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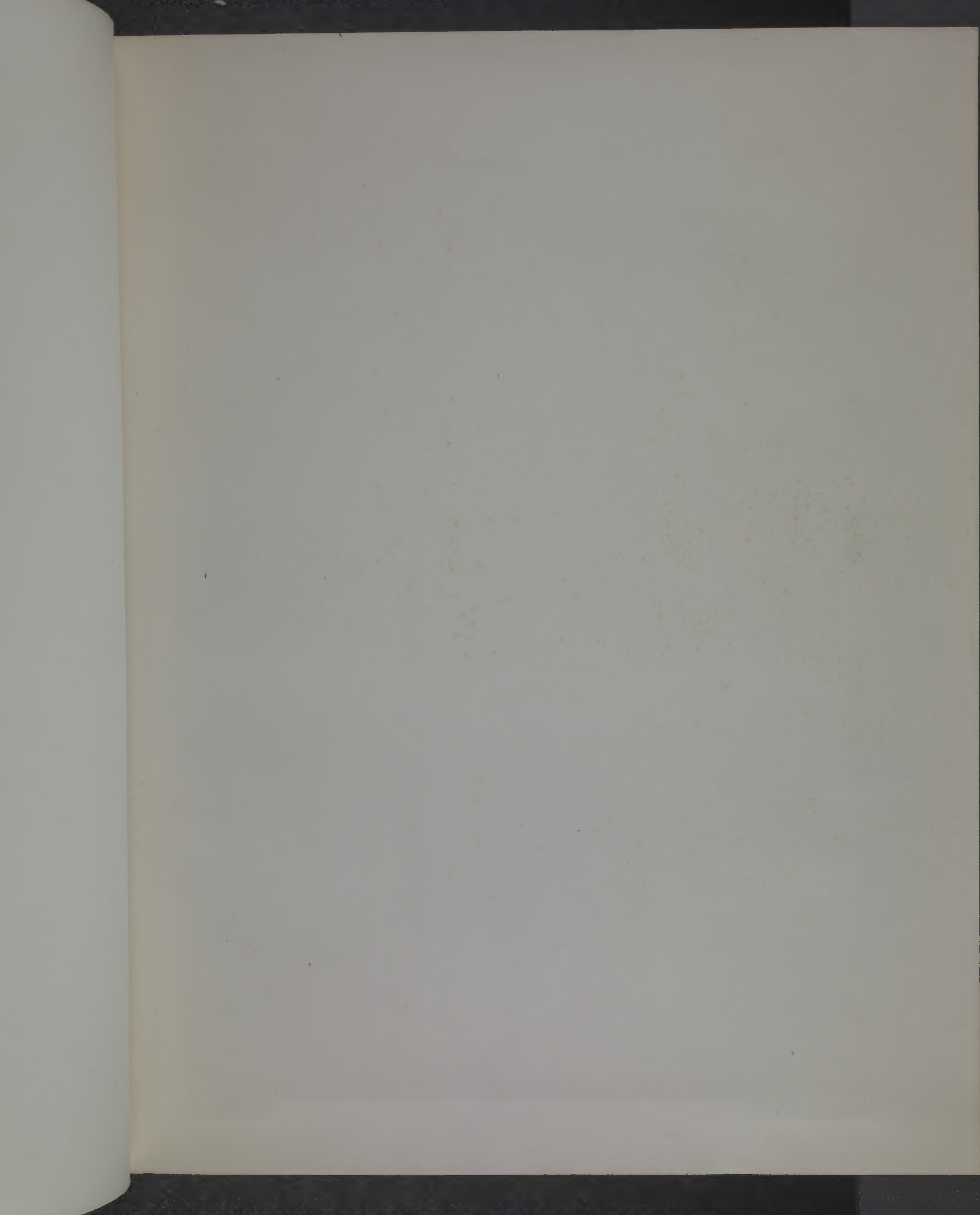
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THE MOA OF NEW ZEALAND.

(DINORNIS GIGANTEUS)

From a Specimen in the Canterbury Museum, N. Z.

A HISTORY

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OF THE

BIRDS OF NEW ZEALAND.

BY

WALTER LAWRY BULLER, Sc.D. R

(RESIDENT MAGISTRATE OF WANGANUI, N. Z.),

FELLOW OF THE LINNEAN SOCIETY, OF THE GEOLOGICAL SOCIETY, AND
OF THE ROYAL GEOGRAPHICAL SOCIETY, CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY,
MEMBER OF THE BRITISH ORNITHOLOGISTS' UNION,
ETC., ETC., ETC.



LONDON:

JOHN VAN VOORST, 1 PATERNOSTER ROW.

1873.

PROSPECTUS.

It has been remarked by a celebrated naturalist that "New Zealand is the most interesting ornithological province in the world;" and in a qualified sense this is no doubt true. The last remnant of a former continent, and, geologically considered, probably the oldest country on the face of our globe, it contains at the present day the only living representatives of an extinct race of wonderful Struthious birds.

Within recent historic times this circumscribed area, scarcely equal in extent to that of Great Britain, was tenanted, to the entire exclusion of Mammalia, by countless numbers of gigantic brevipennate or wingless birds, of various genera and species, the largest attaining to a stature nearly twice that of a full-grown Ostrich. These colossal ornithic types have disappeared; but their diminutive representatives (the different species of *Apteryx*) still exist, in diminished numbers, in various parts of the country; and these are objects of the highest interest to the natural-historian. But apart from this view of the subject the avifauna of New Zealand presents many special features of considerable interest. A large proportion of the genera are peculiar to the country; while some of the forms are perfectly anomalous, being entirely without a parallel in any other part of the world.

Under the changed physical conditions of the country, brought about by the operations of colonization, some of these remarkable forms have already become almost, if not quite, extinct, and others are fast expiring. It has been the author's desire to collect and place on record a complete life-history of these birds before their final extirpation shall have rendered such a task impossible; and it will be his aim to produce a book at once acceptable to scientific men in general and useful to his fellow-colonists.

It may be mentioned that the author's official position in New Zealand, during a period of

more than twelve years, has enabled him to visit nearly every part of the country, while his frequent intercourse with the various native tribes has been highly favourable to such an object as the present undertaking.

The work will comprise an introductory treatise on the ornithology of New Zealand, a concise diagnosis of each bird in Latin and English, synoptical lists of the nomenclature, and a popular history and description of all the known species—and will contain coloured illustrations, by Keulemans, of all the more interesting or characteristic forms. It will be published in five Parts, each containing not less than seven coloured lithographs, comprising altogether about seventy figures of New-Zealand birds.

London, January 1872.

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PREFACE.

THE study of Ornithology has always been a source of intense enjoyment to me; and to write a history of the Birds of my native country was one of the day-dreams of my early boyhood. In maturer years my intervals of leisure, during an active official life in the colony, have been chiefly devoted to the collection of materials for such an undertaking; and the result is now presented to the public in a form which will, I trust, be acceptable to both the scientific and the general reader.

With what amount of success I have executed my self-imposed task it is not for me to decide. I am conscious, however, of having bestowed much honest labour upon it; and the highly favourable manner in which it has been reviewed, as well as the numerous letters of commendation and approval which I have received from persons in every way competent to form a judgment, give me reason to believe that my efforts have not been misdirected.

As a proof that I have spared myself no trouble to make the work complete I may mention that, without a single exception, the descriptions of the species have been taken from specimens actually before me, and that every measurement given throughout the book has been made or verified by myself. The life-histories are, for the most part, records of my own observations during a number of years; and I have endeavoured to make them as truthful as possible. It will be seen, however, that I have not failed to avail myself of the notes of other local naturalists, whose contributions are, in every instance, duly acknowledged.

I take this opportunity of expressing my gratitude to the Colonial Government for having granted me a prolonged leave of absence, on the most liberal terms, for the purpose of visiting England to superintend the publication of my work. To the authorities of the British Museum

my thanks are due for the facilities which have been afforded me of studying the contents of perhaps the finest collection of Birds in the world, and to the gentlemen having charge of that department for their unvarying courtesy and attention—even my application to be allowed to remove the rare *Notornis* from its hermetically closed case, for the purpose of examination, having been readily complied with.

In working out the historical synonymy of the species I have found the Library of the Zoological Society of great service; and in consulting authorities I have received valuable assistance from Mr. R. B. Sharpe, the late librarian, whose long connexion with the Society had made him familiar with the bibliography of the subject. The excellent lists already published by Mr. G. R. Gray and Dr. Otto Finsch had rendered this part of my task a comparatively light one; but all the references have been carefully verified, and the chronology given for the first time; while numerous synonyms have been added, and the whole of the nomenclature critically examined and revised.

To my brethren of the British Ornithologists' Union I hereby tender my acknowledgments for the readiness with which they have at all times given me the benefit of their opinions and judgment on doubtful points, or lent me specimens for comparison.

In conclusion, I have only to state that, in consideration of the generous assistance accorded to me by the New-Zealand Government, I have presented the whole of my collection of Birds, on which the descriptive letterpress is chiefly founded, to the Colonial Museum at Wellington, where it will in future be accessible for purposes of reference.

W. L. B.

London, March 1873.

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INTRODUCTION.

THE first published list of the birds of New Zealand was drawn up by the late Mr. G. R. Gray of the British Museum, and appeared in 1843 in the Appendix to 'Dieffenbach's Travels.' This enumeration contained the names of eighty-four recorded species; but many of these were of doubtful authority, and have since been omitted. In the following year the same industrious ornithologist, in the 'Voyage of H.M.S.S. Erebus and Terror,' produced a more complete list, embracing the birds of New Zealand and the neighbouring islands, accompanied by short specific characters, and illustrated by twenty-nine coloured figures, many of them of life-size. In July 1862 he published in 'The Ibis' a revision of this synopsis, with the newly recorded species added, including, moreover, the birds inhabiting Norfolk, Phillip, Middleton's, Lord Howe's, Macaulay's, and Nepean Islands. This enumeration contained altogether 173 species, of which 122 were said to occur in New Zealand and the Chatham Islands. In the 'Essay on the Ornithology of New Zealand,' written by myself at the request of the Exhibition Commissioners, in 1865, and afterwards published by the New-Zealand Institute*, eleven additional species were recorded; and in a paper which I communicated to the Wellington Philosophical Society in August 1868†, I gave the names of fourteen more. A few other species have since been added to the list; while, on the other hand, it has been found necessary to strike out several which had been admitted on insufficient evidence.

The present work contains descriptions of 145 species, including two (*Platycercus alpinus* and *Tribonyx mortieri*) of which an account will be found in the accompanying pages.

The leading feature in the Ornithology of New Zealand is thus expressed by a very accomplished zoological writer:—"Recent birds being divided into two great and trenchantly marked groups, of very unequal extent, the smaller of these groups (the *Ratitæ*) is found to contain six most natural sections, comprising, to take the most exaggerated estimate, less than two score of species, while the larger group (the *Carinatae*), though perhaps not containing more natural sections, comprehends some ten thousand species. Now, two out of the six sections of this small group are absolutely restricted to New Zealand; and these two sections contain considerably more than half of the species known to belong to it. Thus, setting aside the Carinate birds of our distant dependency (and some of them are sufficiently wonderful), its recent Ratite forms alone (some twenty species, let us say) may be regarded as the proportional equivalent of one tenth of the birds of the globe—or numerically, we may say, of an avifauna of about one thousand species"‡.

* Trans. N.-Z. Instit. 1868, vol. i.

† *Ibid.* pp. 105-112.

‡ Nature, July 18, 1872.

A perusal of the following 'History' will show that the avifauna of New Zealand possesses other distinguishing features of a very striking character, a full review and discussion of which would occupy many pages. Having, however, already far exceeded the limits originally assigned to this book, I must reserve for some future occasion the more exhaustive treatment of this subject, and confine myself now to a few introductory notes, chiefly of an explanatory kind.

In the arrangement of the genera, I have, for the most part, followed the system employed by the learned editor of the 'Zoological Record,' Professor Newton, of Cambridge,—not that I consider it altogether perfect, but because it seems to me the one of all others best adapted to the present state of ornithological science. Any system of classification, however excellent in itself, or ably conceived and elaborated, must of necessity be a provisional or tentative one, so long as our knowledge of the structural character and natural affinities of the vast majority of species continues so imperfect as it confessedly is at present. When the anatomy of every known bird on the face of the globe has been as fully investigated as that of the Rock-Dove (*Columba livia*) was by the late Professor Macgillivray, and its life-history becomes as thoroughly known, then, but not till then, will it be possible to devise a system of arrangement absolutely true to nature. The aim and purpose of all classification being to aid the memory in its effort to comprehend and master the complex and ever varied productions of nature, or, in other words, to assist the mind by a ready association of ideas in the grand study of Creation, it follows that the method of arrangement which best subserves this practical end is the right one to adopt. But we must be content to see our carefully elaborated systems swept away one after another, till, perhaps, in the distant future some gifted mind shall arise, who, with the constructive energy of a second Cuvier, may be able to fashion, from the more complete materials at his command, a system perfect in all its parts and destined to endure till time shall be no more.

With regard to the changes I have found it necessary to make in the generally accepted nomenclature, my explanation is a simple one. While fully admitting the advantages of the rule "*quieta non movere*" in the case of names which have obtained universal currency, I have considered it better, in undertaking a general revision of the whole subject, to apply the strict principle of modern nomenclature, and, in all cases where the subject was free from doubt, to adopt the oldest admissible title. We cannot, of course, look for any finality in the generic appellations so long as the science is a progressive one; but I am desirous of giving something like fixity and permanence to the specific names; and with this view I have endeavoured, so far as I could, to rectify all existing errors—altering the names entirely in cases where it appeared to me that wrong ones had hitherto been employed, and correcting obvious classical defects in others—substituting, for example, *Hymenolæmus* for *Hymenolaimus*, and *antipodum* for *antipodes*. In no instance have I introduced any change without very careful consideration and research; and the fact that the authorities in the British Museum have adopted, with scarcely a single exception, my corrections and identifications, in the classification of the New-Zealand birds in the national collection, may, I think, be accepted as a proof that I have exercised proper judgment in this respect.

In portraying the manners and habits of the various species, I have been careful to omit nothing that seemed calculated to elucidate their natural history. It has been said that a zoologist cannot be too exact in recording dates and other apparently trivial circumstances in the

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course of his observations, and that it is better to err on the side of minuteness than of vagueness, because an observer is scarcely competent to determine how far an attendant circumstance, trivial in itself, may afterwards be found to enhance the value of a recorded fact in science when viewed in relation to other facts or observations. It must be borne in mind, however, that we are as yet only imperfectly acquainted with many of the native species, and that probably, in the history of all that are here treated of, new facts or new features of character will hereafter come to light. It is extremely difficult to cultivate an intimate acquaintance with birds that are naturally shy and recluse, and especially, so in a thinly peopled country, where they rarely cross the path of man and must be assiduously sought for in bush, swamp, and jungle. While relying generally on my own opportunities for observation, I have not failed to avail myself of the kind assistance of others; and in the body of the work numerous acknowledgments will be found of information furnished by correspondents in various parts of the country, who, amid the multifarious duties and engagements of a colonial life, have found time to take notice of the natural objects around them.

I have considered it necessary to omit the following species, there being no satisfactory proof of their having occurred in New Zealand, viz.:—*Halcyon cinnamomina*, *Anthochæra carunculata*, *Gerygone igata*, *Rhipidura motacilloides*, *Aplonis zealandicus*, *A. caledonicus*, *Ortygometra fluminea*, *O. crex*, *Nesonetta aucklandica*, *Anous stolidus*, *Procellaria incerta*, *P. mollis*, *Dysporus piscator*, *Phalacrocorax sulcirostris*, and *Aptenodytes pennantii*.

The following supplementary notes, on several of the natural sections, contain all that I deem it at present necessary to add:—

Fam. FALCONIDÆ. Since the appearance of Part I. of my work, some further discussion has taken place as to the real distinctness of *Hieracidea novæ zealandiæ* and *H. brunnea*. I see no reason, however, to alter or modify the views I have expressed in my history of the species; on the contrary, the evidence that has since been adduced is strongly in support of my conclusions. Thus Dr. Haast writes to me (under date of March 10, 1872):—

“Concerning the specific distinctness of the Sparrow-Hawk and the Quail-Hawk, I may tell you that on my last journey into the interior I got two of the former (*i. e.* the small species). They were male and female; and I secured them at the nest, where they had young ones. The female was a little bigger and lighter than the male bird. Both birds were *full-grown*, and showed at a glance the impossibility of their ever developing into the large and perfectly distinct Quail-Hawk.”

Since writing my account of *Circus gouldi* (pp. 12–16), I have found that the Harrier which occurs in Celebes is not *Circus gouldi*, but the true *C. assimilis=jardini*. It seems very doubtful whether the species inhabiting New Zealand has ever been met with north of the equator.

Mr. J. H. Gurney, the well-known authority on Raptores, has sent me the following interesting note:—“The circumstance which you mention at p. 11 of *Circus gouldi* being called by the natives ‘kahu-pango’ strikes me as very curious, as *C. macroscelis* bears the name of ‘Papango’ in Madagascar and *C. maillardi* in Réunion (vide Ibis, 1863, p. 338 and note). The fact of the Réunion Harrier being called ‘Papango’ was also mentioned to me by a resident there.”

I may here mention that, Mr. Gurney having sent to the Norwich Museum for a specimen

of his *Circus wolfi* (P. Z. S. 1865, p. 823) for my inspection, I felt no hesitation, after comparing it with adult examples of *Circus gouldi*, in accepting it as a good species, notwithstanding the opinions to the contrary of Professor Schlegel and other continental ornithologists. It appears to me to be readily separable from our bird by its blackish crown and ear-coverts, and likewise by the much darker colour of its wing-coverts. In the otherwise excellent drawing, from the pencil of Mr. Wolf, which appeared in the 'Proceedings' (*l. c.*), these distinguishing features are not sufficiently shown; nor does Mr. Gurney give the necessary prominence to them in his descriptive account, his object having been (as he has since informed me) to point out the distinguishing characters of the species as compared with *C. maillardi* (Verreaux), rather than with *C. gouldi*.

Fam. PLATYCERCIDÆ. In treating of the members of this section I have had recourse to Dr. Otto Finsch's elaborate Monograph on the Parrots ('Die Papageien'), a work the care and labour of which may be estimated from the fact that, of the 350 species described therein, all but 18 were examined by the author personally. Accepting the decision of so able an authority, I agreed to sink my *Platycercus alpinus* as a species, and to consider it the young state of *Pl. auriceps* (vide pp. 61 & 62). The validity of the species, however, has since been established beyond all doubt. More than twenty specimens have recently been brought to this country; and it is now to be seen alive in the parrot-house in the Zoological Society's Gardens. I take this opportunity, therefore, of introducing it as follows:—

PLATYCERCUS ALPINUS, Buller, Ibis, 1869, p. 39.

Ad. P. auricipiti similis, sed minor, et fronte aurantiacâ, vertice pallide flavo distinguendus.

The following is my description of the new species, as it originally appeared in 'The Ibis':—

"This Alpine form differs from its near ally (*Platycercus auriceps*) both in size and in the tints of its plumage. Our three species of *Platycercus* present a distinct gradation in size and colouring. In *P. pacificus* the frontal spot, ear-coverts, and thigh-spots are deep crimson, while the general plumage is dark green. In the smaller species (*P. auriceps*) the frontal band is crimson, and the vertex golden, while the general plumage is a warm yellowish green. In *P. alpinus*, which is smaller again than the last-named species, the frontal band is orange, and the vertex pale yellow, while there is an absence of the yellow element in the plumage, which is of a cold pure green, much paler on the underparts. The thigh-spots, moreover, are much smaller than in *P. auriceps*, and are orpiment-orange instead of crimson. On comparing the bills of the two species the difference is very manifest, that of *P. alpinus* being fully one third less than that of *P. auriceps*.

"Length 8.5 inches; wing, from flexure, 4.25; tail 4.5; tarsus .625; longest fore toe and claw .875; bill, following curvature .5, along the edge of lower mandible .25.

"Dr. Haast, from whom I received several specimens of this bird, met with it in the forests of the Southern Alps, at an elevation of from 2000 to 2500 feet; and Mr. Travers sent me, for examination, other examples, obtained by him in the high wooded country of the Nelson Province."

Fam. MELIPHAGIDÆ. Since writing my account of the appearance and migrations of *Zosterops lateralis* in New Zealand, I have met with the following passage in a small volume, entitled 'Castaway on the Auckland Island,' by Captain Thomas Musgrave, which may serve to throw further light on the question discussed at pp. 80-84:—

"I cannot omit taking notice of a small bird which appears to be an annual visitor to this island, as they have been here about the same time both last year and the present one. They come in immense flocks, fly rather high and in waves. They are evidently a seed-bird, of the Sparrow kind, and very much resemble the wild Canary both in colour and size. They only remained here a few days; and I fancy they went away on the 3rd of this month [April], which was a fine day with a light southerly breeze."

The genus *Zosterops* comprises a rather numerous group of closely allied species, with a wide geographic distribution; but, as a genus, it is somewhat isolated in its affinities. Mr. Gould in placing it, very properly, next to the Australian Honey-eaters, observes:—"I have been influenced by their approximation to these birds both in form and habits, and to which they exhibit a further degree of affinity in the form and structure of their nests, but not in the colouring of their eggs, which are always blue." But I would remark that a stronger indication of this affinity than any mentioned by Mr. Gould is to be found in the structure of the tongue, which is slightly pencilled at the tip, and proclaims at once the meliphagous habits of the group.

Members of this genus are scattered through Southern Africa, India, China, and Japan; but the species are most numerous in the sea-girt lands of Australasia and Polynesia, where each group of islands appears to have one or more species peculiar to itself. Mr. Gould records three well-marked species from Australia, two from Lord Howe's Island, and two more from Norfolk and Phillip Islands. There is one species (*Zosterops flaviceps*) peculiar to the Fiji Islands, another (*Z. flavifrons*) to the New Hebrides group, and another (*Z. conspiciata*) to the Ladrone or Marian Islands. Two species inhabit New Caledonia (*Z. xanthochroa* and *Z. griseonota*); one (*Z. cinerea*) is recorded from the Caroline group, and another (*Z. melanops*) from the Loyalty Islands.

The New-Zealand representative of the genus is undoubtedly the same as *Zosterops lateralis*, Lath. (= *cærulescens*, Gould), an inhabitant also of Tasmania, New South Wales, and South Australia.

Fam. STURNIDÆ. Naturalists who profess to be governed by the ordinary rules of zoological nomenclature will, I feel persuaded, follow me in the adoption of *Heteralocha acutirostris* in substitution for *H. gouldi*, as applied to the Huia. But it is necessary to alter the position of the bird in our system of classification, inasmuch as it proves, on further research, to be a Passerine form, and not a Picarian. In placing it in the family *Upupidæ* (order Picariæ) I stated (at p. 63) that till its affinities were better understood I preferred to leave it where my predecessors had stationed it, especially as I had myself observed a striking similarity in some of its habits to those of the Common Hoopoe (*Upupa epops*). The bird which I referred to at page 68, as then living in the Zoological Society's Gardens, has since died; and the loss to the collection has, in this instance, been the gain of science; for Mr. A. H. Garrod has thus been afforded an opportunity of studying the osteology and anatomy of this singular form, the result being that he assigns it a place among the Starlings. It is only fair, however, to mention that the late Mr. G. R. Gray, in his 'Hand-list of Birds,' had already referred it to the family *Sturnidæ*. Here it still holds an isolated position as the only known representative of the genus, although it seems to have a near generic ally in another New-Zealand form, the *Creadion carunculatus* or Saddle-back.

I quote the following from Mr. Garrod's valuable paper read before the Zoological Society on the 21st May last:—

"The arrangement of the feathers is completely Passerine. The rhombic saddle of the spinal tract does

not enclose any ephippial space, therein differing from the Crow's, and resembling the typical Starling's. There are nineteen remiges, of which ten are on the hand; they increase in size up to the fifth. The rectrices are twelve in number. The oil-gland is nude. The gizzard is well developed. The intestines are 16 inches long, with the bile-ducts $2\frac{1}{2}$ inches from the gizzard. The cæca are 1 inch from the cloaca and $\frac{1}{4}$ inch long, being cylindrical. There is one carotid artery, the left. The palate is strictly ægithognathous; that is, the vomer is truncate in front abruptly, and cleft behind; the postero-external angles of the palatines are produced; the maxillo-palatines are slender, and approach towards, but do not unite with, one another, nor with the vomer, which they partly embrace. There is no ossification in the nasal septum anterior to the vomer. The whole cranial configuration closely resembles that of *Sturnus*; but the mandible, instead of being bent upwards, is straight. Like it, the palatines are narrow and approximate; the antero-internal angles of the posterior portions of those bones are reduced and rounded off, as is sometimes the case with *Sturnus*. The vomer is completely truncated in front, and is not prolonged forwards at its external angles, as in *Corvus* and its allies. The zygoma is not so slender as in *Sturnus*; but the curves are similar. The articular surfaces on the quadrate bone for the mandible are proportionally very large. The anterior extremities of the pterygoid bones articulate with the sphenoidal rostrum much as in *Corvus*, meeting in the middle line behind the posterior extremities of the palatines for a short distance. The maxillo-palatines, in their approximate portions, are shorter from before backwards than in *Sturnus*, and much resemble those of *Corvus*. The antero-inferior processes of the orbit are large and spongy; they almost touch the zygoma. But the most characteristic portion of the skull of *Heteralocha* is the occipital region; and in this it presents a great exaggeration of the peculiarities of *Sturnus* and its allies. In *Corvus* and most Passerines the digastric muscles occupy a narrow space intervening between the auditory meatus and the mass of occipital muscles, not extending so high up the skull as the latter. The occipital ridge encloses a space elongated from side to side, and of but little depth. In *Sturnus* the digastrics are much broader, and they narrow the occipital space; they also extend up the skull to so great an extent that they nearly meet in the middle line above the origin of the biventre cervicis muscles; but in *Heteralocha* they are of still greater size, and, meeting above the middle line, they form a strong ridge, which extends for some distance into the parietal region vertically. This peculiar development of these muscles produces a corresponding change in the shape of the space enclosed by the occipital ridge. In *Heteralocha* it is almost circular, and it extends some way above the foramen magnum. In *Sturnus* there is an approximation to this condition. A vertical parieto-occipital ridge in many other birds closely resembles that of *Heteralocha*; but it is the median limit of the temporal fossa in most. Correlated with this extensive digastric origin is a large surface for its insertion. The angle of the mandible is prolonged directly backwards for this purpose, in a manner unique among Passerine birds, but well seen in the *Anatidæ*. In *Sturnus* the angle of the mandible is slightly prolonged backwards for a similar purpose. In the sternum *Heteralocha* differs in no important point from *Sturnus*, except that the posterior notches tend to be converted into foramina, as observed by Mr. Eyton in his 'Osteologia Avium.' In conclusion, it may be stated that the anatomy of *Heteralocha* shows clearly that it is truly Passerine, and not related to *Upupa*, as was previously supposed by most authors. When examined more in detail its relation to the *Sturnidæ* is found to be very intimate, and its structure is clearly not closely allied to that of the *Corvidæ*. In its relation to *Sturnus* it seems to present an exaggeration of the peculiarities of that bird, which would place it at the head of the family"*.

Fam. RALLIDÆ. In a country possessing such forms as *Notornis* and *Porphyrio* we might naturally look for the occurrence also of *Tribonyx*. Both of the latter are known to have a wide geographic range, while *Notornis*, which is a strictly local form, appears to combine in some measure the characters of each, being allied to *Porphyrio* in the form of its bill and in its

* P. Z. S. 1872, Part ii. pp. 643-647.

