags is abundant on the coast of the South Island, but is seldom met with on the northern side of Cook's Strait. I observed a party of three at the mouth of the Waikanae river in January 1864; two young birds were killed in Wellington harbour in the winter of 1865; and other instances have already been mentioned on page 154.

It associates in large flocks, and frequents the open sea in the vicinity of the coast, as well as the mouths of estuaries and sounds, subsisting on fish and crustaceans, which it obtains by diving. It is apparently a very inquisitive bird; for I have often observed a flock of them make up to a steamer going at full speed, and fly round her, sometimes returning a second time to reconnoitre.

Unlike that of the other Shags, its flight consists of quickly repeated flappings of the wings, without any sailing movement; and when out of the water the black plumage of the underparts is very conspicuous. It never rises to any great height above the water, which is probably due to the comparative shortness of its wings.

It breeds on the high shelving rocks on the coast or within the sheltered arms of the sea, the nests being arranged in successive tiers of considerable extent, and as closely grouped together as the form of the rocks in the locality chosen as a breeding-station will admit of.

The eggs (generally two in number) are elliptical in form, measuring 2.25 inches in length by 1.4 in breadth. When taken from the nest they are covered with a yellowish-white chalky matter, but on being cleaned they present a uniform surface of soft bluish green.

PHALACROCORAX FEATHERSTONI.

(CHATHAM-ISLAND SHAG.)

Graculus africanus, Hutton, Ibis, 1872, p. 249 (nec Gm.).*Phalacrocorax featherstoni*, Buller, Ibis, 1873, p. 90.

Ad. pileo et collo undique indigotico-nigris, fronte et occipite conspicuè cristatis, collo postico filamentis albis paullò dilatatis ornato : dorso summo cum scapularibus et tectricibus alarum olivascenti-brunneis, plumis nigro conspicuè apicaliter maculatis, tectricibus minimis sordidè indigotico-nigris : dorso postico, uropygio et supracaudalibus indigotico-nigris : remigibus nigricanti-brunneis, secundariis extùs canescentibus : caudâ nigrâ : subtùs pulchrè canescens, abdomine imo cum subcaudalibus subalaribusque indigotico-nigris : rostro saturatè brunneo : pedibus aurantiacis : iride canâ viridi reticulatâ.

Adult. Head, upper portion of neck, and the whole of the nape, with the vertical and occipital crests, shining indigo-black ; sides and hind part of neck ornamented with scattered filamentous white feathers, having the tips produced and somewhat spatulate ; the shoulders, mantle, and upper surface of wings olivaceous brown glossed with green, each feather marked with a conspicuous terminal spot of black ; back, rump, and upper tail-coverts, as well as the small wing-coverts, dull indigo-black ; quills blackish brown, the secondaries greyish on their outer webs ; tail black ; lower part of fore neck, breast, and middle portion of abdomen beautiful grey ; sides of the body, flanks, under surface of wings, lower abdomen, and under tail-coverts indigo-black. Irides grey, streaked with green ; bill dark brown ; legs and feet orange-yellow. Length 22 inches ; wing, from flexure, 9 ; tail 4 ; bill, along the ridge 2·2, along the edge of lower mandible 2·6 ; tarsus 1·6 ; longest toe and claw 3·25.

THIS beautiful addition to the ornithology of our country was one of the novelties brought from the Chatham Islands by Mr. Henry Travers on his return from the exploratory visit mentioned on a former page. Professor Hutton had referred it (*l. c.*) to *Graculus africanus* (Gmelin), but the original specimen having been courteously forwarded to me by Sir James Hector, through the Colonial Office, I saw at a glance that we had a new species to record, and was therefore glad of the opportunity thus afforded me of describing and figuring it in my former edition.

I had already associated the name of Mr. Henry Travers with one of the new species discovered by him ; and, in assigning a distinctive title to this bird, I desired to pay a slight tribute to one who, having originally assisted in founding a colony at the Antipodes, had devoted more than thirty years of his life to its political affairs, and at that time filled the important office of its Agent General in Great Britain—the late Dr. Featherston.

Several further examples have been received at the Colonial Museum, and Mr. Walter Hood informs me that it is a comparatively common bird on the rocks lying off the Chatham Islands, and that he found it breeding there in the months of October and November. On Pitt Island these birds were so tame that he knocked over two of them with a small stone.

As will be at once apparent from the figures, this species bears a general resemblance to *P. punctatus* : like that bird it has a vertical as well as an occipital crest, and the distribution of the colours is somewhat similar, although the plumage altogether is much darker. It is readily distinguished, however, by its black head and neck, and by the absence of the white stripes which are so conspicuous in the other species.

PHALACROCORAX NYCTHEMERUS.

(CAMPBELL-ISLAND SHAG.)

Phalacrocorax nycthemerus, Cab. teste Gray, Hand-l. iii. p. 128 (1871).*Phalacrocorax magellanicus*, Hutton, Trans. N.-Z. Inst. vol. xi. p. 338 (nec Gmel., 1879).*Phalacrocorax nycthemerus*, Hutton, Proc. Linn. Soc. N. S. Wales, vol. iv. p. 357 (1880).*Phalacrocorax nycthemerus*, Buller, Manual Birds of New Zealand, p. 96 (1882).*Ad. similis P. imperiali*, sed major et splendidior : gutture purè albo : nuchâ et collo reliquo undique nitidè purpurascens : rostro nigricanti-brunneo ad basin flavicante : pedibus saturatè brunneis.

Adult. Crown, sides of the head, and vertical crest shining blackish green, changing to brilliant steel-blue on the nape and neck all round; back, rump, upper tail-coverts, and thighs dark steel-blue, highly glossed; the whole of the mantle and upper surface of wings glossy blackish green, fading into the steel-blue on the shoulders and back; the wing-coverts with narrow velvety margins, and the middle ones crossed by a narrow alar bar of white, about 2 inches in length by half an inch in width; an angular patch of white covers the chin and throat, and the whole of the underparts are pure white, the termination of the dark metallic blue on the fore neck being distinctly defined across the crop; primaries blackish brown with darker shafts; secondaries darker, glossed with green; tail rather dull black, the shafts of the feathers polished, and becoming whitish towards the base. The crest is vertical, and is composed of soft linear feathers about an inch and a half in length. On the face, immediately below the crest, and scattered over the sides of the head, are some fine white filaments, indicating that the bird is in breeding-plumage. Bill blackish brown, yellowish towards the gape; feet dark brown. Total length (approximate measurement) 27 inches; wing, from flexure, 11; tail 5; bill, along the ridge 2.1, along the edge of lower mandible 3; tarsus 2; longest toe and claw 3.75.

Young female. Differs from the adult in having the plumage blackish brown instead of metallic green, but nevertheless glossed with green on the head, neck, back, and wings; the feathers of the vertex are lengthened, but there is no appearance of a crest; there is no white alar bar, and the wing-coverts are dull brown with paler margins; tail-feathers yellowish brown with paler edges.

Note. I am in doubt about the determination of the sex, for the so-marked ad. ♀ is a really gorgeous bird. Both specimens are from Campbell Island, June 1878.

Of this magnificent species there are two specimens, from which my descriptions were taken, in the Otago Museum. Professor Hutton, who was the first to record it as a New-Zealand bird, says (*l. c.*) in reference to these specimens:—"I find that they differ from *P. magellanicus* in not having the white spot under the ear, and in the bare skin in front of the eyes being blue with crimson dots, instead of red. From *P. purpurascens*, Brandt, and from *P. sarmientonus*, King, the Campbell Island bird differs in having a narrow white alar band, and in the feet being flesh-colour, instead of brownish yellow. I find it comes nearest to *P. nycthemerus*, if not identical with that species."

There is no example of this bird in the British Museum, or indeed, so far as I am aware, in any collection in this country, with which to compare my description of the Otago Museum specimens; but I think Professor Hutton's identification may be safely followed.

PHALACROCORAX BREVIROSTRIS.

(WHITE-THROATED SHAG.)

- Phalacrocorax brevirostris*, Gould, P. Z. S. 1837, p. 26.
Graculus brevirostris, Gray, Voy. Ereb. and Terror, Birds, p. 20 (1844).
Carbo flavagula, Peale, U. S. Expl. Exp. p. 270 (1848).
Halieus brevirostris, Bonap. C. R. xliii. p. 577 (1856).
Microcarbo brevirostris, Bonap. Consp. Av. ii. p. 178 (1857).
Carbo brevirostris, Cass. U. S. Expl. Exp. p. 375 (1858).
Phalacrocorax finschi, Sharpe, App. Voy. Ereb. and Terr. p. 35 (1875).

Native name.—Kawau-paka.

Ad. suprâ nitenti-niger, interscapulii plumis medialiter sordidè cinerascentibus : scapularibus et tectricibus alarum cinerascentibus conspicuè velutino-nigro marginatis : remigibus et reetricibus nigris, canescente paullò lavatis : frontis nuchæque plumis clongatis, loris cum supercilio distincto, facie laterali guttureque toto albis : subtùs nitenti-niger : rostro flavicante, culmine et apice brunnescentibus : pedibus nigris : iride saturatè brunneâ.

Juv. omninò nitenti-niger : pileo et collo postico brunneo lavatis : gutture et facie laterali paullò cinerascentibus : tectricibus alarum minimis brunneo marginatis.

Adult. General plumage glossy black, slightly tinged with green on the upper surface; a line of white extends from the nostrils over the eyes, and, spreading into a patch beyond, covers the cheeks, throat, and a large portion of the fore neck, often varying, however, in extent in different examples; wing-coverts and scapulars shining greyish black, bordered with satiny black; quills and tail-feathers black, with polished shafts. Irides deep chocolate-brown; naked skin in front of the eyes and bordering the pouch greenish yellow; bill bright yellow, changing to black on the ridge and towards the hook; legs and feet black. Total length 24 inches; extent of wings 34; wing, from flexure, 9.5; tail 7.5; bill, along the ridge 1.5, along the edge of lower mandible 2.4; tarsus 1.25; longest toe and claw 3.

Obs. Some specimens exhibit a few short filamentous white feathers on the posterior sides of the head.

I have an adult bird exhibiting a seasonal change of plumage from a rusty or brownish black to the glossy black, and without any indication of white on the throat or fore neck. This specimen would seem to favour the view held by some collectors that there is a small Black Shag in New Zealand distinct from *P. brevirostris*. For the present, however, we must treat it as a melanoid variety of the common species. In some examples of this bird there is a tendency in the underparts to change to white, and as a rule the extent of white on the throat and fore neck is uncertain and variable. On this account Dr. Finsch seems inclined to unite the species with *P. melanoleucus* (Trans. N.-Z. Inst. v. p. 211). But I have never seen a specimen exhibiting the "frill" or lateral and occipital crests which are characteristic of the last-named species. Birds in full nuptial plumage have the feathers of the vertex lengthened, so as to form a slight crest.

Young. Entire plumage glossy black, inclining sometimes to greyish white towards the base of lower mandible; sides of the head, fore neck, and breast tinged with brown; mantle and upper wing-coverts greyish black, with velvety borders and brownish tips. The bill has the upper mandible dark brown, with yellow edges and tip, the lower mandible bright yellow, with wavy brown marks in the centre; legs and feet jet-black. Bare membrane around the eyes and at base of lower mandible flesh-colour.

Nestling. Covered with thick down of a jet-black colour; forehead and fore part of crown and a broad space round the eyes and across the chin perfectly bare and of a pale blue, changing to purplish flesh-colour towards the base of lower mandible. The feathers come first on the back and flanks, the quills and tail-feathers also making an early appearance. The newly-hatched chick is almost wholly bare; and in its next state it is sparsely covered with short, smoky-grey down, looking as if it had been singed in the fire, the head and neck being still bare and resembling the leather of a black kid glove. Down the abdomen there is a line of white which widens out near the vent.

Fledgling. The fully-fledged nestling is all black, but, in some specimens, immediately below the gular sac, which is greenish yellow, there are a few narrow white feathers interspersed among the black.

Varieties. Although the plumage described above is undoubtedly that of the adult, this species appears to exhibit a dimorphic phase. In almost every flock (say of a dozen) a bird will be observed having the throat, fore neck, and entire under surface pure white. Between this extreme form and the normal white-throated bird every intermediate condition of plumage may from time to time be met with, although the vast majority of these birds have merely white throats. My series presents the following gradation:—

No. 1. Entirely black (young bird).

No. 2. White-throated as described above (both sexes alike).

No. 3. The white extends down the fore neck and terminates sharply on the crop.

No. 4. The white extends further and is mixed irregularly with the black on the breast, the former preponderating.

No. 5. Has the abdomen also largely marked with white.

No. 6. Has the entire under surface white with a few widely scattered black feathers.

No. 7. Has the well-defined black and white plumage, as described above.

I think it is the safest course to account for this variation on the theory of dimorphism, because the two forms interbreed; whilst, as fixing the normal plumage, I may mention that on visiting one of their nesting-colonies I found the breeding-birds (of both sexes) in the ordinary white-throated plumage, without a single exception.

A specimen in the British Museum, with a very white throat, has the plumage of the underparts largely tipped with pale brown.

Mr. Sharpe's *P. finschi* is undoubtedly only an albinoid form of *P. brevirostris*. I have examined his type in the British Museum, which was in the collection of New-Zealand birds brought home by the Antarctic Expedition. It is in the pied plumage described above, with the following differences:—The frontal feathers, which are somewhat lengthened, are pure white; on each wing there is a large subtriangular patch of white, covering the median coverts; the white is pretty even on both wings, but on one of them it extends to the outer web of one of the longer coverts, and there is likewise a white feather among the scapulars, thus betraying the albinism. But what places the matter beyond all doubt is the existence of another example in the British Museum, more recently received from Wellington, in which the white markings are considerably extended. In this example the white alar patch is again present, although appreciably larger in one wing than the other; the scapulars on both sides are almost entirely white, so also is the middle portion of the back, whilst there are numerous white feathers scattered through the black plumage covering the shoulders; on the crown the black is reduced to a small irregular patch, whilst on the nape there is a disconnected stripe of black, the rest of the neck being pure white. It is apparent, at a glance, that this is a case of albinism; and by labelling this also *P. finschi*, Mr. Sharpe practically admits that his supposed new species will not stand.

Another example of the pied form in the British-Museum collection has the feathers covering the shoulders and the median upper wing-coverts narrowly margined with brownish white, outside the velvet border, imparting a lively effect to the plumage of the upper surface.

Note. At Whakatane, in the month of January, 1886, I saw a flock of seven, five of which were in the ordinary white-throated state. Of the remaining two, one was entirely black, the other had white underparts and a conspicuous spot of white on each wing. This at once raised a doubt in my mind (now confirmed) as to the specific value of the bird referred to by myself in the following note:—"Mr. W. T. L. Travers, who has

just returned from the Hot Springs, informs me that, in Lake Tarawera, he observed a small Shag, differing apparently from *P. brevirostris*, being of inferior size and marked with white on the wings. He was unable to obtain a very close inspection, but it seems not unlikely that this is the bird described by Mr. Sharpe under the name of *P. finschi*." (Trans. N.-Z. Inst. vol. ix. p. 336.)

THE White-throated Shag, which appears to be confined to New Zealand and the Chatham Islands, frequents the freshwater rivers and lagoons in all parts of the country. Like some of its congeners it is social or gregarious, obtains its subsistence by diving, and roosts at night on the branches of trees overhanging the water. Its food consists chiefly of eels and small fish; but I have also found the stomach filled with freshwater shrimps.

It has a habit of swimming, for a yard or two at a time, with its head just under the surface as if foraging for food under water.

It is met with more or less on all parts of the coast, but there are some localities which it specially affects. One of these is the Porirua harbour near Wellington. Latterly the progress of the Wellington and Manawatu railway-works has interfered with the quietude of the place, but for nearly thirty years past I have been accustomed to see them when riding or driving along that road. They congregate at the little rocky points, in parties of three or four, and sometimes from 15 to 20—some sitting bolt upright, others with their "banners unfurled," and others preening their feathers in the sunshine. The white throat is very conspicuous as the bird turns its head from side to side, and the occasional presence of a white-vested individual among those wearing the black livery always has a picturesque effect.

It is very strong on the wing, and often ascends to a considerable height in the air, and then sails in wide circles. On these occasions, owing to its narrowness of body and length of neck and tail, it has very much the appearance, when seen from below, of a flying cross.

It is active in all its movements and often exhibits an unusual amount of intelligence amounting almost to ratiocination. For example: I remember once standing on the bank of the Waikato river, near the Aniwanui rapids—at the point where the stream is so narrow that in ancient times a war-party bridged it with a fallen tree—when I observed one of these little Shags rise from the water and take its silent course up the stream, skinning low along the surface. It passed a little jutting rock, suggestive of a Shag station, and after proceeding some yards further seemed to change its mind, dropped suddenly into the water, deliberately swam back, and mounted the stone, where it remained some time sunning its outstretched wings.

I have remarked that it has a special fondness for waterfalls and loves to disport itself in the vapoury spray. On the 23rd of October I paid a visit (by no means the first) to the Huka Falls, near Taupo, one of the finest sights of its kind in all the Southern Hemisphere. Here the whole volume of the Waikato river (after a course of fifty miles from its source in the Ruapehu mountains), confined within stone walls scarcely thirty feet apart and forming as it were an immense sluice-box, comes plunging down the steep channel with terrific velocity till it shoots over a precipice of forty feet in a magnificent cascade, discharging about 240 million gallons of water every hour into a basin of seething foam. Nothing can be more beautiful or picturesque than the view which is obtained of this unique waterfall from below, on the Wairakei side of the river. The fine spray caused by the madly plunging volume rises in a vapoury mist high above the basin, and the slanting rays of the sun upon this produces ever-changing rainbows of exquisite beauty. Descending the bank, I entered the little rocky cavern known as Ethel's cave*, the arched roof of which is densely covered with *Lomaria*, *Adiantum*, and other hanging ferns of great beauty, whilst the entrance is protected and

* So named in honour of Mrs. Howard Vincent, who was the first lady to explore it.

shaded by a group of luxuriant tree-ferns (*Dicksonia squarrosa*) growing up from the very edge of the water, their fronds almost interlaced by their close contact and their stems laden with the withered growth of a former season, hanging around them like a well-wrapped Maori toga. Seated in this cool and enchanting spot, and listening to the delicious song of the *Zosterops*, I gazed long and with insatiable delight on the Huka Falls; and not the least interesting feature to me was this, that a dozen or more of these little Shags (or "River Crows" as they are sometimes called) kept passing and repassing through the misty spray, and up and down the surging "sluice-box," apparently for the sheer delight of the thing, or else in silent wonderment.

On another occasion I was standing, with a party of tourists, admiring the beauties of the Wairere waterfall near the Taheke. In this unique fall the whole volume of water plunges over two ledges in succession, increasing its velocity at the lower one, and forming in the stream below a swirl of considerable force. And the effect is greatly heightened by the peculiar situation of the waterfall, both sides being closed in by dense overhanging woods, the undergrowth being so luxuriant that the pendent ferns dip their waving fronds in foaming water. While standing at the very edge of the lower bank, holding on to a convenient branch and gazing on the beautiful scene, a White-throated Shag swept past us, within a yard or two, and, passing the fall, disappeared in the woods beyond. I mention this in illustration of the habits of this bird, which seems to be quite as much at home in woodland stream as on the sea-shore.

Dr. Finsch says (Trans. N.-Z. Inst. vol. vii. p. 235):—"Although omitted in Dr. Buller's work there can be no doubt that Mr. Peale collected a Shag in the Bay of Islands, which, like *Graucalus chalconotus*, Gray, has not yet been observed since. This species, *G. purpuragula*, Peale, seems to be very near if not identical with *G. stictocephalus*, Bp.=*sulcirostris*, Brandt."

I still omit *Phalacrocorax purpuragula* from our list, because I feel persuaded that Peale's specimen was only *P. brevirostris* in the black garb of immaturity. The Australian *P. stictocephalus*, with which Dr. Finsch is inclined to unite it, has a very close resemblance to the young of our bird, being not much larger, and only distinguishable by its blackish-brown bill, a brighter lustre in its dark plumage, and the presence on each side of the head of numerous narrow linear specks of white.

Large numbers are sometimes congregated in their roosting-place; and when disturbed or alarmed they rise into the air simultaneously and course about in a confused manner, resembling at a distance a flight of Rooks.

On one occasion I visited their roosting-place in the evening in order to watch their behaviour on assembling. On the banks of the Rangitikei river I found a number of them crowding together on the branches of a small kahikatea tree overhanging the water, and about twenty more performing gyrations high in the air, apparently surveying the ground before descending to roost for the night. Those already on the branches were very shy, and on our approach slipped away on the wing noiselessly and with the swiftness of an arrow. They do not breed in these roosting-places, but retire further up the streams, where they are less likely to be molested.

One of my brothers visited a breeding-place in the centre of a large "negro-head" swamp in the South Island, but the odour was so intolerable that he could not be induced to go there again. He found some hundreds of these Shags breeding together in a colony, the nests being placed close together on the clumps of "negro-head" standing out of the water.

Like the Black Sea-Shag, they retire to the "negro-head" swamps and to the lakes of the interior for the purpose of breeding, establishing themselves in large colonies, and returning to the same shaggy year after year. The low scrub fringing the shores of a lake or lagoon is the site usually selected; and the nests are constructed of broken twigs, dry flags, and rushes loosely placed together to the thickness of several inches, with sometimes an upper layer of soft dry grass.

In the Lake district there are shaggeries of considerable magnitude which are much valued

by the natives, each colony of nests having its own proprietor, who exercises all the rights of ownership, visiting the ground at the breeding-season for the purpose of collecting the young birds, which are potted in the usual manner and are considered a great dainty. Captain Mair accompanied one of the Shag parties to the Tauranga river, at Lake Taupo, and saw 400 young birds collected in the course of a single day. Both the White-throated and the small Black Shag, he states, breed together in these localities, although apparently never pairing.

I visited one of these colonies at Matapiro (in the Hawke's Bay district) on Jan. 29, and found nests in every stage of breeding. We saw naked young birds just extruded from the egg, looking like little leathery sacs of a flesh-brown colour, their sensitive young bodies full of tremor even in the strong sunlight; in other nests were young birds a stage more advanced, the whole surface of the body, with the exception of the head, blackened like the skin of a negro; in some nests two such little "niggers" were lying side by side with two unhatched eggs; in others, again, the black skin was covered with a dense, short growth of sooty-black down, the whole of the head and cheeks being entirely bare and flesh-white, darkening on the nape and then passing into black, with a gradual development of down on the neck, the bill and feet being black. In the most advanced state, the young birds had a thick-set growth of short down right up to the crown of the head, where it presented a well-defined outer margin, the whole covering being sooty black, with a sprinkling of white down along the margins of the wings, upon which the quill-feathers were just appearing; the naked skin of the crown, sides of the face, cheeks, and chin perfectly smooth and of a clean flesh-white, excepting only a narrow line of dark brown passing from the base of the upper mandible through the eyes, and becoming still narrower behind; bill and feet perfectly black.

In association with the nests of this species were two belonging to the Black Shag, and presenting a far more substantial appearance. One of these was empty; the other contained two young birds, of large size and covered with thick black down, the bare skin on the sides of the face, cheeks, and chin being bright lemon-yellow. These birds craned up their lanky necks as we approached them with a snare at the end of a long rod, took the situation in at a glance, clambered over the sides of the nest, and tumbled hurriedly into the stream below, thus beginning a new epoch in their lives!

In the Canterbury Museum there are two nests of the White-throated Shag, differing entirely in their construction. One of them is very compact, rounded in form, with a diameter of more than a foot, and a thickness of five inches, presenting only a slight depression for the eggs, and composed of weeds, grasses, and dry flags, on a foundation of broken twigs. The other is formed entirely of broken twigs, with the leaves attached, closely interlaced together, with a deep cavity for the eggs, the whole being securely placed in the fork of a small tree; it is, in fact, a compact structure, of a round symmetrical form, and very firmly put together. Each of these nests contains three eggs, all of which have the surface much soiled.

The eggs of this species exhibit much variety in shape and size. I have now before me a large series of specimens from my son's collection, varying from the typical ovoid to a narrow elliptical form. The former measures 2 inches in length by 1.15 in breadth, and is of a clear pale green, with only a thin yellowish film over a portion of its surface; the latter measures 1.7 inch in length by 1.2 in breadth, and is of a paler green, thickly incrustated in places with chalky matter and stained over a great part of its surface to a dark yellow colour. Between these extremes there are numerous individual variations. An example received from Mr. Walter Shrimpton is both small and elliptical in form, measuring 1.8 inch in length by 1.1 in breadth; it is greenish white, with a faint gloss, the coating of chalky matter on the surface being thin and even.

PHALACROCORAX MELANOLEUCUS.

(FRILLED SHAG.)

Phalacrocorax melanoleucus, Vieill. N. Dict. viii. p. 88 (1817).*Phalacrocorax flavirhynchus*, Gould, P. Z. S. 1837, p. 157.*Graucalus flavirostris*, Gray, in Dieff. Trav. ii., App. p. 201 (1843).*Graculus melanoleucus*, Gray, Voy. Ereb. and Terr., Birds, p. 20 (1844) *.*Graculus melanoleucus*, Gray, Ibis, 1862, p. 251.*Haliæus melanoleucus*, Bonap. C. R. xliii. p. 577 (1856).*Microcarbo melanoleucus*, Bonap. Consp. Av. ii. p. 177 (1857).

Ad. pileo colloque postico et corpore suprâ nigris, scapularibus et tectricibus alarum viridi nitentibus, velutino-nigro marginatis : pileo et collo lateralibus cum corpore subtùs toto albis : corporis lateribus, subalaribus et axillaribus nigris : rostro flavicanti-brunneo, culmine saturatiore : pedibus nigris : iride saturatè brunneâ : regione ophthalmicâ flavâ.

Adult. Crown of the head, hind part of neck, and general upper surface, as well as the sides of the body, flanks, axillary plumes, and inner lining of wings glossy black; wing-coverts and scapulars greenish black, with ebony-black edges; face, throat, fore part and sides of neck, and all the under surface pure white; wing-feathers and tail black. Irides dark brown; space round the eyes yellow; bill yellowish brown, deepening to black on the ridge; tarsi and feet black. The feathers of the forehead are narrow and elongated, forming a slight vertical crest; the white plumage of the face and the feathers of the hind head are likewise produced, forming tolerably distinct lateral and occipital crests. Length 24.5 inches; wing, from flexure, 9.5; tail 6.25; bill, along the ridge 1.25, along the edge of lower mandible 2.1; tarsus 1.25; longest toe and claw 2.6.

Young. Differs only in having the feathers of the upper surface margined more or less with pale brown, and the plumage of the underparts of a less pure white, obscurely mottled with brown.

THE Frilled Shag, although dispersed over every part of Australia, is a comparatively rare species in New Zealand, if indeed it does occur at all; for I am inclined to think that the supposed examples of *Phalacrocorax melanoleucus*, recorded from time to time, are nothing but *P. brevirostris* in the occasional pied plumage already described.

There is, however, a locally-killed specimen in the Auckland Museum which seems inseparable from the Australian bird. It has a distinct frontal crest and a well-developed frill, the white feathers of the upper fore neck being lengthened, almost sufficiently to meet at the back.

This species resorts to the rocky shores of bays and estuaries, as well as to inland rivers and lagoons; and it is said to breed in trees, several pairs being generally associated together.

* Afterwards named *Phalacrocorax finschi* by Mr. Sharpe, who thus distinguished it:—" *P. similis P. melanoleuco* sed tectricibus alarum medianis exterioribus albis, speculum vel fasciam alarem formantibus : axillaribus tantum nigris, nec corporis lateribus ut in *P. melanoleuco* nigris, distinguendus." But Mr. Sharpe's type is undoubtedly an albinoid variety of *P. brevirostris* (see page 168).

PHALACROCORAX HUTTONI.

(HUTTON'S SHAG.)

Exempl. ex N. Z. Similis *P. vario*, sed paullo major: supra brunnescens, tectricibus alarum pallidior brunneo marginatis et terminatis: maculâ aurantiacâ anteculari absente: pedibus sordidè flavis.

New-Zealand specimen. Head and hind neck dark vinous brown, touched on the margins with lighter brown; this colour deepens to blackish brown, with darker velvety edges, on the mantle, gets lighter in the inter-scapular region, and changes to glossy greenish black on the lower back, rump, and thighs; the throat, fore neck, and all the underparts pure white. The wing-feathers are blackish brown with a greenish gloss, and the whole of the wing-coverts, as well as the outer feathers of the mantle, are rich vinous brown, with paler brown margins and tips, producing a very pretty effect; the inner secondaries are similarly tipped; and some of the outer scapulars have whitish margins; the tail-feathers are blackish brown with paler edges, becoming brownish white on the two middle ones, and with dark shafts changing to greyish white at the base. The lores are sparsely covered with very short vinous-brown feathers, and the membrane behind the eyes is partially studded in a similar way but with still smaller feathers. The bill is dark greyish horn-colour, and the legs and feet appear to have been originally orange, the colour having faded out in the dried skin. Total length 36 inches; wing, from flexure, 12.5; tail 6; bill, along the ridge 2.75, along the edge of lower mandible 3.75; tarsus 2.25; longest toe and claw 4.5.

Obs. In the specimen described above the tail-feathers are much worn and abraded at the tips, the bird being a fully adult one and in changing plumage. The bill is more attenuated, or with a narrower gonys, than in any of our other species.

THE specimen from which the above description is taken forms part of the fine collection of New-Zealand birds in the Otago Museum, and I understand that it was shot by Mr. Bourne on the ocean-beach near Dunedin, in January 1876.

It is marked, in Prof. Hutton's handwriting, *Phalacrocorax varius*; but its somewhat superior size, the difference in the plumage of the upper surface, the slightly feathered lores, the absence of the facial spot of orange, and, more than all, the colour of its legs (which are yellow instead of being jet-black) to my mind render such an identification impossible. Indeed, the curator of the Museum informed me that Professor Hutton had himself expressed doubts on the subject.

There is an almost exactly similar specimen (from the Straits of Magellan) in the British Museum which has been referred to *Phalacrocorax albiventris*. I am not satisfied with this identification, because that species is described as "having a recurved crest and the caruncles on the front largely developed," besides having a white alar bar, all of which characters are wanting in the British-Museum example.

I feel very uncertain as to whether this bird belongs to a species already described; but as I have been quite unable to identify it, I think I cannot do better, for the present at least, than connect with it the name of Professor F. W. Hutton, who has done so much towards elucidating the synonymy of this group, to say nothing of his numerous other contributions to New-Zealand ornithology.

PLOTUS NOVÆ HOLLANDIÆ.

(AUSTRALIAN DARTER.)

New-Holland Darter, Lath. Gen. Hist. vol. x. p. 453 (1824).*Plotus novæ hollandiæ*, Gould, Proc. Z. S. part xv. p. 34 (1847).

Exempl. ex N. Z. Viridescenti-niger : dorso brunnescente lavato : gulâ maculis albis sagittiformibus notatâ : fasciâ latâ albâ a basi mandibularum usque ad latera colli extensâ : scapularibus lanceolatis, medialiter griseo-albis, latè nigro marginatis : gutture imo rufo lavato.

New-Zealand specimen. Crown, nape, hind part of neck, and shoulders blackish brown, mottled with white, each feather being narrowly edged with it ; the whole of the back and rump black ; quills and tail-feathers black, the inner webs of the former tinged with purplish brown, and the three innermost secondaries with a broad longitudinal stripe of white on their outer vane ; bastard quills and the superior primary coverts black, the inner ones slightly tipped with white ; the larger secondary coverts are white on their outer webs and beyond the shaft, then black with a sharply defined edge ; the smaller coverts white in their central portion, with a black lanceolate stripe on each web and narrowly margined with white ; towards the edge of the wing the feathers are black with a central arrow-head spot of white, becoming entirely greyish white at the carpal flexure ; scapulars black with a broad stripe of dull white on their outer webs ; the coverts white in their central portion with black shafts, a broad stripe of black on each web with a narrow outer margin of white ; throat, fore neck, and all the underparts buffy white ; under surface of the wings and tail black. A broad line of black extends from the posterior edge of the eyes down the side of the neck, separating the dark brown of the hind neck from the white plumage of the under surface. The middle tail-feathers, and the innermost scapulars on the outer webs, have a peculiar crimped surface. Bill yellowish horn-colour, brownish towards the base of the upper mandible ; the inner cutting-edges of both mandibles armed with minute sharp barbs inclined backwards. Feet dull yellow, shaded with brown ; claws yellowish brown. Total length (approximately) 40 inches ; wing, from flexure, 14 ; tail (consisting of eight feathers) 10 ; culmen 3·15 ; bill, along the edge of lower mandible 4·25 ; tarsus 2 ; longest toe and claw 3·8 ; hind toe and claw 1·5.

THE Canterbury Museum contains a roughly prepared skin of the Australian Darter (*Plotus novæ hollandiæ*) obtained under circumstances which leave no doubt in my mind of the occurrence of this bird as a straggler in New Zealand.

The late Mr. F. R. Fuller, an excellent taxidermist attached to the Museum, during a visit to Hokitika in January 1874, found the skin stretched flat and nailed up inside an old shed. He brought it away, but could get no information as to how it came there. An examination of the skin shows clearly that it was in a fresh state when affixed to the wall, the edges having, in the process of drying, shrunk away from the nails on both sides.

It would seem that some digger or working settler, probably attracted by the rarity of the bird, had adopted this rude mode of preserving it. At any rate the skinning-operation appears to have been performed by unskilful hands, an open slit having been made from the hind part of the head right down the back to the root of the tail.

The suggestion will occur that the bird may have come down from Australia in some vessel ; but the condition of the tail-feathers, which to the very tips are clean and unbroken, proves, I think, that

this was no eaged bird. Those who have kept birds of this class in captivity know how soon the tail-feathers in particular get soiled and abraded. The almost entire absence of fat on the inner surface of the skin would seem to indicate that the bird had performed a long journey on the wing; although this may be otherwise accounted for on the supposition of its being a female in breeding condition. The plumage of this specimen, of which a description is given above, allows of its being either an adult female or a young bird of the first year, at which stage the sexes are alike.

I may here mention that the late Sir J. von Haast, during his exploration of the Southern Alps in the summer of 1862, met with a bird in the Ohau Lake, swimming very low in the water, which he was unable at the time to identify, and that the above discovery convinced him it was a *Plotus*.

The habitat of *Plotus novæ hollandiæ*, according to Gould (Handb. B. Austr. ii. p. 496), is confined to the colonies of South Australia and New South Wales, where it is thinly but generally dispersed in all situations suitable to its habits, such as the upper parts of armlets of the sea, the rivers of the interior, extensive water-holes, and deep lagoons. This writer adds:—"Shy and seclusive in disposition, it usually takes up its abode in localities little frequented by man; seeks its prey in the water, dives with the greatest ease to the bottom of the deepest pools, and is as active in this element as can well be imagined. It ordinarily swims with a considerable portion of the body above the surface of the water, but upon being disturbed immediately sinks beneath it, leaving the head and neck only to be seen, and these, from their form and the motion communicated to them by the action of swimming, present a close resemblance to those of a snake*. Its food consists of fish, aquatic insects, newts, frogs, &c. After feeding it perches on a snag of some fallen tree in the water, or on the naked branch of a tree in the forest nigh to its haunts, often on one of the greatest height, where it sits motionless for hours together: while thus perched it is much more easily approached and shot than on the water, where it is wary in the extreme."

The male differs from the female in having the breast and neck black with an arrow-head mark of white on the throat, and a broad stripe of the same from the base of the mandibles on each side of the upper neck; also in having rusty red stains on the underside of the throat.

* There is a special mechanism in the neck of the Darter which gives it a peculiar "kink" in the middle. The connection between this specialized character and the natural habits of the bird has been well explained by the late Mr. W. A. Forbes as follows:—

"The Darters feed entirely, so far as I have been able to observe, under water. Swimming with its wings half expanded, though locomotion is effected entirely by the feet, the bird pursues his prey (small fishes) with a peculiar 'darting' or jerky action of the head and neck, which may be compared to that of a man poising a spear or harpoon before throwing it. Arrived within striking-distance, the Darter suddenly transfixes, in fact bayonets, the fish on the tip of its beak with marvellous dexterity, and then immediately comes to the surface, where the fish is shaken off the beak by jerking of the head and neck (repeated till successful), thrown upwards, and swallowed, usually head first. A study of the neck in the recently dead bird leaves little doubt as to the mechanism by which this peculiar impaling of the prey is effected. The 8th cervical vertebra is articulated with the 7th in such a way that the two cannot naturally be got to lie in the same line, but form an angle, open forwards, of about 145°, when the two bones are stretched as far as is possible in that direction. Behind, its articulation with the 9th cervical is such as to permit it to be bent back at an angle a little greater than 90° with that vertebra, beyond which extent, however, no further flexion is possible. The 8th vertebra is thus so articulated with the 7th anteriorly and the 9th posteriorly as to allow it, when the neck is flexed, to be nearly at right angles to the rest of the neck, the two portions of which, though parallel, are then at different horizons, something like the two bars of a parallel ruler. When the neck is bent in this Z-shaped form, any opening-out of the anterior angular bend by the action of the anterior neck-muscles causes the anterior moiety of the neck to suddenly shoot out, thus causing a corresponding protrusion of the head and beak. By the flexion of the 6th on the 7th, and of the 9th on the 10th cervical vertebrae, the curve of the neck is increased—the articulations of the 8th vertebra still forming the double hinge round which motion takes place—and the impaling action correspondingly augmented. This protrusion, though only for a short distance, is so violent as to effectually 'strike' the fish which the bird is pursuing." (Proc. Z. S. 1882, pp. 210-212.)

DYSPORUS SERRATOR.

(AUSTRALIAN GANNET.)

Sula australis, Gould, P. Z. S. 1840, p. 177 (nec Steph.).*Sula serrator*, Gray, Voy. Ereb. and Terror, Birds, p. 19 (1844).*Dysporus serrator*, Finsch, J. f. O. 1867, p. 339.*Sula serrator*, Buller, Birds of New Zealand, 1st ed. p. 323 (1873).*Native names.*—Takapu, Takupu, and Toroa-haoika.

Ad. albus: pileo et collo postico clarè ochrascenti-fulvis: remigibus brunnescenti-nigris, scapis flavicantibus, versus apicem brunneis, secundariis intimis albis dorso concoloribus: caudâ albâ, rectricibus quatuor centralibus brunneis, ad basin albis: rostro saturatè eano: regione ophthalmicâ nudâ cyanescenti-eanâ: plagâ nudâ ad basin rostri et fasciâ gulari nudâ nigricanti-eanis: pedibus saturatè brunneis, tarso et pedibus anticè viridibus: iride pallidè argenteseenti-brunneâ.

Adult. General plumage snowy white; the crown of the head and back of the neck deep sienna-yellow; the primaries, secondaries, and four central tail-feathers brownish black, with white shafts, darkening towards the tips. Irides pale silvery brown; bill dark pearl-grey; bare space surrounding the eyes bluish grey; bare skin at the base of the beak and down the centre of the throat blackish grey; legs and feet dark brown, with a broad line of bright apple-green down the front of the tarsus and continued on the toes. Total length 35 inches; extent of wings 70; wing, from flexure, 19; tail 10; bill, along the ridge 3·5, along the edge of lower mandible 4; tarsus 2; middle toe and claw 3·75.

Young. Upper surface dark slaty grey, each feather with a rounded spot of white near the tip; the plumage of the forehead and vertex darker than the rest of the head, this shade running off into a point on the crown; under surface white, more or less marked on the fore neck and breast with sooty grey. The white spots are most distinct on the wing-coverts, scapulars, and feathers of the back and rump. The eyelids are dull grey, and have not that beautiful blue tint which adorns the fully matured bird; nor is the green rib on the tarsi and toes so conspicuous, for, although present, it is rather of a dull yellowish colour.

Younger state. There is a somewhat younger bird in my collection which has the white down still adhering to the vertex, nape, and hind neck. It differs in having the white spots on the upper surface, and particularly on the shoulders, larger and more conspicuous; also more white on the crown, with a few crescentic grey markings on the breast.

Progress towards maturity. A young bird, in the condition of plumage described above, was brought by me to England and presented (with other birds) to the Zoological Society. It was lodged in the Gardens at the end of April, and during several successive visits, extending over the following six months, I was able to mark the changes of plumage as the bird advanced towards maturity.

By the middle of July the spots on the upper surface had considerably diminished, being reduced on the back and wing-coverts to mere shaft-points. This change was not, however, due to the moulting of the feathers, but to the wearing away of the extremities, the shaft-tips being almost denuded. The dark markings on the head and neck had also undergone a change; but this was evidently the result of a new growth, for on the nape and hind neck the white now predominated, and was already assuming a yellow tinge. The spotted character was, however, still conspicuous on the wing-coverts, back, and rump. The tail-feathers were much

worn and broken, probably the result of captivity. The facial membrane was nearly as blue as in the adult, but the lines on the tarsi and toes were of a much paler green; irides as in the adult.

By the end of October the head, neck, and underparts had assumed the plumage of the adult. The shoulders, back, and upper surface of wings were blackish brown, irregularly marked or variegated with white, all the new feathers being pure white, this transitional plumage having a very pretty effect. The white tips had disappeared from the scapulars, and were much worn and denuded on the wing-coverts; but the spots were still visible on the back and rump.

Nestling. Covered with thick woolly down of the purest white; forehead and cheeks denuded and of a yellowish colour. The woolly covering stands up and over the crown, giving the bird a peculiar "judicial look" which is very comical; bill black, with greyish tip to both mandibles; legs pale brown, with visible lines of paler brown along the tarsi and toes. The wing-feathers, which are the first to appear above the down, are black with white tips.

Remarks. The form of this bird is specially adapted to its plunging-habits, the body being very elongated and compressed on the sides, the neck long and powerful, and the head wedge-shaped in front, with a flattened crown. The throat is capable of great dilatation; and the bill, which is longer than the head and strongly formed, has a peculiar hinge-like development, the purpose of which is very obvious; on each side of the rounded culmen there is a deep longitudinal furrow, which forks laterally about an inch from the tip; below this the sides of the upper mandible are slightly convex, and towards the base there is a jointed notch, which, being elastic, adds considerably to the expansive power of the bill as a means of seizure. A bare membrane, extending from the base of the upper mandible, occupies the lores, turns sharply round the eyes, and ends in a narrow process about an inch in length and in a line with the gape; a similar membrane covers the throat, and passing down the middle of the gular pouch, terminates acutely. The tongue is rudimentary, being only a quarter of an inch in length, and free at both extremities. The nasal apertures are extremely small. The feet are strong, the toes webbed to their extremities, the claws short and convex, the middle one being flat and pectinate on its inner edge. The tarsi and toes are armed anteriorly with a line of soft scutella, which differ in colour from the surrounding parts. The total weight of the bird is only 3 lb.

Obs. The first moult would seem to take place before the young birds leave the breeding-ground, inasmuch as the spotted plumage is never met with at sea.

THE Gannet is comparatively common on our coasts, and, during tempestuous weather, enters the bays and harbours in quest of its food.

It is a powerful flier; and it is very interesting to watch it while in pursuit of its finny prey: poising its body for an instant in mid-air, it plunges headlong into the sea, with a velocity that makes the spray rise several feet, entirely disappearing under the surface for some seconds, and then springing upwards with the buoyancy of a cork; after which it rests on the water for several minutes, and then takes wing again, to renew the feat.

In stormy weather it frequents our bays and harbours, being able to continue there its fishing-operations in spite of the weather. When the proverbial S.E. gale is blowing at Wellington, a few of them are always to be seen on the wing, coursing up and down the harbour, and a few amidst the shipping, sometimes mounting high, and ever and anon plunging under water. From the ocean-beach I have watched them, for hours together, when the sea was calm, foraging in pairs, crossing and recrossing each other's line of flight with untiring industry and occasionally resting for a few minutes on the placid surface.

On the Whangarei river, several miles from the sea, I saw on one occasion several of these birds flying low over the quiet waters, and occasionally rising high in the air as if to reconnoitre; but their appearance at this distance from the sea is very unusual.

In dull murky weather the snow-white plumage of this bird, rendered more striking by the black

extremities of the expanded wings, makes it a very conspicuous object as it sails majestically overhead or scans the surface of the rippling waves.

It is a curious circumstance, and perfectly well attested, that shortly before the terrific Tarawera eruption in 1886 the Gannets suddenly disappeared from White Island and from all their other resorts in the Bay of Plenty*.

On one occasion, when riding down the coast between Manawatu and Otaki, I came suddenly upon a Gannet asleep on the smooth sandy beach, and, dismounting from my horse, I succeeded in taking it before it awoke. It was a beautiful specimen, in full feather, and apparently quite healthy; but it was probably worn out by fatigue and hunger, after a stormy day at sea. The description at the head of this article was taken from this particular bird, which is now in the Colonial Museum.

It is a fact, although I was myself for a long time sceptical about it, that the Gannet cannot rise off a plane surface. On the ground it is quite helpless; and it can only mount in the air by getting on to an incline and then starting outwards.

When not fishing it generally flies pretty close to the water in a very direct course and with rapid and regular strokes of its narrow but powerful wings. The black pinions have a pretty effect by contrast with the pure white plumage of the body as the bird is thus seen skimming along the surface of the "dark blue wave." Occasionally, however, it rises higher and sometimes forms a striking object in the sky. For instance, I find this passing note in my journal:—"The shores of Cook's Strait, as we approach Queen Charlotte Sound, are bold and mountainous. As we proceed on our voyage, noble vistas open themselves to view, presenting wild and varied scenery and disclosing in the remote background towering peaks all shrouded in vapoury clouds. As we stand gazing at the ever-changing picture an object appears far away in the distance, held against the murky wall of cloud and mountain beyond like a boy's kite sailing against the scud, and ever and anon glistening with pearly whiteness in the uncertain light. That object is a Gannet. Tired of fishing, he has mounted on his strong pinion and is now poising himself in mid-air and surveying far below him the troubled waters in which he loves to plunge."

The Maoris manifest great admiration for the Gannet, because of its spirit and dash in catching fish; and this bird naturally takes a prominent place in the ancient story recounting a trial of strength between the birds of the sea and those inhabiting the land. (See page 148.)

I had a young bird brought to me towards the end of February; it was of full size, but in the immature plumage, looking very handsome in its spotted dress. I was staying at the time at the Wellington Club, and the bird was confined in a back yard, from which it made its escape several times in a very clever manner, and was always found skulking among the vegetation on the surrounding hills. It lived almost exclusively on fish, and had so voracious an appetite that I have known it to swallow as many as twenty-seven herrings in the course of a day. It never exhibited a spark of gratitude for this liberal supply of food, but would, on every occasion, attack its keeper's hands in the fiercest manner, uttering at the same time a peculiar guttural sound as if choking. I succeeded in

* A newspaper correspondent thus refers to this singular coincidence:—"The 'Hinemoa' left Wellington for Tauranga on the night after the now famous eruptions at the Hot Lakes. She carried Dr. Hector, Major Mair, and others (including myself), who were bound for the scene of the disturbance. Nothing more uncommon than a heavy sea is to be recorded on the passage to White Island. Captain Fairchild ran in close to the island, but there was no sign of any recent disturbance, although the captain thought that the lake was throwing off more steam than usual, and that a mound which had latterly appeared in the lake had disappeared. The Gannets, however, which, to use the skipper's description, were formerly so thick upon certain points 'that you could not stick another Gannet in,' left the island altogether some time before the eruption and have not returned, and I venture to recommend their unanimity to the notice of the numerous scientists, who will, no doubt, explain in full the why and the wherefore. Shortly after leaving White Island we encountered a vile sulphurous smell, which came in company with a thick fog off the land. A little more than an hour's running took us through the fog, which left an impalpable dust upon everything on deck, and formed a peculiar froth upon the sea."

bringing this bird to England in one of the New Shipping Company's steamers, having been able to lay up a sufficient supply of fresh fish for the voyage in the ship's freezing-chamber. On arrival I presented it, as already mentioned, to the Zoological Society, and there it developed the mature livery, sharing for a long time, with numerous other waterfowl, the pond-enclosure near the Eastern Aviary, and attracting the notice of visitors by the eager manner in which it followed the keeper about the ground at feeding-time.

Of the Australian Gannet the Earl of Pembroke writes * in the following spirited terms :—

“The splendid yellow-headed species which is common in the South Pacific is, I think, the finest of all fishing-birds from John o' Groats to the Chatham Islands. . . . Soaring high he marks his prey beneath him, and shutting up his wings (like a Wood-Pigeon darting into cover) he plunges downwards with a splash that makes one's head ache to look at, and after a semicircular dive of five or six yards, he emerges, sneezing and flapping, with his prey safely lodged in his throat. I have seen a good deal of Gannet-life, both domestic and public. On Nepean and Phillip Islands, in the Norfolk-Island group, I used to find the fond mother sitting affectionately by the side of the snow-white fluff she called her child (paterfamilias having made himself scarce long before we reached the party) till I was within two or three yards of her, when she solemnly disgorged the two fish she had been cooking in her throat for her darling's supper, and followed her mate's example. These two fish on Nepean Island were nearly always a species of anchovy with the brown line of flesh, or fish, strongly marked; they were closely pressed together, and had evidently undergone a process of maceration if not of digestion. The New-Zealand *Sula*, like his Maori fellow-countryman, is of a most war-like nature, and fights fiercely for the sanctity of his nursery. I once saw the most stout-hearted of British skippers fairly driven off a rookery of them with his breeks in rags and tatters and his legs in holes, positively obliged to retreat and arm himself with a big stick before he could make his ground good. Even after the old birds were driven off, we had to walk warily amongst the sharp-billed Powder-puffs, as they never missed a chance of giving us a sharp prod if we came within their reach.”

Colonel Haultain informs me that on the occasion of a visit to White Island, in the Bay of Plenty, on Christmas day, he found thousands of young Gannets there. They were clothed in down, and were packed so closely together, that it was almost impossible to distinguish the occupant of any single nest. The old birds manifested no fear at the presence of man, and, where they were sitting on their eggs, required to be fairly pushed off before they would quit the nest. On being thus disturbed, or when fighting with one another, they utter a gurgling cry, like *ko-wack, ko-wack*, but habitually they are silent. It may be here mentioned that White Island is the top of a submerged volcanic cone, in the centre of which there is a deep lake of hot water, like a vast cauldron, constantly emitting steam, with occasional outbursts of boiling water rising to the height of several hundred feet. In the vicinity of this lake there are numerous round holes, in which boiling mud is kept in violent agitation; and the surface of the ground round these geysers is covered with great masses of crystallized sulphur, deposited by the heated vapours. Altogether the island is a very remarkable geological curiosity; and, considering its normal heat and the sulphurous state of its atmosphere, it seems a singular spot to be chosen as a nesting-ground.

Off the Kawhia shore, on the opposite or west coast (about halfway between Manukau and Taranaki), there is a bare rock, known to sailors as Gannet Island, where another extensive breeding-place exists. My son Percy visited this place in December 1883, in the Government steamboat 'Hinemoa,' but owing to the heavy sea he was unable to land. Passing, however, close alongside, he was able to make some observations, of which he has furnished the following note :—

* 'South-Sea Bubbles,' by the Earl and the Doctor, p. 65.

“The island comprises about six acres of rock, without to all appearance a blade of vegetation upon it, and is situated about thirteen miles abreast of Kawhia. It forms a gentle slope upwards from the sea, with a sheer precipice on the other side. On the slope a space of about three acres in extent was literally one mass of Gannets, there being tens of thousands. Captain Fairchild, who has visited the island on many occasions, says that he found an almost incredible number breeding there, the separate nests being indicated by a few loose feathers placed on the guano-deposits in every available spot. Each nest contained only a single egg, and there were no idle mates, the male and female occupying nests side by side. He states that this bird breeds twice in the season—first in September and again in February. Both sexes incubate, and at one and the same time; for every Gannet on the island was found sitting, and so close together that to walk amongst them was almost impossible. At the second breeding-time, in February, a young bird of the former brood, easily distinguished by its spotted plumage, is invariably found squatting alongside of the incubator. He has often watched the old birds bringing food to the nest. They come in from the sea with their pouched throats quite full of small fish, which they forthwith disgorge and divide between the young ones. The operation is a very droll one, and may be watched at a distance of only a few yards from the nest.”

Captain Fairchild has himself furnished me with the following interesting account of their breeding-habits:—

“The habits of the Gannet are so very strange that it may interest you if I give the results of my own experience with these birds. So far as I am aware, their only breeding-places off the coast of New Zealand are on Gannet Island, lying to the east, on some small islands in the Hauraki Gulf, near Coromandel and near to the Great Barrier, and on White Island in the Bay of Plenty. At all these places the birds congregate in great numbers. They commence laying about the 18th September, and it takes about thirty-three days to hatch out the young. The female lays two eggs; she keeps one and the male bird takes charge of the other, and each one hatches its own and afterwards looks after the wants of the young one. About the 1st February the same thing is repeated. The second hatching takes place about the first week in March. I hardly think that there can possibly be a mistake in this, as I have carefully watched the habits of these birds during the last twenty years, whenever an opportunity offered.”

There are evidently two broods in a season, for Captain Fairchild assures me that in every instance—and he examined hundreds of nests—where the old bird was covering an egg or a chick a well-grown young one, in spotted plumage, was sitting alongside, resting its beak on the parent's shoulder, and on the least provocation showing fight in defence of the nursery. The old birds obstinately refused to quit their nests even when hustled and kicked with the foot; and when thus molested, fought viciously, striking at the intruder with their powerful bills, and inflicting sharp cuts on the hand if incautiously placed too near. On his return from one of his annual cruises among the islands lying off New Zealand, he sent me a whole basketful of the eggs of this fine Gannet. This was about the first week in February, and as most of the eggs contained a well-advanced embryo, this would indicate a comparatively early date for the second brood. They varied somewhat in size, but an ordinary example measured 3 inches in length by 1.8 in breadth. They were, for the most part, very elliptical in form, and of a pale greenish colour, covered over with a chalky incrustation and much soiled.

The eggs when taken from the nest are soiled and begrimed with dirt from the bird's feet or from contact with the ground, having then a dark brown colour. On being cleaned by scrubbing with a wet brush, they present a chalky surface, often much scratched by the action of the bird's feet; and on this being scraped off the shell becomes dull bluish white, which changes to a lovely pale blue tint on the inner surface.

TACHYPETES AQUILA.

(GREAT FRIGATE BIRD.)

- The Man-of-War Bird*, Edwards, Gleanings, vi. p. 209, pl. 309 (1760).
Pelecanus aquilus, Linn. Syst. Nat. i. p. 216 (1766).
Frigate Pelican, Lath. Gen. Syn. iii. pt. 2, p. 587 (1785).
White-headed Frigate Pelican, Lath. Gen. Syn. iii. pt. 2, p. 591 (1785).
Palmerston Frigate Pelican, Lath. Gen. Syn. iii. pt. 2, p. 593 (1785).
Pelecanus leucocephalus, Gm. Syst. Nat. i. p. 572 (1788).
Pelecanus palmerstoni, Gm. Syst. Nat. i. p. 573 (1788).
Fregata aquila, Illiger, Prodr. p. 279 (1811).
Tachypetes aquila, Vieill. N. Dict. d'Hist. Nat. xii. p. 143 (1817).
Tachypetes aquilus, Kittl. Kupf. Vög. p. 15, taf. xx. fig. 1 (1832).
Tachypetes leucocephalus, Kittl. Kupf. Vög. p. 15, taf. xx. fig. 2 (1832).
Atagen aquila, Gray, Gen. of B. iii. p. 669 (1845).
Tachypetes palmerstoni, Cass. U. S. Expl. Exp. p. 359 (1858).
Fregata aquila, Buller, Birds of New Zealand, 1st ed. p. 339 (1873).

Native names.—Hokioi and Hakuwai.

Exempl. ex N. Z. Nigricans, plumis versus apicem brunnescentibus et sub certâ luce chalybeo nitentibus: tectricibus alarum brunnescente latè terminatis, medianis albido marginatis: remigibus nigris, secundariis sordidè olivaseenti-brunneis et pallidiore brunneo terminatis: reetricibus nigris brunneo marginatis, scapis albis: pileo et collo undique eum pectore anteriore albis, hœ pallidè ferrugineo lavato: pectore laterali eum tibiis, erisso, subeaudalibus et subalaribus brunnescenti-nigris: abdomine toto albo: rostro eincrascente, ungue corneo versus apicem nigro: pedibus earneo-brunneis: iride nigrâ.

New-Zealand specimen (immature). Head, greater portion of neck, and a broad continuation with its apex on the fore part of the breast white, stained with fawn-colour on the fore neck and breast; a broad triangular patch of white covering the whole of the abdomen; the rest of the body-plumage brownish black, with dull steel reflexions, and strongly tinged on the upper surface with umber-brown; the upper wing-coverts are broadly edged with pale brown, and the central ones margined with white, forming a conspicuous band from the bend of the wing to the roots of the inner secondaries, which are dark olivaceous-brown in their whole extent, tipped with paler brown; wing-feathers black, with faint steel-blue reflexions, the scapulars margined with brown; tail-feathers black, with white shafts, also margined with brown. Irides black; bill greyish, changing to horn-colour on the unguis, and black at the tip; feet flesh-brown. Total length 39 inches; extent of wings 82; wing, from flexure, 24; tail 16 (the middle feather 9 inches shorter); bill, along the ridge 5, along the edge of lower mandible 5; middle toe and claw 3.5; hind toe and claw 1.

Remarks. The form of this bird is beautifully adapted to its habits of life. As will be seen from the above description, the wings measure nearly seven feet in extent; moreover they are strongly built, the shaft of the first primary measuring a quarter of an inch in width by one eighth in thickness throughout its lower portion. The first primary is longest, and the rest are rapidly graduated; the long inner secondaries reach to within five inches of the former in the closed wing. The tail is long and deeply forked; the lateral tail-feathers are acuminate in form, with rounded tips; the median ones are broader. The feet are small and

feeble; the outer toe is $\frac{1}{5}$ of an inch longer than the inner one; the claw on the middle toe measures an inch in length, and is pectinate on its inner side; the hind claw is small, rather broad, and abruptly arched; the lateral claws are equal, and slightly larger than the hind one; the interdigital web is deeply cut, and terminates at the third joint of the middle toe.

So far as I am aware there is only one recorded instance of the occurrence of this "Vulture of the sea," as it has been appropriately termed, on the New-Zealand coast. In February 1863 a fine specimen was taken alive at Castle Point, on the east coast of the Wellington Province, and forwarded to Mr. George Moore, who very generously presented it to me; and this unique example, of which a description is given above, is now with the rest of my original collection in the Colonial Museum. I was unable at the time to get any information about it, beyond the mere fact of its having been brought in alive by a party of natives, who had been on a fishing excursion; but, several years afterwards, when travelling through another portion of the province, I happened to meet with the native who had actually caught it. He said he was fishing near Rangiwahakaoma, when he observed a strange bird sitting on the rocks apparently asleep: creeping stealthily up, he succeeded in catching it with his hands. It made no attempt to escape; but, on being captured, attacked his hands fiercely with its powerful bill. He stated further that a similar bird had been killed by the natives at Ihuraua, on the same line of coast, a short time before, and that all who had seen it pronounced this the true "Hokioi" of Maori tradition—a long-winged bird that is supposed to soar in the heavens, far above the range of human vision, and to descend to the shore at night to feed on shell-fish. Sir George Grey is of opinion that the extinct New-Zealand Eagle (*Harpagornis moorei*) was the bird to which the tradition relates, and he may be right in this conjecture. On the other hand, it is not improbable that the wonderful powers of flight possessed by the Frigate bird gave rise to this well-known story of the "Hokioi;" and the enormous expanse of its wings would seem almost to warrant the most extravagant belief. On this subject thus graphically writes Audubon, the American ornithologist:—

"The Frigate Pelican is possessed of a power of flight which I conceive superior to that of perhaps any other bird. However swiftly the Cayenne Tern, the smaller Gulls, or the Jager move on wing, it seems a matter of mere sport to it to overtake any of them. The Goshawk, the Peregrine, and the Gyr Falcon, which I conceive to be the swiftest of our Hawks, are obliged to pursue their victim, should it be a Green-winged Teal or Passenger Pigeon, at times for half a mile, at the highest pitch of their speed, before they can secure them. The bird of which I speak comes from on high with the velocity of a meteor, and on nearing the object of its pursuit, which its keen eye has spied while fishing at a distance, darts on either side to cut off all retreat, and with open bill forces it to drop or disgorge the fish which it has just caught. See him now! Yonder, over the waves, leaps the brilliant dolphin, as he pursues the flyingfishes, which he expects to seize the moment they drop into the water. The Frigate bird, who has marked them, closes his wings, dives towards them, and, now ascending, holds one of the tiny things across his bill. Already fifty yards above the sea, he spies a porpoise in full chase, launches towards the spot, and in passing seizes the mullet that has escaped from its dreaded foe. I observed a Frigate Pelican that had forced a Cayenne Tern, yet in sight, to drop a fish, which the broad-winged warrior had seized as it fell. This fish was rather large for the Tern, and might probably be about 8 inches in length. The Frigate Pelican mounted with it across his bill about a hundred yards, and then tossing it up caught it as it fell, but not in the proper manner. He therefore dropped it, but before it had fallen many yards caught it again. Still it was not in a good position, the weight of the head, it seemed, having prevented the bird from seizing it by that part. A second time the fish was thrown upwards, and now, at last, was received in a convenient manner (that is, with its head downwards), and immediately swallowed."

It would seem that this species frequents all the seas of the warmer parts of the globe, and especially the Tropics, assembling in large flocks during the breeding-season, and dispersing over the wide ocean again as soon as the parental obligations are discharged. Their food consists of young turtles, cuttle-fish, crabs, and fish of all kinds. Being furnished with a capacious and expansive pouch they are able to stow away in a convenient manner all they can seize by way of plunder quite irrespective of their immediate wants.

Audubon found them breeding in large numbers in the Gulf of Mexico and on the Florida Keys; and he has given us the following interesting account, which further illustrates the amazing power of wing already mentioned:—"About the middle of May (a period which to me appeared very late for birds found in so warm a climate as that of the Florida Keys), the Frigate Pelicans assemble in flocks of from fifty to five hundred pairs or more. They are seen flying at a great height over the islands on which they have bred many previous seasons, courting for hours together; after which they return towards the mangroves, alight on them, and at once begin to repair the old nests or construct new ones. They pillage each other's nests of their materials, and make excursions for more to the nearest keys. They break the dry twigs of trees with ease, passing swiftly on wing, and snapping them off by a single grasp of their powerful bill. It is indeed a beautiful sight to see them when thus occupied, especially when several are so engaged, passing and repassing with the swiftness of thought over the trees whose tops are blasted; their purpose appears as if accomplished by magic. It sometimes happens that the bird accidentally drops a stick while travelling towards its nest, when, if this should happen over the water, it plunges after it and seizes it with its bill before it has reached the waves."

For a long period the only knowledge we possessed of the Frigate bird was that afforded by those who had voyaged in the tropical seas and studied the bird in its distant haunts; but in the early part of 1871 a pair of live ones, the gift of Captain Dow, were received at the Zoological Society's Gardens; and home naturalists had thus an opportunity of studying this remarkable form in a living state. But when I first looked on these captives, moping gloomily on their perch, with a mere dish of water beneath them, and their noble wings folded up in languid misery, I could not help pitying from my very heart these captives from the ocean, whose fate seemed almost harder than that of the "lord of the plains" on the opposite side of the Gardens, condemned to pass his life within an iron railing only ten feet square! From observing the Frigate bird under such circumstances it is impossible to form any adequate idea of what it is in a state of nature, where its whole individuality depends on its wonderful speed, its long powers of endurance, and the graceful aerial evolutions it is able to perform. Audubon, who was familiar with it in its native element, gave a spirited drawing of it dashing headlong through the air in pursuit of its quarry. In the 'Field' of September 23, 1871, there is an equally characteristic figure of the same bird as it was then to be seen in the Gardens (accompanied by an excellent description)—resting moodily on its feet, with the wings drooping, and the head drawn closely in upon the shoulders.

TACHYPETES MINOR.

(SMALL FRIGATE BIRD.)

Lesser Frigate Pelican, Lath. Gen. Syn. iii. pt. 2, p. 590 (1785).*Pelecanus minor*, Gm. Syst. Nat. i. p. 572 (1788).*Tachypetes minor*, Vieill. N. Diet. d'Hist. Nat. xii. p. 144 (1817).*Atagen ariel*, Gray, Gen. of B. iii. p. 669, pl. 104 (1845, ex Gould MSS.).*Fregata minor*, Buller, Birds of New Zealand, 1st ed. p. 342 (1873).

Exempl. ex N. Z. Nigricans, plus minusve purpureo et viridi nitens: dorsi plumis elongatis lanceolatis et pectore laterali nitidè viridibus aut purpurascens: tectricibus alarum cum hypochondriis brunneo tinctis: remigibus caudâque nigris, scapis reetricum exteriorum albis: rostro nigricanti-eano: plagâ gulari lætè rubrâ, flavo tinctâ: pedibus brunnescenti-rubris: iride nigrâ.

New-Zealand specimen. General plumage black with bluish metallic reflexions, more or less distinct; the long lanceolate feathers of the back and on the sides of the breast brilliant, and changing from purple to green, according to the light; upper wing-coverts and sides of the body tinged with brown; quills and tail-feathers black, the shafts of the outermost tail-feathers white. Irides black; bill blackish grey; a bare membrane, an inch wide, and extending five inches down the throat, bright red tinged more or less with yellow; feet brownish red. Total length 36 inches; wing, from flexure, 23; tail, to middle of fork 7.25, to end of lateral feathers 15; bill, along the ridge 4.25, along the edge of lower mandible 3.6; greatest width of bill at the base 1.1; middle toe and claw 2.75; hind toe and claw 1.

THIS smaller species of Frigate bird, which roams over the seas washing the shores of the more tropical parts of Australia, has occurred at least once as a straggler on the New-Zealand coast, and is therefore entitled to a place in our list. A fine adult male was taken on the Wakapuaka beach in the early part of 1861; and the skin, which was fortunately preserved, now forms part of the collection of birds in the Nelson Museum.

Mr. Gould states that this species of Frigate bird is very abundant in Torres Strait; and the late Commander Ince, R.N., who, during the voyage of H.M.S. 'Fly,' was for some time stationed on Raine's Islet, superintending the erection of a beacon there, has given the following interesting particulars as the result of his own observations on this unfrequented rock:—"We found this bird breeding in colonies at its S.W. corner, the nest being composed of a few small sticks collected from the shrubs and herbaceous plants, which alone clothe the island, and placed either on the ground or on the plants a few inches above it. The eggs, which are generally one, but occasionally two in number, are of a pure white, not so chalky in appearance as those of the Gannet, and nearly of the same shape at both ends. Upon one occasion I killed the old birds from a nest that contained a young one; on visiting the spot I found the young bird removed to another nest, the proprietors of which were feeding it as if it had been their own; I am sure of this fact, because there was no other nest near it containing two young birds."

PHAETHON RUBRICAUDA.

(RED-TAILED TROPIC BIRD.)

- Phaeton rubricauda*, Bodd. Tabl. Pl. Enl. p. 57 (1783).
Red-tailed Tropic Bird, Lath. Gen. Syn. vol. iii. pt. 2, p. 618 (1785).
Phaeton phœnicuros, Gmel. Syst. Nat. vol. ii. p. 583 (1788).
Phaeton aethereus, Bloxh. Voy. Blonde, App. p. 251 (1826).
Phœnicuros rubricauda, Bonap. Consp. vol. ii. p. 183 (1857).
Phaeton phœnicurus, Gould, Handb. B. of Austr. ii. p. 501 (1865).
Phaethon rubricauda, Salvin, Cat. Strickl. Coll. p. 511 (1882).

Exempl. ex N. Z. Omnino sericeo-albus, rosaceo-tinctus: remigibus concoloribus fuscis: regione oculari nigra, anticè semilunata, posticè longitudinaliter producta: reetricibus duabus intermediis longissimis intense rubris, scapis nigris: rostro rubro: pedibus flavis, membranis interdigitalibus nigris.

New-Zealand specimen. General plumage silky or satiny white, with a delicate roseate or salmon tint over the entire surface; a lunate spot of velvety black in front of the eyes, and a broken streak of the same above and beyond them; on the flanks and under tail-coverts some of the feathers largely centred with slaty black, leaving on the sides an even, narrow margin of white, which broadens at the tip. The scapulars have their shafts black in their basal portion; so have the outer secondaries; on the long inner secondaries the black spreads into a broad irregular stripe down the centre of each feather, running off to a fine point about half an inch from the tip. The two middle tail-feathers are white at the base, with a black central streak, but at a distance of two inches from the root the webs suddenly contract, and these feathers are then produced, to a length of thirteen inches beyond the cuneiform tail, as rigid bright red plumes with black shafts, and becoming somewhat paler at the tips; the lateral tail-feathers also have black shafts, changing to white an inch from the tips. Bill bright coral-red, shaded with brown in the nasal groove; legs and feet black, as is also the entire skin of the bird under the feathers. Total length (without the elongated tail-plumes) 21 inches; wing, from flexure, 13; tail 4 (to end of central plumes, 17); bill, along the ridge 2.5, along the edge of lower mandible 3.3; tarsus 1; middle toe and claw 2.25.

Young. Silky white, without any of the roseate blush mentioned above; the whole of the upper surface broadly barred with black; the primaries having the black of their shafts expanded into a spatulate form at the tips.

IN the list of the Birds of New Zealand compiled by Mr. G. R. Gray and published in 'The Ibis' for July 1862, the Red-tailed Tropic bird was included among the species of Pelecanidæ, the habitat assigned being Norfolk and Nepean Islands. On the publication of my 'Essay on the Ornithology of New Zealand' (1865), in the absence of any positive evidence of its occurrence in our seas, I decided to omit this bird from our list of species, and it was struck out accordingly.

It was re-introduced by myself in 1878*, on the authority of a specimen received from the late Mr. Henry Mair, and now in my collection. This bird (apparently a male in full plumage) is the one described at the head of this article. It was shot by Mr. Mair from the deck of a schooner during a calm, off the Three Kings, a group of islets a few miles north of New Zealand, the furthestmost

* Trans. N.-Z. Inst. vol. x. pp. 219, 220.

southern limit yet recorded for this eminently tropical species. A boat was lowered and the prize picked up and successfully skinned.

I never handle this specimen without being reminded of Charles Waterton's touching story, as related in his 'Essays on Natural History,' 1st series, p. 291 :—

“The burning zone, in which the ancients have placed the zodiac, is the favourite resort of this solitary wanderer of the deep. . . . Far, far away from land, where the Atlantic waves roll beneath the northern tropic, our mariners are often favoured with a view of the bird which I am about to describe. The total absence of all other winged inhabitants of the air, save now and then a Mother Carey's Chicken, renders the appearance of *Phaeton* very interesting in this sequestered region of the deep; and every soul on board hastens to get a glance at him, as he wings his lonely way through the liquid void. . . . In my passage home across the Atlantic, on board the 'Dee,' West Indiaman, commanded by Captain Gray, we saw *Phaeton* sitting on the wave, within gunshot of the ship—a rare occurrence. I fired at him with effect, and as he lay lifeless on the water, I said (without any expectation of recovering the bird), 'A guinea for him who will fetch the bird to me.' The vessel was then going smartly through the water. A Danish sailor, who was standing on the fore-castle, instantly plunged into the sea with all his clothes on, and swam towards the bird. Our people ran aft, to lower down the jolly-boat, but it was filled with lumber, and had been well secured with lashings for the passage home. Our poor Dane was now far astern; and in our attempt to tack ship, she missed stays, and we were obliged to wear her. In the meantime, we all expected that the Dane had gone down into Davy's locker. But, at last, we fortunately came up with him; and we found him buffeting the waves, with the dead bird in his mouth. I dissected it, and prepared it, and have kept it ever since, nor do I intend that it shall leave my house, as the sight often brings to my remembrance an occurrence of uncommon interest, now long gone by; for it is twenty years and more since I received the Tropic Bird from the cold and trembling hand of our adventurous Dane.”

The bird is well known to the Ngapuhi tribe at the north, under the name of Amokura, and they set a high value on the long red tail-feathers, which they exchange with the southern tribes for greenstone. Almost every year, after the prevalence of easterly gales, some specimens are washed ashore (generally dead) at the North Cape or in Spirits Bay. The natives of that district go out systematically to hunt for them at these periods. Owing to their rarity these plumes are more prized than those of the Huia or Kotuku, and in one instance a valuable slab of pounamu was given by a Hawke's Bay chief in exchange for three feathers, one of which is now in the possession of the Manawatu natives. The allusion is to this bird in the love-song of the fairies, commencing—

Come, deck my head
With amokura plumes*.

Mr. Gould, who has figured the species with his usual skill in 'The Birds of Australia,' states that it "is very generally dispersed over the temperate and warmer latitudes of the Indian Ocean and the South Seas, where it often hovers round ships, and occasionally alights on their rigging. During the months of August and September it retires to various islands for the purpose of breeding; among other places selected for the performance of this duty are Norfolk Island off the east coast of Australia, and Raine's Islet in Torres Strait, from both of which localities I possess specimens of the

* Kiatia taku rangi
Te kapu o te amokura
Tikapa o te hau
O kotuku te rangi
Kati nei ano
Aku rangi ki te noho
He pakinga ra tahi
Ka whana tu ai au, e-i.

bird and its eggs." It is not unusual to meet with it in the Bay of Bengal and about the Andamans and Nicobars; and it is known to breed in the neighbourhood of the Mauritius. It occurs also in Aneiteum, where its tail-feathers are much prized by the natives, who call it "Intoneg" *.

I have noticed in passing through the tropical seas that, as compared with the South Pacific (the great nursery, so to speak, of the Petrel family), these placid waters are singularly destitute of bird-life; indeed for a whole day together, sometimes, there is no animate sign except the feverish movements of the little flying-fish which are perpetually rising out of the water, fluttering a few yards in a direct line, and then dropping out of sight with a tiny splash, or, during a perfect calm, the appearance of thousands of "Portuguese men-of-war" (the pretty blue *Physalis*) floating listlessly on the bosom of the deep. It is pleasant at such a time to descry a "Straw-tail" or "Boatswain-bird" (by which names the sailors call the *Phaethon*) hovering in the sky far above the masthead or flying around the ship. I saw one for a short time in the full heat of the Tropics (lat. 11° S., long. 24° 21' W.). It hovered over our steamer with a rapid flapping of the wings, as if making an inspection, and then, ascending high in the air, made a swift sweep far over the ocean and we saw it no more.

Mr. Macgillivray, who obtained several on Raine's Islet in the month of June, gives the following account:—"Upon one occasion three were observed performing sweeping flights over and about the island, and soon afterwards one of them alighted. Keeping my eye upon the spot, I ran up and found a male bird in a hole under the low shelving margin of the island bordering the beach, and succeeded in capturing it after a short scuffle, during which it snapped at me with its beak, and uttered a loud, harsh, and oft-repeated croak. It makes no nest, but deposits its two eggs on the bare floor of the hole, and both sexes assist in the task of incubation. It usually returns from sea about noon, soaring high in the air and wheeling round in circles before alighting. The eggs are blotched and speckled with brownish red on a pale reddish-grey ground, and are two inches three-eighths long by one inch four-eighths-and-a-half broad. The contents of the stomach consisted of beaks of cuttle-fish. The only outward sexual difference that I could detect consists in the more decided roseate blush upon the plumage of the male, especially on the back; but this varies slightly in intensity in different individuals of the same sex, and fades considerably in a preserved skin."

Dr. Crowfoot writes (*Ibis*, 1885, p. 268):—"This bird breeds on Norfolk Island, Nepean Island, and Phillip Island, but the last-mentioned island is its principal resort, and here it may be counted by hundreds. It lays its single egg on ledges of rock, in cracks of the cliffs, under overhanging boulders, and in such-like situations. The bird defends its nest with its strong beak, and may be easily caught on the nest. On Norfolk Island the eggs are difficult to get, but on Phillip Island they may be readily obtained. The young Tropic-bird is a curious-looking object, being completely covered with thick snow-white down. The eggs vary in length from 2.65 inches to 2.85, and in breadth from 1.75 inches to 2.16. They have a reddish-brown ground-colour, and are covered all over with fine dark reddish and violet-brown markings. Some have the colouring-matter apparently partially washed off."

The best account I have seen of the nesting-habits of this bird is that given by the Earl of Pembroke in his little book of adventures in the South Pacific, already cited. I have examined a large series of eggs collected on Lord Howe's Island, and found them differing in shape from a thick ovoid to a long ovoido-conical form, and varying in colour from pale stone-grey, minutely freckled with darker grey to a splashed brown surface, as rich in colouring as a Merlin's egg. Two specimens in my son's collection from that locality are of equal size, measuring 2.8 inches in length by 1.8 in breadth; one of them is greyish white, marbled at the larger end and dotted and freckled all over with brown, whilst the other is splashed, dotted and marked over its entire surface with reddish brown of a uniform shade.

* "The Tropic Bird is very common in the Islands; the beautiful rose-coloured tail-feathers are largely esteemed by the natives, who pull them from the birds as they sit in their nests."—*Blocham* (l. c.).



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WANDERING ALBATROS.
DIOMEDEA EXULANS
(ONE-FIFTH NATURAL SIZE)

DIOMEDEA EXULANS.

(WANDERING ALBATROS.)

Diomedea exulans, Linn. Syst. Nat. i. p. 214 (1766).*Diomedea albatrus*, Pall. Spic. Zool. fasc. v. p. 28 (1769).*Chocolate Albatros*, Lath. Gen. Syn. iii. pt. 1, p. 309 (1785).*L'Albatros du Cap de Bonne Espérance*, Buff. Pl. Enl. x. pl. 237 (1786).*Diomedea spadicea*, Gm. Syst. Nat. i. p. 568 (1788, ex Lath.).*Diomedea adusta*, Tschudi, J. f. O. 1856, p. 157.*Native name.*—Toroa.

Ad. albus: interscapulio indistinctè brunneo fasciatim vermiculato: tectricibus alarum nigris vix brunnescentibus, majoribus interioribus plus minusve albis, margine carpali albo et brunneo vario: remigibus brunnescenti-nigris, apicem versus pallidioribus, scapis flavicanti-albidis: scapularibus albis, ad apicem nigris: dorso postico et uropygio, supracaudalibus caudâque albis, hac nigro apicatâ, rectricibus exterioribus basaliter brunneo irregulariter transversvermiculatis: subtùs purè albus, pectore indistinctè brunneo vermiculatim fasciato: rostro albido, carnosio vix tincto, ad apicem flavicanti-corneo: pedibus carneo-albicantibus: iride saturatè brunneâ: annulo ophthalmico viridi-purpurascente.

Juv. suprâ fuliginoso-brunneus: alis caudâque fuliginoso-nigris, scapis flavicanti-albis, versus apicem nigris: fronte cum facie laterali et gutture purè albis: subtùs fuliginoso-brunneus, abdomine magis cinerascete: subalaribus et axillaribus albis, his versus apicem brunneo vermiculatis: rostro albicanti-corneo: pedibus albicanti-carneis: iride nigricanti-brunneâ.

Adult. General plumage pure white; the feathers of the back and those composing the mantle crossed more or less with narrow wavy lines of brown; the breast and sides of the body obscurely freckled and vermiculated with pale brown; upper surface of wings blackish brown, varied with pale brown and white along the edges, and with an extensive patch of white on the humeral flexure; primaries brownish black, with paler tips and yellowish-white shafts; secondaries brownish black, largely marked with white on their inner webs; scapulars white on their basal portion, black towards the tips; tail-feathers largely marked with black in their apical portion, and the outer ones more or less vermiculated with brown; lining of wings and under tail-coverts pure white. Irides rich dark brown; bare eyelids greenish purple; bill white, with a pinky tinge, yellowish horn-coloured at the tip; legs and feet flesh-white, sometimes with a pinky tinge. Total length 42.5 inches; wing, from carpal flexure, 24; tail 8.5; bill, following the curvature of upper mandible 7; length of lower mandible 6; depth of bill at the base 2.5; bare tibia 1.5; tarsus 5; middle toe and claw 6.5; greatest width of expanded foot 6.5.

Obs. The measurements given above are those of an ordinary-sized bird captured off the New-Zealand coast by the seamen of H.M.S. 'Virago'; the size, however, is variable, and much larger examples are sometimes taken. For example, I saw in the possession of the first mate of the steamboat 'Stella' the head and neck of one of extremely large size, with the whole plumage of the purest white, the bill of which gave the following measurements:—Length from gape to tip 6.5 inches; following curvature of upper mandible 8.5; and along edge of lower mandible 6.5.

Professor Hutton gives for this species an "average breadth across the wings of 10 feet, the smallest being 9 feet and the largest 12 feet"; another writer mentions having measured one which yielded an extreme extent, from tip to tip, of 17 feet. My largest, however, is barely 14 feet across.

It may be observed that, soon after death, the lower part of the bill, the legs, and the feet change to a delicate purplish colour from congestion of the blood in the small vessels, and ultimately become yellow or yellowish brown in the dried specimen.

Young. A narrow band across the forehead and the whole of the face, sides of the head, and throat pure white; crown of the head, nape, neck all round, and the entire body-plumage deep slate-grey, washed more or less with brown and darker on the upper surface, the feathers composing the mantle having pale brown margins; the whole of the upper surface of the wings uniform blackish brown; rump and upper tail-coverts slaty brown with darker margins; primaries and tail-feathers black, the shafts and the inner webs becoming greyish white in their concealed basal portion; lining of wings and long axillary plumes pure white, the latter with delicate vermiculations of sooty brown near the tips. Irides brownish black; bill white horn-colour; legs and feet flesh-white.

Obs. The white patch on the face is very distinct, with well-defined edges; it fills the whole region in front of the eyes, crosses the forehead along the base of the mandible, and passing well over the eyes extends beyond them almost to the ears, where it forms a sharp angle, and then, sweeping back over the cheeks, spreads downwards and expands so as to cover the whole of the throat.

Nestling. Covered with pure white down.

Progress towards maturity. As it takes a considerable time to attain the fully adult plumage, birds are to be met with in every intermediate stage, and are often very beautifully barred and freckled with dark brown, especially on the upper parts and sides of the body. In very old birds the wavy markings described above diminish considerably or entirely disappear.

I have before me a fine series (now in my collection) showing the transitions of plumage through which this bird passes before it attains to the adult livery.

No. 1 is a more advanced stage than the "young" described above. The whole of the plumage is many shades lighter; the white on the face is more extensive, the narrow frontal band expanding to the width of an inch, and the patch extending beyond the throat halfway down the neck, still, however, preserving its characteristic form with a pretty well-defined outline; the crown, hind neck, shoulders, and mantle darker brown, with very pale brown margins; rump and tail-coverts uniform slaty brown; upper surface of wings brownish black, the small coverts tipped with pale brown; primaries and tail-feathers brownish black; lower portion of fore neck, breast, and underparts generally dark chocolate-brown with broad buffy margins, having a pretty wavy appearance on the sides of the breast, becoming lighter and more mixed on the abdomen, and darkening to blackish brown on the under tail-coverts; the whole of the inner lining of wings and the axillary plumes pure white, the latter with pretty grey vermiculations, more or less distinct, towards the tips. This bird (which is probably a female) is undergoing a change of plumage; the old, brown feathers composing the mantle have worn and abraded tips fading into buffy white; and the new feathers are of a uniform slaty grey, with only a faint indication of margin. On the sides of the body and mixed with the dull brown plumage are likewise some new feathers, which are white, thickly freckled in a wavy manner with grey. Bill uniform yellowish horn-colour, changing to bright yellow on the unguis, which has a bluish patch at the base. Bill 6.5 inches, following curvature 7.5.

No. 2 has still lighter plumage; the outline of the white patch disappears on the throat, merging into the brown plumage of the breast through a delicate shade of buff; and the ground plumage being paler, the wavy light brown markings on the breast are not so conspicuous; the feathers of the shoulders and mantle have broad margins of pale brown, many of them much abraded, and there is a strong wash of brown on the rump and tail-coverts; the plumage of the underparts is likewise much lighter, becoming almost white on the abdomen. Judging by its large size this bird is a male. Bill from gape to tip 7 inches, following curvature of upper mandible 8; wing, from first flexure, 27; tail 8.75; tarsus 4.5.

No. 3 is lighter on the underparts than No. 1, and with the white on the throat not so well defined, although forming a distinct hood over the eyes; hind neck, shoulders, and mantle much paler brown, a few scattered white feathers with rayed markings appearing among the smaller scapulars; upper surface of wings and tail blackish brown; sides of the body and under tail-coverts much vermiculated; lining of wings and axillary plumes pure white. Bill 6.25, following curvature 7.75.

No. 4 has the vertex and crown dark brown; the throat, collar, and hind neck creamy white with pale brown patches on the former; mantle dark brown, each feather paler at the extremity, but with numerous scattered white feathers distinctly vermiculated; upper surface of wings and tail uniform blackish brown; underparts of the body pale brown mixed with darker, and delicately vermiculated; under tail-coverts dark brown, with a single white feather covered with dusky rays. Bill 6.5 inches, following curvature 8.

No. 5 has the crown dark brown, fading away on the nape; back, rump, and upper tail-coverts white, beautifully barred and vermiculated with blackish brown; wings and tail brownish black; throat and entire fore neck pure white; breast and sides covered with freckles and minute vermiculate markings of grey. Bill 5.5 inches, following curvature 6.75.

No. 6 is similar to No. 4, but having more of the scattered white feathers, covered with vermiculation on the shoulders and mantle, presenting a highly variegated appearance; with a darker crown it has the hind neck very pale, and there are no white feathers among the under tail-coverts. Bill 6.25 inches, following curvature 7.75.

No. 7 (which is probably a female) has very nearly attained the adult plumage, as described above. The white of the throat extends to the breast, having only a wash of brown on the lower fore neck; crown and nape uniform brown; the rest of the body-plumage white; mantle, back, rump, and upper tail-coverts with some plain brown feathers intermixed and closely rayed and vermiculated with brown; the breast is thickly freckled or mottled, and the sides of the body, flanks, and under tail-coverts rayed irregularly with brownish grey; on the lower breast and above the vent these markings fade away, and the abdomen is pure white. Bill 5.75 inches, following curvature 6.75.

No. 8. The brown markings have almost entirely disappeared from the neck, there being only a slight wash of brown on the nape; the crown is still brown, but not so dark as in the last. The white face is tolerably distinct, the white covering the fore neck and extending to the breast, which is crossed with delicate vermiculations and freckles, these becoming fainter towards the abdomen till they fade away altogether; under tail-coverts freckled and vermiculated in their whole extent; lining of wings and axillaries pure white, the innermost of the latter faintly marked and clouded with grey; the whole of the back, mantle, rump, and upper tail-coverts closely vermiculated and freckled with greyish brown, presenting, however, a very different appearance to the wavy zigzag lines which adorn another example to be presently described; upper surface of wings and tail brownish black. Still there is the distinguishing feature of immaturity in the upper surface of the wings and tail being brownish black. Bill yellowish horn-colour.

No. 9. Crown of the head chocolate-brown, fading away on the nape; forehead, face, sides of the head, throat, and neck all round white, but exhibiting a wash of brown on the sides and hind neck; shoulders, mantle, back, rump, and upper tail-coverts white, thickly mottled and vermiculated with greyish brown, the markings being larger and more pronounced on the upper tail-coverts; entire upper surface of wings and tail brownish black, the shafts of the primaries being yellowish white with darkened tips; underparts white, the whole of the breast thickly freckled and speckled, the sides of the body, flanks, and under tail-coverts speckled and vermiculated with greyish brown, these delicate markings fading insensibly away towards the abdomen; inner lining of wings and axillary plumes spotless white, excepting only some of the inferior plumes, which are faintly freckled and clouded with grey. Irides rich dark brown; bare eyelids greenish purple; bill white, with a pinky tinge, yellowish horn-coloured at the tips of both mandibles; legs and feet flesh-white, with a tinge of pink.

No. 10. This fine example, which furnishes the front figure in my Plate of this species, has the general plumage pure white; the vertex, nape, and the whole of the breast obscurely freckled and rayed with dark grey; sides of the body and flanks with delicate vermiculations of the same colour; shoulders, mantle, back, rump, and upper tail-coverts silky white, covered with narrow transverse zigzag bars of greyish brown, producing a very pretty effect; on the scapular-coverts these markings become darker and more vermiculate in character; the upper surface of wings brownish black, with scattered white markings along the arm, which increase and finally become confluent at the inner flexure of the humerus, forming a broad irregular patch with barred markings and freckles of greyish brown; the primaries are brownish black with yellowish-white shafts; the lining of the wings and the long axillary plumes are pure white, the innermost of the latter clouded and freckled with grey. The tail-feathers are parti-coloured, with pure white shafts; the middle tail-feather has its basal half white with produced marginal limbs; on the three next the white progressively

extends further on the inner web; on the outermost feather the black reaches only halfway down on the outer web, and on the inner is reduced to a patch in the form of a hatchet; the under tail-coverts, which extend to the end of the feathers, are pure white. Bill beautiful pinky horn-colour, the cutting-edge of the upper mandible margined with black as far as the unguis. Length 43 inches; wing, from second flexure, 24.5; tail 8; bill, from gape to tip 6, following curvature of upper mandible from the base 6.5, along the edge of lower mandible 5.6; tarsus 4; middle toe and claw 6.5; greatest width of expanded foot 6.5.

Notes. Mr. Gould, in his 'Handbook to the Birds of Australia' (ii. p. 433) thus disposes of the differences of plumage:—"The Wandering Albatros varies much in colour at different ages: very old birds are entirely white, with the exception of the pinions, which are black; and they are to be met with in every stage, from pure white, white freckled and barred with dark brown, to dark chocolate-brown approaching to black, the latter colouring being always accompanied by a white face, which in some specimens is washed with buff; beneath the true feathers they are abundantly supplied with a fine white down. . . . The young are at first clothed in a pure white down, *which gives place to the dark brown colouring mentioned above.*"

A fledgling, however, in the Otago Museum (obtained at Campbell Island) is entirely without the dark plumage. It has not yet completely lost the dense fluffy pure white down which forms the clothing of the nestling. The head, neck, shoulders, rump, tail, and entire under surface are of the purest white, having a fine silky gloss; the interseapular region is traversed longitudinally with club-shaped marks of greyish black, increasing downwards, the larger feathers having their apical portion completely covered; upwards, towards the shoulders, these marks diminish till they become mere arrow-heads; on the mantle there are numerous marginal bars, but there is no vermiculation. The wings are brownish black on their upper surface varied with white, all the coverts having white margins, and the quills are black. Bill yellowish horn-colour, with a bluish tinge on the upper mandible.

Shortly before leaving the colony, I saw, at Waikanac, a fresh specimen which had been cast ashore on the coast during a severe gale. It was of small size, and evidently a young bird. The whole of the plumage was pure white without any markings, excepting only the wings, which were black on their upper surface, largely dappled with white, especially towards the humeral flexure. Legs and feet flesh-grey. The skin of this bird afterwards came into the possession of Mr. S. W. Silver, of Letcomb Manor, and, with his permission, I have introduced its likeness into my Plate of this species, as the back figure standing on a rock.

We cannot suppose that the Albatros is first pure white, then dark brown, and, after passing through several intermediate states, pure white again in extreme old age. Nor would it be altogether safe, from the materials at present before us, to construct a new species. I am inclined rather to account for the differences I have mentioned on the supposition of the existence of dimorphic phases of plumage as in some other oceanic birds.

The following is a description of a perfectly mature example of this Albatros, the fresh skin of which was received at the Canterbury Museum from one of the emigrant ships, in 1874, and noticed by me in a communication to the Philosophical Institute*:—"The whole of the head and neck, as well as the upper and lower parts of the body, of the purest milk-white. On each side of the nape, or upper part of the neck, there is a broad longitudinal mark, of a beautiful roseate pink, covering an area of about six inches in length by two inches in breadth, which fades soon after death, and ultimately disappears altogether in the dried skin †. Another specimen obtained at the same time showed traces of this feature, but in a very diminished degree; and I conclude that it is to be met with only in very old birds, or at some particular season of the year. The only dark markings are on the wings and tail; on the latter, each feather has two subapical irregular spots of black, larger and darker on the outer webs. (It is probable that these spots ultimately disappear, leaving

* Trans. N.-Z. Inst. vol. viii. p. 189.

† This feature, which appeared to me at the time quite a new fact in natural history, has since been noticed by Dr. Kidder in the following terms:—"All of the nesting Albatroses that I saw, without exception, showed a slight pinkish discoloration of the neck, as if a blood-stain had been washed out (usually on the left side), and extending downward from the region of the ear."

I find, however, that I was not the first to record this peculiarity of coloration. Captain Hutton, in his 'Notes on the Petrels of the Southern Ocean,' mentions "a rose-coloured streak on each side of the neck," and adds, "I have never seen this on either the young or very old birds; and the only one I ever captured with it was a male. I have also only seen these marks between June and August, and I am therefore disposed to believe that they distinguish the middle-aged male bird previous to the breeding-season; but I am not sure of this."

the tail entirely white, for I observed that on some of the lateral feathers there was only a single irregular spot on the outer web.) Two of the upper tail-coverts (which otherwise are perfectly white) are crossed transversely with delicate vermiculations of dark brown; the lining of the wings and the axillary plumes pure white. At the insertion of the wings some of the upper feathers have delicate vermiculations; the inferior secondaries are broadly marked in this manner, and the longer ones have a broad terminal patch of black. Along the edge of the humerus there are spots of black, having a very pretty effect, each feather having a broad angular spot on the outer vane. At the humeral bend of the wing the white plumage predominates, the spots appearing again like irregular inky patches, and becoming thicker and larger towards the carpal flexure. The secondaries are white in their basal portion, greyish black towards the tips. The primaries are brownish black, with white shafts, fading to grey on their inner webs, and white at the base.

In the Otago Museum there is an apparently fully adult bird in which the crown is mottled and the sides of the neck, the entire mantle, and the upper tail-coverts handsomely vermiculated with brownish black on a pure white ground; the upper surface of the wings black, varied more or less with white; quills and tail-feathers brownish black; the entire under surface of the body delicately vermiculated with dark brown; bill yellow horn-colour, with a slate-coloured patch near the expansion at the tip of the lower mandible.

There is another adult specimen in the Colonial Museum, which has a perfectly white head, neck, and underparts, with very silky plumage; no markings whatever on the back, and only an indistinct vermiculation on some of the feathers composing the mantle; rump and tail white, the middle tail-feathers somewhat clouded with grey; upper surface of wings greyish black, marked along the upper edge and largely towards the humeral flexure with white; scapulars white, marked with broken bars of greyish black. Bill uniform pale yellow, the cutting-edge of upper mandible black. Legs and feet flesh-white.

There is likewise a very fine specimen in the Canterbury Museum in which there is an entire absence of freckles or vermiculate markings, the whole of the body-plumage being of the purest white; the upper surface of wings largely varied with white, the humeral flexure being entirely white.

In another very large one which I had an opportunity of examining the entire plumage was white except on the upper surface of wings, where likewise, along the upper edge and towards the humeral flexure, the white predominated; there was no vermiculation on the upper surface, except at the ends of the scapulars, and the tail-feathers were only mottled with black at the tips. But the principal feature in this bird was in the colour of the bill, which from a whitish horn-colour deepened to rich orange-yellow on the culmen, and darkened to reddish brown towards the base.

WHAT voyager on the high seas has not watched with wonder and admiration the sailing flight of the Albatros! It has been the theme of poets and philosophers from the earliest times; and various ingenious theories have been propounded to account for the amazing power which this bird possesses of sailing in the air for an hour at a time without the slightest movement of its expanded wings. Professor Hutton, whose observations on the birds inhabiting the Southern Ocean ('Ibis,' 1865) are full of suggestive information, has contributed an essay* on the flight of the Albatros; and although his mathematical treatment of the subject has been challenged, his paper shows a very clear apprehension of the mechanical principles on which the explanation rests—his main object being to show that if an Albatros started with a certain velocity it could, by slightly altering the angle at which it was flying, continue to support itself in the air without using its wings until its velocity had been reduced below a certain point.

Dr. Bennett, who has written on the same subject, remarks:—"It is pleasing to observe this superb bird sailing in the air in graceful and elegant movements, seemingly excited by some invisible power; for there is scarcely any movement of the wings seen after the first and frequent impulses are given, when the creature elevates itself in the air, rising and falling as if some concealed power guided its various motions, without any muscular exertion of its own." Mr. Gould adds the following testimony:—"The powers of flight of the Wandering Albatros are much greater than those of any other

* Philosophical Magazine, August 1869.

bird that has come under my observation. Although during calm or moderate weather it sometimes rests on the surface of the water, it is almost constantly on the wing, and is equally at ease while passing over the glassy surface during the stillest calm, or flying with meteor-like swiftness before the most furious gale; and the manner in which it just tops the raging billows and sweeps between the gulfy waves has a hundred times called forth my wonder and admiration. Although a vessel running before the wind frequently sails more than 200 miles in the twenty-four hours, and that for days together, still the Albatros has not the slightest difficulty in keeping up with the ship, but also performs circles of many miles in extent, returning again to hunt up the wake of the vessel for any substances thrown overboard." It requires no great stretch of imagination to believe, with the last-named naturalist, that in the course of their peregrination they frequently make the circuit of the globe—a conclusion the more natural, as the medusæ and other marine productions on which they subsist appear to be equally abundant in every latitude.

Dr. Bree writes, in his 'Birds of Europe':—"The Wandering Albatros, of which but few naturalists have much personal knowledge, inhabits the Atlantic and Pacific Oceans. Its appearance in European seas is rare and accidental; at least, but few instances of its having been seen there are recorded. Degland notices one specimen having been captured at Dieppe about 1830, the head of which is preserved by M. Hardy, the well-known naturalist of that place. Another specimen was killed near Anvers in 1833, and three more in the neighbourhood of Chaumont in November 1858. There is also a specimen in the Museum at Christiania, which Mr. Tristram informs me he has seen, which was killed off the coast of Norway. Notwithstanding these instances, however, ornithologists have been tardy in admitting this species into the European lists*. Nuttall, whose descriptions are always interesting, proceeding as they did from an accomplished naturalist, who, like Audubon, earned his reputation in the forests and the prairies, has given an excellent account of this bird. 'Vagabond,' he remarks, 'except in the short season of reproduction, they are seen to launch out into the widest part of the ocean, and it is probable that, according to the season, they pass from one extremity of the globe to another!'

"I cannot endorse Nuttall's statement that it is only 'when the flying-fish fail they have recourse to the inexhaustible supply of molluscous animals with which the milder seas abound;' nor can the following be a true record of the natural history of the species:—"They are nowhere more abundant than off the Cape of Good Hope, where they have been seen in April and May, sometimes soaring in the air with the gentle motion of the Kite at a stupendous height, at others nearer the water, watching the motions of the flying-fish, which they seize as they spring out of the water to shun the jaws of the larger fish which pursue them. Vast flocks are also seen around Kamtschatka and the adjacent islands, particularly the Kuriles and Bering's Island, about the end of June. Their arrival is considered by the natives of these places as a sure presage of the presence of the shoals of fish which they have thus followed into these remotest seas.' It is very evident that Nuttall's observations relate to an entirely different bird; for no one ever saw the Wandering Albatros capture its food in the manner described, nor does its range extend into the region he mentions."

I have myself never tired of watching the flight of the Albatros and of speculating on the exact nature of its guiding and impelling force. It is interesting, too, to observe the conduct of these birds when a number of them, perhaps six or seven, are following in the wake of the steamer. They are coursing around in circles that meet, and with scarcely a movement of their ample pinions, when one of them observes a piece of offal, or other object, thrown everboard and drifting astern. It suddenly arrests itself in its graceful flight, bends its body into an ungainly shape by stretching forward its straddled legs and throwing back its head, and then flops down into the water, followed first by

* Both *Diomedea exulans* and *D. chlororhyncha*, although admitted by Dr. Bree on the authority already mentioned, are omitted by Mr. Dresser from his 'Birds of Europe.'

one and then by another of its companions in quick succession. Over the floating morsel they seem to hold a "caucus," with all their heads together and wings partially raised, and in a few minutes are left far astern of the moving steamer, rising and falling with the rolling wave, till they are well nigh out of sight; then mounting in the air again, one after the other, after a preliminary run on the water to get the required impetus, they come sweeping up to their former position with almost incredible swiftness. They follow the coastal steamers in all weathers, seldom, however, venturing further than the entrance when a port is reached; although on several occasions I have known young birds continue in pursuit almost to the anchorage.

Perhaps no writer has more graphically described the flight of this noble bird than Froude in his 'Oceana' (pp. 65, 66):—

"From the Cape to Australia the distance is 6000 miles, or a quarter of the circumference of the globe. Our speed was thirteen knots an hour, and we were attended by a body-guard of Albatrosses, Cape-hens, and Sea-hawks—the same birds, so the sailors said, following the ship without resting all the way. I know not whether this be so, or how the fact has been ascertained. One large Gull is very like another, and the islands in the middle of the passage are their principal breeding-places. Any way, from fifty to a hundred of them were around us at sunrise, around us when the night fell, and with us again in the morning. They are very beautiful in the great ocean solitude. One could have wished that Coleridge had seen an Albatross on the wing before he wrote the 'Ancient Mariner,' that the grace of the motion might have received a sufficient description. He wheels in circles round and round, and for ever round, the ship—now far behind, now sweeping past in a long rapid curve, like a perfect skater on an untouched field of ice. There is no effort; watch as closely as you will, you rarely or never see a stroke of the mighty pinion. The flight is generally near the water, often close to it. You lose sight of the bird as he disappears in the hollow between the waves, and catch him again as he rises over the crest; but how he rises and whence comes the propelling force is to the eye inexplicable; he alters merely the angle at which the wings are inclined—usually they are parallel to the water and horizontal; but when he turns to ascend or makes a change in his direction the wings then point at an angle, one to the sky, the other to the water. Given a power of resistance to the air, and the air itself will do the rest, just as a kite flies; but how, without exertion, is the resistance caused? However it be, the Albatross is a grand creature. To the other birds, and even to the ship itself, he shows a stately indifference, as if he had been simply ordered to attend its voyage as an aerial guardian, but disdained to interest himself further" *.

On my last voyage from the Antipodes, by direct steamer by way of Cape Horn, I made careful observations on the Albatrosses that followed us. During the first few days from the New-Zealand coast (middle of March), and in lat. 56° S., some twenty or more of *D. exulans* were in daily attendance. Nearly the whole of these were in the dark plumage characteristic of the young bird, the fore neck, breast, and upper parts of the body being of various shades of chocolate-brown, and the face, throat, and abdomen pure white. In some the brown on the breast was very pale, and in one or more of them was reduced to a mere cloud of speckled markings. One bird, however, and the only one in the white body-plumage mentioned above, was conspicuous among the group. It had the head,

* "A singular incident at sea is reported by the captain of the ship 'Gladstone,' which arrived in Port Jackson from London on November 20. At 1 p.m. on October 22, in lat. 42° S., long. 90° E., the ship was running down her easting across the Southern Ocean when one of the hands fell overboard from the starboard gangway. Immediately on the alarm being given the ship was smartly rounded to, and the life-boat, manned by the first officer and four hands, lowered in hot haste. The boat reached the unfortunate man after a long pull, and found him supporting himself in the water by clinging desperately to a large Albatross, which, on coming to the surface after his plunge, he had succeeded in making his prize. Holding to the huge bird with all the energy of a drowning man, he had utilized him as a life-buoy until rescued by his comrades. This is probably the first case of the kind on record."—*The Colonist*, Jan. 20, 1882.

neck, back, and all the underparts of the purest white; and the upper surface of the wings blackish brown, with a broad white patch at the humeral flexure. It was a bird of considerable size—larger, indeed, than any of the others—and seemed to take much wider sweeps over the ocean, and often approached so near to the stern of our ship that I could detect the pinky flesh-colour of the beak. Its tail was white, with what appeared to be a terminal band of black. In long. 126° , the weather being bitterly cold, all the Albatroses had left us. But three days later, lat. $56^{\circ} 22'$ S., long. $107^{\circ} 9'$ W., a pair of young birds (in brown plumage) came up to us about noon; and on the following day (March 21), with a stiff gale blowing, an old one appeared in the midst of a flock of Petrels, but did not remain very long. The last appearance of this species was on March 22nd, lat. 56° , long. 88° , when two birds (one of them in the young plumage) joined us about noon and followed our ship till dark. At this time we were steaming before the wind at a great rate, our log having registered a run of 320 miles for the previous twenty-four hours.

About 5 P.M. the next day, lat. 56° , long. 83° , an Albatros of another species, probably *D. brachyura*, appeared in sight. It kept at a long distance from the steamer, made one wide sweep over the sea, and then vanished; and two days later, having rounded Cape Horn and got into a placid ocean, six more of them appeared at one time, sailing close to the water, and then rising high in the air (with a movement like a Sea-Gull's), then sweeping down again in a wide circle and skimming the surface as before—coursing far away to leeward, keeping company, as it were, with the ship, but never following in our wake after the manner of the South Pacific bird.

Although the Wandering Albatros is very common in the seas round New Zealand, I have never heard of its breeding on any of the outlying rocks, except those in the vicinity of the Chatham Islands. Campbell and the Auckland Islands are enumerated among its known breeding-stations*. Dr. McCormick, surgeon of H.M.S. 'Erebus,' who found it nesting on the latter in the months of November and December, writes:—"The grass-covered declivities of the hills above the thickets of wood are the spots selected by the Albatros for constructing its nest, which consists of a mound of earth, intermingled with withered grass and leaves matted together, 18 inches in height, 6 feet in circumference at the base, and 27 inches in diameter at the top, in which only one egg is usually deposited. The eggs I had an opportunity of weighing varied in weight from $14\frac{1}{2}$ to 19 oz., thirty specimens giving an average of 17 oz.; colour white [measuring 4.75 inches in length by 3.25 in breadth]. The Albatros during the period of incubation is frequently found asleep, with its head under its wing; its beautiful white head and neck, appearing above the grass, betray its situation at a considerable distance off. On the approach of an intruder it resolutely defends its eggs, refusing to quit the nest until forced off, when it slowly waddles away in an awkward manner to a short distance without attempting to take wing. Its greatest enemy is a fierce species of *Lestris*, always on the watch for the Albatros quitting its nest, when the rapacious pirate instantly pounces down and devours

* Mr. J. D. Enys writes to me that it likewise breeds on some rocks north of the Chatham Islands; and Mr. Hood, a Wharekauri settler, informs me that the Chatham Island natives periodically visit two groups of small islands (the Sisters and the Forty) for the purpose of collecting young birds. In August 1883 he saw the boats return with seven hundred young Albatroses. The natives had caught them on the nest and wrung their necks. After this they were tried down in their own fat and potted in calabashes for future use. He has several times joined himself in this annual excursion and assisted in the capture of the young birds: and on one occasion, the natives having chartered his schooner for the purpose, they collected as many as two thousand young birds off these islands. This was in the month of September, and the young were fully fledged and well grown. From the Pyramid Rock, lying off Pitt's Island, they obtained several hundred more. Mr. Hood states that on these small islands the birds breed on the high rocks, forming very rude nests of drift and seaweed, and that each of these contains a single young one. Whilst the nests are being plundered in the wholesale manner described above, the old birds generally sweep in wide circles overhead, but never utter a sound. A few braver ones remain near their offspring, but they offer no resistance. The young, on the contrary, are very vicious with their beaks, and have to be despatched with clubs. Mr. Hood further states that the young birds are pure white with black wings.

the egg. So well is the poor bird aware of the propensity of its foe, that it snaps the mandibles of its beak violently together whenever it observes the *Lestris* flying overhead."

Professor Scott found this species breeding on Campbell Island in the month of November; and, strange to say, as late as March 16th, as Sir James Hector has informed me by letter, "Captain Fairchild found it nesting in large numbers on Antipodes Island. The nests were placed among the tussock-grass and moss, on a plateau 25 acres in extent and 1320 feet above the sea. Each nest contained a single egg. He examined hundreds of nests, but never found one with two eggs in it*. The 'Hinemoa' proceeded from Antipodes to the Bounty Islands: *Diomedea exulans* was not breeding there, but there were lots of *D. melanophrys*, and the young were quite large."

The fledgling in the Otago Museum, described above, is stated to be about ten months old; and to account for this long babyhood I cannot do better than quote the following account † of the very curious domestic economy of this bird:—"At a certain time of the year, between February and June, Mr. Harris cannot exactly say when, the old birds leave their young and go to sea, and do not return until the next October, when they arrive in large numbers. Each pair goes at once to its old nest; and after a little fondling of the young one, which has remained in or near the nest the whole time, they turn it out and prepare the nest for the next brood. The deserted young ones are in good condition and very lively, frequently being seen off their nests exercising their wings. When the old birds return and take possession of their nest, the young one often remains outside, and nibbles at the head of the old one until the feathers between the beak and the eye are removed and the skin made quite sore. The young birds do not go far from land until the following year, when they accompany the old ones to sea."

There can be no reasonable doubt as to the truth of this account, wonderful as it may appear. The Maoris, who are good natural observers, confirm the story, and state that when the young birds are left they are so immensely fat that they can subsist for months without food of any kind. Professor Hutton expressed a belief that the young birds are nocturnal (although the old ones are strictly diurnal) and "go down to the sea at night, returning to their nests in the morning;" but Mr. Harris rejects this theory, stating that they are incapable of flight, and that the situations occupied by many of them made it impossible to get to the water except by that means.

What is that divinely-implanted faculty which enables this bird, after wanderings that defy calculation and perhaps encircle the globe, to find her way back at the right moment, across the pathless deep, to that little speck of rock in mid-ocean where she had cradled her young the season before? Doubtless the same mysterious unerring instinct that guides the Swallow in its annual pilgrimage—that leads the Pipit, without landmark of any kind, straight to her little nest in the grass amidst miles of waving tussock—that enables the nesting sea-bird, when she comes back from fishing, to pick out her two painted eggs from amongst the thousands that lie upon the barren rock.

An egg of this species in the Canterbury Museum is ovoid or slightly ovoido-elliptical in form, yellowish white, with a roughly granulate shell, wholly devoid of gloss or polish, but without any excrescences. It measures on its axis 4.8 inches in length by 3.3 in width. Its longest circumference is 12.6 inches, and its widest 10 inches. An egg obtained at Campbell Island, at the same time as the nestling described above (in the month of November), is ovoido-elliptical in form, measuring 5 inches in length by 3 in breadth, and is perfectly white, with a slightly granulate surface. There is another egg in the Otago Museum (without any locality assigned to it) which is somewhat larger, measuring 5.5 inches in length by 3.2 in breadth, of a creamy colour and much soiled by external contact, especially at the larger end. An egg in my son's collection is ovoido-elliptical, being slightly larger at one end, and measures 4.85 inches in length by 3.15 in breadth; it is of a uniform yellowish white with a finely granulate surface, without the slightest gloss.

* Sir George Grey informs me that on the Auckland Islands he found hundreds of Albatrosses breeding together. The nests, according to his account, were of the shape of a Chilton cheese, and each one contained a single egg. Hence the Maori saying, "Kaingatahi."

† "Notes on Birds inhabiting the Southern Ocean," by F. W. Hutton ('The Ibis,' 1865, p. 279).

DIOMEDEA MELANOPHRYS.

(BLACK-EYEBROWED ALBATROS.)

Diomedea melanophrys, Boie, in Temm. Pl. Col. v. pl. 456 (1828).*Native name.*—Toroa.

Ad. albus : interscapulio et scapularibus cum alâ totâ schistaceo-nigris : dorso postico, uropygio et supracaudalibus albis : caudâ schistaceo-nigrâ, scapis albidis : regione oculari delicatè cincreâ, suprâ oeculum saturatiore, supercilium formante : rostro sordidè flavo : pedibus flavicanti-albis, eyanescente vix lavatis, plantis etiam cyanescente tinctis : iride pallidè brunncâ.

Adult. General plumage pure white ; middle portion of back and upper surface of wings slaty black ; in front of the eyes a broad patch of bluish grey, which passes into a darker streak over and behind them ; tail dark ash-grey, the shafts of the feathers white. Irides light brown ; bill dull yellow ; legs and toes yellowish white, the interdigital webs and the joints washed more or less with pale blue. Total length 34 inches ; wing, from flexure, 20·5 ; tail 8 ; bill, along the curvature 5·25, from gape to extremity of lower mandible 4·75 ; tarsus 3 ; middle toe and claw 4·75.

Obs. Individuals vary in size, and in one of my specimens the bill measures along the culmen 6 inches, and from gape to tip, in a direct line, 4·75.

Young. Differs from the adult in having the head and neck ash-grey, and the upper surface of wings and interscapular region brownish black, the smaller wing-coverts with paler margins, the bill blue-black, and the legs and feet bluish grey.

Progress towards maturity. The grey gradually changes to white ; according to Prof. Hutton's observations "first on the cheeks, then spreading to the top of the head, leaves a collar round the neck, which breaks first in front, and gradually spreads upwards until the whole is white." He adds that "the bill remains dark blue for some time after the plumage has assumed the colours of the adult." Although mainly correct this does not exactly accord with my own observations. I have a specimen in which the old colour presents only an irregular wash of ash-grey on the crown and sides of the head, whilst the dark bill is undergoing a rapid change, the culmen, bilge of hook, and outer edge of lower mandible being dull yellow.

Another in my collection has the bill blackish brown, changing to dull yellow on the ridge and again on the hook, also, less distinctly, along the edge of the lower mandible. The crown is white ; occiput and hind neck pale slaty grey, forming a sort of half-collar around the neck.

A third specimen has a yellow bill ; the vertex is still clouded with grey, forming a sort of nuchal cap ; there is the usual dark streak through the eyes, and the hind neck is entirely white. Bill measures 4 inches ; following curvature 4·75. (Sex ♀.)

In a fourth, which has fully assumed the adult plumage, the bill is yellowish grey, lighter on the hook, but with a dark band around the base and another extending to the nostrils.

Nestling. Covered with long, thick woolly down, of a pale grey colour ; bill brownish black with yellowish horn-coloured tip ; legs and feet yellowish white. In form plump, and having a comfortable aldermanic appearance.

This species of Albatros is far more common in our seas than *Diomedea exulans*, and habitually

approaches nearer to the coast, generally following a vessel to the entrance of the harbours, and sometimes to their anchorage. After boisterous weather it is sometimes picked up on the ocean-beach, not actually lifeless, but so exhausted by fatigue as to be incapable of rising.

Professor Hutton has observed that this bird "dives sometimes, but does not appear to like doing so, generally preferring, when any thing good to eat is under water, to let a Night-hawk fish it up; then giving chase and running along the top of the water, croaking, and with outstretched wings, it compels him to drop it, and then seizes it before it sinks again." Mr. Gould refers to it in the following terms:—"Of all the species with which I am acquainted this is the most fearless of man, for it often approaches many yards nearer the vessel than any other; I have even observed it so near that the tips of its pinions were not more than two arms' length from the taffrail. It is very easily captured with a hook and line; and as this operation gives not the least pain to the bird, the point of the hook merely taking hold in the horny and insensible tip of the bill, I frequently amused myself by capturing specimens in this way, and after detaining them sufficiently long to afford me an opportunity for investigating any particular point respecting which I wished to satisfy myself, setting them at liberty again, after having marked many, in order to ascertain whether the individuals which were flying round the ship at nightfall were the same that were similarly engaged at daylight in the morning after a night's run of 120 miles; and this in many instances proved to be the case. When brought upon deck, from which it cannot take wing, it readily becomes tame, and allows itself to be handled almost immediately; still I believe that no member of this group can be domesticated, in consequence of the difficulty of procuring a supply of natural food."

Much of what I have said of the Wandering Albatros applies equally to this bird, their habits in their common field of action on the mighty deep being very much the same. It has the same awkward style of dropping into the water, as if its back was broken, but once upon the surface it comfortably tucks in its wings and swims with as much buoyancy as grace, lifting its proud head well above the body, and glancing sharply around with its piercing eyes; then, as if impelled by a sudden thought, it stretches up its lengthy pinions and mounting in the air glides through space with the silence of a spirit, scarcely moving its outspread wings as it sweeps around in never-ending circles, but restlessly turning its head from side to side as it scans the water below.

Mr. Drew sent me the mandibles of a Diving Petrel (*Pelecanoides urinatrix*) found, together with a mass of feathers, in the stomach of an Albatros of this species, which had been cast ashore in a gale of wind at the Wanganui heads. Its ordinary food consists of minute oceanic animals, such as medusæ and mollusca, and floating refuse of any kind thrown overboard from ships, whose course these birds desery from an amazing distance, and follow persistently for many days together. Whilst thus employed they appear to fraternize freely enough with the larger species.

Some months ago there was a live one in the Zoological Society's Gardens, which had become quite tame, knowing its keeper and following him, with a gurgling note or deep croak and much awkward flapping of its wings, on the approach of feeding-time. It spent most of its time resting placidly on a grass mound, and apparently quite indifferent to its banishment from the sea.

On the nesting-habits of this species of Albatros Mr. W. Dougall has communicated (through Mr. Collison-Morley) to the 'Southland Times' some very interesting notes, from which I have culled the following extracts:—"Every six months the New-Zealand Government sends a steamer to the following uninhabited South Pacific Islands, namely, Stewart, Snares, Auckland, Campbell, Antipodes, and Bounty Islands (the last being 415 miles south-east of New Zealand), to overhaul and replenish food depôts maintained for those who may unfortunately be shipwrecked upon these remote islands; and the following observations were made when accompanying one of these trips.

"At Monumental Head (Auckland Island) we picked up our hunters laden with Albatroses living and dead, and Albatros eggs in abundance. At Campbell Island I ascended one of the highest

hills, Mount Honey (1866 feet), amidst hundreds of nests of the Albatros, surrounded by nothing save the unvarying tussock fern and ti-tree scrub. We came on the first Albatros at about 800 feet above sea-level, and after reaching the crown of the hill, 1000 feet, found them sitting in their nests and flying about close to the ground in hundreds. The Albatros apparently lays but one egg each year, but one of the party found two nests containing two eggs each. It was suggested that this was only a freak of nature, although it is known that the Gannet of New Zealand lays two eggs, one of which is hatched by the male bird. All up the sides of the hill wild parsley was growing luxuriantly, often two feet high, while everlasting daisy clothed the ground like a carpet. The cotton-wood plant in full bloom was also plentiful. As the top (1866 feet) is reached, this variety of vegetation ends and travelling becomes easier, as there is no growth to impede progress, but diminutive tussock among which are the Albatros nests and their tenants. These nests are built up of moss and earth about four inches above the surface of the ground. The material to form the nest is so taken from the soil as to leave a trench all round it, and this keeps things dry for the important object in view. The female never leaves the nest during incubation, a period of about *sixty days*, and is fed by her consort, who faithfully hunts for food for both. If by chance the nest is left unguarded for a single moment the Sea-Hawk, which is here in thousands, pounces upon the egg and 'love's labour's lost,' at least so far as the Albatros is concerned. The Albatros is a stupid bird, for it will sit, whether hatching or not, till you tumble it head over heels with your foot. At the same time it will resent such liberty, and, if it succeeds in getting a hold, it will take the piece out of trousers, hose, and skin. They are very strong birds. The best way to catch one is to make a feint at his head with the left hand, which distracts the bird's attention, and then quickly seize it by the bill with the right; but be sure you get the grip, as they turn very quickly, and would snap your fingers off if they got the proper hold. They build on the flat plateaus of the hills; and so far as we have seen, never lower down than 700 feet from sea-level. At Antipodes Island, on Tuesday, January 31st, the day broke beautifully and the bay was like a mirror, but the glass was still low: as the day advanced we were enveloped for half an hour in one of those dense mists characteristic of this locality, and when it passed the hills were covered with snow. The height of the island is marked on the chart at 600 feet, but this is an error, as the principal hill, Mount Galloway, is 1200 feet above the sea-level. From seaward this hill looks conical or dome-shaped, but on reaching the summit a beautiful clear lake covering an area of thirteen or fourteen acres is found—a lake which a little later in the season than the time of our visit is much frequented by the Albatros, being virtually surrounded by thousands of their nests.

"We moved on northwards (Stewart Island) and came upon a perfect cemetery of dead Penguins lying rotting amidst black sand—thousands upon thousands—evidently cut off by some epidemic."

Mr. W. Dougall's principal object in visiting these islands was to obtain photographs, and he brought back with him a beautiful series of instantaneous views, some of them exhibiting most interesting groups of Albatroses and Penguins, in every condition of growth, on their nesting-ground. I have in my possession a set of these photographs (which may be obtained by purchase from Mr. C. R. Joplin, 4 Blackfriars Street, Stamford), and I have selected for reproduction one of them showing a group of these birds among the rocks in their island sanctuary. (See p. 293.)

In the Otago Museum there are two eggs of this Albatros (collected in November), the larger of which measures 4·3 inches in length by 2·2 in breadth; they are creamy white, irregularly marked or blotted with surface-spots of yellowish brown. The smaller of the two specimens presents more distinct blots in its middle portion, and has its larger pole studded with spots presenting a reddish-brown surface.

DIOMEDEA CULMINATA.

(GREY-HEADED ALBATROS.)

Diomedea chlororhynchos, Aud. Orn. Biogr. v. p. 326 (1839, nec Gm.).*Diomedea culminata*, Gould, Ann. N. Hist. xiii. p. 361 (1844).

Ad. similis *D. chlororhyncha*, sed pileo colloque totis pileis einereo lavatis: culmine et gonyde sordidè flavis: pedibus flavicanti-albis.

Juv. similis adulto, sed pileo colloque saturatiùs einereis: rostro nigro, culmine medialiter flavicante et gonyde obscure corneâ.

Adult. Plumage similar to that of *D. chlororhyncha*, but having the whole of the head and neck washed with delicate slaty grey, and the feathers of the back and mantle more or less margined with brown. Bill black, with the ridge of the upper mandible, and the lower edges of the under mandible, to the junction of the erura, dull yellow; legs and feet yellowish white. Total length 31.5 inches; wing, from flexure, 20; tail 7.5; bill, along the ridge 5, from the gape to the extremity of lower mandible 4.75; tarsus 3.25; middle toe and claw 4.75.

Young. Has the head and neck dark grey; the space between the upper mandible and the eyes, as well as a mark above the latter, of a deeper shade; beneath the posterior side of the lower eyelid a light grey mark; the cheeks whitish; bill black, with indications of yellow in the middle portion of its ridge, and with the outer edges of the lower mandible horn-coloured towards the base; legs and feet yellowish white.

Obs. A specimen from Blueskin Bay, in the Otago Museum (sex ♂), is an exceptionally handsome bird, the delicate shading of French grey on the head and neck being really exquisite. There is another specimen in the Otago Museum in which the head and entire neck are dark grey, changing to white on the cheeks, and deepening into sooty brown on the shoulders and mantle; upper surface of wings sooty black; tail sooty grey with white shafts; breast and sides more or less marked and washed with grey; rump and abdomen pure white.

IN the Canterbury Museum there is a young bird of this species, which was picked up on the ocean-beach somewhere between the mouths of the Avon and Waimakariri rivers, and another, in adult plumage, more recently presented by Mr. Hugh O'Neill. My description of the youthful state is taken from the first-named specimen, and that of the adult from a very fine example in the British Museum. Mr. Gould writes:—"I frequently observed it between Sydney and the northern extremity of New Zealand; and it also occurred in the same latitude of the Indian Ocean as abundantly as any of its congeners. It is a powerful bird, and directly intermediate in size between *Diomedea cauta* and *D. chlororhyncha*. The specific differences of the three species are so apparent that I had no difficulty whatever in distinguishing them while on the wing. In *D. chlororhyncha* the bill is more compressed laterally, the culmen is round, and the yellow colouring terminates in an obtuse point midway between the nostrils and the base; while in *D. culminata* the culmen is broad and flat, and has its greyish yellow colouring continued of the same breadth to the base; the feet of the latter are also fully a third larger than those of the former. The habits, mode of life, and the kind of food partaken of by the *D. culminata* are so precisely similar to those of its congeners that a separate description would be a mere repetition of what has already been said respecting the preceding species."

DIOMEDEA CHLORORHYNCHA.

(YELLOW-NOSED ALBATROS.)

Yellow-nosed Albatros, Lath. Gen. Syn. iii. pt. 1, p. 309, pl. 94 (1785).*Diomedea chlororhynchos*, Gm. Syst. Nat. i. p. 595 (1788, ex Lath.).*Diomedea chlororhyncha*, Coues, Pr. Phil. Acad. 1866, p. 185.

Ad. similis *D. melanophryi*, sed rostro nigro, eulmine cum ungue et maculâ parvâ ad basin mandibulæ positâ lætè flavis : pedibus eyaneseenti-albis.

Adult. Plumage similar to that of *D. melanophrys*, but having only a light shade of grey in front of the eyes, and a black tail with white shafts. Bill black, with the culmen, hook, unguis, and edge of lower mandible bright yellow ; a narrow basal spot on the lower mandible orange ; legs and feet bluish white. Total length 32.5 inches ; wing, from flexure, 19.5 ; tail 8 ; bill, following the curvature of upper mandible 5.4, from gape to extremity of lower mandible 5 ; tarsus 3 ; middle toe and claw 4.25.

Obs. The yellow does not melt into the black as in transitional states of *Diomedea melanophrys*, but the two colours are well defined, and the former terminates in an acute point about half an inch from the base of the upper mandible. In very mature birds the yellow deepens to orange on the hook, where it spreads, and then fades away to pale yellow at the tip.

In the Otago Museum there is a fine specimen which has the bill perfectly black, with a broad, well-defined stripe of yellow down the culmen, which widens considerably and deepens to orange on the hook ; the extreme edges of the lower mandible are likewise yellow. There is just a pale shade of grey in front of the eyes, which becomes darker above them ; shoulders, upper surface of wings, and tail sooty black, the shafts of the latter white ; the rest of the plumage pure white.

THERE is a specimen of this Albatros in the Auckland Museum ; and Dr. Crosbie, of H.M.S. 'Virago,' showed me the head of another. Both of these, as I was informed, were obtained off the New-Zealand coast, although the proper range of this species appears to lie in more northern latitudes.

There are likewise specimens, more recently obtained, in the Canterbury and Otago Museums.

Dr. Bree says that this species "has occurred still more rarely than *D. exulans* in European seas. Two instances are, however, mentioned by Esmark (Degland, Orn. Eur. p. 359) as having been killed near Kongsberg, in Norway, in the month of April 1837," in consequence of which Bonaparte and Degland gave it a place among the birds of Europe. It ranges, according to Latham, from 30° to 60° in the southern hemisphere, all round the pole.

Prof. Hutton has expressed his opinion that the three allied forms, *D. chlororhyncha*, *D. culminata*, and *D. melanophrys*, are in reality one species ; but in this view I do not concur, because the adult birds are easily discriminated, the well-marked black and yellow bill of the two former distinguishing them from the Mollyhawk, whilst as between each other the differently coloured head in the adult bird is a very conspicuous feature.

In the Otago Museum there is a specimen of *Diomedea chlororhyncha* (marked ♂, St. Paul's Island) which comes very near in general appearance to *D. cauta*, but it wants the face-adornment along the base of the mandible which distinguishes the latter species.

DIOMEDEA CAUTA.

(SHY ALBATROS.)

Diomedea cauta, Gould, in Proc. Zool. Soc. part viii. p. 177 (1840).*Diomedea (Thalassarche) cauta*, Bonap. Compt. Rend. de l'Acad. Sci. 1856.

♀ *ad.* fronte et vertice cinerascanti-albis: pileo colloque toto pulchrè cinereo lavatis: regione ante- et supra-oculari cinerascanti-nigris: dorso et interseapulo eum alâ totâ cinerascanti-nigris: uropygio et supraeaudalibus albis: remigibus brunnescenti-nigris, scapis ad basin flavicanti-albidis, secundariis versus apicem brunnescente tinctis: caudâ saturatè argentescenti-cinereâ, scapis albidis: subtùs purè albus: subalaribus albis, plumis exterioribus nigricantibus: iride lætè vinascanti-brunnâ: pedibus sordidè corneo-albicantibus, tarsis saturatoribus: rostro cyanescanti-corneo, ad apicem sordidè nigro, culmine mediallyter et gonyde obscurè flavicantibus, ad basin conspicuè nigro marginatis: margine mandibulari ad basin lætè flavo.

Adult female. The whole of the head and neck delicate pearl-grey, shading off almost to white on the crown and forehead; lores and a line over each eye greyish black, shading off below into the pearl-grey; back and upper surface of wings greyish brown; rump, tail-coverts, and the whole of the underparts pure white, softly blending with the grey on the lower fore neck; quills brownish black, the shafts whitish horn-colour towards the base, the longer secondaries tinged with sepia-brown; tail-feathers dark silvery grey, with white shafts, and paler on the under surface; lining of wings white, some of the feathers towards the edge of the wing greyish black; irides rich vinous brown; feet dull fleshy white, the tarsi darker; bill bluish horn-colour, lighter and tinged with yellow along the culmen, and also on the under surface of the lower mandible; the sides of the unguis or hooked extremity, as well as the terminal expansion of the lower mandible, dull black; the upper mandible margined at the base with a narrow black band, which broadens on the ridge and extends along the groove on each side to the nostrils. Base of lower mandible fringed on each side with a membrane of a bright yellow colour, bordered behind with black, and forming a very distinguishing feature in this species. Another bright yellow membrane extends, in an oblique line, down the cheeks for about three inches from the angles of the mouth, but this is only observable on the feathers being moved aside. Total length 35 inches; extent of wings 91, from carpal flexure to the tip 22·5; tail 9; bill, following the curvature of upper mandible 5·3, length of lower mandible 5; tarsus 3·25; middle toe and claw 5·7.

THIS fine species was first described by Mr. Gould (as quoted above) and named by him the Shy Albatros, in allusion to its cautious habits when on the wing. In his 'Birds of Australia' he gives the following account of it:—

"I first saw this species of Albatros off the south coast of Tasmania, and had frequent opportunities of observing it during my stay in Recherche Bay, at the southern entrance of D'Entrecasteaux's Channel, where I was wind-bound for nearly a fortnight. Unlike other Albatroses it was most difficult to procure, for it seldom approached our ship sufficiently near for a successful shot. I succeeded, however, in shooting several examples while they were flying round the bay in which we had taken shelter. It is not usual for Albatroses to approach the land or enter a secluded bay like that of Recherche, and I attribute this deviation from the ordinary habits to the temptation presented by the vast quantities of fat and other remains of whales floating about, the locality being one of the principal whaling-stations on the coast of Tasmania. I have no doubt likewise that it was breeding on the Mewstone and other isolated rocks in the neighbourhood, as the plumage of some of the specimens I procured indicated that they had lately been engaged in the task of incubation.

“It is a large and powerful bird, the male being scarcely a third less in size than the *D. exulans*; is rapid and vigorous on the wing, and takes immense sweeps over the surface of the ocean. It will be interesting to learn the extent of the range of this species. A head in the possession of Sir William Jardine was said to have been procured at the Cape of Good Hope, but I believe this was by no means certain. When fully adult the sexes differ but little in colour; the female may, however, at all times be distinguished by her diminutive size, and the young by the bill being clouded with dark grey. Besides being larger than the three succeeding species (namely, *D. culminata*, *D. chlororhyncha*, and *D. melanophrys*, to which and the present the generic appellation of *Thalassarche* has been given), the beautiful grey on the sides of the mandibles and the yellow mark at the base of the lower mandible will at all times distinguish this bird from the other members of the genus. The stomachs of those I obtained in Recherche Bay contained blubber, the remains of large fish, barnacles, and other crustaceans.”

Prof. Hutton added this bird to the New-Zealand avifauna on the authority of a specimen captured at Blueskin Bay, in Otago; and in 1877 I exhibited and described* an adult female taken on the beach near the Wellington Pilot Station and brought to me alive. The fishermen by whom it was caught informed me that it had apparently been shot at sea and allowed to float ashore, the right wing being completely disabled, but that they had nevertheless considerable trouble in overtaking it before it reached the water †.

In lat. 55° S., long. 135° W., in fine but intensely cold weather, a pair came up to us and followed our steamer for two or three hours. They fly in company with *D. exulans* and appear to associate freely enough with the smaller Petrels, but they did not once approach very near to the ship. Their flight is graceful and in wide circles, the outstretched wings appearing narrower and straighter than in the other species of Albatros, there being scarcely any perceptible curve.

A shrewd collector, who appeared to know the bird well, assured me that he found it breeding on the Snares, the nest being placed on a high platform of rock and the birds being quite unapproachable, rising on the slightest alarm and circling high in the air till all danger was past, in which respect their habits differ entirely from those of the Wandering Albatros, which will often allow itself to be captured on the nest.

This species may be readily distinguished from all the other members of the group, notwithstanding the similarity of colour, by the basal black band on the bill and the peculiar fleshy membranes which fringe the base of the lower mandible and extend down the cheeks, in the form of a narrow rib, the use or purpose of which in the natural economy of the bird it is impossible to imagine.

This feature was entirely new to me; but I find that it exists in another species also, for Capt. Carmichael, writing of *D. chlororhyncha*, says:—“A curious circumstance, with regard to this bird, is that when irritated the feathers of its cheeks are separated, so as to display a beautiful stripe of naked orange skin running from the corners of the mouth towards the back of the head.”

The only thing analogous to it among the other *Diomedæ* is the fleshy rib which extends from the angles of the mouth backward in *D. fuliginosa*.

I am indebted to Mr. L. Wilson, of the Marine Department, for two specimens of the egg of this species, which were collected by him on one of the islands lying off the east coast during one of his official trips in the steamboat ‘Stella.’ They are broadly elliptical in form (presenting, indeed, a perfect ellipse); one is appreciably larger than the other, and they are yellowish white, with a finely granulate surface, but somewhat soiled by contact with the bird’s feet. The larger one measures 4 inches in length by 2·6 in breadth; the other 3·7 inches by 2·5.

* Trans. N.-Z. Inst. vol. x. p. 217.

† Mr. Cheeseman has since recorded a male specimen, presented to the Auckland Museum by Mr. Bate of Parnell.

DIOMEDEA FULIGINOSA.

(SOOTY ALBATROS.)

- Sooty Albatros*, Lath. Gen. Syn. iii. pt. 1, p. 309 (1785).
Diomedea fuliginosa, Gm. Syst. Nat. i. p. 568 (1788).
Diomedea spadicea, Lesson, Man. d'Orn. ii. p. 391 (1828).
Diomedea fusca, Aud. Orn. Biogr. v. p. 116 (1839).
Diomedea palpebrata, Forst. Descr. An. p. 55 (1844).
Phœbetria fuliginosa, Reich. Natürl. Syst. Vög. p. v (1852).

Native name.—Toroa-pango.

Ad. fuliginoso-cinereus, alis caudâque saturatioribus : facie laterali nigricante : fasciâ postoculari albâ : primariorum scapis ad basin albis, rectricum scapis omninò albis : rostro nigro, gonyde albicante : pedibus albis purpureo lavatis : iride saturatè cinerascenti-brunnêâ.

Adult male. Head and neck and upper surface of wings and tail brownish black ; back and mantle slaty brown, with obscure wavy bands or margins of brownish grey ; the rest of the plumage uniform dark slaty grey ; the eyes surrounded posteriorly for two thirds of their circumference by a distinct mark of white ; the shafts of the primaries white in their basal portion, and those of the tail-feathers in their whole extent. Irides dark greyish brown ; bill jet-black and perfectly smooth, with a white cartilaginous line along each side of the lower mandible ; legs and feet white, with a purplish tinge. Total length 32.5 inches ; wing, from flexure, 19 ; tail 9.5 ; bill, along the curvature 4.25, from the gape to extremity of lower mandible 3.75 ; tarsus 2.75 ; middle toe and claw 4.75.

Adult female. Similar to the male, except that the whole plumage is lighter, being of a dull sooty brown, darker on the head and upper surface of wings and tail ; the feathers of the back and the interscapulars broadly margined with paler brown.

Young. Differs from the female only in having the plumage of the upper parts more largely tinged with brown, the margins of the feathers paler, and the marks encircling the eyes light grey instead of white.

Nestling. Covered with thick down having a woolly appearance, and being sooty black with pale brown tips.

Var. A specimen obtained by Mr. Reischek at Antipodes Island is remarkable on account of its very pale colour. The general upper surface is slaty grey, becoming darker on the head ; the underparts uniform light slate-colour.

Note. The fine series in my collection consists of the adult male bird, female, and young, as described above.

THIS well-known species (the "Cape-Hen" of sailors), which appears to be generally distributed over the temperate latitudes southward of the Equator, is comparatively common in the New-Zealand seas. Its graceful form and long cuneated tail at once distinguish it from all the other members of the group, while its short and rather feeble legs indicate its more aerial character. Thus we find Mr. Gould observing that "in its actions and mode of flight it differs very considerably from all the

other species of Albatros, its aerial evolutions being far more easy, its flight much higher, and its stoops more rapid; it is, moreover, the only species that passes directly over the ship, which it frequently does in blowing weather, often poising itself over the masthead, as if inquisitively viewing the scene below. At this moment it offers so inviting a mark for the gunner that it often forfeits its life."

In the winter of 1856 I received a very fine specimen from the Wairarapa plains, where it was found alive many miles from the sea, apparently blown inland by the violence of the prevailing storms. I have since received several specimens from the South Island, all in adult plumage, and a young bird from Cook's Strait, where the violence of the storm had driven it ashore.

It flies fast and often very near to the surface, almost touching the water, and with the wings more angular than in *D. exulans*. The black head is very conspicuous, and the length of tail enables one to distinguish the species almost at any distance. Its flight is more like that of an ordinary Petrel, and it has the same habit of coming up close under the stern of the ship and down into the trough of the sea.

On my last voyage to England (*via* Cape Horn) on the 16th March, about lat. 55° S. and long. 144° W.—in a heavy westerly wind with the thermometer very low,—a pair of these birds came up to us and followed our steamer during a great part of the day, although she was making nearly 20 knots an hour.

An egg of this species examined by me is of a narrow elliptical form, measuring 4.2 inches in length by 2.7 in breadth; of a dingy brownish white, splashed, dotted, and marked all over its larger pole with dull blackish brown. Another, of the same length but somewhat narrower, is of a clear greyish white, minutely and indistinctly spotted, and presenting a pretty regular zone of sepia-brown near its larger end.

Some naturalists separate this form from the other Albatroses under the generic name of *Phaebetria*, Reich., with the following distinguishing characters:—Bill excessively compressed; a sulcus on the sides of lower mandible; feathers forming a deep re-entrant angle on culmen; an acute salient on one side of lower mandible; nostrils very large; tail elongated and cuneate.

As mentioned on page 202, it has been proposed to treat three of the preceding forms of Albatros as belonging to one and the same species, but the more specimens I examine the more satisfied I am as to their being specifically distinct. In *D. chlororhyncha* the shape of the head and whole expression of the face are so entirely different from *D. melanophrys* that I do not understand how any naturalist who has compared them can confound the species. The dark loreal spot is one of the distinguishing features of *D. melanophrys*, but I have seen a very old example in which it had entirely disappeared, the whole of the head and neck being snowy white.

In the Natural-History Museum of the Jardin des Plantes there is a beautiful specimen of *Diomedea culminata*; head and entire neck delicate uniform slate-grey; there is no loreal spot, but there is a dark rim round the eyes; bill black, with the culmen yellow, broadening on the hook; lower edge of under mandible up to commencement of the symphyseal margin, and forming an angle upwards at the base, bright yellow. In the same collection there is a very fine specimen of *D. chlororhyncha*, in which the forehead and crown are pure white; the cheeks and face of a very delicate pearl-grey, this wash presenting a distinct boundary line extending from the mandible to the upper margin of the eyes; bill black, with the ridge of the upper mandible and the extreme tip of the lower bright yellow, this colour running up into an acute point near the root of the bill, and spreading out on the hook, where it deepens into orange-red. In the Liverpool Museum there are two specimens of *D. melanophrys*, in which the colour of the bill is changing from brownish black to yellow. In two specimens of *D. chlororhyncha* in the same collection the bill is perfectly black, with a bright yellow culmen, changing to reddish on the ridge of the unguis.

PELECANOIDES URINATRIX.

(DIVING-PETREL.)

- Diving Petrel*, Lath. Gen. Syn. iii. pt. 2, p. 413 (1785).
Procellaria urinatrix, Gm. Syst. Nat. i. p. 560 (1788, ex Lath.).
Pelecanoides urinatrix, Lacép. Mém. de l'Inst. 1800, p. 517.
Halodroma urinatrix, Illiger, Prodr. Syst. Mamm. et Av. p. 274 (1811).
Procellaria tridactyla, Forst. Descr. Anim. p. 149 (1844).
Puffinuria urinatrix, Gould, B. of Austr. pl. 60 (1848).
Haladroma berardii, Bonap. Consp. Av. ii. p. 206 (1857, nec Temm.).

Ad. suprâ nitenti-niger, scapularibus albo apicaliter vix notatis : collo laterali fusceseenti-einereo : fronte brunnescente : subtùs albus, hypoehondriis einereo lavatis : rostro nigro : pedibus cyaneseentibus, viridi tinetis, palmis cyaneseenti-albis : iride nigrâ.

Adult. Crown and sides of the head, hind neck, and all the upper surface shining steel-black ; the forehead tinged with brown, the sides of the neck dusky, and the scapulars touched with white ; throat, fore neck, and all the underparts pure white ; the sides of the body and flanks sometimes stained with grey. Irides and bill black ; legs and feet cobalt, tinged with green, the webs bluish white. Length 9·5 inches ; extent of wings 16·5 ; wing, from flexure, 5·5 ; tail 2 ; bill, along the ridge ·75, along the edge of lower mandible ·75 ; tarsus 1 ; middle toe and claw 1·5.

Nestling. Covered with sooty-grey down ; head and neck nearly bare ; black feathers first appear on the wings.

THE Diving-Petrel is very common in the seas surrounding New Zealand, consorting in flocks, and living on medusæ and other marine productions. It is specially abundant at all seasons in the Gulf of Hauraki. Its flight, which is rather laboured, consists of a rapid fluttering movement along the surface of the water : then it drops and dives through the waves with amazing agility. Latham states that they "croak like frogs, and sometimes make a noise like the cackling of a hen." My description is taken from a specimen picked up on the Waikanae beach in September 1863.

They swim in the sea with the head much uplifted, and are very active on the water.

Some years ago, during a severe gale, many hundreds of them were cast ashore in the Bay of Plenty, and it was observed that a number of them were afflicted with a large flat tick measuring ·25 of an inch across the body and legs.

The stomach of one I opened contained black comminuted matter and one or two small seeds, apparently of some kind of seaweed. I observed that the skin of this bird was very tough and thick, the roots of the feathers appearing underneath as in the Penguins and some other birds.

The young birds are so fat that it may truly be said of them that a wick inserted through the body of a dead one will burn as steadily as if in a lamp !

Mr. Burton found this Petrel breeding on Stephen's Island, in Cook's Strait. It also breeds on Karewa Island (off Tauranga), on the small islets off the Great Barrier, and on the "Hen and Chickens."

Specimens of the egg in my son's collection from Portland Island are almost spherical, measuring 1·5 inch in length by 1·2 in breadth ; they are yellowish white, with a smooth surface.

PELECANOIDES BERARDI.

(BÉRARD'S DIVING-PETREL.)

Procellaria bérard, Quoy et Gaim. Voy. Uran., Zool. p. 135 (1824).*Haladroma berardii*, Temm. Pl. Col. 517 (1831).*Pelecanoides berardii*, Gray, Gen. of B. iii. p. 646 (1844).*Ad.* similis *P. urinatrix*, sed rostro tenuiore, pedibus flavicantibus, palmis nigricantibus.*Adult.* Similar to *P. urinatrix*, but with a more slender bill, and having the legs and feet yellowish, with dark webs. Length 7 inches; wing, from flexure, 4·25; tail 1·5; bill, following the curvature of upper mandible ·6, from gape to extremity of lower mandible ·8; tarsus ·75; middle toe and claw 1·1.

THE above description was taken from a specimen obtained by Mr. Henry Travers on Pitt's Island, in January 1872, this being my authority for admitting the species into our list of birds. I have never met with it since in New Zealand, and am somewhat in doubt about the propriety of retaining the species, the colour of the feet being a very unreliable test of specific distinctness. I ought, however, to mention that I examined four specimens in the Natural-History Museum at the Jardin des Plantes, and that they all had yellowish legs and feet.

Dr. Finsch also identified a specimen brought by Mr. Henry Travers as belonging to this species Trans. N.-Z. Inst. vol. vii. p. 234).

It is very closely allied to *P. urinatrix*; and its habits of life are doubtless the same.