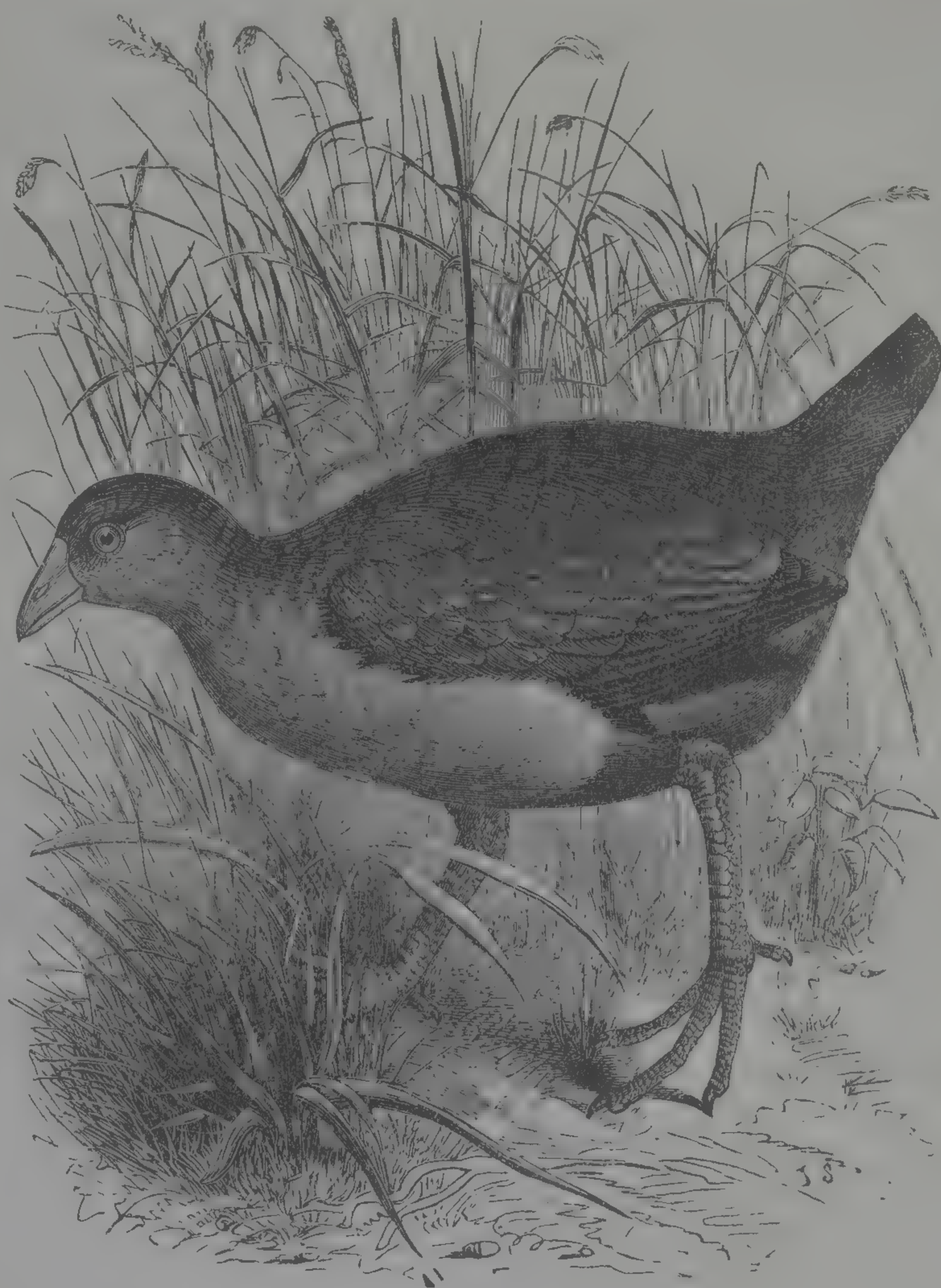
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general colouring, and to *Tribonyx* in the structure of its feet; while in the feebleness of its wings and the structure of its tail it differs from both. (See page 192.) The recent discovery therefore, in the South Island, of an example of *Tribonyx mortieri* which has been brought to England, and is now living in the Zoological Society's Gardens, is a very interesting fact in geographic natural history.

The former acquisition by the Society of a similar bird, in July 1867, led to the discovery by Dr. Sclater that the species figured and described by Mr. Gould in his 'Birds of Australia' under that name was not the true *Tribonyx mortieri* of Du Bus (Bull. Acad. Sc. Brux. vii. p. 214), but a distinct bird, characterized by its smaller size, and by the absence of white stripes on the wing-coverts. Dr. Sclater accordingly proposed the name of *Tribonyx gouldi* for the latter species (Ann. N. H. 1867, xx. p. 122), and gave the following distinguishing characters for *T. mortieri*:—

"Diagn.—Major; alis albo striatis; plaga magna hypochondriali alba."



For the purpose of illustrating the difference in the plumage, an excellent woodcut of this species was given in the 'Proceedings' of the Zoological Society (1867, p. 816); and by the kind permission of the Publication Committee I am allowed the opportunity of reproducing it here.

The bird now in the "Gardens" was brought home (with other birds from New Zealand)

by Mr. Richard Bills, and purchased by the Society on the 21st October, 1872. I am informed by the late owner that it was captured on the shores of Lake Waihora, in the Province of Otago, by a party of men who hunted it down with dogs. When first brought to him at Dunedin it was very wild and shy; but it soon became reconciled to confinement, and when he exhibited the bird to me in London it was perfectly tame and would feed from the hand.

Descr. ♀. Crown and sides of the head, nape, hind neck, back, and rump brownish olive, washed more or less with chestnut; wing-coverts greyish olive, shading into brown, each feather with a white streak down the centre; throat, fore neck, breast, and sides of the body dark ashy grey, passing into slaty black on the abdomen and under tail-coverts, where the plumage is slightly tipped or freckled with grey; the overlapping feathers on the flanks pure white in their apical portion, forming a conspicuous mark on each side of the body; under wing-coverts dull blackish brown, and all largely tipped with white; quills blackish brown, the secondaries brownish olive on their outer webs; tail-feathers black, the middle ones tinged with brown on their outer margins. Irides bright crimson, with a paler rim surrounding the pupil; bill greenish yellow, lighter towards the tip; legs and feet pale plumbeous tinged with yellow, the claws black. Total length 16.5 inches; extent of wings 25; wing, from flexure, 8; tail 4.5; bill, along the ridge 1.5, along the edge of lower mandible 1.4; tarsus 2.75; middle toe and claw 3.25; hind toe and claw 1.1*.

Besides the three well-marked species of *Ocydromus* described at pp. 165–175, Dr. Finsch† recognizes a fourth (*O. troglodytes*, Gmel.); but, although, as I have pointed out at page 171, the South-Island Woodhen is subject to great variation both as to size and plumage, I am unable to draw any specific line. It may be mentioned, however, that there is a very distinct species, *Ocydromus sylvestris* (Sclater), inhabiting Lord Howe's Island, several live examples of which have been brought to Europe. On the structural peculiarities of this singular Ralline form Professor Newton has favoured me with the following notes:—

“One remarkable character in its osteology is that the angle which the coracoid makes with the scapula is greater than a right angle. 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.”

Mr. A. H. Garrod has sent me the following interesting communication on the same subject:—

“In its osteology and visceral anatomy, as well as in its myology, *Ocydromus* agrees completely with the

* To prevent any misapprehension of terms, I may here explain that in the formulary of measurements adopted in this work, “length” always means from the tip of the bill to the end of the tail in the outstretched bird; “extent of wings,” the extreme span of the wings when spread; “wing from flexure,” the length from the carpal joint to the end of the longest quill; and “tail,” the length from the root to the extremity of the longest feather. The measurements of the bill and claws indicate the curvature of those parts in every case, unless otherwise expressed.

† Journal für Ornithologie, 1872, p. 174.

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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 Rallidæ, the skull is schizognathous and holorhinal; in other words, the maxillo-palatine bones of either side do not anchylose 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 cæca 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."

Fam. CHARADRIIDÆ. The most remarkable member of this section in New Zealand, or perhaps in any part of the world, is the Wry-billed Plover (*Anarhynchus frontalis*). I have made my account of this bird as complete as possible, and in doing so I have drawn largely on the notes contributed by Mr. Potts to the Wellington Philosophical Society. Referring to my remarks on its mode of feeding, and on the peculiarity of the pectoral band in the male bird, which is always unsymmetrical, being wider on the right- than on the left-hand side of the bird (see p. 219), the accomplished Editor of 'The Ibis' indulges in the following reflections:—

"It would appear that the peculiarly shaped bill would only be an efficient weapon for obtaining food in this way so long as the bird walked one way round the stone, *i. e.* bearing to the off side or from west to east! The wider portion of the pectoral band would thus be always next the stone, and more hidden than the narrower or left portion. Has running round stones always the same way been the cause which enabled those birds which practised it to survive and transmit this habit to their offspring? and has their success been further promoted by the tendency to reduce the exposed side of their pectoral band, a secondary sexual character? Or has the process been reversed, and the protection given to those birds which ran one way round stones, keeping the prominent portions of their pectoral bands from sight, tended to produce the curvature of the bill? The development of both characters seems to hang upon the birds acquiring the habit of running only one way round stones"*.

Fam. ANATIDÆ. I am indebted to the kindness of Mr. W. S. Pillans (who has recently arrived from New Zealand) for the following further particulars respecting the appearance in Otago of *Dendrocygna eytoni*:—

"About the middle of June 1871 a flock of fourteen of these Ducks was first seen in the neighbourhood of

* Ibis, 1873, p. 93.

the Tuakitoto and Kaitangata lakes, in the Clutha district, Otago. They attracted the attention of the settlers, because in form, colour, cry, and manner of flight they differed widely from any kind of Duck indigenous to that part of New Zealand. After much trouble I succeeded in shooting three specimens. All of these I carefully skinned and preserved. The first I forwarded to Dunedin by Mr. J. P. Maitland, to be placed in the Provincial Museum of Otago; and from this specimen the description was taken which appears in the 'Proceedings of the Otago Institute.' I may mention that these birds utter a low, plaintive, whistling cry, which they constantly repeat while on the wing. Having a turn for bird-stuffing, I set up the second of my three specimens, and gave it to my uncle, the Hon. F. S. Pillans; and it is now in his house at Myres, Inch Clutha, in the swamp opposite to which place I obtained the specimens. On my way to England, in October 1871, I left the third specimen at Wellington, in the care of Dr. Hector, to be presented to the Museum in that city.

"There was no appreciable difference in the size of the three specimens; so that either the male and female of this species are alike, or all the birds I shot chanced to be of the same sex If these birds are really natives of such warm latitudes as the north coast of Australia, they must be very hardy and easily acclimatized; for, a few weeks after they were first seen in Otago, there was a fall of several inches of snow. This sudden change of climate, combined with the hardships of a long flight, would lead one to suppose that they would be in a very poor condition; but the contrary was the case, though it is possible that they may have lingered somewhere on the west coast, and so recovered their flesh after their long sea-flight, before they came as far east as the Molyneux. The birds I obtained were in fair condition, and were excellent eating, being dark in the flesh and of a gamy flavour, though a little dry, which I attributed to their having been denuded of their skins some time before they were cooked."

Fam. PROCELLARIIDÆ. In treating of this extensive group I have received much assistance from Dr. Coues's valuable 'Monograph;' and in all doubtful cases I have considered it safer to adopt his nomenclature.

Mr. Potts has described, in 'The Ibis' (1873, p. 85), a supposed new species of *Prion*, under the name of *P. australis*. This may be the bird referred to by Mr. Gould, whose remarks I have quoted at page 311; but I have not yet had an opportunity of examining a specimen.

Fam. APTERYGIDÆ. 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.

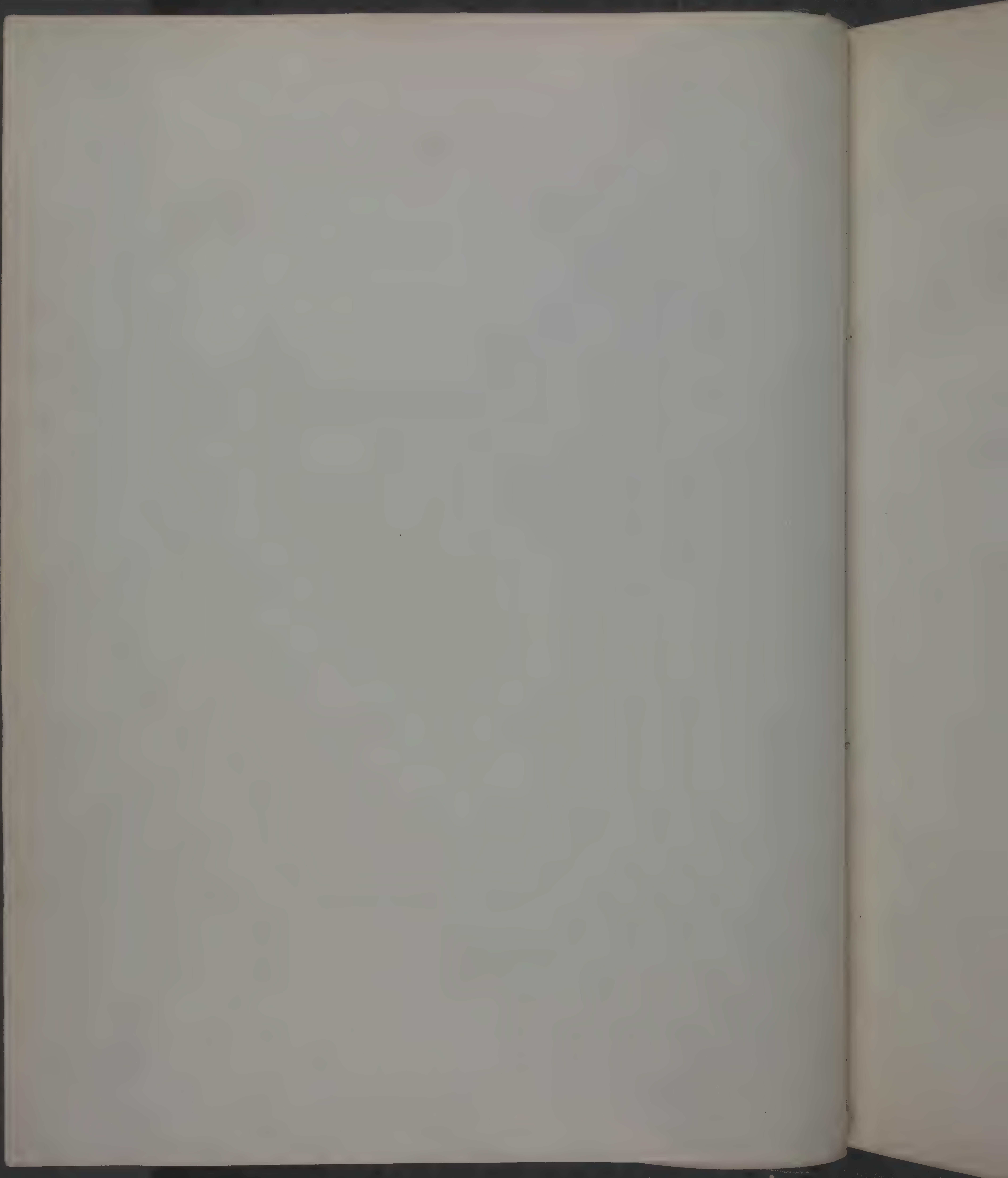
It seems impossible for any one who has given even the most cursory attention to the subject to doubt that such closely allied forms as *Apteryx mantelli* and *Apteryx australis*, *Ocydromus earli* and *Ocydromus australis*, and the other representative species inhabiting the North and South Islands 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 required in support of such an hypothesis is, that the North and South

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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 coæval 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.

Prof. A. Milne-Edwards, who has for many years past been engaged in the publication of a great work on fossil birds, has lately pointed out, in a communication to the Academy of Sciences in Paris, some facts showing a striking analogy in this respect in the case of certain islands east of Africa. In treating of the Mascarene Islands (Mauritius, Rodriguez, and Bourbon), he remarks that, "as far as the indications go, these are the points still remaining of an ancient continent, which, little by little, has sunk beneath the ocean. Upon these, thus converted into islands, have been concentrated the inhabitants of the land, where they have been crowded together, as shown by their fossil remains, and where they became exterminated, sooner or later, either by the action of man or by other agencies. M. Edwards thinks Madagascar was not connected with these islands at any time; since, when first discovered by Europeans, the latter contained no mammals whatever, and therefore, of course, none of the forms at all peculiar to Madagascar, such as lemurs &c. On the other hand, there is, he contends, evidence to show that Madagascar and New Zealand were formerly united, since three species of *Æpyornis* from Madagascar bear a close generic relationship to *Dinornis*, *Palapteryx*, and *Apteryx* of the latter region. All these belong to the same zoological type; and communication must have existed between the countries, probably by groups of islands forming intermediate stations, and now unfortunately submerged, leaving no trace behind."







HIERACIDEA NOVÆ ZEALANDIÆ.

(Adult and Young)

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HIERACIDEA NOVÆ ZEALANDIÆ.

(QUAIL-HAWK.)

- New-Zealand Falcon*, Lath. Gen. Syn. i. p. 57 (1781).
Falco novæ seelandiæ, Gm. Syst. Nat. i. p. 268 (1788, ex Lath.).
Falco australis, Hombr. et Jacq. Ann. Sci. Nat. 1841, p. 312.
Hypotrionchis novæ zealandiæ, Gray, Gen. of B. i. p. 20 (1844).
Falco harpe, Forst. Descr. Anim. p. 68 (1844).
Hieracidea novæ zealandiæ, Kaup, Isis, 1847, p. 80.
Harpe novæ-zealandiæ, Bonap. Comptes Rendus, xli. p. 652 (1855).
Ieracidea novæ zealandiæ, Gray, Hand-l. of B. i. p. 22 (1869).

Native names.

Karearea, Kaiaia, Kaeaea, Kakarapiti, Karewarewa, and Tawaka.

♂ *suprà nigricanti-brunneus*, pileo unicolori saturatiore: dorso fasciis irregularibus fulvescentibus transnotato: remigibus nigricanti-brunneis, pogonio interno albo transfasciato: secundariis extùs fasciis angustis albidis notatis: caudâ nigricanti-brunneâ, albido angustè et interruptè transfasciatâ: facie laterali nigricante, supercilio indistincto et genis imis rufescentibus: gutture fulvescenti-albo, scapis plumarum nigro indicatis: corpore reliquo subtùs lætiùs fulvescente, pectoris plumis saturatè brunneo medialiter striatis et fulvo plus minusve distinctè ocellatis: hypochondriis imis cum cruribus et subcaudalibus lætissimè castaneis: subalaribus fulvescentibus, castaneo tinctis, his et axillaribus fulvescenti-albo ocellatis: rostro cyanescenti-nigro, ad basin mandibulæ corneo: cerâ pallidè flavâ: pedibus flavis: iride sordidè flavâ.

♀ *mari similis*, sed *paullò major*.

♂ *juv.* *suprà fuliginoso-brunneus*, pileo magis cinerascete: caudâ minùs distinctè transfasciatâ: gutture fulvescenti-albo, angustè brunneo striato: subtùs fuliginoso-brunneus, pectore paullò nigricante et hypochondriis cruribusque vix castaneo tinctis: pectore medio albido obscurè maculato: abdomine imo crissoque fulvescentibus: hypochondriis distinctè fulvo ocellatis: cerâ et plagâ oculari cyanescenti-albis: pedibus plumbeis: unguis nigricantibus.

Pull. lanugine plumbeâ indutus.

Adult male. Crown of the head and nape glossy black; upper surface generally brownish black, barred on the scapulars and tail-coverts with rufous, and narrowly on the wing-coverts with rufous grey; a line over each eye, and sides of the neck, varied with rufous; facial streak and ear-coverts black; throat fulvous white, with narrow black shaft-lines, broadening out towards the breast; fore part of the neck and breast fulvous varied with rufous, and having the centre of each feather brown; sides of the body dark brown varied with rufous, and with large rounded spots of fulvous white; abdomen and vent rich fulvous; under tail-coverts and tibial plumes rufous brown, with narrow black shaft-lines; quills and secondaries obscurely

marked on their outer webs with grey; tail with eight narrow interrupted bars of greyish white, and slightly tipped with rufous; under surface of quills and tail-feathers dusky, the former largely toothed and the latter barred with white. Bill bluish black; base of lower mandible horn-colour; cere pale yellow; legs brighter yellow; claws black; irides brownish yellow, becoming purer yellow with advancing maturity. Extreme length 19 inches; extent of wings 31; wing, from flexure, 11.25; tail 8.25; culmen 1.2; tarsus 2.5; middle toe and claw 2.75; hind toe and claw 1.75.

Adult female. The plumage is similar to that of the male, excepting, perhaps, that the spotted markings on the sides are more distinct; but there is a slight difference in the size. Extreme length 19.5; wing, from flexure, 11.5; tail 8.5; tarsus 2.75.

Young. Crown of the head and upper parts generally brownish black, glossed with grey in certain lights; line over each eye reddish fulvous; throat fulvous white, with a central line of brown on each feather; sides of the neck, breast, lining of wings, and underparts generally dark brown varied with fulvous; sides marked with rounded spots of fulvous white, very obscure in some specimens; tibial plumes reddish brown; lower part of abdomen, vent, and inner side of thighs fulvous; under surface of quills and tail-feathers dusky, with numerous transverse bars of white. Cere and bare space around the eyes bluish white; irides black; legs dark grey, with black claws.

Nestling. Covered with plumbeous-grey down.

Obs. The above measurements were taken from a pair of birds of this species formerly in the Christchurch Acclimatization Gardens, and now preserved in the Canterbury Museum, the sex in both cases having been determined by Dr. Haast, after careful dissection. The dimensions of the young male figured in our plate, the skin of which is now in the British Museum, accord almost exactly with those given above. The figure of the adult female is from a fine specimen obtained in the South Island, and now, with the rest of my collection, in the Colonial Museum at Wellington. Examples vary in the details of their colouring. In some the light spots on the sides are far more conspicuous and the tibial plumes are of a brighter rufous than in others. As a rule, the white bars on the tail-feathers, although interrupted in the middle, are conterminous on each side of the shaft. In a specimen, however, obtained by Mr. Travers in the South Island, the bars are alternate on each web, as is also the case with another, in the possession of Mr. T. H. Potts; but this character is quite exceptional.

THE synonymy given above will serve as a tolerably complete guide to the scientific and literary history of the present species; but much confusion has arisen at various periods with regard to the nomenclature employed, and a few words in further explanation of the subject appear to be necessary.

In Mr. G. R. Gray's 'List of the Birds of New Zealand,' published as an Appendix to Dieffenbach's 'Travels' (1843), this naturalist recognizes only two species of Accipitres, which he calls respectively *Falco harpe*, Forst., and *Falco brunnea*, Gould, thereby intending, of course, to indicate the existence of two distinct species of true Falcons in New Zealand; but in this list there is no mention whatever of the Harrier (*Circus gouldi*), a common and well-known bird in our country. In adding the native names an unfortunate mistake occurred; for *Falco harpe* was stated to be the bird known to the inhabitants as "Kahu" and "Kahu-papango," whereas these are in reality the native appellations for the Harrier, which, as already stated, had been omitted from the list. This will, no doubt, account for the mention of Gould's Harrier, in the earlier

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writings of Layard, Haast, and Taylor, under the erroneous title of *Falco harpe*. Mr. Gray himself afterwards, in his 'Birds of New Zealand' (Voy. Erebus and Terror), partially rectified this error by introducing the *Circus* in its proper place; but the misapplication of the native names was continued. In this work Mr. Gray substituted the prior title of *Falco novæ zealandiæ*, Gmel., for *F. harpe*, Forst., with *F. australis* (Homb. et Jacq.) correctly added as a synonym. He likewise reduced Gould's *F. brunnea* to the rank of a synonym; but in a subsequent list (Ibis, 1862, p. 214) he recognized it again as a distinct species, and equivalent to *F. ferox* of Peale (U. S. Expl. Exped. 1848), referring both forms to Kaup's genus *Hieracidea*. Unfortunately Mr. Gould's description of *H. brunnea* was founded on an immature bird, in a condition of plumage exactly corresponding with the young of *H. novæ zealandiæ*. This circumstance, together with the great difference in size between the male and female, led myself, among others, to the conclusion that the two birds were referable to one and the same species*. Dr. Otto Finsch (Journal für Ornithologie, 1867, p. 317) expressed his belief that *H. brunnea* was the female of *H. novæ zealandiæ*—a decision based (as he has since informed me) on Forster's account of the bird; but in a subsequent paper (*op. cit.* 1870), referring to my observations on the subject, he adopts the view of its being the young of that species, quoting, at the same time, Dr. Haast's opinion to the contrary. In the last published list of New-Zealand birds†, only one species is admitted, the compiler remarking that it is very variable in size, and that "a large male can be distinguished from a small female by its more slender legs, which are 0·6 of an inch in circumference in the male, and 0·88 of an inch in the female." On the other hand, several excellent local observers have always contended that they could distinguish a larger and a smaller species, the former differing in some of its habits from the common Bush-Hawk, and frequenting the open country in preference to the woods. Mr. Gurney also called attention to the subject in a letter to 'The Ibis' (1870, p. 535), in which he gave the following dimensions of examples that had come under his notice:—

List of Specimens.	Long. tot.	Alæ a carp.	Caud.	Tarsi.	Dig. med. c. ung.
<i>H. novæ zealandiæ.</i>	in.	in.	in.	in.	in.
Adult. Auckland Island. (Mus. Brit.)	18·0	11·5	7·75	2·25	2·0
Ditto, ditto. (Mus. Brit.)	19·5	11·75	8·25	2·25	2·0
Immature. New Zealand. (Mus. Norvic.)	19·0	11·75	8·0	2·25	2·0
<i>H. brunnea.</i>					
Adult. New Zealand. (Mus. Brit.)	15·0	9·5	6·25	2·0	1·5
Ditto, ditto. (Mus. Brit.)	14·75	9·25	6·25	2·0	1·5
"♀" immature. New Zealand. (Mus. Norvic.)	14·5	9·25	6·0	2·5	1·75

The small specimen of *H. brunnea*, in the Norwich Museum, marked ♀, is, no doubt, as Mr. Gurney suggests, incorrectly labelled; for I have never met with so small an example of that

* *Vide* Trans. N. Z. Instit. vol. i. p. 106, 1868.

† 'Catalogue of the Birds of New Zealand,' by F. W. Hutton, Geol. Survey of N. Z.: 1871.

sex; and it must be confessed that conclusions based on a mere examination of skins, in the absence of a positive determination of the sex, are very unsatisfactory. It will be seen, on reference to the measurements I shall give in treating of the smaller species, that the sexes differ very much in size, the female, as is always the case with members of this family, being the larger bird. The fact that a male of the present species (carefully sexed by Dr. Haast, and exhibiting the testes fully developed) proves to be actually larger than the female of *H. brunnea* is, I submit, of itself sufficient to warrant a specific separation. With regard to the difference in the circumference of the legs, in the males and females relatively, I would simply remark that, had Captain Hutton enjoyed the opportunity, as I have recently done, of examining the immense series of Hawks which exist in European museums, he would regret having drawn an inference from so worthless a character; for size of leg in Accipitrine birds is variable in the highest degree, and this is especially noticeable in the case of dried specimens.

Having brought with me to England good examples of both forms, for more critical examination, and having compared them with the fine series of specimens in the British Museum (about twenty in number) and with Forster's original drawings, I have come to the conclusion that there are in reality two distinct species, closely resembling each other in plumage in both the young and adult states, but differing appreciably in size. In this examination I have been kindly assisted by Mr. J. H. Gurney, an ornithologist who, as is well known, has made Birds of Prey his special study; and as he entirely concurs in the conclusion arrived at, I feel that I can publish it with some degree of confidence.

Dr. Haast, who has always believed in the existence of two species, assures me that their habits differ in the manner of taking their prey; and his collector, Mr. Fuller, states that he has invariably found the large birds paired together in the plains, and the small ones in the bush.

The food of the Quail-Hawk consists of birds, rats, mice, lizards, and the larger kinds of insects. It often takes its prey on the wing, swooping down on its terrified quarry with the rapidity of an arrow. It never feeds on carrion or offal.

Mr. Thomas H. Potts, of Ohinitahi, Canterbury, to whom I am indebted for many valuable notes, has sent me the following observations:—"The Quail-Hawk exhibits great perseverance in pursuit of its prey, and almost unequalled audacity. I have known it pursue and strike down a large Spanish hen in a stockyard, not relinquishing its hold till killed with the blow of a stick. I have also known it pursue its prey into the inner room of a small cottage. When Quail-shooting, years ago, I have been on different occasions attended by this dauntless fowler, and have shot an individual in the act of pouncing on the flying Quail. I have seen a female of this species bear off a Tui trussed in her talons, and carry it some distance without a rest, the male bird apparently keeping watch and ward, soaring within easy distance. I remember also seeing a Quail escape the rapid pursuit of one of these Hawks by dropping like a stone, at the very instant that I expected to see it trussed up in the talons of its pursuer, so close was the chase before the Quail adopted its last resource for escape."

I have been informed by a credible eye-witness that on one occasion a Quail-Hawk swooped down upon a man who was carrying a dead Pigeon, and, striking the bird forcibly out of his hands, retired to its station in a Puriri tree (*Vitex littoralis*) to wait the course of events. It unfortunately fell a victim to its intrepidity, as it was instantly shot.