At noon on the 29th of December, as we were passing Rangitoto, near the entrance to the Auckland harbour, in a little costal steamer, we came upon a flock of Petrels to the number of 80 or 100. They allowed us to approach very near before they rose; then they took wing irregularly, kept close to the surface, with a vigorous flight, and took to the water again nearer to the island. I could not positively identify the bird, but it probably was either this species or the preceding one. The flock kept well together, and the birds seemed very restless and playful.

Mr. Percy Seymour sends me the following note:—"I have obtained information on good authority of eggs being collected after August 15th which contained embryos, and fresh eggs again in October. It builds a small nest in a burrow, but I have not yet obtained the egg."

Mr. A. J. Campbell writes:—"On some isolated islets in Bass's Strait, Diving-Petrels are numerous. They generally remain in the vicinity of these rocks, but at times disappear for two or three months. During June and July the birds come ashore to scrape out or prepare their nest-burrows. The laying-season occurs about the end of July, and continues for about a fortnight. Each female bird deposits one egg only in a burrow, which is from 6 to 8 inches deep, under ground or under a ledge of rock."

PRION TURTUR.

(DOVE PETREL.)

Procellaria turtur, Kuhl, Monogr. Procell. p. 143, pl. xi. fig. 8 (1820, ex Banks MS.).

Prion turtur, Gould, Ann. N. H. xiii. p. 366 (1844).

Halobæna typica, Bonap. C. R. xlii. p. 768 (1856).

Pseudoprion turtur, Coues, Proc. Phil. Acad. 1866, p. 166.

Native names.—Whiroia and Totorore.

Ad. suprâ pilehrè et saturatè einereus, scapularibus brunnescentibus albo terminatis: teetrieibus alarum dorso concoloribus, minimis brunnescentibus: remigibus fuliginoso-brunneis, intûs albis, secundariis einereis: eaudâ einereâ, ad apicem brunneo faseiatâ: facie anticâ albâ minutè einereo punctulatâ: supereilio albo ab oculo postico suprâ regionem parotieam dneto: plumis subocularibus et regione parotieâ einereis: facie laterali et corpore reliquo subtûs albo, pectore laterali summo et hypoehondriis imis pilehrè einereis: subalaribus albis: rostro clarè einereo, ad basin nigricante: pedibus pallidè einereis, anticè viridi lavatis, palmis albieanti-eanis: iride nigricanti-brunneâ.

Adult. Crown of the head, back of neck, and upper parts generally delicate blue-grey; a small spot in front of the eyes and a streak below them greyish black; space surrounding the bill, the lores, a broad line above and continued beyond the eyes, the throat, fore neck, and all the under surface pure white, tinged on the sides of the body and flanks with blue-grey; the primaries and their coverts are black on their outer webs; a black band with fading edges covers the smaller wing-coverts, and passes across the lower region of the back and the scapulars, leaving the tips of the latter white; and when the wings are expanded this assumes the form of a crescent; the middle tail-feathers are blackish towards the tips, and their under-coverts are tinged with blue. Irides brownish black; bill bluish grey, darker on the sides, and inclining to black at the base; legs and feet light blue, tinged with green in front, the webs whitish grey. Total length 11 inches; extent of wings 22; wing, from flexure, 7; tail 3; bill, along the ridge 1, greatest width at base .4, length of lower mandible 1.2; tarsus 1.5; middle toe and claw 1.6.

Young. Assumes the adult plumage on emerging from the downy state.

Chick. Covered with thick, soft down, and having much the appearance of a little ball of wool. General colour grey; whitish on the fore neck, breast, and abdomen. Bill whitish horn-colour at the tip.

Nestling. The downy covering darkens to a slaty grey as the young bird advances, and the feathers begin first to show themselves on the wings.

THIS charming little Petrel is extremely abundant off our coasts, and I have often observed flocks of them on the wing together numbering many hundreds. In boisterous weather it appears to suffer more than any other oceanic species from the fury of the tempest, and the sea-beach is sometimes found literally strewn with the bodies of the dead and dying. I have frequently watched them battling, as it were, with the storm, till at length, unable longer to keep to windward, they have been mercilessly borne down upon the sands, and being unable, from sheer exhaustion, to rise on the wing again, have been beaten to death by the rolling surf or pounced upon and devoured by a hovering

Sea-Gull. On picking them up and placing them in the pocket of my overcoat, they have soon revived, and in some instances have lived for several days on a diet of fresh meat, minced into small pieces. From the increased activity they always manifested on the approach of night, seeking the darker corners of the room and fluttering about in a very excited manner, with a rapid twittering note, I conclude that, whether at sea or on land, this Petrel is more nocturnal than diurnal in its habits. During the day the eyes were always half closed, imparting a peculiar fretful expression to the face. One circumstance interested me much, as illustrating the force of habit. On taking up one of these birds and inserting its bill in a glass of water, it at once commenced to move its feet, as if in the act of swimming or treading the waves. I repeated the experiment many times, and always with the same result.

This Petrel, like many of the others, feeds on squids and other small jelly-fish, which contribute likewise to the support of our great cetaceans. The presence of large flocks at sea is regarded by whalers as a favourable sign on this account, and among sailors the Dove Petrel is generally known as the "Whale bird."

In rising from a plane surface I observed that they always accomplished it by running a few feet with the wings outstretched, so as to give the body an impetus forward; and they seemed never to tire of climbing over the armchairs or other inclined surfaces in the room, using both wings and feet in this operation. At sea they are very active on the wing, and are rarely seen to rest on the water; they hover over the rolling billows, and dance, fairy-like, in the trough of the sea, sometimes poising their bodies like butterflies over a flower, at others cutting the air with the swiftness of a meteor, and always apparently intent on the one object of seeking the small marine animals on which they feed.

In the winter of 1878 I had occasion to visit the Wellington west coast, after a north-west gale had been blowing for several days, and I found that large numbers of *Prion* had been killed by the fury of the tempest and their bodies washed ashore on the beach. In travelling by coach from Waikanae to Otaki, a distance of only ten miles, I counted no less than twenty-seven lying on the strand, and there were probably many more. As I performed the rest of the journey to Manawatu in a buggy, I was able to stop and pick up specimens. In this way I was fortunate enough to obtain, during one day, twenty fresh birds. Of these, twelve were referable without hesitation to *Prion turtur* and eight to *P. banksii*. The difference in the size and form of the bill was constant, and among individuals of each species there was only a slight variation.

Reischek found this Petrel breeding in holes underground, on both the Little Barrier and the Chickens; but it was very scarce, and met with only on the highest wooded ridges in the centre of the island. He found a fresh egg on the 1st November, and met with young birds (one in each nest) in the beginning of December, and reports that during the breeding-season this Petrel hovers about after dusk, making a noise like the cackling of a Bantam-hen after laying her egg, but not quite so loud.

Of the egg of this species I have received specimens from the Island of Kapiti, in Cook's Strait, where also Mr. Percy Seymour obtained fresh ones on the 20th October. The egg is of a regular ovoid form, measuring 1.8 inch in length by 1.5 in breadth; it is creamy white, and generally much soiled over the entire surface. Examples vary slightly in form and size, one of the specimens in my son's collection measuring 1.8 inch by 1.2, and another 1.7 inch by 1.3.

PRION BANKSII.

(BANKS'S DOVE PETREL.)

Prion banksii, Gould, Ann. N. H. xiii. p. 366 (1844).*Prion rossii*, Gray, Cat. Brit. Mus. *Anseres*, p. 165 (1844).*Pachyptila banksi*, Smith, Ill. Zool. S. Afr., Birds, pl. lv. (1849).*Procellaria banksii*, Schl. Mus. Pays-Bas, *Procell.* p. 17 (1863).*Pseudoprion banksii*, Coues, Proc. Phil. Acad. 1866, p. 166.*Ad.* similis *P. turturi*, sed rostro latiore, pileo saturatiore et caudâ nigro latius terminatâ distinguendus.*Adult.* Plumage similar to that of *P. turtur*, but with the crown of the head darker, and a broader terminal band of black on the tail: distinguished by its broader bill. Total length 11.5 inches; wing, from flexure, 9; tail 3.5; bill, along the ridge 1.35, greatest width at the base .6, from gape to extremity of lower mandible 1.35; tarsus 1.4; middle toe and claw 1.5.*Nestling.* Covered with slaty-grey down.

I WAS formerly much in doubt about the propriety of retaining the above specific distinction; but a further investigation of the subject has satisfied me that the species is a good one. After a storm on the coast in the month of July I found the Otaki beach strewn with the bodies of the Dove Petrel; and had thus an opportunity of collecting a large number for comparison. Apart from the slight differences of colour, *P. banksii* has the tail longer and more conical, the wing decidedly longer, and the bill appreciably broader at the base than in *P. turtur*; besides which the unguis or hooked extremity has a very different form*.

Mr. Gould, in treating of the group, says that *Prion ariel* is much smaller than *P. turtur*, and that the pectination of the bill is not discernible when that organ is closed, that *P. turtur* is the most delicate in colour as well as the most slender and elegant in form of the four species inhabiting the southern ocean, that *P. banksii* has the bill of a breadth intermediate between that of *P. turtur* and that of *P. vittatus* and exhibiting the pectination of the mandibles when closed, and that "there is another and broader-billed species than *P. vittatus*" not yet described. Captain Hutton, writing on the same subject, observes:—"A regular sequence of the *Prions* can be formed from *P. vittatus* to *P. ariel*; and therefore I do not think it desirable to retain more than three specific names, to mark each end and the centre of the chain; and *ariel*, as the latest, will have to be omitted. On the New-Zealand coast the intermediate (*P. banksii*) is much the most common"†. In the last observation I cannot concur; for *P. turtur* is certainly far more plentiful on every part of the coast that I have visited; and, as already mentioned in treating of the species, numbers are cast ashore after every gale of wind. According to my experience the broad-billed form is far less common than either *P. turtur* or *P. banksii*.

* At a Meeting of the Wellington Philosophical Society, held on the 29th January, 1876, five examples of the adult and young of *Prion banksii*, together with a specimen of the egg, were exhibited; and the Author pointed out the characters which, to his mind, sufficiently distinguished this species from *Prion turtur* on the one hand, and *Prion vittatus* on the other. The specimens exhibited were obtained on the small islands off the New-Zealand coast, known as "The Brothers." (Trans. N.-Z. Inst. vol. viii. p. 197.)

† Cat. Birds of New Zealand, 1871, p. 80.

PRION VITTATUS.

(BROAD-BILLED DOVE PETREL.)

- Broad-billed Petrel*, Lath. Gen. Syn. iii. pt. 2, p. 414 (1785).
Procellaria vittata, Gm. Syst. Nat. i. p. 560 (1788, ex Lath.).
Procellaria forsteri, Lath. Ind. Orn. ii. p. 827 (1790).
Prion vittatus, Lacép. Mém. de l'Inst. 1800, p. 514.
Pachyptila vittata, Illiger, Prodr. p. 275 (1811).
Procellaria latirostris, Bonn. et Vieill. Enc. Méth. i. p. 81 (1823).
Pachyptila forsteri, Swains. Classif. of B. ii. p. 374 (1837).
Prion australis, Potts, Ibis, 1873, p. 85.

Ad. similis *P. banksii*, sed saturatior : pileo et facie laterali nigricanti-einereis : tectricibus alarum brunneo lavatis : saturatâ majore et rostro conspicuè latiore faciliè distinguendus.

Adult. Similar to *P. banksii*, but darker, the crown of the head, the sides of the face, and the ear-coverts being blackish grey, and the wing-coverts shaded with brown : distinguished by its larger size and much broader bill. Irides brownish black ; bill blue-black on the upper mandible, greyish blue on the lower, and on the bare membrane between the crura ; legs and feet pale blue. Total length 12·5 inches ; extent of wings 26 ; wing, from flexure, 8·25 ; tail 3·5 ; bill, following the curvature of upper mandible 1·5, greatest width at the base ·8, from gape to extremity of lower mandible 1·7 ; tarsus 1·2 ; middle toe and claw 1·6.

ALTHOUGH closely resembling the preceding species in the colours of the plumage, this *Prion* may be readily distinguished by the peculiar form of its bill, which is much dilated at the base, and very conspicuously pectinated along the edges.

As already stated in treating of *Prion turtur*, after boisterous weather in July I found the sea-beach between Waikanae and Manawatu strewn with the dead bodies of *Prion turtur* and *P. banksii*, the former species predominating. Having occasion to make the journey again after stormy weather in the early part of the following month, I found the strand strewn with even a larger number of bodies, but, strange to say, nearly all belonging to the very broad-billed species, *Prion vittatus*. Out of twenty-four specimens picked up in succession, there were only three of *Prion turtur* and none of *P. banksii*. Scores of others which I was able to determine from the box-seat of the coach belonged to *P. vittatus*, with here and there a *P. turtur*, but not a single example could I find of the intermediate form so plentiful a month before. It may be inferred from this singular fact that the species do not intermingle, but fly in separate communities. I have observed flocks of *Prion turtur* on the wing together numbering many hundreds. *Prion vittatus* and *P. banksii* in like manner, no doubt, keep to themselves, for it is evident that the flocks in the vicinity of our coast, when caught in the fatal storm on the occasion I have referred to, were composed almost exclusively of *Prion vittatus*.

I opened a large number of these birds for the purpose of ascertaining on what they had been feeding. As might have been expected with storm-tossed fugitives, the stomachs of many were quite empty. In others there was a black mass of comminuted matter, and in two or three of them I detected among this matter what appeared to be the beaks of a very minute cephalopod.

Two eggs of this species, collected by Macgillivray on the island of St. Paul, in the Indian Ocean, are pure white, and measure 2 inches in length by 1·5 in breadth.

PRION ARIEL.

(GOULD'S DOVE PETREL.)

Prion ariel, Gould, Ann. N. H. xiii. p. 366 (1844).*Procellaria ariel*, Schl. Mus. Pays-Bas, *Procell.* p. 18 (1863).*Pseudoprion ariel*, Coues, Proc. Phil. Acad. 1866, p. 166.*Ad.* similis *P. turturi*, sed minor.

Adult. Similar in plumage to *Prion turtur*, but smaller in all its proportions. Total length 10 inches; wing, from flexure, 6·5; tail 2·25; bill, along the ridge ·75, along the edge of lower mandible 1; tarsus 1; middle toe and claw 1·5.

THIS is the smallest of the Prions. On the 13th February, 1881, I picked up two storm-killed specimens on the beach near Otaki; and on the same day I caught with my hand another that was fluttering on the wing evidently much exhausted by its efforts to preserve life. This was a female, and from being storm-driven the stomach was empty. It is undistinguishable from *P. turtur* except by its smaller size, and I am in doubt about the propriety of keeping it separate*.

On one occasion, when nearly thirty miles from land, about sundown, just as the sky had become overcast, I observed large flights of the Dove Petrel—sometimes in close communities, sometimes more widely scattered—all coming in the same direction and taking a south-west course. This constant stream of passengers was kept up till dark, and probably much later; but during the time they were visible some tens of thousands must have passed by us, all of them, under some common impulse, making for mid-ocean. Long after dark, I noticed a flock of them hunting in company and very near the surface of the water on our weather port.

A friend who visited Mutton Island, towards the end of December, assures me that he found numbers of young Dove Petrels nesting in holes burrowed in the layers of guano, and looking like little balls of bluish-grey down, but he saw no old birds during his stay there of several hours; and it is rather a curious circumstance that the nests were all on the southern side of the island, probably on account of its more sheltered position.

Mr. Sharpe, adopting Latham's view, has suggested (*Zool. Kerg. Island*, p. 139) that the difference in the bill which characterizes the various species of *Prion* may be only a sexual character. But I think I have placed that point beyond all question. The twenty specimens mentioned on page 210 were carefully dissected by me, with the following results:—Of *Prion banksii* there were four males and four females; of *P. turtur* there were seven males and five females. In some cases, owing to the state of the reproductive organs at that season of the year (first week in July), I was unable to determine the sex with absolute certainty. In others, however, the testes were sufficiently conspicuous; whilst in two females of *P. turtur* and in one of *P. banksii* I was able to detect a bunch of undeveloped eggs. The examination in this respect was therefore conclusive.

* Mr. Sharpe says (*"Zool. of Kerg. Island," Phil. Trans. R. S. p. 101*) that he considers *Prion ariel* "nothing but the young of *P. turtur*;" but the bird described above was a fully matured one.

HALOBÆNA CÆRULEA.

(BLUE PETREL.)

- Blue Petrel*, Lath. Gen. Syn. iii. pt. 2, p. 415 (1785).
Procellaria cærulea, Gm. Syst. Nat. i. p. 560 (1788, ex Lath.).
Pachyptila cærulea, Illiger, Prodr. p. 275 (1811).
Procellaria similis, Forst. Descr. Anim. p. 59 (1844).
Procellaria forsteri, Smith, Ill. Zool. S. Afr. pl. 411 (1849).
Halobæna cærulea, Bonap. C. R. xlii. p. 768 (1856).
Fulmarus cæruleus, Gray, Hand-l. of B. iii. p. 107 (1871).
Procellaria cærulea, Buller, Birds of New Zealand, 1st ed. p. 306 (1873).

Ad. suprâ elarè cinereus, pileo summo brunnescente lavato: teetricibus alarum minimis et alâ spuriâ brunneesen-
 tibus: remigibus extûs brunneescanti-cinereis, intûs albis, secundariis elariûs cinereis: caudâ obscurè cinereâ
 albo terminatâ, reetrice extimâ albieante: fronte, loris, supereilio indistincto, facie laterali et corpore subtûs
 toto albis, pectoris superioris lateribus et hypocondriis imis cinereis: rostro rufescenti-brunneo, culmine et
 apice saturatoribus: pedibus flavicanti-albidis: iride nigrâ.

Adult. Upper surface pale ashy grey, darker on the scapulars and washed on the crown of the head with brown; the whole of the small wing-coverts as well as the primary coverts greyish brown; forehead, sides of the face, an indistinct line over the eyes, the throat, fore neck, and all the under surface pure white, stained on the sides of the breast and on the lower part of flanks with ashy grey; outer primaries greyish brown, with black shafts, whitish on their inner webs; inner primaries and secondaries dark grey on their outer webs; middle tail-feathers greyish brown, largely tipped with white, the lateral ones uniform dark grey, and the outermost one on each side entirely white. Irides black; bill reddish brown, darker on the ridge and at the tips; legs and feet yellowish white, with brown claws. Length 11.5 inches; wing, from flexure, 8.5; tail 3.5; bill, following curvature of upper mandible 1.3, from gape to extremity of lower mandible 1.4; tarsus 1.2; middle toe and claw 1.6.

MR. GOULD states that he found this species "very abundant off the north-east coast of New Zealand" in May 1840, and that he observed it in every part of the ocean he traversed between the 40th and 55th degrees of south latitude, both in the Atlantic and Pacific. Nevertheless it is a very rare bird in local collections. The Auckland Museum has, for some years past, possessed a specimen, and in 1877 I received one, in very perfect plumage, from Mr. C. H. Robson of Cape Campbell. I have not met with any other examples.

Mr. Layard records that "it is not uncommon along the coast of South Africa, and is occasionally cast ashore after a gale of wind."

It is readily distinguished by the scapulars being edged and the tail-feathers broadly tipped with white.

Of the egg of this species Mr. Howard Saunders (in his account of the collection brought from Kerguelen Island by the Transit of Venus Expedition) says that the nine or ten specimens varied a good deal in size, the average being 1.9 inch in length by 1.5 inch in breadth; also that the shell has a granulated surface, and is "of the dead white colour characteristic of the birds of this family," besides having the usual musky smell.

DAPTION CAPENSIS.

(PINTADO PETREL.)

Procellaria capensis, Linn. Syst. Nat. i. p. 213 (1766).*Daption capensis*, Steph. Gen. Zool. xiii. p. 241 (1826).*Procellaria punctata*, Ellman, Zool. 1861, p. 7473.

Ad. pileo et collo postico usque ad interscapulium fuliginosis: dorsi totiùs plumis albis ad apicem conspicuè fuliginoso maculatis: tectricibus alarum minimis fuliginosis, medianis et majoribus interioribus ad basin conspicuè albis: remigibus fuliginoso-brunneis, intùs ad basin albis, secundariis albis, ad apicem fuliginoso maculatis: caudæ dimidio basali albo, apicali latè fuliginoso-brunneo: mento fuliginoso: corpore reliquo subtus albo, subcaudalibus exterioribus et subalaribus marginalibus fuliginosis: rostro nigro: pedibus saturatè brunneis: iride nigrâ.

Adult. The whole of the head, throat, back, and sides of the neck sooty black; the back, mantle, rump, and upper tail-coverts white, handsomely spotted with sooty black, each feather marked with a terminal triangular spot of that colour; fore neck, breast, and all the underparts pure white; primaries blackish brown, paler on the inner webs, and more or less varied with white; secondaries and scapulars white towards the base, black in their apical portion; wing-coverts sooty black, the longer ones varied with white; under surface of wings white, stained with sooty grey towards the edges; the long under tail-coverts tipped with sooty grey. Irides and bill black; legs and feet dark brown. Length 15 inches; wing, from flexure, 10; tail 4; bill, following curvature of upper mandible 1.25, length of lower mandible 1.4; tarsus 1.5; middle toe and claw 2.

To those who have made a voyage in the southern hemisphere probably no bird is so familiar as the so-called "Cape-Pigeon."

It is numerous off the New-Zealand coast at most seasons of the year, and is the commonest of the birds inhabiting our seas. Nor indeed does it seem to be limited to any particular tract of ocean, for it is met with in all the colder latitudes.

In stormy weather it often approaches the land, following in the wake of the tossing vessel, hovering gracefully over the water, and occasionally alighting on the surface to pick up any floating substance that may arrest its attention. On one occasion, in comparatively smooth weather, a number of these birds attended our little steamer to the very mouth of the Wanganui river; but this occurrence was quite exceptional.

I do not know any more pretty sight than to watch the Cape-Pigeons on the wing. They move about with such absolute command of wing, presenting to the observer alternately their snow-white breast and then their prettily marked upper surface, the whole set off by their sooty black head and neck, that they look like large painted moths hovering in the air. The eye never tires of following them and noting their ever-varying evolutions, all performed with the utmost ease and gracefulness. Unlike the Albatroses and other sea-birds which exhibit a considerable amount of individual variation, one is struck with the wonderful uniformity in the plumage of these birds. All have the same freckled and spotted back and rump, and the same broad splash of white on the upper surface of each wing. There is no transitional plumage from the young to the adult states, and no difference observable between the sexes.

When clustering together and disputing for the possession of some floating offal, they utter a low cackling note, like *ka-ka-ka-ka*.

The peculiar roundness of back which characterizes the various species of Albatros and other Procellariidæ, when on the wing, is conspicuously apparent in this bird.

Professor Hutton states that he has observed a Cape-Pigeon following a ship for several days in succession, when she has been making from 150 to 200 miles in the twenty-four hours. He adds:—"It is, I believe, the generally received opinion of naturalists that these birds, when seen for several days together, have never slept during the whole period, but have followed the ship night and day. To me, however, it appears incredible that any animal should be able to undergo so much exertion for so long a time without taking rest. Mr. Gould says that birds caught and marked are generally seen next day; but such is not my experience. I have sometimes marked ten or twelve Cape-Pigeons in a day, and seldom seen one again. Mr. Gould, however, is quite right when he says that sometimes a marked bird turns up after being absent for two or three days; and how can this be accounted for by the theory of the birds constantly following the ship? Most of the Petrels, more particularly those that burrow or live in holes in rocks, are no doubt nocturnal in their habits when they are on or near land; but when they are at sea they all become more diurnal. A few can certainly be often seen flying under the stern at night; and once, when I was keeping the middle watch, at about 1 A.M., a Cape-Pigeon, in crossing over the ship, struck a rope and fell on deck. Still they are never numerous, and where there were fifty or a hundred birds in the daytime there are only one or two at night. Their defenceless condition is, as far as I can see, the only reason for the Petrels hiding themselves by day and flying by night; for the oceanic mollusca &c. on which they feed are equally diurnal and nocturnal. At sea, however, where they have no enemies to fear and no holes to hide in, the conditions are quite different, and it is then better for them to take their rest at night and to be alert and feeding in the daytime, and they change their habits accordingly. I therefore believe that, although a few may follow a ship for a night, most of them sleep on the sea; and in the morning, knowing very well that a ship is the most likely place to obtain food, they fly high with the intention of looking for one. Some find the ship that they were with the day before; some another one. In the latter case, if the second ship is going in an opposite direction to the first, they are never seen by the first again; if, however, the course of the two ships is the same, the bird might very likely lose the second ship and rejoin the first, after a lapse of two or three days. A height of 1000 feet would enable a bird to see a ship 200 feet high more than fifty miles off; and often, although unable to see a ship itself, it would see another bird which had evidently discovered one, and would follow it in the same way that Vultures are known to follow one another. This opinion is much strengthened by the fact that at sunrise very few birds are round the ship, but soon afterwards they begin to arrive in large numbers; and I think I may safely say that this is always the case; for, having had to be on deck from four to eight o'clock every third morning for six of my voyages, and about once a week during my last voyage, I have had better opportunities for observing this than most people." (Ibis, 1865, pp. 292-294.)

Mr. Layard writes:—"At one season of the year, about November and December, they disappear, and the voyager finds the sea duller and tamer than ever. We presume they go off to breed; but where they select their nurseries we know not."

Sealers declare that the only locality known as a breeding-place of this species is the island of South Georgia; and, common as the bird is in all the temperate latitudes of the Atlantic and Pacific Oceans, its egg is still a desideratum in all the known collections.

ÆSTRELATA COOKII.

(COOK'S PETREL.)

- Procellaria cookii*, Gray in Dieff. Trav. ii. p. 199 (1843).
Procellaria leucoptera, Gould, P. Z. S. 1844, p. 57.
Procellaria brevipes, Peale, U. S. Expl. Exp., Birds, p. 294 (1848).
Rhantistes cooki, Bonap. C. R. xlii. p. 768 (1856).
Rhantistes velox, Bonap. C. R. xlii. p. 768 (1856).
Cookilaria leucoptera, Bonap. Consp. Av. ii. p. 190 (1857).
Cookilaria velox, Bonap. Consp. Av. ii. p. 190 (1857).
Æstrelata cookii, Coues, Proc. Phil. Acad. 1866, p. 152.
Fulmarus cookii, Gray, Hand-l. of B. iii. p. 106 (1871).
Fulmarus leucopterus, Gray, Hand-l. of B. iii. p. 106 (1871).
Procellaria cookii, Buller, Birds of New Zealand, 1st ed. p. 307 (1873).

Native name.—Titi.

Ad. suprâ saturatè cinereus, plumis quibusdem pallidiùs terminatis : alâ totâ nigricanti-brunneâ, primariis et secundariis intùs albis, his ferè omninò albis : rectricibus centralibus cinerascentibus, reliquis albo variis, duabus externis intùs purè albis : fronte albâ, cinerascenti-nigro variâ : regione suboculari conspicuè cinerascenti-nigrâ : facie laterali et corpore subtùs albis, pectoris lateribus cinereo lavatis et minutè variis : subalaribus albis, exterioribus plus minusve nigricantibus : rostro nigro : pedibus flavicanti-brunneis, palmis pallidioribus : iride nigrâ.

Adult. Crown of the head, hind part and sides of the neck, the back, rump, and upper tail-coverts dark ashy grey, changing to slaty grey in certain lights, the tips of the feathers paler, or very narrowly margined with greyish white, giving a peculiarly soft effect to the plumage; entire upper surface of the wings blackish brown, the primaries largely, and the secondaries entirely white on their inner webs; the forehead white, each feather largely centred with greyish black, presenting a spotted appearance on the surface; under the eyes a broad mark of greyish black; sides of the face, throat, fore neck, and all the underparts pure white, stained and freckled on the sides of the breast with ashy grey; under surface of wings white, largely marked with greyish black along the outer edges; middle tail-feathers dark ashy grey, the lateral ones mottled or freckled, and the two outermost ones on each side entirely white on their inner webs. Irides and bill black; legs and feet pale purplish blue, with the webs a little darker and yellowish. Total length 12·5 inches; wing, from flexure, 9·25; tail 4; bill, following the curvature of upper mandible 1·4, length of lower mandible 1·5; tarsus 1·2; middle toe and claw 1·5.

I HAVE taken the above description from the type specimen in the British Museum, which was obtained off the New-Zealand coast. Up to the time of my first edition I had never met with it, although informed of a specimen in the collection of the Rev. R. Laishley, at Auckland. Numerous examples have since been received from the Hauraki Gulf and other localities, but it has not yet been recorded in the South Island. This Petrel seems to be generally distributed around our coasts, at any rate to the north of Cook's Strait. It is diurnal in its habits, and on a fine sunny afternoon in April, while lying off the port of Napier, a score or more of them passed our weather-bow, displaying the contrasts of

their plumage, and looking like huge moths fluttering over the troubled waters. The dark wings are conspicuous against the grey and white plumage of the body, and make it easy to distinguish this bird on the wing from all the other Petrels of similar size. They fly low, sometimes skimming the water, with their wings aslant, and appear generally to be moving in a scattered community. I have observed it in the Hauraki Gulf sailing gracefully at a convenient distance from the steamer. Once I observed it dip into the water, touching the surface first with its feet and resting for a few moments before it took wing again. It was perhaps picking up something from the sea, but I was not near enough to observe this. Reischek met with it on the Little Barrier, chiefly at the northern extremity of the island, and once on the Larger Chicken; but it was a comparatively rare bird, even in the former place, and during several months' sojourn he collected altogether about a dozen specimens. Of these he opened seven, and found that the stomachs contained nothing but seeds and small seaweed, without any of the oily matter so abundant in the stomachs of other Petrels.

It deposits its single egg at the end of a burrow from three to eight feet long, very tortuous and entirely dug out by the birds themselves. At the extremity of this burrow there are invariably two chambers, one beyond the other, and in the further one usually the bird deposits her egg. Up to this time the male and female share the same compartment, but the male now withdraws himself, and for the rest of the breeding-season occupies another hole at some little distance from the nest. The burrows are generally on sloping ground, and, owing to their depth and extent, involved often two hours' digging to get out the occupants. And here I may record a very wonderful fact in natural history, an excellent illustration of which by a local taxidermist attracted much attention at the Colonial and Indian Exhibition in 1886. On some of the islands in the Hauraki Gulf, and on several groups of rocky islets off the New-Zealand coast, there exists a very remarkable lizard, which has long since disappeared from the mainland. This is the tuatara of the Maoris and *Sphenodon* of naturalists. But this is the point of interest to us at present: wherever the tuatara and burrowing Petrel co-exist, there appears to be a perfect understanding between them; they share the same underground habitation and respect each other's rights to the utmost. On the Chickens Mr. Reischek found the tuatara very abundant, and (I grieve to add) collected for the market some thirty or forty specimens, many of them of very large size. He assures me that in every instance he found the Petrel (sometimes *Estrelata cookii*, sometimes *Puffinus assimilis*) and a lizard occupying one and the same burrow. Often the terminal chamber had, as it were, two compartments, facing each other, one of which was occupied by the bird, the other by the lizard; but generally the two were living "cheek by jowl." Whether the bird was sitting on its single egg or had hatched out its callow young, it was never without its attendant lizard, keeping watch over the Petrel's nest as the Hesperides were wont of old to guard the golden apples which Gaia gave to the lady Hêrê. Captain Mair tells me that he has observed exactly the same state of things on the island of Karewa, in the Bay of Plenty, where both tuataras and Petrels are abundant; and his brother, Major Mair, sends me a similar report from the Rurima Rocks lying adjacent thereto. But here comes the curious part of the story. Mr. Reischek affirms positively that the lizard assumes the guardianship of the cave, and actively defends the nest against any invasion from without. Under ordinary circumstances the tuatara, in the wild state, does its best to escape, but here, as Mr. Reischek declares, whenever he attempted to meddle with the bird on the nest the lizard would immediately come to the rescue, attacking his hands and fingers with exceeding ferocity and biting fiercely. So real and constant was this mode of defence that he had at length to make it a rule to capture and remove this "dragonette" before attempting to handle the egg or young bird on the nest.

The breeding-season begins about the first week in October, or perhaps a little later, freshly-laid eggs having been found on November 2nd. The egg, which is perfectly white, is broadly ovoido-elliptical, and measures 1.9 inch in length by 1.5 in breadth; the surface is smooth but not glossy. A rather larger example than usual, from the Little Barrier, measures 2.1 inches in length by 1.5 in breadth.

ÆSTRELATA LESSONI.

(WHITE-HEADED PETREL.)

- Procellaria lessonii*, Garnot, Ann. Sci. Nat. vii. p. 54, pl. 4 (1826).
Procellaria leucocephala, Forst. Descr. Anim. p. 206 (1844).
Rhantistes lessoni, Bonap. C. R. xlii. p. 768 (1856).
Astrelata leucocephala, Bonap. Consp. Av. ii. p. 189 (1857).
Æstrelata lessonii, Cass. Proc. Phil. Acad. 1862, p. 327.
Fulmarus lessoni, Gray, Hand-l. of B. iii. p. 106 (1871).
Procellaria lessoni, Buller, Birds of New Zealand, 1st ed. p. 303 (1873).

Ad. pileo summo et facie laterali albidis : regione ante- et suboculari nigricante : collo postico et laterali albicante obsoletè cinereo transfasciato : interscapulio et dorso superiore obscurè cinereis, ad apicem obsoletè fulvescente fasciatis : dorso postico et uropygio saturatè fuliginosis, supracaudalibus albis, versus apicem cinerascens : tectricibus alarum fuliginoso-brunneis, majoribus extùs cinereis : remigibus fuliginoso-brunneis, intùs cinerascens : caudâ albâ, pennis centralibus suprâ cinereis, reliquis plus minusve obsoletè brunneo vermiculatis : corpore subtùs albo : subalaribus fuliginoso-brunneis : rostro nigro : pedibus obscurè flavis, digito externo et palmis partim nigris : iride nigrâ.

Adult. Crown of the head and nape greyish white, obscurely and minutely freckled with darker grey ; back, mantle, and rump cinereous grey ; upper surface of wings brownish black, the larger coverts narrowly edged with greyish white ; sides of the head white, with a broad mark of brownish black crossing the eyes ; throat, fore neck, and all the underparts pure white ; primaries and secondaries brownish black, lighter on their inner webs ; tail-feathers pale cinereous grey on their upper surface, and freckled at the tips ; inner lining of wings sooty black, variegated with grey. Irides and bill black ; tarsi and a portion of the feet dull yellow ; the outer toe of each foot and a diagonal patch across the webs black. Total length 18 inches ; wing, from flexure, 12 ; tail 5.5 ; bill, following the curvature of upper mandible 1.9, length of lower mandible 1.7 ; tarsus 1.6 ; middle toe and claw 2.5.

I HAVE never seen this fine Petrel but once in New Zealand, and it is evidently very rare. The one I refer to was picked up in a dying condition, in the ocean surf, near Kaipara heads. Mr. Reischek informs me that he saw it once at the Hen and Chickens, but could not secure it. The example figured in my former edition was obtained at the Bay of Islands, and is now in the British Museum. So far, therefore, as our present information goes, this bird confines its range to the ocean lying northward of New Zealand.

Mr. Gould has given the following account of it in his 'Birds of Australia' :—"While engaged in watching the movements of the several species of the great family of *Procellariidæ*, which at one time often and often surrounded the ships that conveyed me round the world, a bright speck would appear on the distant horizon, and, gradually approaching nearer and nearer, at length assume the form of the White-headed Petrel, whose wing-powers far exceed those of any of its congeners : at one moment it would be rising high in the air, at the next sweeping comet-like through the flocks flying around ; never, however, approaching sufficiently near for a successful shot ; and it was equally wary in avoiding the boat with which I was frequently favoured for the purpose of procuring examples of other species." He states, moreover, that during flight the dark colouring on the wings shows very conspicuously, assuming the form of the letter W.

ŒSTRELATA INCERTA.

(DOUBTFUL PETREL.)

Procellaria incerta, Schl. Mus. Pays-Bas, *Procell.* p. 9 (1863).*Œstrelata incerta*, Coues, Proc. Phil. Acad. 1866, p. 147.

Ad. suprà saturatè fuliginoso-brunneus, alis obscurioribus : pileo colloque dorso concoloribus : subtùs albus : subcaudalibus apicaliter nigricanti-brunneis : rostro nigro : pedibus aurantiacis, digitis et membranis apicaliter nigricantibus : unguibus nigris.

Adult. Head, neck all round, and all the upper surface dark sooty brown, deepening to brownish black on the wings and tail; the feathers of the back and the small wing-coverts narrowly margined with pale brown; in front of the eyes an obscure mark of black; breast and abdomen pure white; sides of the body stained with slaty grey; inner lining of wings uniform blackish brown; under tail-coverts, especially the longer ones, blackish brown in their apical portion. Bill black; legs and feet orange-yellow, the outer toe and the interdigital webs, beyond the second joint, brownish black. Total length 19 inches; wing, from flexure, 12.75; tail 5.5; bill, along the ridge 1.9, along the edge of lower mandible 2; tarsus 1.75; middle toe and claw 2.5.

THIS is a species that may with certainty be regarded as inhabiting the New-Zealand seas, although it may not be more plentiful than its near ally, *Œ. lessoni*.

Dr. Schlegel describes its range thus—"Southern Oceans: New Zealand, Australia, and New Caledonia"; and there is a specimen in the Leyden Museum labelled as having come from New Zealand.

Dr. Coues thinks it likely that this bird will prove to be the young of *Œstrelata lessoni*; but Mr. Salvin accepts it as a valid species, and the specimen in the British Museum from which I have taken my description appears to be a perfectly adult bird.

This species has not often been recorded, but this is hardly surprising when one considers the nature of its habitat. After a voyage by sailing-vessel from New Zealand to London, Sir James Hector wrote to me:—"I have been rather surprised at the small number of birds we have seen. For some days out from New Zealand we had *Diomedea melanophrys* and another small species with a white head and mottled body. These were very common near the Bounty Islands, but were not seen afterwards. The Mollymawks we had till we reached the South Tropic. It was not till we rounded the Horn that we saw any *D. exulans* or *D. fuliginosa*. The latter species I am positive we never saw in the Pacific, as it is so easily recognized by the blue streak on the mandibles. It is very abundant between the Falkland Islands and latitude 30° S. *Thalassidroma nereis* followed us almost to the Horn; but after entering the Atlantic *T. melanogastra* took its place, at first in large flocks, but since latitude 50° S. only a few stragglers have been seen. In the Pacific I saw one *Lestris*, and large flocks of 'Whale-birds,' as the sailors call them, which were the Blue Billy (*Prion turtur*); but in the South Atlantic we met flocks of another but larger-sized grey bird, which they also called 'Whale-birds.' These were evidently *Procellaria glacialoides*. We never saw a Cape-Pigeon during the voyage. Where can they be at this season—February to March? Only two Tropic-birds, one Frigate-bird, and a few Noddies were seen near St. Paul's Rocks, and these complete the list of birds."

ÆSTRELATA FULIGINOSA.

(SOOTY PETREL.)

- Procellaria fuliginosa*, Kuhl, Monogr. Procell. p. 142, pl. x. fig. 6 (1820).
Procellaria atlantica, Gould, Ann. N. H. xiii. p. 362 (1844).
Procellaria macroptera, Smith, Zool. of South Africa, Aves, pl. lii. (1849).
Pterodroma fuliginosa, Bonap. C. R. xlii. p. 768 (1856).
Pterodroma atlantica, Bonap. Consp. Av. ii. p. 191 (1857).
Æstrelata fuliginosa, Coues, Proc. Phil. Acad. 1866, p. 157.
Fulmarus atlanticus, Gray, Hand-l. of B. iii. p. 107 (1871).
Procellaria fuliginosa, Buller, Birds of New Zealand, 1st ed. p. 304 (1873).

Ad. omninò fuliginoso-niger, gutture pallidiore: subtùs brunneo lavatus: rostro et pedibus nigris: iride nigrá.

Adult. Entire plumage sooty or brownish black, paler on the throat, and tinged with brown on the underparts. Irides, bill, and feet black. Total length 17.5 inches; wing, from flexure, 12.5; tail 5; bill, following the curvature of upper mandible 1.75, length of lower mandible 1.75; tarsus 1.5; middle toe and claw 2.4.

THIS species, which ranges over both the Atlantic and the Pacific Oceans, inhabits the seas all round New Zealand, but seldom approaches the land. If I was right in my identification of those observed on the wing during a passage from Auckland to Sydney in July 1871, this Petrel is a remarkably powerful flier, coursing about with the activity of a Martin, and generally near the surface; but it is almost impossible to distinguish the various allied species with any certainty by merely observing them from the deck of a ship.

Of this species Mr. Salvin says (Ibis, 1888, p. 360):—"Sir Walter Buller's collection contains two specimens attributed to *P. gouldi*, Hutton. They agree with one in the British Museum from the coast of Tasmania, referred by Gould to *P. macroptera*, Smith. These I have compared with a large series from the South Atlantic Ocean, the Cape Seas, and elsewhere; and though they are rather larger and (especially the New-Zealand specimen) have stronger bills, I do not think the differences sufficiently constant or important to justify the recognition of more than one form of this widely-ranging species. Some stress has been laid upon the greyness of the face of *P. gouldi*; but this character, too, fails, and a specimen before me with a short wing has the chin white."

ÆSTRELATA MOLLIS.

(SOFT-PLUMAGED PETREL.)

Procellaria mollis, Gould, Ann. & Mag. Nat. Hist. vol. xiii. p. 363 (1844).

Cookilaria mollis, Bonap. Consp. Av. 1855, ii. p. 190.

Rhantistes mollis, Bonap. Compt. Rend. xlii. 1856, p. 768.

Æstrelata mollis, Coues, Proc. Phil. Acad. 1866, p. 630.

Æstrelata mollis, Salvin, Proc. Z. S. 1878, p. 738.

Ad. suprà griseus, pileo paulò saturatiore: alis brunnescenti-nigris: caudâ griscâ: plumis frontalibus albido marginatis: regione oculari nigrâ, fasciam longitudinalem supra-auricularem formante: genis et faciei lateribus albis, griseo fasciatis, gulâ et corpore reliquo subtùs albis: gutture imo et præpectore cinereis vel griseo fimbriatis: subalaribus schistacco-fuliginosis: rostro nigro: pedibus flavis, digitis dimidio apicali nigricantibus.

Adult. Crown of the head and general upper surface dark slaty grey, the feathers of the shoulders and back margined with paler grey; forehead and fore part of face speckled with white; in front of and below the eyes a conspicuous mark of black; throat and fore neck white; the grey of the upper surface spreads down the sides of the neck and breast, meeting in front, and forming a band with freckled edges; underparts of the body pure white, the flanks sometimes stained and freckled with grey; entire upper surface of wings brownish black, the primaries dusky on their inner webs; tail-feathers slaty grey, the three outer ones on each side more or less freckled with white, particularly on their inner webs; inner lining of wings dark slaty grey, more or less varied with white; some of the axillaries uniform slaty grey, others are freckled and clouded with paler grey. Irides and bill black; tarsi and basal portion of two inner toes yellow, the rest of the feet black. Total length 14 inches; wing, from flexure, 10.25; tail 4.5; bill, along the ridge 1.35, along the edge of lower mandible 1.5; tarsus 1.25; middle toe and claw 2.

Young. Gould states that the young differs in having all the under surface dark grey and the throat freckled with grey.

Obs. In some of the British-Museum specimens there is evidence of dimorphic coloration, the entire underparts being pale slaty brown.

DR. FINSCII states that the 'Novara' Expedition collected specimens of this bird in lat. 35° S., long. 175° 5' E. It is therefore clearly entitled to a place in our avifauna.

Of this bird Mr. Gould writes:—"It is a species that will ever live in my memory, from its being the first large Petrel I saw after crossing the line, and from a somewhat curious incident that then occurred. The weather being too boisterous to admit of a boat being lowered, I endeavoured to capture the bird with a hook and line; and the ordinary sea-hooks being too large for the purpose, I was in the act of selecting one from my stock of salmon-flies, when a sudden gust of wind blew my hooks and a piece of parchment ten inches long by six inches wide, between which they were placed, overboard into the sea, and I was obliged to give up the attempt for that day; on the next I succeeded in capturing the bird with a hook I had still left, and the reader may judge of my surprise when on opening the stomach I there found the piece of parchment, softened by the action of the salt water and the animal juices to which it had been subjected, but so completely uninjured that it was dried and again restored to its original use when a further supply of flies could be procured."

ŒSTRELATA AFFINIS.

(MOTTLED PETREL.)

Procellaria affinis, Buller, Trans. N.-Z. Inst. vol. vii. pp. 215-16 (1875).

Œstrelata gularis?, Salvin, Ibis, 1888, p. 358.

Ad. suprâ saturatè cinereus: dorsi plumis et supracaudalibus nigro terminatis: tectricibus alarum minimis et alâ spuriâ nigricanti-brunneis: primariis extûs nigricanti-brunneis, intûs albis: secundariis pallidè cinereis, albo angustè marginatis, basaliter albis: rectricibus saturatè cinereis, duabus externis intûs albidis: fronte albâ cinerascenti-nigro variegatâ: regione suboculari conspicuè cinerascenti-nigrâ: facie laterali guttureque albis: pectore imo et abdomine cinereis, plumis basaliter albis: corpore reliquo subtûs albo, pectoris lateribus cinereo lavatis, hypochondriis et subcaudalibus inferioribus cinereo variis et minutè transfasciatis: subalaribus albis, exterioribus conspicuè nigricantibus: rostro nigro: pedibus sordidè flavis, digito externo et membranis interdigitalibus nigris.

Adult. Crown, hind neck, and all the upper surface dark ashy grey, the feathers of the back, rump, and upper tail-coverts margined with greyish black; all the small wing-coverts and the primary quills brownish black, the latter largely marked with white on their inner webs; the secondaries and their coverts ash-grey, narrowly margined with white, and wholly white towards the base of each feather; tail-feathers dark ash-grey, the two outermost ones on each side marked with light grey on their inner webs; forehead slightly mottled with white; lores, chin, and throat perfectly white; a conspicuous spot of greyish black under each eye; upper part of breast washed and freckled with grey; middle part of breast and the abdomen dark cinereous, the underpart of the feathers white; sides of the body and smaller tail-coverts freckled and minutely barred with grey; long under tail-coverts white. The inner surface of the wings is pure white, but there is a broad bar of slaty black extending from the elbow to the carpal flexure, where it spreads and is continued along the outer edge. Total length 13 inches; wing, from flexure, 10.5; tail 4; bill, along the ridge 1.25, along the edge of lower mandible 1.5; tarsus 1.2; middle toe and claw 1.75.

I DESCRIBED this species from a specimen in the Canterbury Museum, to which I found attached a ticket with the following memorandum, "Shot; Potts River, 1872." I afterwards received a freshly skinned one from Mr. C. H. Robson, with the slightest possible variation in the measurements. This was obtained at Cape Campbell; and Mr. Robson wrote to me (under date June 3) that he had secured another, which struck the Moeraki Lighthouse in thick weather and was killed. (See Plate XLV.). Still more recently a fresh example was received at the Canterbury Museum from the Spencer Mountains. This one has the colours more pronounced than in my type; but exhibits the same pretty mottled markings on the forehead, and freckled touches of grey on the sides of the neck and lower part of the breast, where the white mixes with the clear dark grey of the rest of the body.

Dr. Finsch has expressed his belief that this Petrel is the same as *Procellaria mollis* (Gould); but the two birds are absolutely and entirely distinct. It may possibly prove to be identical with *Procellaria gularis* (Peale), as suggested by Mr. Salvin; but there is no specimen of the latter in Europe with which to compare it. The unique example upon which Peale founded his description (U. S. Expl. Exp., Birds, p. 299) is in the Smithsonian Institution, and I hope to investigate the subject further during my proposed visit to America next year. In the meantime I have thought it better to figure and describe my bird under the new name which I bestowed upon it in New Zealand.

ÆSTRELATA NEGLECTA.

(SCHLEGEL'S PETREL.)

Procellaria neglecta, Schl. Mus. Pays-Bas, *Procell.* p. 10 (1863).

Æstrelata neglecta, Coues, Proc. Phil. Acad. 1866, p. 170.

Ad. suprâ sordidè nigricanti-brunneus: remigibus obscurioribus: præpectore pallidè brunneo: corpore subtùs albo: rostro nigro: pedibus sordidè flavis, digitis et membranis exterioribus nigricantibus.

Adult. Crown of the head and hind neck sooty brown, mixed on the latter with white; the rest of the upper surface brownish black; the interscapulars and small wing-coverts narrowly margined with pale brown; around the eyes there is an obscure mark of brown which fades away on the face; the whole of the under-surface pure white; some of the axillary plumes slaty grey with white tips, others white clouded with grey, as also are the feathers forming the lining of the wings; quills brownish black with white shafts and white on the inner webs, shading into brownish black at the tips; tail-feathers and upper tail-coverts brownish black, white at the base, which, however, is only visible on disturbing the plumage. Irides and bill black; tarsi and basal portion of toes pale yellow, the rest of the feet black. Total length 15·5 inches; wing, from flexure, 12; tail 4; bill, along the ridge 1·5, along the edge of lower mandible 1·7; tarsus 1·5; middle toe and claw 2·25.

Obs. In some specimens there is an obscure patch of brown on each side of the breast; in others it spreads into a broad yellowish-brown pectoral band, narrower in the centre.

THE claim of this species to a place in our avifauna rests at present only on a label in a continental museum; but it is a Petrel that is almost certain to be met with in our seas, and I have therefore felt no hesitation in including it on what might otherwise have been very insufficient authority.

There is likewise a dark-coloured form, in which the whole of the plumage is sooty brown, deepening to brownish black on the upper parts. This colour, however, is confined to the surface, the whole of the plumage being pure white underneath. In this dark form, which Mr. Salvin refers without hesitation to *Æ. neglecta*, the legs and feet are entirely black. This cannot be due to immaturity, inasmuch as nestlings pass from the down into both phases of plumage, and we must therefore regard it as another illustration of that law of dimorphism among sea-birds for which, at present, we are utterly unable to account.

Dr. Coues thinks that this form may be referred to *parvirostris*; but Mr. Salvin regards it as a true species. My description is taken from the single example in the British Museum.

OSSIFRAGA GIGANTEA.

(GIANT PETREL.)

Giant Petrel, Lath. Gen. Syn. iii. pt. 2, p. 396, pl. c (1785).*Procellaria gigantea*, Gm. Syst. Nat. i. p. 563 (1788).*Procellaria ossifraga*, Forst. Descr. Anim. p. 343 (1844).*Ossifraga gigantea*, Hombr. & Jacq. Voy. Pôle Sud, Zool. iii. p. 148 (1853).

Ad. schistaceo-brunnescens, facie laterali et corpore subtus pallidioribus: dorso et tectricibus alarum pallidiorè cinereo angustè marginatis: rostro flavicanti-corneo: pedibus cinerascanti-nigris, unguibus albicanti-corneis: iride nigricanti-brunnèâ.

Adult male. Entire plumage uniform dark slate-grey, with glossy edges to the feathers, imparting to the surface a pretty, sheeny appearance. Irides blackish brown; bill whitish horn-colour; legs and feet greyish black, the claws whitish horn-colour. Total length 37.5 inches; extent of wings 6 feet 9 inches; wing, from carpal flexure, 21.5; tail 9; bill, along the ridge 5, along the edge of lower mandible 4; height of bill, to summit of tubular nostrils, 1.6; tarsus 3.75; middle toe and claw 6; hind claw .5.

Adult female. Entire plumage dull slaty brown, paler or changing to creamy grey on the face, throat, and underparts of the body; on the upper parts some of the feathers are strongly tinged with chocolate-brown; and all the feathers of the back, as well as the wing-coverts, have paler greyish margins. Total length 32 inches; extent of wings 66; wing, from flexure, 18.5; tail 7.5; bill, to anterior edge of tube 1.75, thence, following the curvature, to the tip 2, along the edge of lower mandible 3.75; bare tibia 1.25; tarsus 2.75; middle toe and claw 5.

Obs. On the approach of the moulting-season the plumage has a faded or washed-out appearance.

Var. Albinos, more or less perfect, are not of unfrequent occurrence. One which I obtained near Waikanae, on the West Coast, and presented to the Colonial Museum, was of snowy whiteness without blemish of any kind; even the legs and feet were whitish, the bill being yellowish horn-colour. A more beautiful object than this snow-white Petrel could scarcely be imagined. It proved on dissection to be a ♂, and I noticed that it was almost entirely free from the strong Petrel odour. There is another albino of almost equal purity in the same collection, which was captured by Sir James Hector in Foveaux Strait. This one, however, betrays here and there a dark brown feather on the upper surface.

At Liardet's establishment, in Wellington, there was exhibited for several years a white specimen with widely scattered slaty black feathers all over the body, particularly on the upper parts, and with the tail-feathers pale ash-grey. It was sent to the Colonial Exhibition in 1886, and is now in Mr. Silver's collection of New-Zealand birds at Letcomb Regis. There is an almost exactly similar specimen in the Liverpool Museum.

In the Otago Museum there is another albino which shows traces of the normal colour on the mantle and scapulars, with a few scattered dark feathers on the underparts. This specimen came from Macquarie Island, whence also the Museum received a singular variety in glossy adult plumage, but differing from the normal form in having the head and neck creamy white, shading into pale bluish grey on the breast and deepening on the underparts; the upper surface is as in ordinary specimens, except that the edges of the wings are prettily variegated with creamy white and pale brown; bill dull horn-colour; legs and feet dark brown.

It is not an unusual thing to meet with individuals having the forehead, face, and throat more or less mottled with greyish white, or with a single white feather among the primaries.

In a specimen from Campbell Island the feathers of the back and mantle are more or less tipped with light brown, and have lighter shafts.

THE Giant Petrel, or "Nelly," as it is called by sailors, is by no means uncommon in our seas. Of late years, with the increase of shipping of all kinds, it has become far more plentiful around our coasts and often ventures into the deep sounds or estuaries. I have counted as many as fourteen at one time following the steamer within four or five miles of the Wellington heads. Their power of wing is something marvellous. For hours together they keep up their rapid sailing movement without ever resting or descending to the water for a moment. It is very interesting to watch them in this tireless flight, and to observe how completely they have their wings under control. They approach the steamer at a swift rate with a low flapping movement of the wings, and then make a wide circuit, keeping them perfectly rigid, but shifting the balance of the body in such a way as to make alternately one wing and then the other incline upwards or downwards, thus altering the plane without the slightest visible alular movement. The manner in which the bird steers itself through the air, first ascending far above the masthead, then sweeping downwards, with the point of the wing at its lower inclination just skimming but never actually touching the water, even in a turbulent and broken sea, is really wonderful, and would seem to indicate very perfect organs of vision as a means of measuring distance. Now and then it alters its mode of flight and sails or glides over the surface of the sea with its wings formed into a bow shape, and with an occasional flap to give it fresh impetus.

Like the Albatros, it descends into the water in a very ungainly, straddling way, and, if in a hurry, with an awkward splash; keeps its wings uplifted till the body is steady, then deliberately folds them up and settles down to dinner or floats lazily on the surface, with upstretched neck and eyes ever on the alert. When garbage or food of any kind is thrown overboard, they all descend together and congregate around it, uttering low guttural notes as if disputing for its possession; but they never seem to quarrel or fight over it, and when disposed of, they generally break up into pairs and float about in friendly company, till, actuated by some common impulse, they mount again in the air and come sweeping up astern. On the wing, the tail is usually spread and has a broad euneiform appearance.

It is capable, too, of very rapid movements. On one occasion I was attentively watching six or seven of them, sailing about in circuits that ever crossed but never elashed, and had turned to my note-book for a few seconds to refer to something. On looking up again they had all disappeared as if by magic; and then I descried them in the water more than a mile astern, with their heads together, discussing some object that had been thrown overboard and had excited their notice. They are untiring, too, in their pursuit; for I have noticed that at sundown, when the Albatroses have drawn off from the steamer and disappeared one by one, the Giant Petrel (or "Stink-pot," as the sailors sometimes call it) has remained, still crossing and recrossing the wake of the ship, in undiminished numbers and unaffected by the deepening gloom.

It is universally dispersed over the temperate and high southern latitudes; and Mr. Gould has expressed his belief that it frequently performs the circuit of the globe, a conclusion inferred from the circumstance that an albino variety followed the vessel in which he made his passage to Australia for a period of three weeks, the ship often making two hundred miles during the twenty-four hours. He adds:—"It must not be understood that the bird was merely following the vessel's speed, nor deemed incredible when I state that during the twenty-four hours it must have performed a much greater distance, since it was only at intervals of perhaps half an hour that it was seen hunting up the wake of the vessel to secure any offal that had been thrown overboard, the interim being employed in scanning the ocean in immense circles." He informs us further that on visiting Recherche Bay in

D'Entrecasteaux's Channel, Tasmania, he found thousands of these birds sitting together on the water, and feeding on the blubber and other refuse of the whaling-station.

Some years ago a number of them actually followed the floating carcase of a whale into the harbour of Akaroa, and when discovered were engaged in tearing off the blubber*.

It is easily caught with a hook and line, the former baited with meat. The bird nibbles at the bait and is caught by the hook entering the upper mandible and is forthwith drawn in. Like the Albatros it is unable to rise from a level surface; and although more active on its feet, habitually falls forward, resting on its breast.

The following account of this Petrel (called *Quebranta-huesos*, or Break-bones, by the Spaniards) is given in Darwin's 'Voyage of a Naturalist' (p. 287):—"In its habits and manner of flight there is a very close resemblance with the Albatros; and, as with the Albatros, a person may watch it for hours together without seeing on what it feeds. The 'Break-bones' is, however, a rapacious bird; for it was observed by some of the officers at Port St. Antonio chasing a Diver, which tried to escape by diving and flying, but was continually struck down, and at last killed by a blow on its head. At Port St. Julian these great Petrels were seen killing and devouring young Gulls."

I may add that on one occasion, when steaming up Cook's Strait, I observed at a distance one of these Giant Petrels pursue and capture a small bird (apparently *Prion turtur*), and then, holding it by the wing, batter it against the water till it was killed.

This bird is habitually silent, except when fighting or when voiding its natural excrement, on which occasions it utters a grunting note. It is more pugnacious than other members of its class, and rival males when in conflict make a clashing noise with their bills, and drag each other about in a most unmerciful manner.

Sometimes, when impelled by extreme hunger, they will swim up alongside of the little coastal steamers and take the food that is thrown to them. A pair captured under these circumstances, at the mouth of the Wanganui river, by the crew of the "Huia," came into Mr. Drew's possession, and when I afterwards saw one of them in his garden it had become quite tame and docile, following him about with open bill and outstretched wings asking to be fed. It allowed me to handle it with impunity, making no attempt to bite, although, as a rule, these birds are very vicious. Its capacity for swallowing was surprising, and it gorged its crop with fresh meat till it could hold no more; then it stretched its neck on the ground and worked it violently in its efforts to accommodate another piece. Curiously enough, it would not touch fish of any kind. Although, by way of experiment, starved for several days, it still obstinately declined the fish offered to it. When, however, its mate died and had been skinned, the survivor regaled itself freely on the carcase till it became decomposed.

Professor Hutton states that this species breeds in the cliffs of the Prince-Edward Islands and Kerguelen's Land, and adds:—"When a person approaches the nest the old birds keep a short distance away, while the young ones squirt a horridly smelling oil out of their mouths to a distance of six or eight feet." Layard describes the eggs as being white, and measuring 4.2 inches in length by 2.5 in breadth.

There is an egg in the Otago Museum from Macquarie Island, ovoido-conical in form, measuring 3.75 inches in length by 2.25 in breadth; the shell has a very rough surface and, originally creamy white, is much stained and discoloured. Another specimen (from the Falkland Islands) in Mr. Philip Crowley's collection is more elliptical in form, measuring 3.6 inches in length by 2.5 in breadth.

* Writing from Portland Island, Mr. Robson says:—"We have had numbers of the Giant Petrel here, for some weeks past, feeding on the remains of a dead whale. Amongst them, till very recently, there was a splendid albino—as white as snow—which I tried hard to shoot for your collection, but unfortunately without success."

THALASSÆCA GLACIALOIDES.

(SILVERY-GREY PETREL.)

- Procellaria glacialis*, var. β , Gm. Syst. Nat. i. p. 563 (1788).
Procellaria tenuirostris, Aud. Orn. Biogr. v. p. 333 (1839).
Priocella garnotti, Hombr. & Jacq. Voy. Pôle Sud, iii. p. 148, pl. 32. figs. 43-56 (1844).
Procellaria glacialoides, Smith, Ill. Zool. S. Afr. pl. li. (1849).
Thalassoica tenuirostris, Bp. C. R. xlii. p. 768 (1856).
Thalassoica polaris, Bp. C. R. xlii. p. 768 (1856).
Procellaria smithi, Schl. Mus. Pays-Bas, *Procell.* p. 22 (1863).
Fulmarus glacialoides, Gray, Hand-l. of B. iii. p. 105 (1871).
Procellaria glacialoides, Buller, Birds of New Zealand, 1st ed. p. 301 (1873).

Ad. suprà dilutè argentescenti-cinereus : pilco undique et corpore subtùs toto albis : pectoris lateribus dorsi colore lavatis : primariis extùs nigricanti-brunneis, intùs albicantibus : rostro albicanti-corneo, carnosò tincto, nigro apicato, culmine ad basin cyanescente : pedibus carnosò-cinereis, digitis exterioribus externè saturatioribus : palmis pallidè flavis : iride brunnescenti-nigrâ.

Adult. Hind part of neck, back, and all the upper surface, as well as the sides of the breast, delicate silvery grey; the rest of the plumage pure white; primaries blackish brown on their outer, and greyish white on their inner webs; tail-feathers delicate silvery grey. Irides brownish black; bill whitish horn-colour, with a tinge of pink, the ridge as far as the opening of the nostrils bluish, the tips of both mandibles black; legs and feet pinkish grey, darker on the joints and along the edges of the outer toes; the interdigital webs pale yellow, and the claws brown. Total length 19.5 inches; extent of wings 43.5; wing, from flexure, 13; tail 6; bill, following the curvature of upper mandible 2, along the edge of lower mandible 1.75; tarsus 2; middle toe and claw 3.

THERE are several instances recorded of the occurrence of this beautiful Petrel on the New-Zealand coast; and the above description is taken from a fine example which I picked up, in a dying state, on the sea-beach near the mouth of the Turakina river, and afterwards presented to the Colonial Museum.

There are two specimens in the Canterbury Museum, both obtained in the South Island.

The late Sir Andrew Smith, who was the first to discriminate the characters which distinguish this species from *Thalassæca glacialis*, informs us that it is common on the South-African coasts, and frequently enters the bays—also that it flies higher above the surface of the water than the last-named bird, and rests more frequently.

THALASSŒCA ANTARCTICA.

(ANTARCTIC PETREL.)

- Antarctic Petrel*, Lath. Gen. Syn. iii. pt. 2, p. 400 (1785).
Procellaria antarctica, Gm. Syst. Nat. i. p. 565 (1788, ex Lath.).
Priocella antarctica, Hombr. & Jacq. Voy. Pôle Sud, p. 149 (1844).
Procellaria antarctica, Gray, Voy. Erebus and Terror, pl. 33 (1846).
Thalassoica antarctica, Reich. Naturg. Schwimmv., *Natatores*, pl. xiv. (1848).
Thalassœca antarctica, Coues, Proc. Phil. Acad. 1866, p. 31.
Fulmarus antarcticus, Gray, Hand-l. of B. iii. p. 105 (1871).
Priocella antarctica, Hector, Trans. N.-Z. Inst. vol. ix. p. 464 (1877).
Procellaria antarctica, Buller, Man. Birds of New Zealand, p. 88 (1882).
Aeipetes antarcticus, Forbes, Voy. of Chall., Anat. Petrels, p. 59 (1882).

Ad. pileo eollique toto, cum seapularibus et teetrieibus alarum minimis, fuliginoso-einereis: gulâ et colli lateralibus brunnescentibus: secundiis et teetrieibus alarum albis: corpore reliquo purè albo: caudâ fuliginoso-nigro terminatâ: rostro brunnescenti-nigro: pedibus pallidè brunnescenti-einereis.

Adult. Head, hind neck, and general upper surface dull brownish black; on the throat and sides of the neck the brown fades off into the white; the rest of the under surface pure white, except a broad band along the edge of the wings, which is slaty brown; primaries brownish black, white on their inner webs except at the tips; the whole of the secondaries and their large coverts are pure white, presenting a broad oblique band in the closed wing; seapulars brownish black, white at the base; tail-feathers pure white, with a broad terminal band of dull brownish black. Irides and bill black; legs and feet dull yellow, brownish on the outer side of tarsi and on the outer toes. Total length 19.5 inches; wing, from flexure, 12; tail 5; bill, along the ridge 1.75, along the edge of lower mandible 2; tarsus 1.75; middle toe and claw 2.5.

I AM still in doubt as to the propriety of admitting this species into our avifauna, the specimen described by Sir James Hector having been shot in lat. 46° S., long. 118° 9' E., or about "1000 miles west of Tasmania and in the latitude of Otago." It was included by Mr. G. R. Gray among the birds of New Zealand in the 'Voyage of the Erebus and Terror'; and one or more of the five specimens in the British Museum are said to have been captured in our seas, but the evidence is by no means complete.

Forbes proposed to make this Petrel the type of a genus, *Aeipetes*, which he says is "easily distinguishable from *Thalassœca* by the much shorter and more slender bill, and differently shaped nasal tubes; number of rectrices 12 instead of 14 as in *Thalassœca* and 16 in *Ossifraga*; tracheal septum incomplete, and the structure of the syrinx different."

PUFFINUS TENUIROSTRIS.

(BONAPARTE'S SHEARWATER.)

- Procellaria tenuirostris*, Temm. Pl. Col. vol. v. livr. 99 (1836).
Priofinus brevicaudus, Bonap. C. R. xlii. p. 769 (1856).
Nectris brevicaudus, Bonap. Consp. Gen. Av. ii. p. 201 (1857).
Nectris brevicauda, Coues, Proc. Phil. Acad. 1864, p. 127.
Puffinus brevicaudatus, Hutton, Cat. Birds New Zeal. p. 45 (1871).
*Puffinus brevicaudus**, Buller, Birds of New Zealand, 1st ed. p. 315 (1873).

Native names.—Titi, Hakoakoa, and Hakuakua.

Ad. omninò fuliginosus, corpore superiore brunnesente lavato: rostro nigricanti-brunneo, mandibulâ pallidiore: pedibus vinascenti-cinereis: iride nigrâ.

Adult male. Entire plumage sooty or blackish grey, the upper surface strongly tinged with brown. Irides black; bill blackish brown, the under mandible paler; legs and feet vinous-grey; the webs yellowish flesh-colour, blackish brown towards the edges. Total length 15 inches; wing, from flexure, 10·75; tail 3·75; bill, along the ridge 1·5, from gape to extremity of lower mandible 1·8; tarsus 1·75; middle toe and claw 2·25.

Female. Differs from the male only in having the plumage more suffused with pale brown, the feathers of the breast, sides, and underparts generally having brownish margins.

Young. Has the blackish grey of the upper sides of the face and sides of the neck fading gradually into the white of the underparts; the bill also is darker, being of a uniform brownish black, very slightly paler along the under edge of the lower mandible.

Younger state. A fledgling in Mr. Drew's collection, which was picked up on the Wanganui sea-beach, has the plumage as in the adult, except that the throat and fore neck are ash-grey, the down of that colour giving place, however, to white feathers, which are at present very minute. On the lower cheek the down has almost disappeared.

Obs. A specimen picked up by myself on the ocean-beach near Otaki gave the following measurements:—Total length 14 inches; extent of wings 26·5. This was in the early part of February, and the bird was in adult plumage, but too far gone to admit of my preserving it.

THIS species of Petrel is very abundant on our coasts, and retires inland, sometimes to a distance of fifty miles, to breed. It nests in underground burrows, forming often large colonies, and resorting to the same breeding-place year after year. There is said to be an extensive nesting-ground of this kind in the Kaimanawa ranges in the Taupo-Patea country. At certain seasons the natives collect large numbers of these birds and preserve them in calabashes, potted in their own fat, either for future use or as gifts to neighbouring tribes.

* Dr. Finsch was the first to identify our bird with *Puffinus tenuirostris*; and Mr. Salvin says of it:—"It seems well established that *P. brevicaudus* of the Australian and New-Zealand seas does not differ from *P. tenuirostris* of Japan. The latter name has priority."

It is extremely abundant in the seas surrounding Tasmania and among the islands in Bass's Strait, to some of which it resorts in countless numbers for the purpose of breeding. Green Island is described as the great Petrel nursery; and a most interesting account thereof, by Mr. Davies, may be found in the second volume of the 'Tasmanian Journal.' The following extracts must suffice:—

"About the commencement of September these birds congregate in immense flocks, and shortly afterwards proceed, at sunset, to the different isles upon which they have established their rookeries. Here they remain during the night for the space of about ten days, forming their burrows and preparing for the ensuing laying-season. They then leave and continue at sea for about five weeks. About the 20th November, at sunset, a few come in to lay, and gradually increase in numbers until the night of the 24th. Still there are comparatively few, and a person would find some difficulty in collecting two dozen eggs on the morning of that day. It is not in my power to describe the scene that presents itself at Green Island on the night of the 24th November. A few minutes before sunset flocks are seen making for the island from every quarter, and that with a rapidity hardly conceivable. When they congregate together, so dense is the cloud, that night is ushered in full ten minutes before the usual time. The birds continue flitting about the island for nearly an hour, and then settle upon it. The whole island is burrowed; and when I state that there are not sufficient burrows for one-fourth of the birds to lay in, the scene of noise and confusion that ensues may be imagined; I will not attempt to describe it. On the morning of the 25th the male birds take their departure, returning again in the evening; and so they continue to do until the end of the season. Besides Green Island the principal rookeries of these birds are situated between Flinders Island and Cape Barren and most of the smaller islands in Furneaux's group. The eggs and cured birds form a great portion of the food of sealers, and, together with the feathers, constitute the principal articles of their traffic. It takes the feathers of forty of these birds to weigh a pound; consequently sixteen hundred must be sacrificed to make a feather bed of forty pounds weight. Notwithstanding the enormous annual destruction, I did not, during the five years I was in the habit of visiting the Strait, perceive any sensible diminution in their number. The young birds leave the rookeries about the latter end of April, and form one scattered flock in Bass's Strait. I have actually sailed through them from Flinders Island to the heads of the Tamar, a distance of eighty miles. They shortly afterwards separate into dense flocks, and finally leave the coast."

The following extract from Flinders's Voyage (vol. i. p. 170), describing a single flight of these birds, will give the reader an idea of their prodigious numbers:—"There was a stream from fifty to eighty yards in depth and three hundred yards or more in breadth; the birds were not scattered, but were flying as compactly as a free movement of their wings seemed to allow; and during a full hour and a half this stream of Petrels continued to pass without interruption, at a rate little inferior to the swiftness of the Pigeon. On the lowest computation I think the number could not have been less than a hundred millions. Taking the stream to have been fifty yards deep by three hundred in width, and that it moved at the rate of thirty miles an hour, and allowing nine cubic yards of space to each bird, the number would amount to 151,500,000. The burrows required to lodge this quantity of birds would be 75,750,000; and allowing a square yard to each burrow, they would cover something more than 18½ geographic square miles of ground."

It is very plentiful in the Hauraki Gulf, and is diurnal in its habits. It associates on the water in large communities, has a vigorous flight, and utters a peculiar cry represented by the syllables *ha-kwa-kwa*, from which it derives its native name. It breeds on all the islands in the Gulf—not, however, in colonies, but each pair selecting its own locality and excavating a deep burrow, sometimes 5 feet in extent, with a rounded chamber at the further end, where a single egg is deposited about the end of September. A specimen in my son's collection, from Lord Howe's Island, is of a rather elliptical or slightly pyriform shape, measures 2.75 inches in length by 1.6 in breadth, and is perfectly white.

PUFFINUS GRISEUS.

(SOMBRE SHEARWATER.)

- Procellaria grisea*, Gmel. ex Lath. Gen. Syn. iii. p. 399 (1785).
Procellaria tristis, Forster, Descr. An. p. 205 (1844).
Puffinus major, Gray, Voy. Ereb. and Terr. p. 17 (1846).
Procellaria fuliginosa, Hombr. Voy. Pôle Sud, iii. p. 138 (nec Strickland, 1853).
Puffinus tristis, Gray, Ibis, 1862, p. 244.
Nectris amaurosoma, Coues, Proc. Phil. Acad. 1864, p. 124.
Puffinus amaurosoma, Gray, Hand-l. of B. iii. p. 102 (1871).
Puffinus tristis, Buller, Birds of New Zealand, 1st ed. p. 317 (1873).
Puffinus griseus, Finsch, J. f. O. 1874, p. 209.
Puffinus stricklandi, Ridgw. Man. N. Amer. Birds, p. 61 (1887)*.
Puffinus griseus, Salvin, Ibis, 1888, p. 355.

Native names.—Titi, Hakoakoa †, and Totorore: “Mutton-bird” of the colonists.

Ad. similis *P. tenuirostri*, sed major et obscurior, plumis corporis superioris sordidè brunneo marginatis: subtùs interdum pallidior: rostro cinerascanti-nigro, culmine flavicanti-brunneo: pedibus dilutè cyanescentibus: palmis pallidè brunneis: iride nigrâ.

Adult. Entire plumage blackish grey, the feathers of the upper parts narrowly margined with dull brown; in some specimens lighter grey on the throat and underparts of the body; inner lining of wings greyish white, mottled and clouded with dark grey. Irides black; bill dull greyish black, inclining to yellowish brown on the ridge; tarsi and toes bluish grey, the webs yellowish. Total length 15 inches; wing, from flexure, 11.5; tail 3.5; bill, along the ridge 1.75, along the edge of lower mandible 2.1; tarsus 2; middle toe and claw 2.3.

Nestling. Covered with thick slaty grey down.

THIS bird resembles *Puffinus tenuirostris*, but is appreciably larger, as will be seen on referring to their respective measurements. It is a common species in the New-Zealand seas, and is said to be extremely abundant at Stewart's Island and on the adjacent coast. It is also comparatively plentiful on the Island of Kapiti, where it is found breeding as late as March. On the Island of Karewa and

* Mr. Salvin writes:—“There is now a large series of skins of this bird in the British Museum; and I have taken the opportunity of comparing birds from the North Atlantic with others from the Pacific Ocean, and have failed to see how two species can be set up as proposed by Mr. Ridgway. In his recently published ‘Manual’ it will be seen that dimensions do not afford any diagnostic characters, and that the only difference to be detected is that the under wing-coverts in the Atlantic bird are grey, transversely mottled with white at the tips, whereas in *P. griseus* they are white, transversely mottled with grey at the tips. A comparison of specimens shows how trivial this difference is. In the Pacific Ocean this species occurs as far north as the Kurile Islands, whence specimens have been sent by Mr. H. J. Snow.” (Ibis, 1888, p. 355.)

† One of the Ngatiapa witnesses in the Rangatira case gave the following evidence:—“Pirihakoakoa is the name of a place in the cliffs far up the Rangitikei river—where the Hakoakoa was accustomed to breed. We repaired thither at the right season to extract the young birds from the holes. The cry of this bird was *Pipiriki-pipiriki-tawharara*.”

on the Rurima Rocks large numbers annually breed, sharing their burrows with the tuatara lizard, and submitting, season after season, to have their nests plundered by the Maoris, who systematically visit the breeding-grounds when the young birds are sufficiently plump and fat for the calabash.

Mr. Marchant informs me that he found this species breeding in burrows near the summit of the Island of Kapiti about the end of February. The excavations were in peaty ground over which a fire had passed, destroying all the surface vegetation. The young at this time were half-grown, thickly covered with light grey down, and extremely fat. On being held up by the feet, oily matter ran freely from their throats. The old birds, on being taken hold of, fought fiercely with their bills.

Mr. Kennedy also informs me that when engaged on a survey of the Kaimanawa ranges, his native workmen caught numbers of these birds in their burrows. On their first arrival at the breeding-ground the young birds were very small, but in the month of April they had attained their full size and were veritable lumps of fat, "pure oil pouring from the bill when the birds were held up by the feet."

It sometimes breeds in the hills at the back of Wellington, and I once met with the bird on the coach road in the Ngauranga gorge.

There are some nesting-grounds of this species on Whale Island in the Bay of Plenty. I visited these breeding-places about the middle of January and found the nestlings still occupying their deep burrows, but they were well grown, with black quills and tail-feathers sprouting vigorously through their thick downy mantle of slaty grey.

These birds are at all times more nocturnal than diurnal, and when hovering overhead at night utter a frequent call-note, like *tee-tee-tee*, from which the Maori name is derived.

There are several well-known breeding-places on the south-east coast of Otago, and on Stewart's Island, from which large supplies of potted birds are annually drawn and forwarded to the Northern tribes, a *poha titi* (or cask of preserved Petrel) being a gift worth the acceptance of the highest chief.

Of this species probably Dr. Crowfoot writes (*Ibis*, 1885, p. 268):—"This Petrel, called by the Norfolk-Islanders 'Mutton-bird' or 'Ghost-bird,' from its child-like cry at night, lays its eggs on Norfolk, Phillip, and Nepean Islands. Its breeding-period extends over a considerable time. I have seen young birds nearly fledged on the 27th October, and have obtained fresh eggs on the 15th January. This bird digs out a hole in the soft soil on the faces of the cliffs, also in the sand on flat ground. Some of the burrows are six feet and more in length. The bird also lays extensively on Phillip Island in shallow recesses under overhanging boulders and in colonies, *i. e.* many may be found close together. On Norfolk Island its holes are always isolated and the burrows deep. One egg only is laid. Both bird and egg have a very strong peculiar smell, and I can usually tell a fresh hole from an old one by the smell of the entrance. There is no nest. The eggs, which are pure white, vary from 2.5 inches to 2.75 in length, and from 1.5 inch to 1.75 in breadth. Some are equally rounded at both ends; others are much pointed at one end."

An egg supposed to belong to this species, and sent to me by Mr. Drew (who obtained it at Kapiti), is ovoido-elliptical in form, measuring 3.1 inches in length by 1.95 in breadth; it is white, with a smooth surface, but much discoloured by soiling.

Of the closely allied species, *Puffinus carneipes*, Mr. Salvin writes (*l. c.*):—"Sir Walter Buller's collection contains a specimen which appears to me to belong undoubtedly to this species; the only other examples which I have seen are from Hakodate in Northern Japan. The latter only differ in being rather older, and in more worn plumage, the New-Zealand bird being freshly moulted. These additional localities show that this bird has a much wider range than has hitherto been suspected. Gould's types came from Cape Leewin, S.W. Australia.

"The bird is rare in collections, and we have considerable doubts as to the correct determination of those stated to be in the Leyden and other museums (*cf.* Schl. Mus. Pays-Bas, vi. *Procellariæ*, p. 26); the Leyden birds should, I believe, be referred to *Puffinus griseus* (Gm.)."

PUFFINUS CARNEIPES.

(FLESH-FOOTED SHEARWATER.)

*Procellaria carneipes**, Gould, P. Z. S. 1844, p. 57.*Majaqueus carneipes*, Reich. Naturg. Schwimmv., *Natatores*, pl. xiv. f. 2601; Syst. Av. p. iv (1852).*Nectris carneipes*, Coues, Pr. Ac. Nat. Sc. Phil. 1864, p. 126.*Puffinus carneipes*, Salvin, Ibis, 1888, p. 356.*Native name.*—Hakoakoa.

Ad. similis P. tristi, sed major et suprâ obscurior: rostro conspicuè majore facilè distinguendus: dorsi plumis scapularibusque brunnescente marginatis: rostro flavicanti-corneo, brunnescenti-nigro apicato, culmine quoque ad basin brunnescenti-nigro: pedibus sordidè carneis, membranis interdigitalibus pallidè brunncis.

Adult male. Entire plumage uniform sooty or blackish grey, the crown, hind neck, and general upper surface being several shades darker, and the feathers composing the mantle obscurely margined with brown. Irides black; bill yellowish horn-colour, brownish black at the tips of both mandible, and along the culmen to the opening of the nostrils; legs and feet dull flesh-colour, the webs pale brown. Total length 19.75 inches; extent of wings 43; wing, from flexure, 12.75; tail 4.5; bill, along the ridge 2, along the edge of lower mandible 2.25; tarsus 2; middle toe and claw 2.75.

Female. Similar to the male, but with somewhat lighter plumage and of smaller size. Total length 19 inches; extent of wings 42.5; wing, from flexure, 12.5; tail 2.25; bill, along the ridge 1.75, along the edge of lower mandible 2; tarsus 1.9; middle toe and claw 2.75.

Nestling. Covered with thick dark-grey down.

THIS fine Shearwater is comparatively common off New Zealand, and breeds in large colonies on some of the small islands near the coast.

The above descriptions were taken from a pair obtained by Captain Fairchild on White Island, where they were breeding, and sent to me alive at the beginning of November. When taken out of the box in which they had been confined on board the 'Hinemoa,' they were very vicious, attacking everything with their bills, and even snapping savagely at each other when brought within reach. When taken hold of they uttered a cry like that of a young child in pain. At other times they had a peculiar chuckling note; and it was amusing, when travelling with them by train, to hear the passengers remark from the sounds that "there were fowls under the seats."

Captain Fairchild sent me at the same time the nestling of a Diving Petrel (*Pelecanoides urinatrix*) which he assured me had been taken from the same burrow as the pair of Titi.

I dissected the latter, and found the testes in the male bird largely developed; and in the ovary of the female a cluster of embryo eggs, the largest being of the size of buck-shot. It would seem from this that, like some other Petrels, it has two broods in the season.

* Of this species Dr. Finsch writes (Trans. N.-Z. Inst. vol. viii. p. 202):—" *Procellaria carneipes*, Schleg., in the Leyden Museum, is identical with *Procellaria griseus*." But Mr. Salvin regards it as a valid species, and it seems to me very readily distinguishable from the latter bird by its more robust bill.

PUFFINUS CHLORORHYNCHUS.

(WEDGE-TAILED SHEARWATER.)

Puffinus chlororhynchus, Less. *Traité d'Orn.* p. 612 (1831).*Puffinus sphenurus*, Gould, *Ann. & Mag. N. H.* xiii. p. 365 (1844).*Thiellus chlororhyncha*, Bonap. *Consp. Av.* ii. p. 201 (1850).*Thiellus sphenurus*, Bonap. *ibid.**Procellaria chlororhyncha*, Schl. *Mus. Pays-Bas*, vi. *Procell.* p. 25 (1863).*Procellaria sphenura*, Schl. *ibid.**Puffinus chlororhynchus*, Salvin, *Ibis*, 1888, p. 352.

Ad. omninò schistaceo-fuliginosus, interscapulio scapularibusque ad apicem pallidioribus : gulâ et jugulo anteriore schistaceis : abdomine crissoque et supracaudalibus saturatè brunneo tinctis : rostro grisescenti-nigro, apice et culmine obscurioribus : pedibus flavescenti-brunneis.

Adult. General plumage dark slaty brown, changing to dark slaty grey on the throat and fore neck; the feathers composing the mantle edged with grey; flanks, upper portion of abdomen, with upper and lower tail-coverts more strongly tinged with brown; quills and tail-feathers slaty black with polished shafts; lining of wings uniform slaty grey. Irides black; bill greyish black; legs and feet yellowish brown. Total length 17 inches; wing 10·25; tail 6; bill, along the ridge 1·8, along the edge of lower mandible 1·9; tarsus 1·7; middle toe and claw 2·3.

Obs. In the female the general plumage is more suffused with brown.

Note. Mr. Salvin's collection contains a New-Zealand example. There is a specimen from Lord Howe's Island in the British Museum, and another from the Seychelles, received from Canon Tristram.

MR. SALVIN writes (*Ibis*, 1888, p. 352):—"Lesson's type of his *P. chlororhynchus* in the Paris Museum was brought from Australia (Baie des Chiens Marins), so Pucheran tells us, by Quoy and Gaimard in 1820. Those writers who have attempted to separate it from *P. sphenurus* of Gould attribute to it a more western range, extending from Western Australia to the Mascarene Islands and the Cape of Good Hope, and reserve the name of *P. sphenurus* for the more eastern bird, giving its range 'Australian Seas.' Gould's types of *P. sphenurus*, however, came from Houtmann's Abrolhos, off the coast of W. Australia, so that the difference of habitat breaks down. I have compared specimens from the Mascarene Islands (Mauritius and Rodriguez), Raine's Islet (N.W. Australia), Bird Islet (N. Australia), Norfolk I., Lord Howe's I., Eimeo (Society I.), and New Zealand, and fail to see how any separation can be maintained. The Mascarene birds have perhaps a rather stouter bill, the colour of which in the skin is more of a fleshy yellow; but these differences seem to me to be of little importance, as intermediate specimens occur. The slight difference in size is not more than occurs in most birds having so wide a range. Gould's figure represents a bird with a dark bill, but his description gives it as 'reddish fleshy-brown, darker on the culmen and tip.' We have two skins said to have come from New Zealand, where its occurrence, at least on the shores of the North Island, can hardly fail to be established."

A specimen of the egg in my son's collection, from Lord Howe's Island, is rather ovoido-elliptical in form, measuring 2·5 inches in length by 1·5 in breadth, and is perfectly white.

PUFFINUS GAVIA.

(FORSTER'S SHEARWATER.)

Procellaria gavia, Forst. Descr. Anim. p. 148 (1844).*Æstrelata gavia*, Coues, Proc. Phil. Acad. 1866, p. 154.*Puffinus assimilis*, Hutton, Trans. N.-Z. Inst. vol. i. p. 161 (1868, nec Gould).*Native name.*—Pakahaa: "Rainbird" of the colonists.*Ad.* suprâ nitidè brunnescenti-niger: facie laterali et corpore subtùs toto albis: rostro sordidè plumbeo, mandibulâ pallidiore: pedibus flavicanti-albis, extùs nigro limbatis: iride nigrâ.*Adult male.* Crown of the head, nape, and all the upper surface, including the wings and tail, glossy brownish black, fading away gradually towards the under surface; sides of the face, throat, fore neck, and all the under surface white. Irides brownish black; bill dark grey, lighter and sometimes yellowish grey on the under mandible; tarsi and toes pinkish flesh-colour, stained with blackish brown along the front of the tarsus, and on the outer edges of the toes; webs darker. Total length 14.5 inches; extent of wings 27.5; wing, from flexure, 8.5; tail 3; bill, along the ridge 1.4, along the edge of lower mandible 1.75; tarsus 1.5; middle toe and claw 2.*Female.* Upper parts dull yellowish brown, with dingy tips; underparts white; on the sides of the neck the dark colour fades imperceptibly away. Total length 14.5 inches; wing, from flexure, 8.5; tail 3; bill, along the ridge 1.25; tarsus 1.5.

Another example (in the Otago Museum) is somewhat smaller and has the plumage of the upper parts darker.

Young. The young bird assumes the colours of the adult from the nest, but with rather paler margins to the wing-coverts, the woolly covering clinging longest to the back and flanks.*Nestling.* Covered with very thick slate-coloured down on the upper, and white on the under, surface.*Obs.* In this Petrel the white on the femoral region is very conspicuous when the bird is on the wing.

One from Selwyn (in the Canterbury Museum) has the upper parts sooty grey, and the underparts pure white, the former colour extending forwards from the shoulders and being nearly confluent on the lower fore neck. Another (marked ♀) from Chicken Island is somewhat smaller in all its proportions, and has the plumage of the upper parts sooty black, there is less white on the cheeks, and the dark colour is not spread forward on the fore neck.

THIS species of Petrel, which enjoys a wide oceanic range, is comparatively common in the seas surrounding New Zealand; and after stormy weather it is frequently picked up, either dead or in an exhausted state, among the sea-drift on the open strand. It is certainly not the same as *P. opisthomelas*, Coues, as I formerly supposed, for the latter species may be at once distinguished by its "fuliginous-black under tail-coverts" (see Proc. Nat. Sc. Phil. 1864, p. 139)*. Mr. Salvin has shown* Mr. Salvin writes (Ibis, 1888, p. 356):—"Sir Walter Buller's collection contains a specimen referred to this species, which is the first I have seen answering to Forster's description. It has a general resemblance to *P. opisthomelas*, Coues, as regards the colour of its plumage, but may at once be distinguished by its pure white under tail-coverts."

me a careful drawing by Keulemans from the type of *P. opisthomelas* (obtained off the coast of Lower California), which was sent over from the Smithsonian Institution for the purpose of being figured in his forthcoming 'Monograph,' and this feature is very distinct.

They congregate in flocks, often of considerable size, and fly in a compact body, generally in a zigzag course, with a very rapid movement of the wings and not far above the water. Their flight is peculiar, too, in this respect, that they appear all to turn at the same moment, like a company of soldiers, showing first the dark plumage of the upper surface and then the white underparts as they simultaneously dip towards the water.

Their habits are sociable, and flocks may often be seen in the daytime disporting themselves in the sea, making short flights just above the surface, then flopping into the water, splashing and chasing one another in their playful gambols, and when tired of their fun rising in a body and rapidly disappearing from view in the manner already described. On one occasion I saw a flock of several hundred thus amusing themselves in the broad sunshine (although the bird is more nocturnal than diurnal) as our ship was steaming through the narrow "French pass" in Cook's Strait.

They seem to scatter at night, for as darkness approached I have noticed numerous single examples, as if the flocks of the daytime were dispersing over the surface of the ocean in quest of their food. They fly low but swiftly, and utter a note resembling the native name by which the bird is called, but somewhat prolonged, as *paka-ha-a—paka-ha-a*. During the breeding-season I have seen very large flocks of them between Whale Island and the mainland, some of them hovering on the wing, hundreds together in "schools" or flocks, and others scattered far and wide over the surface, floating in a listless manner as if resting after the hunting exploits of the night.

Occasionally, perhaps once in several years, they appear in prodigious flocks and seem to cover the sea for miles around; but they soon scatter again over "ocean's boundless bosom," and are then not more plentiful than the other Petrels. This periodical "mustering of the clans" is doubtless due to a superabundance of some particular food-supply in the part of the sea where they congregate.

Whale Island is one of their favourite breeding-grounds, the places selected being the stony, scrub-covered slopes near the summit, as well as the holes and crevices among the rocks far above high-water mark. The adjacent little island of Motoki is also a nesting-ground. The island of Karewa in the Bay of Plenty, and the numerous islands in the Hauraki Gulf are also favourite breeding-grounds. They nest in communities and their burrows are like rabbit-warrens, covering acres in extent. As a rule, they go down vertically for about a foot and then spread off laterally for a distance of two feet or more, thus forming a chamber in which the Petrel deposits her single egg and afterwards cradles her young. In the early morning the old birds go off to sea, and do not return to their nests till after dark, when there is great noise and excitement among the nestlings in their eagerness for the food which has been stewing for them all day long in their parents' crops.

The Maoris state that the young birds quit their nests for the sea towards the end of February, which would accord with my observations on Whale Island. They do their best, however, to interfere with this domestic arrangement, for when the fledglings are about to take their departure, they are visited by Maori hunting-parties, who capture sometimes four or five hundred of them in a day, and pot them in their own fat as *huahua*, which is esteemed a great delicacy. Having regard to the profit the island is strictly *tapu* during the early part of the breeding-season, and no native is allowed to land there. The expiation of the *tapu* and the slaughter of the innocents form one and the same event!

It breeds on several of the larger islands in the Hauraki Gulf; and Mr. Cheeseman found it nesting on the "Hen and Chickens."

An egg of this species in my son's collection is broadly oval, measuring 2.3 inches in length by 2 in breadth, and is perfectly white.

PUFFINUS OBSCURUS.

(DUSKY SHEARWATER.)

- Dusky Petrel*, Lath. Gen. Syn. vi. p. 416 (1785).
Procellaria obscura, Gmel. Syst. Nat. i. p. 559 (1788, ex Lath.).
Nectris obscura, Kuhl, Beitr. Zool. 1820, p. 147, pl. xi. fig. 11.
Puffinus obscurus, Bonap. Synop. 1828, p. 371.
Cymotomus obscurus, Maeg. Man. Orn. 1844, ii. p. 13.
Puffinus obscurus, Salvin, Ibis, 1888, p. 357.

Ad. supra brunnescenti-niger: facie laterali inferiore et corpore subtùs albis: subalaribus exterioribus et subcaudalibus externis cinerascanti-nigro variis: rostro nigro: pedibus flavicanti-brunneis: iride nigrâ.

Adult. Crown and sides of the head, hind neck, and entire upper surface brownish black; chin, fore neck, and entire under surface pure white; feathers covering inner edges of wings and the lateral under tail-coverts largely varied with slaty black; on the sides of the neck the dark plumage blends with the white of the under surface without any line of demarcation; wing-feathers uniform dark brown; tail-feathers black. Irides black; bill jet-black and slightly polished; legs and feet yellowish brown, shading into brownish black on the outer side of the tarsi and on the outer toes; claws black. Total length 13 inches; wing, from flexure, 8·2; tail 3·5; bill, along the ridge 1·3, along the edge of lower mandible 1·6; tarsus 1·4; middle toe and claw 1·8.

Obs. There is no observable difference in the sexes, except that the dark plumage in the female is duller.

Of this species Mr. Salvin writes (*l. c.*):—"A skin, said to have come from New Zealand, in our collection, belongs to the larger form of this species. It agrees with one from Manua, Samoa Islands, except that the crissum is white in the middle to its extremity, the sides alone being dusky. In the Samoa bird the central feathers of the crissum are dusky tipped with white. These differences can hardly be considered specific, seeing that considerable variation prevails in this respect when a large series of birds is examined. The smallest birds with the darkest crissum that I have seen are from the Pelew Islands."

Like most of the Petrels, it has a peculiar cry. Of another species, described further on, the Rev. Mr. Eaton in his account of the habits of the birds in Kerguelen Island (Phil. Trans. Roy. Soc. 1879, p. 131) says:—"Occasionally late in the evening and during the night a piercingly shrill piping note, repeated singly at intervals of four or five seconds, used to be heard on the hills about Observatory Bay. Generally the sound changed its direction, showing that the bird which uttered it was flying. This call might be imitated on a piccolo-fife in the key of G or F. In its complete form it consists of a series of single notes separated by pauses of four seconds or more, followed by a jerky succession of notes in the same tone. One night the sound was traced to a crevice in a cliff beneath an immovable rock. The place was marked by a pile of stones, and visited the next morning. While efforts were being made to move the rock the bird within the recess became alarmed, and uttered a cry somewhat like that of a Kestrel-hawk in its tone, but not nearly so loud. On another night the sound was followed up to a hill. Every now and then the bird ceased piping, but it recommenced whenever the call was imitated with the lips. Its nook was therefore easily discovered; it was in a terrace on the hillside under a piece of rock. The stone was pulled away, the nesting-place laid open, and two birds in it disclosed, one of which escaped. The female was caught, and she proved to be a *P. melanogaster*."

PUFFINUS ASSIMILIS.

(ALLIED SHEARWATER.)

Puffinus assimilis, Gould, P. Z. S. 1837, p. 186.*Procellaria nugax*, Solander, MS. (Bonap. Consp. Av. ii. 1856, p. 205).*Puffinus assimilis*, Salvin, Ibis, 1888, p. 357.

Ad. similis P. obscuro, sed minor et obscurior, plumis corporis superioris cinerascente marginatis : subalaribus et subcaudalibus omnino albis.

Adult. Very similar in appearance to *P. obscurus*, but smaller. There is less brown in the dark colouring of the upper surface, the prevailing colour being slaty black, the edges of the feathers having a bluish-grey or ashy tinge; the blending of colours on the sides of the neck is softer; the lining of the wings is pure white over the entire surface, as are also the under tail-coverts; and the wing-feathers instead of being uniform slaty brown are white on their inner webs, shading into grey towards the tips. Irides black; bill brownish black. Total length 12·5 inches; wing, from flexure, 7·75; tail 2·5; bill, along the ridge 1·15, along the edge of lower mandible 1·25; tarsus 1·5; middle toe and claw 2.

Nestling. Taken from the nest on Little Barrier, 6th Nov. Covered with long, soft, dark grey down, paler on the underparts, and becoming whitish on the crop; throat bare, with minute white tufts of down just appearing.

Obs. A specimen of *P. assimilis*, obtained by Mr. John Macgillivray on Raoul Island (Kermadec group), and now in the British-Museum collection, is somewhat smaller in all its dimensions, but precisely like our bird in all other respects—coloration of plumage, soft parts, &c.

MR. REISCHEK informs me that he found this species on the Chicken Island in December 1880. He discovered adult birds with their unhatched egg and the tuatara lizard (*Sphenodon punctatum*) all in the same burrow, and sometimes young birds associated with the reptile, but occupying separate chambers. He writes:—"I found them very plentiful at this season on the south-eastern side of this island. On the smaller island I met with them again, but there were only a few of them there. I noticed that they ventured further inland for the purpose of breeding than *Puffinus gavia*. They commence their nesting-operations about the end of October, and their habits at this season are in no respects different from those of the latter species."

Like *Majaqueus parkinsoni* and *Æstrelata cookii*, it resorts, on the Little Barrier, to the wooded parts of the island, selecting always a high elevation and generally a little way inland. During the breeding-season the male bird habitually goes out to sea during the day, returning at night and hovering over the island with much clamour, but observing a discreet silence on approaching its nest.

Reischek informs me that in bright moonlight nights he has found them sitting in the trees uttering their cry of *ha-kwa-kwa*. He obtained an egg on the 17th October which was nearly hatched out, and met with nestlings three weeks later.

The egg of this Petrel is ovoido-conical in form, measures 2·2 inches in length by 1·4 in breadth, and when fresh is perfectly white.

PUFFINUS BULLERI.

(BULLER'S SHEARWATER.)

Puffinus bulleri, Salvin, Ibis, 1888, p. 354.

Ad. suprâ saturatè griseus, capite toto suprâ eum cervice posticâ fuliginoso-nigris, loris et regione ophthalmicâ vix griseo intermixtis: tectricibus alarum minoribus fuliginoso-nigris, majoribus externè griseis et extrorsum albo limbatis: remigibus fuliginoso-nigris, pogonio interno bitriente interno nigro: paginâ alarum inferiore et corpore subtùs niveis, crisso utrinque schistaceo limbato: caudâ cuneatâ nigricante, rectricibus lateralibus griseo tinctis: rostro obscure plumbeo, mandibulâ infrâ carneâ: pedibus externè corylinis, internè flavis.

Adult male. General upper surface dark slaty grey, shading into sooty brown on the crown, nape, and small wing-coverts; the secondaries and their coverts margined with greyish white; the primaries and the tail-feathers black in their whole extent, the former greyish white on the under surface, except towards the tips; the tertials and the scapulars brownish black, more or less tipped with grey; the upper tail-coverts somewhat lighter than the plumage of the back, and each feather narrowly tipped with greyish white; throat, sides of face, the entire fore neck, and all the underparts pure white, except that the lateral under tail-coverts are slaty grey on their outer webs; under surface of wings and axillary plumes pure white, only the long covert of the first primary on each wing showing a tendency to grey. Irides black; bill blue-black, fading into bluish grey on the sides of both mandibles; inner side of tarsi, which are much flattened, the middle and inner toes, and the interdigital web flesh-white; outer aspect of tarsi and the whole of the outer toe brownish black. Total length 19·5 inches; extent of wings 40; wing, from flexure, 12; tail 6; bill, along the ridge 2, along the edge of lower mandible 2·1; tarsus 1·8; middle toe and claw 2·5.

Female. Mr. Salvin's collection contains a specimen (purchased from Mr. Whitely, of Woolwich, as having come from New Zealand) which is duller in plumage than my bird, with more brown on the upper surface. This is probably the female.

THE only example of this fine Petrel I have had an opportunity of examining in the flesh was picked up by myself on the ocean-beach near the mouth of the Waikanae river on the 1st October, 1884, having been blown ashore by the "rangawhenua," as the Maoris call all winds from the sea.

It is remarkable for its length of neck and tail. Indeed at first sight it looks more like a small Shag than a Petrel, and several of the Maoris at Waikanae to whom I showed it declared that it really was a Kawau till I pointed out to them its tubular nostrils. It proved on dissection to be a male.

On passing Whale Island in a boat with a Maori crew in the summer of 1886, a black-looking Petrel with a conspicuously long tail hovered over us for some time and then steered out seaward at a considerable elevation and with a swift flight. On asking our steersman, Wepiha, if he knew the bird, he replied "He Kahu no te moana" (a Hawk from the sea). Unless I am right in referring the bird to the above species, I am unable to identify it, for it never came very near to us, and did not reappear from the dreary waste of waters.

Mr. Salvin, who has been good enough to dedicate the species to myself, writes of it:—"This distinct species appears to belong to the section of the genus possessing long cuneate tails, of which *P. chlororhynchus* is the best-known species. Its coloration at once makes it easily recognizable, no other species having a grey mantle, with which the dark head and dark wings are in striking contrast, this style of coloration being characteristic of many species of *Æstrelata*."



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LAUGHING PETREL.
ESTRELATA AFFINIS.

BULLER'S PETREL.
PUFFINUS BULLERI.

(ONE-HALF NATURAL SIZE.)

ADAMASTOR CINEREUS.

(BROWN PETREL.)

- Cinereous Fulmar*, Lath. Gen. Syn. ii. pt. 2, p. 405 (1785).
Procellaria cinerea, Gm. Syst. Nat. i. p. 563 (1788, ex Lath.).
Procellaria hæsitata, Forster, Deser. An. p. 208 (1844).
Procellaria hasitata, Gould, B. Austr. fol. pl. 47 (1848).
Puffinus cinereus, Bonap. C. R. xlii. p. 769 (1856).
Adamastor typus, Bonap. Consp. Av. ii. p. 187 (1857).
Puffinus cinereus, Lawr. B. of N. Am. p. 335 (1860).
Puffinus kuhlîi, Cass. Proc. Phil. Acad. 1862, p. 327.
Procellaria adamastor, Schl. Mus. Pays-Bas, *Procell.* p. 25 (1863).
Procellaria cinerea, Buller, Birds of New Zealand, 1st ed. p. 305 (1873).

Native name.—Kuia:

Ad. suprâ cinerascenti-brunneus, dorsi plumis et supracaudalibus pallidiore brunneo terminatis: remigibus et rectricibus brunnescenti-nigris: facie et colli lateribus obscure cinerascitibus brunneo variis: subtus albus, pectoris lateribus brunneo lavatis: rostro flavo, versus apicem nigricante: pedibus sordidè flavis; iride nigrâ.

Adult. Crown of the head, back of the neck, and all the upper surface greyish brown, the feathers of the back and the upper tail-coverts edged with paler brown; the face and sides of the neck dusky grey mottled with brown; throat, fore neck, and all the underparts pure white, stained on the sides of the breast with brown; quills and tail-feathers brownish black. Irides black; bill yellow, stained towards the tips with black; legs and feet dull yellow. Total length 20 inches; wing, from flexure, 13.25; tail 5.5; bill, following the curvature of upper mandible 2.5, from gape to extremity of lower mandible 2.5; tarsus 2; middle toe and claw 2.6.

PROFESSOR HUTTON states that this species is "very common on the coast;" but I have never myself seen a specimen in New Zealand, nor do the local museums contain any. That it is extremely abundant, however, in certain latitudes may be inferred from the following notice of this Petrel in Darwin's 'Voyage of a Naturalist':—"I do not think I ever saw so many birds of any one sort together as I once saw of these behind the island of Chiloe. Hundreds of thousands flew in an irregular line for several hours in one direction. When part of the flock settled on the water the surface was blackened, and a noise proceeded from them as of human beings talking in the distance."

There are two specimens in Mr. Salvin's collection received from Whitely as having been obtained in "New-Zealand seas." These are male and female.

I met with a large flock of them, in the month of August, about 300 miles eastward of Australia. They appeared to be active on the wing and very restless.

MAJAQUEUS PARKINSONI.

(BLACK PETREL.)

Procellaria parkinsoni, Gray, Ibis, 1862, p. 245.*Majaqueus parkinsoni*, Gray, Hand-l. of B. iii. p. 108 (1871).*Procellaria parkinsoni*, Buller, Birds of New Zealand, 1st ed. p. 302 (1873).*Native names.*—Taiko and Kuia.*Ad.* omninò brunnescenti-niger, interscapulio scapularibusque pallidioribus marginatis : rostro flavicanti-brunneo, culmine et apice brunnescentibus : pedibus nigris : iride nigrâ.*Adult.* Entire plumage brownish black, the feathers of the back and mantle narrowly edged with a lighter shade. Irides black ; bill yellowish horn-colour, shaded with dark brown on the culmen and towards the tips of both mandibles ; legs and feet black. Total length 18 inches ; wing, from flexure, 13·75 ; tail 5 ; bill, following the curvature of upper mandible 2, length of lower mandible 2 ; tarsus 2 ; middle toe and claw 2·75.*Young.* Plumage, as in the adult, glossy black ; down adhering to underparts long, thick, and blackish brown in colour ; bill black, marked with horn-grey on the sides and unguis ; feet black.*Nestling.* The young is first thickly covered with sooty down, which adheres to the plumage for a considerable time, as in other Petrels, imparting to the body an appearance of unnatural size. It comes off first from the head, breast, and upper surface ; and in this operation the bird itself no doubt assists.*Obs.* The above description of the adult is taken from a New-Zealand specimen in the British Museum, presented by Miss R. Stone. Some examples have the underparts much tinged with brown.

THIS species, which appears to be peculiar to the New-Zealand seas, is by no means uncommon in the Hauraki Gulf, resorting to the Little Barrier and adjacent islands to breed. Mr. Kirk, the well-known botanist, who has carefully explored these islands, informs me that he found both this and Gould's Petrel breeding in subterranean burrows. He observed that the two birds differed entirely in character—*M. gouldi* being extremely vicious, fighting savagely even with a dog when attacked, whereas *M. parkinsoni* would allow itself to be seized by the hand in its burrow almost without resistance.

It is diurnal in its habits, hunting in the open sea like the Albatros. I have watched several at one time following our steamer, not immediately in the ship's track, but wheeling about with angular wings, like black kites, occasionally mounting high in the air, then descending almost to the surface, and always maintaining a circular course of flight.

It has a soft whistling cry of *kuia*, whence its name. It is also said to make at certain times a mewing sound, like a young cat.

I have not often been able to identify them on the wing, for, at a little distance, dark Petrels are all very much alike. A pair which I saw, in fine, calm weather, off the port of Napier early in December, were flying low, keeping close to the surface of the water, and with a somewhat rapid movement of their wings.

The stomachs of several which were examined contained blubber-like matter and the sharp-pointed beak of some cephalopod.

My son Walter obtained at Manawatu, in the month of September, an adult bird which had been captured by the Maoris far inland; and at this season it was so fat that he had the utmost difficulty in detaching the skin.

It breeds in communities, often resorting for that purpose to the tops of low mountains far removed from the sea. The Maoris soon discover these breeding-places, and not only collect the young, but capture large numbers of the old birds by lighting fires on calm nights and thus decoying them to their destruction.

In the Bay of Plenty, about four miles north of Matata, there is a high sea-cliff of soft sandstone called Te Tuhi-o-mahuika. The softer parts of the rock have been eroded by the weather, leaving the harder contorted strata intact and projecting from the face of the cliff in all sorts of eccentric shapes; and here it was, according to Maori tradition, that their famous ancestor, Mahuika*, obtained most of his patterns in the art of ornamental "tattooing." That is doubtless a myth, but after allowing the eye to rest for some time on these curious natural devices in the face of the rock, I found I could trace a resemblance to many of the typical forms in the highly artistic *moko* of the present day. In the deeper cavities caused by this singular erosion of nature the Black Petrel forms her nest and hatches her brood in perfect security, no one ever attempting to scale these perpendicular cliffs.

Mr. Cheeseman writes to me from Auckland:—"This species breeds on the coast-ranges north of the Manukau, and on the Cape Colville peninsula, also on many of the small islets off the eastern shore. A friend fishing a short time ago in Rangitoto channel, caught a small shark, which he cut up for bait, throwing portions overboard. He was soon surrounded by large numbers of *M. parkinsoni*, and by continuing to throw over small pieces of the shark, he induced them to come so near the boat as to enable him to kill several with the blade of his oar, some of which he brought to the Museum."

Mikaera, a Wainuiomata native, brought to the Colonial Museum, on the 1st February, an egg of this species which he had taken from a burrow in the hills on the north side of Wellington harbour; and I have received eggs from the Little Barrier in the beginning of December.

Mr. Reischek found it nesting under the root of a tree, near the top of the Waikomiti hill, fully twelve miles from the sea. He likewise met with it on the Little Barrier, principally on the tops of the hills and about the centre of the island. He generally found it in natural cavities, dug round and adapted to the wants of the bird. When not breeding two were often found associated in the same hole; but when the nest contained an egg, only the female remained in charge. In the month of November he has seen the old birds assisting each other in the labour of cleaning out and adapting the hole they have selected, and afterwards in collecting dry leaves and pieces of moss wherewith to make it comfortable and form a nest, which is usually placed in a depression at the further end of the cavity. These breeding-holes are generally from one to two feet deep; then comes the nest-chamber, measuring often two feet in extent and about half that in width. One nest was found in the hollow of an old puriri stump. At the end of November a single egg is produced and, according to the natives, the young bird is hatched out at the end of December or beginning of January. In April or May the canoes visit the island to collect the young Petrels, which by this time have grown to the full size and are excessively fat. Except at the breeding-season, when they are to be seen about the island in the early morning and again in the evening, these birds are only to be met with far out

* Mahuika was the Maori "Ulysses." It was he who discovered the art of making fire by the friction of two dry sticks. He had dominion over the animal creation and was exacting in his demands. On one occasion, according to mythical tradition, being thirsty he appealed to the Kiwi to bring him water. The bird refused, whereupon he kicked it and broke its back, which accounts for the crouching attitude of the Kiwi as compared with other birds.

at sea, hovering about the ship till darkness closes in the view, but always refusing to take the hook. Off the West Coast of New Zealand, in lat. 36° S., and about a hundred miles from land, numbers have been met with at one time, and no doubt its range extends far over the South Pacific. Mr. Reischek's experience of the nesting-bird differs from Mr. Kirk's, for he informs me that in every instance he found the old birds very fierce when their nest was invaded, scratching vigorously with their claws, which have extremely fine points and are capable of inflicting nasty wounds on the hand. On coming in from the sea, the old birds show great caution in approaching their nests by moonlight, making first a circuit in the air around the spot, then dropping suddenly to the ground and remaining a short time at the entrance, as if to make sure that all is safe before disappearing in their burrows. They have a deep call, only uttered when on the wing in the vicinity of the nest, and this may be heard both morning and evening all through the breeding-season. He writes * :—"This Petrel is gregarious, and I have seen them in large flocks together resting on the water. Their power of flight is marvellous. In July 1879, outside the Kaipara, on the west coast of New Zealand, I had an opportunity of observing these birds, having to lay by outside the bar for several days, being unable to enter, as it was blowing one of the severest gales experienced in these seas. They cruised about, dipping the points of their wings at intervals in the water, then suddenly swooping down through the foaming waves for their prey; rising with the next wave, and repeating their former action. From July to November these birds are always out at sea. In November they come ashore to their breeding-places, on the top of high and steep mountains, which they choose for the purpose of easier flight, as they have difficulty in ascending from the level ground. They are expert climbers. I saw them by the aid of their sharp claws, their bill and wings, climbing up trees out of the perpendicular, from which they flew away. In November 1882, on the eastern slope and near the centre of the Little Barrier or Hauturu Island, situated north of Auckland, at about 2300 feet above sea-level, on a steep, precipitous ridge, I noticed my dog repeatedly setting at burrows, which, on examination, I found contained *Procellaria parkinsoni*. They were clearing out their old burrows; and staying to observe, I noticed them digging with their bills, removing the earth by a backward motion of their feet, till the burrow was cleansed. In most cases I found them working; in others the burrows were clean and the refuse outside. Some burrows were in loose soil, others under the roots of trees and under stones, also in hollow trees. I have found them sometimes very far inland, and always on the tops of mountains. When they have finished cleaning out the burrows, which process male and female accomplish together, they remain quiet till the last rays of the sun have disappeared, then any one can hear their call, which is similar to that of the Black Swan; and on coming out they stop a moment, pick up a few leaves or grass, and go back into the burrows; this operation they repeat several times, and always on entering the chamber they make a peculiar noise together. After dark, both come out, rise and circle round, calling until they attract others; and when a large flock is assembled, they fly away to their haunts on the ocean, returning before daylight. At this season, before they lay, they are very fat. When caught, on their return from the ocean, if they cannot protect themselves by scratching and biting, they expectorate a lot of oily matter on their assailant. The first time I caught one of these birds it treated me in that manner. In December 1884, on the Waitakeri ranges, 1000 feet above sea-level, and twelve miles from the ocean, I found the female sitting on an egg, nearly hatched."

An egg in my son's collection is broadly elliptical, measuring 2·7 inches in length by 2 in breadth; originally white, it is much soiled over its entire surface by contact with the bird's feet. Other specimens which I have examined are slightly narrower or more elliptical.

* Trans. N.-Z. Inst. vol. xviii. pp. 87, 88.

MAJAQUEUS GOULDI.

(GREY-FACED PETREL.)

Pterodroma macroptera, Gould, Handb. B. of Austr. ii. p. 449 (1865, nec Smith).*Æstrelata gouldii*, Hutton, Trans. N.-Z. Inst. ii. p. 79 (1869).*Procellaria gouldi*, Hutton, Cat. Birds N. Z. p. 47 (1871).*Procellaria gouldi*, Buller, Birds of New Zealand, 1st ed. p. 308 (1873).*Native name.*—Oii.*Ad. fuliginoso-niger*, subtùs brunnescentior : fronte, loris et facie anticâ albicanti-cinereis : rostro et pedibus nigris ; iride nigrâ.*Adult male.* General plumage sooty black, tinged with brown on the underparts ; forehead and parts surrounding the base of the bill whitish grey, shading gradually into the darker plumage. Irides, bill, and feet black. Total length 17 inches ; wing, from flexure, 12 ; tail 5 ; bill, along the ridge 2, along the edge of lower mandible 1.75 ; tarsus 1.5 ; middle toe and claw 2.5.*Female.* Differs from the other sex only in having the plumage more suffused with brown, many of the feathers of the back, breast, and under tail-coverts being margined with pale brown.*Young.* There is a full-grown fledgling in the Auckland Museum, in which the plumage is as in the adult, but with long thick down of a sooty-grey colour still adhering to the breast, and some paler-coloured down on the throat. Obtained on the Hen Island in the Hauraki group.*Nestling.* Covered with dingy slaty-grey down ; the black feathers appear first on the head and in four or five parallel series on the cheeks. The down is long, thick, and fluffy, especially on the underparts ; and the bill and feet are perfectly black.*Remarks.* The form of this Petrel is rather slender ; the tail is long and euneate ; and the wings, when folded, extend about half an inch beyond it.

I HAVE taken the above description from the type specimen in the Auckland Museum. Professor Hutton, who first distinguished the species, observes :—“ It is very common on the Tasmanian and New-Zealand coasts, and is undoubtedly the bird that Mr. Gould refers to as the dark Petrel with a grey face, which he shot off the coast of Tasmania, and which he suggests might be *Procellaria macroptera* of Dr. A. Smith. According to that author, however, the bird he called *P. macroptera* has no grey face, but a white circle round the eye and reddish-brown legs and feet, in all of which respects it differs from the present bird . . . I am informed by Mr. Kirk that this bird breeds in holes on a little island called Kitakita, near the Kawau, and that when attacked by dogs fights hard for its life, often tearing open their noses with its sharp curved bill, and in this respect differing remarkably from *P. parkinsoni*, which we found on the Little Barrier Island to surrender at discretion, without any fighting.”

As already stated on p. 221, Mr. Salvin disallows this species ; but I have thought it safer to retain it for the present, especially as Dr. Finsch writes :—“ I got the type specimen from the Auckland

Museum for comparison, and am quite sure of its specific distinctness" (Trans. N.-Z. Inst. vol. vii. p. 233).

I have seen this Petrel as far south as the Bay of Plenty. It flies low and more swiftly than *M. parkinsoni*.

Unlike the preceding species, which resorts to the summits of the hills, this Petrel, which is comparatively plentiful on the Little Barrier, generally seeks holes near the base of the cliffs. They breed in companies, sometimes four or five pairs having their nests within the same little cavern, each nest being placed at the end of a separate burrow, having a bend and varying in length, with an oval chamber at the further end. These burrows are generally about three feet in extent (one, however, measured four), and the nest-chamber is decidedly smaller than that usually formed by *Majaqueus parkinsoni*. The egg is deposited on a few dry leaves, there being very little care bestowed on the nest itself.

Like the allied species it is diurnal at sea, and doubtless sleeps at night on the bosom of the deep, for it does not return to land after the responsibilities of the breeding-season are over; but with the recurrence of spring, the reproductive instinct impels it again to navigate its way back to its "island sanctuary" to repair its burrow and refit its nest.

Reischek found Gould's Petrel all round the coast of the Little Barrier, and on some occasions came upon wild pigs intent on rooting out the eggs and young birds. This they would often accomplish if the conditions were favourable. In the case of *Æstrelata cookii*, however, the length and tortuous course of the burrow placed the nest beyond the reach of these merciless depredators. The above collector found broken egg-shells at the end of August, and the Maoris say that the breeding-season extends through September, which is no doubt the fact, as the young birds do not come to their full maturity till the end of December or beginning of January, when the food-parties repair to the island to dig them out.

Curiously enough, here again Messrs. Hutton, Kirk, and Reischek are at issue, for the latter says:—"Instead of being fierce like *Procellaria parkinsoni*, which rushes to the attack the moment the dog shows himself at the mouth of the hole, *P. gouldi* is a comparatively mild bird, retiring when molested to the furthest corner of its burrow, and only biting when taken hold of." As this collector furnished me with specimens of both birds, there can be no doubt as to the identification of the species to which his notes refer.

My explanation of this conflict of testimony among accurate observers is that it is impossible to lay down any general rule of character for either species, their conduct under circumstances entirely novel to them being determined partly by the disposition of the individual bird and partly by the conditions under which they are found, for theoretically a mother with hatched offspring would be fiercer than the occupant of a newly-made nest.

There is a breeding-place of this Petrel, as I am informed, sixty miles inland from Opotiki, near the source of the Waioeka, a river which takes its rise in Maungatapere and Rangihakakapua, the range of mountains terminating at the East Cape. It is said to breed in large numbers on the Island of Karewa, in the Bay of Plenty. In March the Maoris visit the island and collect the young of this and other species.

This Petrel breeds also on Whale Island and on the other small islands off the east coast, on several of the islands in the Hauraki Gulf, and (according to Cheeseman) on the coast-line north of the Manukau.

An egg of this species, in the Auckland Museum, which was obtained on one of the small islands in the Gulf of Hauraki, is of a regular oval form, measuring 2.6 inches in length by 1.75 in breadth, and is of a dirty white colour. Another specimen in my son's collection is more ovoid, measuring 2.75 inches in length by 1.95 in breadth, and is of a creamy-white colour.

GARRODIA NEREIS.

(GREY-BACKED STORM-PETREL.)

Thalassidroma nereis, Gould, P. Z. S. 1840, p. 178.*Procellaria nereis*, Bonap. C. R. xlii. p. 769 (1856).*Thalassidroma nereis*, Buller, Birds of New Zealand, 1st ed. p. 322 (1873).*Garrodia nereis*, Forbes, P. Z. S. 1881, p. 736.

Ad. pilco colloque toto, cum interscapulio et tectricibus alarum minimis, et medianis exterioribus fuliginoso-nigris : dorso postico, uropygio et supracaudalibus, scapularibus et tectricibus alarum majoribus canescentibus : remigibus brunnescenti-nigris, secundariis vix canescente lavatis : caudâ sordidè canescente, ad apicem nigricante : gutture pallidiùs fuliginoso : corpore reliquo subtùs albo, subalaribus exterioribus brunneis : rostro nigro, versus basin mandibule albicante : pedibus saturatè brunneis : iride nigrâ.

Adult. Head, neck, and all the upper surface dark ash-grey ; rump and upper tail-coverts paler, or silvery grey ; under surface pure white, the grey plumage presenting a distinct margin across the upper part of the breast. Irides and bill black, the latter whitish towards the base of lower mandible ; legs and feet dark brown. Length 6·5 inches ; extent of wings 13 ; wing, from flexure, 5·5 ; tail 2·75 ; bill, along the ridge ·5, along the edge of lower mandible ·55 ; bare tibia ·6 ; tarsus 1·3 ; middle toe and claw 1.

Obs. The sexes are alike, both as to size and plumage.

THIS pretty little Storm-Petrel was originally discovered and described by Mr. Gould, who obtained four specimens during a calm on his passage from Hobart Town to Sydney in May 1839, and who met with it again a month earlier in the following year between New South Wales and the northernmost point of New Zealand. I have received specimens from Otago and from Cape Campbell. Under stress of weather it is sometimes driven inland, and I remember an instance of a foot-passenger on the Wanganui bridge catching one with his hands as it fluttered past him.

The species is readily distinguishable from the other Storm-Petrels by its diminutive size and the absence of white on the rump.

Mr. Reischek found it breeding on Guano Island in the beginning of November. He discovered five or six nests, each containing a single egg.

Mr. Percy Seymour sends me the following note :—“ I found a number of nests of this Petrel on Tomahawk Island, Otago Peninsula, on the 18th January. The birds had been previously disturbed and their eggs taken, and they were therefore probably unusually late in breeding, for I have, on another occasion, obtained fresh eggs as early as November 23. The nests were situated in burrows, about 18 inches deep, and resembling rat-holes. Five of the nests contained one young bird each, and the other five one egg each, on which the female bird was sitting in every case. I was able to preserve only two of the eggs, as in the others the young birds inside broke the shell before I reached home. The specimen in my cabinet measures 1·45 inch by 1·05, and is white, faintly stained with yellowish brown, and marked all over with faint blotches of purplish red, with numerous tiny dots of a darker shade. The marks are most numerous at one end, but both ends are equally rounded.”

An egg of this species in my son's collection is ovoido-elliptical, has a fine granulate surface, and measures 1·25 inch in length by ·9 in breadth ; originally white, it has now a soiled appearance, with a zone of minute specks at the larger end.

PELAGODROMA MARINA.

(WHITE-FACED STORM-PETREL.)

Frigate Petrel, Lath. Gen. Syn. iii. pt. 2, p. 410 (1785).*Procellaria marina*, Lath. Ind. Orn. ii. p. 826 (1790).*Thalassidroma marina*, Gray, Voy. Ereb. and Terror, Birds, p. 17 (1844).*Thalassidroma hypoleuca*, Moquin-Tandon, Orn. Canar. p. 45 (c. 1850).*Pelagodroma marina*, Reich. Syst. Av. p. iv (1852).*Pelagodroma fregata*, Bonap. C. R. xlii. p. 769 (1856).*Thalassidroma marina*, Hutton, Ibis, 1872, p. 249.*Thalassidroma fregata*, Buller, Birds of New Zealand, 1st ed. p. 321 (1873).

Ad. supra einerasenti-fuliginosus, pileo saturiore : uropygio imo et supracaudalibus clariùs einraceis : teetricibus alarum brunnescentibus, majoribus pallidioribus : remigibus et rectricibus brunnescenti-nigris : fronte eum supercilio distincto, facie laterali et corpore subtùs toto albis : plumis circumocularibus et regione auriculari einerasenti-fuliginosis : collo laterali, hypoehondriis imis et subcaudalibus clariùs einraceis : rostro nigro : pedibus nigris, palmis flavicantibus : iride saturatè rufescenti-nigrâ.

Adult. Crown of the head, nape, and a broad patch from the under margins of the eyes, spreading over the ear-coverts, sooty grey ; upper surface sooty brown, darker on the wings, and changing to a light grey on the upper tail-coverts ; forehead, streak over the eyes, face, throat, and all the underparts pure white, shading into grey on each side of the breast ; quills and tail-feathers brownish black, the former greyish white on their inner webs. Irides dark reddish brown ; bill black ; legs and feet black, the webs yellowish. Total length 8 inches ; wing, from flexure, 6 ; tail 3 ; bill, following the curvature of upper mandible .65, length of lower mandible .75 ; bare tibia .85 ; tarsus 1.5 ; middle toe and claw 1.4.

Nestling. Covered with thick long down of a uniform grey colour.

Obs. Both sexes appear to be exactly alike. The Canterbury Museum contains several specimens, both male and female, from the Chatham Islands.

Individuals present a certain degree of variation. A specimen in the Otago Museum has the crown and upper surface generally blackish brown ; underparts white ; the former colour extending downwards in a broad band over both sides of the chest, but not meeting ; face with a broad patch of slaty black covering the eyes, spreading over the ear-coverts, and merging in the dark chest-band ; under tail-coverts bluish grey.

A specimen in the Auckland Museum (sent from Mokohinu Lighthouse) has the patch on the face conspicuously darker, and the interdigital webs pale yellow, with black edges, and a line of black between the inner and middle toe.

THE White-faced Storm-Petrel appears to have a wide range over the southern ocean. It is not so plentiful, however, off the New-Zealand coast as the Grey-backed Storm-Petrel, although the habits of the two birds appear to be very much the same.

Mr. Gilbert discovered it building in some of the small islands lying off Cape Leuwin, in South Australia, in December ; and he met with young birds almost ready to leave their holes, on East Wallaby Island, a month later. Its egg, of which I have obtained several specimens, is pure white, and measures 1.5 inch in length by 1.15 in breadth.

FREGETTA MELANOGASTER.

(BLACK-BELLIED STORM-PETREL.)

- Procellaria grallaria*, Lieht. Verz. Doubl. p. 83 (1823).
Thalassidroma melanogaster, Gould, Ann. N. H. xiii. p. 367 (1844).
Fregetta melanogastra, Bonap. C. R. xlii. p. 769 (1856).
Procellaria melanogastra, Schl. Mus. Pays-Bas, *Procell.* p. 6 (1863).
Thalassidroma melanogaster, Buller, Birds of New Zealand, 1st ed. p. 319 (1873).

Ad. fuliginoso-brunneus, tectricibus alarum majoribus pallidiùs brunnescentibus : gulâ albo variâ, plumis basaliter albis : corporis lateribus, supracaudalibus, subalaribus et axillaribus albis : subcaudalibus fuliginosis albo terminatis : rostro et pedibus nigris : iride nigrâ.

Adult. General plumage sooty black, darker on the wings and tail ; sides of the body, flanks, and long upper tail-coverts pure white ; some of the under tail-coverts on each side edged with white ; long inner wing-coverts and axillary plumes pure white. Irides black ; bill and legs black. Total length 9 inches ; wing, from flexure, 6·5 ; tail 3 ; bill, along the ridge ·75, along the edge of lower mandible ·9 ; bare tibia ·75 ; tarsus 1·5 ; middle toe and claw 1·1.

OCCASIONAL examples of this Storm-Petrel are recorded ; and specimens are to be found in the Auckland, Nelson, and Canterbury Museums, all obtained on the adjacent coasts. Mr. Gould, who met with it in great abundance, in Mareh 1840, between the eastern coast of Australia and New Zealand, observes:—"It is a bird of powerful flight, and pats the surface of the rising waves more frequently than any other species that came under my notice ; or perhaps the great length of its legs rendered this action more conspicuous."

During stormy weather it often follows in the wake of the labouring vessel, and apparently for days together. I observed this myself, in 1856, during a severe gale, experienced off the Chatham Islands, which lasted nearly a fortnight. These Storm-Petrels followed us day and night ; and it was some relief to the extreme monotony and misery of our situation (for our vessel was a mere schooner of 80 tons) to watch the movements of these fairy-like beings as they danced among the surging billows, running with fluttering wings in the hollow of the waves, and then hovering over their foaming crests with the lightness of summer butterflies. I observed that the same individual bird often remained in our wake for considerable distances, without ever resting on the water or changing its course for one moment, its powers of endurance being truly wonderful. I found, on inquiry, that seamen make no distinction between this species of Storm-Petrel and its congeners, calling them all "Mother Carey's chickens," and resenting as a positive sin any attempt to shoot or capture these "spirits of departed sailors," as they facetiously term them, to whom they profess to commit the destinies of the voyage. It is an interesting sight to watch this Petrel fluttering over the stormy ocean—alternately skimming over the rolling billows and treading, as it were, the trough of the sea. It is a pretty object when seen under these circumstances, and it is not surprising that from time immemorial it has excited the sympathy of the hardy sailor. As the bird trips lightly over the waves the black and white plumage shows very clearly against the opaline blue of the deep sea water. Like the other members of the group, it subsists on small mollusks, medusæ, and any kind of greasy substance that may be floating on the water.

OCEANITES OCEANICUS.

(WILSON'S STORM-PETREL.)

- Procellaria pelagica*, Wilson, Am. Orn. vii. p. 90, pl. 69 (1813, nec. L.).
Procellaria oceanica, Kuhl, Beitr. Zool. p. 136, tab. x. fig. 1 (1820).
Procellaria wilsoni, Bonap. Journ. Acad. Phil. iii. pt. 2, p. 231 (1824).
Thalassidroma wilsoni, Aud. Birds Amer. 8vo, vol. viii. p. 106, pl. 460 (1839).
Thalassidroma oceanica, Schinz, Europ. Faun. p. 397, pl. 1 (1840).
Oceanites wilsoni, Keys. & Blas. Wirb. Eur. p. 238 (1840).
Oceanites oceanica, Bonap. C. R. xlii. p. 769 (1856).
Oceanites oceanicus, Salvin, Proc. Zool. Soc. 1878, p. 735.

Ad. fuliginoso-brunneus, pileo undique aliquantò eineraseente, regione auriculari et collo postico magis nigricantibus : tectricibus alarum fumoso-nigricantibus, majoribus versus apicem pallidè brunneis : remigibus reetricibusque nigris, intùs brunneis : supracaudalibus et erissi lateribus conspicuè albis : plumis uropygialibus imis nigris albo terminatis : subcaudalibus saturatè brunneis ad basin albis : rostro nigro : pedibus nigris, membranarum interdigitalibus sordidè flavis : iride nigrâ.

Adult. General plumage sooty black, darker on the head and hind neck ; a broad band of white crosses the rump and upper tail-coverts, covers the flanks and spreads out on each side of the under tail-coverts ; small upper wing-coverts margined with pale brown ; quills and tail-feathers black, the former dusky on their inner webs. Irides, bill, and legs black ; interdigital webs dull yellow. Total length 7 inches ; wing, from flexure, 6·2 ; tail 3 ; bill, along the ridge ·6, along the edge of lower mandible ·7 ; bare tibia ·5 ; tarsus 1·3 ; middle toe and claw 1·15.

Obs. The sexes are exactly alike in plumage.

THIS species is almost cosmopolitan on the high seas. It is very numerous in the ocean that surrounds the Australian coast, and is sometimes met with off New Zealand, although it is by no means so plentiful as the other species of Storm-Petrel*. Mr. Salvin's collection contains several specimens from the Azores.

The gifted Charles Waterton thus refers to this species at page 154 of his charming 'Wanderings' :—"When it blows a hard gale of wind the Stormy Petrel makes its appearance. While the sea runs mountains high, and every wave threatens destruction to the labouring vessel, this little harbinger of storms is seen enjoying itself, on rapid pinion, up and down the roaring billows. When the storm is over it appears no more. It must have been hatched in Æolus's cave, amongst a clutch of squalls and tempests ; for whenever they get out upon the ocean it always contrives to be of the party."

* Another well-known species (*Fregatta grallaria*) is certain to occur in our seas ; but as no authentic New-Zealand specimen has been yet recorded, I will content myself with giving here a description of the bird, whereby it may hereafter be identified by local collectors :—*Adult.* Head, neck, and entire upper surface, except the uropygium, sooty black ; the feathers of the back and the larger wing-coverts minutely margined with white ; breast, abdomen, sides of the body, and middle portion of wings underneath, flanks, rump, and upper tail-coverts pure white ; lateral under tail-coverts tipped with white. Irides, bill, and feet black. Total length 7·25 inches ; wing, from flexure, 6·5 ; tail 3 ; bill, along the ridge ·75, along the edge of lower mandible ·8 ; bare tibia ·6 ; tarsus 1·3 ; middle toe and claw ·8. The sexes are alike in plumage, except that the female appears to have broader white margins on the plumage of the upper surface.

ANAS SUPERCILIOSA.

(GREY DUCK.)

Supercilious Duck, Lath. Gen. Syn. iii. pt. 2, p. 497 (1785).*Anas superciliosa*, Gm. Syst. Nat. i. p. 537 (1788, ex Lath.).*Anas leucophrys*, Forster, Descr. Anim. p. 93 (1844).*Anas mülleri*, Bonap. C. R. xliii. p. 649 (1856).*Native names.*—Parera and Maunu (Taupo).

Ad. suprâ brunneus, plumis omnibus fulvescentē marginatis, pilei et colli postici plumis quasi striatis: lineâ superciliari distinctâ fulvescenti-albâ, alterâ inferiore brunneâ a summâ maxillâ per oculum post regionem paroticam ductâ: facie reliquâ et gutture toto fulvescenti-albis, lineâ faciali indistinctiore a basi maxillæ versus regionem paroticam, hâc et colli lateribus brunneo striatis: tectricibus alarum dorso concoloribus et eodem modo limbatis, majoribus velutino-nigro terminatis: remigibus brunneis, secundariis extûs lætè purpurascenti-viridibus, versus apicem velutino-nigris, angustè albo terminatis: caudâ brunneâ, rectricibus angustè fulvo marginatis: corpore reliquo subtûs pallidiûs brunneo, latè fulvescente marginatis, quasi marmoratis; subalaribus albis: rostro plumbeo, mandibulâ brunnescente: pedibus flavicanti-brunneis: iride rufescenti-brunneâ.

Adult. Top of the head and a broad streak from the base of the upper mandible through the eyes brownish black, the former slightly marked with grey; a narrow streak from the forehead over the eyes, the cheeks and the whole of the throat yellowish white, sometimes tinged with rufous; from the gape, or angles of the mouth, and crossing the cheeks a mottled streak of very dark brown; ear-coverts and sides of the neck greyish brown, mottled or striated with yellowish white; general upper surface blackish brown, each feather margined more or less distinctly with fulvous white, and those composing the mantle having a strong coppery hue; fore neck, breast, and underparts greyish brown, varied with fulvous white; inner lining of wings and axillary plumes pure white; sides of the body and flanks blackish brown, each feather margined with dull fulvous white; primary quills dark velvety brown on their upper surface, greyish underneath; speculum rich glossy green, bounded on both sides with velvety black; the secondaries with a narrow terminal edge of white, and of those overlapping the speculum the whole of the inner webs deep velvety black; the superior wing-coverts dark brown, with a broad edging of velvety black, below which there is a line of yellowish white. Irides reddish brown; bill bluish lead-colour, the nail black, and the lower mandible tinged with brown; legs yellowish brown, the webs darker. Length 20 inches; wing, from flexure, 16; tail 2·5; bill, along the ridge 2, along the edge of lower mandible 2·25; tarsus 1·5; middle toe and claw 2·25.

Young. General plumage paler than in the adult; the facial streaks, and the throat, washed with fulvous brown; the underparts tinged with rufous brown.

Nestling. Upper parts dark olive-brown, with produced hair-like filaments of paler brown; sides of the head and underparts of the body pale yellowish brown, lightest on the abdomen; from the base of the bill, on each side, a dark band passes beyond the eye, and another in a curve below it; there are markings of fulvous white on the edges of the wings; and on each side of the back there are two irregular spots of the same, about an inch apart. Irides black; bill and legs plumbeous, the nail of the former brown.

Varieties. Slight differences are observable in the plumage of fully adult birds; and a specimen which I obtained at Manawatu in the winter of 1864 was very curiously marked on the breast, each feather having a crescentic

or horse-shoe band of yellowish white, similar to the markings on the breast of the Shoveller. There is also a manifest difference in the size of the birds from different localities.

A specimen in my collection (marked ♀) has the whole of the face and throat stained, and the white of the underparts strongly suffused, with chestnut-brown; the speculum on the wing indistinct, the feathers being outwardly edged with brown.

An example obtained from the Wairarapa Lake, and presented by me to the Colonial Museum, is much larger than ordinary examples, and presents some peculiar markings in the plumage. There is a broad irregular patch of white on the lower part of the fore neck; the speculum on the wings is nearly obliterated, the secondaries being dull white on their outer webs, while their coverts have a broad terminal band of pale brown and white. The two outer primaries in one wing, and the second and third in the other, are entirely white. There are likewise some eccentric markings on the feathers of the crop and sides of the breast. These individual peculiarities may be due to hybridism, possibly the result of a cross with the Domestic Duck.

Another, which I likewise presented to the Colonial Museum, is a partial albino received from Marlborough. In this specimen the primaries and secondaries in both wings are almost entirely white in their apical portion; a broad band of white meets the upper margin of the speculum; the wing-coverts are irregularly barred with white, and some of the scapulars are entirely white.

My eldest son, during a shooting-exeursion to Ngapuke, in the Hawke's Bay district, saw on several occasions a pure albino among several hundred of the Grey Duck, and remarked on its large size and swiftness of wing. It was very shy and he was unable to get a shot at it.

Obs. The sexes are alike in plumage, but differ slightly in size. In well-plumaged birds the light margins on the wing-coverts form crescentic loops, like fine network.

Hybrid. More recently (in March 1885) my son shot at Wainuiomata, near Wellington harbour, what is undoubtedly a hybrid. It is a fine bird, and weighed in the flesh 3 lb. 9 oz.

This specimen combines in a very pronounced way the characters of the two species to which it owes its parentage. On dissection it proved to be a female. Careful measurements before the bird was skinned gave the following result:—Extreme length 24.5 inches; tail 4; bill, along the ridge 2, along the edge of lower mandible 2.25; tarsus 1.75; middle toe and claw 2.5. The crop was widely distended with the seed-vessels of some cyperaceous plant. The following is a description of the plumage:—Head, neck, and breast the same as in the male parent bird, except that there is a broad patch of pure white on the chin, and another, two inches wide, crossing the fore neck immediately above the breast; underparts generally uniform brownish black; small wing-coverts exactly as in the parent bird, with marginal crescents; speculum broad and black with steel-blue reflections at the base, margined on both sides with white, which is continued on the secondaries, being more or less mixed with grey; quills black, the first two in both wings white; lining of wings white; mantle, back, rump, and upper tail-coverts black, the whole of the back having a bluish gloss; tail-feathers brownish black; bill (which is large and broad like that of the Domestic Duck) greyish black, with a darker nail; under mandible dull yellow marked with brown; legs and feet dull orange-yellow, the interdigital webs brownish black, marked irregularly with bright yellow towards the outer edge, as so commonly seen in the domestic bird.

When shot it was in association with a male of *Anas superciliosa* and two well-grown young birds.

COMMON in every part of our country, the Grey Duck ranges over the whole of Australia as well, and is found also in some of the Polynesian islands. I found it extremely abundant at the Chatham Islands; and it is said to occur on Norfolk Island also*.

* In my former edition I treated *Anas sandwichensis* (Bonap. C. R. xliii. p. 649, *sine* diag.) as a synonym of this species; and in my Introduction to the present work (page lvi) I have extended the range of our bird accordingly. But my attention has since been directed to Dr. Selater's more recent differentiation of that species under the name of *Anas wyvilliana* (Proc. Zool. Soc. 1878, p. 350).

Mr. Layard writes of *Anas superciliosa* (Ibis, 1882, p. 537):—"This is the common Duck of the country (in New Caledonia), being found on all our marshes and rivers when not too much persecuted by sportsmen and pot-hunters; it also frequents the sea-shore and islands within the circling reef. It breeds inland, generally on the mountains covered with niaouli-forest near some damp spot, either a rivulet of water or a little swamp, but is especially careful to place its rough loose nest above the reach of a chance inundation."

It is deservedly in high estimation for the table, and may be regarded as perhaps the most valuable of our indigenous birds. It is less plentiful than it formerly was, which is no doubt partly attributable to the increased traffic on our rivers, but is chiefly owing to the indiscriminate use of the gun. Happily, however, the Colonial Legislature has undertaken the care of this among other native species, and the Wild-Birds Protection Act now makes it a punishable offence to shoot or trap these birds during certain months of the year.

It frequents rivers, bush-creeks, lagoons, and swamps, often consorting in large flocks, but more generally associating in parties of from three to seven. In some localities it affords very good shooting; and being seminocturnal in its habits, a clear moonlight night is considered by many the best time for this kind of sport. The birds on reaching their feeding-ground make a circuit in the air to reconnoitre, and then descend in an oblique direction, the rapid vibration of their wings producing a whistling sound, very familiar and pleasant to the ear of a sportsman.

In its habits, the Grey Duck differs in no respect from the other members of its group. In the water it swims low, with the neck erect and the head gently swayed to and fro; when at rest it either floats on the surface, with the head drawn closely in, or it reposes on the bank very near to the water's edge, often selecting a jutting point of land, as affording a more unobstructed view and less danger of surprise; and when the banks are soft and muddy it takes up its station on a log of wood, bare rock, or other projecting object. Naturally of a wild disposition, the attempts to domesticate this bird, even when it is taken from the nest and reared by hand, generally end in failure—although I have met with one or two striking instances to the contrary, and with one case of its crossing, in captivity, with the Domestic Duck.

Regarded as an article of food, the Grey Duck is in its prime during the autumn and commencement of winter; but the quality of the game differs according to the locality, those from the lakes and rivers of the interior having a richer flavour as a rule than birds living in the vicinity of the sea-shore, where the food is coarser.

In many of our harbours and estuaries, when the tide has ebbed and the exposed sandy spits run far out into the rippling waters, flocks of Grey Duck may be seen resting there in long straggling lines, with here and there, in the very midst of them, a Sea-Gull displaying his snow-white head and breast, or a Black Shag spreading his wings, like funereal banners, to dry in the morning air. On these occasions a person on horseback, or even on foot, if not carrying a gun, may often come within easy range of them; but it is notorious that, except in the more unfrequented parts of the country, the Grey Duck has learnt from cruel experience to detect the presence of fire-arms, and, unless under cover, a sportsman has no chance whatever of getting within shot-range. The same remark applies to other Ducks, but particularly to this species and to *Casarca variegata*. Any one carrying a long stick, or indeed anything having any resemblance to a gun, is similarly avoided by the wary Grey Duck.

They seem generally to prefer cool and shady resorts, but I have also seen dozens of them floating on the bosom of the Waikato, under a strong noonday sun, as if enjoying the perfect calm. In the deep, quiet pools, or basking in the sunshine on the scattered rocks in the midst of a mountain-stream—its plump form exhibited to perfection—it is one of the commonest features of a New-Zealand river.

From the box-seat of the passing coach I once witnessed, in the Manawatu gorge, a very unusual sight. A fine old Hawk (*Circus gouldi*) was apparently determined to dine off young duck, and was persistently chasing a small brood that were disporting themselves in the water below us. He made frequent dips upon them with his outstretched talons, but the little things were always on the alert, diving under the moment their pursuer approached. The old birds, evidently quite satisfied as to the safety of their brood, took no heed of what was going on, and remained quite motionless on their post of observation till we had passed out of sight.

In the Bay of Plenty district there are Duck-preserves which are a source of great profit to the natives and are jealously guarded by them. From October to February no canoes are permitted on the principal lake, and no fires are allowed to be lighted in the vicinity. Various kinds of Duck breed here in great numbers. From feeding on the small green beetle and on the nahonaho, a stingless gnat which swarms in countless myriads over all the waters in the lake district, the birds become extremely fat; and during the moulting-season, which extends over part of February and March, they are incapable of flight owing to the loss of their quills. The strict "tapu" which is enforced during the close season is now removed with great ceremony, and all the population, men, women, and children, start together on a Duck-hunting expedition. The men with dogs in short leashes keep within the belt of manuka scrub along the margin of the lake; the women and children proceed to the middle of the lake in canoes, then take to the water, and with great noise and splashing drive the frightened birds up into the bays or inlets, where they seek refuge in the scrub and sedges and are immediately pounced upon by the trained dogs which are still held in leash. The Duck-hunter snatches the bird away from the dog, kills it noiselessly by biting it in the head, and then throws it behind him to be collected by a party of women who follow on foot for that purpose. In the season of 1867, seven thousand, it is said, were caught in this manner, in three days, on one lake alone. These were not all Grey Duck, but included also the Black Teal (or Scaup), the Shoveller, and the White-winged Duck.

At the Bitter Lake (Rotokawa), in the Taupo district, they are caught in a similar manner. Those that escaped the dogs are caught by snares set at night. The snares are placed along the margins of the lake and on the warm stones where the Ducks are accustomed to congregate after dark.