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On the breeding-habits of this species, Mr. Potts has communicated the following particulars, in a paper read before the Wellington Philosophical Society* :—“At present it is in the ‘back country’ only that we can hope to find its breeding-place, which is usually in a ledge of rock commanding a prospect over some extent of country. Such an out-look gives an advantage of no little value, of which the Falcon is not slow to avail itself, should such a bird as a Tui or Pigeon appear in sight. Several of the breeding-places which we have had opportunities of examining have presented, in a remarkable degree, very similar conditions as regards situation. Amongst bold rocks, on the mountain-side, somewhat sheltered by a projecting or overhanging mass, appears to be its favourite site for rearing its young. The eggs very closely resemble those of *Falco peregrinus* of Europe in colour, size, and shape, are usually three in number, and are deposited on any decayed vegetable matter that wind or rain may have collected on the rocky ledge; for the efforts of this bird in the way of nest-building are of the feeblest description.” Mr. Potts gives October, November, and December as the breeding-months, and states that the localities (in Canterbury) noted for its eyries are rocks near Cass’s Peak, Governor’s Bay, Malvern Hills, the river Potts, and Mount Harper. Above the upper gorge of the Ashburton or Haketere River he discovered a nesting-place on the bare soil, sheltered by a large isolated rock. It contained two young Hawks covered with grey down; and the old birds were very bold in defence of their offspring.

From my brother, in Canterbury, I received a very handsome pair of eggs belonging to this species. Although taken from the same nest, they differ somewhat from each other, both in size and in the details of their colouring. One of them measures 2 inches in its longer axis, by 1·4 in diameter; is elliptical in form; mottled and blotched with dark brown on a lighter ground, and encircled at the thick end with a broad zone of very rich brown, varied with blotches of a paler or reddish tint. The other is more broadly elliptical, measuring in its axis 1·9; diameter 1·45. It wants the well-defined dark zone of the former, the whole surface being more or less mottled and blotched with reddish-brown on a paler ground. The series of eggs of this species in the Canterbury Museum exhibit considerable individual variation. Two specimens, taken from the same nest, are more ovato-conical than ordinary examples, having an appreciably smaller end. One of these is of a rich reddish brown towards the thicker end, with darker blotches, and towards the other end pale brown, profusely sprinkled and mottled with dark reddish brown. The other is somewhat similar, but more blotched with dark brown in the median circumference, and with the ground-tint towards the small end reduced to a whitish cream-colour. In two other examples (also from one nest) the whole surface is reddish brown, stained, mottled, and blotched with darker brown; but one of them has the brown of a richer tint, and the mottled character more distinct.

* Transactions of the New-Zealand Institute, vol. ii. p. 51, 1869.

HIERACIDEA BRUNNEA.

(BUSH-HAWK.)

Falco brunneus, Gould, P. Z. S. 1837, p. 139.*Falco ferox*, Peale, U. S. Expl. Exp. p. 67 (1848).*Hieracidea brunnea*, Gray, Ibis, 1862, p. 215.*Harpe brunneus*, Gray, Hand-l. of B. i. p. 22 (1869).*Native names.*

The same as those applied to the preceding species; but sometimes distinguished as Karewa-rewa-tara. "Sparrow-Hawk" of the colonists.

♂ similis *H. novæ zeelandiæ*, sed valdè minor: subtùs magis cinereus: caudæ fasciis angustioribus et obscurioribus: subtùs pallidior, distinctiùs striatus et maculatus.

♀ maris staturam conspicuè superans.

Juv. a specie præcedente haud distinguendus, sed subtùs obscurior.

Adult male. Upper parts generally greyish black, darkest on the head and nape; shoulders, scapulars, and small wing-coverts narrowly barred with greyish white, the back and upper tail-coverts with small crescentic bands of rufous; throat yellowish white; ciliary bristles, ear-coverts, and the facial streak black; a line over each eye, and the sides of the neck, reddish brown, varied with fulvous and black; breast and sides fulvous, varied with reddish brown, and largely marked with black. On the breast each feather has a central dash of black; and on the sides these markings assume a triangular form, giving a spotted character to the surface of the plumage. The wing-feathers are marked, on their outer web, by narrow transverse bands of greyish white; and the tail-feathers, which are black with a purplish reflection, have a series of seven narrow white bars disunited at the shaft, and are tipped with rufous brown; axillars dark rufous brown, with a series of round white spots on each web; abdomen and vent pale fulvous; tibial plumes rufous, with black shaft-lines. Bill black, white at the base of lower mandible; irides and feet yellow; claws black. Extreme length 16 inches; extent of wings 26·5; wing, from flexure, 9; tail 6·5; tarsus 2·25; middle toe and claw 2·3; hind toe and claw 1·3; bill, along the ridge, ·85, along the edge of lower mandible 1.

Adult female. Differs from the male in its somewhat larger size and in the darker and richer colouring of its plumage; but in other respects the sexes are alike. Extreme length 17 inches; wing, from flexure, 11; tail 8; tarsus 2·5.

Young. The young of this species bears a general resemblance in its plumage to that of the preceding bird; but on a close comparison it will be observed that the brown of the underparts is darker, while the spotted markings on the sides are rather more conspicuous. The tibials, moreover, are of a brighter rufous, and are crossed with numerous arrow-shaped marks of brown.

Nestling. Covered with bluish-grey down; bill black; tarsi and toes leaden-grey.

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Obs. This species closely resembles *Hieracidea novæ zealandiæ*, but is decidedly smaller, and has more slender legs and claws. The plumage of the head and of the upper surface generally is more suffused with grey; the bars on the tail are narrower and more obscure; the plumage of the underparts is generally lighter, and the brown streaks on the breast are smaller and more sharply defined. As with the other species, however, considerable variation exists; and but for the manifest difference in size, it would be impossible to distinguish the two birds. There is a greater disparity of size in the sexes of this Hawk than in those of the preceding one.

ALTHOUGH not so common as it formerly was, the Bush-Hawk is more frequently met with than its congener. The high wooded lands of the interior appear to constitute its favourite haunts; and on the southern mountain-ranges of the North Island, as well as in the subalpine woods of the Canterbury Province, I have found it comparatively abundant. It is a spirited little hunter, and subsists by the chase, its food consisting principally of mice and small birds. During the breeding-season it is more than usually bold and fearless, assailing with fury all intruders upon its nest or young. Some remarkable instances of its courage are mentioned by Dr. Haast in his interesting 'Journal of Explorations in the Nelson Province'*

"One day," says this traveller, "walking along near the margin of the forest in Camp Valley, my hat was suddenly knocked off my head, and at the same time I heard a shrill cry. On looking up, I found it was one of these courageous little Sparrow-Hawks that had attacked me, and which, after sitting for a moment or two on a branch, again pounced on me; and, although I had a long compass-stick in my hand, with which I tried to knock it down, it repeated its attack several times. We met with another instance of the courage of these birds in the Matakita Plains. A White Crane, of large size, standing in the water, was attacked by three of them at once; and they made frequent and well-concerted charges upon him from different quarters. It was admirable to behold the Kotuku (White Crane) with his head laid back, darting his pointed beak at his foes with the swiftness of an arrow, while they, with the utmost agility, avoided the spear of their strong adversary, whom at last they were fain to leave unmolested. Another day, in the same neighbourhood, a Cormorant (*Graculus varius*) passing near a tree on which two of these Sparrow-Hawks were sitting, was pounced upon by them and put to hasty flight with a shrill cry of terror, followed closely by his small but fierce foes; and all three were soon out of sight."

The ordinary flight of this Hawk is direct and rapid; but it may sometimes be seen soaring high in the air, with the wings almost motionless and the tail spread into a broad fan. On the wing it often utters a prolonged petulant scream. This is the signal for a general outcry among the small birds within hearing; and the Tui and Korimako will often rise in large flights and follow him into the air. But the little Hawk, heeding not their menaces, pursues his course, and the excitement among the feathered fraternity gradually subsides till all is quiet again. The appearance of an Owl in the daytime produces a similar commotion among the small birds of the forest; and I have often been guided to the hiding-place of the unfortunate "More-pork" by the clamour of the persecuting mob.

* Report of a Topographical and Geological Exploration of the Western Districts of the Nelson Province, New Zealand, undertaken by the Provincial Government. Nelson: 1861.

Besides the prolonged shrill note which is generally uttered on the wing, this species has also a low peevish cry, exactly like the squealing of a young pig, which is peculiar, I believe, to the breeding-season.

It is well known that birds are good natural barometers. The height to which they rise in the air renders them susceptible to the slightest change in the temperature of the atmosphere; and they are thus warned of approaching changes in the weather. Thus the continuous screaming of the Bush-Hawk is understood by the natives to be a sure indication of change; and they have a common saying, "Ka tangi te Karearea &c." (If the Karearea screams in fine weather, 'twill soon rain; if in rainy weather, 'tis about to clear). Wilson, the American ornithologist, in treating of the Fish-Hawk (*Pandion haliaëtus*), states that when these birds are seen sailing high in air, with loud vociferations, "it is universally believed to prognosticate a change of weather, often a thunderstorm in a few hours. . . . On the faith of the certainty of these signs, the experienced coaster wisely prepares for the expected storm, and is rarely mistaken." I have met with some remarkable instances of this unerring instinct in the species under consideration, and this, at times, when the glass gave no indication of a coming change.

The Bush-Hawk is generally met with on the outskirts of the woods or among the dead timber of native "Wairengas," these localities being favourable for mice, on which it largely subsists. I once observed a young male of this species playing in the air with mice, after the manner of a cat; and the sight was as pretty as it was novel. When I first observed the bird, he was perched on the naked limb of a tree, apparently engaged in examining his quarry. Then mounting in the air with a mouse in each of his talons, and expanding his wings and tail to their full extent, he dropped first one mouse and then the other, and instantly darted after them, catching them in his talons before they reached the ground, then mounting high in the air again to renew the feat. Ultimately losing one of the mice, he discontinued his play, and, returning to the tree, killed and devoured the remaining one.

The natives state that this little Hawk usually builds its nest in a bunch of Puwharawhara, often at a great elevation from the ground, forming it rudely of loose materials—that it lays generally two, but sometimes three eggs—and that the young birds remain on the tree for several days after quitting the nest. The Puwharawhara (*Astelia cunninghamii*) is a parasitical plant, with short, thickly set flag leaves, radiating upwards from a clump of roots by which it adheres firmly to the parent tree. These plants, which often attain a circumference of many feet, are very common on the forks and naked branches of aged or withered trees on the outskirts of the forest, a single tree sometimes supporting twenty or more of them. A better situation for a Hawk's-nest than the centre of one of these plants could hardly be selected, combining, as it does the requisites of warmth, security, and shelter; and the Bush-Hawk seems to be instinctively aware of this. Some years ago I was informed that a pair of these birds had bred for several successive seasons in a nest placed as described, and situated in the high fork of a dead Kahikatea tree near the Horowhenua Lake. Having waited for the breeding-season, I offered the natives a half-sovereign each for the eggs; but, although excellent climbers, they failed in all their attempts to reach the nest. They afterwards observed the Hawks carrying mice, lizards, and small birds to their young; and the latter, on quitting the nest, were shot and destroyed. When I last visited the spot the old Kahikatea was still standing, and the bunch of withered

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Astelia, which had cradled several successive broods, was still clinging to the tree; but the persecuted Hawks had quitted their exposed eyrie for some more secure retreat.

In the summer, however, of 1867, during a visit to Taupo, I was fortunate enough to find the nest of this species. We had fixed our bivouac for the night on the banks of the Waitangi Creek, only a few miles from the base of the grand snow-capped Ruapehu. Our native companion soon detected the old Hawks carrying prey to their young; and on the following morning he discovered the nest. It was situated on the ground, under cover of a block of trachyte, which cropped out of the side of the hill. There had been no attempt to form a proper nest; but the ground was covered with the feathers of birds (almost entirely those of Ground-Larks) on which the young Hawks had been fed. The latter were three in number, of different sizes, the largest being apparently three weeks old, and the smallest scarcely a fortnight. They were extremely savage, striking vigorously with their sharp talons and uttering a peculiar scream. While we were engaged in securing them in a basket the old birds were flying to and fro, occasionally dashing up to within a few feet of us, and then off again at a sharp angle, alighting at intervals, for a few moments only, on the rugged points of rock above us, but never uttering a sound. They were in perfect plumage; and when they occasionally poised their bodies overhead, with out-spread wings and tail, they presented a very beautiful appearance. During our journey of forty miles through the bush, the gun supplied the young Hawks with a sufficiency of food; but they were very voracious, two large Pigeons per diem being scarcely enough to appease their joint appetites. Fifty miles more by canoe, and about forty on horseback, brought the captives to their destination, when they were placed in a compartment of the aviary. They continued to be very vicious, punishing each other severely with their claws. The youngest one was an object of constant persecution, and ultimately succumbed to a broken back. A small tame Sea-Gull that had unwittingly wandered into the aviary, through an open doorway, was instantly pounced on, although the young Hawks, in their unfledged condition, could only move by hopping along the ground. In about three weeks these birds (which proved to be male and female) had fully assumed the dark plumage; and for about two months after they were very clamorous, especially during wet or gloomy weather. By degrees they became less noisy, till at length they were perfectly silent and moody, never uttering a sound for weeks together, with the exception of a peculiar squeal when they were fighting. A more quarrelsome couple never existed. The female, being the larger and stronger bird, generally came off best, leaving the male severely punished about the head. At the end of six months the climax was reached by her actually killing and devouring her mate. I found the aviary strewn with feathers, and the skeleton of the poor victim picked clean! The surviving bird underwent a partial moult in the month of September following, and the plumage began to assume a spotted character. The legs also became slightly tinged with yellow. By the beginning of March in the following year she had acquired the full adult plumage, except that the throat and spots on the sides were not so light as in more mature examples. The legs had changed to a pale greenish yellow, and the irides from lustrous black to a dark brown colour—the cere retaining its pale blue tint, but with indications of a change to yellow. After two months' absence I again saw the bird, and noticed that the lores were becoming tinged with yellow, while the colour of the legs had deepened. Unfortunately, at this stage she was found dead on the floor of the aviary; and on dissection,

I found in the cavity of the back an amazing number of parasitical worms, many of them measuring from six to eight inches in length.

The result of my observations is, that the Bush-Hawk attains the mature livery during the second year, the plumage being liable to some slight variations as the bird gets older. As the irides had undergone very little perceptible change at the time of the bird's death, it is possible that several years may elapse before the bright yellow colour is acquired.

This bird, a stranger to liberty from the very nest, had become quite attached to its aviary. It never attempted to escape when the door was accidentally left open; and on one occasion when it did get out it remained perched on the dome of its house, and voluntarily reentered it. It partook readily of all kinds of meat, cooked or raw, although preferring the latter. Beef, pork, or mutton were alike acceptable; but a preference was always shown for birds. On a live bird being offered to it, the Hawk would eye its quarry intently for a short time and then make a sudden swoop upon it, seizing with the talons of one or both feet, according to the size and strength of the object. It would then proceed cautiously to destroy life by crushing the head of its victim in its powerful beak, only relaxing its hold when life was quite extinct. While thus employed, its eyes were full of animation, and its whole body quivered with excitement.

The description of the male is taken from a fine specimen* shot in the Karori Hills, near Wellington, in 1859, and of which I sent, at the time, a descriptive notice to the Linnean Society. Its much smaller size led me to suppose that it was distinct from *Hieracidea novæ zealandiæ*; and it was not then known that Mr. Gould's *H. brunnea* was founded on an immature example. That such was really the case is sufficiently proved by the account given in the foregoing pages, and previously recorded in the Transactions of the New-Zealand Institute (1868, vol. i. p. 106).

The eggs resemble those of *H. novæ zealandiæ*, but are somewhat smaller and lighter in colour. There are three examples in the Canterbury Museum, differing in the details of their colouring; but they may be defined as yellowish-brown stained and mottled with reddish brown, and having a rather soiled appearance. In one of them the blotched character is most apparent at the smaller end; in another it is equally dispersed, while in the third the dark brown markings present a smudgy character over the whole surface. They measure 1·9 inch in length by 1·45 in breadth.

* Preserved in the Colonial Museum at Wellington.

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CIRCUS GOULDI.
(Adult and Young.)

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CIRCUS GOULDI.

(GOULD'S HARRIER.)

Circus assimilis, Gray, Voy. Ereb. and Terror, Birds, p. 2 (1844, nec J. & S.).*Circus gouldi*, Bonap. Consp. Gen. Av. i. p. 34 (1850).*Falco harpe*, Haast, Layard, Taylor (nec Forst.).*Falco aurioculus*, Ellman, Zoologist, 1861, p. 7464.*Circus approximans*, Gray, Hand-l. of B. i. p. 36 (1869).*Native names.*

Kahu and Manutahae; also Kahu-korako and Kahu-pango, to distinguish the very old and the young birds.

Ad. suprâ brunneus, sub certâ luce cupreo nitens, dorsi plumis plus minusve fulvo lavatis et terminatis: pilei plumis medialiter et longitudinaliter nigris, ferrugineo marginatis: nuchâ cum collo postico et laterali clariùs fulvescentioribus: regione oculari nigrâ: facie laterali brunneâ, plumis medialiter nigris: radio faciali saturatè brunneo, ferrugineo tincto et fulvescenti mixto: dorso postico brunneo, plumis latè fulvo terminatis: uropygio imo et supracaudalibus albis, his fasciâ fulvâ anteapicali transnotatis: tectricibus alarum dorso concoloribus, minimis fulvo et albo lavatis: alâ spuriâ cinereo lavatâ: remigibus brunneis, ad apicem saturatoribus, extùs argenteo-cinereo lavatis, saturatè brunneo transfasciatis: caudâ cinereâ, rectricibus exterioribus ferrugineis, plus minusve albicantibus, pennis centralibus distinctè, exterioribus irregulariter brunneo transfasciatis, omnibus ad apicem albis: caudâ subtùs albicante, fasciis brunneis interruptis notatâ: subtùs lactescenti-albus, paullò fulvescens: gulâ brunneâ, plumis medialiter nigris: pectore toto distinctè brunneo longitudinaliter striato: cruribus paullò ferrugineo tinctis, suprâ angustè ferrugineo striatis: subalaribus albis, maculis ferrugineis et brunneis notatis: cerâ et pedibus flavis: rostro et unguibus nigris: iride lætè flavâ.

♀ mari paullò major et ferè pallidior: scapularibus rufescenti-albo terminatis.

Juv. chocolatinus, cupreo nitens, pileo vix nigricantiore: nuchâ albicanti-fulvo notatâ: subtùs ferrugineo tinctus: caudâ subtùs albicante, suprâ chocolatinâ, ferrugineo marmoratâ: remigibus subtùs ad basin lactescentibus, plus minusve brunneo marmoratis: cerâ et pedibus flavis: iride saturatè brunneâ.

Adult male. Upper parts dark brown, the feathers of the head and neck broadly margined with reddish fulvous, the wing-coverts and scapulars terminally edged with pale rufous brown; quills black, with the outer web silvery grey, obscurely banded; tail, when closed, light silvery brown, with interrupted transverse bars and a subterminal band of dark brown; the lateral tail-feathers washed with rufous; the bars more conspicuous when the tail is spread; upper tail-coverts pure white, barred near the tip with rufous brown; superadjacent feathers tipped with rufous. Underparts generally pale fulvous, with a broad dash of rufous brown down the centre of each feather, these markings being thickest on the breast and sides; tibial plumes paler fulvous, with the central streak much reduced; the axillary plumes, which are remarkably long, pale rufous, barred with darker rufous; under surface of wings and tail light fawn-

colour varied with grey. A narrow white fringe, varied with brown, encircles the throat, terminating behind the ear-coverts. Cere and legs yellow; beak and claws black; irides bright yellow. Length 22.5 inches; extent of wings 52.5; wing, from flexure, 17; tail 10; tarsus 4; middle toe and claw 2.5; hind toe and claw 1.75; bill along the ridge 1.5, along the edge of lower mandible 1.5.

Adult female. Slightly larger than the male, but differing very little in plumage. The tints generally are lighter, the edges of the scapulars are rufous-white instead of brown; and the wings are varied with rufous and white, especially towards the flexure.

Young. In the young bird the whole of the plumage is chocolate-brown, darker on the upper parts, and edged with paler brown; hind part of the neck varied with white, and tinged with rufous; upper tail-coverts rufous brown, with paler tips and fulvous at the base, sometimes white barred with rufous brown. Cere and legs yellow; irides dark brown.

Progress towards maturity. Upper parts dark brown with a purple gloss; the tail with five rather obscure bars of black, about half an inch apart, and darkest towards the tip; upper tail-coverts delicate fawn-colour, with the centre of each feather brown, shaded off on the sides. The wing-coverts have a coppery hue, and the longer ones, together with the scapulars, are narrowly tipped with rufous white. Underparts bright chocolate-brown, tinged with rufous, especially on the neck and abdomen; tibial plumes rufous brown. Cere and legs yellow; beak and claws black; irides bright yellowish brown.

Nestling. Covered with buffy-white down; cere and legs yellow.

Obs. It must be noted that individuals differ, more or less, in the details of their colouring during their progress towards maturity. With extreme age, the fulvous of the lower parts changes to white, and the brown markings become much narrower, being almost obsolete on the tibial plumes. The silvery grey on the quills and tail-feathers increases, while the rufous colouring diminishes, and the lining of the wings becomes pure white, with narrow shaft-lines of dark brown. There is a beautiful albino specimen in the Nelson Museum.

THE present species is spread over a wide geographical area; for not only is it found in all parts of our own country, but it also occurs in Australia and Tasmania, extending to the eastward to the Fiji Islands, and ranging northwards into the Malay archipelago as far as Celebes. Mr. J. H. Gurney has already drawn attention (*Ibis*, 1870, p. 536) to the fact that our Harrier is exactly the same species as that figured by Mr. Gould in the 'Birds of Australia' under the name of *Circus assimilis*. The true *Circus assimilis* of Jardine and Selby (*Ill. Orn.* ii. pl. 51) has proved, however, to be only the young of *Circus jardinii*, also figured in the 'Birds of Australia' (pl. 27); and therefore the New-Zealand Harrier bears the name of *Circus gouldi*, Bonap. (*l. c.*)

It is a very common bird in New Zealand, being met with on the fern-covered hills, in the plains, among the marshes of the low country, and even along the open seabeach, where it feeds on carrion. It is seldom, however, found in the dense bush, although I once surprised one there in the act of picking a large Wood-Pigeon.

Like all the other members of the genus, it hunts on the wing, performing wide circles at a low elevation from the ground, and sailing over meadows, fern-land, or marshes in quest of lizards, mice, and other small game. Its flight is slow but vigorous and well sustained. The

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small size and specific gravity of its body, as compared with the great development of wings and tail and corresponding muscles, enable it to continue these wanderings for a whole day without any apparent fatigue. When sailing, as it often does, at a high elevation, the wings are inclined upwards so as to form a broad obtuse angle (with the tail half spread), and there is no perceptible motion in them, except when the bird alters its course. A pair may often be seen sailing thus in company, mounting higher with each gyration, and emitting a peevish whistle as they cross each other's course. On these occasions I have sometimes seen the birds close in upon and attack each other, the upper one making the first swoop, and the lower one instantly turning on its back, with upstretched talons, to receive him, and, after thus parrying the attack, wheeling upwards and becoming in turn the assailant. Whether it be the angry meeting of rival males, or the amorous gambols of "raptorial lovers," I have never been able to determine; but this aerial encounter, whether in earnest or in play, has a very pretty effect. It is worthy of remark that the birds of the first year are apparently incapable of the peculiar sailing flight which I have described, their locomotion being effected entirely by slowly repeated flappings of the wings. This circumstance, taken in conjunction with the dark colour of the young bird (appearing perfectly black at a little distance), has led to the common belief that there are two distinct species.

When gorged with food, the Harrier takes up its station on a rising knoll, a projecting stump, or the naked limb of a detached tree standing in the open, when it assumes an erect posture, with the head drawn closely in and the wings folded, and remains perfectly motionless for a considerable time. When thus reposing, it is possible to get within gun-range of a "Kahu korako," or very old bird; but at other times it is extremely difficult to obtain a shot. Hawks are known to be long-lived; and they appear to gain more experience of the world as they grow older. The dark-plumaged Harrier falls an easy prey to the gunner: it may be winged as it sails above him at an easy elevation, or it may be approached quickly and surprised when it descends to the ground to capture and devour a mouse or lizard. But the wary old "White Hawk" carries with him the experience of many dangers, and is not so easily taken. I have followed one for the greater part of a day before I have succeeded in shooting it. These old birds, notwithstanding the extreme abundance of the species, are comparatively rare, and they are called Kahu-korako by the natives, in allusion to their hoary plumage. Birds in ordinary adult plumage are also somewhat shy; but on horseback I have often approached near enough to detect the colour of the cere and legs.

Besides devouring carrion of all kinds, the Harrier subsists on rats, mice, lizards, feeble or wounded birds, and even grubs and spiders. One, which I had confined in an outhouse, subsisted for several days entirely on spiders, for which he made a systematic search among the cobwebs that covered the walls. At the close of each day I found him with a matted circlet of spider's web surrounding the base of the bill. On my offering him the body of a Wood-Robin (*Petræca longipes*) he struck his talons into it, and, holding it firmly down, plucked off the feathers with his beak with remarkable rapidity, and then, tearing it to pieces, devoured it—the whole proceeding occupying only a few minutes. Mr. Gilbert Mair, who kept several of these birds in confinement for a considerable time, fed them frequently with freshwater fish, which they devoured with great avidity; and he assures me that he has observed them, in the wild state, capturing mullets in a shallow fish-pond.

The Harrier secures his prey by grappling it in his talons, sometimes bearing it off with him, but more generally remaining on the spot to devour it. On newly ploughed land he may occasionally be seen regaling himself on grubs and earthworms. It may be noticed that on these occasions, instead of walking, he moves by a succession of hops, the toes being turned inwards, in order, as it would appear, to protect the fine points of his grappling-instruments.

When the winter rains have inundated the low-lying flats and filled the lagoons, these places become the favourite resort of Wild Duck, Teal, Pukeko, and numerous other Waterfowl; but this Hawk also puts in his appearance with the new comers, and is a perpetual terror to them. I have frequently seen one attack a full-grown Pukeko (*Porphyrio melanotus*), attempting to grapple it in its talons—its long tarsi and legs being stretched downwards to their full extent, accompanied by much noiseless fluttering of the wings. The Pukeko, anticipating the attack, springs upwards with open mouth and outstretched neck, and generally succeeds in warding off its assailant till it reaches cover and hides in the sedge. Audubon, in his 'Birds of America,' states that he has seen the *Circus cyaneus* attack the Marsh-Hen (*Rallus crepitans*) in the same manner. Young birds, and those wounded by the sportsman, suffer most. On one occasion I fired at and disabled a large Pukeko, which at once took refuge in some rushes on the edge of the lagoon; but before I could get round to the spot, one of these Hawks had killed, plucked, and partly devoured it.

I have known the Harrier, when urged by excessive hunger, visit the poultry-yard and snatch up a chicken in its talons; and I have occasionally seen it attack both the wild and the domestic Duck; and Mr. Gould, in writing of this species in Australia, declares that it is addicted to the stealing of eggs. On the other hand, I have seen it assailed by the Common Sea-Gull (*Larus dominicanus*) on approaching the nest of this bird, and put to an ignominious flight.

It is said to be very destructive on the sheep-runs during the lambing-season; and I have been assured by eye-witnesses that three or four of them will sometimes detach a lamb from the flock, and then, assailing it from different points, tear out the animal's eyes, and ultimately kill it. I am of opinion, however, that these attacks are confined to the weakly or sickly lambs of the flock, and occur only in times of great famine. Be that as it may, the practice of poisoning Hawks in the lambing-season has now become very general; and I have known upwards of a hundred of them destroyed in this manner, during that season, in a single locality. It is accomplished by rubbing a small quantity of strychnine into the body of a dead lamb or piece of offal, and leaving it exposed on the run. The poison takes immediate effect, and often eight or ten birds are thus destroyed in the course of an hour. We are informed by Mr. Potts that on the Cheviot Hills Station (in the Province of Canterbury) upwards of a thousand Hawks per annum have been destroyed in this manner during the last two or three years, and, as an almost necessary corollary of this, that rats are most abundant on this particular sheep-run. The damage to a flock where these Hawks abound is, no doubt, greatly overrated. It is true, however, that this species does sometimes hunt in packs; for I have counted as many as twenty of them at one time hovering over a small "mob" of sheep detached from the main flock; and three of them have been seen to attack a full-grown Turkey, and, acting in concert, to overpower and kill their quarry.

The natives take this species by means of flax snares, arranged in such a manner that the

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bird, in attempting to grapple the bait, gets its legs entangled in a running noose, which its efforts to escape only serve to tighten. I have frequently taken it alive by means of a steel trap, with muffled edges, baited with a dead rat or chicken. When shot at, and wounded in the wing, it attempts to escape by a succession of leaps along the ground, and, on being overtaken, defends itself vigorously with beak and claws, its beautiful golden eyes sparkling with passion. In captivity it is at first fierce, throwing itself backwards when approached, and striking forwards with its long talons; but it soon becomes reconciled to the situation, and permits itself to be stroked with the hand. The late Captain Buck, 14th Regiment, informed me that, while stationed at Napier, one that he had winged became so tame that, on recovering health and liberty, it was accustomed to return every evening to his garden and roost in the arbour.