Captain Mair says:—"At Rotoiti, Rotoehu, and Rotoma, as well as on other lakes in the Bay of Plenty district, I have observed that the Ducks at one season leave the waters and travel into the surrounding woods. This happens about March and therefore not during the breeding months. Probably they retire for more security during the seasonal moult; for although at other times these lakes fairly swarm with Ducks, at this period they are quite deserted. In the woods, however, the dogs turn them up in all directions. When on the lakes it is interesting to watch the Ducks feeding on the gnats and green beetles which float on the surface of the warm water, forming a thick scum. On this diet they are always in good condition. The beetles, I may mention, get shaken into the water from the overhanging scrub by the action of the winds, and the gnats appear to be killed by the sulphurous vapour that rises from the water, and are seen floating on the surface in countless millions."

From the gullet I have taken a quantity of the minute seed of *Triglochin triandrum*, a common aquatic plant. The various species of *Lemna* appear also to contribute to the sustenance of this bird.

There is a large raupo-swamp at Matata—lying between the sea-coast and the hills—extending some fifteen or sixteen miles in all directions, crossed in some places by narrow ridges of dry land, and intersected by a perfect network of streams whose courses are indicated by long tortuous lines or fringes of weeping-willows. It was from the Maori pahs placed in well selected positions within these extensive marshes that Major Mair and his Arawa contingent had, in 1865, to dislodge the hostile tribes who were harbouring the murderers of Volkner and Fulloon. Accompanied by a force of 500 "friendlies" he pursued the enemy from point to point, and finally captured the whole of them (numbering in all 600) in the very gallant attack which he made on Te Teko. These singular fens are naturally a great rendezvous for Waterfowl of all kinds, and since the destruction of Rotomahana by the volcanic outbreak of Tarawera, it is undoubtedly the best shooting-ground in the colony. The Grey Duck, Scaup, Brown Teal, Shoveller, Bittern, and Pukeko are all equally abundant, and a sportsman in a canoe, with a Maori boy to do the paddling, may easily bag 50 brace

in the course of a single morning. Other birds, too, are to be met with in these dreary marshes. The Dabchick is plentiful in all the open spaces of water, and in one little lagoon I counted as many as ten in a flock. The Water-Rail (*Ortygometra tabuensis*) and its spotted congener (*O. affinis*) are frequently to be heard, although seldom seen; and the melancholy cry of the Fern-bird is so general and persistent that its nickname of "Swamp-Sparrow" is not undeserved.

On the 5th October, standing on the Paikakariki road-cutting, waiting for Cobb's coach to come up, and gazing with a delight that never tires on the magnificent panorama that there presents itself to view,—the far-reaching ocean, with the rock-bound island of Kapiti rearing its majestic outline a few miles distant, and away to the north the low-lying coast-line, intersected with streams, and forming a border to the long sweep of sandhills and swamps that lie between Ruahine and the sea,—I cast my eyes for a moment below, and there, in a "negro-head" swamp, of which from the position I occupied I had a complete view, I witnessed a very pretty picture of wild bird-life. A Grey Duck had brought out her brood and was keeping watch on a clump of toetoe, just above the surface of the water, while the ducklings (of which I counted eleven or twelve) were gaining their first experience of "life in the swamps." It was interesting to observe how they pursued one another through the intricacies of that stagnant pool, all covered with duck-weed, broke up into parties of two and three, skimmed along the surface of the water, disappeared in the sedge and tangle, assembled again for a moment, then dispersed in opposite directions, every now and then rallying round the parent bird, as if to be assured that all was right. On the appearance of a Hawk overhead, or of an innocent sea-bird making a wider circuit than usual in its survey of the sandy beach beyond, an alarm-note from the old Duck operates like magic and not a sign is visible of the brood of young ones, all hidden away under the overhanging tufts of vegetation till the threatened danger has passed. Cautiously one of them reappears on the pool and is followed by others, as one by one they recover confidence, and in a few minutes all is excitement again, and they are frolicking about in the liveliest manner.

This intuitive or instinctive sense of danger and the impulse to hide so generally manifested by the Waterfowl, especially in the earliest stage of their existence after quitting the egg-shell, is indeed very remarkable. The downy young of many species of Limicolæ and other Sea-fowl appear to find their best security in perfect stillness. On being surprised or alarmed they simply squat on the ground and remain perfectly motionless, without uttering a sound of any kind, instinctively trusting to escape detection from their likeness to surrounding objects. I have often passed and repassed within a foot of a young bird thus concealed without being able to find it; and at length, on discovering it, I have been astonished at the passive manner in which it would allow itself to be handled without making any sign.

This species sometimes breeds rather late in the season; for I have a note in my journal that I saw a flock of very young ducklings in the Horse-shoe lake (Whangaehu) on the 14th January, more than three months later than the instance recorded above.

As an instance of how the Grey Duck may be tamed by protection, I may mention that, on October 26, I saw a pair with eleven young ones within a few yards of Travers' Bridge, Avon, almost in the heart of Christchurch, and several other pairs in the vicinity. It has generally been found almost impossible to domesticate this bird owing to its tendency to revert to the wild state. But not very long ago, when riding between Woodville and the Manawatu Gorge, I saw, at a "Cockatoo homestead," a flock of domestic ducks on the roadside, and with them a perfectly tame *Anas superciliosa*, apparently a bird of the first year. It was distinguishable at a glance from the rest by its manner of walking, carrying its head low or in a crouching attitude. Its smaller size and more slender form also betrayed it, before I came near enough to examine the plumage.

It usually breeds among the sedge and tangle in low situations in the immediate vicinity of its haunts. As a rule, the place selected is a dry and convenient situation on the ground—always well-

concealed from view, sometimes, too, at a considerable distance from the water. Occasionally, however, a more elevated site is fixed upon. On the famous Island of Motutaiko, in the Taupo Lake, there are some large pohutukawa trees (*Metrosideros tomentosa*). In the forked branches of these trees, some twenty or thirty feet above the surface of the water, the Grey Duck often builds her nest and hatches her young. The natives state that when the ducklings are ready to take to the water the old birds bring them down to the lake on their backs*.

I have sometimes found its nest on the summit of a cliff overlooking a river; and in one instance placed in a bunch of *Astelia*, in the fork of a dead tree, at an elevation of 20 feet or more from the ground †. The nest is formed of dry grass, flags, or other soft materials placed loosely together in a circular form; and the interior is lined with down, plucked from the bird's own body. The eggs vary in number, there being sometimes as many as ten; they are of a broadly oval form, measuring 2·5 inches in length by 1·6 in breadth, and are of a dull creamy-white colour.

* Mr. Barker contributes the following:—"A short account may interest you of a Grey Duck's nest I discovered in a tree this spring, at Peel Forest; I was walking through the bush to ascend the gorge of a small mountain-torrent that drains Mount Peel, when from a tree above my head flew a wild Grey Duck. On inspection the tree turned out to be an old broad-leaf, well covered with a mass of ferns, overhanging a bank which had evidently been in former times the south bank of the creek, now running some twenty feet away. On climbing a young tree close by I was surprised and pleased to see, in the hollow formed by the divergence of two large branches in the broad-leaf, a beautifully formed Grey Duck's nest of fine down inside with a basis of small twigs, and containing nine eggs of a creamy-green colour. The nest was made the more beautiful by the natural way the long pendent fronds of the ferns hung over and around it, completely hiding the mother from view when on the nest. On measuring the distance from the ground I found it to be thirteen feet nine inches. I was particularly anxious to find out how the mother would contrive to get her young ones down, as unless she carried them I could not see how she would manage it, for owing to the steepness of the tree they would not be able to clamber down, and even if shoved over the edge must tumble through small underwood on to hard stones. The bird's way of getting to the nest was most ingenious: the nest was on the side of the tree away from the stream, and so obstructed with creepers that she could not get in on that side; but on the other a branch grew at right angles to the tree over the bed of the stream; she flew on to this branch, walked along it, and where it joined the tree was a small hollow arch formed by the curving and meeting together again of two old stems; through this small cavity she squeezed herself (so small is the orifice that if I had not seen it I could not have believed a Duck would think of working its way through), and on the other side about eight inches below her is the nest, into which by a steep slope she slides. The way from the nest along the bough was well worn by her constant traffic backward and forward.

"I visited the nest regularly for a week, when unfortunately bad weather set in, and it being in a rather inaccessible situation, owing to the torrents of water that come out of the narrow gorge after heavy rain, I was unable to get to it again for a fortnight, and when I did I was disgusted to find the young had all hatched out and gone, and the rain had quite spoilt the nest. However, I made a close examination of the tree, and could find no signs whatever of disturbance along the edges of the cavity in which the nest was built, or down the semiperpendicular fern-covered trunk of the tree, such as one might expect had they endeavoured to descend on that side; while through the arch I discovered some of the down of the nest clinging to the side of the bark, as if they had gone that way. I also looked well on the ground beneath, but could find no sign except under the arch connected with the bough at right angles to the tree; here was a small piece of moss-covered bark, which was detached from the bottom edge of the arch and had evidently been dislodged by their journeyings. However, I was fully convinced that they had escaped out of the nest through the hole on to the branch, the other way being quite impracticable. How the parent bird managed to get her young to the ground, I am unable to tell you; but I incline to the belief that she carried them on her back, as some bushmen assured me they had actually witnessed this feat."

† The following paragraph appeared in a Colonial newspaper:—"A curious freak of a wild Duck has been noticed in the Wairoa district, one of those birds having built its nest in a tree, and there brought forth its brood. As is well known, these birds usually build low; but in the instance we refer to, in a rata tree, high up on a cliff overhanging the river, the bird had formed its nest. The position of the nest, which is inaccessible, was first noticed by the bird's efforts to entice its young into the water. The Duck was seen to fly out of the tree down towards the river, uttering a peculiar cry, and shortly afterwards the ducklings, six in all, fell one after another over the nest on to the river-bank, from which they scrambled into the water."



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BROWN DUCK.
ANAS CHLOROTIS.

AUCKLAND-ISLAND DUCK.
NESONETTA AUCKLANDICA.

(THREE-FIFTHS' NATURAL SIZE.)



ANAS CHLOROTIS.

(BROWN DUCK.)

Anas chlorotis, Gray, Voy. Ereb. and Terror, p. 15, pl. 20 (1844).

Native names.—Tarawhatu, Patake, Tete, and Tete-whereo.

♂ *ad.* suprâ saturatè brunneus, dorsi plumis vix olivaceo lavatis et obsoletè fulvo marginatis, tectricibus alarum cinerascanti-brunneis, pallidiùs marginatis, majoribus rufescenti-fulvo terminatis: remigibus saturatè brunneis, scapis rufescentibus, minimis extùs sordidè viridibus rufescenti-fulvo terminatis, secundariis extùs angustè fulvo limbatis: scapularibus fulvo vermiculatis, extùs nigricantibus: supracaudalibus brunneis, latiùs fulvo marginatis: caudâ brunneâ angustè fulvo limbata: pileo sordidè rufescenti-brunneo, nigro vario: regione oculari albidâ: facie laterali brunneâ, genis rufescentibus: regione supraparoticâ viridi versus occiput extendente: gulâ fulvescente: pectore ferrugineo, maculis obsoletis nigris cordiformibus marmorato: abdomine medio crissoque pallidioribus, fulvescentioribus, obsoletè nigro transnotatis: hypochondriis brunneo et fulvescente transversimulatis, plagâ crissali utrinque nigrâ, rufescente marginatâ et suprâ viridi nitente: subcaudalibus nigris: subalaribus et axillaribus albis: rostro saturatè brunneo, ungue pallidiore: pedibus pallidè brunneis: iride saturatè brunneâ.

♀ capitis et colli lateribus fulvescentibus minutè brunneo striolatis: pectore haud rufescente: hypochondriis et scapularibus haud vermiculatis: subcaudalibus rufescentibus nigricante medialiter notatis.

Adult male. Head and anterior portion of neck blackish brown, darker on the crown, and narrowly edged with rufous, mottled on the chin with fulvous; eyelids greyish white; sides of the head posteriorly and the nape shining green in certain lights; this dark plumage is bounded anteriorly by a narrow zone of rufous white which nearly encircles the neck; below this zone and on the lower part of fore neck castaneous, changing into chestnut-brown on the breast and sides of the body, with numerous obscure rounded spots of black; general upper surface dark fuscous, margined with pale brown, and slightly glossed with green; on the lower sides of the neck posteriorly and on the smaller scapulars numerous freckles and vermiculations of pale rufous brown; the longer scapulars have a broad apical spot of velvety black on their outer webs, below which, and on the inner webs, they are vermiculated with pale ferruginous; primaries dusky brown, highly glossed with green, and margined on their outer webs with a narrow line of pale rufous brown; outer secondaries shining velvety green on their outer webs, with a broad apical margin of rufous white, dusky on their inner webs, their coverts dark brown, terminally edged with rufous, the closed wing presenting a dull speculum margined accordingly; the long inner secondaries dull shining green on their outer webs, broadly edged with pale fulvous; inner lining of wings and axillary plumes pure white, with a wash of dark brown near the margin; the long plumage covering the flanks castaneous brown, beautifully vermiculated with pale ferruginous; abdomen pale brown, obscurely spotted with a darker shade; below the vent and the under tail-coverts velvety black, tipped with brown; on each side of the rump a conspicuous spot of white, with black vermiculations on its upper edge; tail dark glossy brown, its upper coverts shining greenish brown, margined with rufous. Irides black; bill bluish black, the pectination of the upper mandible yellowish brown; feet dull slaty grey. Length 17 inches; wing, from flexure, 8; tail 4; bill, along the ridge 1.65, along the edge of lower mandible 1.75; tarsus 1.5; middle toe and claw 2.25.

Adult female. Head and anterior portion of neck blackish brown; the crown darker, and edged with rufous; the sides of the head, throat, and fore neck thickly speckled and mottled with fulvous grey; no gloss on the head, nor is there any marginal zone on the neck, the colours gradually blending; lower part of neck behind

and all the upper surface dark fuscous, each feather broadly margined with pale yellowish brown; lower sides of neck and upper part of breast dark fulvous brown, and the abdomen fulvous white, the feathers of these parts being largely centred with brown, and presenting on the surface a soft mottled appearance; long plumage covering the flanks dark brown, broadly edged with fulvous; surface of wings and tail as in the male; under tail-coverts brownish black, sometimes edged with rufous. Bill greyish brown; legs and feet pale yellowish brown.

Young male. Head and neck as in the adult female; there is no gloss on the crown, nor white circlet on the fore neck; the lower part and sides of neck are dull ferruginous brown, each feather with a central round spot of darker brown in its apical portion; breast and abdomen rufous white mixed with fulvous and obscurely spotted with brown; scapulars, as well as the long plumage covering the flanks, dark brown margined with fulvous, and showing little or no vermiculation; under tail-coverts pale rufous, blotched with dark brown; in place of the white rump-spots a few feathers freckled brown and white.

Nestling. Covered with thick, soft down, blackish brown with lighter markings on the upper surface; chin and underparts yellowish brown.

Varieties. In some examples of the male, the colour of the lower part of neck and breast deepens to a dark chestnut, and the abdomen is mottled and banded with pale fulvous on a dark brown ground; while in others the white circlet is wanting, and the vermiculation on the upper parts is scarcely apparent.

An albino form, the whole of the plumage being of a dull cream-colour, with obsolete markings, was shot in the Horowhenua Lake in June 1878.

In the Colonial Museum there is a partial albino, the head, hind neck, shoulders, and upper surface of wings being varied with irregular patches of white.

In the hands of the local taxidermist, Mr. Liardet, I saw two more (also from the Wairarapa) with partially white heads, and at Wanganui I examined a specimen in which the whole of the head and neck, and a portion of the back, were pure white.

Obs. The example figured in my Plate is a particularly fine male bird obtained in the Canterbury district, the skin of which is now in my collection:—Crown dark castaneous with greenish reflexions; the rest of the head, as well as the nape, metallic or bronzy green; a mark of fulvous white, a quarter of an inch wide in the middle, separating the dark brown of the upper fore neck from the rich castaneous colouring below; the feathers of the lower hind neck and shoulders more or less vermiculated with chestnut-brown; scapulars very prettily marked, being dark brown with a broad lunate spot of velvety black on the outer web, bordered along the inner edge with a line of fulvous brown, beyond which the webs are conspicuously vermiculated with chestnut-brown.

The female is somewhat smaller than the male. In some specimens the large wing-coverts overlapping the speculum are broadly margined at the tips with pale rufous.

Note. Mr. Reischek brought from the West Coast Sounds some examples of an apparently smaller form of this Duck. A pair of these (now in my collection), marked male and female, were shot together at night, at the mouth of a creek in Supper Cove. The male (in the "young" plumage described above) gives the following measurements:—Total length 16.5 inches; wing, from flexure, 7.25; tail 2.75; bill, along the ridge 1.5, along the edge of lower mandible 1.75; tarsus 1.25; middle toe and claw 1.9. The female is smaller, the wing from flexure being only 7 inches.

SOME confusion has hitherto existed regarding this species, owing to the differences of plumage exhibited by the male, female, and young; but I trust that the above exhaustive account will sufficiently clear up the difficulty. I have shot birds in the various states of plumage described above, and have determined the question of sex by careful dissection.

This elegant little Duck is distributed all over the country, being met with in every inland lake, and often in the deep freshwater streams which run into them, where the overhanging vegetation affords ready shelter and concealment. Being a nocturnal feeder, it is not so commonly seen as the

Grey Duck and the "Black Teal" or Scaup. It always retires up the creeks in the woods during the day, or conceals itself among the sedges and vegetation which usually fringe the inland water-courses and lagoons. At Horowhenua, for example, where they are particularly abundant, you rarely surprise one, except by means of a dog, during the heat of the day. But after sunset they begin to collect on the surface of the lake, emerging in pairs from their concealment, swimming down to the mouth of the bush creek, and then taking wing to their place of rendezvous. They then form into flocks, sometimes of considerable size, and are on the alert, feeding about the lake generally all night long. When hunting for its food, it makes a peculiar and rather musical sniffing noise.

For many miles along the low banks of the Manawatu and other tidal rivers in the North Island there are what the settlers term "kahikatea swamps," extending often considerable distances inland. Here the land, at all times wet and swampy, is liable to frequent inundations from the river freshets. The trees, which consist almost entirely of white pine, are laden with a prodigal growth of kiekie (*Freycinetia banksii*), which entwines itself around the trunks, throwing out, tier above tier, its waving bunches of flag-leaves till a single tree sometimes supports many tons of this epiphytic growth; it also spreads along the damp ground, forming an almost impenetrable tangle, and shading from the sunlight the deep water-holes left by the subsiding river. Into this secure retreat, where the sportsman and his dog alike are baffled by the very exuberance of the vegetation, the Brown Duck loves to betake itself during the day, coming out in the cool hours of the evening to feed in the creeks and lagoons.

This Duck often wanders to a distance from its usual haunts. It has been met with in a raupo swamp far up the Wangaehu valley, and Captain Mair has found it among the thick undergrowth in a kakikatea swamp, in the remote Urewera country.

In the settlers' bush-clearings at Eketahuna, in the Forty-mile Bush, I found them long after dark in the drains or watercourses along the sides of the road, diligently hunting for their food and uttering at intervals a soft and rather musical note. They were very tame, allowing me to approach within a few feet of them.

It is a very indifferent flier, but swims well and dives with facility. When shooting on a lake near Tiakitahuna, in the Upper Manawatu, some years ago, I came upon a flock of sixty or more of these birds; instead of taking wing when closely followed, they swam towards the shore, and then forming into a line they hurried forward in a very impetuous manner, keeping close under the banks of the lake, and uttering a low confused twitter.

It nests in places contiguous to its ordinary haunts, always selecting a dry and secluded spot for that purpose. Like many other Ducks, it forms its nest of dry grass, and lines the interior with soft down plucked from its own body. The eggs, which vary in number from five to eight, are very oval, large for the size of the bird, measuring 2.3 inches in length by 1.7 in breadth, and of a dark cream colour, with a slightly greasy surface.

Some years ago I received from Mr. Taylor White, of Hawke's Bay, two skins of a Duck which was alleged to be a cross between the wild Grey Duck and the domestic species. The bird is undoubtedly a hybrid, but I am rather inclined to think that the male parent belonged to the present species or to *Anas gibberifrons* and not to *Anas superciliosa* *. I presented both specimens to the Colonial Museum, but before doing so I made the following notes:—

♂. General plumage slaty grey on the upper, and white on the underparts; crown and nape steel-black; throat white mottled with grey. Colours very indeterminate, the plumage of the back being much varied and

* Mr. Taylor White has, however, given the following particulars of another case in which the parent was undoubtedly of the latter species. He writes:—"About nine years ago a Grey Duck (*Anas superciliosa*) was trapped in the Wakatipu Lake district, and readily became tame, but was very shy with strangers. In the third spring it paired with a Domestic Duck (*A. boschas*). A brood of six hybrids was reared.

"1. These mainly partook in type of the Domestic Duck, but were smaller and more plump in shape; colour creamy brown

vermiculated with dark brown, which colour asserts itself again on the lower fore neck; speculum very conspicuous, and bordered above with a white band edged with black. Bill and feet yellow.

- ♀. General plumage pale brown, with darker shaft-lines; upper parts prettily banded and mottled, partaking more of the appearance of a wild bird than a domestic one; vertex dark brown, with a slight gloss; throat and fore neck prettily stippled with black, just as in *A. gibberifrons*; speculum distinct, velvety black in its outer portion, and bordered above and below with a well-defined band of white; tail-feathers dark brown, with whitish edges. Bill yellow, with the unguis dark brown, and a broad mark of the same colour across the middle.

with darker markings, inclining to white on lower part of breast, throat, and cheek; a dark line passing through the eye, as in *A. superciliosa*; beak brownish yellow; legs dull yellow; speculum blue, outer side black, margined with white, as in Domestic Duck. The drakes very similar to English Wild Duck, and having the curled tail-feathers; speculum blue. Could fly fairly well, but with reluctance.

"No. 2. One of these half-bred Ducks mated with a Grey Duck (*A. superciliosa*), and one Duck was reared, which in colour and size was almost identical with *A. superciliosa*, but had the speculum green, margined with white, and a slight touch of white on some of the secondary feathers of wing. Could fly strongly.

"No. 3. This Duck, when mated with a drake of *Anas superciliosa*, produced a brood in type and colour like the latter, some of which have reverted to a wild state. For several seasons the first brood have been all dark-coloured, and the second brood always includes pure white, or albinos, and white with markings or dark pencillings of rufous; speculum green; dark-coloured bill and legs; curled tail-feathers wanting.

"No. 4. A drake, bred *inter se*, might be described as in foundation-colour like *A. superciliosa*; slightly tinged on the head with green; light colour on cheeks; dark mark through eyes; breast rufous; speculum green; tail and tail-coverts inclining to black, edged with brown; two small curled feathers in tail.

"No. 5. This season (1885) there was a brood of six, reared by a hybrid Duck, which might be easily mistaken for a coloured call-duck, and which was mated to *A. superciliosa*. The Ducks were slightly larger than the latter; foundation-colour and markings similar, having a washed-out look; sides of breast forward of thigh white-grey, same as lower part of breast of *A. boschas*. Bill blackish green in some, with legs the same; yellow in others, chequered with black, and legs yellowish black; speculum green, the outer edge black, margined with a white band above and below. The drake was identical in general appearance to *Anas boschas*; green head, white ring on front of neck, one curled tail-feather only. Colour of speculum green, margined with white. Can fly, but are thoroughly domestic. As in the Mallard, the bright colouring changes with the seasons.

"The hybrids lay twice in the season, but few young are reared, owing to want of convenient mates; and numbers are destroyed by dogs, cats, hawks, and rats. The latter are very destructive." (Trans. N.-Z. Inst. vol. xviii. pp. 134, 135.)

In my Introduction (pages xviii to xxxv) I have given an account of the various ancient forms of New-Zealand birds known to us by their fossil remains. To these must be added the extinct Duck, apparently allied to *Anas chlorotis*, of which a skeleton from the Earnsclough Caves, in Otago, has been described*, under the name of *Anas finschi*, by Van Beneden, who supposes that this bird disappeared from the land at the same time as *Dinornis*. This writer says:—"In comparing these bones with the two species known in Europe, we have been quite struck with their resemblance to the fossil species which inhabited in great numbers the shores of the lakes, the bottoms of which at the present day constitute a considerable portion of the department of Allier, and to which M. Alphonse Milne-Edwards has given the name of *Anas blanchardi*. . . . The principal difference between them and *Anas finschi* is that the head is not so long as in the New-Zealand species; and if there is but a slight difference in the size of the head, there is, on the other hand, a remarkable difference in the size of the bones of the limbs. The wings, as well as the feet, are stronger in the New-Zealand species; the clavicle is wider; but it is with difficulty one discerns differences between the sternums and plastron. That which is especially surprising in comparing these bones of a New-Zealand form with the European species is that one finds so faithfully reproduced all the characters peculiar to the birds of this family."

* Annales de la Soc. Géol. de Belg. vol. ii. p. 123.

ANAS GIBBERIFRONS.

(WOOD-TEAL.)

- Anas (Mareca) gibberifrons*, Müller, Nat. Gesch. Land- en Volkenk. p. 159 (1841).
Querquedula gibberifrons, Bonap. C. R. xliii. p. 650 (1856).
Anas gibberifrons, Schl. Mus. Pays-Bas, *Anseres*, p. 58 (1866).
Anas gibbifrons, Eyton, Synopsis Anat. p. 94 (1869).
Anas gracilis, Buller, Ibis, 1869, p. 41.
Nettion gibberifrons, Gray, Hand-l. of B. iii. p. 33 (1871).
Virago castanea, Newton, P. Z. S. 1871, p. 651.
Anas castanea, Hutton, Trans. N.-Z. Inst. xii. p. 272 (1880, nec Gould).

Native names.—Tete, Tete-moroiti, and Pohoriki.

Ad. supra brunneus, dorsi plumis fulvescente marginatis: pileo saturatiùs brunneo fulvescente longitudinaliter notato, quasi striolato, occipite vix viridi nitente: facie laterali fulvescenti-albidâ, minutè brunneo striolatâ: tectricibus alarum saturatè eivnaseenti-brunneis unicoloribus, majoribus ad apicem latissimè albis, fasciam conspicuam alarem exhibentibus: remigibus saturatè brunneis, secundariis extùs lætè velutinis, angustè albo terminatis, pennis duabus mediis extùs nitenti-viridibus, secundariis dorsalibus intùs brunneis dorso eivnoloribus: caudâ brunneâ, rectricibus obsoletè fulvescente marginatis: gutture toto fulvescenti-albido, unicolore: corpore reliquo subtilis brunnescenti-fulvo, plumis medialiter saturatè brunneis, quasi marmoratis, hypochondriis magis distinctè, pectore medio et abdomine obsoletiùs notatis: rostro pallidè brunneo, versus apicem mandibulæ flavicanti-albo: pedibus pallidè brunneis: iride saturatè brunneâ.

Adult male. Upper surface dusky brown, with greenish reflexions; the feathers of the back and the scapulars narrowly margined with fulvous white; crown and nape blackish brown, minutely marked with fulvous white; throat, fore neck, and sides of the head fulvous white, the latter marked with sagittate spots of brown; underparts light fulvous brown with obscure spots of a darker shade, especially on the breast and sides of the body, each feather having a broad central mark of blackish brown; throat and abdomen more or less tinged with cinnamon; primaries and tail-feathers dark brown; the outer portion of the upper wing-coverts pure white, forming a conspicuous bar across the wing; the secondaries velvety black, narrowly tipped with fulvous, and a speculum of shining green occupying the outer webs of the three middle ones. Irides dark brown; bill pale brown, yellowish white towards the base of lower mandible; feet pale brown. Length 17 inches; extent of wings 25.5; wing, from flexure, 8; tail 4; bill, along the ridge 1.5, along the edge of lower mandible 1.75; tarsus 1.25; middle toe and claw 1.25.

Female. Somewhat smaller than the male, and with the tints of the plumage paler. In other respects the sexes are precisely alike. Length 15.5 inches; extent of wings 23.5; wing, from flexure, 7.5; tail 3.5.

Albinism. My collection contains a specimen (obtained from the Wairarapa in June 1879) adorned with a lovely white head; there is an irregular patch of brown on the vertex between the eyes, and the chin and throat are likewise brown; but around the upper part of the neck there is a patchy white collar, and the upper wings are almost wholly white, as are also the edges of the wings and some of the primaries and secondaries.

Obs. I have examined specimens from Celebes, and although I am not prepared at present to separate our bird, it seems to me that the former are appreciably smaller in size and darker in plumage.

I OBTAINED my first specimens of this somewhat rare Duck (in 1866) on the Oroua stream, near its junction with the Manawatu, in the Province of Wellington. I observed that on being disturbed from the marsh where they were apparently feeding they rose high in the air, and came down suddenly into the creek with a rapid, oblique, and rather awkward flight. On the water they kept near to each other, and I killed both at one shot. They proved, on dissection, to be male and female; I found the skin very tender, and the flesh extremely delicate, with fat of a bright yellow colour.

I afterwards saw a pair on the wing, passing over one of the freshwater lagoons of the Upper Manawatu, the white alar bar being very conspicuous; and, subsequently, I obtained a fine specimen in the flesh from Napier. It is comparatively plentiful in some of the sulphur-springs at Ohinemutu, and was so formerly at Rotomahana, where, as Captain Mair informs me, he once killed as many as eleven at a single shot on the water. It sometimes swims in pairs, but usually associates in small flocks of a dozen or more. It is easily distinguished from all the other species by the conspicuous white bar on the wings. Its form is remarkably slender and graceful, the contour of the body being almost as elongate as that of a Gannet. The stomach of one I dissected contained numerous particles of gravel and comminuted vegetable matter.

Although of rare occurrence in most parts of New Zealand, the species has a wide geographical distribution, examples having been recorded from Timor, Flores, Celebes, Northern Australia, South Australia, and New Caledonia. It bears a close resemblance to *Anas punctata* of Australia; but it is appreciably smaller, and the male does not exhibit the bright summer plumage of that species. Mr. Gould, in his account of *Anas punctata*, observes:—"There appear to be two very distinct races of this bird, one of which is much larger than the other; so great, in fact, is the difference in this respect in specimens from various parts of the country, that the idea presents itself of their being really distinct species. The smaller race inhabits Tasmania, the larger the western and southern portions of Australia." These remarks, no doubt, refer to the present species, inasmuch as I was able to identify a specimen received by the late Sir J. von Haast from Australia with the true *A. gibberifrons*. This circumstance was noticed by me in a communication to the 'Ibis' (1869, p. 42, note); and I have since had an opportunity of further verifying the fact by the examination of several specimens in the Sydney Museum.

An excellent plate of this Duck appeared in the 'Proceedings of the Zoological Society' (1882, pp. 453, 454, pl. xxxiii.), in illustration of a paper by Dr. Sclater, in which he reported that a pair of live ones from Australia, in the Society's Gardens at Regent's Park (previously supposed to be *A. castanea*), had nested in what is termed the "Waders' Pond," towards the end of March, and had brought out four nice young birds*. In this figure, however, the bill and feet are represented as being black instead of yellowish brown.

* Dr. Sclater continues:—"There is no longer any doubt that we have here to deal with a species which, however much it may resemble the female of *Anas castanea*, is quite distinct, and of which the sexes, as may be proved by the examination of our breeding birds, are very nearly alike, the female being merely slightly smaller in size and duller in plumage. It is, in fact, the species described in the 'Ibis' for 1869, by Dr. Buller, from New-Zealand specimens, as *Anas gracilis*, but subsequently identified by Dr. Finsch ('Ibis,' 1869, p. 380) with *Anas gibberifrons*, S. Müller. As regards the synonyms of this species, after the positive statement of Dr. Finsch and Prof. Schlegel, I think we can hardly accept Prof. Hutton's unsupported opinion that '*Anas gracilis* is distinct from *A. gibberifrons*'. . . . Having been in error myself as to my first identification of these Ducks, I fear I have also led Prof. Newton into an error upon the same subject. In January 1871 I furnished Prof. Newton with what I believed to be specimens (in the flesh) of a male and female *Anas castanea* that had recently died in the Society's Gardens. Prof. Newton, trusting to Mr. Baker's determination that the presumed female was really of that sex, read a paper upon these birds before this Society in November of that year, in which he pointed out that the presumed female possessed the extraordinary peculiarity of having a *bullæ ossea*, hitherto only known to occur in the male sex of the Anatidæ, and proposed in consequence the new generic term *Virago* for *Anas castanea*. But Prof. Newton having been kind enough to send me up the skins of this presumed pair of birds for examination, I think I may say that there is little doubt that Mr. Baker must have made an error in his determination of the sex of the supposed female, and that that bird is in all probability a male of *Anas gibberifrons*."

I happened to be present at the meeting of November 1871, and ventured to express a strong opinion at the time that the specimen exhibited as ♀ *Anas castanea* was in reality ♂ *A. gibberifrons*, a view which has proved to be correct.

NESONETTA AUCKLANDICA.

(AUCKLAND-ISLAND DUCK.)

Nesonetta aucklandica, Gray, Voy. Ereb. and Terror, p. 16 (1844).

Ad. brunneus, vix viridi nitens, plumis tergi nonnullis nigro irroratis: alis concoloribus brunneis, secundariis clariore viridi nitentibus: pileo saturatiore brunneo: facie laterali totâ et gutture toto brunneis saturatiore brunneo maculatis: corpore reliquo subtùs rufescenti-brunneo, indistinctè saturatiore brunneo maculato, pectoris lateribus nigro irroratis: subcaudalibus brunneis nigro terminatis: rostro nigricanti-brunneo: pedibus rubescenti-brunneis: iride saturatè brunneâ.

Adult male. Head and neck warm umber-brown, slightly glossed with green on the vertex and nape, largely mottled with white on the chin, and less so on the fore neck; entire upper surface dark umber-brown, the feathers composing the mantle margined with chestnut-brown, and the whole of the plumage glossed in certain lights with metallic green, which is brighter on the upper wing-coverts; upper part of breast, sides of the body, flanks, and under tail-coverts dark chestnut-brown; quills and tail-feathers blackish brown, with a ruddy glow on the former; there is no speculum, but the secondaries are darker on their outer webs and are terminally margined outwardly with fulvous white; lower part of breast and the abdomen fulvous white, varied more or less with brown, especially towards the vent. Irides dark hazel; bill blackish brown; legs and feet reddish brown. Total length 15 inches; wing, from flexure, 5.2; tail 2.5; bill, along the ridge 1.5, along the edge of lower mandible 1.75; tarsus 1.2; middle toe and claw 2.

Obs. The type of this species in the British Museum (which was brought home by the Antarctic Expedition) is slightly larger, and differs somewhat in its coloration, the plumage of the shoulders and the sides of the body being more or less vermiculated.

THE above description and the accompanying figure are taken from the only specimen of this bird in my collection (an adult male), which was brought from the Auckland Islands by Mr. Burton, of the Colonial Museum, in May 1880.

I have never met with this species in New Zealand proper, but there is a specimen in the British Museum, presented by Sir George Grey when Governor of the Colony, without, however, any information as to locality.

Nothing is at present known of its habits, except that, owing to the abbreviated form of its wings, it is quite incapable of flight.

CASARCA VARIEGATA.

(NEW-ZEALAND SHELDRAKE.)

- Variigated Goose*, Lath. Gen. Hist. iii. pt. 2, p. 441 (1785).
Anas variegata, Gm. Syst. Nat. i. p. 505 (1788, ex Lath.).
Casarca castanea, Eyton, Monogr. Anat. p. 108, pl. 10 (1838).
Casarca variegata, Gray, in Dieff. Trav. ii., App. p. 198 (1843).
Anas cheneros, Forst. Descr. Anim. p. 92 (1844).
Anser variegata, Ellman, Zool. 1861, p. 7471.

Native names.

Putangitangi ; Putakitaki in the South Island ; “Paradise Duck” of the colonists.

♂ pileo undique et eervice virescenti-nigerrimis : collo undique nigricante, ochraceo vermiculatum vario : dorso saturatè cinerascens-fuseo, plumis omnibus albido transvermiculatis, plumis castaneis absentibus : dorso postico nigricante obscurè albido transvermiculato : uropygio et supracaudalibus purpurascens-nigris : remigibus nigris, minoribus extùs pulcherrimè viridibus, secundariis extùs lætè castaneis, intùs cinereis, versus apicem albo vermiculatis : eaudâ nigrâ : corpore subtùs reliquo cinerascens-fuseo, albido transversim vermiculato : abdomine medio castaneo obscurè nigro transfasciato : subalaribus albis, imis cinerascens-ibus, marginalibus paulò nigricante vermiculatis : rostro plumbescens-nigro : pedibus et iride nigris.

♀ mari dissimilis : suprâ fuscus, plumis fulvescente vel albido transversim vermiculatis, quibusdam castaneis aut eodem modo vermiculatis vel omninò unicoloribus : dorso postico nigricante obscurè albido transvermiculato : dorso postico et uropygio, alis et eaudâ ut in mari coloratis : pileo undique et eervice purè albis : corpore subtùs castaneo, plumis quibusdam nigricantibus fulvescente aut albido transvermiculatis : abdomine medio saturatè castaneo, nigro transfasciato : subcaudalibus lætiùs castaneis : subalaribus ut in mari coloratis.

Adult male. Head and greater portion of neck black, with bluish-green reflexions ; neck below and fore part of breast rich dark brown, minutely spotted or freckled with pale rufous ; back and scapulars, as well as the lower part of the breast, sides of the body and flanks black, mottled and marked with wavy lines or vermiculations of white ; on the sides and flanks the vermiculation is very distinct, and adds much to the beauty of the plumage ; the rest of the underparts dark rufous spotted and barred with black ; under tail-coverts bright ferruginous with darker stains ; the whole of the wing-coverts pure white ; the primaries glossy black, lighter on their under surface ; the lesser quills shining green on their exposed webs, dusky and margined with white on their inner, forming a large, bright speculum ; the four inner secondaries have their outer webs rufous, becoming paler towards the tips, and their inner webs dark cinereous, freckled more or less with white. The contrast of colours described above gives the upper surface of the wings a very beautiful appearance when partially spread ; the under surface or lining of the wings is pure white. Irides and bill black ; legs greyish black. Total length 24 inches ; extent of wings 47 ; wing, from flexure, 14.5 ; tail 6 ; bill, along the ridge 1.75, along the edge of lower mandible 2 ; tarsus 2.75 ; middle toe and claw 2.75 ; hind toe and claw .6.

Obs. In some examples (probably immature birds) the middle tail-feathers are terminally margined with pale brown, and the lateral ones vermiculated at the tips with white.

Adult female. Head and greater portion of neck pure white ; lower part of neck, breast, and sides of the body



J. G. K. BLEMANS DELT & J. H.

JUDD & CO LIMITED, IMP

SHELDRAKE OR PARADISE DUCK. (MALE AND FEMALE.)
CASARCA VARIEGATA.
(ONE-HALF NATURAL SIZE.)



bright ferruginous, with freckled margins, and varied more or less with brown; on the sides and long plumage overlapping the thighs numerous freckled vermiculations of brown and white; shoulders and mantle dark brown mixed with rufous, beautifully vermiculated with fulvous white and largely varied with ferruginous; middle portion of back minutely freckled with white; surface of wings precisely as in the male; rump and upper surface of tail glossy black; abdomen ferruginous largely mixed with dark brown, presenting a banded and mottled appearance; under tail-coverts paler ferruginous, freckled with black at the tips.

Young. In the young state the sexes are alike, the plumage resembling more nearly that of the adult male. Head and upper portion of neck sooty black, varied with light brown; lower portion of neck dark brown, with narrow transverse lines of rufous; the whole of the under surface blackish brown, mottled and barred with rufous, each feather narrowly margined with white; shoulders, back, and lower sides of the body black, with white freckles and vermiculations; wings as in the adult; rump and tail black; under tail-coverts pale ferruginous.

Progress towards maturity. Examples exhibit much individual variety in their progress towards maturity; this is especially the case with the female, the first indication of change being the appearance of irregular white feathers on the head and neck, which rapidly increase in number till the plumage of those parts becomes entirely white; and in a more advanced state the underparts are varied with scattered feathers of rufous in such a manner as to impart a very lively effect. Some specimens of the immature male are marked with rufous on the forehead and lores.

Nestling. Covered with soft down, for the most part pure white, but largely varied on the upper surface with brown; the checks, throat, fore neck, and all the under surface entirely white; the top and upper sides of the head, in a line with the eyes, the hind neck and shoulders, a broad mark down the back spreading on the tail, the anterior portion and tips of wings, and a broad patch on each flank, continued in a line over the thighs, dull umber-brown; bill and feet pale brown.

Obs. Younger males differ from the perfectly matured ones in having a tinge of brown about the head, and the feathers of the shoulders more or less margined with dull fulvous brown, presenting on the surface wavy lines.

OF the eight species of this tribe inhabiting New Zealand the "Paradise Duck" of the colonists is undoubtedly the finest. It is spread all over the South Island, being extremely abundant in some localities; but in the North Island, although abundant in the Wairarapa and in the Ruataniwha plains, its range does not extend beyond lat. 39° S., or, in other words, it ceases to be met with after passing the Petane district, on the east coast*. It is difficult to understand why it should be thus confined, but it is nevertheless a well-established fact. A flock of five, many years ago, visited the Kaipara district, north of Auckland. Another flock of five visited Rotomahana Lake in March 1866, and a pair was seen on Lake Taupo in October 1873. These are the only instances that have come within my knowledge of the occurrence of this species beyond its ordinary range. At certain seasons of the year it associates in large flocks, which migrate from one part of the country to another, resorting at one time to the river-mouths and salt-marshes near the sea-coast, and at another retiring to the grassy plains and lagoons of the interior. In winter a partial separation of the sexes appears to take place, it being a common thing to see a flock of ten or more drakes to one duck, and *vice versa*. At other times they wander about in pairs; and whether reposing on the water or feeding

* On the west coast it is very scarce. A few are always to be seen on the river-flats near the mouth of the Ohau, and it has been shot on the Wanganui race-course; but its comparative rarity may be inferred from the following paragraph, which appeared, not long ago, in the 'Rangitikei Advocate':—"The well-known chief Utiku has a pair of rare curiosities at the Houhou pah, in the shape of a brace of tame Paradise Ducks. The creatures are as docile as domestic poultry."

on the shore, their strongly contrasted colours cannot fail to arrest and please the eye *; such a scene, in fact, as that represented in our Plate must be familiar to any one who has travelled at all in the country.

In districts where it has been much molested it becomes exceedingly shy; and it is then impossible to shoot it except by stratagem. One bird appears to keep watch while its mate is feeding; and on the slightest alarm it sounds its note of warning, to which the other responds; and both then observe the strictest vigilance, taking wing on the first approach of danger. The call-notes of the two sexes differ remarkably: the drake, with his head bent downwards, utters a prolonged guttural note, *tuk-o-o-o*, *tuk-o-o-o*; and the duck, elevating her head, responds to her mate with a shrill call, like the high note of a clarionet.

Its habits resemble, in many respects, those of the Common Sheldrake of Europe (*Casarca rutila*); and, like that species, it subsists to a great extent on tender grasses and other succulent herbage. Its wings are armed at the flexure with a hard round knob, denuded of feathers, the use of which, in the economy of the bird, I have not yet been able to discover. During the moulting-season it is unable to fly, and, being a very indifferent diver, it is readily captured. Even when thus taken in an adult state it is easily domesticated, and it has been successfully introduced into England. It is to be seen, in all its beauty, on the artificial lake at Kew Gardens and on the ornamental waters of several private estates in various parts of the country; and it breeds in the Zoological Society's Gardens in Regent's Park. I have kept them in New Zealand, and found them easy to domesticate and very tractable. They require, however, constant access to a stream or pond of water; for if denied this privilege they become subject to attacks of cramp, which in the end prove fatal. On these occasions the bird entirely loses the use of its legs, and, lying flat on its breast, flaps the ground violently with its wings in apparent agony. When stationed years ago at Wanganui, as Resident Magistrate, I kept in my garden several pairs which had become perfectly tame. I ultimately presented them to Sir George Grey, and they were then removed to the island of Kawau, where, in the enjoyment of a larger amount of freedom, they soon commenced to breed.

On one occasion, when I was staying at Omahu, in the Hawke's Bay district, the natives brought in a Paradise Duck, apparently in perfect health, but having only one wing, the other having been shot away at the junction at some former period, and the wound having then healed over.

The ingenuity with which the old birds decoy intruders away from the nest or young is very remarkable; and I have myself been so completely deceived by a Paradise Duck feigning a disabled wing, that I have followed it for a hundred yards or more, endeavouring to overtake it, before discovering the ruse it had so successfully practised. Mr. Travers refers to this subject, in a communication to the Wellington Philosophical Society †, in the following terms:—

“The Paradise Duck breeds from October to January, and not unfrequently rears two broods during the season. I have, in fact, more than once seen two broods of different ages running with the same pair of parent birds. The single broods vary in number, the largest I ever saw being ten. Both parents are anxious and watchful about their young, resorting to the ruse of pretending lameness and inability to rise from the ground, in order to draw off any animal which they think

* Writing of this species, Darwin says, in his ‘Descent of Man’ (footnote p. 479):—“The New-Zealand Sheldrake offers a quite anomalous case; the head of the female is pure white, and her back is redder than that of the male; the head of the male is of a rich dark hazel colour, and his back is clothed with finely pencilled slate-coloured feathers, so that altogether he may be considered as the more beautiful of the two. He is larger and more pugnacious than the female, and does not sit on the eggs. So that in all these respects this species comes under our first class of cases; but Mr. Selater (Proc. Z. S. 1866, p. 150) was much surprised to observe that the young of both sexes, when about three months old, resembled in their dark heads and necks the adult males, instead of the adult females, so that it would appear in this case that the females have been modified, while the males and the young have retained a former state of plumage.”

† Trans. N.-Z. Inst. 1871, vol. iv. p. 207.

likely to be mischievous. It is excessively amusing to see an old Duck waddling away as if with the greatest difficulty, her wings drooping and flapped occasionally, in order to assist her apparently struggling efforts to escape, whilst all the time she manages to keep in advance of even a fleet dog, until at last, having drawn him to what she deems a safe distance from her nest, she at once rises from the ground, screaming out her harsh danger-signal, to the complete discomfiture of the panting dog. Upon the danger-signal being uttered by the parent birds, the young ones usually make at once for the nearest flowing water, down which they float close to the bank, seeking cover, and availing themselves, with great sagacity, of every opportunity of shelter or concealment, in which they are assisted by their similarity in general colour to the soil and vegetation."

All of our Plovers resort to similar expedients for the protection of their young, but some species appear to develop a greater degree of intelligence than others. For example, the Oystercatcher, when in danger of molestation, has been known to bury its downy young in the soft sand, thus ensuring absolute concealment. Captain Mair assures me that he has witnessed this himself in the Bay of Plenty, and that, keeping his eye on the spot, he has actually scooped the young birds out with his hands.

Mr. Proctor Smith relates the following incident within his own experience at Otago:—"I have seen a drake of this species gallantly beat off a large Hawk from the duck I had wounded. On my reaching the scene of combat, the cunning drake feigned to be wounded, and limped away beyond gunshot, while the duck escaped by concealing herself in a large marsh close by."

In selecting a breeding-place it displays some fastidiousness: generally speaking, the nest, rudely formed of dry grass, and deeply lined with feathers and down, is placed among the reeds and tussocks near the water's edge; sometimes, however, it is situated on rising ground at a distance from its ordinary haunts; and in one instance, in the Upper Manawatu, I found a pair breeding in a small cavern in the face of a sandstone cliff overhanging the river*. The eggs vary in number from five to nine; and occasionally there are more, Mr. J. D. Enys having met with a nest containing eleven; and subsequently, in the Upper Waimakariri with a brood of thirteen young birds. The largest brood I have met with myself numbered eight. The eggs are of a regular ovoid form, measuring 2.6 inches in length by 1.9 in breadth, perfectly smooth on the surface, and of a yellowish cream-colour. Others in my son's collection are somewhat smaller, measuring 2.4 inches in length by 1.7 in breadth, and are of an almost invisible greenish-white tint.

In May 1866 Dr. Sclater reported to the Zoological Society that a pair of these birds had bred for the first time in the spring of the previous year in one of the small ponds in the Gardens. Five eggs were laid in one of the breeding-boxes about the second week in April and five young birds were hatched on the 15th May. One of the five died in the first downy plumage; and when about three months old the other four moulted into the first feather-dress, in which stage they were all alike, having the head and neck black. In the autumnal moult three of them threw off the black hood and assumed the characteristic white head of the female.

* A correspondent (Mr. W. E. Barker) adds the following particulars:—"Two men inform me they have seen young Paradise Ducks carried by their mother; one man saw the Duck fly down on a small lagoon, and as soon as she touched the water the young Ducks were swimming around her. In the other case two men were watching a Paradise Duck which was flying swiftly but pretty close to the surface of the water; she settled quietly, and to their astonishment immediately there appeared around her several young ones. In both instances it happened in open water, and none of the observers could see where the young Ducks had come from, except that the moment the parent touched the water the young appeared around her. I have heard of numerous instances of Paradise Ducks building their nests in trees. One was rather a peculiar case: the bird building its nest 25 feet up a black-pine tree, close alongside the road going from Mt. Peel to Mr. Acland's station."

DENDROCYGNA EYTONI.

(WHISTLING DUCK.)

Leptotarsis eytoni, Gould in Eyton's Monogr. Anat. p. 111 (1838).*Dendrocygna eytoni*, Gray, Cat. *Anseres* Brit. Mus. p. 132 (1844).

Ad. suprâ cinerascenti-brunneus, dorsi plumis paucis griseo lavatis, dorso postico vix pallidiore: supracaudalibus pallidè ochrascentibus saturatè brunneo latè terminatis: tectricibus alarum dorso concoloribus: remigibus brunneis, secundariis cinerascente lavatis: caudâ saturatè brunneâ, versus apicem pallidiore: pileo summo et collo postico sordidè ochrascentibus: facie laterali pallidiore, fulvescentiore: gutture albo: jugulo et pectore superiore ochrascentibus vix rufescente lavatis: pectore laterali clariùs rufescente nigro transfasciato: plumis hypochondriacis elongatis, lanceolatis, flavicanti-albis, utrinque nigro angustè limbatis: abdomine medio et subcaudalibus albicantibus his purioribus: subalaribus pallidè rufescentibus brunneo transnotatis: rostro pallidè brunneo, nigro marmorato: pedibus pallidè brunneis: iride saturatè brunneâ.

Adult. Head, neck, and fore part of breast yellowish brown, tinged with ochre-yellow on the crown and nape, and fading to greyish white on the throat; the whole of the back, rump, and upper surface of wings dark cinereous brown; the inferior scapulars and some of the interscapulars margined with greyish white; upper tail-coverts yellowish white, broadly tipped with blackish brown; upper sides of the body and lower part of the breast chestnut-brown, with numerous regular transverse bars of black, broad and conspicuous on the sides, but becoming narrower on the breast; the long acuminate feathers covering the flanks yellowish white, broadly and distinctly margined with black; abdomen and under tail-coverts pure white; quills and tail-feathers coppery brown. Irides dark brown; bill yellowish brown, largely blotched with black, the nail darker brown; legs and feet pale flesh-brown. Length 16 inches; wing, from flexure, 9.5; tail 3; bill, along the ridge 1.75, along the edge of lower mandible 1.75; tarsus 2; middle toe and claw 2.4; hind toe and claw .75.

THERE are two recorded instances of the recent occurrence of this species in New Zealand: the one at the Thames*, and the other at Kaitangata, in the provincial district of Otago †. It is therefore entitled to be admitted into our list of birds as a straggler from the Australian continent, on the north-west coast of which it is said to be extremely plentiful.

Captain Stokes has furnished the following account of its habits:—"When on the wing it makes a peculiar whistling sound that can be heard at a great distance, and which changes as it alights into a sort of chatter. It perches on trees in a very clumsy manner, swinging and pitching to and fro. On the north-west coast it is one of the commonest birds of the country. We subsequently often found it on the rivers of the north coast, but not within some miles of their mouths, or near their upper waters, from which it would appear that it inhabits certain marshes of the river, only we never found it in the swamps. The furthest south it was afterwards met with was on the Albert River, in the Gulf of Carpentaria, in lat. 18° S., which gives it a range of six and a half degrees of latitude over the northern part of the continent. Its nest never came under our notice, consequently we are not acquainted either with the size or colour of the eggs, neither did we see any young birds during the period of our observations, ranging from July to November."

Mr. White, of Adelaide, informed Mr. Gould that he once found the nest of this species in a hollow log, and, that according to the natives, the usual number of eggs is from eight to ten.

* Cat. Birds of N. Z. 1871, p. 77.

† Trans. N.-Z. Inst. 1871, vol. iv. p. 213.



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SHOVELLER OR SPOONBILL DUCK. (MALE AND FEMALE.)
RHYNCASPIS VARIEGATA.
(ONE-HALF NATURAL SIZE)

RHYNCHASPIS VARIEGATA.

(NEW-ZEALAND SHOVELLER.)

- Spatula rhynchotis*, Gray, in Dieff. Trav. ii. App. p. 198 (1843).
Spatula variegata, Gould, P. Z. S. 1856, p. 95.
Anas rhynchotis, Ellman, Zool. 1861, p. 7471.
Rhynchaspis variegata, Finsch, J. f. O. 1870, p. 358.
Spatula variegata, Buller, Birds of New Zealand, 1st ed. p. 252 (1873).

Native names.

Tete, Pateke, Putaitai, Kuruwhengi, Kuruwhengu, Papaunguungu, Kahoho, and Wetawetangu;
 "Spoon-bill Duck" of the colonists.

♂ *suprà saturatè brunneus, æneo nitens, pilei dorsique postici plumis obscurè fulvescente marginatis: loris et mento nigricanti-brunneis: lineâ faciali latâ ab oculo anteriore ductâ et infra gulam conjunctâ: facie reliquâ laterali et nuchâ sordidè cinereis virescente adumbratis: collo postico sordidè cinereo: interscapulii plumis brunneis, latè fulvescente marginatis: scapularibus albis, fulvescente lavatis, quibusdam omninò brunneis, reliquis æneo-brunneo fasciatis aut maculatis: tectricibus alarum pulchrè cyaneis, majoribus exterioribus albo terminatis, fasciam parvam exhibentibus: remigibus æneo-brunneis, minoribus extûs pulcherrimè viridibus, secundariis clongatis versus apicem medialiter albis, remigibus dorsalibus extûs pulchrè cyaneis: supracaudalibus exterioribus lætè viridibus: candâ brunneâ, rectricibus albido marginatis et terminatis: gutture imo et collo laterali albis, plumis plus minusve distinctè medialiter nigris: pectore superiore ochraseente, plumis ad basin albis et brunneo erescentim transfasciatis: corpore reliquo subtûs intensè ferrugineo, pectore superiore magis distinctè, pectore imo et abdomine obscuriùs nigro notatis: plagâ crissali utrinque albâ nigro paullulum vermiculatâ: subcaudalibus nigris, lateralibus et longioribus viridibus, quibusdam fulvo transfasciatis et terminatis: subalaribus albis, imis cinerascensibus, marginalibus fulvo maculatis et pallidè cyaneo lavatis: rostro nigro: pedibus aurantiacis: iride lætè flavâ.*

♀ *mari dissimilis, ubique sordidior: suprà brunneus, uropygio virescente, plumis omuibis latè fulvo marginatis: facie et collo lateralibus fulvescentibus brunneo striatis, gutture sordidè fulvescente: corpore reliquo subtûs ochraseenti-fulvo, plumis nigro medialiter notatis: tectricibus alarum cyaneis, angustè fulvo marginatis, majoribus albo terminatis: remigibus æneo-brunneis, secundariis latiùs fulvo marginatis.*

Adult male. Crown of the head and space surrounding the base of the bill brownish black, edged with grey; in front of each eye a broad crescent of white, meeting and widening on the chin, where it is more or less speckled with black; checks, sides, and anterior portion of hind neck dark grey, with beautiful green reflexions, mixed with steel-blue in certain lights; a streak down the fore neck, and a circular zone bounding the grey portion, fulvous white, largely spotted and mottled with brown; neck below and fore part of breast fulvous white, varied with brown, each feather being pure white at the base, then marked with a broad crescent of blackish brown, and tipped with fulvous; on the sides of the neck, towards the breast, the white is very conspicuous, but higher up, and on the hind neck, it diminishes, till at length the dark colour predominates, each feather being blackish brown, with a lunate spot of white in the centre, and tipped with fulvous. The plumage of the upper surface is very beautiful, the whole of the back and rump being blackish brown, edged with pale brown, and glossed with green, while the scapulars, which are of a peculiar elongated form, are marked and varied in a very effective manner; some of the inferior scapulars are white, spotted and

marked near the end with a crescent of shining green, while others are blackish brown, with irregular horse-shoe marks of fulvous and white; the succeeding outer ones are white, bordered on the outer webs and largely freckled with purplish blue; while the corresponding inner ones are glossy green, with a broad lanceolate stripe of white, shaded with brown down the centre. The longer scapulars are still more brilliant: the outermost one is glossy purplish blue on its outer web, marked on the inner with a lanceolate stripe of satiny white bordered outwardly by shining green; the next is glossy purplish blue, changing to shining green at the base, and margined on the inner web with white; the corresponding inner ones are dull velvet-green, with a broad conspicuous streak of white bordered with brown down the centre; the whole of the small wing-coverts are of a delicate lilac-blue, glossed with purple; the secondary coverts are pure white in their exposed portion, purplish black underneath: primaries dark brown, with paler shafts; secondaries velvet-brown, glossed with green, the outer ones rich shining green on their outer webs, the long inner ones marked down the shaft on their inner webs with a lanceolate streak of pale brown; the closed wing presenting a large bright speculum of satiny green, bordered anteriorly above with white: under surface of wings and axillary plumes pure white; along the edges of the wings and towards the flexure a few irregular markings of steel-brown; lower part of breast and all the underparts rich castaneous, very glossy, and obscurely blotched and spotted with black; sides of the body and flanks deep chestnut, with a series of elegant crescent-shaped bands, which become more conspicuous on the long plumage overlapping the thighs; on each side of the rump a broad patch of white, freckled and vermiculated with brown; tail greenish black; upper and lower coverts rich shining green, like the speculum. Irides bright or golden yellow; bill black; feet orange-yellow. Length 21 inches; extent of wings 31; wing, from flexure, 9.75; tail 4; bill, from base to extremity of upper mandible 2.5, width at the base .6, greatest anterior expansion 1.4, length along the edge of lower mandible 2.75; tarsus 1.5; middle toe and claw 2.1; greatest span of web 2.

Obs. The above description is taken from a fine specimen in my collection in the best condition of plumage; but it should be mentioned that examples of the adult male present much diversity in the details of their colouring. In some specimens the white crescents on the cheeks are broken or indistinct, and do not meet on the chin, while in others they are very broad and well defined, and at their junction spread over the throat in a long irregular patch. The extent of the white markings on the upper part of the breast and sides of the neck likewise varies considerably in different individuals, as also do the tints of the plumage generally. In birds that have not reached perfect maturity the dark crescents on the sides of the body are often wanting, being represented merely by a few transverse bars of dark brown. The size is likewise variable, an apparently fully adult male in my collection giving the following measurements:—Length 20 inches; extent of wings 27.5; wing, from flexure, 9.25.

Adult female. Crown of the head, nape, back of neck, and all the upper surface blackish brown, each feather broadly margined with fulvous; all the underparts pale ochre-brown, on the sides of the head and neck thickly studded with linear punctations, on the breast and sides largely blotched, and on the abdomen mottled with blackish brown; on closer examination it is seen that on the breast, where the dark colour predominates, each feather is blackish brown in the centre, with light margins; on the abdomen there is a basal and another, subterminal, spot of brown; and the long overlapping tibials are blackish brown, with a broad irregular V-shaped mark, and margined with fulvous; quills and wing-coverts as in the male, but with a duller speculum and a narrower border of white; scapulars velvet-brown, glossed with green, margined and tipped with fulvous, the shorter ones with a central letter-V mark of the same; under surface of wings and axillary plumes pure white, spotted with dusky brown towards the carpal flexure; tail and its upper coverts velvet-brown, with paler margins. Irides reddish brown, sometimes tinged with yellow; bill dark brown; feet pale brown. Length 18.5 inches; extent of wings 29; wing, from flexure, 9; tail 4; bill, from base to extremity of upper mandible 2.25, width at the base .5, greatest anterior expansion 1, length along the edge of lower mandible 2.5; tarsus 1.25; middle toe and claw 2.

Young male. Head and neck as in the adult female, except that the punctations on the sides are more conspicuous, owing to the ground-colour being lighter; plumage of the upper parts as in the adult female; but the light margins are narrower, the feathers more strongly glossed with velvet-green, and the scapulars marked with a central longitudinal streak of dull brown; lower sides of the neck and the whole of the breast blackish brown, each feather marked near the centre in a crescent form and broadly margined with pale

ochre-brown; underparts dark chestnut-brown, spotted and blotched with black, and marked on the sides with irregular lunate spots of blackish brown; long feathers overlapping the thighs dusky brown, crossed by broad undulating bands of fulvous; spot on each side of the rump white, with numerous crescents and freckles of brown; under tail-coverts pale brown, varied with darker, and vermiculated with black. Bill dark brown; feet pale brown.

Young female. Punctuation on the sides of the head and neck more distinct than in the adult; the whole of the upper surface blackish brown, only faintly glossed with green, the scapulars and upper tail-coverts narrowly margined with paler brown; breast, sides of the body, and the whole of the abdomen dull greyish brown, darker on the former, each feather margined with fulvous brown; under wing-coverts and axillary plumes pure white; the long feathers overlapping the thighs dark brown, with paler edges, but without any markings; upper wing-coverts dull purplish grey; the secondaries merely glossed with green, and their coverts tipped with white.

Nestling. The nestling is covered with thick down, with long produced filaments on the upper parts of the body. The downy feathers composing the tail are rather long and have broad spreading plumelets. The upper surface is bright olive-brown; a broad stripe over the eye, another less distinct immediately below the eye, a conspicuous spot on each side of the back behind the wings, and another on each side of the rump, fulvous yellow, shading into brownish olive on the sides of the body and on the breast. Bill brown, with a yellow nail.

Albino. There is a partial albino in the Canterbury Museum—a fine male specimen. Head and nape very highly glossed; a pure white patch crosses the lower fore neck, where the white line should come, then spreads upwards and entirely covers the shoulders and mantle, with only a broken dividing stripe of greyish brown, and is then continued on the scapulars, where it narrows down to a point; the white thigh-spot is exaggerated, and the lateral tail-feathers are margined with white; but in other respects the colours are as in the normal plumage.

THE first recorded specimens of this beautiful Duck were forwarded to Europe by Mr. Walter Mantell in 1856; and Mr. Gould was thus enabled to give a figure and description of the adult male in the Supplement to his 'Birds of Australia;' but the female was then unknown, and no account of the species in the different conditions of plumage has hitherto appeared. Having myself enjoyed favourable opportunities for studying the bird in its native haunts, and having obtained numerous specimens from various parts of the country, I am enabled to give a very complete descriptive history of it from youth to maturity.

The species appears to come very near to *Rhynchaspis rhynchotis* of the Australian continent; but the late Mr. Gould assured me that, although probably a hundred examples of the latter had passed through his hands, he had never seen one with so much white on the sides of the neck and breast as the New-Zealand bird exhibits, and that he had no doubt whatever about their being specifically distinct. Although more familiar with our own bird than the Australian, my examination and comparison of a great number of specimens has brought me to the same conclusion. Whether the two species present other differences of plumage in their earlier states cannot at present be determined, inasmuch as no sufficiently complete account of the Australian bird has ever yet been given. I carefully examined the specimens in the Australian Museum; but these were all in adult plumage; and Mr. Gould's own collection, being in Philadelphia, is, unfortunately, not readily accessible. The Australian specimens in the British Museum are all males in full plumage, and therefore do not assist the inquiry*.

* Since the above was written I have seen a young male of the Australian bird in the Natural-History Museum at Edinburgh (wrongly labelled *Spatula clypeata*): it very closely resembles our *Rhynchaspis variegata* in the same stage; but the breast is decidedly darker.

On the wing it is more active than the Grey Duck, but its flight is more irregular. The white thigh-spot in the male is very conspicuous when the bird is swimming.

It is by no means a common species in any part of New Zealand, while in the extreme northern portions of the North Island, so far as I am aware, it has never yet been met with. Up to the time of the recent volcanic eruption, it was comparatively plentiful at Rotomahana and at Waihi, but not in other parts of the Lake district, and I have never heard of more than one pair being seen at Rotorua. It is often met with on the Waikato river.

Mr. Cheeseman writes to me from Auckland :—“ Rare with us. I have heard of it on the lakes near the Kaipara heads ; Mr. Hobbs has sent me a specimen shot on the Whangamarino creek, near Mercer, and it is occasionally seen on Lakes Whangape and Waikare.”

It frequents the shallow lagoons near the sea-coast, and the quiet bush-creeks overshadowed by trees, usually associating in pairs, but sometimes forming parties of three or more. It flies with rapidity, and often at a considerable elevation, descending to the ground or water in a slanting manner, and with the wings bent in the form of a bow. When disturbed on the water it produces a low whistling note ; but it is far less suspicious than the common Grey Duck, and is easily approached and shot. It subsists on minute freshwater mollusks, aquatic insects, tender herbage, and the seeds of the toetoe and other plants ; on opening the stomachs of several I have found a mass of comminuted substances of a greenish colour, among which could be distinguished fragments of vegetable matter, seeds, the remains of insects, and numerous small pebbles of white chalcedony. It no doubt extracts much organic matter from the slimy mud and sand in the places it is accustomed to frequent, inasmuch as nature has furnished it with a very remarkable spoon-shaped bill, from which it derives its popular name. The surface of the upper mandible is smooth, but slightly furrowed from the nostrils outwardly, and in its anterior portion is marked with numerous punctures ; its nail is almond-shaped, and forms a strong overhanging lip with a hard cutting-edge ; in the lower mandible there is a corresponding development, resembling in shape the human finger-nail, which fits into the upper process, forming, so to speak, a strong terminal beak ; the lamellæ are highly developed in both mandibles, presenting a comb-like appearance ; and in addition to this the lower mandible has a rasped outer edge. The tongue is large, fleshy, and of a very peculiar shape ; it is fringed along its upper edges with a series of stiff, closely set bristles ; towards the extremity it is deeply concave, and is furnished anteriorly and on each side with a horny semitransparent membrane. In the female the bill is appreciably smaller than in the male, and the spoon-like expansion is not so highly developed.

Mr. Donald Potts found a nest of this species near the Rangitata river, and he has furnished the following account of it :—“ It was placed, not in a swamp, or even near water, but on the side of one of the low downs in Craig Phillips, sheltered by a couple of tufts of tussock, and a plant of Spaniard grass (*Aciphylla*) ; it was made of fine grass, in which was a fair amount of down, but not so much as is usually seen in the nest of the Grey Duck ; it was deep and rather narrow across the top (about 7 inches) ; the eggs were ten in number, ovoido-conical in form, very smooth and fine in texture, creamy white, with a slight greenish tint, and measuring in length 2 inches $1\frac{1}{2}$ line, with a breadth of 1 inch $5\frac{1}{2}$ lines.” This nest was found on November 7 ; but as some of the eggs which it contained were hatched out, under a hen, on November 18, it is inferred that the Shoveller commenced her nest about the first week of October. The young bird so hatched greatly resembled those of the Grey Duck (*Anas superciliosa*) in colour, but could be readily distinguished by the peculiar form of the bill*.

The number of eggs is no doubt variable ; for I have a note of the occurrence of a nest at Kaia-poi (Canterbury) containing no less than thirteen.

* Trans. N.-Z. Inst. 1870, vol. iii. p. 103.



NEW-ZEALAND SCAUP.
FULIGULA NOVE ZEALANDIÆ.

BLUE DUCK
HYMENOLEMUS MALACORNYCHUS.

(TWO-FIFTHS NATURAL SIZE)

FULIGULA NOVÆ ZEALANDIÆ.

(NEW-ZEALAND SCAUP.)

- New-Zealand Duck*, Lath. Gen. Syn. iii. pt. 2, p. 543 (1785).
Anas novæ seelandiæ, Gm. Syst. Nat. i. p. 541 (1788, ex Lath.).
Anas novæ zealandiæ, Lath. Ind. Orn. ii. p. 870 (1790).
Fuligula novæ zealandiæ, Steph. Gen. Zool. xii. p. 210 (1824).
Anas atricilla, Forster, Descr. Anim. p. 95 (1844).
Fulix novæ seelandiæ, Gray, Hand-l. of B. iii. p. 86 (1871).

Native names.

Papango, Tetepango, Matapouri, Titiporangi, and Raipo; "Black Teal" and "Widgeon" of the colonists.

♂ *ad.* cristatus: suprâ nigricans, vix virescente nitens, obsoletè et minutissimè fulvo vermiculatim punctulatus: tectricibus alarum paullò brunnescentioribus viridi nitentibus, haud vermiculatis: remigibus brunneis, extûs et versus apicem nigricantibus, seapis rufescentibus, minimis extûs ad basin albis, fasciam alarem conspicuam formantibus, seeundariis intimis sordidè virescente lavatis: caudâ nigricante: capite summo purpureo, faeiei et colli lateribus viridi nitentibus: pectore sordidè purpuraseenti-brunneo: corpore reliquo subtûs albicante, minutè brunneo transversvermiculato, hypochondriis rufescentibus: subcaudalibus nigricantibus: subalaribus albidis, exterioribus brunnescentibus: rostro cyancseenti-nigro: pedibus saturatè brunneis: iride lætè flavâ.

♀ magis brunnescens: subtûs pallidior: genis anticis et mento ipso plus minusve albidis.

Adult male. Head and neck black, glossed with purple and green; at the base of the lower mandible a spot of pure white; baek and upper surface of wings black strongly glossed with green, the scapulars and upper wing-coverts minutely pricked or dusted with white; breast brownish black, freckled and dusted with white in its lower portion; underparts fulvous white varied with brown; beyond the vent dark glossy brown; sides and long plumage overlapping the thighs dark castaneous brown, with a rich vinous gloss; primaries velvety brown, paler on their inner webs; secondaries velvety brown glossed with green, the outer ones white in their basal portion, presenting, in the elosed wing, a narrow white speculum; sometimes the white extends also to the primaries, forming a conspicuous alar bar; tail dark brown. Irides bright yellow; bill bluish black; feet dark brown. Total length 17 inches; extent of wings 26; wing, from flexure, 7·5; tail 2·5; bill, along the ridge 1·5, along the edge of lower mandible 1·9; tarsus 1·25; middle toe and claw 2·25.

Female. A broad band surrounding the base of the upper mandible white; head, neck, breast, and sides of the body blackish brown, changing to castaneous on the lower part of the breast and flanks; on the abdomen lighter brown mottled with fulvous white; darker brown in the ventral region; under tail-coverts blackish brown largely marked with white; shoulders dark brown margined with castaneous; back and upper surface of wings blackish brown, glossed with green; speculum as in the male; tail dark brown.

Obs. An example of the female in my collection differs from ordinary specimens in having no frontal band, the feathers surrounding the bill being light castaneous brown, but with a spot of white at the base of the

lower mandible, as in the drake; the whole of the underparts white mottled with brown, an effect produced by each individual feather being brown in its basal portion and white at the tip. Another differs in having all the upper parts stained with pale umber-brown.

There is a smaller form in the Canterbury Museum, several of which were obtained at Lake Ellesmere. It is of a more chestnut hue than ordinary specimens, but on a careful comparison I can find nothing to distinguish it from the present species.

Nestling. Has the down thickset; the upper parts pale clove-brown, the underparts white; a dusky collar round the neck; an obscure white spot on each wing, and a smaller one on each side of the rump; the hair-like filaments on the upper parts rather long, very fine in texture, and perfectly black; irides dark brown; bill reddish brown, the under mandible yellow, with a brownish tip; feet light brown, both these and the bill having a fine polish.

THIS small Duck has all the habits of a true Scaup, although it is generally called by other names. It is freely distributed over the country, frequenting most of the rivers and lagoons, but seldom being met with in the bush-creeks, and never on the open sea-shore. In winter it associates in large flocks, mingling freely with the Grey Duck and other species; but at other times it is more generally met with in pairs or in parties of four or five together. Its powers of flight are very feeble; it takes wing with reluctance, and never rises high in the air, generally only skimming the surface; but it is a very expert diver, and usually trusts to this faculty for eluding pursuit. Even when mortally wounded it will often escape by this means, and take refuge in the dense sedge, whence it can only be dislodged by a retriever well trained to the work.

It is interesting to watch a flock of these birds disporting together in the water—standing up on their feet and flapping their wings, splashing the water as they chase one another, swimming under the surface, and performing other playful antics, accompanying them with a soft sibilant note and, at intervals, a feeble *quack-quack*.

This Duck is semi-nocturnal in its habits, and when the eel-fishing parties light their fires on the banks of the stream this inquisitive bird swims close up to the spot, and manifests the utmost curiosity in what is going on.

It is naturally a fearless bird, and in waters where it is protected it becomes very tame. I have never heard of any attempt to domesticate it; but this might, I think, be very easily accomplished, and there can be no doubt that it would be a very acceptable addition to the English duck-ponds.

It builds its nest of grass and lines the interior with soft down from its own body, placing it among the swamp-vegetation in situations contiguous to its haunts, or in the centre of a "negro-head" just above the level of the water. The eggs vary in number from five to seven, or even more, and are of a rather large size for such a bird, measuring 2.5 inches in length by 1.75 in breadth; they are of a rich dark cream-colour.

Mr. Travers informs me that he found a nest of this species containing seven eggs as late as the 17th of March*. He took three away; and the remaining four were hatched out in due course. The old birds were remarkably tame, allowing him to approach within a few yards of them, then hustling off the nest and returning to it again as soon as he had withdrawn himself. He remarked this very curious fact—that, during incubation, the duck was accustomed on leaving the nest to conceal the eggs by a covering of duck-weed taken dripping wet from the lake. He observed this on several occasions, and on examining the eggs afterwards he found that although quite wet they were perfectly warm. As already mentioned, the eggs were duly hatched in spite of these repeated wettings.

* Since writing the above I have met with several instances of unhatched clutches as late as the last week in March.

NYROCA AUSTRALIS.

(WHITE-EYED DUCK.)

Nyroca australis, Gould in Eyton's Monogr. Anat. p. 160 (1838).*Aythya australis*, Gray, Hand-l. of B. iii. p. 86 (1871).*Native name.*—Karakahia.

Ad. suprâ brunneus, tectricibus alarum magis cinerascens: remigibus brunneis, extûs et versus apicem nigricantibus, minimis extûs albis nigro terminatis, fasciam alarem conspicuam formantibus: caudâ brunneâ: pileo et collo undique cum pectore superiore saturatè castaneis: corpore reliquo subtûs albo, hypochondriis cum abdomine imo et crisso sordidè castaneis: subcaudalibus et subalaribus albis: rostro nigro, versus apicem cinereo transfasciato: pedibus saturatè brunneis: iride albâ.

Adult male. The general plumage is dark chestnut-brown, paler on the flanks, and deepening to castaneous on the head and nape, where the feathers have a beautiful silky lustre; a broad band of brownish white crosses the underparts; the under tail-coverts, likewise, are white, and on the sides of the rump there are faint spots of greyish white, speckled with brown; quills dark brown; primaries in their middle portion, and the secondaries towards the base, pure white, forming together, in the opened wing, a conspicuous bar, and exhibiting in the closed wing a diagonal triangular spot. Irides white; bill black, with a band of bluish grey near the tip, not including the nail, however, which is black, prominent, and of the shape of the human finger-nail; feet dark leaden brown. Length 19 inches; wing, from flexure, 8; tail 3; bill, along the ridge 2, along the edge of lower mandible 2.25; tarsus 1.5; middle toe and claw 2.4; hind toe and claw .6.

Female. Rather smaller than the male and with the plumage duller.

Young male. Has the chestnut-brown plumage much lighter, and the feathers of the back margined with pale brown; it has also less gloss on the head, and the brownish white of the underparts mottled with brown.

THE existence of this well-known Australian Duck in our country was first ascertained by Captain Hutton, who, in 1869, sent me a specimen for determination. He furnished at the same time the following notes:—"I first noticed this bird about two years ago, on the Whangape lake, Lower Waikato, and since on the Waikare lake, where it was abundant in March 1868. On the lakes of the Lower Waikato it is not uncommon, but is so wary that, as yet, I have only been able to obtain three specimens, the first of which was kindly procured for me by Mr. A. M. Sheppard of Ahiruna. This bird is known to the natives both of Tarawera and Waikato by the name of Karakahia. Like all the Pochards, it frequents the lakes only, and is rarely, if ever, seen in the rivers and creeks."

It has since been found on Lake Ellesmere, in the South Island; and the Canterbury Museum contains several fine specimens from that locality.

In Australia and Tasmania it appears to be thinly distributed, frequenting quiet reaches of rivers (where the water runs slowly), bays and inlets of the sea, and freshwater lagoons.

Shortly before leaving the Colony I observed one, on the wing, in Te Aute Lake in the Hawke's Bay district.

HYMENOLÆMUS MALACORHYNCHUS.

(BLUE DUCK.)

Soft-billed Duck, Lath. Gen. Syn. iii. pt. 2, p. 522 (1785).*Anas malacorhynchus*, Gm. Syst. Nat. i. p. 526 (1788, ex Lath.).*Malacorhynchus forsterorum*, Wagler, Isis, 1832, p. 1235.*Hymenolaimus malacorhynchus*, Gray, Ann. Nat. Hist. 1843, vol. xi. p. 370.*Anas malacorhynchus*, Forster, Descr. Anim. p. 94 (1844).*Native name.*—Wio.

Ad. ubique clarè plumbeseens, pileo saturatiore, paullò brunnescente : interscapulii plumis medialiter nigricantibus, gutture vix brunnescente : pectoris superioris et lateralis plumis pallidè castaneo medialiter notatis : subalaribus et subcaudalibus pallidè castaneo lavatis : rostro albicanti-corneo, ad apicem nigro : pedibus saturatè brunneis : iride latè flavâ.

Adult male. General plumage pale slate-blue, darker on the upper parts ; the crown of the head and nape, as well as the scapulars and upper wing-coverts, olivaceous, with a slight metallic gloss ; the secondaries with a narrow exterior margin of velvety black ; the breast thickly spotted with dark chestnut, of which colour there are also a few obscure spots on the under tail-coverts. Irides bright yellow ; bill white horn-colour, the tip and the lateral membrane black ; legs and feet dark brown. Length 22 inches ; extent of wings 29 ; wing, from flexure, 9.5 ; tail 4.5 ; bill, along the ridge 2, along the edge of lower mandible 1.75 ; tarsus 2 ; middle toe and claw 2.75.

Obs. I have observed that, as a rule, the specimens from the South Island have the pectoral markings more numerous and conspicuous, and the velvety margins on the secondaries more distinct.

Female. Slightly smaller than the male, but similar in plumage, excepting that there is little or no metallic gloss on the head and upper surface, less chestnut on the breast, and more on the under tail-coverts.

Young. General plumage lighter, and the underparts whitish ; the green gloss which pervades the plumage of the upper parts in the adult almost entirely absent ; hind head and nape dull cinereous brown ; breast obscurely spotted with dusky and brown, sometimes barred with chestnut at the insertion of the wings ; under tail-coverts dull rufous brown.

Nestling. " Bill horn-colour, lightest on the lower mandible, unguis rosy at the point, membranous appendage slaty black, well overlapping the lower mandible, furnished with lamellæ along its basal half, which work against the finely serrated sides of the compressed basal half of the lower mandible ; body covered with thick down, longest on the back ; upper surface dull green, brightest on the back ; over and behind the eye irregular streaks of white ; under surface white ; wings and upper part of thighs brownish ; tail green above, at each side a patch of chestnut ; under surface of the tail chestnut ; legs and feet yellowish flesh-colour."

—Potts.

FAR up the mountain-gorge, where the foaming torrent, walled in on both sides, rushes impetuously over its shingle-bed, surging around the huge waterworn boulders that obstruct its course, and forming alternately shallow rapids and pools of deep water, there the Blue Duck is perfectly at home,

and its peculiar whistling or sibilant note may be easily distinguished amidst the noise of the rushing waters; indeed, as Mr. Travers has already suggested, the bird appears to have been specially endowed with this singular note in consequence of its frequenting such localities. A stray one is sometimes carried down during a freshet into the still reaches, or even to the very mouth of the stream, but it speedily works its way back again to its favourite mountain-haunts. It is a very tame or stupid bird, often remaining perfectly quiet on a projecting boulder till you approach within a few feet of it; then sidling off into the water it swims into the nearest rapid and allows itself to be hurried down by the current. It seldom dives, and takes wing only when fired at or closely pressed; but it swims with considerable rapidity, the head being carried low and inclined somewhat forward. It has the faculty of turning itself round in the water, and without losing ground, however rapid the stream, as though its body were worked on a pivot, a performance no doubt aided by the peculiar lengthened shape of its tail. It climbs the slippery face of the rocks with facility, assisting itself in the ascent by its wings, which are armed at the flexure with a hard protuberance or knob. As already mentioned, it utters a peculiar whistling note, from which it derives its native name.

It is somewhat nocturnal in its habits, and seems to become more active in its movements towards nightfall, when it sometimes makes a comparatively long flight in its passage from one mountain-torrent to another.

Some five-and-twenty years ago, in consequence of the death by drowning of the well-known botanist, Dr. Sinclair, I paid a visit with his nephew to the scene of this unfortunate accident, near the head-waters of the Rangitata, and in this secluded country I found these birds at that time so tame that I could almost catch them with my hand.

I believe this Duck is to be found at the sources of all mountain-streams, for although I never succeeded in getting a specimen at the far north, its name was perfectly familiar to the natives of that part of the country. Mr. Cheeseman, however, writes to me:—"I have never heard of a specimen being obtained north of Auckland. Mr. Spencer has shot it at the head of the Kaueranga, Thames. Mr. R. E. M. Campbell informs me that it is plentiful at the sources of the streams forming the Wairoa river (discharging into Tauranga harbour), and Mr. W. T. Firth has seen it in the Wairere stream, near Matamata. I have noticed it in the upper part of the Waitetuna."

Captain Mair informs me that the Wio is plentiful in all the mountain-streams in the Urewera country. When marching with the native contingent in pursuit of Te Kooti, as many as forty or fifty were sometimes caught in the course of a day, some being taken by hand, and others knocked over with sticks or stones, so very tame and stupid were they. A pair which he obtained as very young birds at Maunga-pohatu lived in the Kaiteriria camp for two years, associating freely with the domestic ducks, and fairly establishing themselves in the cooking-hut. They were particularly fond of potato and rice, and would readily take food from the hand. Ultimately they took to the lake and disappeared.

My son met with a pair at the Pokaiwhenua falls, in the Upper Waikato, in the early part of February. He observed that they ascended the rapids by diving under the surface. They were very tame, and by imitating the whistling note of the duck, or the whirring call of the drake, he was able to bring them within a few paces of where he stood. He met with this Duck again at Owahaoko, in the upper waters of the Rangitikei and Moawhango rivers.

In the month of March I met with a pair in the turbulent rapids of the Kurupapango, in the Hawke's Bay district. They appeared to fly well on being disturbed, and produced almost constantly a soft whistling cry, hardly distinguishable from that of the Harrier (*Circus gouldi*). Their ivory-white bills were a very conspicuous feature, even at a distance of a hundred yards.

Mr. Reischek met with it in the West-Coast sounds, and shot several at night far out on the water, thus proving that this Duck is sometimes marine in its habits. He likewise obtained

specimens in the Pirongia ranges, in the Upper Waikato, and Professor Hutton received it from the Mokau district.

Its range may therefore be described as pretty general, although it is not very plentiful in any part of the country. It does not, however, occur out of New Zealand, nor has it any known ally.

In the autumn of 1863, I visited the upper gorges of the Manawatu river, and obtained a fine series of specimens in the various states of plumage. The crops of those which I opened were filled with a species of "caddis-worm;" and on turning out the contents I discovered the nest of this insect, consisting of a tough integument shielded by small angular stones firmly glued over the entire surface. The caddis-worms were of different sizes (none, however, exceeding an inch in length), light brown in colour, with a dark head armed with three nuchal plates, and furnished with six legs. This insect appears to exist abundantly in all our shingle-rivers, and as we may assume that it forms the chief, if not the only food of the Blue Duck, the troublesome task of dislodging the animal from its stone-covered cell appears to explain at once the use of the fleshy membrane which fringes the bill of this bird. That it is, at any rate, an expert, may be inferred from the fact that out of several hundred specimens taken from the crops of my birds, only one of these insects was invested with the case or integument, this having probably been swallowed by accident among the rest.

Several pairs of this Duck were kept for some months in the Acclimatization Gardens at Christchurch and became perfectly tame. They were ultimately shipped home to the Zoological Society.

Mr. Potts states that on examining an embryo of three weeks he found the form of the bill well developed, showing on the sides, near the end of the upper mandible, the peculiar membranous appendage of a darker colour than the rest of the bill, but that he was unable to discern the presence of lamellæ; the caudal down was produced to a remarked degree. The same accurate observer has furnished the following interesting account of the breeding-habits of this species:—"Sometimes it is a burrower, and its nest may then be found in a hole in a bank. I have found it concealed from view by overhanging sprays of those various Alpine veronicas which sometimes make the mountain-creeks in the back country perfect gems of beauty. The nest, like that of other ducks, thickly lined with down, generally contains five eggs of a deep cream-colour, elliptical in form, measuring 2 inches $8\frac{1}{2}$ lines in length, with a diameter of 1 inch 9 lines. I have seen nests of eggs in October and November, but I have known the young brood to be swimming about by the end of September. We may therefore consider it one of our early breeders. As I have mentioned that it breeds in holes of banks, it is worth recording, perhaps, that I have found the nest in situations that did not afford any great amount of shelter; one such instance was met with on a spit in the Upper Ashburton river, about three miles below the glacier from which that river derives its source: the nest was placed in a solitary snow-grass tussock of moderate size, within two or three yards of the stream; it was made of grasses, the interior composed of cut grass like chaff, down, and a few feathers."

Mr. Hill, school inspector, was up in the Ruahine ranges (Hawke's Bay side) towards the end of November, and caught some young Wio there. They were very active in the water, diving persistently, and when hard pressed they took to the bank and endeavoured to secrete themselves.

The old birds remained on the water within sight and made no sign; but before the discovery of the young, they had tried to divert attention by feigning disability on the water, as if inviting pursuit.

There are several specimens of the egg of this bird in the Canterbury Museum. They are narrower or more elliptical in form than those of most other Ducks, measuring 2.6 inches in length by 1.7 in breadth; they are of a pale cream-colour, slightly tinged with green, and some of them much stained on the surface, probably from contact with the bird's feet during the process of incubation.

MERGUS AUSTRALIS.

(AUCKLAND-ISLAND MERGANSER.)

Mergus australis, Hombr. & Jacq. Ann. des Sci. Nat. 1841, p. 320.

Ad. brunneus, plumis dorsalibus cinereo lavatis: alis caudâque brunneis, tectricibus alarum majoribus nonnullis albo maculatis: secundariis quoque interioribus extus albo notatis: pileo cristato colloque undique rufescenti-brunneis, gutture clariore rufescente: pectore et abdomine medio albis, schistaceo variis, corporis lateribus saturatè schistaceis, plumis singulis cinereo limbatis: plumis axillaribus purè albis: rostro nigricanti-brunneo, versus apicem saturatiore: pedibus rufescenti-brunneis.

Adult male. Head, crest (which is two inches long), and the entire neck reddish brown, paler on the throat and lower part of fore neck; entire upper surface dull brownish black, the feathers more or less edged with slaty grey, especially on the shoulders; in place of the speculum there is a broad angular patch of pure white on the secondaries, and a few rounded spots of white on their coverts; breast and middle of abdomen fulvous white varied with grey; sides of body, flanks, and under tail-coverts dark slaty grey, with paler tips, and the long feathers overlapping the thighs slightly mottled with white; axillary plumes pure white; primaries and tail-feathers blackish brown. Bill reddish brown, changing to black on the culmen and at the tips of both mandibles; legs and feet reddish brown. Total length 20·5 inches; wing, from flexure, 7·5; tail 3·5; bill, along the ridge 2·3, along the edge of lower mandible 2·7; tarsus 1·5; middle toe and claw 2·75.

Female. Differs from the male in having no crest, and in the greyer colour of the head and neck.

OF this species, Baron von Hügel writes (*Ibis*, 1875, p. 392):—"I procured a pair of Mergansers with a few other skins in Invercargill, from a man who had just returned from a surveying trip to the Auckland Islands. He had not even turned the skin after taking it off the body; but as soon as I saw the back through the opening, and felt the beak through the skin of the neck, I knew what I had I have compared this *Mergus* with the original description of *Mergus australis* in the 'Voyage of the Astrolabe'; from it I judge that either the description is a very poor one, or my two birds must belong to a new species. But what agrees well, and made me first think they were an immature pair of birds, is the lower surface of the body, which, instead of being white, as in *M. serrator*, is of a dull slaty grey, variegated with white bands (the feathers being edged with white). The whole plumage is very dark, approaching black on the back, the crest well formed, and the size, I fancy, considerably smaller than the British Red-breasted Merganser (*M. serrator*). From the great difference in size and brightness of colouring in bill and feet, I deem them to be male and female; but in plumage there is little difference. The birds were killed the latter end of November last; and I procured them on the 27th of the following month."

My collection contains a single example (a female), and there is another, of the same sex, in the British Museum. My description of the adult male is taken from the Baron's specimen in the Cambridge University Museum, which was courteously lent to me by Professor Newton.

PODICEPS RUFPECTUS.

(NEW-ZEALAND DABCHICK.)

Podiceps (Polioccephalus) rufpectus, Gray, in Dieff. Trav. ii., App. p. 198 (1843).*Podiceps rufpectus*, Gray, Voy. Ereb. and Terror, Birds, p. 17, pl. 16 (1844).*Native names.*

Weweia, Totokipio, Taihoropi (Hokianga), and Taratimoho (Waikato).

Ad. suprâ nigricans vix viridi nitens, interseapulii plumis scapularibusque pallidè brunneo marginatis: pileo nuchâque sordidè chalybeo-nigris, facie et collo lateralibus brunneis, genis et pilei lateribus filamentis pilosis albidis ornatis: teetricibus alarum dorso concoloribus: remigibus cinerascenti-brunneis, secundariis conspicuè ad basin albis: gulâ brunneâ: jugulo et pectore anteriore rufescenti-brunneis: corpore reliquo subtùs argentescenti-albo, plus minusve brunneo lavato, corporis lateribus brunneis: rostro cyanescenti-cinereo, culmine nigricante: pedibus pallidè olivaseentibus, suprâ flavicante lavatis, unguibus cyanescentibus iride argentescenti-canâ.

Adult male. Crown and upper sides of the head black, with numerous white hair-like filaments having the appearance of pencilled markings; hind neck and all the upper parts dark olivaceous brown, margined on the back with paler brown, and glossed with green; lower sides of head, throat, and fore neck dusky brown; the cheeks pencilled with white, but not so thickly as on the crown; upper part of breast dark rufous brown; underparts of the body silvery white, stained on the sides and flanks with dusky brown; soft downy plumage at the lower extremities dull sooty brown. Irides silvery grey; bill bluish grey, shading to black on the ridge; feet light olive, marked with yellow on their upper surface, olive-brown below, the claws pale blue. Total length 12 inches; extent of wings 19; wing, from flexure, 5; bill, along the ridge 1, along the edge of lower mandible 1.25; tarsus 1.5; longest toe and claw 2.1; hind toe and claw .5.

Female. In the female the pencilled markings on the head are not quite so distinct, and the rufous colouring on the breast is somewhat paler; but in other respects the sexes are alike.

Young. The following is the description of a young Dabchick in a transitional condition—that is to say, after it has ceased to be a nestling, but before it is fully fledged. On close examination a beautiful development exhibits itself: the body is covered with real feathers; but they are largely fringed with fine down, for the purpose of imparting greater warmth, and the whole of the plumage is soft and silky to the touch. The head is handsomely marked, the crown being blackish brown varied with rufous; sides of the head and throat fulvous white traversed with marbled veins of dusky black; hind part of neck varied with dull rufous; upper surface and sides of the body dusky brown; breast pale buff; abdomen yellowish white; bill dark brown; feet olivaceous yellow, with grey margins.

First year's plumage. Head black, variegated on the crown with bright ferruginous, and marked on the sides with two broad streaks of buffy white, one commencing above the eye and passing round to the occiput, the other extending from the angle of the mouth down the side of the neck; throat and neck yellowish buff streaked with black; upper parts and sides of the body dusky black, indistinctly mottled with fulvous; breast and abdomen buffy white. Bill dark brown, crossed in the middle and near the tip with dull black bars.

Progress towards maturity. The head becomes dark brown, the facial streaks described above gradually disap-

pearing, but the lengthened plumes with the white pencilled markings still wanting, these being characteristic of the fully adult plumage; chin whitish grey; lower part of neck and crop dull rufous brown; the breast, sides, and flanks much suffused with brown, and the white of the underparts without any lustre; upper parts greyish brown without any gloss.

Varieties. The following is a description of an albino presented to the Canterbury Museum by Mr. Thomas Waters:—General plumage pure white, the sides of the head and throat shaded with brown; crown, nape, and hind neck streaked and spotted with black; fore neck and breast varied with pale rufous; shoulders, back, and scapulars with numerous scattered black feathers, giving the upper surface a pied appearance; wings dusky black, more or less varied with white; bill and feet of the normal colours. Another abnormally coloured specimen in the same collection has the whole of the underparts dark buff, deepening into dull chestnut-brown on the breast and fore neck; the crown of the head and nape black with steel-blue reflexions, and with abundant white hair-like plumes on the vertex and occipital region all round.

Remarks. In this species there is no true crest, but the plumage of the crown and upper sides of the head is very soft, and the shafts are produced into hair-like filaments, the whiteness of which renders them more conspicuous. In place of a tail there is a tuft of black silky feathers about an inch in length. The toes are armed with flattened claws, resembling the human finger-nail; and that of the middle toe has a pectinate edge. The tongue is large and fleshy, filling the cavity of the lower mandible; and the palate is armed with two convergent rows of papillæ directed backwards.

EVERY country appears to possess at least one species of Dabchick; and the group does not admit of very much variety. The form inhabiting New Zealand, although readily distinguishable as a species, is very similar to *Podiceps nestor* of Australia; and its habits of life are precisely the same. It is very abundant in all the freshwater lakes and lagoons of the South Island, and equally so in the southern portions of the North Island. Strange to say, however, although the physical conditions of the country are the same, till late years it was rarely or never met with in the far north; indeed the only instance that had come to my knowledge of its occurrence in the district north of Auckland before 1869 was that of a pair shot by Major Mair in the Hurupaki lake (Whangarei) as far back as 1852. One of these was sent to Europe; and the other is in my old type collection in the Colonial Museum. Its rarity in that part of the country may be inferred from the fact that the Ketenikau and other neighbouring natives had never seen or heard of the bird before. In 1869, however, Major Mair on visiting Rotokawan, a very pretty lake at the far north, between Te Awanui and Doubtless Bay, found the Dabchick comparatively plentiful there; of late years it appears to have become even more so. The following is another interesting fact in connection with its local range:—Mount Edgecumbe is a high volcanic cone on the banks of the Rangitaiki river some fifteen miles from the sea. At the bottom of the now extinct crater there is a small pool of water about thirty yards across. In this pool Captain G. Mair, in 1868, observed three of these Dabchicks disporting themselves. Some months after the same number was seen again in the same place by Dr. Nesbitt and Dr. Manley, and again by another party of visitors a considerable time afterwards. There are lagoons at the foot of the mountain frequented by these birds; but the singular fact is that those inhabiting the basin must have climbed up the cone, which is thickly covered on the outside with dense scrubby vegetation, and then into the crater, which contains a heavy forest-growth right down to the edge of the pool.

Like the other members of the group, it dives with amazing agility, and unless taken by surprise will effectually dodge the gun by disappearing under the surface at the first flash, and before the charge of shot has reached it. It is capable of remaining under water a considerable time; and when wounded, it hides by submerging the body and leaving only its bill and nostrils exposed. When hunting for its food, which consists of small mollusca, among the aquatic plants at the bottom of the

usually covered with pond-weed, during the absence of the birds from the nest, but afterwards the nest is seldom, if ever, left by both birds, except under unusual circumstances.

“The New-Zealand bird, as might be expected from its more recent contact with civilized man, is far less shy than the European one, and easily discriminates between persons who may be dangerous and those who are not. The children of my manager frequently visit the nests during the progress of incubation, and as they have never injured the nests or eggs, or interfered mischievously with the birds themselves, they are allowed to approach quite close without the latter thinking it necessary to quit the nest. When they do so, they glide into the water with a quick but stealthy motion, diving at once and rising at a considerable distance from the nest.

“The eggs do not appear to suffer from immersion in water, even for a considerable time; for, on one occasion three eggs which by some means had been thrown out of a nest, and had sunk below it to a depth of several feet, and which must have been immersed in the water for twenty-four hours at least, were replaced by one of the children, and the parent birds having sat upon them, two out of the three produced chicks

“When the water of the lake is rising in consequence of heavy rain the birds are seen busily engaged in procuring material and building up the nest so as to raise the eggs above the reach of the flood. This added material is afterwards spread out after the water subsides; but on some rare occasions the rise of the lake has been so great and so rapid that, the birds having been unable to meet it, the eggs have become addled. In such case no chicks have been produced that season.

“The young birds are of a greyish colour, striped with black, and, particularly when of a small size, are not easily detected whilst floating on the water. They take to the water immediately after being excluded from the egg, and both parents exhibit the greatest solicitude in tending and feeding them. When fatigued they are carried on the backs of the old birds, taking their station immediately behind the insertion of the wings, for which purpose the parent bird immerses itself deeper in the water.

“Mr. Yarrell, in his description of the Crested Grebe of Europe, says:—‘The parent birds are very careful of their young, taking them down with them for security under their wings when they dive.’ This is certainly not the case with the New-Zealand birds, for I have frequently observed the parents, both when engaged undisturbed in feeding the young ones, and when pursued by a boat for the express purpose of noting their habits. In no instance did I see the young ones being taken down by the parent when diving. It dives itself with great ease, and travels a considerable distance under water. From its inconspicuous colour and small size it easily eludes observation, more particularly if there be the slightest ripple on the water; and this is quite sufficient protection for it. When engaged in feeding their young, each parent bird dives in succession, the young ones remaining on the surface, but with the body fully immersed, so as to leave nothing but the small head and neck visible. The habit of carrying the young on their backs and of diving in order to shake them off when the young birds exhibit a determined disinclination to leave their snug station, has probably led to the error referred to.”

According to my experience the eggs of this species are very elliptical in form, measuring 2.25 inches in length by 1.45 in breadth; a small example in my son's collection from Rotoiti in the South Island measures 2 inches in length by 1.4 in breadth. They are usually three in number, but sometimes more. When first deposited in the nest they are of a greenish-white colour, with a chalky surface, but they rapidly become discoloured and smudged, owing probably to some staining quality in the materials composing the nest. I have seen one so deeply discoloured as to be of a uniform reddish-brown colour. Whatever the cause may be, they are always found thickly smeared and stained with yellowish brown, and often presenting a very dirty appearance.

EUDYPTES PACHYRHYNCHUS.

(CRESTED PENGUIN.)

- Eudyptes pachyrhynchus*, Gray, Voy. Ereb. and Terr., Birds, p. 17 (1844).
Chrysocoma pachyrhynchus, Bonap. C. R. xliii. p. 775 (1856).
Eudyptes pachyrhyncha, Gray, Hand-l. of B. iii. p. 98 (1871).
Eudyptes chrysocomus, Buller, Birds of New Zealand, 1st ed. p. 344 (1873).
Eudyptes chrysocoma, Sharpe, App. Voy. Ereb. and Terr. p. 35 (1875).
Eudyptes pachyrhynchus, Buller, Man. Birds of N. Z. p. 100 (1882).

Native names.—Tawaki and Pokotiwha.

Ad. suprâ nigricans, sordidè eyanescente nitens : subtùs albus, pectore laterali dorso eoneolore : alâ quoque dorso eoneolore, secundariis angustè albido terminatis : supereilio distincto a naribus dueto et pileum marginante, posticè cristato, dilntè sulphureo : facie laterali gulâque nigricantibus vix brunucseenti-albo variis : rostro rubescenti-brunneo ad basin nigricante : pedibus flavicanti-albidis, subtùs nigricanti-brunneis : iride flavicanti-brunneâ.

Adult. Crown, sides of the head, throat, and hind part of neck black ; the rest of the upper surface bluish black, each feather having a narrow central streak of pale blue ; from the base of the upper mandible, on each side, a broad line of pale golden yellow passes over the eyes, and is continued beyond in a crest of fine pointed feathers, extending nearly two inches beyond the head ; the black feathers of the crown between these side crests are lengthened, acuminate, and slightly rigid ; upper surface of flippers glossy bluish black, the feathers, which are lanceolate and closely imbricated, being margined and tipped with pale blue ; along the inner edges a narrow band of white. The underparts of the body are silvery white, contrasting sharply on the sides with the dark plumage of the upper surface, and tapering upwards on the fore neck to a point about three inches below the angle of the lower jaw ; under surface of flippers bluish grey, with the central portion outwardly, and a continuation towards the root, silvery white ; tail-feathers long, narrow, very rigid, and perfectly black ; the coverts greyish white, with black shafts, and tipped with blue. Irides brick-red ; bill from rich nut-brown to pale orange-brown, darker on the lower mandible, blackish at the base, and horn-coloured at the tip ; feet pinkish or yellowish white, with darker webs ; claws dark brown, with black points, the soles blackish brown. Total length 27 inches ; length of flipper 8·5 ; tail 4 ; bill, along the ridge 2·75, along the edge of lower mandible 2·75 ; tarsus 1·5 ; middle toe and claw 3·5 ; hind toe and claw ·75.

Young. Has the crests very inconspicuous, the line over the eye being narrow, and the posterior feathers scarcely produced beyond the head ; the crown and nape dull black, and the sides of the hind neck below strongly tinged with brown ; the peculiar sharply defined black throat which distinguishes the adult bird is absent, the chin and the sides of the face being mottled with dusky black on a lighter ground, shading away insensibly on the throat ; the plumage of the upper parts duller than in the fully matured bird. Bill dark brown.

More advanced state. Crown of the head bluish black, the feathers somewhat lengthened, with polished shafts ; from the base of the mandible, in a line with the nostrils, a streak of pale yellow with points of black passes over the eyes, widening backwards and extending to the hind head, where the feathers are lengthened, but scarcely to a degree deserving the name of a crest ; the throat and for nearly three inches down the neck sooty black, freckled and mottled with fulvous white ; the whole of the upper surface dull bluish black, the centre of each feather having a touch of colour ; along the lower edge of flippers a narrow line of white ; tail-feathers sooty black ; the whole of the underparts pure white. Bill clear reddish brown ; feet flesh-white ; the claws black.

but there is a tinge of rufous on the dark plumage of the sides immediately under the wings; the primaries are of a uniform blackish brown, with darker shafts; the secondaries, tertials, and a broad band on the anterior edge of the wings pure white; primary and secondary coverts blackish brown; lining of wings and axillary plumes pure white.

Younger state. No appearance whatever of crest or ruff, but the position of the future growth is indicated by a pale wash of rufous on the sides of the neck.

Obs. The above descriptions are taken from fine examples of this bird in the Colonial Museum; but it should be mentioned that individuals exhibit slight differences of plumage, especially in the amount of chestnut and rufous colouring. A fine adult male in my collection has the sides of the neck and shoulders, as well as the sides of the body and thighs, pale rufous, whilst the rest of the underparts are silky white.

Nestling. Covered with soft down; the head, neck, and upper parts generally, pale buff, with numerous longitudinal stripes of black, which are broadest on the back; the underparts yellowish white. Bill yellow, crossed at the base and in the middle with black, changing to white near the tips of both mandibles; legs and feet light olive-brown. (Obtained by Sir James Hector on Lake Whakatipu.)

A down-covered chick killed by Mr. Cheeseman (out of a brood of seven) on Rotoiti lake, South Island, in January 1881, is preserved in the Auckland Museum:—Upper parts buffy white with longitudinal stripes of brownish black running the whole length of the body; on the hind neck these stripes become darker, but narrower, and somewhat broken or irregular; on the sides of the crown they spread out into broad patches, meeting again acuminately at the base of the upper mandible, and enclosing a small triangular spot of bare skin; on the wings a narrow irregular stripe of black; throat, fore neck, and underparts white. Bill blackish brown, with a white horny tip; feet apparently greenish black, but faded in the dried specimen.

More advanced stage. Little or no occipital crest, but a perceptible ruff which is white clouded with chestnut-red; throat marked with interrupted streaks of brown. (From a specimen in my own collection.)

Progressive state. An immature bird in the Otago Museum has the occipital crests only about half an inch long; there is scarcely any ruff, and what there is of it is white with faint reddish blotches; and in the wings, which are open, the white on the secondaries is very distinct.

THE species described above is no doubt identical with that inhabiting Australia, and named *Podiceps australis* by Mr. Gould. On a careful comparison of specimens, however, I can see no reason for separating it from the well-known *Podiceps cristatus* of Europe; and I therefore agree with Dr. Finsch in the adoption of that name.

The specimen on which I founded my original description of *Podiceps hectori* was in an imperfect condition, and the supposed absence of white on the secondaries proved afterwards to be merely accidental; but, as I have already pointed out in a published paper*, there appears to be a distinct race inhabiting some of the South-Island lakes, and distinguished by the dark colour of the underparts. Sir James Hector considers this a good species, and states that he found it on the Whakatipu lake, accompanied by young, and exhibiting the double crest and red ruff which characterize the fully adult bird; while in brackish lakes by the coast, where old and young birds, as well as eggs, were obtained, none but white-breasted ones were ever shot.

On a comparison of the two forms, I find that the Whakatipu bird (of which there are several examples) is rather larger than ordinary specimens of *P. cristatus*, has the upper parts perfectly black, and the fore neck and underparts greyish brown tinged with rufous; the lores, moreover, are black, the rufous white commencing at the angle of the mouth and passing under the eyes to the ear-coverts. It will, of course, be necessary to obtain a larger series of specimens, establishing the

* Trans. N.-Z. Inst. 1869, vol. ii. p. 388.

constancy of these characters, before the question can be set at rest; but if the dark-breasted bird should hereafter prove to be a distinct species, I must claim from naturalists its recognition as the true *Podiceps hectori*.

The Crested Grebe is, generally speaking, a rare bird in both Islands, but is more commonly met with in the southern portions of the Otago country than elsewhere. The late Mr. Wilmer informed me that during an expedition with Major Goring to Waikareiti, in the spring of 1879, he shot seven or eight of them on that lake, and he sent me the skin of one he had preserved. This is a curious fact in the distribution of this bird, seeing that Waikareiti is at a much higher elevation than Waikaremoana, where this Grebe has never yet been found. Like the Dabchick its local distribution is quite unaccountable. I have already mentioned (on p. 281) a singular instance in the case of the latter species. Hurupaki is one of those deep, wood-fringed lakelets which lend such a charm to the bush-scenery of the North Island. I have before me now a large photograph of this picturesque spot, displaying through a gap in the forest a placid sheet of water, hemmed in to the very edge by a growth of underwood in rank profusion and reflecting on its mirror-like surface the sylvan beauty that surrounds it—a view of transcendent beauty and not to be excelled by any lake-scenery of its kind in the world. In this sequestered place, surrounded by woods and far removed from any other sheet of water, a solitary pair of Dabchicks had taken up their abode; and, as with the fly in the piece of amber, the marvel was how they ever got there. In the case of strong-winged birds no surprise is occasioned by the occurrence of stragglers in places remote from their ordinary range; but it is quite impossible to account for the appearance in such a locality of this little Grebe, which is altogether incapable of any prolonged flight, and is, moreover, from the position of its legs, very helpless on land.

Unlike the Dabchick, which is more or less gregarious, the Crested Grebe seems to love seclusion, being generally met with singly or in pairs. It is a striking object on the water and swims with much grace; and when two of them are associated or feeding together they have a pretty habit of meeting each other after each dive, and “touching bills” as if in token of their mutual confidence.

Mr. Travers has so well described the habits of the Crested Grebe from personal observation, that I cannot do better than transcribe a portion of his paper, merely adding that, although I have had less favourable opportunities of studying the bird in its natural haunts, I can myself verify much of what he has written:—

“*Podiceps cristatus* is found at all seasons of the year upon Lake Guyon, a small lake in the Nelson Province, lying close under the Spencer mountain-range, and upon the borders of which the station buildings connected with a run occupied by me are situated. The water of this lake is generally very warm, and even in severe seasons has never been frozen over. To this fact I attribute the circumstance that some of these birds are to be found upon it throughout the year. There are several apparently permanent nests on the borders of the lake, which have been occupied by pairs of birds for many years in succession, from which I am led to infer that, as in the case of some of the Anatidæ, these birds pair for life. These nests are built amongst the twiggy branches of trees which have fallen from the banks of the lake, and now lie half floating in its waters, and are formed of irregularly laid masses of various species of pond-weeds, chiefly *Potamogeton*, found growing in the lake, and which the birds obtain by diving. They are but little raised above the surface of the water; for, in consequence of the position and structure of its feet, and the general form of its body, the Grebe is unable to raise itself upon the former unless the body be in great measure supported by water.

“Both the male and female Grebe assist in the labour of incubation, although I believe that the chief part of this task devolves upon the female, and that she is only relieved by her partner for the purpose of enabling her to feed. Before the actual work of incubation commences, the eggs are

lagoon, it usually remains under about 20 seconds, and then rises to the surface for an interval of 7 seconds, repeating these actions with the utmost regularity, as I have observed by timing them with my stop-watch. It flies with difficulty and only for a short distance, skimming the surface with a very laboured flapping of its little wings. On the water it usually swims low, and with a rapid jerking movement of the head. The form of its body and the laminated structure of its feet are admirably adapted to its subaqueous performances; and in clear water I have watched the bird gliding easily along the gravelly bottom, with the neck stretched forward and moved from side to side, and the wings partially open, the feet being used as a means of progression. It utters, at intervals, a peculiar sibilant note, from which it derives its native name of *Weweia*. Although generally found in pairs it is gregarious also, and I have counted as many as twenty consorting together on a small sheet of water at Manawatu. Its natural element is the water, which it seldom quits; but when resting, as it sometimes does, on a bank, at the water's edge, it assumes a very upright position with the neck stretched up to its full length.

It is naturally a very curious or inquisitive bird, and if an object is kept moving within sight, or something is done to arrest attention, the Dabchicks, after swimming about for a time, will approach nearer and nearer, jerking the head forward in the manner already described as they advance. Sometimes they swim so low that the back is scarcely visible above the water; at other times the whole body seems to rise above the surface. They indulge, too, in a habit of standing bolt upright in the water and flapping their wings, apparently for the purpose of shaking the water out of them. Recently, three were shot in a deep freshwater lake not far from Hokianga Point; these had their stomachs crammed with a species of leech, about an inch in length and of a pale yellow colour.

Captain Mair states that this bird is very plentiful in the Hot Springs district, and especially in Kaiteriria and Rotorua lakes. On its habits he has furnished me with the following note:—"In 1869 I was riding along the shores of Tikitapu lake with H.R.H. the Duke of Edinburgh, when our attention was arrested by a pair of Dabchicks with their young. We drew up and watched them for some time. Taking alarm at our approach, the female took her five young ones on her back and made several dives with them, coming up after each submersion at distances of ten yards or more. The young birds appeared to nestle under the feathers of the parent's back, and to hold on with their bills. In this manner they continued to dive till they were entirely out of sight, and H.R.H. appeared to be much interested in this singular performance."

The Dabchick is very properly included in the schedule to 'The Wild Birds Protection Act,' and the wanton killing of the bird is punishable by fine. Notwithstanding this, however, a few find their way into the market; and it was the sight of one of these birds hanging in a poulterer's shop at Wellington that drew from the vigorous pen of Mr. Edward Wakefield, in the 'Evening Press,' a very pathetic appeal concluding thus:—"Anyone who deliberately slaughters a Dabchick, must surely be of that ruthless quality which would have achieved for him a distinguished position in the service of Herod the King. But to all sportsmen, and to all colonists, whether sportsmen or not, we would say, Spare the poor little, defenceless, inoffensive Dabchicks! Have the manliness to deny yourself a moment's selfish excitement, for the sake of helping to prolong the existence of any of those few races of God's dear creatures which we found in possession of New Zealand when first we intruded ourselves upon its solitudes."

The nest of this species is a large and somewhat clumsy structure, formed of the roots and leaves of various aquatic plants, but always well concealed. The eggs of the Dabchick, usually two in number, are of a perfect elliptical form, and greenish white when first laid, with a granulate surface, and often presenting round warty excrescences. Examples vary slightly as to size; but an average specimen measures 1.7 inch in length by 1 in breadth. After long incubation the surface of the shell becomes smeared and stained to a yellowish-brown colour.

PODICEPS CRISTATUS.

(GREAT CRESTED GREBE.)

- Colymbus cristatus*, Linn. Syst. Nat. i. p. 222 (1766).
Colymbus urinator, Linn. Syst. Nat. i. p. 223 (1766).
Podiceps cristatus, Lath. Ind. Orn. ii. p. 780 (1790).
Colymbus cornutus, Pall. Zoogr. Rosso-Asiat. ii. p. 353 (1811).
Lophaithya cristata, Kaup, Natürl. Syst. p. 72 (1829).
Podiceps mitratus, Brehm, Vög. Deutschl. p. 953 (1831).
Podiceps patagiatus, Brehm, Vög. Deutschl. p. 955 (1831).
Podiceps longirostris, Bonap. Faun. Ital., Ucc. p. 18 (1832-41).
Podiceps australis, Gould, P. Z. S. 1844, p. 135.
Podiceps hectori (var.), Buller, Essay on N.-Z. Orn. p. 19 (1865).

Native name.—Pateketeke.

Ad. supra nigricans, remigibus brunneis, minimis albis : pilei plumis utrinque elongatis, fascias duas erectas formantibus : loris et lineâ supereiliari angustâ cum facie laterali gulâque albis : regione oculari, collo laterali gutturoque cristatis, ferrugineis, nigro marginatis : corpore subtus argentescenti-albo, lateribus brunneis : rostro cinerascens-brunneo, versus apicem pallidior : pedibus olivascens-nigris : iride coccineâ.

Adult male. Crown, hind neck, and general upper surface, as well as the sides of the body, blackish brown, slightly glossed with green ; a streak in front of the eyes, the throat, sides of the head and lower part of fore neck fulvous white ; underparts of the body silvery white, stained deeply on the sides of the breast and slightly in front with chestnut. The feathers of the nape are produced in soft filamentous plumes, forming two black occipital crests, nearly 2 inches in length ; the corresponding plumage of the neck is developed in a similar manner, forming a thick ruff of a beautiful silky texture, bright chestnut in its anterior portion and then jet-black ; on the neck below there is a wash of the same bright chestnut. The primary quills are greyish brown, with black shafts, the webs stained more or less and tipped with pale rufous ; secondaries pure white, excepting the outermost ones, which are black on their exposed webs and are largely marked with rufous ; bastard quills pure white ; outer wing-coverts greyish brown ; secondary coverts much produced and almost black ; edges and lining of wings white, with rufous stains. Irides red ; bill dark brown, yellowish along the lower edge and at the tip of the lower mandible ; legs and feet olivaceous black tinged with green on the edges and near the joints ; claws greenish black, with a pectinate edge of transparent horn-colour. Total length 22 inches ; wing, from flexure, 7·5 ; bill, along the ridge 2·4, along the edge of lower mandible 3 ; tarsus 2·75 ; longest toe and claw 3·25.

Female. Similar to the male in plumage, and adorned in the same manner with ruff and crest, but having the breast more or less stained with pale rufous and brown.

Young. Crown of the head and nape black, with dull steel reflexions ; the feathers of the forehead and those immediately over the eyes tipped with white ; hind part of neck, back, and general upper surface blackish brown ; throat, fore neck, breast, and underparts of the body silvery white. The occipital feathers on both sides are lengthened, forming an inconspicuous crest : there is no ruff ; but the plumage of that portion of the neck is somewhat longer than on the surrounding parts, and is lightly washed with chestnut and marked on the sides with black : there is an absence of the chestnut colouring on the breast, which is pure white ;

Nestling. Head and throat, hind neck and entire upper surface covered with short, thick, woolly down of a sooty brown colour; the rest of the body covered with yellowish-white down, but so thinly that the white skin is visible underneath. From the crop to the abdomen, down the centre, there is a perfectly bare strip; the flippers also are bare. Bill brownish black, changing to dull white at the tip; feet flesh-white.

Obs. A specimen caught in the castaway wreck of a brig near the Wellington heads, in 1856, was brought to me in a moulting condition, and presented a very singular appearance—the plumage peeling off as it were in large patches, and disclosing to view a short undergrowth of new feathers: the whole process was completed in two or three days.

The eyes are not as depicted in my former edition. They are of a dark brick-red, with a very small pupil, which in the strong sunlight becomes reduced to a mere black point, situated above the middle line. The eye has a very peculiar appearance, being more like a flat button than a bird's eye, and it is large for the size of the Penguin. It reminds one in its general character of a seal's eye, and on watching the bird in the sunlight it will be seen that the nictitating membrane, which is extremely thin and transparent, is being continually drawn over it, having the appearance, owing to its delicacy, of a mere line crossing the vision, there being no movement whatever of the eyelids. The feet are of a pinky flesh-colour, not dark as in my former Plate, which was drawn from a preserved specimen. The bill is of a uniform rich pale orange-brown, not dark brown as in the old figure. I examined on one occasion six or seven of these birds on board the 'Hinemoa,' and all had bills of the same colour. Both sexes are crested, and I can distinguish no difference in the plumage.

THIS fine Penguin is more or less distributed, in suitable localities, all around our coast-line. In the North Island it is a comparatively rare bird, but it becomes more numerous as we proceed south; and in the West Coast sounds large colonies of them are to be found breeding together among the rocks or in the caverns scooped out of the cliffs by the erosive action of the sea. Reischek found as many as twenty-four pairs associated together in Supper Cove, and nearly as many on Cooper's Island. In the vicinity of these breeding-places the birds may often be seen swimming in companies, cleaving the water like a school of small porpoises. On the Snares, he "saw thousands of them jumping over the rocks, and fishing in the sea to feed their young ones, which were nearly full-grown." This was about the last week in January.

On Bounty Island they congregate in large numbers during the breeding-season, sharing the domain with *Diomedea melanophrys* and other sea-birds having a community of interest. (See wood-cut on page 293.)

Major Mair informs me that he saw a perfectly tame one, which had been captured by the natives half a mile up the Opotiki river, in 1868. It is not often that this Penguin wanders so far up the coast, although I have a record of one taken at the mouth of the Waiotahi, five miles further north.

It is occasionally found nesting on the Island of Kapiti, but not in communities.

The eggs, as a rule, are of a very rounded form, measuring 2.9 inches in length by 2.3 in breadth. The largest and most rounded specimen in my son's collection gives the above measurements; the smallest, which is more ovoido-conical in form, measures 2.75 inches by 2.05; and one of intermediate size 2.9 inches by 2.1. I have seen one, however, of a broadly elliptical form, measuring 2.9 by 1.9, and with its smaller pole much flattened. The colour of the shell when fresh is a pale bluish green, the tint being brighter in some than in others, but this is in a great measure due to the presence in some of a chalky film of yellowish white; after being incubated they become much soiled and stained. In some specimens the surface exhibits minute pimples or chalky excrescences.

EUDYPTES SCLATERI.

(SCLATER'S PENGUIN.)

Eudyptes chrysocome, Sclater, Zool. Soc. Register (1888, nec Forst.).

Ad. similis *E. pachyrhyncho*, sed major et fasciâ superciliari a rictu oris minimè a basi narium oriente : alis subtùs magis extensè nigricantibus.

Adult. Similar in plumage to *Eudyptes pachyrhynchus*, but appreciably larger in all its dimensions. It has a similar superciliary streak of golden yellow which develops into an erectile crest on each side of the head ; but this streak, instead of commencing in a line with the nostrils as in the former species, springs from the base of the upper mandible immediately above the angle of the mouth. The posterior edge of the flippers in its middle portion has a border of white nearly $\cdot 25$ of an inch in width running off on both sides to a point ; the under surface in its basal and apical portions with a broad connecting band along the anterior edge, jet-black. Bill uniform reddish brown, with a line of white along the base of the lower mandible, which is more conspicuous in the live bird than in the dried specimen, being somewhat concealed in the latter by the overlapping feathers ; feet yellowish white ; claws reddish brown, changing to black at the tips. Total length 28 inches ; length of flipper 8 ; tail 3.5 ; bill, along the ridge 2.4, along the edge of lower mandible 2.75 ; tarsus 1.25 ; middle toe and claw 3.6.

IN April last I received a note from Dr. Sclater calling my attention to two Penguins recently added to the menagerie of the Zoological Society at Regent's Park, and observing :—"The bird just received from the Aucklands seems quite distinct from the New-Zealand species." I accordingly repaired to the "Fish-house," and the inspection which I then made satisfied me that, notwithstanding a general outward resemblance between the two birds, there was considerable difference both as to size and in the details of the plumage.

The Auckland-Island bird having since died it was courteously forwarded to me by Mr. Bartlett, the Superintendent of the Gardens, for more critical examination. I received, about the same time, from Sir James Hector, a Penguin preserved in spirits which proves to be a similar bird ; and after a careful comparison of these specimens with the very complete series of *Eudyptes pachyrhynchus* in my own collection, I have no hesitation in pronouncing the Auckland-Island bird a new species, distinguishable from the former by its larger size, by the peculiar character of its superciliary streak, and by the different coloration of its flippers.

It becomes necessary, therefore, to select a distinguishing name for this species, and I have much pleasure in connecting with it that of the accomplished Secretary of the Zoological Society of London, Dr. P. L. Sclater, F.R.S., who has long taken an interest in our local zoology, as was recognized by his election some years ago as Honorary Member of the New-Zealand Institute.

EUDYPTES CHRYSOCOME.

(TUFTED PENGUIN.)

- Aptenodytes chrysocome*, Forst. Comm. Soc. Reg. Sc. Gott. iii. p. 135, pl. 1 (1781).
Chrysocoma saltator, Steph. Gen. Zool. xiii. p. 58, pl. 8 (1826).
Catarractes chrysocome, Brandt, Bull. Ac. Pét. ii. p. 314 (1837).
Eudyptes chrysocome, Gould, B. of Austr. fol. vii. pl. 83 (1848).
Eudyptes nigrivestis, Gould, P. Z. S. 1860, p. 418*.
Eudyptes chrysocome, Scl. P. Z. S. 1860, p. 390.
Spheniscus chrysocome, Schl. Mus. Pays-Bas, *Urinat.* p. 6 (1866).
Eudyptes nigriventris, Gray, Hand-l. of B. iii. p. 98 (1871, err.).
Eudyptes saltator, Sharpe, Zool. Kerg., Phil. Trans. R. S. vol. 168. p. 158 (1879).
Eudyptes filholi, Hutton, Proc. Linn. Soc. N. S. W. vol. iii. p. 334 (1879).

Ad. suprâ sordidè cinereus, pilei plumis rigidis, elongatis, cristam frontalem exhibentibus, verticis lateralis plumis quoque elongatis, eum fasciâ latâ supereiliari cristam duplicem formantibus : facie laterali cum colli lateribus gulâque totâ brunnescenti-cinereis : corpore reliquo purè albo : pectore laterali, hypochondriis, imis et tibiis posticè cinereis : alâ suprâ saturatè cinereâ, margine alari summâ vix albidâ, sceundariis etiam albo terminatis : caudâ rigidâ dorso eonecolore : alâ subtùs albâ, ad basin et juxta marginem alarum summarum cinereâ ; remigibus primariis versus apicem cinereo-nigricantibus : rostro aurantiaco ; pedibus albicantibus ; iride eocineâ.

Adult. Similar in plumage to *Eudyptes pachyrhynchus*, but with a narrower bill and much more abundant crest ; besides which the throat is dark slaty instead of black, and the flippers have a more conspicuous white outer margin ; a streak of golden yellow commencing at the base of the upper mandible, in a line with the nostrils, passes over the eyes and spreads out in a tuft behind to the length of three inches or more, the plumes being narrow and of soft texture ; the feathers on the sides of the head are also lengthened and mingle with the yellow plumes, forming together a fine erectile crest. Total length 26.5 inches ; length of flipper 6.75 ; tail 3.75 ; bill, along the ridge 2, along the edge of lower mandible 2.3 ; tarsus .75 ; middle toe and claw 2.75.

Young. Has the plumage generally duller, and the throat largely mottled with fulvous white ; with little or no crest, and a very inconspicuous streak of yellow over the eyes.

Var. An example from Campbell Island, in the Otago Museum, presents the following appearances :—Head, throat, hind neck, and all the upper surface sooty brown, darkest on the crown and nape ; fore neck, breast, and underparts yellowish white, the brown of the upper parts fading into this on the sides of the body. Bill black at the base, bright yellow in its outer portion ; feet brown, with yellow claws.

Obs. In some examples the coronal feathers are also produced, but not to the same extent as the lateral crests.

Note. Professor Hutton, who described this form under the name of *Eudyptes filholi*, remarks :—“ In colour and in length of crest, this species is intermediate between *E. chrysocome* † and *E. chrysolopha* ; but is easily distinguished from both by the supereiliary yellow streaks commencing behind the termination of the culmen instead of between the termination of the culmen and the nostrils, and by the dark colour of the

* With regard to *E. nigrivestis*, I think I am right in stating that Mr. Gould, who distinguished the species, agreed with me that it could not stand.

† *Eudyptes pachyrhynchus* of the present edition.

back advancing on the sides of the lower neck. From *E. chrysocome* it is also distinguished by the narrowness of the bill, and the different shape of the black mark on the under surface of the apex of the wing, in which *E. filholi* resembles *E. chrysolopha*. From the latter species it is also distinguished by its colour." After examination of a large series of specimens I have come to the conclusion that the bird here described is not separable from the so-called *Eudyptes saltator*. I may add that this view is concurred in by Messrs. Salvin and Sharpe, both of whom have made the Penguins a special subject of study.

Professor Hutton's bird, which came from Campbell Island, was placed in the Otago Museum. In an example received there afterwards from Macquarie Island the upper parts are of a brighter blue, and the crest is pale golden yellow, scanty in character but fully three inches in length; the dark plumage does not advance upon the neck in the manner described above; the bill is reddish brown in colour, and comparatively slender in form, measuring along the ridge 1.75 inch, and along the edge of lower mandible 2.

There are two specimens in the Canterbury Museum. One of these (obtained in Akaroa harbour) has a small, narrow, pale yellow crest, which commences at the base of the upper mandible and curls over behind the ear-coverts; the bill is very dark brown, paler towards the tip. The other (which was picked up on the Nine-mile Beach) presents only a narrow supraciliary line of yellow, with a very inconspicuous crest, and is presumably a younger bird.

AFTER a careful comparison of the fine series of specimens in the British Museum, as well as those in the Natural-History Museum at the Jardin des Plantes, I have come to the conclusion that Prof. Hutton's *Eudyptes filholi* (from Campbell Island) is the same as Mr. Sharpe's *E. saltator* from Kerguelen Island, and that the latter again is identical with the true *E. chrysocome* of the Falkland Islands. The more common New-Zealand bird, which I described in my former edition under the name of *Eudyptes chrysocomus*, is undoubtedly distinct; and to this species I have accordingly restored Mr. G. R. Gray's very appropriate name of *E. pachyrhynchus*.

In their account of the birds collected by the 'Challenger' Expedition, Messrs. Selater and Salvin say:—"Why Mr. Sharpe should have referred *Eudyptes chrysolophus* (Selater and Abbott) of the Falklands to *Eudyptes saltator* we cannot understand, nor can we appreciate the characters by which he separates his *Eudyptes saltator* and *Eudyptes chrysocome*. . . . The type-specimen of *Eudyptes diadematus*, Gould, for which we have made every enquiry, is unfortunately no longer to be found. Mr. Gould has parted with it, he knows not whither. It was *probably* only an individual variety of this species."

Sir Wyville Thomson, in the 'Voyage of the Challenger' (p. 167), gives the following interesting account of this Penguin as observed by him at Tristan d'Acunha:—"We were close under Inaccessible Island, the second in size of the little group. The ship was surrounded by multitudes of Penguins, and as few of us had had any previous personal acquaintance with this eccentric form of life, we followed their movements with great interest. The Penguin, as a rule, swims under water, rising now and then and resting on the surface, like one of the ordinary water-birds, but more frequently with its body entirely covered, and only lifting its head from time to time to breathe. One peculiarity surprised us greatly, for although we were tolerably familiar with the literature of the family, we had never seen it described. 'Rock-hoppers' (and I am inclined to think species of other genera besides *Eudyptes*), when in a number in the water, have a constant habit of closing together, the legs and tail straight out, laying the wings flat to the sides, arching forward the neck, and apparently by an action of the muscles of the back, springing forwards clear out of the water, showing a steel-grey back and a silvery belly like a grilse. They rise in this way in lines like a school of porpoises, seemingly in play, and when they are thus disporting themselves it is really very difficult to believe that one is not watching a shoal of fish pursued by enemies.

"In the water Penguins are usually silent, but now and then one raises its head and emits a curious prolonged croak, startlingly like one of the deeper tones of the human voice. One rarely

observes it in the daylight, and in the midst of other noises; but at night it is weird enough, and the lonely officer of the middle watch, whose thoughts may have wandered for the moment from the imminent iceberg back to some more genial memory, is often pulled up with a start by that gruff 'whaat' alongside in the darkness, close below the bridge."

And again (at p. 179):—"Beyond the garden the tussock grass of the Tristan group (*Spartina arundinacea*) forms a dense jungle. The root-clumps or 'tussocks' are two or three feet in width and about a foot high, and the spaces between them one or two feet wide. The tuft of thick grass-stems (seven or eight feet in height) rises strong and straight for a yard or so, and then the culms separate from one another and mingle with those of the neighbouring tussocks. This makes a bush very difficult to make one's way through, for the heads of grass are closely entangled together on a level with the face and chest. In this scrub one of the Crested Penguins, probably *Eudyptes chrysocome*, called by the natives in common with other species of the genus *Eudyptes* 'Rock Hoppers,' has established a rookery. From a great distance, even so far as the hut, or the ship, one could hear an incessant noise like the barking of a myriad of dogs in all possible keys, and as we came near the place bands of Penguins were seen constantly going and returning between the rookery and the sea. All at once, out at sea, a hundred yards or so from the shore, the water is seen in motion, a dark red beak and sometimes a pair of eyes appearing now and then for a moment above the surface. The moving water approaches the shore in a wedge-shape, and with great rapidity a band of perhaps from three to four hundred Penguins scramble out upon the stones, again exchanging the vigorous and graceful movements and attitudes for which they are so remarkable while in the water, for helpless and ungainly ones, tumbling over the stones, and apparently with difficulty assuming their normal position, upright on their feet, which are set far back, and with their fin-like wings hanging in a useless kind of way at their sides. When they have got fairly out of the water, beyond the reach of the surf, they stand together for a few minutes, drying and dressing themselves and talking loudly, apparently congratulating themselves on their safe landing, and then they scramble in a body over the stony beach, many falling and pulling themselves up again with the help of their flippers on the way, and make straight for one particular gangway into the scrub, along which they waddle in regular order up to the rookery. In the meantime a group of about equal number appear from the rookery at the end of another of the paths. When they get out of the grass on to the beach they all stop and talk and look about them, sometimes for three or four minutes. They then with one consent scuttle down over the stones into the water and long lines of ripple, radiating rapidly from their place of departure, are the only indications that the birds are speeding out to sea. The tussock-brake, which in Inaccessible Island is perhaps four or five acres in extent, was alive with Penguins breeding. [This was in the latter part of October.] The nests are built of the stems and leaves of the *Spartina* in the spaces between the tussocks. They are two or three inches high, with a slight depression for the eggs, and about a foot in diameter. The gangways between the tussocks, along which Penguins are constantly passing, are wet and slushy, and the tangled grass, the strong ammoniacal smell, and the deafening noise, continually penetrated by loud separate sounds which have a startling resemblance to the human voice, make a walk through the rookery neither easy nor pleasant.

"The Penguin is thickly covered with the closest felting of down and feathers, except a longitudinal band, which in the female extends along the middle line of the lower part of the abdomen, and which, at all events in the breeding-season, is without feathers. The bird seats herself almost upright upon the eggs, supported by the feet and the stiff feathers of the tail, the feathers of the abdomen drawn apart, and the naked band directly applied to the eggs, doubtless with the object of bringing them into immediate contact with the source of warmth. The female and the male sit by turns; but the featherless space, if present, is not nearly so marked in the male. When they shift quarters they sidle-up close together, and the change is made so rapidly that the eggs are scarcely uncovered for a

moment. The young, which are hatched in about six weeks, are curious-looking little things covered with black down. There seems to be little doubt that Penguins properly belong to the sea, which they inhabit within moderate distance of the shore, and they only come to the land to breed and moult and for the young to develop sufficiently to become independent. But all this takes so long that the birds are practically the greater part of their time about the shore. We have seen no reason as yet to question the old notion that their presence is an indication that land is not far off."

Mr. Howard Saunders writes:—"Two eggs ascribed to this species differ considerably in size, the larger measuring 2.7 inches by 2, the other 2.4 inches by 1.65. The colour is very pale blue, with a white calcareous coating irregularly disposed over the surface. In shape they are somewhat pointed at one end." An egg of this Penguin from Campbell Island is very broadly ovoid, or inclining to spheroid, and measures 2.75 inches in length by 2.25 in breadth; white, with a greenish tinge (which is absent in some), and much smeared over with chalky matter. Another which I measured was a quarter of an inch shorter and proportionately less in size, with a creamy white shell having a roughened chalky surface.



PENGUINS AT HOME. (See p. 288.)

EUDYPTES ANTIPODUM.

(YELLOW-CROWNED PENGUIN.)

Catarrhactes antipodes, Hombr. & Jacq. Ann. Sci. Nat. xvi. p. 520 (1841).*Eudyptes antipodes*, Gray, in Dieff. Trav. ii., App. p. 199 (1843).*Aptenodytes flavilarvata*, Peale, U.S. Expl. Exp. p. 260 (1848).*Pygoscelis antipodes*, Hombr. & Jacq. Voy. Pôle Sud, Zool. iii. p. 156, pl. 33. fig. 2 (1853).*Pygoscelis antipoda*, Bonap. C. R. xlii. p. 775 (1856).*Eudyptes antipoda*, Cass. U. S. Expl. Exp. p. 351 (1858).*Spheniscus antipoda*, Schleg. Mus. Pays-Bas, *Urinatores*, p. 9 (1866).

Ad. supra obscurè cyanescens, nigro minutè varius : alâ saturatiore, margine carpali angustè, margine apicali latiùs flavicante : subtùs argentescenti-albus, pectoris lateribus dorso concoloribus : pilei plumis rigidis, pilosis, pallidè sulphureis, nigro medialiter lineatis : supercilio lato nucham cingentè pallidè sulphureo : genis anticis pallidè sulphureis nigro lineatis : facie reliquâ et collo superiore laterali gulâque brunneis, hâc multò pallidiore : rostro obscurè brunnescenti-aurantiaco : pedibus saturatè brunneis.

Adult male. Top and sides of the head, cheeks, and towards the base of lower mandible pale sulphur-yellow, the feathers of the forehead and crown lengthened, and having a shaft-streak of glossy black ; general upper surface of the body, as well as the sides of the breast and thighs, dull blue, with a streak of black down the centre of each feather ; upper surface of flippers bluish black, the outer edges yellowish white ; region of the ears, throat, and upper sides of neck pale fulvous brown ; fore neck, breast, and the rest of the underparts yellowish white ; tail-feathers bluish black. Bill dull brownish orange ; legs and feet dark brown. Total length 32 inches ; length of flipper 7.5 ; tail 3 ; bill, along the ridge 2.5, along the edge of lower mandible 3 ; tarsus 1.5 ; middle toe and claw 3.5.

Obs. A specimen of the male bird in my collection from Campbell Island, and now figured, has the black shaft-lines on the vertex broader, the dark colour predominating, with an outer and well-defined band of pale yellow, which is continued, although in a narrower form, through the eyes to the angles of the mouth, forming a sort of coronal hood, the feathers composing which are glossy and of a silky texture. The yellow on the lower sides of the cheek is marked with minute black shaft-lines ; and the fulvous brown of the throat and sides of the upper fore neck has a darker edge separating it from the white, the latter forming a rounded apex in front about three inches below the angle of the lower mandible. The underparts are white, with a very decided gloss.

Another adult male from Campbell Island, which I had an opportunity of examining in the Otago Museum, has a beautiful head, the coronal region being pale lemon-yellow, pencilled on the vertex and crown with black ; cheeks washed with yellow ; chin and sides of the neck pale brown, shading into the light blue which covers the nape and lower sides of the neck ; hind neck, back, and general upper surface bright blue with thick black shaft-lines ; inner margin of flippers and the whole of the under surface satiny white. The white of the fore neck extends upwards to within an inch and a half of the bill, where it meets the pale brown colour and forms a rounded outline. Irides said to have been bright yellow.

Adult female. As large as the male, but with the entire plumage less conspicuous. The vertex and crown are only slightly washed with yellow, the dark shaft-lines being less pronounced on that account, but extending further back and covering the whole crown, there being no indication of the coronal circlet described above. The plumage of the upper parts is chiefly a dingy brown with a faint wash of blue on the outer edges of the feathers, this colour being of a much lighter tint than in the other sex. Upper surface of flippers dull bluish



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YELLOW-CROWNED PENGUIN.
EUDYPTES ANTIPODUM.

BLACK PENGUIN.
EUDYPTES ATRATUS.

(ONE-THIRD NATURAL SIZE.)

brown. There is no appearance of yellow on the cheeks, but both here and on the throat the fulvous brown fades away into the white, the rounded apical margin presented by the male being wholly obliterated. On the cheeks each feather has an extremely minute central mark of brown, giving a somewhat "stippled" appearance to the plumage of these parts. Underparts glossy white.

Obs. The bird from which the above description is taken has the claws much blunted and worn, indicating maturity, and the tail-feathers abraded to mere shafts, like strips of elastic whalebone (the middle ones to the length of three inches), denoting, as I think, an adult female at the close of the breeding-season. In both sexes the bill appears to have been originally of a dull brownish orange, darker on the ridge and in the terminal part of the lower mandible.

Young. The white of the fore neck extends right up to the bill and spreads on to the face; there is a broad mark of brown behind the eyes and on the sides of the upper neck; the coronal band is absent, but there is a tinge of yellow on the vertex, with some indistinct pencilled markings of brown.

THE above description of the adult male, which appeared in my first edition, was taken from a fine specimen in the British Museum. At that period there was only a single example known in the Colony—an immature specimen obtained at Oamaru on the east coast of the South Island. Numerous individuals have since been taken, but in every instance further south. The description of the female is from one obtained at Cape Campbell and presented to me by Mr. Robson, who also forwarded a pair to the Colonial Museum. There is an example from Akaroa in the Canterbury Museum; and the young bird described above was captured near Dunedin in December 1873, and is now preserved in the Otago Museum.

The egg is broadly ovoido-conical, measuring 2.85 inches in length by 1.15 in breadth, creamy-white and having a roughish surface with a thin chalky covering. I have two before me, and in one the outline is slightly pyriform; in other respects they are alike. Both specimens were collected on Campbell Island.

Mr. Percy Seymour, who is a very zealous oologist, has favoured me with the following notes:—

"At Otago Peninsula, on the 9th November, I found a nest of this species containing two eggs, on which the female bird was sitting. The eggs were white, and uniform in shape and size, measuring 2.95 inches by 2.15. The nest consisted of a mere platform of sticks, about 18 inches in diameter, and was situated at the foot of a leaning tree in thick bush, on a steep ascent from a sandy beach. The birds in their journeys to and from the beach had made a beaten track up the hill, on which the marks of their claws were plainly perceptible in the soft clay. Two other nests, found on the same occasion, also contained two eggs each, resembling in appearance and size those described above, but I did not get an opportunity to measure them. The nests were constructed principally of coarse grass, on a ledge at the foot of a small cliff near the water.

"Another nest had been found on the 26th of October in the same locality under a log. It contained two fresh eggs, measuring 2.75 inches by 2.1.

"I visited the beach again on the 9th of August in the year following, and found, near an old nest, two young birds, both males. They were fully feathered, but still had a little down about their plumage. There were plenty of footprints of the birds on the track leading up the hill, but all the tracks on the sandy beach below high-water mark pointed seawards, showing that the birds, at that time of the year, came ashore only at night and left again in the morning."

EUDYPTES ATRATUS.

(BLACK PENGUIN.)

Eudyptes atrata, Hutton, Ibis, 1875, p. 114.

Ad. omninò nigricans : dorsi plumis cyaneseente medialiter lineatis : subtùs pallidior, plumis cyanescenti-griseo medialiter obscure lineatis : supercilio distincto a naribus dueto et pileum marginante, posticè conspicuè brunneo : rostro rufescenti-brunneo : pedibus nigris.

Adult. General plumage black, but a different shade of colour observable on the upper and lower surfaces, and this is produced in the following manner: on the upper parts each feather has a central stripe of dark blue, which deepens almost to black on the head; on the underparts each feather has the centre bluish grey; over the entire surface of the body the feathers are black save as to this narrow median stripe; an obscure patch of yellow commencing at the angle of the upper mandible passes over the eyes, and then widening develops into a crest immediately beyond, the occipital plumes being pale golden yellow and two inches in length; flippers black, with obscure bluish points on the feathers; tail entirely black; bill uniform reddish brown; legs and feet black; claws dark brown. Total length (approximate measurement) 27 inches; wing or flipper 6·5; tail 4·5; bill, along the ridge 2·5, along the edge of lower mandible to gape 3; expanse of foot 2; middle toe and claw 3.

THIS remarkable Penguin, so conspicuously different in its coloration from all other known members of the genus, was obtained from the Snares, a group of sea-girt rocks lying about sixty miles to the south-west of Stewart's Island.

Apart from its black plumage it may be distinguished by its powerful bill, the peculiar form of its crests, and the long, stiff tail-feathers.

There is only one known example, and this belongs to the fine collection of birds in the Otago Museum. I have to thank Prof. Parker for allowing me to bring this unique specimen to England, in order to figure it in the present work.

The black coloration of its under surface separates this form from all the other known species, and its massive deep bill, its very small hind toe, and long tail afford other distinguishing characters. In size it somewhat exceeds the well-known Crested Penguin (*Eudyptes pachyrhynchus*).

EUDYPTES CHRYSOLOPHUS.

(THE MACARONI PENGUIN.)

Eudyptes chrysolophus, Brandt, Bull. Acad. Sc. Pét. ii. p. 314 (1837).*Eudyptes chrysocome*, Abbott, Ibis, 1860, p. 337 (nec Forst.).*Eudyptes chrysolophus*, Sclater, Ibis, 1860, pp. 338, 432.*Eudyptes diadematus*, Gould, Proc. Zool. Soc. 1860, p. 419.*Eudyptes chrysolophus*, Scl. & Salv. Proc. Zool. Soc. 1878, p. 654*.

Ad. suprâ nigricans cinereo lavatus, alis cinereo nigricantibus, margine alari summâ vix albicante, margine remigiali medialiter albo: caudâ rigidâ, dorso concolore: facie laterali gulâque dorso concoloribus: pilei plumis nitidis nigris elongatis cristam formantibus, frontis plnms basaliter aurantiacis: fasciâ superciliari cristali a loris supra oculum per latera capitis dntâ: corpore reliquo subtùs purè albo, pectoris lateribus dorso concoloribus: alâ subtùs albâ, margine alari nigricante, plagâ nigricante etiam propè ortum alæ et ad apicem remigialem positâ: rostro rufescuti-brunneo: pedibus albicanti-carneis, unguibus nigricantibus.