The peculiar whistling note already noticed is only heard when two or more of these birds are in company. The young has a cry resembling the hoarse note of our Stilted Plover. Captain Hutton informs me that the cry of this Hawk is very similar to that of the Govinda Kite, of India, which he has frequently heard.

This species prefers a swamp for its breeding-place, and generally builds its nest on the ground, though sometimes in a tussock. It often repairs to the same place for several successive seasons, the old nest forming a foundation for the new one, which is usually constructed of the dry blades of *Arundo conspicua* and the flower-stalks of the Spaniard-grass rudely placed together and overlaid with dry grass. The eggs are from two to four in number, but generally three, ovato-conical in form, with a smooth or finely granulate surface, perfectly white, till stained by the bird's feet during incubation, and measuring 1.9 inch in length by 1.5. My largest example measures 2 by 1.6. At first sight they appear to be disproportionately small for the size of the bird; but they are not so in reality; for the body of this Hawk, when stripped of the feathers, is almost ridiculously small. After being blown, if held up against the light, the interior of the shell presents a surface of a beautiful clear green. The breeding-months are October and November; but as late as Christmas Day (1863) I saw, in Matene Te Whiwhi's house at Otaki, a very young one that had been taken from a nest (containing two) about three weeks previously. It was about the size of a half-grown Gosling, and was covered with thick cottony down of a dirty white colour inclining to buff, with feathers beginning to show themselves on the back, wings, and tail; cere and legs yellow. It opened its mouth for food on being approached, and, when provoked, would strike forward or upward with its well-armed feet. It made one aware of its presence by its rather fetid odour, as well as its occasional cry, which was like a half-suppressed whistle.

I have observed that, in very old birds of this species, the feathers of the upper parts present a faded and ragged appearance, from which it may be inferred that the moulting-power becomes impaired as age advances. A specimen that came under my examination, in the flesh, presented the following singular condition, for which I was quite unable to account, although probably the result of disease. A space on the breast, and the whole surface of the sides, were entirely denuded of feathers, these parts being covered by a thick growth of white down; on the back also there was simply a narrow strip of feathers down the line of the spine. The head of this bird was greatly infested with parasitic ticks.

There is a very beautiful albino variety in the Nelson Museum, presented by Mr. Goodall, of Riwaka, where the bird was obtained. The whole of the plumage is of a very delicate white

ash-colour, the underparts having a rosy-purple tinge. The primaries are ashy grey; and both these and the tail-feathers present, on the under surface, obsolete bands, as though they had been washed out. The shafts of all the feathers on the upper parts are dark grey, presenting the appearance of finely pencilled lines. The bill, as also a superciliary line of hairs, and those covering the lores, black; cere, tarsi, and toes yellow. The taxidermist to whom this handsome specimen was entrusted, with a full appreciation of its value, charged the modest sum of eight guineas for stuffing it, and had to be compelled to give it up by process of law.

Before passing on to the next division of this order, it may be well to mention those other diurnal birds of prey that are alleged to have been killed in New Zealand, although there is not such evidence of the fact as would warrant our including them, at present, in our list.

Mr. Gould has presented me with a beautiful specimen of his White-bellied Sea-Eagle (*Ichthyaëtus leucogaster*), which was said to have been procured in New Zealand. This species has been observed along the whole southern coast of Australia, from Moreton Bay on the east to Swan River on the west, including Tasmania and all the small islands in Bass's Straits; and as it is a powerful flier, there is no physical reason why it should not occur sometimes as a straggler on the New-Zealand coast. Mr. Gould had satisfied himself that this specimen was obtained there, although unable to ascertain the precise locality. In corroboration of its presumed occurrence, I may mention that an officer of the 14th Regiment, who was a good sportsman and a tolerable naturalist, assured me that he had actually seen and fired upon a "Sea-Eagle" on the rocks near the entrance to the Wellington harbour.

Two other species of Accipitres, the *Falco subniger* (a rare bird, inhabiting South Australia) and the *Milvus isurus*, or Australian Kite, have had New Zealand assigned as their habitat, on the authority of Mr. J. H. Gurney, who, in a letter to 'The Ibis' (1870, p. 536), offers the following explanation:—"My authority for quoting New Zealand as a habitat for the former was the veteran ornithologist, M. Jules P. Verreaux, who informed me that a New-Zealand specimen had passed through his hands. With regard to the latter (*Milvus isurus*), the Norwich Museum possesses a specimen which I obtained from Mr. A. D. Bartlett, who assured me, at the time, that he had received it from New Zealand, and had satisfied himself that it had been killed in that country. Probably both these species, if not indigenous to New Zealand, may occasionally occur there as accidental visitors from the Australian continent." In support of Mr. Gurney's surmise, I may state that the account sent to me by Dr. Haast, of a Hawk observed by him in the Southern Alps, although, unfortunately, not secured, seems to accord with that given by Captain Sturt of the Australian *Falco subniger*. For the further elucidation of this question we must trust to the intelligence and diligence of Mr. F. Fuller and other local collectors.

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SCELOGLAUX ALBIFACIES.

SPILOGLAUX NOVÆ ZEALANDIÆ.

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SPILOGLAUX NOVÆ ZEALANDIÆ.

(NEW-ZEALAND OWL OR MOREPORK.)

- New-Zealand Owl*, Lath. Gen. Syn. i. p. 149 (1781).
Strix novæ seelandiæ, Gm. Syst. Nat. i. p. 296 (1788, ex Lath.).
Strix fulva, Lath. Ind. Orn. i. p. 65 (1790).
Noctua zelandica, Quoy & Gaim. Voy. de l'Astrol. Zool. i. p. 168, t. 2. fig. 1 (1830).
Athene novæ seelandiæ, Gray, Voy. Ereb. & Terror, p. 2 (1844).
Athene novæ zelandiæ, Gray, Cat. Brit. Mus. Accipitr. p. 52 (1844).
Noctua venatica, Peale, U. S. Expl. Exp. p. 75 (1848).
Spiloglaux novæ seelandiæ, Kaup, Isis, 1848, p. 768.
Ieraglaux novæ zelandiæ, Kaup, Tr. Zool. Soc. iv. p. 218 (1852).

Native names.

Ruru, Koukou, and Peho; "Morepork" of the colonists.

Ad. suprâ chocolatinus, scapularibus maculis fulvis plus minusve celatis notatis: loris, genis anticis et supercilio distincto fulvescentibus: regione auriculari chocolatinâ: tectricibus alarum medianis et majoribus extûs fulvo vel albo maculatis: remigibus brunneis, extûs albo maculatis, et saturatè brunneo transfasciatis: caudâ suprâ brunneâ, subtûs pallidiore, fasciis distinctis saturatè brunneis transnotatâ: collo laterali et corpore subtûs toto lætè fulvis, medialiter latè brunneo striatis: abdomine imo, hypochondriis et subcaudalibus pulchrè albo marmoratis: cruribus et tarsorum plumis lætè ferrugineis: rostro nigro, culmine albicante: pedibus flavis, digitis setis nigricantibus indutis: iride aureo-flavâ.

Adult male. Crown of the head and all the upper parts dark umber brown, obscurely spotted on the scapulars and wing-coverts with fulvous white; lores and region of the bill white, with black produced filaments; forehead, fore neck, and upper part of the breast light fulvous, mixed with brown; underparts generally fulvous, with triangular spots of dark brown disposed in rows and blending; under tail-coverts fulvous, barred with white; quills and tail-feathers dark brown obscurely banded, the former touched on the outer webs with fulvous white; feathers covering the tarsi fulvous. Irides golden yellow; toes yellow, with dark hairs; bill black, white on the ridge. Length 12.5 inches; extent of wings 25; wing, from flexure, 8; tail 5.75; bill, along the ridge, 1, along the edge of lower mandible .75; tarsus 1.5; middle toe and claw 1.25.

Female. The female is slightly smaller, and the markings of the plumage are less distinct than in the male.

Nestling. In their earlier condition the young birds are covered with whitish down, plumbeous beneath; but they assume the full plumage before quitting the nest.

Varieties. Examples from different localities present slight but uniform differences of plumage. Specimens from the Nelson Province are, on comparison with those from the north side of Cook's Strait, invariably found to be more largely marked with white around the eyes and on the feathers surrounding the bill.

As we proceed further south the variation is still more apparent, the whole plumage partaking of a lighter character. There is also considerable variation in size; and a specimen in the collection of Mr. W. T. L. Travers, in addition to being unusually small in all its proportions, has the whole of the plumage deeply stained with ferruginous. A beautiful albino was shot at Te Whauwhau (Whangarei) in the winter of 1871.

EVERY New-Zealand colonist is familiar with this little Owl, under the name of "Morepork." It is strictly a nocturnal species, retiring by day to the dark recesses of the forest, or hiding in the crevices of the rocks, and coming abroad soon after dusk to hunt for rats, mice, and the various kinds of moths and beetles that fly at night. It is common in all parts of the country, although not so numerous now as it formerly was; and the familiar cry from which it derives its popular name may often be heard in the more retired parts of our principal towns, as well as in the farmer's country home or in the rustic Maori "kainga." I have even known several instances of its voluntarily taking up its abode in a settler's house or, more frequently, in the barn, and remaining there a considerable time.

When discovered in its hiding-place during the day, it is found sitting upright, with the head drawn in, the eyes half closed, and the feathers of the body raised, making the bird appear much larger than it really is. It will then allow a person to approach within a few yards of it, and, if disturbed, will fly off noiselessly for a short distance and attempt to secrete itself. It will often remain many days, or even weeks, in the same piece of bush. In the volcanic hills or extinct craters that surround the city of Auckland, there are numerous small caves, formed by large cracks or fissures in the ancient lava-streams, the entrance to them being generally indicated by a clump of stunted trees, growing up among loose blocks of scoria. These gloomy recesses are a favourite resort of the Morepork in the daytime.

On the approach of night its whole nature is changed: the half-closed orbits open to their full extent, the pupils expand till the yellow irides are reduced to a narrow external margin, and the lustrous orbs glow with animation, while all the movements of the bird are full of life and activity. It then sallies forth from its hiding-place and explores in all localities, preferring, however, the outskirts of the forest, where nocturnal insects abound, and the bush-clearings in the neighbourhood of farms, or the ruins of Maori villages, these places being generally infested with rats and mice, on which it chiefly subsists. Like other birds of prey, it afterwards regurgitates the hair and other indigestible parts of these animals in hard pellets. That the Morepork also preys on small birds there can be no reasonable doubt, although it has been frequently denied. Mr. Gilbert Mair has seen one, at sunset, seated on the branch of a Tutu bush (*Coriaria rusci-folia*) with a live Korimako in its claws, and in the act of killing it; and a native once told me that he had seen one of these Owls killing and devouring a Parrakeet. Captain Robinson, of Manawatu, further attests the fact; for on one occasion, when walking in his garden after sunset, he saw a Morepork emerge from a Blue-gum and spring upon a Kingfisher, firmly grappling it in its claws. The bird uttered a cry of pain or terror; and on my informant advancing towards the spot, the Owl released its victim and flew off, but immediately afterwards made a second attack, securing the Kingfisher firmly in its grasp, and only relaxing its hold at the moment of being seized. I have been informed by Sir George Grey that, of nearly a hundred Diamond-Sparrows

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which he liberated on the island of Kawau, very few survived the ravages of this little Owl, and that some other importations suffered in like manner. The Hon. Mr. Stafford, who has for many years interested himself in the introduction and acclimatization of useful birds, has also given evidence against the Morepork on this charge; for he has assured me that on one occasion, having turned out a large number of insectivorous birds in his grounds at Wellington, an unusual number of Owls sought harbour there, and preyed on the little immigrants till scarcely a single one remained. For a considerable time, however, it was doubted whether the Morepork was destructive to acclimatized birds; and a lengthy controversy on the subject appeared in the Auckland newspapers. The careful observations of Mr. Brighton, the Curator of the local Acclimatization Society, at length placed the matter beyond all discussion. Frequently he had to forego his night's rest in order to watch the aviaries, and during a period of only a few months he shot no less than fourteen of these birds. Some of these were surprised in the act of attacking the aviaries, and all of them in the immediate vicinity. He repeatedly found the dead and lacerated bodies of Sky-Larks and Chaffinches lying on the wooden ledge just inside the eave of the wire roofing; and the abundance of Morepork-feathers found entangled in the netting afforded a clue to the perpetrator of these murderous attacks. From the appearance of the feathers, and the mutilated condition of the dead birds, it was evident that the Morepork had tried hard, but unsuccessfully, to pull them through the wire netting in the roof. The following account, by the Curator, renders this perfectly intelligible:—

“The aviary is constructed in the usual manner, on the model of a bird-cage, of wire netting, over a wooden framework, with a sloping roof, also of wire netting. Attached to the framework, comprising the wall-plates, on either side, there are wooden ledges, resembling shelves, on which the Larks rest at night, while the Chaffinches roost upon twigs planted within the aviary, and reaching within a few inches of the wire netting of which the roof is composed. During moonlight nights the Moreporks have been seen to fly upon the roof of the aviary, and after making, as it were, a reconnaissance of the defences, to pounce repeatedly against the wire, causing a loud vibration; and startling the feathery inmates. These, in their fright, fly towards the light, dashing themselves against the wire netting, until the Morepork, by hopping about on the roof, succeeds in fastening upon one of them, and, of course, making short work of him.”

There has, in consequence, been a crusade against the Morepork in many parts of the country. But whether this wholesale destruction of an indigenous species, on account of these predatory habits, is wise, or even prudent, may be seriously questioned. The Morepork, as we have already shown, not only preys on rats and mice, but is also a good insectivorous bird, with a voracious appetite. Its habit of feeding largely on the nocturnal Lepidoptera is of itself an inestimable benefit to the agriculturist, as it tends to check the spread of the caterpillar, whose ravages are becoming more severely felt every year. It is a dangerous thing to disturb the balance of nature by violent means; and, in a new country especially, we must be careful that in removing one evil we are not opening the door to an immeasurably greater one. For my own part, I consider the killing of a single Owl a positive injury to the farming industries of the country, and scarcely compensated for by the introduction of a score of soft-billed insectivores in its place.

I have sometimes found this species, at night, among the rocks along the sea-margin, from

which it may be inferred that crabs and other small Crustacea contribute to its support. In the stomachs of some I have found remains of the large wood-beetle (*Prionoplus reticularis*); and those of others I have found crammed with moths of all sizes, or with nocturnal Coleoptera. I examined some castings of the Morepork in the Canterbury Museum. They are hard pellets, of an oval form, and of the size of a Sparrow's egg, composed chiefly of the hard elytra and heads of various coleopterous insects, among which I noticed particularly the shining covering of the Mata (*Feronia antarctica*), a handsome ground-beetle which is found on the Canterbury plains, but does not occur in the North Island.

The flight of this bird is light, rapid, and so noiseless that, I verily believe, it could surprise and capture a mouse at the very entrance to its burrow. On examining the feathers of the wing, it will be found that they are furnished with a soft or downy margin, and are specially adapted for this manner of flight. From an examination of the orifice of the ear we are led to infer that the power of hearing in this Owl is very acute. It is therefore the more surprising that, on two occasions after dark, I have succeeded in seizing this species with the hand, when perched on the eaves of a veranda, over which its tail projected. When caught, it manifests its anger by a repeated clicking of the mandibles, while it dexterously uses its beak and talons in its appeals for liberation. Besides the cry which gives this Owl its popular name, it has a peculiar call which is not unlike the alarm-cry of the Australian Rosehill Parrakeet (*Platycercus eximius*), but louder and more shrill. At dusk, also, before leaving its retreat, it utters a low croaking note, quickly repeated, which is responded to by the other Owls within hearing. This note resembles the syllables *kou-kou*, uttered from the chest; and among the northern tribes the bird is usually called by a name resembling that cry. It is, however, more generally known as the "Ruru," and in some districts as the "Peho."

It nidificates in hollow trees; but I have never been fortunate enough to obtain the eggs. They are described as being two in number, nearly spherical in shape, and of pure whiteness. The young leave the nest about the beginning of January, and may be heard during every night of that month uttering a peculiar, sibilant, snoring sound. But the breeding is sometimes delayed to a much later period of the year; for, on one occasion, at the North Shore (Auckland), I both heard and saw a young bird so late as the 11th of April. So far as I have been able to ascertain, the young are always two in number. Mr. Gilbert Mair found a nest of this species in the hollow of a dry Hinau tree (*Elæocarpus dentatus*), containing two very young birds, which were "covered with soft white down, plumbeous beneath." Mr. Potts records a similar discovery in Canterbury. In a clump of wood on the banks of the Wairoa River I found a nest, also containing two fully fledged young ones. I sent my native lad, Hemi Tapapa, up the tree to capture them; and while he was so engaged, the parent birds came forth from their hiding-place, and darted at his face with a low growling note, making him yell with fear. The Maories share in the almost universal feeling of superstition regarding the Owl. Hemi's conscience was troubled; and as the shades of night were closing in upon us with the call of "more pork!" in every direction, he handed me the captives and hurried away from the scene of his exploit, evidently sharing, in some degree, the horrors of that luckless wight, immortalized by Mr. Stevenson in his 'Birds of Norfolk,' who, having killed the church-Owl as it flitted past him, ran shrieking home and confessed his awful crime—"I've been and shot a Cherubim!"

SCELOGLAUX ALBIFACIES.

(LAUGHING-OWL.)

- Athene albifacies*, Gray, Voy. Ereb. & Terror, p. 2 (1844).
Sceloglaux albifacies, Kaup, Isis, 1848, p. 768.
Ieraglaux albifacies, Kaup, Tr. Zool. Soc. iv. p. 219 (1852).
Athene ejulans, Potts, Trans. New-Zeal. Inst. vol. iii. p. 63 (1870).

Native names.

Whekau, Ruru-whekau, and Kakaha; "Laughing-Jackass" of the colonists.

Ad. suprâ lætè fulvescens, plumis omnibus medialiter latè nigro striatis: uropygio lætiùs fulvo: scapularibus et dorso postico brunnescentioribus, latè albido marmoratis: tectricibus alarum magis ferrugineo tinctis, fulvo marmoratis: remigibus brunneis, extùs ferrugineo lavatis et fulvo maculatis: caudâ brunneâ, fasciis fulvis conspicuè transnotatâ: fronte, superciliis, gulâ cum collo laterali griseo-albidis, angustè nigro striatis: regione oculari et auriculari brunnescentibus: corpore reliquo subtùs lætè aurantiaco-fulvo, plumis medialiter brunneo striatis: tarso plumulis albidis induto: rostro nigro, versus apicem corneo: pedibus corneo-brunneis, setis fulvescentibus ornatis, unguibus nigricantibus: iride rufescenti-brunneâ.

Adult. Forehead, throat, ear-coverts, and sides of the head greyish white, with black shafts and hair-like filaments; sides of the neck white, each feather having a narrow central streak of black; upper parts dark brown, the feathers of the crown and nape broadly margined with yellowish brown towards the tip; those of the lower part of the back streaked, spotted, and barred with fulvous and white; lower part of the fore neck and the whole of the breast dark brown, each feather narrowly margined with bright fulvous or yellowish brown; on the abdomen, sides of the body, and under tail-coverts the latter colour predominates, the centre of each feather being dark brown; the soft ventral feathers and the short plumage covering the thighs and tarsi light fulvous, without any dark markings; primaries dark brown, marked on the outer web with equidistant angular spots of white, and on the inner web with obsolete bands; secondaries dark brown, with broad transverse bands of white, and clouded in the centre; scapulars dark brown, handsomely variegated with ocellated spots of white. The feathers forming the mantle are all differently marked, some having two broad approximate lateral bars of white, others a double series of spots on each web, while others again have a narrow lateral bar of white on one side of the shaft, and broad angular spots on the other; a few of them are transversely barred and margined with a narrow terminal crescent; upper wing-coverts dark brown, with numerous oval spots of fulvous white more or less distinct; tail-feathers dark brown, with five equidistant transverse bands and a terminal margin of fulvous white. Irides dark reddish brown; toes fleshy brown, and covered with coarse yellow hairs; bill black, horn-colour towards the tip; claws black. Extreme length 19 inches; wing, from flexure, 11; tail 6.5; bill, along the curvature to anterior edge of cere, 2.75; cere .25; middle toe and claw 1.6; hind toe and claw .75.

Obs. The above description is taken from one of the specimens in the Colonial Museum. In the British-Museum example, from which our drawing is made, there is less of the spotted character on the upper surface, and the plumage is stained with ferruginous.

Varieties. Examples differ from each other in the minute details of their colouring. The two specimens in the Canterbury Museum have less white about the face; the soft feathers forming the facial disk are tawny white, with black shaft-lines and hair-like filaments; and along the exterior edge of the disk there is a narrow crescent of pure white, each feather marked with a narrow brownish streak down the centre. In one of these examples the lengthened spots or fusiform markings on the upper surface are less distinct, while in the other they are wholly wanting; but in the latter the fulvous white bars on the primaries are very conspicuous, and add much to the beauty of the plumage. In this specimen the feathers of the upper surface are blackish brown, with a broad tawny margin, those forming the mantle, scapulars, and upper wing-coverts having, on each web, a broad oblique bar of fulvous white. The North-Island bird (in the Colonial Museum) is several shades darker than those from the South Island, the whole of the plumage being deeply stained with ferruginous. The feathers at the base of the upper mandible, and those immediately above the eyes, are white, with black shaft-lines; but the facial disk is washed with fulvous. There is an entire absence of the white markings on the upper surface; underparts rich tawny fulvous, with a dark brown stripe down the centre of each feather; tail dark brown, crossed by five broad V-shaped bands of tawny fulvous.

THIS bird was originally described by Mr. G. R. Gray, in the 'Voyage of the Erebus and Terror,' under the name of *Athene albifacies*; and Dr. Kaup afterwards made it the type of his genus *Sceloglaux*, of which it still remains the sole representative. Mr. Gould, in treating of this singular form, has already pointed out that its prominent bill, swollen nostrils, and small head are characters as much Accipitrine as Strigine, and that its short and feeble wings indicate that its powers of flight are limited, while its lengthened tarsi and shortened toes would appear to have been given to afford it a compensating increase of progression over the ground; and it does, at first sight, appear strange that a bird, specially formed by nature for preying on small quadrupeds, should exist in a country which does not possess any. It must be remembered, however, that when the Laughing-Owl was more plentiful than it now is, New Zealand was inhabited or, rather, overrun by a species of frugivorous Rat, which is now almost, if not quite, extinct. The *Kiore maori*, which has been exterminated and replaced by the introduced Norway Rat (*Mus decumanus*), formerly abounded to such an extent in the wooded parts of the country that it constituted the principal animal food of the Maori tribes of that period. It was a ground-feeder, subsisting almost entirely on the fallen mast of the Tawa, Hinau, Towai, and other forest-trees; and it would therefore fall an easy prey to the *Sceloglaux*. The fact that the extinction of the native Rat has been followed by the almost total disappearance of this singular bird, appears to warrant the conclusion that the one constituted the principal support of the other. Be that as it may, the Laughing-Owl, as it has been termed, in allusion to its cry, is at the present day one of our rarest species. There are three specimens in the British Museum, and one in the fine collection of raptorial birds formed by Mr. J. H. Gurney, and presented by him to the Norwich Museum. The Colonial Museum, at Wellington, and the Canterbury Museum contain two specimens each; and there is a fifth in the local Museum at Dunedin. All these examples, but one, were

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obtained in the South Island—the exceptional one having come from Wairarapa, in the Province of Wellington.

I had an opportunity of examining a live bird of this species in the Acclimatization Gardens at Christchurch, shortly before leaving the colony; and an excellent photograph of this individual, kindly furnished by Dr. Barker, has enabled my artist to delineate his subject in a characteristic attitude.

Unfortunately this Owl, which has lived in the Gardens for upwards of two years, is stone-blind, and its large eyes have a dead, glassy appearance; but I saw quite enough to satisfy me that, in its natural state, it is strictly a ground-feeder. Its appearance was very full and rounded, the feathers of the head and neck being puffed out to a considerable extent. Although it had the freedom of a commodious shed, I observed that it remained constantly on the ground, standing high on its feet, the strong, feathered tarsi being very conspicuous. It manifested much impatience or, rather, restlessness, striding with rapidity along the ground, or sometimes moving by a succession of hops, and generally in a rotatory manner, which may have been due to its blindness. The keeper informed me that this bird is a very poor eater, refusing fresh meat, and taking nothing but newly killed birds and live mice. A young mouse, quite paralyzed with fear, was crouching near the ground awaiting its fate, but the Owl took no heed of it; and in another part of its shed there was lying the half-devoured body of a hen Pheasant. I remarked of this bird that the feathered tarsi were much broader and stronger than they appear to be in the dried specimens. It walks quickly and with long strides, the body being held very erect; and when its speed is increased, the wings are raised with a quivering motion. During the whole time that it has been in confinement, the keeper has never heard it utter a sound, except once, when it alarmed him with its loud mocking shriek.

It should be mentioned that this bird, which was obtained near the source of the Cass River, in the county of Westland, is much darker in plumage than the specimens in the Canterbury Museum, and more nearly resembles the North-Island example mentioned above. As the colours have undergone no change during its long confinement, it is sufficiently clear that the dark plumage is not a condition of immaturity.

Mr. Potts has furnished the following interesting details* regarding this species:—"If its cry resembles laughter at all, it is the uncontrollable outburst, the convulsive shout of insanity. We have never been able to trace the faintest approach to mirthful sound in the unearthly yells of this once mysterious night-bird—mysterious, because for years unsuccessful attempts had been made to secure a specimen of this dismal visitor, whose fitful presence at eventide was scarcely observed before its form was lost to view in the deepening gloom of approaching night. Mr. W. Newton lately, at the Levels Station, near Timaru, secured a specimen of this Owl whilst engaged in the very act of making night hideous; so that all doubt has been removed as to the bird from which this startling cry proceeds. In 1854, at Richmond, in the Malvern Hills, we first became acquainted with the Whekau. It had been captured in a drain or ditch, and lived in a half-tamed state for some time beneath the house, till unfortunately destroyed by a visitor's dog. Some years since, we saw a fine bird, which had been caught, on the preceding night, by a bushman on the

* Trans. New-Zealand Inst. vol. iii. p. 63, 1870.

Upper Rangitata Flat. The intelligent captor signalized his good fortune by chopping off the head of his victim with the ever-ready axe. The look of satisfied triumph, as the bird was pointed at, we have never seen equalled, except, perhaps, on one occasion, when a friend, fresh from town, entered the house with the mangled remains of a tame Kaka, which he had blown almost to pieces in a kowhai tree, from whence poor Bess had unfortunately studied the stranger's face too closely. A Whekau entered a shepherd's abode at the foot of Mount Hutt, and remained for several days perching in the roof; and on one occasion it seized a mouse which a cat had just brought in. Another visitor of this species remained in a station on the Rangitata for some weeks. Last year (1869) a fine light-coloured specimen was obtained at the Point Station, Malvern Hills. When killed it was perched on the rail-fence not many yards distant from the house. Of the examples in the Canterbury Museum, one was procured from the Kakahu Bush, near Arowhenua; and the other, killed at the Levels Station, as before stated, was presented to the Museum by Mr. Donald McLean. Mr. G. Dobson states that the Waimatamate natives describe this Owl as living in holes in the rocks. They call it Kakaha; and they say that it is as large as a Pigeon, with a light breast,—that it has a wide mouth, comes out at night only, and flies without any noise. Dr. Haast states that, one night in 1861, when camping on the Upper Rangitata under Mt. Potts, judging from the noise, there must have been many of these birds flying about, and that he and his party were kept awake for several hours by their shrieking clamour. In May 1857, while living in a tent on the Upper Ashburton, we were constantly disturbed at night by their doleful yells amongst the rocky mountain-gullies. When disturbed on the ground, it bursts forth its weird-like cry immediately after taking wing. Its robust form, thickly clothed with soft feathers, is admirably adapted for encountering the severities of climate to which it must be frequently exposed whilst scouring its wild hunting-grounds. Far less arboreal than its smaller congener, it roams over the bleakest tracts of country in many districts where bush of any extent is rarely to be met with, finding shelter among the numerous crevices in the rocks of rugged mountain-gullies. Being strictly nocturnal in its habits in pursuit of its prey, it must brave the icy blast of the alpine snowstorm at the lowest temperature. The severity of the climate in these elevated regions would scarcely be credited by those who have only known the mildness of the coast-line. As may be inferred, the real home of this hardy raptorial bird is amongst the fastnesses of the Southern Alps, from whence it makes casual excursions by the numerous river-beds to the lower-lying grounds, these occasional visits extending as far as the plains. Although well known from its cry, not many specimens have been obtained."

Dr. Haast now believes that the large Owl captured by his dog amongst the rocky precipices in a creek near the Lindis Pass, and noticed by me, on his authority, under the provisional name of *Strix haasti**, was in reality a bird of the present species. Captain Hutton also writes informing me that this is the Owl referred to in the following passage, in his account of the Birds of the Little-Barrier Island†:—"Another bird also lives on the island, apparently in the cliffs, and comes out only in the evenings. Its cry is a peculiar kind of laugh in a descending scale, and is very ridiculous to hear. I saw it twice by the light of the fire." Mr. Enys informs me that it has

* Essay on New-Zealand Ornithology, 1867.

† Transactions of the New-Zealand Institute, vol. i. p. 162, 1868.

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been seen at the Bealey Police Station (in the Southern Alps), and that it sometimes utters a note "something like that of the Morepork, but just as if he had his mouth full."

Nothing is at present known of the nesting-habits of the Laughing-Owl; and we can only hope that Mr. Potts may succeed in finding and describing the eggs before the hand of man shall have finally obliterated this fast-expiring species.

The two forms of *Strigidæ* described above are the only ones inhabiting New Zealand of which we have, as yet, any positive knowledge. But the natives are acquainted with another species, which they describe as being very diminutive in size and strictly arboreal in its habits. This is no doubt the bird indicated by Ellman as *Strix parvissima* (Zoologist, 1861). Mr. J. D. Enys informed me that he once captured an Owl "standing only five inches high," and that it was perfectly tame and gentle. Mr. Potts, in a communication to the Wellington Philosophical Society*, records, on hearsay evidence, several instances of the occurrence in Canterbury of an Owl "about the size of a Kingfisher." This bird may prove to be the same as Bonaparte's *Scops novæ zealandiæ*, as suggested by Dr. Finsch; but, till it has been more accurately determined, it is impossible to give it a place in our list of species. In his notes on my 'Essay,' a translation of which appeared in the 'Journal für Ornithologie' (1867, pp. 305-347), Dr. Finsch includes *Strix delicatulus*, Gould, among the species occurring in New Zealand; but although this handsome bird ranges over a great part of the southern hemisphere, I have not known a single instance of its appearance in our country.

* Transactions of the New-Zealand Institute, vol. iii. p. 68, 1870.

STRINGOPS HABROPTILUS.

(OWL PARROT.)

- Strigops habroptilus*, Gray, P. Z. S. 1847, p. 62.
Stringops habroptilus, Van der Hoeven, Handb. Zool. ii. p. 466 (1856).
Strigopsis habroptilus, Bonap. Consp. Gen. Av. i. p. 8 (1850).
Strigopsis habroptilus, Schl. Mus. Pays-Bas, *Psittaci*, p. 107 (1864).

Varieties.

- Strigops greyii*, Gray, Ibis, 1862, p. 230.
Stringops greyi, Finsch, Papag. i. p. 253 (1867).

Native names.

Kakapo and Tarepo; "Ground-Parrot" of the colonists.

Ad. viridis: plumis pilei dorsique medialiter pallidè flavidis, irregulariter nigricanti-brunneo transfasciatis et transvermiculatis: uropygii plumis lætiùs viridescentibus: loris plumisque rictum obtectentibus pallidè fulvescenti-brunneis, medialiter albicantibus: regione auriculari brunneâ, rachidibus plumarum fulvescentibus: facie laterali brunneâ, plumis medialiter latè flavicantibus: remigibus nigricanti-brunneis, primariis extùs et intùs flavicante maculatis, secundariis irregulariter flavido fasciatim variis et extùs olivascenti-viridi lavatis: caudâ olivascenti-brunneâ, ubique nigricante fasciolatâ: subtùs magis flavicans, viridi lavatus, abdomine puriùs flavicante: pectoris plumis paullò nigricante variis, hypochondriis magis conspicuè fasciatis: subalaribus olivascenti-flavis, obscurè brunneo fasciatis: subalaribus flavicantibus, minoribus nigro variis: rostro flavicanti-albido, ad basin saturatiore: pedibus flavicanti-brunneis, unguibus saturatiore.

Adult. General colour of the upper surface dark sap-green, brighter on the wings and lower part of back, and largely varied with dark brown and yellow; on their under surface the feathers of these parts are light verditer-green towards the tip, with a fine metallic lustre; on the crown and nape the centre of each feather is blackish brown, with a narrow shaft-line of dirty yellow and a broad terminal band of dull green; on the back, rump, and upper surface of the wings, each feather is silvery brown at the base, pale lemon-yellow beyond, changing to sap-green on the sides and towards the tip, and crossed by numerous broken bars and vermiculations of dark brown; on the anterior portion of the back these bars are regular and distinct, but on the other parts they are interrupted by a broad shaft-line of lemon-yellow. These details of colouring, however, can only be observed when the plumage is disturbed, the general effect on the surface being as already described. The feathers at the base of the upper mandible, lores, sides of face, and feathers projecting over the lower mandible dull yellowish brown, with darker filaments; ear-coverts darker brown, mixed with yellow; fore neck, breast, and sides of the body yellowish sap-green, varied with pale yellow and brown, the distribution of colouring on each individual feather being the same as on the upper parts, but with more yellow down the shaft; lower part of abdomen, thighs, and under tail-coverts light greenish yellow, the longer coverts obscurely barred with light brown; lining of wings pale lemon-yellow, blotched and streaked with dark brown; primaries dark brown, largely toothed on their outer webs with dull lemon-yellow, and on their inner with paler;

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pedibus flavicanti-brunneis,

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secondaries and their coverts dull greenish yellow, rayed and freckled with dark brown on the outer webs; dusky brown on the inner webs, with broken transverse markings of lemon-yellow; tail-feathers yellowish brown, with arrow-shaped markings along the shaft, and largely freckled and mottled with blackish brown. Irides black; bill yellowish white, darker at the base and along the fluting of the lower mandible; tarsi and toes yellowish brown; claws darker. Extreme length 26 inches; wing, from flexure, 12; tail 10; bill, along the ridge (from base of cere), 2, along the edge of lower mandible, 1; tarsus 1.75; longer fore toe and claw 3; longer hind toe and claw 2.5.

Obs. The sexes are alike in plumage. Individuals vary a good deal both in the brilliancy of their tints and in the details of their colouring. The ground-colour of the upper parts varies from a dull sap-green to a bright grass-green, and in some examples the whole of the plumage of the underparts is strongly suffused with lemon-yellow. The barred character of the individual feather is more defined in some specimens, while in others the light markings on the quills and tail-feathers are softened to a pale yellow. Individual birds also differ perceptibly in size, owing probably to conditions of age and sex. The largest example that has come under my notice is one in the possession of Mr. Potts, of Governor's Bay, and which measures 29 inches in length.

Varieties. I have examined the type specimen of Mr. G. R. Gray's *Stringops greyi*, in the British Museum, and have come to the conclusion that it is simply an accidental variety, although a very singular one, of the true *S. habroptilus*. The specimen is in very bad condition, the quills being much worn and abraded, and the tail worn down to a mere stump; indeed the whole of the plumage is dingy and soiled, apparently the result of long confinement. The feathers of the upper parts, instead of being sap-green at the ends, are of a dull greenish blue, changing in certain lights to a purplish blue. There is, moreover, somewhat less of the terminal colour; and as the barred markings on the basal portion of the feathers are fulvous-white instead of yellow, the back has a more variegated appearance. The entire plumage of the underparts is a pale yellowish fulvous, mottled, except on the abdomen, with brown. The cheeks and feathers overlapping the lower mandible are the same as in ordinary examples, but without any yellow tinge. On the sides and flanks the feathers are slightly tinged with blue, but of a duller tint than on the upper parts; thighs deeply stained with yellow. The newest of the tail-feathers (*i. e.* the stumpy portion that remains) is rayed in the same manner as in ordinary examples, but without the yellow element; showing a decided tendency to albinism. In the wing-feathers, in which also the yellow colour is absent, the bars appear at first sight more regular and distinct; but on closer examination it will be found that in both wings the broad inner secondaries and the scapulars have been torn out (an incident doubtless of the bird's assumed captivity), and the barred effect is therefore more conspicuous. Although, among the numerous examples that have come under my notice, I have never seen one in any degree approaching this condition, yet I have detected in some a tendency in the feathers of the back to assume a bluish margin, and in all specimens these feathers have a bright metallic lustre on their under surface. There is no means of determining the exact length of the wing, as the long primaries, on both sides, have been broken off; but the specimen does not appear to differ in size from ordinary small examples of *S. habroptilus*. But what tends more than any thing else to convince me that the so-called *S. greyi* is merely an abnormal or accidental variety of the species under review is the fact that some of the small coverts on both wings, and the feathers of the crown, have assumed the normal sap-green colour, thus betraying a strong tendency to reversion. In the absence of any other examples in a similar condition of plumage, this fact appears to me of itself fatal to the recognition of the species. At the same time, I should add that the difference in colour was so manifest and striking, that Mr. G. R. Gray was perfectly justified in characterizing it provisionally as a distinct species, although (as appears from his Catalogue of Psittacidæ, 1859) he was himself of opinion that it might ultimately prove a mere variety. Even Dr. Finsch, who is scrupulously careful in all his identifica-

tions, states (in his valuable Monograph of Parrots) that, after a careful examination of the type specimen, he felt bound to admit *S. greyi* as a good species. It only remains for me to say that I regret that my convictions compel me to sink a name designed by the describer as a compliment to Sir George Grey, who has always taken so zealous a part in the furtherance of ornithological science.

Nestling. The young Kakapo is at first covered with greyish down, but assumes the adult plumage from the nest, although the colours are duller than in the mature bird, and with a less admixture of yellow; the ear-coverts are darker, and the facial disk less conspicuous.

General remarks. In the peculiar form which constitutes the unique member of the genus *Stringops*, the bill is broad and powerful; the upper mandible has a peculiar rasp-like character within, while the lower mandible is deeply fluted on its outer surface, with a worn, notched process near the extremity. The plumage is soft but compact; the wings apparently well-developed, but useless for purposes of flight, with the quills much curved or bent; the tail long and slightly decurved, the feathers composing it acuminate and sometimes with the tips abraded; the projecting feathers on the cheeks loose, with disunited filaments and shafts much produced; the legs strong and well formed; the tarsi covered with elevated rounded scales; the toes similarly protected in their basal portion, scutellate towards the end; the claws strong, well-arched, sharp on their inner edge, and with fine points.

THIS is one of the very remarkable forms peculiar to New Zealand, and has been appropriately termed an Owl Parrot. As its name *Stringops* indicates, its face bears a resemblance to that of an Owl; and our knowledge of the structure and habits of the bird would seem to prove that it supplies in the grand scheme of nature the connecting link between the Owls and Parrots. In all the essential characteristics of structure it is a true Parrot; but in the possession of a facial disk (in which respect it differs from all other known Parrots), in the soft texture of its plumage, and especially in its decidedly nocturnal habits, it betrays strong affinities to the Owl tribe. Its toes, as in all other members of the order, are zygodactyle; but, as pointed out by Mr. T. W. Wood, in an interesting article communicated to the 'Student' (1870, p. 492), the foot of an Owl, when the bird is perched, considerably resembles that of a Parrot, as the outer toe is then placed backwards with the hind one, so that the bird's feet may be said to be temporarily zygodactyle, whereas those of the Parrot are permanently so.

Although exclusively a vegetable-eater, its habit of hiding during the day in holes of trees and dark burrows exhibits a further point of resemblance to the nocturnal birds of prey. As these latter are in reality night Hawks, so is this bird, what the native name, Kakapo, implies, a night Parrot; and the analogy thus presented harmonizes with the idea of its being the connecting link between the *Accipitres* and *Psittaci*.

The feathers surrounding the eyes and filling the lores differ from those on the other parts of the body not only in being of a lighter colour, but also in form and structure, being narrow and penicillate, with the shaft considerably produced. Those overlapping the base of the lower mandible are more stiff and elongated.

All who have studied the bird in its natural state agree on this point, that the wings, although sufficiently large and strong, are perfectly useless for purposes of flight, and that the bird merely spreads them to break the force of its fall in descending from a higher point to a lower when suddenly surprised; in some instances (as one of the writers quoted below informs us) even this use of them is neglected, the bird falling to the ground like a stone.

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We are naturally led to ask how it is that a bird possessing large and well-formed wings should be found utterly incapable of flight. On removing the skin from the body it is seen that the muscles by means of which the movements of these anterior limbs are regulated are very well developed, but are largely overlaid with fat. The bird is known to be a ground-feeder, with a voracious appetite, and to subsist chiefly on vegetable mosses, which, possessing but little nutriment, require to be eaten in large quantities; and Dr. Haast informs us that he has sometimes seen them with their crops so distended and heavy that the birds were scarcely able to move.

These mosses cover the ground and the roots or trunks of prostrate trees, requiring to be sought for on foot; and the bird's habit of feeding at night, in a country where there are no indigenous predatory quadrupeds, would render flight a superfluous exertion, and a faculty of no special advantage in the struggle for existence. Thus it may be reasonably inferred that *disuse*, under the usual operation of the laws of nature, has occasioned this disability of wing; for there is no physiological reason why the Kakapo should not be as good a flier as any other Parrot.

Conformably also with the doctrine of natural selection, we have here another striking instance of the law of assimilative colouring, which obtains more or less in every department of the animal kingdom. Nature has compensated this bird for its helplessness when compelled to leave its hiding-place in the daytime, by endowing it with a mottled plumage so exactly harmonizing with that of the green mosses among which it feeds, that it is almost impossible to distinguish it.

Although the existence of a large ground-Parrot was known to the early colonists of New Zealand from the reports of the natives, who set a high value on the feathers for purposes of decoration, it was not till the year 1845 that a skin of this bird reached Europe; and this was purchased by the Trustees of the British Museum for the sum of £24.

According to native tradition, the Kakapo was formerly abundant all over the North* and South Islands; but at the present day its range is confined to circumscribed limits, which are becoming narrower every year. In the North Island it is rarely heard of,—although I may state, on the authority of Dr. Hector and Mr. Mair, that it still exists in the Kai-Manawa ranges, and, as I have been assured by the chief Herekieke, it is still occasionally met with in various parts of the Taupo district†.

The first published account of this singular bird is that given by Dr. Lyall, R.N., in a paper read before the Zoological Society of London, on the 24th of February, 1852, and which I have transcribed from the 'Proceedings' of that year:—"Although the Kakapo is said to be still found occasionally on some parts of the high mountains in the interior of the North Island of New Zealand, the only place where we met with it during our circumnavigation and exploration of the coasts of the islands in H.M.S. 'Acheron,' was at the S.W. end of the Middle Island.

* Te Heuheu's father, Ngatoroairangi, a renowned Maori naturalist of former times, was a successful Kakapo-hunter. He was (so the natives relate) accustomed to lie in ambush near the beaten tracks of these birds, and capture them, in the early dawn, on their way to their hiding-places. This good old chief is said to have attempted the introduction of the Snapper into the Taupo Lake. He planted the island of Mokoia, in the Rotorua Lake, with *totara*, and left behind him other evidences that he was a "scientific man" far in advance of his time.

† Through the kindness of Mr. White, R.M., I obtained a native-prepared skin of the Kakapo from Taupo, for comparison with examples from the South Island. It was a very small specimen, measuring only 21 inches in length, and 8.5 in the wing; but I was able to satisfy myself of the real identity of the species in both islands.

There, in the deep sounds which intersect that part of the island, it is still found in considerable numbers, inhabiting the dry spurs of hills or flats near the banks of rivers where the trees are high and the forest comparatively free from fern or underwood. The first place where it was obtained was on a hill nearly 4000 feet above the level of the sea. It was also found living in communities, on flats near the mouths of rivers close to the sea. In these places the tracks were to be seen, resembling footpaths made by man, and leading us at first to imagine that there must be natives in the neighbourhood. The tracks are about a foot wide, regularly pressed down to the edges, which are two or three inches deep amongst the moss, and cross each other usually at right angles.

“The Kakapo lives in holes under the roots of trees, and is also occasionally found under shelving rocks. The roots of many New-Zealand trees growing partly above ground, holes are common under them; but where the Kakapo is found, many of the holes appeared to have been enlarged, although no earth was ever found thrown out near them. There were frequently two openings to these holes; and occasionally, though rarely, the trees over them were hollow for some distance up. The only occasion on which the Kakapo was seen to fly was when it got up one of these hollow trees and was driven to an exit higher up. The flight was very short, the wings being scarcely moved; and the bird alighted on a tree at a lower level than the place from whence it had come, but soon got higher up by climbing, using its tail to assist it. Except when driven from its holes, the Kakapo is never seen during the day; and it was only by the assistance of dogs that we were enabled to find it. Before dogs became common, and when the bird was plentiful in inhabited parts of the islands, the natives were in the habit of catching it at night, using torches to confuse it. It offers a formidable resistance to a dog, and sometimes inflicts severe wounds with its powerful claws and beak. At a very recent period it was very common all over the west coast of the Middle Island; but there is now a race of wild dogs said to have overrun all the northern part of this shore, and to have almost extirpated the Kakapo wherever they have reached. Their range is said to be at present confined by a river or some such physical obstruction; and it is to be feared that, if they once succeed in gaining the stronghold of the Kakapo (the S.W. end of the island), the bird may soon become extinct. During the latter half of February and the first half of March, whilst we were amongst the haunts of these birds, we found young ones in many of the holes—frequently only one, never more than two, in the same hole. In one case where there were two young ones, I found also an addled egg. There was usually, but not always, an old bird in the same hole with the young ones. They build no nest, but simply scrape a slight hollow amongst the dry dust formed of decayed wood. The young were of different ages, some being nearly fully fledged, and others covered only with down. The egg is white and about the size of a Pigeon’s.

“The cry of the Kakapo is a hoarse croak, varied occasionally by a discordant shriek when irritated or hungry. The Maories say that during winter they assemble in large numbers in caves, and that at the times of meeting, and again before dispersing to their summer haunts, the noise they make is perfectly deafening. A good many young ones were brought on board the ship alive. Most of them died a few days afterwards, probably from want of sufficient care; some died after being kept a month or two; and the legs of others became deformed after they had been a few weeks in captivity. The cause of the deformity was supposed to be the want of

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proper food, and too close confinement. They were fed chiefly on soaked bread, oatmeal and water, and boiled potatoes. When let loose in a garden they would eat lettuces, cabbages, and grass, and would taste almost every green leaf that they came across. One which I brought within six hundred miles of England (when it was accidentally killed), whilst at Sydney ate eagerly of the leaves of a *Banksia* and several species of *Eucalyptus*, as well as grass, appearing to prefer them all to its usual diet of bread and water. It was also very fond of nuts and almonds, and during the latter part of the homeward voyage lived almost entirely on Brazilian ground-nuts. On several occasions the bird took sullen fits, during which it would eat nothing for two or three days at a time, screaming and defending itself with its beak when any one attempted to touch it. It was at all times of an uncertain temper, sometimes biting severely when such a thing was least expected. It appeared to be always in the best humour when first taken out of its box in the morning, hooking on eagerly with its upper mandible to the finger held down to lift it out. As soon as it was placed on the deck it would attack the first object which attracted its attention—sometimes the leg of my trowsers, sometimes a slipper or a boot. Of the latter it was particularly fond: it would nestle down upon it, flapping its wings and showing every symptom of pleasure. It would then get up, rub against it with its sides, and roll upon it on its back, striking out with its feet whilst in this position. One of these birds, sent on shore by Capt. Stokes to the care of Major Murray, of the 65th Regiment, at Wellington, was allowed to run about his garden, where it was fond of the society of the children, following them like a dog wherever they went.

“Nearly all the adult Kakapos which I skinned were exceedingly fat, having on the breast a thick layer of oily fat or blubber which it was very difficult to separate from the skin. Their stomachs contained a pale green, sometimes almost white, homogeneous mass, without any trace of fibre in it. There can be little doubt but their food consists partly of roots (their beaks are usually more or less covered with indurated mud), and partly of the leaves and tender shoots of various plants. At one place where the birds were numerous we observed that the young shoots of a leguminous shrub growing by the banks of a river were all nipped off; and this was said by our pilot, who had frequented these places for many years in a whaling-vessel, to be the work of the Kakapo. Their flesh is white and is generally esteemed good eating.”

Sir George Grey, two years later, sent the following interesting account of the Kakapo to Mr. Gould, who gave it a place in the Appendix to his ‘Birds of Australia’ :—

“During the day it remains hid in holes under the roots of trees or rocks, or very rarely perched on the boughs of trees with a very dense thick foliage. At these times it appears stupid from its profound sleep—and if disturbed or taken from its hole, immediately runs and tries to hide itself again, delighting, if practicable, to cover itself in a heap of soft dry grass; about sunset it becomes lively, animated, and playful, issues forth from its retreat, and feeds on grass, weeds, vegetables, fruit, seeds, and roots. When eating grass it grazes rather than feeds, nibbling the grass in the manner of a rabbit or wombat. It sometimes climbs trees, but generally remains upon the ground, and only uses its short wings for the purpose of aiding its progress when running, balancing itself when on a tree, or in making a short descent, half jump half flight, from an upper to a lower bough. When feeding, if pleased with its food, it makes a continued grunting noise. It is a greedy bird, and choice in its food, showing an evident relish for any thing of which it is fond.

It cries repeatedly during the night, with a noise not very unlike that of the Kaka (*Nestor meridionalis*), but not so loud.

“The Kakapo is a very clever and intelligent bird—in fact, singularly so; contracts a strong affection for those who are kind to it; shows its attachment by climbing about and rubbing itself against its friend, and is eminently a social and playful bird: indeed, were it not for its dirty habits, it would make a far better pet than any other bird with which I am acquainted; for its manner of showing its attachment by playfulness and fondling is more like that of a dog than a bird.

“It builds in holes under trees and rocks, and lays two or three white eggs about the size of a pullet’s, in the month of February; and the young birds are found in March. At present (1854) the bird is known to exist only in the Middle Island of New Zealand on the west coast between Chalky Harbour and Jackson’s Bay, and in the Northern Island about the sources of the Wanganui and in part of the Taupo countries. It was, within the recollection of the old people, abundant in every part of New Zealand; and they say it has been exterminated by the cats introduced by the Europeans, which are now found wild and in great numbers in every part of the country. They say also that the large rat introduced from Europe has done its part in the work of destruction.

“The natives assert that, when the breeding-season is over, the Kakapo lives in societies of five or six in the same hole; and they say it is a provident bird, and lays up in the fine season a store of fern-root for the bad weather. I have had five or six of the birds in captivity, but never succeeded in keeping them alive for more than eighteen months or two years. The last I had I sent home as a present to the Zoological Society; but it died off Cape Horn.”

Mr. G. S. Sale (now Professor of Classics in the New-Zealand University) succeeded, in 1870, in bringing, for the first time, to England a live specimen of the Kakapo. This bird was deposited for a short period in the gardens of the Zoological Society, and excited much interest*. An excellent portrait of it appeared in the ‘Field’ newspaper of October 15, 1870, accompanied by a short article on the subject, in which the readers of that journal are informed that “unfortunately for the gratification of the curiosity of visitors, the Kakapo in the gardens obstinately persists in indulging in its nocturnal habits. During the day it remains concealed; and it is only at night, when the visitors have departed, that the singular movements and habits of this animal can be studied with advantage.” This notice called forth a letter† from Mr. Sale, the owner of the bird, in which further interesting particulars of its history are recorded. After explaining that the bird had been in his possession for several months before he deposited it in the gardens, and that he had carefully observed its habits, Mr. Sale continues:—“Sir G. Grey exactly hit the chief characteristics of the Kakapo when he spoke of its affectionate and playful disposition. During the whole time that the bird has been in my possession it has never shown the slightest sign of ill-temper, but has invariably been good-humoured and eager to receive any attention. Its playfulness is remarkable. It will run from a corner of the room, seize my hand with claws and beak, and tumble over and over with it exactly like a kitten, and then rush back to be invited to a fresh attack. Its play becomes sometimes a little severe; but the slightest check makes it more gentle. It has also, apparently, a strong sense of humour. I have sometimes amused myself by placing a

* The Council of the Society offered a sum of £50 for this bird, but were unable to come to terms with the owner

† ‘Field’ newspaper, November 12, 1870.

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dog or cat close to its cage; and it has danced backwards and forwards with outstretched wings, evidently with the intention of shamming anger, and has testified its glee at the success of the manœuvre by the most absurd and grotesque attitudes. One trick especially it has, which it almost invariably uses when pleased; and that is, to march about with its head twisted round, and its beak in the air—wishing, I suppose, to see how things look the wrong way up; or, perhaps, it wishes to fancy itself in New Zealand again. The highest compliment it can pay you is to nestle down on your hand, ruffle out its feathers, and lower its wings, flapping them alternately, and shaking its head from side to side; when it does this it is in a superlative state of enjoyment. I do not think it is quite correct to say that it has dirty habits; certainly it is not worse in this respect than an ordinary parrot.

“I am surprised to find that during the time it was in the Zoological Gardens it very rarely showed itself in the daytime. My experience has been the reverse of this. It has generally been lively enough during the greater part of the day, though not quite so violent and noisy as at night. I had this bird at Saltburn, in Yorkshire, during the summer; and any of your readers who were at that place in the month of August, will remember seeing this bird at the bazaar held in aid of the district church, on which occasion its playfulness never flagged during the whole day. This may partly have been due to excitement at seeing so many strange faces; but it also, no doubt, felt the excellence of the cause (recollect, Sir G. Grey testifies to its cleverness and intelligence), and exerted itself accordingly to help the Church-building Fund.”

In another account of the habits of the particular bird in his possession, Mr. Sale remarks:—“I observe that it rarely makes any noise by day; but about dusk it usually begins to screech, its object being apparently to attract attention; for if let loose from its cage and allowed to have its usual play, it ceases to make any noise. It also makes a grunting noise when eating, especially if pleased; and I have myself attracted it to me by imitating the same sound. It also screeches sometimes when handled, not apparently from anger, but more from timidity.” In a note he adds:—“The sound of the bird is not a shrill scream, but a muffled screech, more like a mingled grunt and screech.”

Dr. Hector found the Kakapo very numerous on the west coast of the Otago Province during his exploration of that country in 1861–62; and his collection of birds, in the Otago Museum, contains many beautiful specimens of it. He succeeded in bringing some live ones to Dunedin; but although they had become perfectly tame, they did not long survive their confinement. As Dr. Hector had good opportunities of studying this bird in its native haunts, I am glad to add the following additional particulars from the pen of so able a naturalist:—

“The name of Owl Parrot is very appropriate, from the aspect of its head and face, as the bill is short and almost buried among feathers and long bristly hairs like the whiskers of a cat. These whiskers, no doubt, are used in the same manner, as delicate feelers for distinguishing objects in the dark, as the Kakapo is strictly nocturnal in its habits—never stirring from the holes and burrows in which it rests during the day until nightfall. They then emerge from the woods to the sides of the rivers; and, as they feed, their harsh screams can be heard at intervals until they return at daybreak to the depths of the forest. Notwithstanding the shortness of their legs and large size of their feet, they run at a good pace, with a waddling duck-like gait; and though they climb with great facility, and rapidly take to trees when disturbed or pursued,

they never make any attempt to fly. They are found on the mountains at all elevations; but their favorite haunts are either on the flats by the sides of the rivers, or at 3000 to 4000 feet elevation, where the forest is very scrubby and dense and merges into open ground, and where the spurs that lead to the precipitous and rocky ridges are covered with coarse grass. In their nocturnal rambles on the mountain-tops—which the Kakapos seem at some seasons to indulge in—they appear to keep in line along the spurs and ridges, as they beat down broad tracks which it would be quite excusable to mistake for the well-frequented paths leading to some encampment in the woods. They seem strictly herbivorous, their food being principally grass and the slender juicy twigs of shrubs, such as the New-Zealand broom (*Carmichellia*), which they chew up into a ball without detaching it from the plant—satisfying themselves with the juice which they extract. Their haunts are therefore easily recognized by the little woolly balls of chewed fibre which dangle from the branches of the shrubs, or strew the ground where they have been feasting on the succulent grasses. It is stated by the Maories that in winter they assemble in large numbers, as if for business; for after confabulating together for some time with great uproar, they march off in bands in different directions. However, they are not gregarious at all seasons of the year, but are generally found in families of two or three together. They breed in February, having two eggs at a time, which they lay in the holes they scrape for dormitories under the roots of decayed trees and fallen rocks.