Adult. Forehead and crown blue-black; across the vertex an inconspicuous band of yellow, the base of each feather being of that colour and the apical portion bluish black; over the eyes the yellow increases and develops into a supraorbital crest of extremely narrow feathers of bright canary-yellow, about an inch and a half in length; nape, hind neck, and general upper surface bluish black, each feather having a median stripe of dark blue; sides of face, throat, and upper part of fore neck bluish grey, becoming paler downwards, and terminating in a tapering projection, both flanks of which as well as all the underparts of the body are pure white; under surface of flippers white, with a band of slaty black along the exterior edge, and a mark of the same colour near the tip. Bill dark reddish brown; feet paler brown (probably flesh-colour in the fresh bird); claws pale brown. Total length (approximately) 26 inches; length of flipper 7.75; bill, along the ridge 2.5, along the edge of lower mandible 2.75; maximum depth of bill 1; tail too much broken for reliable measurement; tarsus 1.50; middle toe and claw 3.25 (the claw being 1).

Obs. The extent of the crest and the richness of its colouring vary in different individuals. In most examples I have seen from other localities there is a small white patch over the tail; but this is absent in the two New-Zealand specimens mentioned below.

Note. *Eudyptes chrysolophus* was first included in the New-Zealand avifauna by Dr. Otto Finsch, who did so, with some hesitation, on the authority of a label in the Leyden Museum.

OF this fine Penguin I have seen only two examples in New Zealand. One of these is in the Otago Museum, having been obtained somewhere on the east coast; the other was caught in a fishing-net at the Spit, near Napier, in the summer of 1880-81. It was brought ashore alive, and having afterwards died was very successfully mounted by the local taxidermist, Mr. Hooper. I believe it is now in the possession of Messrs. Nelson Brothers of Tomoana.

* "On comparison of the Kerguelen specimens of this Penguin with others from the Falklands we find no reason for considering them otherwise than of the same species. There is, however, less appearance of the white upper tail-coverts in the Falklands specimen." (Scl. & Salv. Voy. Chall., Zool. Birds, p. 127.)

EUDYPTES SCHLEGELI.

(ROYAL PENGUIN.)

Spheniscus diadematus, Schl. indiv. No. 3 in Mus. P.-B. *Urinatores*, p. 9 (1867, nec Gould).

Eudyptes schlegeli, Finsch, Trans. N.-Z. Inst. vol. viii. p. 204 (1876).

Eudyptes schlegeli, Buller, Man. Birds of N. Z. p. 100 (1882).

Ad. similis *E. chrysolopho*, sed major et cristâ pilei majore et splendidiore aureâ : facie laterali gutture et præpectore albis.

Adult. Similar in plumage to *Eudyptes chrysolophus*, except in having a rich frontal band of yellow, and the cheeks, sides of the head, and throat white, instead of being slaty black. The crest springs from the forehead and spreads outwards, the colour being bright golden or canary-yellow, mixed with black; the long plumes measure two inches and are entirely yellow, the shorter ones are black towards the tips; surrounding the upper mandible there is a narrow band of sulphur-yellow which extends to and fills the lores; and on the fore neck there is a slight wash of grey. The bill, which is even more robust than in *E. chrysolophus*, is of a uniform reddish-brown colour. Total length 29 inches; length of flipper 6.5; tail 5; bill, along the ridge 2.4, along the edge of lower mandible 2.75; tarsus 1; middle toe and claw 3.

Obs. There is a somewhat interesting specimen in the Otago Museum. It is in a moulting state, and the old plumage is peeling off the body like a reversed glove; the wing-plumage, which is thick-set, is coming off in flakes, disclosing an imbricated surface beneath. Although marked ♂, it is probably a female bird, as there is far less yellow on the coronal region, the vertex being almost entirely black, the brighter colour showing itself only in narrow streaks on both sides of the crest. There is an ashy wash on the face, and the bill is almost black.

THERE are two examples of this fine Penguin from Macquarie Island in the Otago Museum; and at a meeting of the Otago Institute in October 1877, Professor Hutton exhibited a specimen which had been obtained by the late Mr. Robert Gillies at Brighton, near Dunedin, in March of that year.

Prof. Schlegel's bird is said to have come from New Zealand, but only on the authority of a dealer (Parzudaky); but Dr. Finsch's type, in the Leyden Museum, is from Macquarie Island.

There are two eggs of this species in the Otago Museum, also from Macquarie Island. One of these is ovoido-conical, whilst the other is more pyriform; the former measures 3.25 inches in length by 2.4 in breadth, and the latter with a similar length has a greater width by one eighth of an inch. Originally white they are now more or less discoloured, and the surface of the shell is somewhat granulated but without any papillæ.

EUDYPTES VITTATUS.

(THICK-BILLED PENGUIN.)

? *Aptenodytes papua*, Vieill. (nec Forst. nec Gmel.), Gal. Ois. ii. p. 246 (nec diagn.), tab. 299 (1834).

Eudyptes vittata, Finsch, Ibis, 1875, p. 112.

Ad. suprâ obscurè cyaneiscenti-niger, alâ saturatiùs brunnescente: subtùs omninò albus: facie laterali et præpectore brunnescentibus: supercilio distincto lato occiput cingente albedo: rostro rufescenti-brunneo: pedibus rufescentibus, membranis interdigitalibus nigricantibus.

Adult. Crown, sides of the head, face, chin, hind neck, and the rest of the upper surface dark brown, inclining more or less to blue; from the base of the upper mandible, in a line with the nostrils, a streak of yellowish white passes over the eyes, and widening in its course encircles the crown; but there is no elongation of the feathers or any appearance of a crest; the flippers are dull blackish brown on their upper surface, and white underneath, with similar dark markings to those which distinguish *Eudyptes pachyrhynchus*. Bill reddish brown; legs and feet pale brown, the claws darker. Total length 26 inches; length of flipper 6; tail 1.5; bill, along the ridge 2, along the edge of lower mandible 2.2; tarsus 1; middle toe and claw 3.

Note. Of this species Dr. Finsch writes (Ibis, 1875, pp. 113, 114):—"Captain Hutton suggests that this may be Latham's 'Red-footed Penguin' (Gen. Syn. iii. p. 572), but without reason, as a careful examination of the synonymy shows that Latham's description is based on 'the Penguin' of Edwards (t. 49 et t. 94, head on right hand), as is also '*Aptenodytes catarractes*' of Forster (Comm. Soc. Reg. Gotting. iii. 1781, p. 145) and Gmelin (Linn. Syst. Nat. ii. p. 558), and '*Phaëton demersus*' of Linné (S. N. p. 219), and Brisson's '*Catarractes*' (Ornith. iv. p. 102). All these descriptions are simply derived from Edwards's figure, which represents a bird the existence of which, in my opinion, will ever remain doubtful, being very likely based on a made-up bird. I do not understand how G. R. Gray (Hand-l. of B. iii. p. 98) and Schlegel (Mus. P.-B. Urinat. p. 8) could identify Edwards's inaccurate figure with *E. chrysocoma*, Forst. and Gmelin (*Pinguinaria cristata*, Shaw), even supposing it to be the young bird, without tuft—as Edwards's figure, besides other inaccuracies, shows a bird with *Mergus*-like legs, the tarsus being longer than the middle toe. *E. vittatus*, if indeed a true *Eudyptes*, is easily distinguished from all other members of the Penguin group by its broad white superciliary streak, which runs from the base of bill to the back of head, but which does not consist of elongated feathers. A close examination of all the existing representatives of Penguins leads me to the belief that very probably to this new species belongs the figure of a Penguin which Vieillot erroneously published under the name of '*Aptenodytes papua*' (*l. c.*), but which is not the well-known species of Sonnerat, Forster, and Gmelin, which Mr. Selater, from the unfitness of the name, proposed to call *Pygoscelis wagleri* (P. Z. S. 1861, p. 47). To judge from Vieillot's figure and the French description (not the Latin diagnosis, which relates to the true *papua*), the bird very much resembles our *E. vittatus*, especially in having the white superciliary streak, which runs to the occiput."

THE type specimen of this Penguin is in the Otago Museum; but there is a much finer example in the Canterbury Museum, in which the colours are brighter, the coronal band more conspicuous, and the bill appreciably thicker.

I take it that this is a male bird, and that the one described above (which has been courteously forwarded to England by Professor Parker, for my examination) is a female in old and faded breeding-plumage.

EUDYPTULA MINOR.

(BLUE PENGUIN.)

- Little Penguin*, Lath. Gen. Syn. iii. pt. 2, p. 572, pl. ciii. (1785).
Aptenodyta minor, Gm. Syst. Nat. i. p. 558 (1788, ex Lath.).
Catarrhactes minor, Cuv. Règn. An. i. p. 513 (1817).
Chrysocoma minor, Steph. Gen. Zool. xiii. p. 61 (1825).
Spheniscus minor, Gray, in Dieff. Trav. ii., App. p. 199 (1843).
Aptenodytes minor, Forst. Descr. An. p. 101 (1844).
Eudyptula minor, Bonap. C. R. xlii. p. 775 (1856).
Eudyptila minor, Gray, Hand-l. of B. iii. p. 99 (1871).
Eudyptula albosignata, Finsch, P. Z. S. 1874, p. 207.

Native name.—Korora.

Ad. suprâ obscurè cyaneseens : subtis argenteseenti-albus : facie laterali brunnescente lavatâ : alâ sordidè cinereâ, albo marginatâ et latiùs apieatâ ; rostro cyanescenti-cano, eulmine saturatiore : pedibus carneo-albidis, membranâ interditalibus brunnescenti-nigris : iride flavieanti-canâ.

Adult. Crown of the head, hind part of neck, and all the upper surface, as well as the thighs, light blue, with a black line down the centre of each feather ; sides of the head dark grey ; throat, fore neck, and all the underparts silvery white ; upper surface of flippers black, tinged with blue, and margined with white along the inner edges ; under surface yellowish white, with a dark grey spot near the extremity. Irides yellowish grey, with a brownish margin ; bill bluish grey, darker on the ridge ; feet flesh-white, the soles, webs, and claws brownish black. Total length 19 inches ; extent of flippers 14 ; length of flipper 5 ; bill, along the ridge 1.75, along the edge of lower mandible 2 ; tarsus 1 ; middle toe and claw 2.5.

Nestling. In the downy condition the young are blackish brown on the upper and white on the under surface ; but they assume the adult colours before leaving the nest.

Remarks. I have already stated * my reasons for considering *Eudyptula albosignata* a mere variety of *Eudyptula minor*, but Dr. Finsch still believes in its validity as a species. The only differences pointed out by the learned doctor are : a patch of white on the upper tail-coverts, and a strongly marked peculiarity in the coloration of the flippers. These characters appear to me wholly insufficient, and I feel sure that on examination of a series of specimens Dr. Finsch would himself relinquish the species. The white marking on the wing is certainly peculiar, but it has an indeterminate character, and I find that in recognized examples of *E. minor* there is a tendency for the white to spread on the inner margin. In the type of *E. albosignata* it expands upwards at the flexure and forms a square patch about three quarters of an inch in extent, but on its further edge there is a broken connection with the broad white band which forms the outer margin of the wing. In another specimen I find a similar white mark, but only one third the size of the former, and very broadly separated from the white margin above. In ordinary examples of *E. minor* there is merely a notch in the blue at the inner flexure of the wing and no extension of the white ; but this character is, in my opinion, too variable to be of any value whatever in the differentiation of allied species, and the white on the upper tail-coverts is obviously accidental.

* Trans. N.-Z. Inst. vol. vii. p. 210.

THIS species occurs all round our coasts, and resorts in large numbers to the Island of Kapiti, in Cook's Strait, and probably to other islands of similar character, to breed and rear its young. It is abundant also in the seas surrounding Tasmania, in Bass's Strait, and on the south coast of Australia generally. Mr. Gould found it breeding on the low islands in Bass's Strait from September to January, and states that in these localities the ground is "completely intersected by paths and avenues; and so much care is expended by the birds in the formation of these little walks, that every stick and stone is removed, and in some instances even the herbage, by which the surface is rendered so neat and smooth as to appear more like the work of the human hand than the labour of one of the lower animals. . . . A considerable portion of the year is occupied in the process of breeding and rearing the young, in consequence of its being necessary that their progeny should acquire sufficient vigour to resist the raging of that element on which they are destined to dwell, and which I believe they never again leave until, by the impulse of nature, they in their turn seek the land for the purpose of reproduction. Notwithstanding this care for the preservation of the young, heavy gales of wind destroy them in great numbers, hundreds being occasionally found dead on the beach after a storm; and when the sudden transition from the quiet of their breeding-place to the turbulence of the ocean, and the great activity and muscular exertion then required, are taken into consideration, an occurrence of this kind will not appear at all surprising. . . . Its powers of progression in the deep are truly astonishing; it bounds through this element like the porpoise, and uses its short fin-like wings as well as its feet to assist it in its progress; its swimming-powers are in fact so great that it stems the waves of the most turbulent seas with the utmost facility, and during the severest gale descends to the bottom, where, among beautiful beds of coral and forests of sea-weed, it paddles about in search of crustaceans, small fish, and marine vegetables, all of which kinds of food were found in the stomachs of those I dissected."

I once had a live one in my possession for a considerable time; and although very savage when first taken, severely punishing the captor's hands with its beak, it soon became quite tame, and exhibited, for such a bird, a remarkable degree of intelligence.

On land its mode of progression is very ungainly, and it frequently topples over when attempting to run. Its usual attitude is an upright one, but it sometimes crouches low, with its breast nearly touching the ground. The sea, however, is its natural abode; and on observing its movements there it is at once manifest that the flippers are intended to perform the office of fins, or paddles, for propelling the body through the water. On the surface it swims low and in a rather clumsy fashion; but the moment it dives under it trails its legs behind like a bird on the wing, and using its flippers in the manner indicated, glides forward with the same ease and freedom that the Sea-Gull cleaves the air above it. In clear deep water I have watched its graceful evolutions with considerable interest; and I have been astonished at the length of time the bird could remain under before rising to the surface to breathe. Whether it is nocturnal in its habits I am unable to say; but I am inclined to think not, inasmuch as my captive bird seemed to be far less active after dark than during the day, and when disturbed appeared to stumble about in a very blind manner.

It makes a loud croaking noise; and where large companies are breeding together they appear to keep up a constant angry altercation. The eggs, which are usually two in number, are deposited in a shallow artificial burrow or in a natural crevice among the rocks. Occasionally, however, these burrows are of considerable depth; and Reischek informs me that he traced one under the root of a tree, at Dusky Sound, for a distance of 12 feet. He also found the nests (often carefully lined with leaves and grass) more than a mile from the sea-shore. Sometimes three or four birds are found associated; and it is said that the sexes assist each other in the labour of incubation. The eggs are of a very rounded form, measuring 2.2 inches in length by 1.7 in breadth, greenish white originally, but always much soiled or stained by the bird, and often smeared with a white chalky substance.

EUDYPTULA UNDINA.

(LITTLE BLUE PENGUIN.)

Aptenodytes undina, Gould, Proc. Zool. Soc. 1844, p. 57.*Spheniscus undina*, Gould, B. of Austr. vii. pl. 85 (1848).*Eudyptula undina*, Bonap. C. R. xlii. p. 775 (1856).*Eudyptila undina*, Gray, Hand-l. of B. iii. p. 99 (1871).*Ad.* similis *E. minori*, sed minor, et suprâ dilutiùs et lætiùs cyanescens.

Adult. Crown, nape, hind neck, and all the upper parts bright glossy pale blue, the shafts of the feathers black; sides of the head bluish grey; throat, fore neck, and all the underparts pure silvery white; upper surface of flippers bright blue, each feather with a lanceolate mark of black down the centre; along the inner edges of flippers a narrow band of white. Irides pale grey with a silvery edge to the pupil. Bill blackish brown, paler on the under mandible; feet yellowish white, with black claws; the webs and soles blackish brown. Total length 14·5 inches; length of flipper 3; tail 1·25; bill, along the ridge 1·25, along the edge of lower mandible 1·5; tarsus ·75; middle toe and claw 1·75; hind toe and claw ·4.

Young. I have obtained newly-fledged specimens from the nest, with the down adhering; the colours were the same as in the adult, the blue on the upper surface being conspicuously bright.

Nestling. Covered with thick short down, sooty brown on the upper and white on the under surface; irides purplish grey.

Obs. Like *Eudyptula minor*, this species assumes the full plumage from the nest, the blue on the upper surface being very bright. I have a specimen in that stage with remnants of down adhering.

THIS Penguin is equally, if not more abundant on our coasts than the preceding one; and the foregoing account is applicable to both species.

Dr. Finsch refuses to admit any specific distinction. Dr. Coues also, in writing of Gould's types in the Museum at Philadelphia, says:—"These specimens are slightly smaller than average *minor*, bluer than usual, but not bluer than No. 1338, for example, and with rather weak bills. . . . I cannot distinguish these specimens even as a variety." Mr. Gould, however, who originally described this bird, observes:—"By many persons it might be regarded as the young of *E. minor*; but I invariably found the young of that species, whilst still partially clothed in the downy dress of immaturity, to exceed considerably in size all the examples of this species, even when adorned in the adult livery, and possessing the hard bill of maturity; there can be no question, therefore, of the two birds being distinct."

In support of my own view that this bird is specifically distinct from the preceding one, I have already published* figures of the bill in two selected examples, in order to show their relative proportions. These sketches were from specimens in the Colonial Museum, exhibiting the two extremes of size in a somewhat variable series.

There is a fine mounted group of New-Zealand Penguins in the Canterbury Museum. The case

* Trans. N.-Z. Inst. vol. ix. pl. xv.

includes two nestlings of *Eudyptula minor*, with down still adhering to the plumage; and in these young birds the bill is fully one third larger than that of an adult example of *E. undina* in the same group.

On January 18th I visited the Rurima Rocks in the Bay of Plenty and dug out several of these Penguins from their deep subterranean burrows. One was an adult male, in perfect plumage, which bit savagely on being taken hold of and uttered a low growling note. After examining the bird I turned it loose, and it was amazing to see with what celerity he trundled over the stony beach and dived into the surf, not appearing again on the surface till he was well out at sea. In another hole I found an adult female with her plumage much faded and worn, indicating the close of the breeding-season, which probably commences about September. I found two nestlings of very unequal size, and covered with down, in a hole by themselves; and the natives brought me another young bird in a more advanced state, having the bright plumage of the adult, but with a broad yoke of blackish down adhering to its shoulders, with a remnant also on the flippers.

Many of the young of both this and the preceding species lose their lives, in the months of January and February, owing to their inexperience in keeping off a lee shore when the surf is breaking. They are cast ashore and perish on the sands, where I have counted a dozen in less than a mile's walk. I found them particularly abundant on the open beach at Waeheke, in the exact spot where, in 1864, H.M.S. 'Harrier' pitched a shell into a retreating body of Ngatiporou warriors, killing their chief, Poihipi, with several of his followers, whose bodies were afterwards buried in the sand-hills near the spot where they fell. The encroachments of the sea have exposed the bones of these unfortunate braves, and they are now tossed about with the ebb and flow of the tide, just as remorselessly as the bodies of these little Penguins—victims of the pitiless storm and rolling surf.

They swim and dive with great activity; resting their bodies on the surface with the whole of the back exposed and the head raised they travel along at marvellous speed, diving under the moment any danger threatens.

I have found this little Penguin far more tractable than the crested species (*Eudyptes pachyrhynchus*), for under judicious management it will soon become perfectly tame. I have on several occasions endeavoured to keep the Crested Penguins alive, but I could never induce them to eat anything. A very fine one sulked in my aviary for a whole week without, so far as I could discover, eating a morsel of anything. In the end, I had (adopting an Irishman's expression) "to save its life by killing it." This bird was sent to me by Captain Fairchild, of the Government steamboat 'Hinemoa,' who had captured it with many others in Caswell Sound, where he found these Penguins breeding in the early part of September. He also presented me with six specimens of the egg, all collected by himself in that locality; they were found under shelter of the rocks, and there were generally two, but sometimes three, in a nest. It was very amusing, he states, to watch the proceedings of the birds after their nests had been plundered. They were breeding in a colony and all close together. On strutting up to this breeding-place and finding their own eggs missing, they would deliberately commence to steal from their neighbours, pushing the eggs along the ground into their own nests with their bills, and appropriating them in the most methodical way. Major Mair's bird of the same species (mentioned on p. 288) would come up regularly at feeding-time and would make its wants known by a loud chuckle accompanied by a comical twisting of its neck. It had also a habit of waddling off to a duck-yard, a distance of a quarter of a mile, apparently for company, and then coming back at the usual time to be fed.

PYGOSCELIS* TÆNIATUS.

(ROCK-HOPPER.)

- Le Manchot Papou*, Sonn. Voy. N. Guin. p. 181, pl. cxv. (1776).
Aptenodytes papua, Forst. N. Comm. Götting. iii. p. 140, pl. 3 (1781).
Papuan Penguin, Lath. Gen. Syn. iii. pt. 2, p. 565 (1785).
Apterodita papuæ, Scop. Del. Faun. et Flor. Insubr. ii. p. 91, no. 71 (1786).
Chrysocoma papua, Steph. Gen. Zool. xiii. p. 59 (1825).
Pygoscelis papua, Gray, List *Anseres* B. M. p. 153 (1844).
Eudyptes papua, Gray, Gen. of Birds, iii. p. 641 (1849).
Aptenodytes tæniata, Peale, U. S. Expl. Exp. p. 264 (1848).
Pygoscelis wagleri, Sclater, Ibis, 1860, p. 390.
Spheniscus papua, Schl. Mus. P.-B. *Urinatores*, p. 5 (1867).
Pygosceles tæniata, Coues, Pr. Ac. Nat. Sci. Phil. 1872, p. 195.
Pygoscelis tæniatus, Scl. & Salv. Proc. Zool. Soc. 1878, p. 653.

Ad. suprâ nigricans vix cinereo lavatus: alis magis cinereis, margine alari conspiciuâ et remigum apicibus fasciam terminalem latam formantibus albis: supracaudalibus rigidis, nigricantibus cinereo lavatis: rectricibus nigris, marginaliter brunnescentibus: fasciâ latâ verticali albâ ab utroque oculo per verticem duetâ: facie laterali et gutture cinerascens, gutturis plumis albido variis: corpore reliquo subtus scribeo-albo: alâ inferiore albâ, remigibus extimis apicaliter cinereis plagam conspiciuam exhibentibus: pectore subalari et plagâ alterâ ad ortum alæ positâ cinereis: rostro lætè aurantiaco, culmine nigro: pedibus aurantiacis: iride lætè brunneâ.

Adult. Head and upper part of neck all round slaty black, excepting only a coronal band of white, extending from eye to eye, which is half an inch or more in width on the sides and narrows to a mere streak in the middle, with some scattered white feathers below it; entire upper surface dull blue-black, more or less intermixed with brown; on the sides of the body, flanks, and upper tail-coverts the blue tinge deepens; lower part of fore neck and entire under surface pure white; flippers dull bluish black, largely margined on the inner edge with white, their under surface being also white with a conspicuous patch of blackish grey at the humeral flexure; tail-feathers long, rigid, and dull bluish black with polished shafts. Bill reddish brown, changing to horn-colour at the tips; legs reddish brown with black claws. Total length 29 inches; length of flipper 8.5; tail 6.25; bill, along the ridge 2.25, along the edge of lower mandible 3.25; tarsus 1; middle toe and claw 3.25.

Young. Differs from the adult only in having the crown-mark narrower and washed with brown; the line of demarcation on the throat less defined, being mixed with grey; and the fore neck, as well as the wing-margin, more or less marked with brown.

Obs. In none of the examples I have examined is the posterior edge of the coronal band regular or well-defined, but is broken, more or less, by small scattered spots which spread downwards towards the nape.

In the Otago Museum there are two specimens (adult and young) obtained from Macquarie Island,

* The genus *Pygoscelis* (established by Wagler in 1832) holds an intermediate position between *Eudyptes* and *Aptenodytes*, and although not among the genera defined in my Introduction (pp. lxi to lxxxiv), I have found it necessary to employ it.

in December 1879, and this is my authority for including this Penguin among the birds of New Zealand.

Its cry is said to resemble the short bark of the fox.

Prof. Moseley states that in the stomachs of some he dissected at the Falkland Islands he found fish-bones, cuttlefish-beaks, and stones.

The Rev. Mr. Eaton gives the following interesting account of its breeding-habits on Kerguelen Island:—"It builds in communities, some of only a dozen, others from 70 to 150 families. A more populous colony upon the mainland was visited by six officers from the ships, who estimated the number of nests in it to amount to 2000 or more. These larger communities are approached from the sea by regular paths, conspicuous at a distance, like well-worn sheep-tracks, which lead straight up the hill from the water. Their formation is due to the Penguins being very particular about where they land and enter the sea. A small party of the birds occupied a position upon the neck of a low promontory within an hour's walk of Observatory Bay. Their nests were nearest to the farther side of the isthmus; but when they were approached the male birds used to run to the water, not by the shortest route where it was deep close to the rocks, but by the longest to a place where the shore was shelving. It was amusing to see them start off in a troop as fast as their legs could carry them, holding out their wings and tumbling headlong over stones in their way, because as they ran they would keep looking back instead of before them, and to hear their outcries. Panic and consternation seemed to possess them all; but the females (possibly because they could not keep up with their mates) seldom went far from their nests, and, if the intruder stood still, soon returned and settled down again upon their eggs. Not many weeks had passed before a change was effected in their conduct. The young were hatched, and now the mothers anxiously endeavoured to persuade them to follow the example of their fathers and run away to sea. But the nestlings preferred to stay in their nests; they did not mind if the stranger did stroke them; although their anxious mothers ran at him with open mouths whenever he dared to do so. Only a few of the older chicks could be prevailed upon to stir, and they after waddling a few yards became satisfied with their performance and turned to go home again. The mothers, who had straggled to a greater distance, began to return too. It was now that the more tardy youngsters began to experience the ills of life. Every Penguin that had reached its place before them aimed blows at them as they passed by towards their own abodes. One of the little birds certainly did seem to deserve correction. It saw its neighbour's nest empty and sat down in it. The old female Penguin, the rightful occupier, presently returned in company with her own chick, to whom, having put her head well into his mouth, she began to administer refreshment after his run. Seeing them so pleasantly engaged, the small vagrant, thoughtlessly presuming on her generosity, went nearer and presented himself to be fed also, as if he had a right to her attention and care. She looked at him while he stood gaping before her with drooping wings, unable for the moment to credit what she saw. But suddenly the truth flashed upon her, and provoked by his consummate audacity she gave vent to her indignation, pecked his tongue as hard as she could, chased him out of the nest, darting blows at his back, and croaked ominously after him as he fled precipitately beyond the range of her beak, leaving trophies of down upon the scene of his unfortunate adventure."

The nests of this Penguin on Kerguelen Island were composed of dried leaf-stalks and seed-stems of *Pringlea*, together with such other suitable material as happened to be at hand, and they usually contained two eggs, one of them invariably larger than the other.

Mr. Howard Saunders found a solitary egg of this species in the collection brought by the 'Transit of Venus Expedition,' and he describes it as being of a pale blue colour, thickly coated with calcareous matter, and measuring 2.5 inches by 2 inches. In the Otago Museum there are two eggs of this Penguin from Macquarie Island. One is almost spherical, the other slightly ovoid; the former measures 2.4 inches in length by 2.25 in breadth, and the more ovoid one 2.4 in length by 2.15 in breadth; they are perfectly white, except where they are soiled by external contact.

APTENODYTES LONGIROSTRIS.

(KING PENGUIN.)

- Patagonian Penguin*, Penn. Phil. Trans. lviii. p. 91, pl. 9 (1768).
Le Manchot de la Nouvelle Guinée, Sonn. Voy. N. Guin. p. 180, pl. 113 (1776).
Apterodita longirostris, Scop. Del. Faun. et Flor. Insubr. ii. p. 91, no. 69 (1786).
Aptenodytes patachonica, Gm. Syst. Nat. i. p. 556 (1788).
Pinguinaria patachonica, Shaw, Nat. Misc. xi. pl. 409 (1800).
Aptenodytes pennantii, Gray, Ann. N. H. 1844, p. 315.
Spheniscus pennantii, Schl. Mus. P.-B. *Urinatores*, p. 3 (1867).
Aptenodytes longirostris, Coues, Pr. Phil. Acad. 1872, p. 193*.

Ad. pilco gulâque et faeie laterali nigris: collo postico tergoque pallidè eyanescens, dorso et uropygio saturatioribus: plagâ latâ aurantiacâ a regione paroticâ posticâ per latera colli angustante, et gulam nigram marginante: colli lateribus cyanescens, antice latè nigro marginatis: jugulo medio aurantiaco: corpore reliquo subtùs omninò sericco-albus, pectoris lateribus dorso concoloribus: alis cinereis, remigibus seriatim cinereo terminatis, margine alari summo nigricante: caudâ nigrâ: rostro nigro, mandibulis rubescenti-flavis, versus apicem nigricantibus: pedibus nigris.

Adult male. Crown, sides of the head, and throat jet-black; spatulate spot on each side of hind head, line down the sides, and the upper part of fore neck deep golden yellow, fading gradually away on the lower part of fore neck; hind neck and general upper surface pale blue, deepening on the back and rump, each feather with a dark centre; underparts yellowish white. From the crown a narrow fringe of black separates the yellow already described from the blue of the nape, and, continuing downwards as far as the wings, spreads outwards till it is an inch in extent. Irides brown; bill black, the flattened sides of the lower mandible (up to within an inch and a half of its extremity) reddish yellow; feet and claws black. Total length 36 inches; length of flipper 11; tail 3.5; bill, along the ridge 3.5, along the edge of lower mandible 4; tarsus 2; middle toe and claw 4.

Nestling. Covered with very dense fine down of a uniform yellowish-brown or dark buff colour in some, while in others it is many shades darker, or dull blackish brown. There is no difference in the appearance of the sexes at this stage.

Obs. There is a specimen (from Maequaric Island) in the Otago Museum in which the colour on the fore neck is a vivid canary-yellow, fading off downwards towards the breast; the head and throat glossy black, so also is the line along the sides dividing the two colours; the plumage of the back is a pale silvery blue; bill black, sides of lower mandible bright yellowish brown; feet black; irides represented as bright yellow.

THE specimen of this noble Penguin in my collection from which my description is taken was obtained on Stewart's Island, where this bird is extremely rare.

* "Dr. Coues, in his 'Monograph' of the *Spheniscidae*, revives Scopoli's name for this species; and in this I think he is justified, for, laying aside Gmelin's title of *patachonica*, which confuses two species, the *Apteryodita* of Scopoli (*l. c.*) seems to be the next in order of priority. It is founded on 'Le Manchot de la Nouvelle Guinée' of Sonnerat (Voy. N. G. p. 180, pl. 113), and although the figure in this plate is very bad, representing the black on the throat as extending far down to the centre of the breast, the description quite agrees." (Sharpe, App. Voy. Ereb. and Terr. Birds, p. 38.)

Cf. also Selater, *Ibis*, 1888, p. 326.

Professor Moseley gives the following account (Voy. Chall., Zool. vol. ii. p. 123) of the breeding-habits of this Penguin at Marion Island in December 1883:—

“Most interesting, however, by far amongst all rookeries of Penguins which I have seen was one of the King Penguins, which I met with a little further along the shore. The rookery was in a space of perfectly flat ground of about an acre in extent. It was divided into two irregular portions, a larger and smaller, by some grassy mounds. The flat space itself had a filthy black slimy surface, but the soil was trodden hard and flat. About two thirds of the space of one of the portions of the rookery, the larger one, was occupied by King Penguins, standing bolt upright, with their beaks upturned, side by side, as thick as they could pack, and jostling one another as one disturbed them. . . . Penguins were to be seen coming from and going to the sea from the rookery, but singly, and not in companies like the Crested Penguins. The King Penguins when disturbed made a loud sound like ‘*urr-urr-urr*.’ They run with their bodies held perfectly upright, getting over the ground pretty fast, and do not stop at all. A good many were in bad plumage, moulting, but there were plenty also in the finest plumage. On the small area of the rookery, which consisted of a flat space sheltered all round by grass slopes, and which formed a sort of bay amongst these, communicating with the larger area by two comparatively narrow passages, was the breeding-establishment.

“These birds are said by some observers to set apart regular separate spaces in their rookeries for moulting, for birds in clean plumage not breeding, and again for breeding-birds. Here the breeding-ground was quite separate, and the young and breeding-pairs were confined to this smaller sheltered area. This was the only King-Penguin rookery which I saw in full action.”

The Rev. Mr. Eaton writes (Zool. Kerg. Isl. p. 153):—“In December and January small parties of these Penguins come into sheltered inlets to moult. . . . There are so few land animals on Kerguelen Island that the unwonted sight of people walking never failed to attract the notice of the King Penguins. Standing at their ease in their sheltered hollows they uttered as it were derisive cries from time to time while the strangers laboured through the *Azorella*. Seldom did they take the trouble to stir when anyone approached them, but remaining in a group, some standing still, others lying down, they quietly awaited the progress of events. Their unconsciousness of danger was singularly shown by the following incident. One day while grappling for *Algæ* in Swain’s Bay, I came with one of the men upon six ‘Kings’ in a group. Seeing that some of them had finished moulting and were well coloured, we walked up to them, seized the two finest by their necks, and sat down upon their backs. The others stayed beside us unconcerned at the fate of their companions, though they were beating the ground beneath us with their wings and gasping for breath within a yard or so of them. ‘What shall be will be’; so they made themselves comfortable, and they were not molested.”

The egg of this Penguin is of a remarkable shape, being perfectly pyriform. I have before me now two specimens from Macquarie Island. Both are alike in this respect, although one appears to have the apex a little more produced than the other. The more regular pear-shaped one measures exactly four inches in length by three inches in breadth, and is of a pale greenish white; the shell is of close texture, with a roughened surface, the whole of it being covered with prominent papillæ, which are larger and more thickly spread around the central circumference. The other egg gives a measurement only one eighth of an inch shorter by one sixteenth narrower; consequently the more produced appearance is due rather to shape than size. It likewise has a rough surface, but it wants the papillæ, and the entire shell is stained and smudged to an unequal yellowish-brown colour. These eggs were collected on Macquarie Island on the 19th November, which fixes the breeding-time of this Penguin.

APTERYX BULLERI.

(NORTH-ISLAND KIWI.)

- Apteryx australis*, Gould, B. of Austr. vi. pl. 2 (1848, nec Shaw).
Apteryx australis var. *mantelli*, Finsch, J. f. O. 1872, p. 263.
Apteryx mantelli, Buller, Birds of New Zealand, 1st ed. p. 358 (1873, nec Bartlett).
Apteryx mantelli, Sharpe, App. Voy. Ereb. and Terr. p. 36 (1875, nec Bartl.).
Apteryx bulleri, Sharpe, Proc. Well. Phil. Soc. p. 6 * (1888).

Native names.—Kiwi and Kiwi-parure.

Ad. rufescens: dorsi plumis rufescentibus ad basin pallidioribus, utrinque nigro marginatis, quasi striatis, scapis plumarum productis, duris: pilco et collo postico nigricanti-brunneis, plumis ad basin grisescentibus: fronte et facie laterali clariùs grisescentibus, illâ pallidiorc: gutture sordidè brunnescente: corpore reliquo subtùs grisescenti-brunneo, plumis medialiter pallidioribus, quasi striolatis: corporis lateribus dorso concoloribus: rostro albicanti-corneo: pedibus saturatè brunneis: iride nigrâ.

* Dr. Finsch, as far back as 1871, wrote to me:—"You are quite right in what you say about Bartlett's *Apteryx mantelli*. This is, as I have already stated, by no means a species; for all the characters given by him are without value. I have examined about twenty specimens, from the South Island, and they all belong to one and the same species. Bartlett was not, at the time he described his bird, aware of the great variation in the size of the two sexes, and in the scutellation of the tarsus also. Sometimes the scutellation in one and the same bird is different in the two legs. In any case, his name of *Apteryx mantelli* cannot become applied to the North Island bird, and will always remain a synonym of *A. australis*. The North Island bird, if it is in reality a distinct species, must have a new name; and if satisfied with the characters, on an actual comparison of specimens from the North and South Islands, I propose to distinguish the northern species as *Apteryx bulleri*."

As will be explained further on (see p. 324), Dr. Finsch arrived at the conclusion that the two birds were inseparable. Holding strongly to the opposite view, I figured and described the North Island bird, in my former edition, under the name of *Apteryx mantelli*.

Mr. Sharpe, after a close study of a complete series of specimens in my collection, has lately contributed a paper on this subject to the Wellington Philosophical Society (*l. c.*), in which he says:—"During a recent examination of some skins of Apteryges, in company with Sir Walter Buller, I became firmly convinced that the ordinary brown *Apteryx* of the North Island is certainly specifically distinct from the *Apteryx australis* of the South Island; and I was a little surprised to find, on going over the literature of the subject, that, notwithstanding a similar verdict on the part of such excellent naturalists as Sir James Hector, Sir Julius von Haast, Professor Hutton, Mr. Potts, and others, the North-Island bird has not yet received a distinctive name. It has generally been called by naturalists *Apteryx mantelli* of Bartlett, under which name it appeared in the first edition of Buller's 'Birds of New Zealand,' and it is the *Apteryx australis* var. *mantelli* of Finsch's paper in the 'Journal für Ornithologie' (1872, p. 263). The characters given by Mr. Bartlett for his *Apteryx mantelli* are founded on the natural variations of *Apteryx australis*, of which *A. mantelli* is a pure synonym, and the North Island Apteryx awaits a title. The pair of adult birds in Sir Walter Buller's collection are relatively much smaller than the corresponding sexes of *A. australis*, and the colour is of a blackish brown instead of a tawny tint, while the curious harsh structure of the plumage, especially of the feathers of the rump and nape, is a further character of importance.

"It gives me great pleasure to adopt a suggestion of my friend Dr. Finsch that the North Island Apteryx be called *Apteryx bulleri*, after the learned author of the 'Birds of New Zealand,' a work which, in its first edition, seemed to me to be as complete as it was possible to make a history of the birds of any single area until I saw the magnificent new edition on which Sir Walter Buller is now engaged, and on the completion of which I should think any one would find it difficult to write anything more about the birds of New Zealand."



NORTH-ISLAND KIWI.
APTERYX BULLERI.
(TWO-FIFTHS NATURAL SIZE)



Adult. Head, neck, and fore part of breast dark greyish brown, the produced filaments of the feathers black, inclining to grey towards the base of the bill; general plumage of the upper parts dark rufous streaked with blackish brown; lower part of breast, abdomen, and inner side of thighs pale greyish brown. The streaky appearance of the upper surface is produced by each feather having the centre pale rufous-brown, darker towards the tip, and the long hair-like filaments on both sides black; the fluffy basal portion of the feather is of a uniform light grey. The long straggling hairs or feelers which beset the fore part of the head and angles of the mouth are jet-black. Irides black; bill clear white horn-colour; tarsi and toes pure whitish or pale brown to dark brown; claws blackish brown, that of the middle toe whitish towards the base.

Male. Extreme length, following the curvature of the back 23 inches; bill, along the ridge 4.25, along the edge of lower mandible 4.85; tarsus 2.75; inner toe and claw 2.25; middle toe and claw 2.9; outer toe and claw 2.1; hallux or hind tarsal claw .5.

Female. Extreme length, following the curvature of the body, 27.5 inches; bill, along the ridge 6, along the edge of lower mandible 6.6; tarsus 3.5; inner toe and claw 2.6; middle toe and claw 3.4; outer toe and claw 2.2; hallux or hind tarsal claw .75.

Obs. As will be at once apparent from the above measurements, the male is considerably smaller than the female. It is moreover usually of a brighter rufous, inclining to chestnut-brown, although the tone of the colouring in different examples is somewhat variable.

The males have pale brown legs and feet, sometimes whitish, and occasionally marked with blackish brown on the hind part of the tarsus. The females have occasionally the same, but generally their tarsi and toes are dark brown, and sometimes (in very old birds) uniform brownish black.

Young male. A young male which I received from the Upper Wanganui, in October 1870, had the general tints of the plumage lighter than in the adult female, but not so bright as in ordinary examples of the adult male; the sides of the head whitish grey, with a dark ear-spot; the bill 3 inches long and of a white horn-colour; tarsi in front and toes whitish or flesh-coloured; the edges of the metatarsal scutella margined with pale brown, hind part of tarsi and soles darker, and the claws blackish brown. In this bird the feathers of the back were far less rigid than in the full-grown bird; the rudimentary wings were furnished with a delicate sharp-pointed spur of an arched form, half an inch in length, brown in its basal portion and yellowish towards the tip. The tubes of the quills were extremely small, narrow, and flexible, the feathery shaft being far more ample in proportion than in the adult bird.

In another example of the young bird (in a more advanced condition, judging by the greater strength of the quills) the tarsi and toes were of a dark greyish-brown colour.

Younger state. In the very young bird the plumage is soft and fluffy, and of a uniform dull blackish brown, with the rigid tips of the shafts and the produced hair-like filaments black; paler or greyer on the head and throat. Bill shining ivory-white; tarsi and toes delicate grey; claws black.

Obs. To show how much individuals of both sexes vary in size, I will give here the measurements of two fully adult birds captured by myself in the Pirongia ranges:—

♂. Length (measured as above) 22 inches; bill, along the ridge 3.75, along the edge of lower mandible 4.25; tarsus 2.5; middle toe and claw 2.

♀. Length 25.25 inches; bill, along the ridge 5.2, along the edge of lower mandible 5.75; tarsus 2.75; middle toe and claw 2.75.

In the last-mentioned bird the plumage is in excellent order (in spite of the breeding-season, which is destructive to most specimens), and the legs and feet are of an almost uniform blackish brown, the scutella, which are very regular and distinct, having the centre somewhat lighter.

Another female, from Kawhia, gives the following measurements:—Length 26 inches; bill, along the ridge 5.5, along the edge of lower mandible 6; tarsus 3; middle toe and claw 3.

Varieties. There is much individual variety in the shade of the plumage, some being of a lighter and brighter rufous-brown than others, and some being entirely blackish brown on the upper surface; but on a general view the species is decidedly darker than *Apteryx australis* of the South Island. As mentioned above, the

male bird has light-coloured and the female dark-coloured legs and feet, but the rule in regard to the latter has its exceptions. It would seem that the older the female bird gets the darker become the extremities, and there is every reason to believe that the Kiwi, like other struthious birds, lives often to an extreme age.

A specimen obtained by me on the Pirongia mountain, during a Kiwi-hunt fully described in the following pages, is deserving of special mention here. The natives called it a "Kiwi-kura," in allusion to the reddish hue of its plumage. Instead of being blackish brown or rufous brown like the rest, the whole of the body-plumage is of a uniform dull brick-red; and, what is more remarkable still, instead of the plumage being thickset with narrow shaft-lines, the feathers are long, broad, and fluffy, but with numerous stiff filaments, thus preserving the distinctive character of *Apteryx bulleri*, as hereinafter explained. The face, chin, and upper part of the throat are greyish white; tarsi and toes pale greyish brown; claws greyish black with white ridges. The stomach contained hinau and taiko berries. On dissection it proved to be a male, the testes being largely developed. Extreme length, following the curvature of the back, 24 inches (to end of outstretched legs 30.75); bill, along the ridge 4, along the edge of lower mandible 4.75; tarsus 2.5; middle toe and claw 3.

This very interesting specimen was found in a nest-burrow with two young birds; and, as might have been expected, these, instead of being almost black, like ordinary examples, were reddish brown with much softer plumage. One of these chicks afterwards made its escape; the skin of the other (which proved on dissection to be a male) is in my collection. At the age of three weeks it gave the following measurements:—Length 9.5 inches; bill, along the ridge 1.75, along the edge of lower mandible 2.25; tarsus 1.5; middle toe and claw 1.75. The frayed or open character of the plumage so conspicuous in the adult is likewise congenital.

There was a somewhat similar bird to this (also a male) in the collection which I presented some years ago to the Colonial Museum; but in that example the colour was brighter and more inclined to chestnut.

In Sir Robert Herbert's collection of New-Zealand rarities at Ickleton there is a fine female specimen of *Apteryx bulleri* from the Pirongia Ranges, in which not only is the plumage darker than in ordinary examples, but the tarsi and toes are almost black. There is a similar specimen (likewise a female) in my own collection. These were the only black-legged examples out of some thirty adult birds examined by me from that locality; but a male specimen from the Hokianga district has the plumage even darker and the tarsi and toes perfectly black. A fourth example from the Kawhia district (an adult female), which I purchased alive from the natives, has the extremities brownish grey, with black borders to the well-marked scutella. This bird likewise differs from the typical form in having the bill dark brown on its upper surface from the base to the tip, with a tinge of the same colour on the lower mandible; and the claws blackish brown with whitish or horn-coloured ridges.

In the structure of the plumage also there is more or less variation observable. Some have the prickly character, owing to the rigidity of the produced shafts, more pronounced than others; and in some the plumage is thicker and longer than in others. In one of my specimens from Pirongia the plumage of the shoulders is so dense and long that it forms, as it were, an overhanging mantle.

It is said that during one hunting-season (in 1885) the Taupo natives caught on the Kai-manawa Ranges no less than three hundred Kiwis, of which five were albinos. One of these was brought in to Taupo alive, and was in Major Scannell's charge for about five weeks. Ultimately it came into the possession of Mr. Thomas Morrin of Auckland, who forwarded it to the Zoological Society of Sydney. Major Scannell informs me that it was a very handsome bird, being snow-white in every part, even to the bill and legs; and that, owing to the extreme softness of the plumage, the bird looked, when at rest, exactly like a ball of white wool. Soon after its capture it became quite tame and ate voraciously of earthworms, a quart measure of which would disappear in a day. It did not long survive its expatriation, and is now preserved in the Australian Museum.

General Remarks. Although the head of the *Apteryx* is small, the neck is large and muscular. There is also a great development of muscle on the thighs; and the feet are strong and powerful, and armed with sharp claws. (In the adult female, of which the general measurements are given above, the circumference of the tibia in its largest part was 6.25 inches, of the tarsal joint 3.25, and of the tarsus 2.) The bill is broad at the base, then tapering, gently arched, and very much produced, with a slight enlargement at the tip, under which the nostrils are situated. The tongue is short and flattened, very thin, but rigid in its anterior portion, with an even width of .2 of an inch, and rounded at the extremity. The wings are

rudimentary, and are entirely concealed by the plumage of the body: in a bird of the largest size the humerus measures only 2 inches, and the cubitus 1.25. At the extremity of the latter there is a slender claw or spur, like a twisted piece of wire in appearance, bluish black in colour, and varying in length from half an inch to 1.1, being generally more largely developed in the female. The tubes of the quills in a full-grown specimen are 1.25 of an inch in length, and .1 of an inch in diameter in their thickest part. In the fully adult bird the scales covering the tarsi and toes are closely set with overlapping edges, and are perfectly smooth; in the young they are soft and detached, presenting a reticulated surface. The feathers are lanecolate and composed externally of long disunited barbs or filaments; the downy portion towards the roots is very largely developed, and far exceeds in extent the exposed or hairy portion. They are destitute of the accessory plumule so highly developed in some of the struthious birds, for example in the Emu and Cassowary; but the basal or concealed portion of each feather is very fine and silky. Beyond the extremity of the barbs the shaft becomes more rigid, and on the upper and hind parts of the body it is produced to a sharp point. The development of this structure to such an extent as to render the plumage stiff and harsh to the touch is the character which separates the present species from its near ally *Apteryx australis*. The fore part of the head and sides of the face are beset with straggling hairs or feelers, varying in length from 1 to 6 inches, and perfectly black.

A FULL and complete history of the remarkable wingless birds which, even to the present day, form the most distinctive feature in the avifauna of New Zealand, would necessarily fill a volume. As, however, the osteology and anatomy of these singular forms have already been exhaustively discussed by Professor Owen in several able 'Memoirs' published by the Zoological Society, I do not propose to touch on this part of the subject, but rather to confine myself to some account of their life-history; and as the habits of the several species of *Apteryx* at present known to us appear to be the same in almost every respect, I consider it sufficient for my present purpose to record the observations I have made on the bird inhabiting the North Island, an excellent portrait of which, from a living bird, is given on the foregoing Plate.

Some six-and-twenty years ago, when residing at Wellington, I received, through the kind offices of Mr. Richard Woon, my first live specimens of the *Apteryx*. They were eight in number, mostly females, and all full-grown. Three of these birds having shortly afterwards died, I forwarded them in spirits to Professor Owen, to assist him in his examination of the anatomy of this anomalous form. The others remained in my possession for a considerable time; and I was thus afforded a favourable opportunity of studying their peculiarities of structure and habit. In the letter forwarding them, Mr. Woon gave the following information:—"They were caught by muzzled dogs in the bosky groves and marshes of the Upper Wanganui, at a place called Manganuioteao, about 100 miles from the mouth of the river. There are great numbers still to be found in this district. They go together in companies of from six to twelve, and make the country resound at night with their shrill cry."

During my subsequent residence at Wanganui as Resident Magistrate, I had in my possession at various times no less than seventeen of these birds, of different ages, and all obtained from the same locality, which appears to be one of the last strongholds of the *Apteryx* in the North Island. In former years they were very abundant in the mountainous part of the Hokianga district, north of Auckland; but according to all accounts they are now comparatively scarce in that part of the country. To the present day they linger on some of the small islands in the gulf of Hauraki; for although so singular a fact has often been called in question, resting as it apparently did on the mere assertion of the natives, the matter was placed beyond all dispute by Mr. T. Kirk, who obtained several himself on the Little Barrier.

The natives whom I found camping at the foot of the Kaimanawa range in March 1887 assured me that the Kiwi was still very plentiful there. About a fortnight before the date of my visit (or end of February) they captured a female with a well-grown young one in a hollow log. It may be inferred therefrom that this species commences nesting about the beginning of January.

I cannot better illustrate the habits of this bird under confinement than by giving the following extracts from a notebook containing the record of my own observations from time to time. The first entry relates to a fine bird brought to me by a native from Ranana, who stated that he had taken it from a small natural cavity on the slope of the Mairehau hill, some fifty miles up the Wanganui river.

“Oct. 1866. One of the inmates of my aviary at present is an adult female Kiwi, only recently captured. During the day it retires into a small dark chamber, where it remains coiled up in the form of a ball—and if disturbed or dislodged, moves drowsily about, and seeks the darkest corner of its prison, when it immediately rolls itself again into an attitude of repose. It appears to be blinded by the strong glare of sunlight; and although it recovers itself in the shade, it can then only detect objects that are near. Night is the time of its activity; and the whole nature of the bird then undergoes a change: coming forth from its diurnal retreat full of animation, it moves about the aviary unceasingly, tapping the walls with its long slender bill, and probing the ground in search of earthworms. The feeding of this bird at night with the large glow-worm (‘toke-tipa’ of the natives) is a very interesting sight. This annelid, which often attains a length of 12, and sometimes 20 inches, with a proportionate thickness, emits at night a bright phosphoric light. The mucous matter which adheres to its body appears to be charged with the phosphorus; and on its being disturbed or irritated the whole surface of the worm is illumined with a bright green light, sufficiently strong to render adjacent objects distinctly visible. Seizing one of these large worms in its long mandibles, the Kiwi proceeds to kill it by striking it rapidly on the ground or against some hard object. During this operation the bird may be clearly seen under the phosphoric light; and the slime which attaches itself to the bill and head renders these parts highly phosphorescent, so that, even after the luminous body itself has been swallowed, the actions of the bird are still visible. There is no longer the slow and half stupid movement of the head and neck; but the bill is darted forward with a restless activity, and travels over the surface of the ground with a continued sniffing sound, as if the bird were guided more by scent than by sight in its search for food.”

The subject of this notice having afterwards died, I sent the skeleton (skilfully prepared by the late Dr. Knox) to Professor Newton, of Cambridge; and it still occupies a place of honour in the University Museum.

The next entry in my notebook refers to a purchase of eight from the Upper Wanganui natives in October 1870:—“The lot consists of two adult males, one young male, three adult females, and two young birds of doubtful sex. One of the females has the plumage very much faded and worn, resembling somewhat that of the Australian Emu, the tips of the feathers having, as it were, a weather-beaten appearance. The old birds are shy, always attempting to hide themselves from view, but very vicious when taken hold of: they struggle violently and utter a low growling note, accompanied by a vigorous striking movement of the feet. The young birds are particularly savage, and instead of running away they charge you in the most plucky manner, using their feet as weapons of offence: when provoked they manifest their anger by an audible snapping of the bill; and at other times they emit a peculiar chuckle, not unlike that of a brood-hen when disturbed on her nest. I have only once heard these captives produce the loud whistling cry which is so familiar to the ear in the wild mountain-haunts of the Kiwi. The birds occupy at present an empty stall in my stable, and they find both concealment and warmth by burying themselves in a heap of loose straw. During the day they remain coiled up in the form of an almost perfectly round ball, with the head and bill hidden beneath the dense hair-like plumage of the body. If hungry, however, they will sometimes wander about in a desultory manner, probing or touching every object with their bills. They often huddle together when at rest, lying one upon another like little pigs; and when sound asleep no amount of noise will rouse them. On being thrust with a stick, or rudely wakened, they move about in a drowsy inert manner, and soon

relapse into a state of apparent lethargy. They have naturally a peculiar earthy smell; and the place in which they are confined has acquired a very perceptible odour. On taking my dog to a spot in the garden where the Kiwis had been probing for worms on the previous day, he took up the scent very readily, and followed it without any check. I am informed by old Kiwi-hunters that the bird is easily 'brought to earth,' and captured by dogs accustomed to the work, and that in former times a hundred or more have been taken in this way in the course of a single night. My birds have shown a preference for earthworms; but they will also partake readily of minced liver, or pounded flesh of any sort. For the first few days of their captivity the old birds ate very sparingly of this new diet; but the young ones were not so fastidious, eagerly devouring any thing that was offered them."

The Kiwi is in some measure compensated for the absence of wings by its swiftness of foot. When running it makes wide strides and carries the body in an oblique position, with the neck stretched to its full extent and inclined forwards. In the twilight it moves about cautiously and as noiselessly as a rat, to which, indeed, at this time it bears some outward resemblance. In a quiescent posture, the body generally assumes a perfectly rotund appearance; and it sometimes, but only rarely, supports itself by resting the point of its bill on the ground. It often yawns when disturbed in the daytime, gaping its mandibles in a very grotesque manner. When provoked it erects the body, and, raising the foot to the breast, strikes downwards with considerable force and rapidity, thus using its sharp and powerful claws as weapons of defence. The story of its striking the ground with its feet to bring the earthworms to the surface, which appears to have gained currency among naturalists, is as fanciful as the statement of a well-known author that it is capable of "inflicting a dangerous blow, sometimes even killing a dog!"

While hunting for its food the bird makes a continual sniffing sound through the nostrils, which are placed at the extremity of the upper mandible. Whether it is guided as much by touch as by smell I cannot safely say; but it appears to me that both senses are called into action. That the sense of touch is highly developed seems quite certain, because the bird, although it may not be audibly sniffing, will always first touch an object with the point of its bill, whether in the act of feeding or of surveying the ground; and when shut up in a cage or confined in a room it may be heard, all through the night, tapping softly at the walls. The sniffing sound to which I have referred is heard only when the Kiwi is in the act of feeding or hunting for food; but I have sometimes observed the bird touching the ground close to or immediately round a worm which it had dropped without being able to find it. I have remarked, moreover, that the Kiwi will pick up a worm or piece of meat as readily from the bottom of a vessel filled with water as from the ground, never seizing it, however, till it has first touched it with its bill in the manner described. It is probable that, in addition to a highly developed olfactory power, there is a delicate nervous sensitiveness in the terminal enlargement of the upper mandible. It is interesting to watch the bird, in a state of freedom, foraging for worms, which constitute its principal food: it moves about with a slow action of the body; and the long, flexible bill is driven into the soft ground, generally home to the very root, and is either immediately withdrawn with a worm held at the extreme tip of the mandibles, or it is gently moved to and fro, by an action of the head and neck, the body of the bird being perfectly steady. It is amusing to observe the extreme care and deliberation with which the bird draws the worm from its hiding-place, coaxing it out as it were by degrees, instead of pulling roughly or breaking it. On getting the worm fairly out of the ground, it throws up its head with a jerk, and swallows it whole.

In preparing my specimens I was astonished at the toughness of the skin, even in the very young birds; and the late Mr. Dawson Rowley, writing of the dried skin, sent me the following interesting note:—"I have a portion of the skin of an adult male *Apteryx* before me; this is so thick that a pair of light shoes might easily be made of it. In setting up these birds, the toughness of the skin

is such that it can hardly be relaxed: water has little effect upon it. It resembles leather, and is more like the skin of a mammal than that of a bird."

From time to time live examples of the *Apteryx* have been received by the Zoological Society; and the following notes by Mr. Bartlett, on the incubation of this bird in the "Gardens" (P. Z. S. 1868, p. 329), are worth quoting:—

"In 1851 Lieut.-Governor Eyre presented to the Society an *Apteryx*. This bird proved to be a female. In the year 1859 she laid her first egg, and has continued to lay one or two eggs every year since that time. In 1865 a male bird was presented by Henry Slade, Esq. During the last year these birds showed symptoms of a desire to pair. This was known by the loud calling of the male, which was answered by the female in a much lower and shorter note. They were particularly noisy during the night, but altogether silent in the daytime. On the 2nd January the first egg was laid, and for a day or more the female remained on the egg; but as soon as she quitted the nest the male bird took to it, and remained constantly sitting. On the 7th of February the second egg was laid, the female leaving the nest as soon as the egg was deposited. The two birds now occupied the two opposite corners of the room in which they were kept, the male on the two eggs in the nest under the straw, the female concealed in her corner, also under a bundle of straw placed against the wall. During the time of incubation they ceased to call at night—in fact, were perfectly silent, and kept apart. I found the eggs in a hollow formed on the ground in the earth and straw, and placed lengthwise side by side. The male bird lay across them, his narrow body appearing not sufficiently broad to cover them in any other way; the ends of the eggs could be seen projecting from the side of the bird. The male continued to sit in the most persevering manner until the 25th April, at which time he was much exhausted, and left the nest. On examining the eggs I found no traces of young birds. Notwithstanding the failure of reproducing the *Apteryx*, I think sufficient has been witnessed to show that this bird's mode of reproduction does not differ essentially from that of the allied struthious birds, in all cases of which, that have come under my observation, the male bird only sits."

The enormous size of the Kiwi's egg has often been the subject of speculation and comment; for, till the fact was established beyond all question, it seemed almost impossible that the very large eggs occasionally brought in by the natives were the produce of this bird. In the spring of 1870 I had the pleasure of forwarding several live examples of the *Apteryx* to the Hamburgh Consul at Wellington, for transmission to the Zoological Society of Berlin; and one of these afterwards furnished the subject of the following notice in the minutes of the Wellington Philosophical Society*:

"Dr. Hector drew the attention of the meeting to an interesting specimen of an egg of the Kiwi taken *in utero*. He stated that the bird from which the specimen had been taken belonged to Mr. Krull, and had recently died. It had been presented to the Museum; and on being skinned, it was found to contain a fully formed egg, the large size of which had evidently been the cause of the death of the bird. He considered the specimen unique and setting at rest all doubt as to whether the Kiwi really lays an egg so disproportionately large to the size of the body of the bird."

The period of gestation in this bird appears to be unusually protracted; and one of my captives, for the space of forty days before extruding her egg, moved about with evident difficulty, being apparently unable to stand upright, resting the weight of the body on the heel of the tarsus, and walking in a staggering manner. She laid a very large egg on the 22nd March, recovered her full activity on the following day, moped on the next, and died on the 25th.

Since the foregoing pages were written, for my former edition of this work, I have had an opportunity of seeing the Kiwi in its home, and of studying the natural history of the species in its wild state.

* Trans. N.-Z. Inst. 1870, vol. iii. p. 73.

In October 1882 I was attending the Native Land Court at Cambridge professionally, and in order to enable the native tribes to attend a projected meeting between the Minister for Native Affairs and the "Maori King" at Whatiwhatihoe, I had applied to the Court for a week's adjournment, which was accordingly granted. This gave me the long-desired opportunity for a Kiwi-hunt in the celebrated Pirongia ranges. Owing to our strained relations with the "King party," no European had been admitted into this part of the country for many years. It was necessary therefore to obtain King Tawhiao's consent before starting on the expedition. This was readily obtained at a private interview with the old chief, who assured me that, owing to the long closure, "the mountain was now full of Kiwis." I then saw Keremeneta Ngataierua, a well-known Kiwi-hunter and the owner of well-trained dogs, and made arrangements for an expedition on the morrow. His party had already been out and caught a few birds, bringing in also three chicks and an egg, containing an embryo just ready for extrusion. I purchased the egg, and one of the women present then produced a newly-hatched chick from her bosom (where it was kept for warmth) and gave it to me. This young bird seemed at first very weakly and on being turned loose in my room assumed the posture shown in my sketch, and remained perfectly motionless till darkness came on, when it assumed quite a lively *rôle*—running about the room and gently tapping with its bill, after the manner of the old bird, as already described.

After sketching the likeness of this defenceless chick (which proved to be a male) I sacrificed his little life on the sacred altar of science and made a pretty cabinet specimen of the skin (see woodcut on page 326).

At noon on Tuesday, Nov. 1, we had completed all our arrangements for a week's sojourn in the bush and started, fully equipped, for a small kainga, about a mile from Alexandra, where we found our men and dogs awaiting us. The former consisted of an experienced Kiwi-hunter, Wiremu Rihia by name, and two young natives who were to carry our provisions and make themselves generally useful. The dogs were small black mongrels, one of them having something of the colley in him. My companion was Mr. G. Lindauer, the well-known Austrian artist, who fully shared my enthusiasm about a Kiwi-hunt. Some little time was lost in arranging terms with the men and a tariff for the use of the dogs. The latter was ultimately fixed at five shillings for every adult Kiwi taken and something less for the young ones and eggs. It was 3 P.M. before we got fairly started on our expedition. The central cone of Pirongia, which encloses an ancient volcanic crater, towers up to a height of 2800 feet above the level of the sea, and is clothed with dense vegetation to its very summit. The ascent commenced at once, and in less than an hour we had reached the site of the ancient Pirongia pa, the earthworks of which were still distinctly traceable, indicating fortifications of a very formidable kind in the olden time. From this point we obtained a grand panoramic view of the Waikato lands—the theatre of the late war between the British troops and the Maoris, lasting over several years and costing much "blood and treasure." Away to the right, standing up in bold relief against the sky, was Kakepuku, in the form of a natural pyramid, and, in the distance beyond, the long central range of Maungatautari, marking the ancestral home of the Ngatiraukawa. Far down below us, winding through the plains and showing itself at intervals like a broad streak of molten silver, was the picturesque Waipa river, bounding the "King's territory" and spanned, in the direct line of our view, by the new bridge leading to Whatiwhatihoe, recently opened by the Native Minister, and named by the king, in a symbolic way, Tawhara-kaiatua. Away to the extreme right, looking hazy blue in the afternoon light, were the heights of Rangitoto, where, according to our native guides, there exists another Kiwi preserve; and far beyond again could be seen the snow-clad tops of Tongariro and Ruapehu, the giants of the north. In the deep gullies around and in front of us clumps of native bush in all its endless variety filled in the view, the ever-present tree-fern with its lofty crown of spreading fronds being the predominant feature. Groves of these beautiful

objects, and thousands of single ones scattered through the bush, render the landscape characteristic and picturesque. After a brief halt, our natives resumed their swags and we continued the ascent, arriving at Pukehoua, at the edge of the mountain-forest, in time to fix our little camp and cook the evening meal before the shades of night had closed in upon us.

At daybreak one of the native attendants called me up to hear the rich flute-notes of the Kokako (*Glaucopsis wilsoni*) in the low timber at the edge of the forest. I went after him with my gun, but owing to the thickness of the underwood I failed to find the bird. Leaving our camp at 6 A.M. we entered the dense bush and resumed our ascent of the range. Before we had gone far the dogs (each of whom carried a sheep-bell around his neck) took up the Kiwi scent and disappeared down a ravine, one of the natives dashing after them. He presently reappeared with a fine female Kiwi, which was immediately secured in a Maori ket. I returned with him to the spot and saw at once how utterly hopeless it would be to attempt Kiwi-catching without dogs. Near the bottom of a deep gully, completely choked up with the ground-kiekie (*Freycinetia banksii*), so thick and luxuriant indeed that it was a matter of difficulty to push through it at all, down among the gnarled roots of a tawhero, and quite hidden by a growth of *Asplenium bulbiferum* and other ferns, was the entrance to the Kiwi's retreat—a rounded and perfectly artificial entrance, just large enough to admit the hand. I inserted my arm to its full length and could just reach the extremity of the chamber, which spread laterally and widened at a little distance from the mouth. On getting back to the track on the ridge, the natives showed me another "rua-kiwi," from which they had, not long before, taken an adult Kiwi and an egg. This hole was in brown vegetable mould alongside a fallen tree, and the entrance was so perfectly round that I at once felt persuaded that the Kiwis, if they do not actually dig or burrow their holes with their well-armed feet, at any rate scrape and adapt them. Natural holes and cavities are so numerous, owing to the gnarled character of the roots, that the birds would have no difficulty in finding a cavity suitable for nesting-purposes, with the smallest possible labour in preparing it. But more about this anon. After a couple hours' tramp through the bush we came to the place previously decided on for our camp and daily rendezvous.

Our natives were not long in putting up a double shelter, in the form of an inverted V, with the apex open. A log fire occupied the space between, the opening in the roof permitting the smoke to escape. My friend and myself occupied one side and the natives the other. These bush huts, which are quite impervious to the rain, are very simply and rapidly constructed. First, a slanting framework of slender sticks cut from the adjoining woods is erected, and this is thatched on top and sides with the pliant leaves of the nikau palm (*Areca sapida*), the long fronds being skilfully interlaced together, and covered on the outside with a thick layer of tree-fern branches placed with the lower surface reversed, so as to prevent annoyance from the dusty seed-spores.

Our camping-place was conveniently chosen, with ready access to firewood and water, besides being a very picturesque spot; and as it may give some faint idea of the richness and surpassing loveliness of the New-Zealand "Bush," I shall endeavour to describe it. Behind and overshadowing us was a grove of fine tawa trees, their tops meeting so as to admit only a glimmering of the sunlight, and immediately beyond them, in striking contrast with the clear, upright boles of the former, a group of tawhero, their trunks covered from the ground upwards with a dense growth of climbing kiekie, spreading out its tufted arms in all directions. Right in front of us was a thick and almost impenetrable tangle of undergrowth, laced together with the kareao-vine, which hangs its wiry cables from the tree-tops above and twists and coils about among the underwood in every conceivable form. Then a little to the right and open to the light of heaven through a gap in the forest could be seen a lovely group of *Cyathea medullaris*, the stems of the largest being some forty feet in height, and in their very midst, touched by their waving fronds and leaning against a sturdy hinau, stood a withered, crownless trunk, covered with a thick profusion of epiphytic plants in every shade

of green, and forming with the tree-ferns a study that I was never tired of gazing upon from our open shelter. When broad daylight poured in upon us through the opening in the forest, or the slanting rays of the setting sun lighted up the feathery crowns of these majestic tree-ferns, casting the vegetation below into deeper shade, the effect was simply enchanting. Then out of the tangle in front there rose a beautiful specimen of *Cyathea dealbata*, its star-like crown, a perfect model of graceful symmetry, and its lofty stem draped with creeping kohia of brilliant green; while, to heighten the general effect, there hung from a neighbouring tree festoons of the beautiful white clematis, just bursting into full bloom. Examined more in detail the surroundings of our little camp were full of interest. The whole ground was carpeted with mosses and ferns of all the commoner species, whilst a fallen log at our very feet presented on its damp surface a perfect garden of the curious kidney fern (*Trichomanes reniforme*)—tens of thousands of beautiful ferns of vivid satiny-green crowding one upon another in endless profusion, intermingled with the delicate fronds of *Hymenophyllum*. Whilst we were engaged in camp preparations the native lad who had taken charge of the dogs came in with three fine Kiwis, caught in our vicinity, but unfortunately crushed to death, as the dogs were left unmuzzled.

After having refreshed ourselves in the morning, we started on our first real Kiwi-hunt. We took a course down the side of the gully and were soon in a perfect labyrinth of supplejack (*Rhipogonum scandens*). These vines hung from the trees, ran along the ground, twisted around each other and crossed and recrossed, forming the most complete Chinese puzzle one could imagine, and so interlacing the underwood together that it was a matter of extreme difficulty to get through it even at a slow pace. Then when the little dogs took up the scent and disappeared down the gully it became necessary to follow quickly in the direction their bells indicated, so as to be “in at the death;” and then the hunt became as exciting as it was difficult—the kareao catching the feet and tripping one up or striking painfully across the shins—and so up and down, now swinging by a vine, now pushing on all fours through the tangle; forcing one’s way through clumps of kiekie and dense beds of *Lomaria* down into the bottom of the ravine; then, as the scent led upwards, following the tinkling bells (the dogs being out of sight) up the tangled slope again, the course sometimes forming a complete circuit of the “field” and representing the erratic wanderings of the Kiwi upon the feeding-ground the night before. Heated, out of breath, scratched in the face and hands, and with our shins aching from repeated contact with the kareao-vines, every now and then we halted to ascertain by the sound of the bells the position of the dogs, and then, full of excitement, resumed our novel chase again. At length, just beside a rough track on the hillside, our dogs ran their quarry to earth, and began to tear with their paws at the opening to the “rua-kiwi.” Calling the dogs off and closing in upon the spot, we drew from the cavity a fine male Kiwi, and then two vigorous young birds, all unharmed but evidently much scared and striking boldly with their claws. Our captives were soon secured in a Maori ket and we sat down to rest for a short time before taking up the scent again. I put my arm far down into the cavity and found that although the rounded entrance was just large enough to admit the bird, the chamber opened out inside, extending diagonally to a depth of about two feet, and wide enough at the bottom for the accommodation of two full-grown birds. I drew out the nest-materials, consisting of shreds of kiekie-leaves and other dry litter, mixed with Kiwi-feathers.

We had not to hunt long before we came upon another bird, a fine adult female and presumably the mate of the one we had just caught. She had taken refuge in a cavity under a rata-root and one of the dogs, having unfortunately slipped his muzzle, killed the bird by breaking her neck. Other captures followed and the aggregate result of the first day’s hunt was ten Kiwis, of all ages, and one splendid egg*. The ground traversed by us during this hunt and extending over many miles gave

* For the information of collectors it may be mentioned that as soon as the bird is killed it is advisable to hang it up by

evidence everywhere of the presence of Kiwis by their borings in quest of food. These were very numerous in all suitable localities and were of all sizes, assuming in soft ground the appearance of deep funnels with a circular opening four inches or more in diameter, being thus formed by the rotatory action of the bill in its search for the hidden food. The ground seems admirably adapted for this purpose, consisting of a brown vegetable mould. It is easily worked, and, as I ascertained by digging, this earth teems with annelids and insect life of various kinds.

Not far from our camp there was an ancient rata tree—its age extending to many hundreds of years—its hollow trunk bound round with huge cables of aka, and holding in its hoary arms tons of *Astelia* and other parasitic plants. One of our natives set fire to this tree near the base. The accumulation of dry vegetable substances soon ignited, and the flames ascended the hollow trunk with a roar like that from a steamer's boiler. All day long this monarch of the forest burned fiercely, sending up a column of smoke visible many miles away on the Waikato plains. During the night we were all startled from our sleep by the fall of this burning tree, which came down with a terrific crash carrying everything before it. We had just time to turn out of our blankets and witness a "display of fireworks" compared with which the Crystal Palace exhibition is mere child's play!

In the early part of the night we heard the shrill cry of a Kiwi—a prolonged whistle slightly ascending and descending (whence the native name)—and when it was sufficiently light our natives went out with the dogs and brought in an adult female and two young ones. These were found together in one hole. The mate was no doubt one of those obtained in the same locality on the previous day.

Early next morning, accompanied by a native, I climbed to the summit of Pirongia proper and had a magnificent view of the Upper Waikato, the day being beautifully clear and cloudless. The ascent is somewhat laborious owing to its steepness and the absence in many places of anything like a bush-track. Almost to the very summit of the peak we met with traces of the Kiwi in earth-borings of the kind already described; but although we had one of the dogs with us, we did not find any birds in our track. My native companion was no doubt right in his statement that the Kiwi at night roams over these feeding-grounds, and returns on the approach of day to the shade of the gullies, where the light penetrates more feebly. All along this mountain-track and on the summit I found in great abundance the katoutou shrub with its bright green foliage and pretty tassels of crimson flower. The afternoon yielded two more adult males and two young ones, besides an egg just ready to be hatched. The succeeding morning was showery, and although the men made an early start they brought in about noon only two more adult birds (male and female) taken at different places, and two more young ones, the effect of the rain being to obliterate the scent and spoil the hunt. The weather having now set in very wet and tempestuous we had to discontinue Kiwi-hunting and see to making our temporary shelter more secure, by an extra layer of kiekie thatch. The rain came down in torrents towards evening, but on the whole we found ourselves very comfortably housed.

Our expedition lasted a week, with varying success each day according to the weather, the total result being forty Kiwis of all ages and nine eggs.

We partook of the flesh of one of the Kiwis which the natives had boiled. It had the dark appearance of, and tasted very much like, tender beef.

The first two birds (both females) killed by the dogs I dissected with the following result:—The stomach of one contained three wetas (*Deinacrida thoracica*), ten huhu grubs, mostly of large size, several earthworms, and a small brown beetle which my son Percy afterwards identified as *Coptomma*

the bill, not the legs, otherwise the extremely fine network of blood-vessels towards the nostrils become surcharged, and the bill, losing its whitish horn-colour, becomes first rosy and then dark brown. It is undesirable also to kill the bird by compression, as the same result is apt to follow. I found a drop of prussic acid placed in the gullet the safest and most expeditious mode of treatment.

acutipenne; also some berries of the mairi and taiko (well-known forest trees) and a round object, nearly as large as an ordinary marble, which proved to be the egg of the great earthworm toke-tipa. Before we had made out the last-named thing I handed it for examination to my companion, who pressed it between his finger and thumb, when it burst, sending a jet of milky fluid into my eye, causing much smarting and subsequent irritation. The stomach of the other bird contained, besides insect-remains, a large number of the hard kernels of the taiko berry; and it seems to me that these are swallowed by the Kiwi (in lieu of quartz pebbles, which are not to be found in every locality) to assist the process of digestion. I have found similar kernels in the stomachs of Kiwis received from the Upper Wanganui. Among the comminuted matter I was able to detect some very minute land-shells. In the stomach of another which I opened afterwards I found a number of angular pieces of pebble; and others contained the hard kernels of pokaka, miro, mairi, and hinau berries.

The adult birds when taken from their holes were perfectly mute, but endeavoured to wound with their sharply-armed feet and made a snapping noise with their bills. I soon found that the safest mode of holding them was suspended by the bill. They then only struggle vainly and strike the air with their feet; but if their rumps are allowed to touch the ground, so as to give them leverage, then they strike with effect, as I was not long in discovering. A strong adult bird is capable of inflicting a nasty scratch with its sharp claws by a downward stroke; and one of our natives showed me some skin-wounds, long ugly scratches on his arms and legs, inflicted on the previous day by a large Kiwi which he had followed into a sort of cavern at the edge of a stream and captured with his hands.

Judging by analogy and the form of the bird, I felt persuaded that the Kiwi was a burrower, but our native attendants all denied it. We had undoubted proof of it, however, before we had finished. For the safe custody of our captive birds we had constructed a commodious cage, consisting of kareao-vines well arched over, with both ends driven firmly into the ground, then laced together with native flax and covered over with fern-fronds to keep out the daylight. The birds seemed perfectly at home at once and commenced to eat the minced-up fresh meat supplied to them. The old birds continued silent, but the young ones emitted now and then, and especially at night, a low sound not unlike the whimpering of a new-born kitten. The cage contained seven fine adult birds, four females and three males. To our dismay in the morning we discovered that all the former had made their escape during the night through a burrow which undermined the kareao-vines and passed right under an adjacent log, a distance of some eighteen inches. The three male birds were still in the cage. It is evident that the females alone perform the work of digging and preparing the "rua," although, as will presently appear, they take no part whatever in the incubation of the eggs. All the specimens of this sex collected by us at this season had the plumage of the back and rump so abraded and worn as to be quite valueless as skins, and were accordingly reserved for skeletons. The males, on the other hand, while having, in every instance, the abdomen denuded of feathers by constant sitting, generally presented a smooth and undamaged plumage. In further proof of this the adult females invariably had their claws blunted, as the result of their scraping or digging operations, whereas the other sex (except very old birds) had these weapons perfectly sharp.

I have already described how some of our captives effected their escape on the mountain by tunnelling under their cage. We had further evidence, after our return to Cambridge, of their engineering skill. One of my birds—not a *Pirongia* captive, but one caught by the natives in the Kawhia district and the largest specimen of *Apteryx bulleri* I had ever seen—was placed with the rest in a vacant stable which had been previously secured all around the sides to prevent burrowing. To my astonishment, however, in the morning, I found that "Madam Junbo" (as we had christened this large Kiwi) had, during the night, forced aside a heavy packing-case, removed a loose scantling stud, deliberately tunnelled a passage through the hard clay foundation, and escaped from her place

of confinement, taking one of her companions with her. They had disappeared in a deep fern-gully and we naturally thought we had seen the last of them. But the birds had been liberally fed during their imprisonment and this taste of civilization was sufficient, after a day's absence, to bring them back again into the township. The following morning the male bird was found in the back-yard of a chemist's shop, where he was causing consternation among the fowls, whilst Madam Jumbo deliberately marched up the hill into the Constabulary Barracks and made for the officers' quarters, where she was overheard, at daybreak, patrolling the Captain's verandah (tapping the boards gently with her bill), and was immediately "put under arrest."

We kept some of these birds in confinement for a period of six months or more for the purpose of studying more closely their habits and peculiarities of character. Individuals were found to vary much in disposition. Some adapted themselves at once to their new surroundings and became perfectly tame and familiar; others continued, to the last, wild and shy. One male in particular manifested a sulky temper: instead of running off with the rest to hide in a dark corner it would poise its body on its bill and feet and remain perfectly motionless till approached, when it would bristle up its feathers, stretch up its body, and strike forward with its feet, at the same time snapping audibly with its mandibles and uttering a low growling note. The conduct of these birds was appreciably affected by their condition of health: a sickly bird was always restless during the day, and walked about in the sunlight in a desultory fashion; whereas the healthy ones, on being brought to the light, would dart off to the nearest dark corner and endeavour to secrete themselves. The state of the weather seemed likewise to affect their spirits: on dark and wet nights they were particularly active and noisy; on moonlight nights they were generally silent. The cry consists of a short, shrill whistle, not so prolonged as that of the Woodhen, nor so sharp and clear. Usually the sexes cry in response, the male leading off with his shrill *ki-i-wi-i*, and his mate replying in a peculiar half whistle, half scream; this is repeated four or five times in succession between the hours of 9 and 10, and the birds, as a rule, are silent for the rest of the night. Occasionally, and apparently when under excitement, they keep up these responsive calls for fifteen or twenty minutes without cessation. The young or half-grown birds also call to each other, the male in a thinner whistle and the female in a thick husky way. These captive birds ate fresh meat, soaked bread, and boiled potato with avidity, and several of the young ones died of sheer obesity.

My investigations on the spot enabled me to determine one important fact with certainty, namely, that, as with the Mooruk, the Cassowary, the Emu, and the Rhea (all of which have bred in the Zoological Society's Gardens), the male bird alone performs the labour of incubation, and takes upon himself the entire charge of the young till they are old enough to shift for themselves. There is indeed an equitable division of labour after the pairing has commenced. The female, without any assistance from her mate, digs or scoops out a nesting-place, usually adapting to her requirements an existing hole or cavity in the ground, forms a rude nest and deposits her two eggs. Having done this she walks off and disclaims all further responsibility, abandoning her mate to his share of the parental duty, and (so the natives allege) immediately pairing with another male and forming a new nest elsewhere.

The breeding-season evidently extends over a considerable period. Of the ten eggs collected by our party during the first week of November, nine contained well-developed chicks, some of them just ready for exclusion, and the tenth was perfectly fresh. The very young bird figured on page 326 and the egg purchased from the natives were taken from one hole, and the male bird was still sitting. From the condition of the chick, I judged that if undisturbed it would have been hatched out in another day or two; it was alive and active when the shell was opened, although the egg had been out of the nest for several days. Some of the young birds taken by us were apparently about two months old. I think it probable that there are two broods in the season, inasmuch as one of our

adult birds contained in its ovary a large bunch of undeveloped eggs, up to the size of buck-shot, whilst, as stated on page 314, a recently captured bird which I had, many years ago, at Wanganui, produced a fully matured egg on the 22nd March.

One of the nests found by us contained a young bird and an egg (an unusually large one, and from its white appearance evidently newly laid), another contained a single young bird, and two others contained each two young ones. All of them, with a solitary exception, were active and strong, snapping angrily with their little bills and attempting to strike with their feet. The exception referred to could not have been hatched out very long because it was too weak to run, and, after the manner of young nestlings, had an abnormally large stomach. It is evident that the bird usually lays two eggs; occasionally, however, there is only one, and Mr. Cheeseman informs me of two well-authenticated instances of three eggs in the nest, one in the Waitakerei Ranges and the other at Raglan. In both cases the eggs were brought to the Auckland Museum and the fact vouched for to his satisfaction.

The natives state that the Kiwi begins to lay in August, which is quite likely to be true, as the eggs must take a long period to incubate. It will be remembered that Mr. Bartlett's bird (mentioned on page 314) sat on perseveringly from the beginning of January to the 25th of April. In further support of this view I may mention the following circumstance. Among the live birds brought from Pirongia was a female which appeared to be carrying a well-developed egg in the oviduct, inasmuch as it moved about with awkwardness and habitually rested on the tarsus horizontally as described at page 314. She was more untractable than the other birds, attacking the hand when approached, striking savagely forward with her feet, and uttering at the same time a low growl. This bird was killed by an accident about the middle of February following; and on dissection I found a membranous egg, about two thirds the full size, the shell not having yet formed. In the ordinary course a fortnight would probably have elapsed before the exclusion of the egg for incubation. Again, among the birds captured by my party there were three young birds of the year; that is to say, of such a size as to make it probable they had been hatched out about April or May. If the conclusion thus pointed to is the true one, the nesting-operations of the Kiwi must extend over a great portion of the year; in which case its reproduction is not the least interesting feature in the natural history of this anomalous bird. In all the eggs I opened (save one freshly laid) there was enclosed with the well-developed feathered chick a tough membranous sac, connected with the embryo and containing several ounces of yellow fatty substance (*vitellus*). When all this adipose matter has been absorbed into its system, the chick, having in the meantime expanded to its full size, cracks its tabernacle and comes out into the world ready for active service. It is very soon able to forage for itself and increases rapidly in size, inasmuch as the young which I attempted to rear had more than doubled their size in six months.

The eggs, which are broadly elliptical in form, vary somewhat in size. The largest of those collected by us measured 5.30 inches in length by 3.30 in breadth; and the smallest 4.5 by 2.7. The latter weighed exactly 11½ ounces, being just four ounces less than the weight of our largest. Two other eggs of full size weighed respectively 14 oz. and 15¼ oz. They vary likewise in form, some being more elliptical than others, whilst one in my possession is perfectly oval. Some are pure white when laid, others have a greenish-grey tint; but owing to the long period of incubation they get much soiled by contact with the bird, and more especially its feet, the shell becoming a dirty yellowish-brown colour. This is easily washed off, by the application of a brush, in soap and cold water; but I think it is necessary to do this whilst the egg is fresh, for there is a greasy matter on the surface which would no doubt make the discoloration permanent if allowed to become perfectly dry. The fresh egg on being emptied of its contents exhibited a delicate pink tint on the inner surface of the shell; but this was absent in those containing chicks.

APTERYX AUSTRALIS.

(SOUTH-ISLAND KIWI.)

Apteryx australis, Shaw and Nodder, Nat. Misc. xxiv. pls. 1057, 1058 (1813).*Dromiceius novæ zealandiæ*, Less. Man. d'Orn. ii. p. 210 (1828).*Apteryx mantelli*, Bartlett, P. Z. S. 1850, p. 275.*Apteryx fusca*, Potts, Trans. N.-Z. Inst. vol. v. p. 196 (1873).*Native names.*—Kiwi and Tokoeka.*Ad. similis A. bulleri*, sed major, pallidior, et magis griseus; tergo tantum vix castaneo tincto: scapis plumarum haud conspicuis, itaque pilosi molliore distinguendus.*Adult.* Differs from *Apteryx bulleri* in its larger size and in the lighter colour of its plumage, the feathers being of a sandy or greyish brown, with darker margins, those of the upper parts only slightly tinged near the tips with rufous. The plumage of the nape and back of the neck is less hairy; and the feathers of the back and hind parts are destitute of the lengthened and stiffened points which characterize the other species.*Male.* Total length, following the curvature of the back, 22 inches; bill, along the ridge 3.75, along the edge of lower mandible 4.1; rudimentary wing, to end of hook, 1; tarsus 2.25; middle toe and claw 3.5; hallux .75.*Female.* Total length (measured as above) 27 inches; bill, along the ridge 5.5, along the edge of lower mandible 5.8; rudimentary wing, to end of hook, 1.5; tarsus 3; middle toe and claw 3.75; hallux .8.*Obs.* As a rule the South-Island birds are larger than those from the North Island; but occasionally examples of *Apteryx bulleri* are met with fully equal in size to the largest specimens of *Apteryx australis*; and this is therefore of little or no value as a specific character. It may be observed that in this species the long facial hairs or feelers are, generally speaking, far less abundant than in the North-Island *Apteryx*.*Young.* Has the head and hind neck dark grey, and the rest of the plumage greyish brown, lighter on the underparts, each feather with a narrow streak of fulvous along the shaft; on the feathers of the upper parts this streak is darker towards the tip, and the terminal filaments are black, whereas on the underparts of the body both the tips and filaments are light brown or fulvous; the bill, which measures two inches in length, is light horn-colour; the legs and feet are light brown, the metatarsi being covered anteriorly with thin scales, scarcely definable to the eye. In this young condition the quill-tubes are very minute, and the plumage of the body is extremely soft to the touch.

In the Rowley collection at Chichester House, Brighton, there is a specimen of the chick, apparently younger than that described above, and differing from it in the lighter tone of its plumage, especially on the upper parts.

The nestling has a wing-claw of the same character as in the adult, although scarcely more than a decimal of an inch in length.

Partial albino. In the Canterbury Museum there is a partial albino, in which the crown and sides of the head, the throat and the whole of the fore neck, and the front of the thighs are yellowish white.

THE first example of the *Apteryx* of which there is any record was obtained in New Zealand about the year 1813, by Captain Barclay, of the ship 'Providence,' and afterwards deposited in the collection of the late Lord Derby. This bird was first described, under the above name, by Dr. Shaw (Nat. Misc. l. c.), and afterwards, at greater length, by Mr. Yarrell, in the 'Transactions of the Zoological Society' (vol. i. p. 71, pl. 10). On the 10th December, 1850, a series of specimens was exhibited before the Zoological Society of London, when Mr. Bartlett pointed out characters which, as he contended, established the existence of two species, hitherto confounded under the specific name of *Apteryx australis*. Mr. Bartlett stated, at this meeting, that an *Apteryx* belonging to the late Dr. Mantell having been placed in his hands by that gentleman, he had remarked its dissimilarity to ordinary examples, and that, after a careful comparison with a number of other specimens, he had come to the conclusion that it was a new species. On comparing Dr. Mantell's bird, however, with the original specimen in the Earl of Derby's collection, he had found that they were identical. He accordingly referred his supposed new species to *Apteryx australis*, and distinguished the more common bird as *Apteryx mantelli*, for which he proposed the following characters:—"its smaller size, its darker and more rufous colour, its longer tarsus, which is scutellated in front, its shorter toes and claws, which are horn-coloured, its smaller wings, which have much stronger and thicker quills, and also its having long straggling hairs on the face" (Proc. Zool. Soc. 1850, p. 276).

In a paper read before the Wellington Philosophical Society on the 12th November, 1870*, I pointed out that the characters by which Mr. Bartlett had distinguished the species would not stand. I showed that the sexes differed from each other both in size and in the tone of their plumage, that the arrangement of the tarsal scutella differed according to age and other circumstances, that the peculiarity in the cubital quills was not a specific character, the "soft slender quills" indicating only immaturity, and that the length of the "straggling hairs on the face" varied in almost every individual. I stated further that an inspection of the drawings illustrative of the supposed specific distinctions (published by the Zoological Society) had only tended to confirm me in the opinion expressed above.

After that paper was written I had an opportunity of examining several fine series of South-Island *Apteryges*, and of comparing them with examples from the North Island; and I was then convinced that there are in reality two species of brown *Apteryx*, readily distinguishable from each other by a very remarkable difference in the structure of their plumage. In the South-Island Kiwi the feathers of the upper parts are soft and yielding when stroked against the grain, whereas in the North-Island bird, owing to a peculiarity in the structure of the shaft, they have stiffened points, and are harsh and prickly to the touch. This character (apart from a slight difference in the colour of the plumage) is constant in all the specimens I have examined; and I have no hesitation in giving it a specific value. In this course I am supported by the unanimous opinion of several of the best ornithologists in England, to whom I have submitted specimens for examination.

I take this opportunity of saying that the credit of this discovery belonged to the late Sir Julius von Haast, who, on receiving from me a North-Island bird for comparison with the specimens in the Canterbury Museum, detected this structural difference in the plumage, and informed me of it long before I had an opportunity of verifying the fact for myself.

Dr. Otto Finsch, however, has arrived at an opposite conclusion, although he seems to have practically conceded the point by admitting the North-Island Kiwi to the rank of a "variety" (i. e. *Apteryx australis*, var. *mantelli*) †.

* Trans. N.-Z. Inst. vol. iii. pp. 37-56.

† Since the publication of my first edition, I have examined numerous examples of both forms, and I have seen no reason to change or modify the views expressed above as to the specific value of the North-Island Kiwi, as compared with *Apteryx australis* of the South Island. It is desirable, however, to have the arguments on both sides stated fully, and I have therefore

According to the now generally accepted view of what constitutes a "species," the amount of difference is quite immaterial, provided it be constant and readily distinguishable. If (as is certainly the case) all the known examples from the North Island are referable to "var. *mantelli* (Finsch)," then, for all practical purposes, the bird must be regarded as distinct, and is, I submit, as much entitled to recognition as any other species on our list.

taken the trouble to translate, from the German, Dr. Finsch's last published remarks on this subject in the 'Journal für Ornithologie,' from which it will be seen that this naturalist is still opposed to the recognition of the North-Island bird as a distinct species:—

"As hitherto I have had no opportunity of examining any reliable specimens from the North Island, it naturally was not possible for me to make sure about the value of certain characters. I am indebted now to the kindness of Dr. Buller for two specimens from the North Island, so that I am able to make a direct comparison of specimens from both islands. Besides the two specimens from the North Island, I have four old birds (two male and two female) and a young one from the South Island before me; also an old one and a half-grown bird, without any definite locality—consequently a total of nine specimens in different stages and conditions of age and sex. To refer, in the first place, to the tinge of colour. I had, before this, opportunities of observing that in specimens from the South Island the colour is by no means constant, but on the contrary varies from greyish brown to rusty-red brown. The latter tone of colour, as is well known, is produced by the terminal third part of the feathers being of that shade. Each individual feather is coloured either dark brownish grey or brown, changing gradually towards the tip into rusty brown; the single filaments or barbs of the feathers, which stand far apart from each other, terminate, however, in black hair-like tips, which impart to the whole plumage the peculiar bristle-like character. In this fundamental point of colouring the specimens from both islands absolutely agree, and the feathers which I have before me, and which have been carefully pulled out, do not betray differences of any kind. Only, as I have already said, the intensity of the rust-brown on the third part of the tip of each feather is sometimes stronger, sometimes feebler, and on this depends the general colouring of the specimen. One specimen from the North Island shows the same darker and of a more vivid rust-brown than examples from the South Island. It does not, however, appear quite so dark as a specimen in the Bremen collection, without a positively defined locality, of which I have already made mention. The other specimen from the North Island, however, so perfectly agrees, in regard to the rust-brown tone of colour, with specimens from the South Island that, in point of fact, not the slightest difference is observable. Consequently the tinge of colouring as a specific character must be considered as absolutely worthless. The case is different, however, in regard to the relative hardness or softness of the plumage, which is perceptible to the touch. I am in a position to confirm the statement that in general the specimens from the North Island possess more strongly developed feather-shafts, which project beyond the barbs in the shape of naked tips, and consequently appear more like bristles and have a harsher feel. This peculiarity is very perceptible on stroking the feathers the wrong way, or on carefully feeling them; but cannot be distinguished on stroking with the palm of the hand along or in the direction of the feathers. If stroked in this way even the most delicately sensitive hand would be unable to detect any difference at all between certain specimens from the North and South Islands respectively. It is worth mentioning here that on patting the plumage of *Apteryx oweni* (in the manner described) the same difference as compared with *Apteryx australis* becomes at once apparent. What has been said in regard to the relative hardness or softness due to the more or less pronounced development of the projecting naked shaft-tips, which differ again in *Apteryx oweni*, has reference moreover to the plumage of the upper side of the rump. With that which covers the hind head and neck the case is different; and here perhaps might be found a single criterion, or distinguishing mark, which is appreciable not merely to the touch but also to the eye, and which might be considered as a sufficient specific character for the North-Island *Apteryx*. The feathers of the back of the head and the back of the neck have stronger and more projecting shafts, with the barbs composing the webs further apart and consequently less numerous. These hair-like barbs not only feel harder to the touch, but the longer and protruding hair-like filaments are quite apparent to the eye. This peculiarity I find borne out in all the specimens before me. If therefore one intends to acknowledge the *Apteryx* of the North Island as a distinct species, a distinguishing character could only be found in this visible difference of plumage on the hind head and back of neck. On the front and sides of the neck the peculiarity I have described is scarcely perceptible. Still, I do not venture as yet to set up this character as a constant one, as possibly there may be exceptions. Besides, this character alone does not appear to me of sufficient importance to differentiate a species. In my judgment therefore, for the present, this *Apteryx* of the North Island is only a slightly deviating form of the known *Apteryx australis*. I doubt whether it will be possible to define with certainty specimens the origin of which is not warranted, without direct comparison in all cases."

Professor Huxley, in his 'Characters for Classification,' notices the absence of continued shafts as characteristic of the genus *Apteryx*. The abnormal character of *A. bulleri* in this respect is very curious.

Professor Parker has called my attention to another distinguishing feature, which appears to be constant: in *Apteryx bulleri* the claw on the wing is strongly curved and black; in *A. australis* it is less curved and whitish; in *A. oweni* it is much smaller and lighter coloured.

Professor Sir Richard Owen aptly remarks:—"The *Apteryx* presents such a singular and seemingly anomalous compound of characters belonging to different orders of Birds as may well make the naturalist pause before he ventures to pronounce against the possibility of a like combination of peculiarities in the historical Dodo. It seems, as it were, to have borrowed its head from the Longirostral *Grallæ*, its legs from the *Gallinæ*, and its wings from the struthious order. It is clothed with a plumage having the characteristic looseness of that of the terrestrial birds deprived of the power of flight; its feathers resemble those of the Emu in the general uniformity of their size, structure, and colour, but they are more simple than in any of the tridactyle *Struthionidæ*, as they want the accessory plumelet. . . . When the trunk is stripped of its plumage, the body of the *Apteryx* presents the form of an elongated cone gradually tapering forwards, from the broad base formed by the haunches to the extremity of the attenuated beak. The wings appear as two small crooked appendages projecting about an inch and a half from the sides of the thorax, and terminated by a curved, obtuse, horny claw 3 lines long: the *antibrachium* is retained in a state of permanent flexion by the surrounding integument of the wing; and it cannot be brought by forcible extension beyond an angle of 45° with the *humerus*. Nine quasi-quill-plumes, not exceeding in length the ordinary body-feathers, but with somewhat thicker shafts, are arranged in a linear series along the ulnar margin of the *antibrachium*; the terminal ones are the largest, and in one specimen they presented a structure differing from that of the ordinary plumes, consisting of a shaft from which radiated a series of flattened horny filaments of nearly equal length." (Prof. Owen's 'Memoir on *Apteryx australis*,' Trans. Z. S. ii. p. 257.)

Professor Hutton, in his valuable essay on the "Geographical Relations of the New Zealand Fauna" (Trans. N.-Z. Inst. vol. vi. p. 232), says:—"The *Apterygidæ* have a more generalized structure than the other struthious birds; they, therefore, belong to an older type, and cannot, with any degree of correctness, be said to represent the extinct race of Moas." And, again, in his review of my 'Birds of New Zealand' (first edition) in the 'New-Zealand Magazine,' p. 99, Professor Hutton says:—"We must take exception to the Kiwi being considered as the living representative of the Moa, or, as Dr. Buller puts it in his preface, 'the only living representative of an extinct race.' No doubt the Kiwi and the Moa have several features in common; but it is certain that both the Emu and the Cassowary are far more nearly related to the Moa than is the Kiwi." Professor Mivart has since read a paper before the Zoological Society of London on the axial skeleton of the *Struthionidæ*, which effectually settles the question at issue. He pointed out that, judging by the characters of the axial skeleton, the Emu presents the least differential type, from which *Rhea* diverges most on the one hand, and *Apteryx* on the other; that the resemblance between *Dromæus* and *Casuarinus* is exceedingly close, while the axial skeleton of *Dinornis* is intermediate between that of *Casuarinus* and *Apteryx*; its affinities, however, with the existing New-Zealand form very decidedly predominating.

Still later, Professor Newton (in his article "Ornithology" in the 'Encyclopædia Britannica') thus referred to the subject:—"Some systematists think there can be little question of the *Struthionæ* being the most specialized and therefore probably the highest type of these Orders, and the present writer is rather inclined to agree with them. Nevertheless the formation of the bill in the *Apteryges* is quite unique in the whole Class, and indicates therefore an extraordinary amount of specialization. Their functionless wings, however, point to their being a degraded form, though in this matter they are not much worse than the *Megistanes*, and are far above the *Immanes*—some of which at least appear to have been absolutely wingless, and were thus the only members of the Class possessing but a single pair of limbs."

It will be seen, therefore, that I was fully justified in referring to the existing species of *Apteryx* as "the diminutive representatives of colossal ornithic types that have disappeared."

An able paper communicated by Professor Huxley to the Zoological Society on June 2, 1882, contains some interesting information on the respiratory organs of *Apteryx*, from which I extract the

following:—"The question whether *Apteryx* presents any real approximation to mammals in the structure of its breathing-apparatus is of considerable interest from its bearing upon the general problem of the affinities of birds to other groups of vertebrated animals. Having recently examined a specimen of *Apteryx* (which, although it had been many years in spirit, was still in a very fair state of preservation) with reference to this point, I have come to the conclusion that its respiratory organs differ in no essential respect from those of other birds, though they exhibit those peculiarities which are peculiar to and characteristic of the class Aves in a less developed condition than that which obtains in all those Carinatae and Ratitae which have been carefully studied. . . . The respiratory organs of *Apteryx* are thoroughly ornithic, differing from those of other birds chiefly in the greater width and smaller aggregate surface of the respiratory passages, in the rudimentary condition of the pneumatic sacs, and in the much greater strength of the pulmonary and septal aponeurotic expansions. Neither in *Apteryx*, nor in any other bird, has either of these the slightest real resemblance to a mammalian diaphragm. For, as has been seen, the heart lies altogether behind both, and the muscular digitations of the pulmonary aponeurosis are supplied by the intercostal nerves, the phrenic being absent. The vertical and oblique septa really answer to the fibrous tissue of the posterior and middle mediastinum in mammals. In this, as in all other cases, the meaning of ornithic peculiarities of structure is to be sought, not in mammals, but in reptiles. It is only among reptiles that we meet with pneumatic bones similar to those of birds (Crocodylia, Pterosauria, Dinosauria), pulmonary air-sacs (Chamaeleonidae), and membranous expansions which are comparable to the septa in birds." (Proc. Zool. Soc. 1882, pp. 560-568.)

Comparatively few specimens of this species are now brought in by collectors in the South Island, whereas the supply of *Apteryx oweni* is undiminished; and the conclusion is irresistible that *Apteryx australis*, perhaps the most interesting bird in the Southern Hemisphere, is fast becoming extinct.

Mr. Reischek informs me that on the 25th September he captured a male bird of this species sitting on a single fresh egg on a loose nest composed of grass and dry leaves under the shelter of a stone at an elevation of 2000 feet above the sea. The egg, unfortunately, got broken through the kicking of the bird when resisting capture. The sex was determined by dissection, and the bird was of unusual size, equalling the measurements which I have given for the adult female.

A specimen of the egg in Mr. Philip Crowley's collection at Croydon is exactly similar to that of *Apteryx bulleri*, but rather larger than ordinary examples of the latter, measuring 4.75 inches in length by 3.05 in breadth.



Chick of *Apteryx bulleri*. (See page 315.)



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GREY KIWI.
APTERYX OWENI.
(TWO-FIFTHS NATURAL SIZE)

APTERYX OWENI.

(LITTLE GREY KIWI.)

Apteryx owenii, Gould, P. Z. S. 1847, p. 94.*Apteryx mollis*, Potts, Trans. N.-Z. Inst. vol. v. p. 196 (1873).*Native name.*—Kiwi-pukupuku.

Ad. griscus, brunneo et fulvescente alternè transfasciatus, dorsi plumis etiam subterminaliter nigro transfasciatis : subtùs pallidior, clariùs grisescens, plumis albido et brunneo alternè fasciatim transnotatis : pileo guttureque clarè griseis, facie laterali paullò saturatiore : rostro saturatè corneo : pedibus pallidè brunneis, unguibus corneis : iride nigrâ.

Adult. Head, throat, and fore neck dull yellowish brown, darker on the nape; general plumage of the body light yellowish brown, mottled all over and obscurely banded in a wavy manner with blackish brown; the rigid hair-like points of the feathers bright fulvous; underparts paler, the plumage of the abdomen becoming light fulvous obscurely barred with brown. Each feather examined separately has the main portion, which is concealed by the outer plumage, glossy greyish brown, becoming paler towards the root; above this, where the barbs are disunited, it is crossed by an irregular bar of fulvous or yellowish brown, beyond which again it is blackish brown tipped with shining fulvous: on the feathers of the underparts and sides of the body there are generally two of these transverse bands. It is the blending together of these markings that produces the peculiar mottled and wavy appearance described above. Irides black; bill dark horn-colour; legs and feet pale brown, the claws horn-coloured, with transparent tips.

Male. Total length, following the curvature of the back, 17·5 inches; bill, along the ridge 2·85, along the edge of lower mandible 3·4; tarsus 1·75; middle toe and claw 2·4; hallux or hind tarsal claw ·4.

Female. Total length, following the curvature of the back, 20 inches; bill, along the ridge 3·5, along the edge of lower mandible 4; tarsus 2·5; middle toe and claw 3; hallux or hind tarsal claw ·5.

Obs. Independently of the marked difference in size between the sexes, there is a considerable amount of individual variation; and adult specimens are sometimes met with of so small a size as even to suggest the existence of another species. I have remarked this more particularly with examples received from the southern portions of the South Island.

The ground-tints of the plumage vary slightly in different birds. As a rule, however, the male is of a somewhat darker shade than the female, and the plumage has a more banded or rayed character, while the tips of the feathers on the upper parts are of a brighter fulvous.

Young. Plumage very soft; dull greyish brown, obscurely mottled; vertex, sides of the head, and throat greyish white; the light tips of the feathers very conspicuous, having the appearance of small pencilled lines on a darker ground, the produced hair-like filaments being entirely black. Bill white horn-colour, measuring 1·5 inch; tarsus 1·4, and with well-developed scutes.

Very young state. A chick of this species, in the Rowley collection at Brighton, is of a uniform yellowish-brown colour, with the tips of the feathers lighter. The late Dr. J. F. Knox favoured me with the following notes on a still younger specimen, obtained at Nelson in November 1858:—"Kiwi chick: just escaped from the egg, or rather, in all probability, taken from the egg. Weighed exactly 2 ounces; bill straight, soft, and measuring 1·25 inch in length; feathers few in number; wings exceedingly small, and no claw observable."

Varieties. The following is the description of a specimen in the Canterbury Museum, exhibiting a tendency to albinism:—On the left side, just above the thigh, there is a broad irregular patch of the purest white; and there is a similar but more rounded patch on the inner side of each thigh, and another smaller one near the rump; on the right side there are also a few white feathers; and on the sides of the head above the eyes, as well as on the throat, there are patches of dull greyish white blending with the surrounding dark grey plumage. It has the feathers of the thighs and rump much worn by incubation, the shaft-lines being denuded for the space of half an inch. Where the plumage is of the ordinary character the shaft-lines are wholly black or with fulvous points, but where the white patches occur the shafts are, like the webs, perfectly white.

In the Sydney Museum there is a more perfect albino, the whole of the plumage being greyish white, very obscurely streaked with brown.

In the Otago Museum there is a pure albino from the west coast, presented by Mr. Allen. I have met with two other similar instances, all the plumage being either white or tinged with cream; the bill white and the legs pale brown. In the collection referred to there is also a very dark variety, approaching in colour to *Apteryx haasti*, but of inferior size. This was obtained at Jackson's Bay in July 1875.

In the possession of Mr. W. Smyth, of Dunedin, there is an almost perfect albino, the entire plumage being of a creamy white, obscurely stained with grey on the back. He obtained it at Martin's Bay, where he caught it among the short grass at the edge of a swamp. It is of small size, and apparently a male.

Remarks. In this species the bill is straighter than in *Apteryx bulleri*, and the facial hairs or feelers are much shorter, seldom exceeding 2.5 inches in length. In the rudimentary wing the forearm measures scarcely more than one inch; the terminal claw is about .5 of an inch in length, horn-coloured, slightly curved, and sharp-pointed; the quills are equal and regular, the tube being .75 of an inch in length; and the webs, which are perfectly soft, are light brown in colour, crossed by two broad bars of pale fulvous. In the young, or in birds of the first year, the wing-quills are very feebly developed. The tarsi are proportionally longer and more slender than in *Apteryx bulleri*; and they are covered anteriorly with closely-set scales of a rounded form. The claws are long, slender, and sharp-pointed, sometimes with the tip incurvate; the hind claw is slender, only slightly arched, and with sharp edges. The plumage is soft and yielding to the hand when passed along it; but in a reverse direction or against the grain it is slightly rigid, although it wants the stiffened shafts which give to the feathers of *Apteryx bulleri* their distinguishing character. On raising the plumage with the hand and viewing it laterally it has very much the appearance of the thick fur on the back of a tabby cat. The general effect on the surface bears a close resemblance to the fur of the small Australian marsupial, *Lagorchestes fasciatus*, both in colour and in the peculiar character of the wavy markings.

THE Grey Kiwi is distributed over a great portion of the South Island, and in some of the remote districts is still very abundant. Till recently it was not known to occur in any part of the North Island. We had, in consequence, been so accustomed to speak of *Apteryx oweni* as a strictly South-Island species, and as representing there the Brown Kiwi of the North Island (*Apteryx bulleri*), that the discovery of its existence, under certain conditions, in the Wellington provincial district furnished an interesting fact in geographic distribution. A fine specimen for which I am indebted to Mr. Morgan Carkeek, of the Survey Department, was obtained by that gentleman on Mount Hector, at the head of the Hutt river, in December 1875. It was caught by his dog among the snow-grass, at an elevation of about 3000 feet. At a higher altitude he found the species comparatively abundant, and he met with it occasionally below the snow-line, frequenting mossy places in the bush free from undergrowth.

This peculiarity of range, as compared with the distribution of the species in the South Island, is very suggestive, and it will be interesting to discover whether this bird inhabits the summits of mountains further north.

It frequents the woods, and, being (like its congeners) nocturnal in its habits, must be sought for in prostrate hollow trunks, natural holes or caverns among the roots of the large forest-trees, and clefts

or fissures in the rocks. It breeds in these localities, and the nest has sometimes been taken from under a clump of tussock or from the shelter afforded by an overhanging stone on the slope of a wooded hill. The male, female, and young, described above, were all taken from one nest.

All the specimens of this form in the Canterbury Museum were obtained on the western slope of the Southern Alps. The late Sir Julius von Haast collected upwards of fifty of them on that side, but never saw or even heard of one on the eastern side of the Alps.

It is said to be excellent eating; and the diggers' pot is contributing, equally with the trade in specimens, to the rapid extirpation of the bird. The effect of such a statement as this on the mind of a true-hearted naturalist may be readily inferred from the following letter addressed by the late Mr. Blyth to the Editor of 'The Ibis,' in 1861:—"Some time ago I met a stranger who had been travelling in New Zealand. Of course I was curious about the *Apteryx oweni*; and I showed him Gould's figure of the bird, and tried to make him comprehend some notion of its value. 'Good,' said he, 'I know it well: we ate four of them in one pie!' Alas for *Apteryx oweni*, as well as for the last remaining specimens of *Dinornis* or *Palapteryx* (if such there yet remain), to be put into a pie! Gather your roses while you may, Mr. Editor, and collect your impennates before this pestilent civilization spoils and ruins every thing!"

The Maoris, too, have a penchant for roast Kiwi; and travelling parties, when passing through the districts which these birds frequent, as soon as they have fixed up their camp for the night, start off with their dogs to hunt for them, the *Apteryx oweni*, like its congeners, being strictly nocturnal in its habits. But it is in the North Island, where the Maori population is so much larger, that the Kiwis, as well as other native birds, suffer most from this uncontrolled system of hunting. This is especially the case when the members of a tribe are preparing for one of their periodical feasts*, for it then becomes necessary to place every kind of "fish, flesh, and fowl" under contribution.

The egg of this species is of a long elliptical form, measuring 4·3 inches in length by 2·4 in its widest part. It is originally white, but becomes much stained or soiled during incubation; and some examples have the shell traversed with thread-like excrescences, especially at the larger end. A specimen from Martin's Bay is an almost perfect ellipse, with a smooth, perfectly white, and rather glossy shell, and measures 4·1 inches in length by 2·6 in breadth. Another specimen in the Canterbury Museum is much stained and discoloured, but appears to have been originally white, with a finely granulate surface. At the larger end there are numerous irregularities on the shell, formed by limy excrescences; one of these presents the appearance of a piece of twisted thread, being fully two inches in length. Another in the same collection has a great portion of its surface marked with scarcely perceptible oblique furrows or interruptions in the granulation of the shell.

* The following is a newspaper account of one of these feasts, which took place at Parihaka in July 1881:—"Monday being wet, all the natives kept close in their houses, but the weather clearing by next day, although still cold and windy, a move was made, and all collected on the meeting-square. There were then brought on Pigeons, Kakas, and Tuis to the number of 9400, besides three calabashes of Pigeons preserved in their own oil, two casks of preserved Mutton-birds from the Chatham Islands, 600 piharau or lampreys, and the usual pile of bread and boilers of tea. The birds were first distributed, one apiece to each man, woman, and child—even baby in arms; after that another, as far as they went—three Tuis being given as an equivalent to one Pigeon, or Kaka. After this the preserved birds were served round; then the lampreys were scrambled for—there not being enough for distribution; then the bread and tea was partaken of, and the feast concluded. Not many of the birds were consumed on the meeting-square, they being saved for a feast by the natives in their respective houses. Previous to the distribution, a long line of girls, gaily dressed, came in on each side of the square, each carrying a basket of taro and kumaras, or potatoes. These they placed on the heap of birds and retired. Tohu afterwards addressed the meeting, but his speech was unimportant. He referred to birds and eels being of old the food of chiefs, and greenstone their ornaments, which a 'tutua' dare not wear; neither dare he partake of their food; but that at the present time all might partake and adorn themselves, for all were equal in his eyes."

APTERYX HAASTI.

(LARGE GREY KIWI.)

Apteryx haasti, Potts, Trans. N.-Z. Inst. 1871, vol. iv. p. 204.*Apteryx maxima*, Hutton, Cat. Birds of N. Z. 1871, p. 23 (nec Bp.).*Native names.*

Roa or Roaroa, and Kiwi-karuai.

Ad. similis A. oweni, sed multò major, saturatior, et tergo castaneo tineto.

Adult. Head and neck dark greyish brown; the whole of the upper parts as in *Apteryx oweni*, but darker, the bands being almost black, and the fulvous markings strongly tinged with chestnut; underparts as in *A. oweni*, but decidedly darker. Irides black; bill white horn-colour; legs and feet dark brown, changing to brownish black on the posterior aspect of the metatarsi and on the soles; claws dark horn-colour. Total length 25.5 inches; bill, along the ridge 4.75, along the edge of lower mandible 5.4; tarsus 2.75; middle toe and claw 3.1; hallux or hind tarsal claw .75.

Obs. Another example is slightly smaller and somewhat darker; and the thighs are marked by two chestnut bars, one on the hind part and the other immediately above the tarsal joint. To which sex these birds belong has not been ascertained, although they are supposed to be females. If they are males, it may be reasonably inferred that the female of this species is considerably larger than *Apteryx australis*.

General Remarks. This species resembles *Apteryx oweni* in general appearance, but is distinguished by its much larger size (equalling that of *A. australis*), by its darker plumage, which has a strong tinge of chestnut, and by the more robust form and darker colour of the legs and feet. Its metatarsi are armed anteriorly with large and broad scutella, approaching more nearly in this respect to those of *A. australis* than of the former species, in which the scales are small and rounded. The claws are large, well formed, only slightly arched, and sharp-pointed. The quill-tubes are about an inch in length; and the terminal claw, which measures .4 of an inch, is slender, arched, and pointed. The structure of the feathers on the upper parts of the body appears to be similar to that observable in *Apteryx australis*, the shafts of the feathers being less produced than in *A. oweni*; and altogether the form appears to be an intermediate one, combining in some degree the distinguishing characters of both.

At the time of my first edition only two specimens of this fine *Apteryx* were known, both of which belonged to the Canterbury Museum. These were obtained on the high ranges above Okarita, on the west coast of the South Island, where, according to the resident natives, this large Grey Kiwi is tolerably common. Since that date another specimen (also from the west coast) has been received at the Museum, differing from those previously described in being somewhat darker and more strongly suffused with chestnut; indeed the coloration is almost as dark as in *Apteryx mantelli*, thus falsifying Dr. Finsch's opinion that its plumage "entirely agrees with *Apteryx oweni*, and is by no means darker" *.

* Trans. N.-Z. Inst. vol. vii. p. 236.

The resident Maoris, on seeing the first examples that were brought in, said that this was the young of the Roaroa, a Kiwi said to exceed considerably in size the Tokoeka (*Apteryx australis*).

I am informed that Mr. Bills has obtained from the west coast and forwarded to England no less than five specimens of *Apteryx haasti*, some of which were larger and more handsomely marked than those in the Museum. These were probably females, although the collector was unable to state the sex.

There is no proof whatever that the bird here described is the same as that for which M. Jules Verreaux proposed the name of *Apteryx maxima**; on the contrary, the evidence, so far as it goes, would seem to indicate the existence of a much larger species of Kiwi than any of the foregoing—in fact, a bird equalling in size a full-grown Turkey. For this reason I have considered it safer to retain the name bestowed upon it in compliment to the late Sir Julius von Haast, to whom the Colony is indebted for the establishment of a valuable museum of science and art at Canterbury, as well as for several important topographical and geological surveys in that district.

With closely-allied forms sharing the same habitat, it is somewhat hard to determine how far to go or where to stop in the discrimination of species. So far as we can judge at present, *Apteryx haasti* is readily distinguishable from *A. oweni*; but there would seem to be almost as much justification for our distinguishing as a new species, separable from *A. bulleri*, the Kiwi-kura (or “red Kiwi”) found with its young of the same colour in the Pirongia ranges (as mentioned on page 310), for in this instance there was not merely a distinction of colour, but a very manifest modification in the structure of the plumage. It is no answer to say that both forms were found inhabiting the same range of mountain, any more than it would be an objection to the already recognized species that *Apteryx australis*, *A. oweni*, and *A. haasti* are all found in the same district, or that, while *Apteryx bulleri* is abundant in the Upper Wanganui, *A. oweni* is known to exist on the hill-tops between that district and Wellington. The explanation is, of course, to be found in descent from a common ancestor, the differentiation having been brought about by natural causes which we have not yet been able to determine with any certainty. As we have seen in treating of *Apteryx bulleri*, examples from different localities in the North Island exhibit minor peculiarities that are more or less constant. Such variation can hardly be matter of surprise in the case of flightless birds whose habitat for countless generations may have been restricted to some particular range of mountains. This principle extended ought to be sufficient to account for the existence of at least four recognized species of *Apteryx* within so small a geographical area as New Zealand.

For obvious reasons I have endeavoured to make my account of this very remarkable group of wingless birds as full and exhaustive as possible. Apart from the special interest attaching to species that are rapidly expiring, the Apterygine form is so entirely anomalous among existing birds, that every minute particular of natural economy and life-history appears to be worth recording.

It must be at once apparent that a close and patient study of the avifauna of such a country as New Zealand cannot fail to have an important bearing on the question, which claims so large a share of attention among naturalists of the present day, as to the origin of species.

It seems impossible for any one who has given even the most cursory attention to the subject to doubt that such closely allied forms as *Apteryx bulleri* and *Apteryx australis*, *Ocydromus greyi* and *Ocydromus australis*, and the other representative species inhabiting the North and South Islands respectively, have in each case sprung from a common parent, the amount of difference which is now sufficient to distinguish them specifically being the result of a long-continued and persistent modification in a given direction, and under conditions favourable to its permanence. The only admission

* Bp. Compt. Rend. Acad. Sc. xliii. p. 841 (1856, ex Verr. MS.).

required in support of such an hypothesis is, that the North and South Islands have been severed from each other for a sufficiently long period of time to allow of this complete divergence of character under the ordinary laws of natural development. And here we have the supporting testimony of Geology; for there is every indication in the structure of the two islands that their individual insulation dates back into far antiquity, and was probably coeval with that great convulsion of nature which in the remote past plunged under "the azure main" the continent of which New Zealand and her satellites are now the only existing remnants.





P. J. SMIT, DELT. DRAWN ON STONE BY E. WILSON

JUDD & CO LIMITED, IMP

LEG OF DINORNIS ELEPHANTOPUS.

(FRONT VIEW: THREE-FOURTHS NATURAL SIZE.)



P. J. SMIT, DELT. DRAWN ON STONE BY E. WILSON

JUDD & CO LIMITED, IMP

LEG OF DINORNIS ELEPHANTOPUS.

(BACK VIEW: THREE-FOURTHS NATURAL SIZE.)

SUPPLEMENTARY NOTES

TO THE

'BIRDS OF NEW ZEALAND.'

VOL. II.

IN the Introduction to this work (page xxxii) I mentioned a specimen of the leg of *Dinornis elephantopus*, in the Cambridge University Museum, which Professor Newton had kindly forwarded to me for inspection, and I then referred to an *astragalus*-like bone, the presence of which had hitherto escaped notice in the osteology of *Dinornis*. On turning to Professor Owen's elaborate 'Memoir on the Anatomy of *Apteryx*'*, I found that he had described a somewhat similar inter-articular bone as existing in that bird in the following terms:—"There is a small cuneiform tarsal bone wedged into the outer and back part of the ankle-joint."

Having brought this matter under the notice of Dr. Günther, at the British Museum, we together dissected specimens of *Apteryx bulleri* and *Megapodius pritchardi*, and found this little bone present in the former bird but not in the latter. At Professor Newton's suggestion we afterwards made a similar examination of the leg of a Tinamou (*Crypturus tataupa*) and with a successful result, there being the same interarticular bone attached to the head of the tarso-metatarsus by means of two ligaments, one long and slender, the other broad and short.

The discovery of this new bone seemed to me of so much interest that I made a special journey to York for the purpose of examining the comparatively recent skeleton of *Dinornis robustus* preserved in the public Museum there, as mentioned at page xxiii of my Introduction. Here I found the same bone, but of a somewhat different form, being scarcely half as thick as in *D. elephantopus*, although the bird was of much larger stature. It looked more like a cartilage, for which, indeed, it had been mistaken, the label attached denominating it a "knee cartilage."

Before returning the unique specimen to the Cambridge Museum I had careful drawings of it made by Mr. P. J. Smit, showing the anterior and posterior aspects; and the artist has performed his work very faithfully, even to the minutest details of superficial structure. Plate XLIX. accordingly represents the front view of the left metatarsus of *Dinornis elephantopus* with two of the toe-phalanges attached by means of dried ligament; and Plate L. represents the back view.

* Trans. Zool. Soc. ii, p. 293.

The illustrations are reduced one fourth, the dimensions of the metatarsus being as follows:—

Length	9 inches.
Transverse breadth of proximal end	4 „
Transverse breadth of distal end	5 „
Least breadth of shaft	2.25 „
Fore-and-aft breadth of proximal end	3 „
Circumference of proximal end	12 „
Least circumference of shaft	6.25 „
Breadth of middle trochlea	1.9 „
Length, following the curve	4 „

The proximal phalanges of the inner and middle toes are still firmly attached to the distal trochleæ by means of a tough ligament, and a small portion of the sole is still present.

The *astragalus*-like bone to which I have specially referred is well shown, in its natural position, in Plate XLIX. It measures 2.5 inches in width, with a vertical thickness in front of fully an inch, tapering off on the sides and wedge-shaped behind, with a uniform depth of 1.25 of an inch.

Professor Owen in his minute description of the tarso-metatarsal bone of *Dinornis elephantopus*, says (Extinct Wingless Birds of New Zealand, vol. i. p. 227):—

“I had, hitherto, regarded the metatarsus of *Dinornis crassus*, described and figured at p. 137, in pl. xl. figs. 4 & 5, as presenting the most extraordinary form and proportions of all the restored species of huge wingless birds of New Zealand; it is strikingly surpassed in robustness and in great relative breadth and thickness by the same bone of the present species, which chiefly on that account I have proposed to name *elephantopus*. Only in the great Maccaws and Penguins do the proportions of the metatarsus resemble those in this most robust-legged of birds; but the Parrot-like tribe present those peculiar modifications of the distal trochleæ, with the strong articulation for the back toe, which relate to the Scansorial modifications of the bird's foot; and the Penguins associate with their broad and short metatarsus a characteristic retention of much of the primitive separation of the three constituent bones. In *Dinornis elephantopus* these elements have become as completely coalesced as in any other species, and the general characters of both proximal and distal ends accord with those in previously described species. From the metatarsus of *Dinornis robustus* that of the *Dinornis elephantopus* differs, most strikingly, in its proportions of length to breadth, being little more than half the length, but of nearly equal breadth; the distal trochleæ, however, being relatively less expanded than in *Dinornis robustus*. Equalling, or nearly equalling, the phalanges of that bird in breadth and thickness, the bones of the foot differ chiefly in shortness, but in a less degree than the metatarsi differ.”

Professor Owen's figure of this bone (*op. cit.* vol. ii. pl. lvii.) shows the proximal articular surface of the metatarsus; but in the specimen under notice this is partly covered by the interarticular bone already described; whilst the ectocalcaneal and the mesocalcaneal processes are completely hidden by the dried integument, or heel-pad, which, as already mentioned (Introd. p. xxxii) and as shown in the Plate, is still adhering to the base.

I have already discussed fully (Introd. pp. xviii to xxxv) the controversial question of the antiquity of the Moa, and I do not think it necessary to add anything further on the subject except to mention

that at a recent meeting of the Wellington Philosophical Society, Lieut.-Colonel McDonnell brought forward some remarkable Maori evidence in support of the view advanced by me*.

The number of species described in my former edition was 147. Of these two have been omitted in the present work, namely, *Nestor occidentalis* and *Tribonyx mortieri*, the former being now treated as a mere variety of *Nestor meridionalis*, and the latter because, as already stated (Introd. p. xiv), there is no authentic record of its occurrence in New Zealand. On the other hand, 48 species have been added. Of this number three new species were described and named by myself in the 'Transactions of the New-Zealand Institute,' and four more are characterized for the first time in the present work. Professor Hutton and Dr. Finsch have each added two new species. *Gerygone sylvestris*, Potts, *Ocydromus brachypterus*, Lafr., and *Eudypetes pachyrhynchus*, Gray, have now been admitted as good species. The other additions to the list, 34 in number, are made up of stragglers from Australia, and species inhabiting the New-Zealand seas that have hitherto escaped observation.

In the Introduction I gave the number of Cormorants (including two doubtful forms) as fourteen; but, as fully explained in my account of *Phalacrocorax brevirostris* (Vol. II. p. 169), I have since treated Mr. Sharpe's *P. finschi* as a mere variety of that species, thus reducing the number to thirteen. On the other hand, the number of Petrels has been increased, by a closer investigation of the subject, from thirty-three to thirty-nine. Of those now added only one is a new species, *Puffinus bulleri*, Salvin (Ibis, 1888, p. 354).

Those who possess my former edition, or who may otherwise have an opportunity of comparing the two works, will see how much new material has been embodied in the present one, the book having been practically rewritten and the amount of reading matter increased threefold.

It must not be supposed, however, from this that there is nothing left for the future ornithologist in New Zealand. Most, if not all, of the species inhabiting the mainland (the so-called "land-birds" and waterfowl) have no doubt been pretty thoroughly worked out; but a great deal has yet to be done among the shore-birds and sea-birds. Since the publication of my former edition, no less than 38 species of this class have been added to the list, and even whilst the present volume was passing through the press several more have been discovered.

I have described at page 88 (Vol. I.) the causes of the rapid disappearance of many of the New-

* "At the meeting of the Philosophical Society on Wednesday night the vexed question whether the Maori had ever actually known the Moa, or only through tradition, was briefly discussed upon a paper by Lieutenant-Colonel McDonnell, read by Mr. J. Park. The paper, which was entitled 'The Ancient Moa Hunters at Waingongoro,' was ostensibly a reply to Mr. Colenso, of Napier (a gentleman who, as is well known, has always held the theory that the Moa was extinct when the Maori arrived from Hawaiki), who had stated that there was nothing in the stories or proverbs of the Maoris to show that they actually knew the Moa. Colonel McDonnell expressed surprise that a statement of that kind should have come from such a Maori scholar as Mr. Colenso. As showing that the Maoris had known the Moa, and had hunted and eaten it, he related an incident within his own experience which happened on the West Coast of the North Island in 1866. Sir George Grey (then Governor) was visiting the locality, and an old Maori named Kawana Paipai stated that in his youth he had joined his people in hunting the Moa on the Waimate Plains. In answer to questions, he described the mode of hunting, which was that when a party of young men started a Moa they pursued it until they were tired, when another party took up the chase and so on until the Moa tired, when it was killed with stones and sticks. Doubts were expressed as to the truth of Kawana Paipai's statements, whereupon he became exceedingly angry, and said that if men were brought with spades he would show them where they could uncover the bones of the Moas from the old ovens. This was promptly done, and as Kawana had promised, about three feet down large quantities of Moa bones were found among the old ovens. It was explained by Kawana that the Moa, when brought to bay, fought fiercely, striking out with its feet. The time when the old man took part in the hunt, Colonel McDonnell reckoned, would be early in the present century."—*New Zealand Times*, Nov. 1, 1888.

Zealand birds; but I have not thought it necessary to do more than refer incidentally to the extraordinary manner in which many of the introduced birds have established themselves in the country, displacing in some districts the indigenous species, or at any rate adding by their competition another factor to those already in operation*. On the outskirts of the bush everywhere, the notes of English birds predominate; and I have met with the ubiquitous Sparrow, not only among the steaming geysers of Wairakei, but on the barren heights of Owhaoko. I have already given (Introd. p. xlvi) a list of the other English birds that have already been successfully established. There will, ere long, be a welcome addition to the number, as Mr. H. R. Russell of Hawke's Bay (now in this country) is taking active steps for the introduction of that sweetest of British songsters, the Nightingale. It will be interesting to see whether transportation to a new country, with a comparatively mild climate all the year round, will affect its migratory character; for it cannot be denied that one or two of the species already acclimatized in New Zealand have, to some extent, changed their habits of life.

Among the native species apparently doomed to extinction at no distant date are the Bell-bird and the Tui. The former of these has entirely disappeared from the North Island, but its delicious note is still to be heard in the gardens and shrubberies of Nelson and Christchurch; and on the western side of the Southern Alps this bird is still to be found in all suitable localities. Tuis also, although greatly diminished in numbers during the last twenty years, are still comparatively plentiful in many parts of both islands. It is indeed pleasing to record that they sometimes frequent the shrubberies in and around our principal towns, and that in Mrs. Walter Johnston's pretty garden at Wellington they are to be seen every spring, disporting themselves among the exotic flowers surrounding the house, and nesting, as I am assured, in an Australian bottle-brush almost within reach of the ball-room windows.

On the other hand, some of the indigenous species find the new conditions of life favourable to their increase. For example, the Banded Rail (*Rallus philippensis*) is now comparatively plentiful in all suitable localities. On the low-lying sandy lands near the sea-shore, where fields of pinky-red rushes alternate with flax and toetoe, it may be flushed by the sportsman's dog, almost at his very feet; and in the bosky fringes of the forest, where the native bramble casts a mantle over the low vegetation, and tangles of kohia and other creeping plants make progression well-nigh impossible, its note is now familiar, although a few years since its very appearance was unknown to many of the natives.

I have mentioned (Introd. p. xlvi, footnote) the unfortunate fate that befell one of the Queen's White Swans at Kawau. I am glad, however, to learn from Professor Hutton that the experiment was not so unfruitful as I had supposed. Writing to me, from Christchurch, under date of Oct. 17, he says:—"Sir George Grey gave me a pair of White Swans, in 1868, to take up to the Waikato. I turned them out in Lake Whangape, and when I left in 1870 there were thirteen of them. I have been told that they are now commonly seen on the lakes in the Lower Waikato." He adds:—"Also Rooks were introduced into Canterbury from Lincolnshire, many years ago, by Sir Craeroff Wilson. They have done very well, and there must be over 200 now, in spite of poisoning. The Hedge-Sparrow is also naturalized here; and I see a pair in my garden occasionally."

Since writing my account of the various species of *Ocydromus* inhabiting New Zealand, I have

* In my account of the well-nigh extinct *Pogonornis cineta* (Vol. I. p. 104), I stated that the only collections in this country that could boast the possession of a female of this species were the British Museum and the University Museum at Cambridge. On this point, however, Canon Tristram sends me the following note:—"I have had for years a lovely female skin, in most perfect condition. It was given to me by the late Dr. Lyall, R.N., who shot it in 1850."

examined Forster's original drawing of *Ocydromus troglodytes* at the British Museum, and although a very unfinished production, it certainly represents a highly-coloured specimen of *Ocydromus australis*. I trust I have succeeded in elucidating the very confused synonymy of this group and in giving something like finality to the nomenclature. But the manner in which some of the forms intergrade renders the subject a very puzzling one. Under more than one aspect the Woodhen is a bird of considerable interest, and I have therefore endeavoured to do full justice to its natural history*.

With the kind assistance of Mr. Salvin, who has made a special study of the Procellariidæ for the purposes of his forthcoming 'Monograph,' I have made a very complete list of our Petrels up to date, but I am persuaded that many more have yet to be added. As mentioned in my Introduction, the wide ocean which surrounds New Zealand is, so to speak, the great nursery of this family, and their breeding-grounds are the numerous rocks and islets which abound off our coasts or the small groups of islands lying in mid-ocean and far out of the track of our ordinary commerce. Here is still a most promising field for future workers in New-Zealand ornithology.

In his excellent 'Critical Notes on Procellariidæ' (Orn. Miscell. vol. i. pp. 249-257) Mr. Salvin says:—"The exceedingly extensive range of many species of this family of birds adds to the difficulties of their study when the evidently close specific relationship between many of them is considered. But could we compare specimens taken from the *breeding-stations*, much of our perplexity would, I believe, vanish, and the slight differences observable in specimens captured at various points on the high seas would at once assume a greater value, and definite laws of geographical distribution would be found to prevail in these as in other birds. It is on certain islands that the Procellariidæ assemble in the

* Even in the Rev. Mr. Green's charming account of his ascent of Mount Cook, the ubiquitous Weka comes in for a passing notice. Camped at the edge of a little blue lake, fringed with scrub, at the foot of the Tasman glacier, he writes:—"Here, for the first time, we found the New Zealand edelweiss (*Gnaphalium grandiceps*), and my men seemed to take fresh heart after all their fagging work, when we had our hat-bands adorned with the familiar little felt-like flowers. After a good night's rest on a bed of *Veronica hectori*, we continued our 'swagging,' and on the next afternoon, Feb. 23, we reached our fifth and final camp. We were now 3750 feet above the sea, having gained by a week's labour only 1450 feet of actual elevation, and Mount Cook still towered 9000 feet above us. Our advance was here checked by the ice of the much broken Ball glacier coming down from our left, and though we carried our swags on to its surface in hopes of camping farther up, the absence of scrub on the further spurs, of sufficient size to promise a supply of firewood, made us retrace our steps and pitch our tents on a gravel slope close to the mountain side, in the angle formed by the Ball and Tasman glaciers. Here a glacier stream provided us with water, and the vicinity of our camp was strewn with dead wood brought down by landslips and avalanches from the steep slopes above. Whilst looking for a suitable nook for our tent, Boss came upon a little square patch of dwarfed gnarled *Coprosma* exactly the square of our tent. It grew by itself on the gravel in a snug corner, and seemed as if prepared so specially for our use that we did not wish to decline the hospitality of nature. Filling up, therefore, the centre of the square with some cut bushes we pitched our tent on it. Never was a bed more comfortable; its spring was perfect, we never sank to within less than 5 inches or 6 inches of the ground; and so long as the Wekas contented themselves with squeaking and grunting, and not pecking upwards, we did not wish to deny them the comfortable lodging beneath us, which they seemed to appreciate. From this camp we made a long day's excursion up the main glacier and completed our reconnaissance of the ridges of Mount Cook; and from a point on the medial moraine I took a circle of angles with a view to making my map, and secured a couple of negatives of the Hochstetter ice-fall. But the light was so brilliant, there not being a cloud in the sky, that over-exposure of my plates was almost unavoidable. A brisk breeze, occasionally blowing in sudden strong squalls from south-west or north-west, prevailed in the valley, while on the mountain ridges a steady, fierce wind seemed to blow continuously from the west. The Woodhens or Wekas (*Ocydromus australis*) were a source of constant amusement; they seemed to know no fear, and would come picking and examining every article in our camp, and were always ready to bolt off with any small object left on the ground. They cared little for the stones we threw at them, and all night they kept up a constant whistling, accompanied by a kind of grunting noise. On the stream hard by we had an inexhaustible supply of Blue Ducks (*Hymenolaimus malacorhynchus*); there were never many to be seen at a time, but when we shot three or four one day a couple of brace more would occupy the same part of the stream next morning. They were not wild, so in order to save cartridges we generally pelted stones to get them close together, and then tumbled two or three in the one shot."

breeding-season, sometimes in countless numbers; and after the duties of incubation and rearing their young are accomplished, these colonies disperse at large over a vast tract of ocean, to assemble again the following year. Thus, then, for a considerable portion of the year birds of closely-allied species may be found flying together; but they separate to their respective breeding-quarters at the proper season. From this it may be gathered that the fact of two or more closely-allied Petrels found together on the open ocean is not by any means so strong a proof of their specific identity as would be the case in most other birds. It is by the uniformity or otherwise of birds when assembled at their breeding-stations that characters of real specific value are to be traced."

At page 24 (Vol. I.) I have stated my reasons for not including the Kermadec Islands in this work; but as any information relating to the birds of this group must be of interest to the student of New-Zealand ornithology, especially in regard to the subject of geographical distribution, I have much pleasure in quoting the following observations recorded by Mr. T. F. Cheeseman, Curator of the Auckland Museum, who has lately visited those islands in the Government steam-boat 'Stella.' Much of the information was obtained from Mr. Bell, a resident on Raoul Island, which is the furthest of the group, being about 640 miles from Auckland, or midway between New Zealand and Tonga. The following New-Zealand species are, he states, the commonest birds on the Kermadecs, namely, the Harrier (*Circus gouldi*), the Kingfisher (*Halcyon vagans*), the Tui (*Prosthemadera novæ zealandiæ*), the White-eye (*Zosterops cærulescens*), the Pipit (*Anthus novæ zealandiæ*), the Red-fronted Parrakeet (*Platycercus novæ zealandiæ*), the Pukeko (*Porphyrio melanonotus*), and the Grey Duck (*Anas superciliosa*). Mr. Bell states that both the Long-tailed Cuckoo (*Eudynamis taitensis*) and the Shining Cuckoo (*Chrysococcyx lucidus*) are yearly visitants; and that a large Fruit-Pigeon, supposed to be identical with the New-Zealand species, was abundant till it had been exterminated by the introduced cats. A similar fate has befallen the Red-fronted Parrakeet on Sunday Island; but this bird is still plentiful on Meyer Islet, an outlying wooded rock, whilst on Macaulay Island it is to be seen in great numbers, going about in flocks of from twelve to fifty, hopping amongst the short grass, and apparently feeding on the seeds of *Erigeron* and *Gnaphalium*. Mr. Cheeseman adds:—"So tame was it and so unused to man's presence, that I caught two by simply walking quietly up and suddenly putting my hat over them while they were walking on the grass. Several more were caught by the sailors in a similar way." As might have been expected, many of the Petrels belonging to the New-Zealand avifauna are to be met with among these islands; but Mr. Cheeseman writes of a *Puffinus*:—"A species of this genus, clearly different from any of the New-Zealand forms, breeds on Sunday Island in September and October, laying its eggs on the bare ground among the trees on the hill-sides. The young birds, when cured, form no inconsiderable portion of the food of the residents, and are by no means bad eating. The old birds had only just commenced to arrive at the time of our visit, but during the middle of the season they are present in enormous numbers. Large portions of the island are then entirely covered with them, and the noise and confusion is said to be almost indescribable. . . . A fine Gannet, differing from the New-Zealand species in wanting the buff-coloured feathers on the head, was not uncommon, but I was unable to obtain a specimen." Subsequently, in a letter to myself, he says:—"Since I wrote, Captain Fairchild has made another trip in the 'Stella' and has kindly brought me living specimens of the Gannet referred to in my paper. I believe it to be *Sula cyanopus* (Ramsay), but have not yet fully compared it with the descriptions. I have also received skins and eggs of the Tropic bird (*Phaethon rubricauda*), which breeds there yearly in great numbers, also of *Gygis candida*. Mr. Bell writes me that the *Gygis* breeds in the branches of *Metrosideros poly-*

morpha, often selecting a branch not much thicker than a man's wrist, and placing its eggs in a little depression thereon. I hear of several Petrels breeding on the same islands, clearly different from our species, and hope to get specimens next season."

Apart from the serious work of the naturalist, whose duty it is to observe and record, there is pleasure in the mere watching of birds in their native haunts: to witness the ever-varying evolutions of the sea-birds in their tireless flight; to follow the stately White Crane or the Bittern in their lonely wanderings through the swamp; to sit on some mossy bank, with the scented karetu at your feet and the soft hum of insect-life all round, watching the playful flight of the Tiwaiwaka, as it opens its pretty fan and hunts in the air for invisible flies; or even to gaze on the solitary bird whose life is thus charmingly sketched by Sir Emerson Tennent (in his 'Natural History of Ceylon,' p. 249):—"In solitary places, where no sound breaks the silence except the gurgle of the river as it sweeps round the rocks, the lonely Kingfisher, the emblem of vigilance and patience, sits upon an overhanging branch, his turquoise plumage hardly less intense in its lustre than the deep blue of the sky above him; and so intent is his watch upon the passing fish that intrusion fails to scare him from his post."

Some curious facts relating to the distribution of New-Zealand birds have been recently recorded by Dr. Finsch in 'The Ibis' (1888, pp. 307-309) from specimens obtained by Mr. A. Reischek. The latter naturalist lately accompanied the 'Stella' on one of her trips to the outlying islands in search of castaways on the Snares, two small wooded islands with rocks adjacent lying about sixty miles to the south-west of Stewart's Island, and among the birds collected on the larger of the islands was a specimen of *Sphenæacus fulvus*. This species is very rare in New Zealand; but its congener, *S. punctatus*, is common in both islands, frequenting the stunted fern in the open land, but more generally the thick vegetation of the swamps. In its island-home, where there is no open land and no swamp, it has changed its habits and lives in the bush. As I have stated at page 62 (Vol. I.) there is another allied, but very distinct species (*S. rufescens*), inhabiting the Chatham Islands, which does not occur in New Zealand. Another bird met with on this island was the Black Tomtit (*Miro traversi*), a form absent from New Zealand, but common at the Chatham Islands. Several examples were observed, and it is stated that their habits are exactly similar to those of the North-Island Tomtit (*Myiomoira toitoi*). After leaving the Snares, the 'Stella' visited the Auckland, Campbell, Antipodes, and Bounty Islands. Neither of the above mentioned birds was found in any of these localities; but, curiously enough, another allied species, the South-Island Tomtit (*Myiomoira macrocephala*), was met with on the Auckland Islands.

Mr. Reischek reports that on the Auckland Islands he found a species of Skua feeding on the young Penguins. This was doubtless *Stercorarius antarcticus*, the form which I have described above at page 63. Mr. Howard Saunders, in writing of this species (Journ. L. S., Zool. vol. xiv. pp. 392, 393), says:—"The largest birds are from the Southern Ocean, between New Zealand and the Cape of Good Hope, and they are also the duskiest in colour; those from the South Atlantic are smaller, and have a tendency to a pale frill of acuminate feathers, similar to that which is more or less marked in all the other Skuas; whilst the three individuals obtained by the 'Erebus' and 'Terror' Expedition from the edge of the pack-ice, now in the British Museum, are wonderfully bleached and weird-looking birds. Both these species possess great powers of flight, so that they are able to pursue and rob, not only the smaller Gulls, but also the Terns; and as the latter are found in an uninterrupted succession throughout the whole of the indicated range, there is at once an assignable reason for great extension in the range of the latter of these two Skuas."

CONCLUSION.

Having now sent my last sheet to press, I cannot altogether dispel a feeling of regret that my work is finished, for it has been a source of much enjoyment to me since my arrival in England.

Few persons who are not themselves practical ornithologists can fully realize what this statement implies. The truth is this:—In imagination I have lived over again the pleasantest part of my colonial life. In memory I have recalled the bright dewy morning, now five-and-thirty years ago, when I shot my first *Koheperoa* in the old Mission-garden at Tangiteroria, and found my beautiful prize lying on the sward with its banded wings and tail stretched out to their full extent. I have remembered the delight with which, almost as long ago, I shot in the Tangihua mountains my first *Piopio*, a bird so rare at the far north, even at that time, that it was entirely unknown to the natives of the district. I have roamed through the woods and listened to the scream of the *Kaka*, the shrill call of the Kingfisher, and the twitterings of the smaller birds, whose every note has been familiar to me since my boyhood. I have floated in the warm sunlight down the silent river, its banks overhung with evergreens and drooping ferns in rich profusion, and watched the *Tui* high in the air performing their fantastic flight. I have traversed the deep lagoon, pushing my little canoe along the smooth watercourses among the beds of *raupo*, startling the ever-vigilant Bittern, provoking a peevish cry from the *Pukeko*, and flushing Ducks at every turn. I have ridden for a whole day over fern- clad hills, attended along the road by flights of Ground-Larks, with the Harrier sailing in wide circles overhead; and as the shades of evening were closing in upon the landscape, I have heard the whistling cries of the Woodhen in responsive pairs. I have tramped along the shore, gun in hand, for miles, and brought noise and consternation among the crowding flocks of sea-birds in my anxiety to secure good specimens. And, at night, I have sat for hours by my log fire in the bush, listening to the rapid talk and merry laughter of my Maori companions, broken now and then by the call of the lonely Morepork from the gloomy depths of the forest. All this have I done, over and over again in imagination, while endeavouring to depict in truthful language, for the information of the general reader, the life-histories of the various species.

If the perusal of these sketches should afford my friends anything like the amount of interest and pleasure their preparation has given me, I shall feel that I have not been altogether unsuccessful in this further endeavour to popularize the study of ornithology.

That I had a specially interesting *Ornis* to deal with cannot be denied; and I think it will be conceded that, on the whole, I have honestly discharged my duty as its biographer. The numerous letters of approval I have received during the progress of the present edition, from Subscribers whose judgment I value, have been highly gratifying to me; and I feel that I have nothing to complain of on the part of reviewers. But to my mind the highest tribute of praise the book has elicited is that contained in a letter from a very able colonial statesman—one who has devoted more than forty years of his active life to public affairs and still holds high office—in which, after thanking me for a presentation copy of Vol. I., he says:—“But the feeling that stayed and will stay most is admiration for the splendid service you have again done our country. How infinitely little are the ephemeral doings of all us politicians, when set against a work of such constant interest and value as your ‘Birds’; and how happy you must be at being able to dedicate such a *capo d’opera* in science to your boys, amid the applause of those who are best able to recognize what it has been and is!”

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