“The Kakapo can only be successfully hunted with dogs. The best time for hunting these birds is in the early morning, as soon as it is sufficiently light to permit of the sportsman passing rapidly through the bush, as at that time the scent is still fresh of the birds that were abroad during the night. The Maori dogs enjoy the sport very keenly, and follow it largely on their own account—so much so that, when the Maories encamp in a locality where these nocturnal birds abound, the dogs grow fat and sleek, and the birds are soon exterminated. The Kakapo is esteemed a great delicacy by the natives; but its flesh has a strong and slightly stringent flavour.”

Probably no New-Zealand explorer has enjoyed more favourable opportunities for investigating the natural history of the Kakapo than Dr. Haast, whose observations on the subject were embodied in a paper, full of scientific interest, read before the Canterbury Philosophical Society on the 4th June, 1863.

A German version of this paper was contributed by the author to the ‘Verhandlungen’ of the Zoological and Botanical Association of Vienna, of October 10, 1863. A translation appeared in ‘The Ibis’ of the following year (pp. 340–346); and, curiously enough, a retranslation was published in the ‘Journal für Ornithologie’ for 1864 (pp. 458–464). But the paper as originally written has never been published; and as Dr. Haast has favoured me with a copy of it, I have much pleasure in finding room for the following copious extracts:—

“So little is known of this solitary inhabitant of our primeval forests, that the following short narrative of observations which I was fortunate enough to make during my recent west-coast journey may interest you. Although I was travelling almost continuously for several years in the interior of these islands, it was only during my last journey that I was enabled to study its natural history. I was well acquainted with its call, and had often observed its tracks in the sands of the river-beds and in the fresh fallen snow, but I had not actually seen it. The principal reason for this was, that formerly I had no dog with me; and consequently it would only be by

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the greatest accident that this bird, not at all rare in those untrodden regions, could be obtained.

"The true habitat of the Kakapo is the mossy open *Fagus*-forest, near mountain-streams, with occasional grassy plots; but it also lives both on the hill-sides, amongst enormous blocks of rock, mostly overgrown with roots of trees and a deep covering of moss, and on wooded flats along the banks of the larger rivers, liable to be inundated by heavy rainfalls or by the sudden melting of the snow It is a striking fact, that, with the exception only of the valley of the river Makarora, forming Lake Wanaka, I never found the Kakapo on the eastern side of the Alps, although extensive *Fagus*-forests exist there also. It appears to have crossed the main chain at the low wooded pass which leads from the source of the Haast to that of the Makarora, and reached the mouth of this river at Lake Wanaka, where probably the absence of forest put a stop to its further advance. It is very abundant in the valley of the last-mentioned river, and is found even in the Makarora bush, notwithstanding that numerous sawyers are at work there. When camped on the borders of that forest, we continually heard its call near our tents; but none of the sawyers had any idea of the existence of such a large bird in their neighbourhood, although the irregular shrill call had sometimes attracted their attention. It also occurs in the valley of the Wilkin, but is less numerous there, which may be accounted for by the existence of wild dogs in this locality. We may therefore safely assume that from the junction of this river with the Makarora the Kakapo ascended toward the sources of the former. In the valley of the Hunter, only divided by a mountain-range of great altitude but with some low saddles, no sign of it was to be observed, although large *Fagus*-forests would appear to offer a propitious abode. This bird has hitherto been pronounced to be of true nocturnal habits; but I think, from observations I was able to make, that this opinion ought to be somewhat modified. It is true that generally an hour after sunset, the dense foliage of the forest giving additional darkness to the country, its call began to be heard all around us. It then commenced to rove about, and, attracted by the glare of our camp-fire, frequently came close to our tent, when the heedless bird was immediately caught by our dog. But as we met with it on two occasions in the daytime, occupied in feeding, and as I observed that it knew and understood perfectly well the danger which approached, we may safely assume that it has, at least in this respect, some relation to diurnal birds. In order to show why I come to this conclusion, I will particularize the two occurrences I have mentioned, especially as they appear to bear directly upon some other important points in the structure of this bird. When returning from the west coast, we observed, in the afternoon (the sky being clouded), a Kakapo sitting on the prostrate trunk of a tree in the open forest. When about ten yards from it, the bird observed us, and disappeared instantly in its hole, whence, with the aid of the dog, we afterwards took it. It is clear that in this case the bird was not overtaken by the coming day, when far away from its abode, but that it left its retreat voluntarily during daylight. The second instance I shall mention is more striking, and shows that the Kakapo feeds also during the day. It was towards evening, but still broad daylight, when we passed along the hill-side near a deep rocky gorge, and saw a large Kakapo sitting on a low fuchsia tree, about ten feet from the ground, feeding on the berries. When close to it, the bird saw us, and instantly dropped down, as if shot, and disappeared amongst the huge fragments of rocks strewn along the hill-side. But the most remarkable circumstance was, that the frightened bird did not open its

wings to break its fall, but dropped as if it did not possess any wings at all In order to see whether they would fly, or even flutter, when pursued by an enemy, I placed on the ground a full-grown specimen, which had been caught by the dog without being hurt. It was on a large shingle-bed; so that the bird had ample room for running or rising on the wing, if for this purpose it wanted space. I was not a little astonished to observe that it only started running towards the nearest point of the forest, where a dark shadow was apparent—and quicker than I had expected, considering the position of its toes and its clumsy figure, resembling closely a Gallinaceous bird in its movements. As I was standing sideways to it, I thought that it kept its wings closed upon its body, so little were they opened; but my companion, who was equally anxious to see how our prisoner would try to escape, and who stood a little behind it, observed that it opened its wings slightly, but without flapping them in any degree, using them apparently more for keeping its balance than for accelerating its movements. This would almost lead to the conclusion that the Kakapo does not travel far, especially as I have already shown that its whole structure is ill adapted for running. But having myself frequently followed the tracks, and found them to extend a great distance over the sandy reaches along the river, such a conclusion as that suggested above would be erroneous. It must be exceedingly fond of water, because in many localities its tracks were observed for half a mile over shingle and sand to the banks of the river; and I am unable to explain the curious fact, unless the object be to mix river-water with the enormous mass of pulpy vegetable matter which is to be found in its crop. With the exception of two specimens, the crops of which were filled with the large berries of a small-leaved *Coriaria*, by which their flesh was flavoured, all the birds examined by me had their crops widely distended by a mass of finely comminuted vegetable mosses, weighing many ounces I carefully examined the subterranean abode of this bird. From the account given by the natives, I thought that it would be found living in well-excavated holes, resembling in their construction those of the Fox or Badger, that the entrance would be so small as to enable only the inhabitants to enter, and thus to exclude larger animals from persecuting it. This, however, is not the case, because, with one exception, all the specimens obtained were either in fissures amongst rocks, or in cavities formed by huge blocks, tumbled one over another, and overgrown with moss, or in holes formed by the roots of decayed trees. The cavities in the rocks were generally sufficiently large to allow of my dog (a good-sized retriever) freely entering them. The openings to the other holes being smaller, it was sometimes necessary to cut away a few roots at the entrance. Inside, the cavity was invariably of very large size, because we could plainly hear the dog advancing several yards before commencing his scuffle with the occupant; and on returning, with the bird in his mouth, he always emerged head foremost, thus proving that the chamber was large enough to enable him to turn himself round. Before he had become accustomed to the work, the dog was often punished severely by the bird's powerful beak and claws; but he ultimately became quite an expert, always seizing his prey by the head and crushing the skull. He appeared to take a delight in searching for these birds, and was never tired of providing for us in this manner The holes or abodes of the Kakapo were not only on the mountain-sides, but also on the flats near the river-banks, which are liable to be overflowed. There can be no doubt that, when a sudden inundation takes place, the bird can save itself upon a bush or neighbouring tree. I do not think, however, that it can climb the boles of standing trees, because it never resorted to them during the night or

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when persecuted by the dog—except in one single case, when the bird ascended a leaning tree close to our camp, and remained till the dog had given up the attempt to obtain it. But, notwithstanding that almost all the abodes that came under examination were natural cavities, I met with one hole which seemed to have been regularly mined. On the northern bank of the river Haast, just below the junction of the river Clarke, a large flat occurs, formed by deposits of sand, over which a thin layer of vegetable mould is spread, and on which a luxuriant vegetation has sprung up. The river, in washing against these deposits, has in some places formed nearly perpendicular banks, about six to eight feet high. At one spot, about two feet below the surface, several rounded holes were observed; and the dog tried in vain to enter them. After carefully scenting the ground, he began to scratch the surface with his paws, and soon succeeded in widening the entrance sufficiently to admit his body; and he immediately afterwards emerged with the bird in his mouth. There is no doubt, in my own mind, that this hole, at least, had been excavated; and the burrowing-faculty of the bird may be considered so far established. On a flat, in the valley of the Makarora, the dog brought one from the interior of a hollow drift-tree, which was lying amongst sedges and grasses in an old river-channel. There was never more than one individual in the hole, although very often within twenty or thirty yards of it another specimen would be scented out by the dog, the two being generally of opposite sexes. At night-time, in visiting our camp-fire, they generally came in pairs, the two being successively caught by my dog, a single or sometimes a repeated angry growl from the bird informing us that he had hold of it. These circumstances lead me to conclude that during the day each inhabits separately its hole, and that only after dark do they meet for feeding and for social intercourse.”

In his Nelson Report*, Dr. Haast informs us that “in former years the Maruia Plains were a celebrated hunting-ground of the Maories for this bird. They generally went there on fine moonlight nights, when the berries of the tutu (*Coriaria sarmentosa*), a favourite food of the *Stringops*, were ripe, and ran them down partly with dogs, or even killed them with long sticks upon the tutu bushes. Another mode of capture was, when they had found their holes, to introduce a long stick, to which they had fastened several strong flax snares. Feeling the bird with the end of it, they twisted the stick until some part of the bird was caught in the snares, and thus drew it out. The cry of the Kakapo, heard during the night, very much resembles the gobble of a Turkey.”

The Kakapo is said to be still very plentiful in a grassy locality about fifteen miles up the Buller River; and Mr. Huddleston informs me that it is often met with in the wooded country on the western side of the Nelson Province.

To these full and interesting particulars of the habits of a bird that is destined ere long to become extinct, I have little or nothing to add.

A specimen, sent to England by Mr. Murdoch, the Inspector of the Bank of New Zealand, and now in the Zoological Society's Gardens, lives in the same retired way as its predecessor, closely concealing itself in its box by day, exhibiting itself to the public only under coercion of the keeper, and then manifesting the utmost impatience to regain its dark retreat.

A life-size drawing of this species was given in Gray and Mitchell's 'Genera of Birds' (1842), admirably coloured, but placed in an attitude quite foreign to the habits of the bird. Mr. Gould

* *Loc. cit.* p. 7.

gave a portrait of it in the Supplement to his 'Birds of Australia,' executed in his usual masterly style; and other figures, of less note, have appeared at various times. The coloured drawing of this bird in the 'Student' for 1870, as well as the woodcut in the 'Field,' although in other respects excellent pictures, possess a fault in common—namely, in having the tail broad and fan-like, instead of being compressed, narrow, and inclined inwards. This, as I have been informed, was owing to the damaged condition of the tail in the particular bird from which both of these figures were taken.

The attitude selected by our artist is adapted from a sketch taken from life, and furnished by Dr. Hector.

The egg of the Kakapo, of which there is a figure (from the pencil of Mr. Wolf) in the 'Proceedings' of the Zoological Society for 1852, is broadly ovato-conical in form, and of pure whiteness till discoloured in the process of incubation. A specimen in the Canterbury Museum, much stained and slightly damaged, measures 2 inches in length by 1·4 in its greatest breadth. The surface of the shell is smooth, but without any gloss or polish; and on close inspection it is found to be finely granulate.

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NESTOR MERIDIONALIS.

(KAKA PARROT.)

- Southern Brown Parrot*, Lath. Gen. Syn. i. p. 264 (1781).
Psittacus meridionalis, Gm. Syst. Nat. i. p. 333 (1788).
Psittacus nestor, Lath. Ind. Orn. i. p. 110 (1790).
Psittacus australis, Shaw, Mus. Lever. p. 87 (1792).
Nestor novæ zelandiæ, Less. Tr. d'Orn. p. 191 (1831).
Centrourus australis, Sw. Classif. of B. ii. p. 303 (1837).
Nestor meridionalis, Gray, in Dieff. Trav. ii., App. p. 193 (1843).
Psittacus hypopolius, Forst. Descr. Anim. p. 72 (1844).
Nestor australis, Gray, Gen. of B. ii. p. 426 (1845).
Nestor hypopolius, Bonap. Rev. et Mag. de Zool. 1854, p. 155.

Native names.

Kaka; varieties distinguished as Kaka-kura, Kaka-kereru, Kaka-piwarauroa, and Kaka-korako.

Ad. pileo albicanti-cinereo, plumis nuchæ brunneo marginatis: torque collari aurantiaco et coccineo mixtâ: facie laterali fusco-brunneâ, regione auriculari aurantiacâ et genis anticis sordidè coccineo notatis: dorso superiore olivascenti-brunneo, interdum olivaceo-viridi nitente, plumis omnibus nigro marginatis: uropygio et supracaudalibus sordidè coccineis, plumis lætiore coccineo fasciatis et nigro terminatis: tectricibus alarum pallidè brunneis, nigro marginatis: remigibus pallidè brunneis, pogonio interno dilutè coccineo transfasciatis: caudâ pallidè brunneâ, suprâ vix distinctè olivaceo vel rubro tinctâ, sed subtùs hâc colore lavatâ et ad basin coccineo irregulariter fasciatâ: pectore toto cinereo-fusco, plumis nigro terminatis: abdomine toto cum hypochondriis et subcaudalibus pallidè brunneis, plumis omnibus coccineo et ad apicem nigro transfasciatis: subalaribus et axillaribus coccineis, plus minusve aurantiaco tinctis, et minimis brunneo transfasciatis: rostro cyanescenti-cinereo, mandibulâ versus basin fulvescenti-brunneâ: pedibus cyanescenti-cinereis, plantis pedum flavicanti-brunneis: iride saturatè brunneâ.

Juv. torque nuchali indistinctiore: alâ subtùs fusco transfasciatâ.

Adult. General plumage olivaceous brown, each feather margined with darker brown, flushed on the lower parts of the body with dark red, the plumage of the upper parts sometimes with a metallic green tinge; crown and sides of the head grey, margined with dusky brown; ear-coverts orpiment-orange, margined with brown; feathers projecting over the lower mandible dark vinous red, with black hair-like filaments; on the nape the feathers are dingy red, margined with yellow and black, and forming a broad collar with blending edges; feathers of the lower part of the back, rump, sides, abdomen, upper and lower tail-coverts, in their outer portion, dark blood-red, of varying shades, and more or less tinged with yellow in different examples; on the underparts these feathers are narrowly margined with black, on the upper they are banded alternately with black and a lighter shade of red; quills light olivaceous brown, toothed

on the inner web with pale yellowish red, and the secondaries washed, on their inner surface, with pale red; lining of the wings, as well as the axillaries, brilliantly coloured with scarlet and yellow, varying in shade in almost every specimen, and differing in their markings according to age. In the fully mature bird all these soft feathers, excepting the longer ones underlying the primaries, are of a bright scarlet, variegated more or less with yellow, especially towards the outer edge of the wing, where the ground-colour changes to olivaceous; in some specimens the yellow tint predominates, while in rare instances the whole of this plumage is of a uniform bright canary-yellow, the axillaries alone being tinged with scarlet, and the toothed markings on the quills almost white, or only tinged with orange. The long axillary plumes are always bright scarlet, barred with olivaceous brown, and sometimes tipped with yellow; tail-feathers light olivaceous brown on their upper surface, with a broad transverse band of dark brown near the tips, obscure vinous-red on the under surface, with toothed markings of brighter red on their inner webs, and with the subterminal band very distinct. Irides dark brown; bill dark bluish grey, the lower mandible sometimes yellowish brown towards the base; legs bluish grey; soles of feet yellowish brown. Total length 18.5 inches; extent of wings 32; wing, from flexure, 11; tail 7; bill, along the ridge, 2.25, along the edge of lower mandible 1; tarsus 1.25; longer fore toe and claw 2.5; longer hind toe and claw 2.25. Our drawing is taken from a very richly coloured bird now living in the Zoological Society's Gardens, Regent's Park.

Young. In the younger birds the scarlet lining on the under surface of the wings is marked by numerous transverse bars of dusky brown; and towards the carpal edges the feathers are olivaceous brown, barred and margined with orpiment-orange; the long soft feathers underlying the secondaries are dusky grey, with faint bars of scarlet. In some examples the nuchal collar is very indistinct, being simply indicated by a tinge of yellow, while in others it is fully as conspicuous as in the adult.

Nestling. The newly hatched nestling is covered with soft white down, thinly distributed, and very short on the underparts; abdomen entirely bare; bill whitish grey, the upper mandible armed near the tip with a white horny point; cere pale flesh-colour; rictal membrane greatly developed, and of a pale yellow colour; legs dull cinereous. The bill and feet seem disproportionately large, giving the nestling a very ungainly appearance.

Obs. Apart from the strongly marked varieties to be presently noticed, individual specimens exhibit a considerable amount of variation in the details of their colouring. The nuchal collar varies not only in extent, but in colour, from pale orpiment-orange to a dark wine-red margined with yellow; and there is much difference in the colour of the ear-coverts and of the filamentous feathers overlapping the under mandible. Examples also vary in size, a small one in my possession measuring only 16.5 inches in length; wing, from flexure, 10; tail 6.

Varieties. The members of the genus *Nestor* show a great tendency to individual variation, examples even of *Nestor productus* (which is confined in its range to a single rocky island) presenting such differences of plumage as almost to induce a belief in the existence of more than one species. But this variability of character is developed to the highest degree in *Nestor meridionalis*. Although it may be necessary, or convenient, to recognize a larger and a smaller race, the former confined to the South Island, and the latter having a wider dispersion, I have come to the conclusion that the following are merely aberrant varieties of the typical form, and, although sometimes recurrent in different localities, are not entitled to recognition as distinct species.

Var. *a.* *Nestor superbus*, Buller, Essay on New-Zealand Ornithology, p. 11.

This is decidedly the most beautiful of the many varieties to be noticed. Owing to the discovery at the

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same time, and in the same locality, of several examples, all in the same brilliant plumage, I felt no hesitation in characterizing the species as new, under the above designation. Several connecting forms, however, have since been found, and I now feel bound to sink *N. superbus* as a species. The following description of this supposed species appeared in my 'Essay' (*l. c.*):—"Crown, hind neck, breast, scapulars, and upper wing-coverts canary-yellow of different shades, and tinged with scarlet; upper surface of wings whitish yellow, the primaries inclining to pale ash; upper surface of tail, when closed, pale ashy yellow, the sides being bright canary-yellow with a scarlet tinge; sides, abdomen, lower tail-coverts, axillaries, lining of wings, lower part of back, and upper tail-coverts bright scarlet, varied on the underparts, and minutely edged on the upper tail-coverts with canary-yellow; cheeks, throat, ear-coverts, and a broad nuchal collar paler scarlet, largely mixed on the ear-coverts and collar with bright yellow. The under wing-coverts are beautifully marked with alternate bands of scarlet and yellow; the primaries, on their under surface, are ashy, marked on their inner vane with triangular spots of scarlet and yellow; under surface of tail-feathers pale scarlet for two thirds of their extent, and banded on their inner vane with brighter, ashy beyond, and yellowish towards the tip. Bill and legs dark bluish grey."

There are two specimens (said to be ♂ and ♀) in the Canterbury Museum. They differ slightly in the details of their colouring. In the one the nuchal collar of scarlet and yellow is much broader and brighter than in the other, while the crown of the head is paler, being of a dull yellowish white. The lower part of the back is equally brilliant in both; and the peculiar ashy white, which is characteristic of albinism, is very strongly apparent in the primaries and tail-feathers, although tinged on the latter with yellow. One has the bill considerably larger and stronger than the other, while in both the tail-feathers have denuded tips, or, more properly, the shaft is produced half an inch beyond the webs.

An example in my collection, obtained on Banks's Peninsula (Canterbury), corresponds exactly with the supposed ♂ above described.

Var. β . *Nestor esslingii*, Souancé, Rev. et Mag. de Zool. 1856, p. 223.

M. de Souancé, the original describer of the supposed species, says:—"Le *Nestor* dont nous allons donner la description est, sans contredit, l'oiseau le plus remarquable de la collection Masséna. Intermédiaire entre le *N. hypopolius* et le *N. productus*, ce magnifique Perroquet réunit, dans son plumage, des détails caractéristiques de ces deux espèces. Coloration générale semblable à celle du *N. hypopolius*."

Mr. Gould, in the Supplement to his 'Handbook to the Birds of Australia,' says of it:—"A single specimen only of this magnificent Parrot has come under my notice; and this example is perhaps the only one that has yet been sent to Europe. It formerly formed part of the collection of the Prince D'Essling, of Paris, but now graces the National Museum of Great Britain. It is in a most perfect state of preservation, and is, without exception, one of the finest species, not only of its genus, but of the great family of Parrots. The native country of this species is supposed to be New Zealand; but I, as well as M. de Souancé, have failed to learn any thing definite on this point. In size it even exceeds the great Kaka (*Nestor hypopolius*), which it resembles in the form of its beak, while in its general colouring it closely assimilates to *Nestor productus*."

Dr. Finsch, on the other hand, states, in his Monograph, that *Nestor esslingii*, De Souancé (of which the type is in the British Museum), is in size and general colour the same as *Nestor meridionalis*, but has the breast ash-grey, with brown terminal margins and a broad yellowish-white transverse band straight across the belly. He adds that he was not able to make such an examination of it as he wished, owing to its being in an hermetically closed glass case, but quotes Souancé to the effect that the red marks on the inner vane of the quills and tail-feathers are precisely as in *Nestor meridionalis*; whereas Mr. Gould distinctly says that while the tail-feathers in *N. meridionalis* and *N. productus* are strongly toothed on the under surface with red, "in *Nestor esslingii* no such marks occur, the toothing on the inner webs of the primaries is not so clear and well-defined, and the light-coloured interspaces are more freckled with brown."

Referring to these several accounts, I expressed the following opinion, in the 'Transactions of the New-

Zealand Institute' (vol. iii. 1870, p. 51) :—"Assuming Dr. Finsch's description to be strictly correct—that it most nearly resembles *Nestor meridionalis*, from which it is only distinguishable by the broad yellowish-white band across the underparts of the body—and considering the extreme tendency in that species to variability of colour, I should be inclined to regard the British-Museum bird as an accidental variety of the common Kaka. Among the numerous abnormally coloured examples which I have seen, from time to time, varying from an almost pure albino to a rich variegated scarlet, I remember one which, although like the common bird in its general plumage, had a broad *longitudinal* band of yellowish white on the abdomen. The specific identity of this specimen with *Nestor meridionalis* was unmistakable."

It only remains for me to add that the examination which I have since made of the type specimen in the British Museum has entirely verified this conclusion. It may be mentioned that this bird furnished Mr. Gould with a subject for a beautiful picture in the Supplement to his 'Birds of Australia.'

Var. γ . *Nestor montanus*, Haast.

This is a larger race than the common Kaka, and is generally much brighter in colour. It appears to be confined to the South Island, whence all the examples that have come under my notice have been obtained. No doubt some naturalists will be disposed to regard this larger race as a distinct bird; and for a considerable time my own inclinations were in that direction; but, looking to the extreme tendency to variation in this species, and to the difficulty of drawing a clear line between the larger and smaller races, in consequence of the occasional intermediate or connecting forms, I feel that I am quite safe in adopting the views of so sound an ornithologist as Dr. Finsch in refusing, for the present at least, to separate these birds.

There are some beautiful examples of this larger form in the Canterbury Museum. One of these has the crown silvery-grey; the sides of the head and neck washed with sea-green; the ear-coverts glossy golden yellow; the feathers overlapping the lower mandible, and the whole of the throat and fore neck, rich vinous red with paler centres; the nuchal collar very broad, and composed of various shades of scarlet and yellow beautifully blended; the breast and sides varied with crimson and yellowish olive, blending on each feather, and across the former an indistinct pectoral band of yellowish grey; the rump, flanks, abdomen, upper and lower tail-coverts as in ordinary specimens, but brighter in colour. In another example the small wing-coverts are pale orange-red, terminally margined with black; while in a third the abdomen has a conspicuous, irregular patch of canary-yellow. An unusually fine specimen forwarded to me by Dr. Haast for examination had the forehead of a rufous-orange colour; but this proved to be entirely the result of flower-stains, as I had no difficulty in demonstrating. This bird measured 20 inches in length, wing from flexure 12, tail 7.5, culmen 2.75, tarsus 1.5. The plumage of the upper parts was faded and snow-beaten, the ends of the primaries and tail-feathers being much worn and jagged. Crown and sides of the head grey tinged with dull metallic green; ear-coverts bright golden-yellow with darker edges; breast and sides olivaceous brown, with a reddish hue; feathers composing the nuchal collar dull red, with golden tips; those covering the shoulders marked in the centre with a large irregular spot of red, and stained with golden yellow; rump and upper tail-coverts dull arterial red, each feather with a narrow terminal margin of black; under surface as in ordinary specimens, but more largely suffused with yellow.

In another example of the southern bird (in my own collection) the crown and hind part of the head are light grey edged with darker grey; the feathers composing the nuchal collar are rich orange-red, narrowly barred with yellow and black; ear-coverts bright orpiment-orange, changing into deep vinous red on the cheeks; the feathers overlapping the lower mandible edged with black; the fore neck, breast, shoulders, and upper wing-coverts olivaceous brown margined with darker brown, and having, more or less, a green metallic lustre; sides, abdomen, rump, and upper tail-coverts dark red, banded with bright arterial red and dusky brown; under tail-coverts dull red, tipped with brighter red, olivaceous-brown at the base; quills olivaceous brown, lighter on the outer web, largely toothed on the inner one with pale orange-red; lining of wings and axillary plumes bright scarlet tipped with yellow, and banded, more or less distinctly, with brown; tail-feathers

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In another specimen the general colours are altogether duller; but there is more of the metallic lustre on the wings. The arterial-red bands on the rump and abdomen are wanting, the plumage of these parts being dark red edged with dusky brown or black; the lining of the wings is less brilliant; the toothed markings are paler on the quills, and far less distinct on the tail-feathers.

Var. δ .

The following brilliantly coloured variety of *N. meridionalis* was obtained nearly twenty years ago in the Wanganui district, and is now in the author's collection, in the Colonial Museum, at Wellington. General plumage bright scarlet-red, deepest on the lower part of back, sides, and abdomen, and variegated with orpiment-yellow on the nape, sides of the neck, and breast. Crown greenish yellow, with a metallic gloss, each feather centred with brown; feathers overlapping the under mandible, and a broad patch on the throat, dark reddish brown, as in ordinary examples. The feathers of the breast are stained in the centre with dull ashy brown, and, as well as those of the upper parts, are narrowly bordered with black. Primaries dark olivaceous brown, largely marked in their basal portion with yellowish white; secondaries and their coverts pale scarlet, variegated with yellow, olivaceous brown in their apical portion; all the quills on their under surface pale orange in their basal portion, but without the toothed markings; lining of wings vivid scarlet, varied with yellow. Tail-feathers pale scarlet with a broad terminal band of olivaceous brown; under tail-coverts darker scarlet. On the bright upper surface of the tail-feathers there are obsolete bars, and on the under surface there is a broad olivaceous margin; but the "toothed" character peculiar to the species is entirely wanting. Bill bluish grey; feet dark grey, paler on the soles; claws black.

A specimen in the possession of Mr. W. Luxford, at Wellington, has the prevailing colour a bright scarlet; but on the back and wings each feather has a narrow terminal band of blackish brown; head and throat rusty brown; breast darker rust-colour, each feather broadly margined with yellow. Primaries canary-yellow on the outer web for one third of their length, then brown; upper wing-coverts brown margined with scarlet. About two thirds of the tail pale scarlet; there are then a few interrupted bands of brown, and the terminal portion is of that colour.

This bird was shot in the hills near the town of Wellington in the early days of the colony, and before the requirements of the settlers had led to the destruction of the surrounding woods.

Var. ϵ .

The following is the description of a very light-coloured variety obtained by the natives near the burning mountain of Tongariro, and presented to me by Mr. R. W. Woon, R.M.

General plumage pale canary-yellow; the crown tinged with grey; ear-coverts bright orange-yellow; feathers of the throat, hind part of the neck, and some of the upper wing-coverts margined with the same; feathers on the lower part of the cheek, and those overlapping the lower mandible, yellowish red, with paler shafts; sides, abdomen, rump, upper and lower tail-coverts vivid scarlet, the feathers of the underparts narrowly margined with yellow; lining of wings bright yellow tinged with scarlet; axillary plumes, and the soft feathers underlying the secondaries, bright scarlet, tipped with yellow; quills pale canary-yellow on their upper surface, ashy on their under surface, with broad toothed markings of pale red, obsolete on the outer remiges, and diminishing on the secondaries; tail-feathers ashy yellow, with brighter margins, tinged with orange in the centre and along the tips, changing on their under surface to orange-yellow, in their basal portion with narrow toothed markings of scarlet. Bill white horn-colour. Irides dark brown. Tarsi and toes pale brown or flesh-coloured; claws white horn-colour.

The Rev. R. Taylor, who has resided more than twenty years on the Wanganui river, and who has published many interesting notes on the natural history of the country, informs me that he has seen several

examples of this beautiful variety from the same locality as the one noticed above. The natives assured him that they always pair together, nesting in the crevices of the rocks.

Var. ζ.

I am indebted to Dr. Haast for a specimen showing a very decided tendency to albinism, although still exhibiting the bright scarlet facings which adorn the others. In this bird the crown is greyish white, with pale yellow margins; the nape dull crimson, with yellowish tips, forming a broad nuchal collar; ear-coverts bright orpiment-orange stained with red; feathers overlapping the lower mandible, and those covering the throat, pale vinous-red; fore neck and upper part of breast smoky grey, washed with red, and each feather tipped with dull yellow; back and upper surface of wings smoky yellow tinged with gamboge; lining of wings and axillary plumes bright scarlet-red; quills dark yellowish grey, obscurely toothed, and washed at the base with pale scarlet; sides, flanks, and abdomen scarlet red tipped more or less with dusky and yellow; tail-feathers yellowish brown, with paler edges, washed on the under surface with scarlet, marked with dusky freckles, but not toothed; upper and lower tail-coverts bright gamboge, crossed near the tip by a band of bright red. Bill very narrow and fine; yellowish grey in colour, bluish at the tip. Tarsi and toes dark grey; claws bluish horn-colour.

Var. η.

A specimen obtained by Mr. Henry Travers, in the Province of Marlborough, is remarkably small, as compared with ordinary examples from the same locality, and is differently coloured.

Crown of the head hoary grey; fringed behind the eyes and on the occiput with pale sea-green; ear-coverts golden yellow tinged with red; mantle, scapulars, and wing-coverts dull olivaceous green, margined with black; nuchal collar dull vinous red, with lighter tips; neck above dark olivaceous brown; cheeks, throat, front and sides of the neck dark brown, strongly tinged with red; breast, sides, abdomen, and under tail-coverts of different shades of arterial red shaded with brown; lower part of the back, rump, upper tail-coverts, and thighs dark arterial red, banded with lighter red, and tipped with black; lining of wings and axillary plumes beautiful scarlet, transversely barred with dusky black. Quills and tail-feathers olivaceous brown, with paler edges, toothed on their inner webs with pale orange-red.

Var. θ. "Kaka-kereru" of the natives.

The following description is taken from a specimen in my collection, which was obtained in the vicinity of Wellington, in 1856:—

Upper parts generally tinged with oil-green, and each feather narrowly margined with black; crown light grey, with darker shades, varied with deep sea-green over the eyes and on the hinder part of the head; nape sea-green mixed with brown and yellow; nuchal collar, which is nearly two inches broad, dark crimson, each feather faintly margined with yellow and black. Upper wing-coverts and upper portion of the tail-feathers tinged with olivaceous. The ear-coverts are orpiment-orange varying in shade; while the cheeks and throat are dark vinous red, each feather having a bright centre; feathers of the neck and breast dark brown, with a marginal tinge of crimson; rump, upper and lower tail-coverts, thighs, and abdomen deep crimson, with lighter crescentic bands and narrow terminal margins of black. This bird was shot with a flock of twelve others (all bagged), and was the only one presenting this character of plumage.

In another example, obtained at Otaki in September 1862, all the tints of the plumage are very rich, and the red of the underparts extends to the breast, each feather having two bright crescentic bands of arterial red and a terminal margin of dusky black; the ear-coverts are gallstone yellow, and the nuchal collar, which is much extended, is of the same colour intermixed with red; the secondaries and lesser wing-coverts are pale metallic green, narrowly edged with black; and the whole of the dark upper plumage is tinged with the same colour.

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In June, 1870, I received from Manawatu a very beautiful specimen of the variety known among the natives as "Kaka-pipi-warauroa." The whole of the plumage was most handsomely variegated, each feather having a brownish-black centre, and the margins broadly edged with orange-red and yellow. These bright markings were most conspicuous on the nape and upper surface of the wings. The sides of the face and the ear-coverts were of a bright golden yellow, changing to red on the long feathers overlapping the lower mandible; the sides, thighs, and lower part of the abdomen arterial red, with lighter bands; the lining of the wings brilliant scarlet, banded with yellow and black. The natives had this beautiful bird in their possession for many months; and the delighted settler who wrote apprising me of it, described it as "a bird with all the colours of the rainbow." I ultimately induced the owner to part with it, giving him in return a block of the much-prized greenstone, weighing more than 20 lb. I designed this *rara avis* for the Zoological Society of London, and shipped it accordingly with every care; but it appeared to suffer from the extreme cold, and, unfortunately, perished before it was out of sight of the New-Zealand coast.

General Remarks. In this species of *Nestor* the cere is very prominent, and towards the head generally has an abraded appearance, as if the feathers had been rubbed off. The two mandibles are connected at the base by a tough elastic membrane, capable of much expansion, the mandibles being more than an inch apart when fully extended. The tongue, which, like the beak, is bluish grey, is hard and smooth on the under surface, having the appearance of a human finger-nail much produced, along the terminal edge of which there is a fine brush-like development. The upper surface of the tongue is soft, rounded on the edges, with a broad central groove. In adult birds the denuded shaft of the tail-feathers is produced to a fine point a quarter of an inch or more beyond the web. Freshly killed birds have a peculiar woody odour, which is sometimes very strong. During the season that the Rata is in bloom, the long feathers of the cheeks, and the light parts of the lower mandible, as well as the bare membrane at its base, are stained to a rich orange-colour by contact with the juice of these flowers, which evidently contain strong colouring-matter.

To MM. Blanchard and Pelzeln belongs the credit of having first determined the true affinities of the genus *Nestor*, assigning it a station in the subfamily *Trichoglossinae*, or honey-eating Parrots. It bears a close relation to the Australian Lories; and the New-Guinea form known as Pecquet's Parrot (*Dasyptilus pecqueti*) appears to exhibit the transitional or connecting link between these two well-marked groups.

In habits and structure the members of the genus *Nestor* are true flower-suckers, the tongue being furnished at its extremity with a fine brush-like development for that special purpose. The common Kaka of New Zealand is the type of the genus.

Sprightly in its actions, eminently social, and more noisy than any other inhabitant of the woods, the Kaka holds a prominent place among our native birds. Being semi-nocturnal in its habits, it generally remains quiet and concealed during the heat of the day. If, however, the sportsman should happen to find a stray one, and to wound instead of killing it, its cries of distress will immediately rouse the whole fraternity from their slumbers, and all the Kakas within hearing will come to the rescue, and make the forest echo with their discordant screams. Unless, however, disturbed by some exciting cause of this sort, they remain in close cover till the approach of the cooler hours. Then they come forth with noisy clamour, and may be seen, far above the tree-tops, winging their way to some favourite feeding-place; or they may be observed climbing up the rough vine-clad boles of the trees, freely using their powerful mandibles, and assuming every variety of attitude, or diligently tearing open the dead roots of the close

epiphytic vegetation in their eager search for insects and their larvæ. In the spring and summer, when the woods are full of wild blossom and berry, these birds have a prodigality of food, and may be seen alternately filling their crops with a variety of juicy berries, or sucking nectar from the crimson flowers of the rata (*Metrosideros robusta*—a flowering branch of which is depicted in the Plate) by means of their brush-fringed tongues.

With the earliest streaks of dawn, and while the underwoods are still wrapped in darkness, the wild cry of this bird breaks upon the ear with a strange effect. It is the sound that wakes the weary traveller encamped in the bush; and the announcement of his ever active Maori attendant "Kua tangi te Kaka," is an intimation that it is time to be astir. But although habitually recluse during the day, it is not always so. During gloomy weather it is often very active; and, sometimes, even in the bright sunshine a score of them may be seen together, flying and circling about, high above the tree-tops, uttering their loud screams and apparently bent on convivial amusement. When the shades of evening bring a deeper gloom into the depths of the forest, and all sounds are hushed, save the low hoot of the waking Morepork, or the occasional *cheep-cheep* of the startled Robin, the Kaka becomes more animated. It may then be heard calling to its fellows in a harsh rasping note, something like the syllables "*t-chrut, t-chrut,*" or indulging in a clear musical whistle with a short refrain.

It is strictly arboreal in its habits, and subsists to a large extent on insects and their larvæ, so that it is probably one of our most useful species. Where they exist in large numbers, they must act very beneficially on the timber-forests; for in the domain of nature important results are often produced by apparently trivial agencies. Like all the honey-eaters, while supplying their own wants, they do good service with their brush-tongues, by fertilizing the blossoms of various trees, and thus assisting in their propagation; while, on the other hand, the diligent search they prosecute for insects and grubs, and the countless numbers daily consumed by each individual, must materially affect the economy of the native woods. On this latter point Mr. Potts has furnished the following valuable note:—"Although so often accused of injuring trees by stripping down the bark, from careful observation we do not believe a flourishing tree is ever damaged by its beak. It is the apparently vigorous, but really unsound tree that is attacked, already doomed by the presence of countless multitudes of insects, of many varieties, of which it is at once the food and refuge, either in their perfect or larval state. In the persevering and laborious pursuit of this favourite food, the Kaka, doubtless, lends his assistance in hastening the fall of decaying trees; the loosened strips of bark dis severed admit to the exposed wood rain and moisture collected from dews and mists, to be dried by evaporation by the heat of the sun, by the desiccating winds, only to become saturated again. Under this alternation the insidious fungi take root, decay rapidly sets in, the close-grained timber gives place to a soft spongy texture, branches drop off, and gradually the once noble-looking tree succumbs to its fate: but its gradual decay and fall, the work of years, has proved beneficial to the surrounding plants; the dropping of the branches admits light and air to the aspiring saplings, assists in checking the undue spread of lichens and epiphytes; and when the old stem falls, tottering down from its very rottenness, its place is supplied by vigorous successors. In estimating the value of the labours of the Kaka as an insect-eater, it should not be forgotten that the family of Woodpeckers is entirely absent from our Avifauna, and that upon this indefatigable climber devolves some share of the duty of representing that

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peculiar group of forest-birds. How diligently the insects are sought for by the Kaka, may be judged from the heaps of bark chips that lie beneath decaying trees. Often it may be noticed on the ground, tearing away the mossy clothing of the huge gnarled roots that spread around; even the soft rotten boughs are gnawed, to obtain the larvæ of some of the larger bush-insects."

The same accurate observer has contributed the following remarks on the ordinary habits of this species:—"Living in trees, when disturbed it hops amongst the branches with much dexterity, beak and wings assisting its awkward-looking but rapid progress as it threads its way amongst leaves and sprays with unruffled plumage, the peculiar formation of its grasping feet enabling it to execute wonderful feats of agile climbing. A sharp note or two marks its uneasiness when a vigilant eye is watching what takes place from below. When really alarmed, after a few hurried movements, it flies some short distance, at first usually gliding downwards rather than flying straight, threading the leafy maze of the close-growing trees with perfect ease and grace, and warning its fellows of impending danger by uttering loud oft-repeated cries of *kaka, kaka*. We have ever thought it a miserable sight to watch the Kaka when severely wounded, uttering its low smothered cries of distress and pain. How the wretched bird endeavours to save its fall from the leafy shelter by clinging to bough and spray with desperate tenacity, often seizing its wounded limb with its powerful beak, as if to tear away the burning agony from which it suffers! At all times gregarious, it is social even in distress; and numbers gather round their wounded companion, to fall easy victims to the gunner. In September we have observed it poised on the slender bough of some tall *Panax*, luxuriating on the viscid nectar of its blossoms. Happy enough it looks when thus seen through some opening in the bush, its deep-red breast-feathers lit up by the slanting rays of the declining sun. Sated at last, it cleanses its huge beak against a neighbouring bough; then, with grateful clatter glides off to join its fellows. Not only does it regale on flowers and insect food. In the *Fagus* forests, in the bark of the black birch trees may be found a dull red fleshy-looking grub, tightly embedded in the hard bark, quite beneath the black velvety moss that wraps the *Fagus* like a pall. The wound made by this unsightly insect, causes in spring time a sweet honey-like exudation, most frequently taking the form of a fine white filament, terminating in a small white globule, glistening like a dewdrop; glancing upwards, the tall straight-grown stem appears spangled with multitudes of these bright threaded beads. This is a favourite feeding-ground of several arboreals. Of these hungry climbers, the Kaka occupies the foremost rank for size; its hold on the bole of the tree is secure, its movements deliberate, whilst its thick tongue is actively employed in gathering the honeyed meal."

Mr. Buchanan, of the Geological Survey Department, informs me that he has seen the Kaka stripping off the bark from a green tree (*Panax colensoi*), and sucking up with its tongue the gummy matter underneath, in the same manner that it extracts the honey from the flowers of the *Phormium tenax*.

When migrating from one part of the country to another, the Kakas travel in parties of three or more, and generally at a considerable height, their flight being slow and measured, and their course a direct one. They occasionally alight, as if for the purpose of resting, and in a few minutes resume their laboured flight again. On these occasions the bleached and bare limbs of a dry tree are always selected, when one of the requisite elevation is within reach, as affording most fully that which they appear to delight in, an unobstructed prospect. On a near view, the bril-

liant plumage under the wings is very conspicuous when the bird is flying. On the ground it generally moves by a succession of hops, after the manner of the Corvidæ, and not with the awkward waddling gait peculiar to most Parrots. In the trees, where it is more at home, it is perpetually on the move, often walking deliberately along a branch, and then climbing to another by a dexterous use of both beak and feet, or silently winging its way to a station in a neighbouring tree. Its alarm-cry resembles that of the Sulphur-crested Cockatoo, of Australia. During the pairing-season the two birds are always together, and when on the wing keep side by side, both calling as they go. They commence breeding in the early part of November; and at Christmas the young birds are old enough to be taken from the nest, although, if unmolested, they probably do not leave it before the second week of January, or even later. The place usually selected for depositing the eggs is the deep hollow of a tree the heart of which is completely decayed. There is very little attempt at forming a nest, the eggs being placed on the dry pulverized wood which these cavities usually contain. The eggs are generally four in number (sometimes, according to the natives, six), broadly oval, measuring 1.6×1.25 , and pure white in colour till they become soiled and stained in the process of incubation. Much care, and even some degree of fastidiousness, is displayed in the choice of a suitable tree; and once decided on, it is often resorted to by the same birds for many seasons in succession. On this account the natives set a high value on their "rua Kaka." The mere robbing of the nest, if accomplished with caution, does not cause the birds to abandon it; but the natives consider it of importance not to *breathe* into the cavity or to touch any part of it with their hands, for fear of "polluting" the nesting-place and endangering its desertion. A nest which I discovered in the Otairi range, on my journey to Taupo, on the 23rd December, contained two young ones, apparently about ten days old. In a large mairi tree with a decayed heart, about three feet from the ground there was a long narrow opening (measuring 2 feet in length by only 14 inches in width) leading into an inner chamber more than a foot in diameter. The walls of this chamber were smooth; and on the floor there was a deep layer of decayed wood, mixed with fragments of dry rata bark, evidently collected by the birds and brought into the cavity. The natives state that two females, attended by one male bird, sometimes breed in the same cavity, their nests being placed side by side. The fact that during the breeding-season three birds are frequently seen in company, appears to give some colour of truth to this statement.

Mr. Enys informs me that, on Sir Charles Clifford's station at Stonyhurst, he found two nests of the Kaka, one of them situated in the crevice of a rock in a low mountain-gully, and the other in a deep cavity under the roots of a tree. This was on the 24th of December; and both nests contained young birds.

Possessing excellent powers of mimicry, and useful to the natives as a decoy-bird, the Kaka is much sought after, and almost every native village has its "mokai." Like most Parrots, it is a long-lived bird; and one which had been in the possession of the Upper Wanganui tribes for nearly twenty years, presented the curious feature of its overgrown mandibles completely crossing each other. This was no doubt attributable to the fact of its having been constantly fed with soft food, thereby depriving the bill of the wear and tear incident to a state of nature.

The tame Kaka is very susceptible to kindness, and forms strong attachments. It soon learns to distinguish its keeper's voice, and will respond to his call. It often, however, proves a

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mischievous pet, especially if it gets access to the orchard, where I have known it, in a single day, nip off thousands of blossoms from a promising pear-tree. I have seen it treat a favourite vine in a similar manner, and, apparently, from a sheer love of mischief. If it be allowed the freedom of the house, it will destroy the furniture in the most wanton manner with its powerful beak, and proclaim itself a nuisance in a variety of ways.

When the korari-flower (*Phormium tenax*) is in season, the Kakas repair in flocks to the flax-fields to feast on the flower-honey; and on these occasions numbers of them are speared by the natives as an article of food. In the woods also, at certain periods, they are captured in abundance by means of an ingenious snare called a "tutu," worked by a decoy-bird. The tame village-Kaka is not the useless pet that Parrots generally are. It may amuse the young people by its wonderful articulation of Maori words and phrases, and by its whistling-powers; but it has far more substantial attractions for the owner. It is a source of profit and subsistence to him; and as it requires the experience of several seasons to give it proficiency as a decoy-bird, it acquires a specific value according to its age and training. I have known a native refuse an offer of £10 for a well-trained "mokai," although an aged bird and in a very ragged condition of plumage.

As will be seen from the full descriptive notes given above, very beautiful varieties of the Kaka are frequently met with. I have never seen a pure albino; but I am assured by the natives that they are occasionally found. One very nearly approaching that condition was shot at the Whauwhau (in the county of Marsden) in the summer of 1863. The value set on these rare varieties by the natives may be inferred from the following circumstance:—A "Kaka-korako" was seen by a party of Rangitane in the Upper Manawatu, and followed through the woods as far as the Oroua river, every effort being made to take it alive. The Oroua people (of another tribe) then took up the chase, and followed the bird to the foot of the Ruahine range; and although carrying guns, to their infinite credit they allowed it to escape rather than shoot it, in the remote hope that it might hereafter reappear in their district.

From some unaccountable cause the Kaka has always been a comparatively scarce bird in the forests north of Auckland, although there is no lack of its ordinary food-supply. In some other districts it is less common than it formerly was; but it still exists in very considerable numbers in various parts of the country. In the months of December and January, when the rata (*Metrosideros robusta*) is in flower, thousands of these birds are trapped by the natives, in the manner already indicated, and preserved in their own fat for winter use. Partly owing to this cause, and partly to the extension of settlement in some districts where, in former years, they were excessively abundant, their cry is now seldom or never heard; but in the wooded parts of the interior they are as plentiful as ever. Certain wooded ranges are noted as Kaka-preserves, and are very jealously protected by the native tribes owning them, who annually resort to them for the purpose of trapping these birds.

NESTOR OCCIDENTALIS.

(WESTERN KAKA PARROT.)

Nestor occidentalis, Buller, Ibis, 1869, p. 40 (descr. orig.); Hutton, Cat. N. Z. Birds, p. 20 (1871).

Ad. pileo obscurè albicanti-cinereo, nuchæ plumis latè brunneo marginatis, fronte clarius colorato: regione auriculari sordidè aurantiacâ, scapis albicantibus: genis brunneis, medialiter albicante striatis, plumis rictalibus anterioribus elongatis, sordidè coccineo striatis: dorso toto olivaceo-fusco, alâ clarius olivascente, plumis omnibus conspicuè nigro marginatis: tectricibus alarum vix flavido tinctis: collo postico sordidè coccineo et aurantiaco lavato, torquem collarem vix conspicuam formante: dorso postico et uropygio olivaceo-fuscis, plumis omnibus sordidè coccineo lavatis et nigro marginatis: caudâ clarè olivascenti-brunnèâ versus apicem paullò brunnescente, pennis centralibus sub certâ luce vix rubescentibus: subtùs obscurè fuscus, plumis nigro marginatis: pectore imo et hypochondriis olivascente tinctis et conspicuè sordidè coccineo lavatis: subalaribus cum plumis axillaribus fuscis, lætiùs coccineo et aurantiaco lavatis, brunneo transfasciatis.

Adult. Upper surface dark olivaceous-brown, tinged with yellow on the wing-coverts, each feather margined with dusky black; feathers of the nape dull red, margined with yellow and black, and forming a narrow nuchal collar; rump, tail-coverts, and abdomen dark arterial-red, the feathers of the latter banded with a brighter tint; ear-coverts pale orpiment-orange; feathers projecting over the lower mandible tinged with red; throat, neck, and breast dark olivaceous-brown; lining of wings and axillary plumes bright scarlet, obscurely barred with black, and tipped with golden yellow; quills and tail-feathers russet-brown, the former toothed with yellow on the inner web; bill and feet dark olivaceous-grey. Length 16.5 inches; wing, from flexure, 10.5; tail 6; tarsus 1; longer fore toe and claw 2.25; longer hind toe and claw 2.125; bill, following curvature, 2.25, along edge of lower mandible 1.5.

Obs. Apart from the difference of plumage, this species is appreciably smaller than the common one, while the bill is more slender and has the upper mandible produced to a finer point. The two specimens, obtained by Dr. Hector on the west coast of the South Island, differ very slightly in the details of their colouring, and there is scarcely any perceptible difference in their size.

AFTER what I have said in treating of *Nestor meridionalis*, it may be readily understood that I feel some hesitation in keeping this bird distinct. The two examples, on which I founded the characters of my new species, were obtained by Dr. Hector in the wild and rugged country on the west coast of the South Island; and, although no further specimens have yet come to hand, we are assured that it is by no means a scarce or uncommon bird in that region. My chief reason,

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however, for rejecting the supposition that it is another aberrant variety of the common species, is that furnished by Dr. Hector's notes on its habits. The observations of so accurate a field-naturalist, which I shall proceed to give in his own words, are decidedly in favour of its recognition as a good species:—"The range of this bird is very limited. It frequents the precipitous wooded cliffs in the neighbourhood of George Sound, and thence along the coast to Milford Sound. I never met with it in the forests of the low lands. It is more active in its habits and more Hawk-like in its flight than the common *Nestor*. It often sweeps suddenly to the ground; and its cry differs from that of the common Kaka in being more shrill and wild."

Dr. Hector's interesting account of the locality in which his specimens were obtained will give some idea of the bleak and mountainous region which this species inhabits:—"Three miles from the entrance, Milford Sound becomes contracted to the width of half a mile, and its sides rise perpendicularly from the water's edge, sometimes for 2000 feet, and then slope at a high angle to the peaks that are covered with perpetual snow. The scenery is quite equal to the finest that can be enjoyed by the most difficult and toilsome journeys into the alps of the interior; and the effect is greatly enhanced, as well as the access made more easy, by the incursion of the sea, as it were, into these alpine solitudes. The sea, in fact, now occupies a chasm that was in past ages ploughed by an immense glacier; and it is through the natural progress of events by which the mountain-mass has been reduced in altitude, that the ice-stream has been replaced by the waters of the ocean. The evidence of this change may be seen at a glance. The lateral valleys join the main one at various elevations, but are all sharply cut off by the precipitous wall of the Sound, the erosion of which was no doubt continued by a great central glacier long after the subordinate and tributary glaciers had ceased to exist. The precipices exhibit the marks of ice-action with great distinctness, and descend quite abruptly to a depth of from 800 to 1200 feet below the water-level. Towards its head the Sound becomes more expanded, and receives several large valleys, that preserve the same character, but radiate in different directions into the highest ranges."

NESTOR NOTABILIS.

(KEA PARROT.)

Nestor notabilis, Gould, P. Z. S. 1856, p. 94.*Native names.*

"Kea" of the Maoris; "Mountain-Parrot" of the colonists.

♂ *superne omninò olivaceo-viridis; plumarum omnium scapis et marginibus nigricantibus: pileo paulò dilutiore, vix canescente: facie laterali magis brunnescente: dorso postico, uropygio et supracaudalibus sordidè cruentatis versus apicem angustè flavicantibus et nigricante marginatis, his imis olivaceo-flavicantibus: scapularibus et tectricibus alarum dorso concoloribus, his majoribus extùs vix cyanescente lavatis: remigibus nigricantibus, alà spuriâ et primariis versus basin cyanescentibus, secundariis olivaceo-viridibus dorso concoloribus: remigibus subtùs pogonio interno versus basin citrino transfasciatis: caudâ olivaceo-viridi, suprâ sordidè cyanescente lavatâ et fasciâ nigrâ antepicali transnotatâ, rectricibus subtùs flavicante tinctis, et pogonio interno citrino vix aurantiaco dentatis: corpore toto subtùs olivaceo-viridi, plumis nigricante marginatis, abdomine dilutè aurantiaco lavato: subalaribus et plumis axillaribus læte scarlatinis, minimis flavicantibus, angustè nigricante terminatis: rostro cinerascenti-brunneo, mandibulâ ad basin lætè flavicante: pedibus flavicanti-olivaceis.*

♀ *mari simillima, sed sordidior, et plumis nigricante latiùs marginatis.*

Adult male. General plumage dull olive-green, brighter on the upper parts, with a rich gloss; each feather broadly tipped and narrowly margined with dusky black, with shaft-lines of the same colour, except on the head, where there is merely a darker shaft-line; ear-coverts and cheeks olivaceous brown, with darker margins; feathers on the sides strongly tinged with orange-red; primaries dusky brown, the outer webs light metallic blue in their basal portion, largely toothed on the inner web with bright lemon-yellow; secondaries greenish blue, changing to olive on their outer webs, dusky brown on their inner, and toothed with orange-yellow; lining of the wings and axillary plumes vivid scarlet, with narrow dusky tips; inner coverts, towards the flexure, washed with lemon-yellow; rump and upper tail-coverts bright arterial-red mixed with olive, and prettily vandyked at the tips with dusky black, this colour being richest on the middle tail-coverts and changing on the lateral ones to bright olive shaded with red and tipped with brown; tail-feathers olive-green on their upper surface, with a fine metallic gloss, paler at the tips, inclining to blue on the outer feathers, the whole crossed near the extremity by a broad band of blackish brown; the under surface pale olive-green, with the subterminal band less distinct, and broadly toothed on their inner webs with bright lemon-yellow; under tail-coverts dull olive-green, tipped with brown. Bill greyish brown; lower mandible rich wax-yellow in its basal portion; feet yellowish olive, with paler soles. Total length 19.5; wing, from flexure, 12.5; tail 7.5; bill, along the ridge, 1.75, along the edge of lower mandible 1; tarsus 1.5; longer fore toe and claw 2.25; longer hind toe and claw 2.

Female. Similar to the male, but having the tints of the plumage generally duller, and the dusky margins of the feathers broader.

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Obs. In some examples the lower mandible, instead of being yellow at the base, is dark brown, like the upper one, with only a faint line of lighter brown down the centre. This is probably characteristic of the young bird.

THE first recorded examples of this interesting bird were obtained in 1856 by Mr. Walter Mantell, one of the early explorers of New Zealand, to whom we are indebted for many valuable discoveries in natural history, and who is now one of the patrons of science in his adopted country. Two specimens, from the Murihiku district, in the South Island, were forwarded by that gentleman to Mr. Gould, who thereupon characterized the species in the Proceedings of the Zoological Society, and figured it in the Supplement to his 'Birds of Australia.' Nothing more was heard of the Kea till the year 1859, when Dr. Haast received a fine example which had been caught on Mr. Tripp's station, near Mount Cook, and forwarded it in spirits to Professor Owen. In the winter of the following year I made the acquaintance of the species on a station near the Rangitata Gorge, where a live one which had been snared by a shepherd and partially tamed, was frequenting the premises. Of late years, however, owing to the spread of colonization and the opening up of new tracts of country, we have become better acquainted with this bird, and many fine specimens have been secured for our Museums and private collections. It inhabits the slopes of the Southern Alps, and is driven down to the plains only during severe winters; but those who have visited its alpine haunts report it to be comparatively common. At the heads of all the principal rivers in the Canterbury Province it may generally be seen, soaring aloft among the rocks, or foraging amongst the close stunted alpine vegetation.

Thus graphically writes Mr. Potts:—"In order to convey a correct impression of the Kea and its habits, it is necessary to give a brief outline of the features of the country in which it is to be found. Where we have most frequently observed it has been far above the Gorge of the Rangitata, one of the great *snow rivers*, as they are termed. This stream, which derives its source from the glaciers which are embedded in the gloomy and secluded fastnesses of the Southern Alps, is periodically swollen by the melting of the snow and by the heavy rain from the north-west, which falls during the spring and autumn months; fed by numerous creeks and tributaries from every converging gully, its volume increases, it rushes noisily and impetuously over its rough boulder-bed, till the junction of the Havelock and the Clyde swells its waters into a large river. The leafy rugged mountains which imprison it, present almost every conceivable variety of outline, jagged peaks crowned with snow; countless moraines point out where the avalanche and snow-slip have thundered down into the valley below. The river is bordered here and there by grassy flats or hanging woods of timber trees, in which the brown-tinted totara, the silvery *Phyllocladus* with its purplish points, the small-leaved kowhai, and the soft bright-foliaged ribbon-wood contrast well with the dusky hue of the dark-leaved *Fagus*. Far above, dwarf vegetation, in all the wonderful variety of alpine shrubs and flowers, struggles up the steepest slopes, adorning the frowning precipice and foaming cascade, lending its aid in forming scenes of picturesque and romantic grandeur, in which rich and varying tints of perennial verdure gratify the eyes of the spectator with their beauty. This is the home of the Kea. Amongst holes and fissures in almost inaccessible rocks, in a region often shrouded with dense mists or driving sleet, where the north-west wind rages at times with terrific violence, here the Green Parrot may be observed,

entering or leaving crevices in the rocks, or soaring with motionless wings from peak to peak, far above the screaming Kaka or the chattering Parrakeet. The swift-winged Falcon is perhaps the sole intruder in its wild domain. At early dawn its peculiar note is heard, very like the mewing of a cat. Though in some of the more secluded gullies it may be noticed throughout the day, it really appears to wake up into activity at dusk, being, to a certain extent, nocturnal in its habits. It is scarcely less gregarious than its congener, *N. meridionalis*. In the moonlight nights of winter, numbers have been observed on the ground feeding. It can hardly be deemed an arboreal bird in the strict sense of the term.

“The rigour of a hard winter, when the whole face of the alpine country is changed so as to be scarcely recognizable under a deep canopy of snow, is not without its influence on the habits of this hardy bird. It is then driven from its stronghold in the rocky gully, and compelled to seek its food at a far less elevation, as its food-supply has passed away gradually at the approach of winter, or lies buried beyond its reach. The honey-bearing flowers have faded and fallen long before; the season that succeeded, with its lavish yield of berries, and drupes that gaily decked the close-growing *Coprosmas*, the trailing *Pimelias*, or the sharp-leaved *Leucopogon*, has succumbed to the stern rule of winter. Nor has this change of season affected the flora of the Alps alone: the insect world, in a thousand forms, which enlivened every mountain-gully with the chirp and busy hum of life now lies entranced in its mummy state, as inanimate as the torpid lizard that takes its winter sleep sheltered beneath some well-pressed stone. Under the effects of such a change, that cuts off the supply of food, the Kea gradually descends the gullies, where a certain amount of shelter has encouraged the growth of the kowhai that yields its supply of hard bitter seeds, the beautiful *Pittosporums* with their small hard seeds packed in clusters, and the black-berried *Aristotelia*; these and numerous other shrubs or trees, such as the pitch-pine and totara, furnish the means of life to the Parrot. It is during the continuance of this season that we have had the best opportunities of becoming somewhat familiar with it. Within the last few years it has discovered the out-stations of some of the back-country settlers. Of course every station has that indispensable requisite, a meat-gallows. It has found out and fully appreciates the value of this institution, as occasionally affording an excellent supply of food. The gallows is generally visited by night; beef and mutton equally suffer from the voracity of the Kea, nor are the drying sheepskins despised*. These visits may be looked upon quite as social

* Mr. Potts, in a communication to ‘Nature,’ on the development of carnivorous habits in the Kea, has given the following extracts from the ‘Otago Daily Times’ newspaper:—“For the last three years the sheep belonging to a settler, Mr. Henry Campbell, ‘in the Wanaka district (Otago), appeared afflicted with what was thought to be a new kind of disease; neighbours and shepherds were equally at a loss to account for it, having never seen any thing of the kind before. The first appearance of this supposed disease is a patch of raw flesh on the loin of the sheep, about the size of a man’s hand; from this, matter continually runs down the side, taking the wool completely off the part it touches; and in many cases death is the result. At last a shepherd noticed one of the Mountain-Parrots sticking to a sheep and pecking at a sore, and the animal seemed unable to get rid of its tormentor. The runholder gave directions to his shepherds to keep watch on the Parrots when mustering on the high ground; the result has been that, during the present season, when mustering high upon the ranges near the snow-line, they saw several of the birds surrounding a sheep, which was freshly bleeding from a small wound in the loin; on other sheep were noticed places where the Kea had begun to attack them, small pieces of wool having been picked out.’ The birds come in flocks, single out a sheep at random, and each, alighting on its back in turn, tears out the wool and makes the sheep bleed, till the animal runs away from the

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gatherings, as it is by no means a rare occurrence for a score of noisy Parrots to be perched on the roof of a hut at one time. A son of the writer obtained some fine specimens by means of a very simple snare—the noose made of a slender strip of flax-leaf attached to the end of a ricker or rod. He describes them as exhibiting great boldness and confidence, clambering about the roof of the hut, and allowing a very close approach. When caught they remained quite still, without any of the noisy fluttering which usually accompanies the capture of birds, even when managed with adroitness; and they preserved this quiet demeanour till the noose had been removed. One of these birds was placed on the floor under an inverted American bucket, the places for the handle not permitting the rim of the bucket to touch the ground. The Kēa, taking advantage of this, wedged its long beak into the space, and using its head as a lever, it moved the bucket, raising it sufficiently to effect an escape from its prison. This bird appears to be very local in its distribution; but a straggler has now and then been observed far from its usual haunts; for in one instance we have a note of its occurrence at the Horoata, in the Malvern Hills, close to the edge of the Canterbury Plains.”

The penchant for raw flesh exhibited by this Parrot in its wild state is very remarkable. Those that frequent the sheep-stations appear to live almost exclusively on flesh. They claim the sheep's heads that are thrown out from the slaughter-shed, and pick them perfectly clean, leaving nothing but the bones. An eye-witness has described this operation to Dr. Hector as follows:—Perching itself on the sheep's head, or other offal, the bird proceeds to tear off the skin and flesh, devouring it piecemeal, after the manner of a Hawk, or at other times holding the object down with one foot, and with the other grasping the portion it was eating, after the ordinary fashion of Parrots. The plan usually adopted on the stations for alluring this bird, is to expose a fresh sheep-skin on the roof of a hut; and whilst engaged in tearing up the bait, it is easily approached and snared.

In connexion with the flesh-eating propensity of the *Nestor notabilis*, I may mention a very remarkable case that occurred within my own experience, in which a whole fraternity of caged Parrots took to “cannibalism,” if I may so term the killing and devouring of one another, without necessity, and in defiance of their natural habits and instincts. I had the following Parrots associated together in one compartment of my aviary at Wanganui, viz. two King Lories (*Aprosmictus scapulatus*), a pair of Rosellas (*Platycercus eximius*), a pair of Blue Mountain-Parrots (*Platycercus pennantii*), and a Grass-Parrot (*Platycercus semitorquatus*), all of them species indigenous to Australia. For nearly two years they lived together on terms of perfect amity and friendship, feeding from the same seed-troughs, often playing and coying with each other, and forming a constant source of attraction by their noisy clamour and the glittering of their rich plumage in the sunlight. One species alone (the last-named) was moody and shy, generally retiring to the highest perch under the domed roof, and disputing its possession

rest of the sheep. The birds then pursue it, continue attacking it, and force it to run about till it becomes stupid and exhausted. If, in that state, it throws itself down, and lies as much as possible on its back to keep the birds from picking the part attacked, they then pick a fresh hole in its side; and the sheep, when so set upon, in some instances dies. Where the birds so attack the sheep, the elevation of the country is from 4000 to 5000 feet above the sea-level; and they only do so there in winter time. On a station owned by Mr. Campbell about thirty miles distant from the other, and at the same altitude, in the same district, and where the birds are plentiful, they do not attack the sheep in that way.”

with the rest. At length one of the pretty Rosellas met with an accident, which, in part, disabled it in the wing. The attention that it received from its partner was quite touching to witness. The maimed bird being unable to reach its perch, and therefore compelled to roost at night on the lower framework of the aviary, its mate forsook its sheltered perch under the dome and took up its position beside it; and during the day it was constantly chattering to it in a low confidential sort of manner. But this mishap led to a series of disasters that proved fatal, in the end, to the whole company. The Grass-Parrot, still retaining his sulky demeanour, began to persecute the disabled Rosella, and ultimately killed and partly devoured it. There was abundance of grain and other food in the troughs; but the Blue Mountain-Parrots followed suit, and whetted their appetites on the defunct Rosella. Attributing this *contretemps* to the weakly condition of the victim, I simply removed the mutilated body, and left the murderer in the aviary. On the following morning, however, I found, to my dismay, that he had killed and partly eaten one of the beautiful Blue Mountain-Parrots, and was murderously pursuing the surviving Rosella. I at once removed the author of all this mischief, and hoped to see harmony restored in the family; but the spirit of evil had been fairly roused, and I next found that the surviving "Blue Mountain" had killed the male King Lory, and was devouring his body. Then I witnessed another touch of nature; for the mate of the last-named bird fretted and moped, refused her food, and died of a broken heart. Finally, the bereaved Rosella, as if to seek revenge for the murder of his sickly mate, made open war on the surviving female Blue Mountain-Parrot, and succeeded in killing her. I found this valiant little Parrakeet standing on the body of its vanquished enemy, and whistling in the most excited manner. And thus, within the limits of a single week, a group of Parrots that had lived together so long on the most satisfactory terms had, during a contagious passion for killing and devouring, come to utter grief, and only a solitary male Rosella remained! This bird shortly afterwards gained its liberty; and thus terminated my first and last experiment with Australian Parrots. But it must be remembered that this was an abnormal development of character under domestication, or at any rate under the artificial restraints of confinement. The difference in the case of the Kea is that, in its wild and natural state, it readily feeds on raw meat, and seems to prefer that to its proper vegetable diet.

Dr. Haast informs me that in disposition it is most inquisitive, prying into and examining every thing that comes in its way. On one occasion he left a large bundle of valuable alpine plants, which he had collected with much labour, lying exposed on the summit of a lofty mountain-crag. During his temporary absence a Kea came down, and, with a supreme disregard for botanical science, tumbled the collection of specimens over into the ravine below, and quite beyond recovery. Mr. Potts also records an instance of this bird's extreme inquisitiveness. On one occasion a shepherd's hut was shut up, and left for a day or two, the man being required elsewhere. On his return he was surprised to hear something moving within the hut; and on entering, he found that the noise proceeded from a Kea, which had gained access by the chimney. On a closer survey, the worthy shepherd discovered that his visitor had been exercising its powerful mandibles to some effect on his slender stock of goods and chattels. Blankets, bedding, and clothes were grievously rent and torn, pannikins and plates scattered about; and every thing that could be broken was apparently broken very carefully, even the window-frame having been attacked with great diligence.

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Dr. Hector found these birds rather plentiful in the snow-mountains of the Otago Province, and so tame that it was easy to knock them over with a stone or other missile. On the level ground their mode of locomotion is similar to that of the Kaka, consisting of a hopping rather than a walking movement. In addition to the *mewing* cry noticed by Mr. Potts, the Kea utters a short whistle, a chuckle, and a suppressed scream, scarcely distinguishable from the notes of the Kaka (*Nestor meridionalis*). Although, as already shown, very easily captured, it is difficult to detain this bird against its will. My brother, Mr. John Buller, during his residence in the back Mackenzie country, obtained, at various times, no less than eight live specimens for me; but in every instance they managed to escape, either by eating their way out of the wooden cage, or in some other, unaccountable manner, before reaching their destination. It is to be hoped, however, that some one, having the opportunity, will yet succeed in obtaining a pair of live ones for the Zoological Society's Gardens, where they would certainly receive all the attention and study that so singular a bird deserves.

Nothing is known of the breeding-habits of this species, although, judging from its general economy, it may be safely inferred that it nests in the crevices and crannies of the rocks in its wild alpine haunts.

PLATYCERCUS NOVÆ ZEALANDIÆ.

(RED-FRONTED PARRAKEET.)

- Pacific Parrot*, Lath. Gen. Syn. i. p. 252 (1781).
Psittacus novæ zeelandiæ, Sparrm. Mus. Carls. pl. 28 (1787).
Psittacus pacificus, Gm. Syst. Nat. i. p. 329 (1788).
Platycercus pacificus, Vigors, Zool. Journ. i. p. 526 (1825).
Pezoporus novæ zeelandiæ, Voigt, ed. Cuv. Thierreich, p. 750 (1831).
Lathamus sparmanii, Less. Traité d'Orn. i. p. 206 (1831).
Platycercus erythrotis, Wagl. Monogr. Psitt. p. 526 (1835).
Cyanoramphus erythrotis, Bonap. Rev. et Mag. de Zool. vi. p. 153 (1854).
Cyanoramphus novæ zelandiæ, Bonap. Rev. et Mag. de Zool. vi. p. 153 (1854).
Cyanoramphus aucklandicus, Bonap. Naumannia, 1856, Suppl. p. 352.
Cyanoramphus novæ guineæ, Bonap. Naum. 1856, Suppl. p. 352.
Platycercus aucklandicus, Gray, Cat. Brit. Mus. Psitt. p. 13 (1859).
Platycercus cookii, Gray, Cat. Brit. Mus. Psitt. p. 13 (1859).
Platycercus novæ guineæ, Gray, Cat. Brit. Mus. Psitt. p. 13 (1859).
Cyanoramphus saisseti, Verr. et Des Murs, Rev. et Mag. de Zool. xii. p. 387 (1860).
Platycercus rayneri, Gray, Ibis, 1862, p. 228.
Coriphilus novæ zeelandiæ, Schlegel, Dierent. p. 77 (1864).
Euphema novæ zeelandiæ, Schl. Mus. Pays-Bas, *Psittaci*, p. 105 (1864).
Platycercus forsteri, Finsch, Papag. ii. p. 287 (1868).

Native names.

Kakariki, Kakawariki, Powhaitere, Porere, and Torete.

♂ prasinus, uropygio paullò lætiore: genis et corpore subtùs flavicanti-viridibus: pileo antico, maculâ anteo-oculari, alterâ supraauriculari et plumis paucis ad latera uropygii positis puniceis: occipite ad basin plumarum celatè citrino: tectricibus alarum dorso concoloribus: remigibus brunneis, alâ spuriâ lætissimè ultramarinâ: primariis extùs ad basin ultramarino, versus apicem angustè flavido marginatis: caudâ suprâ lætè prasinâ, subtùs magis flavicante: subalaribus cyanescenti-viridibus: maxillâ cyanescenti-albâ, versus apicem nigricante, mandibulâ omninò nigricante: pedibus pallidè brunneis: iride rubrâ.

Adult male. General plumage bright grass-green, lighter, or rather yellowish-green on the underparts. Forehead, crown, and streak across the eye terminating on the ear-coverts deep crimson, with a spot of the same, more or less distinct, on each side of the rump; on the nape a broad basal mark of yellowish white, observable only when the plumage is disturbed or raised. The wing-feathers are dusky black, lighter on the under surface, and crossed by an obscure yellowish band; the outer primaries and their coverts, as well as the bastard quills, bright blue on their outer webs. Irides cherry-red; upper mandible bluish white, with a black tip; lower mandible bluish black; feet pale brown. Extreme length 11.25

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Young. The plumage of the young bird does not differ appreciably from that of the adult. Dr. Finsch's surmise that *Platycercus unicolor* might prove to be the young of this species is therefore erroneous. I have examined the type specimen of *P. unicolor* in the British Museum, and am quite satisfied that it is a good species, very readily distinguishable from *P. novæ zealandiæ* by its more robust form and more powerful mandibles, independently of its uniform green colour. This specimen is quite unique. It was received from the Zoological Society's Gardens; but its habitat is unknown, and its inclusion in Mr. G. R. Gray's "List of New-Zealand Birds" (*Ibis*, 1862) was purely conjectural.

Varieties. Like many other members of the large natural family to which it belongs, this species exhibits a strong tendency to variability of colour; and the slight differences which some of the ornithologists of Europe have recognized as sufficient specific characters, are clearly of no value whatever. A specimen brought to me by a native, in the Kaipara district, many years ago, had the whole of the plumage of a brilliant scarlet-red. Another, obtained in the woods in the neighbourhood of Wellington, had the green plumage thickly studded all over with spots of red; this handsome bird was caged, and at the first moult the whole of the spots disappeared. An example of this species in the British Museum has the abdomen and under tail-coverts bright yellow mixed with green; the thigh-spots very large and bright; the rump stained, and the tail obscurely banded on the upper surface, with dull yellow.

Obs. The synonymy of the genus *Platycercus*, as may be seen above, has been involved in much confusion. We are indebted to Dr. Otto Finsch, of Bremen, for a complete elucidation of the subject, in his able "Monograph of the Psittaciæ" (*Die Papageien*, ii. p. 275, 1868). Examples of *Pl. novæ zealandiæ* vary much in size and in the depth of their colouring. The shade of the prevailing green, the brilliancy of the crimson vertex, and the extent of red colouring on the ear-coverts, and of blue on the wings, are alike variable. *Pl. aucklandicus*, of Bonaparte, is undoubtedly referable to this species; and I have no doubt that Dr. Finsch is right in his determination of *Pl. saisseti* (Verreaux) as being also inseparable. I am further of opinion that *Pl. forsteri*, admitted with some hesitation by Dr. Finsch, and founded on a single example in the British Museum, is nothing but *Pl. novæ zealandiæ*, with the red uropygial spots accidentally absent.

THE Red-fronted Parrakeet is very generally dispersed over the whole country—but is more plentiful in the southern portion of the North Island than in the far north, where the yellow-fronted species predominates. It frequents every part of the bush, but appears to prefer the outskirts, where the vegetation is low and shrubby, as also the wooded margins of creeks and rivers. It is often met with among the dense koromiko (*Veronica*) which covers the low river-flats, or among the brushes of *Leptospermum* and other scrub. It seldom ventures beyond the shelter of the woods, unless it be to visit the farmer's fields for its tithe of grain, or to reach some distant feeding-place, when it rises rather high in the air and flies rapidly, but in a rather zig-zag course. When on the wing it utters a hurried chattering note; and when alarmed, or calling to its fellows, it emits a cry resembling the words "twenty-eight," with a slight emphasis on the last syllable. It often resorts to the tops of the highest trees, but may always be enticed downwards by imitating this note. It is gregarious, forming parties of from three to twelve, or more, in number, except in the breeding-season, when it is generally met with in pairs.

Its food consists chiefly of berries and seeds: but I suspect that it also devours small insects and their larvæ; for I have observed flocks of a dozen or more on the ground, engaged apparently in a search of that kind, and it is a well-established fact that several of the Australian members of this group subsist partly on insect food. When the corn-fields are ready for the harvest, flocks of this gaily-coloured Parrakeet resort to them to feed on the ripe grain; and it is very pretty to see them, on any alarm being given, rise in the air together and settle on a fence, or on the limb of a dead tree, to wait till the danger has passed, keeping up all the time a low, pleasant chatter.

This species bears confinement remarkably well, and is very docile and familiar even when taken as an adult bird. It is also very intelligent, and possesses the faculty of mimicry in a high degree.

One of these birds has been in the possession of a lady at Christchurch (Canterbury) for more than eight years. Although full-grown when first caged, it has learnt to articulate several words with great clearness. It is very tame, and displays a considerable amount of intelligence—leaves its cage every day for exercise, and returns to it immediately on the appearance of a stranger. It knows its fair owner's voice, will respond to her call, and will "shake hands" with each foot alternately in the most sedate manner. Another, in our own possession, survived confinement for more than *eleven* years, and appeared then in perfect health and strength, when it fell a victim to the household puss. This bird could articulate sentences of three or four words with great precision of accent; and the loss of so intimate a family-friend was "sincerely lamented" by all our circle.

A hole in a decaying or dead tree affords this species a natural breeding-place, the eggs being laid on the pulverized rotten wood at the bottom; for there is no further attempt at forming a nest. The months of November and December constitute the breeding-season. The eggs vary in number from three to seven; and a native stated that he once found a nest containing as many as eleven; but five is the usual number. Mr. Gilbert Mair informs me that a pair of these birds bred in the hollow trunk of a Hinau-tree for several successive years, although robbed of their young every season, and that he has frequently observed the cock bird feeding the hen, during incubation, by regurgitating berries from his crop. Although exhibiting a preference for hollow trees, they sometimes nest in the holes or crevices of rocks. On the Upper Wanganui the natives pointed out to me a small round cavity in the perpendicular cliff forming the bank of the river, and assured me that this was the entrance to a small chamber where a pair of Parrakeets had reared their young in security for many years. The eggs are very broadly oval, measuring 1.05 by .85. They are pure white and are very finely granulate on the surface, sometimes with minute limy excrescences near the thicker end.

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PLATYCERCUS NOVÆ ZEALANDIÆ.

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PLATYCERCUS AURICEPS.
(YELLOW-FRONTED PARRAKEET.)

- Platycercus auriceps*, Kuhl, Consp. Psittac. p. 46 (1820).
Pacific Parrot, var. C, Lath. Gen. Syn. i. p. 252 (1781).
Psittacus pacificus, var. δ, Gm. Syst. Nat. i. p. 329 (1788).
Platycercus auriceps, Vigors, Zool. Journ. i. p. 531 (1825).
Platycercus novæ zelandiæ, Bourjot St.-Hilaire, Perroq. t. 37 (1837).
Euphema auriceps, Licht. Nomencl. Av. p. 72 (1854).
Cyanoramphus auriceps, Bonap. Rev. et Mag. de Zool. vi. p. 153 (1854).
Cyanoramphus malherbi, Souancé, Rev. et Mag. de Zool. ix. p. 98 (1857).
Platycercus malherbi, Gray, Cat. Brit. Mus. Psitt. p. 14 (1859).
Coriphilus auriceps, Schlegel, Dierent. p. 77 (1864).
Platycercus alpinus, Buller, Ibis, 1869, p. 39.

Native names.

The same as those applied to the preceding species.

Ad. P. novæ zelandiæ similis, sed valdè minor, et vertice aureo, fronte puniceâ facilè distinguendus.

Adult male. General plumage beautiful grass-green, paler, or more suffused with yellow on the underparts. A band of dark crimson connects the eyes, passing across the forehead, immediately above the nostrils; upper part of forehead and crown golden yellow; on the nape a basal spot of yellowish white, apparent only on moving the feathers; on each side of the rump a conspicuous spot of crimson; quills dusky black, crossed on their under surface with a band of pale yellow; the outer web of the bastard quills and first four primaries, with their coverts, indigo-blue, narrowly margined with yellow. Irides pale cherry-red; upper mandible bluish-white at the base, black towards the tip; under mandible bluish black; feet pale brown. Extreme length 9 inches; wing, from flexure, 4·2; tail 4·75; culmen ·65; tarsus ·65; longer fore toe and claw 1; longer hind toe and claw ·9.

Young. The frontal band is orange, and the vertex pale yellow; and there is an absence of the yellow element in the general plumage, which is of a cold pure green, much paler on the underparts; the rump-spots, moreover, are smaller and less conspicuous, being orpiment-orange instead of crimson.

Varieties. Like the preceding bird, this species also exhibits abnormally coloured varieties. A young bird, brought to me from the nest, and not fully fledged, had the plumage of the body pale yellow, shaded with green on the upper parts, and the quills and tail-feathers marked with red. Another had numerous light crescentic marks on the wing-coverts. In the summer of 1863 I obtained a very beautiful variety at Manawatu. I found it in the hands of a labouring settler, who had purchased it from the natives for something less than a shilling. Finding him unwilling to part with it, I tempted him with a guinea, and secured the prize. It was a bird of the first year, and presented the following appearance:—Frontal band crimson, vertex golden yellow; space around the eyes and a band encircling the

neck green; head, shoulders, and lower part of back red, the intermediate space variegated with red and green; quills dusky, obscurely banded with yellow, and margined on the outer web with blue; wing-coverts greenish yellow, barred and margined with red; tail-feathers green, obscurely barred with yellow in their apical portion; underparts green, variegated with crimson and yellow, an interrupted band of the former colour crossing the breast. Like the spotted variety of *Pl. novæ zealandiæ* already mentioned, within a short time it commenced to moult, and was fast assuming the common green livery of the species, when it was accidentally killed. This specimen, which still exhibits traces of its original colours, belongs now to the typical collection in the Colonial Museum.

Obs. This species is very readily distinguished from all the other members of the group of *Platycerci* by its beautiful golden vertex. Individuals vary both in size and in the brilliancy of their plumage. The type of *Platycercus malherbii*, in the British Museum, received from the Auckland Islands, and characterized by Souancé as "encore plus petit que l'*auriceps*," is nothing but a very small example of this species. There is an equally small one in the same collection from the Bay of Islands, New Zealand. Some specimens exhibit the yellow vertex stained more or less with crimson.

THE Yellow-fronted Parrakeet, although generally dispersed over the country in all suitable localities, is more plentiful than the red-fronted species in the northern parts of the North Island, and less so as we approach Cook's Strait. In the South Island, however, the two species appear to be more equally distributed. Notwithstanding the arguments advanced in the paper read by me before the Wellington Philosophical Society in June 1869*, and the important fact cited, that a caged specimen, at least five years old, exhibited the plumage characteristic of my *Platycercus alpinus*, I have come to the conclusion that Dr. Finsch is right in considering this the young state of *Pl. auriceps*. The particular case in question must find its explanation in the tendency to individual variation in this species, some remarkable instances of which are noticed above.

In habits this bird closely resembles the preceding one; but it is less gregarious, being seen generally in pairs. It loves to frequent the tutu bushes (*Coriaria ruscifolia*), to regale itself on the juicy berries of this bushy shrub; and on these occasions it is easily snared by the natives, who use for that purpose a flax noose at the end of a slender rod. When feeding on the tutu-berry, the whole of the interior becomes stained of a dark purple. When the wild dock has run to seed, this pretty little Parrakeet repairs to the open fields and feasts on the ripe seeds of that noxious weed. At other seasons the berries of *Coprosma lucida*, *Fuchsia excorticata*, and other forest-shrubs afford it plentiful and agreeable nutriment.

In captivity it is very gentle and tractable, but it is far inferior to the larger red-fronted bird in its talking-capacity. One or two instances of its being taught to articulate words of two syllables have come to my knowledge; but as a rule the attempt to instruct it ends in failure.

Like its congener it nests in hollow trees, and lays from five to eight eggs, resembling those of *Platycercus novæ zealandiæ*, but smaller. Specimens in my collection measure .9 in length by .75 in breadth.

Major Mair informs me that he watched a pair of these birds breeding in the cavity of a dead tree for three successive seasons. The first year's brood numbered five, the second eight, and the third seven.

* Transactions of the New-Zealand Institute, 1869, vol. ii. p. 386.

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HETERALOCHA ACUTIROSTRIS.

(HUIA.)

Neomorpha acutirostris, Gould, P. Z. S. 1836, p. 144 (♀).*Neomorpha crassirostris*, Gould, P. Z. S. 1836, p. 145 (♂).*Neomorpha gouldi*, Gray, List of Gen. of B. p. 15 (1841).*Heteralocha gouldi*, Cab. Mus. Hein. Th. i. p. 218 (1850).*Native name.*—Huia.

♂ undique sericeo-niger, sub certâ luce obscurè viridi nitens : caudâ conspicuè albo terminatâ : pileo carunculis magnis rotundatis lætè aurantiacis utrinque ad basin mandibulæ positis ornato : rostro valido, eburneo, versus basin cinereo : pedibus cinereis, unguibus corneis.

♀ mari similis, sed rostro longo valdè decurvato semper distinguenda.

Adult. The whole of the plumage is black, with a green metallic gloss ; the tail with a broad terminal band of white. Bill ivory-white, darkening to blackish grey at the base. Wattles large, rounded, and of a rich orange-colour in the living bird. Tarsi and toes bluish grey ; claws light horn-colour.

Male. Length 18.75 inches ; extent of wings 22.5 ; wing, from flexure, 8 ; tail 7.5 ; bill, along the ridge, 2.75, along the edge of lower mandible 2.75 ; tarsus 3 ; middle toe and claw 2.5 ; hind toe and claw 2.

Female. Length 19.5 inches ; extent of wings 21 ; wing, from flexure, 7.5 ; tail 7.25 ; bill, along the ridge, 4, along the edge of lower mandible 4.12 ; tarsus 3 ; middle toe and claw 2.25 ; hind toe and claw 1.75.

Obs. In some examples the white at the end of the tail is tinged more or less with rufous, while in others the under tail-coverts are tipped with white. It should be noted also that the brightness of the fleshy wattles depends, in some measure, on the health or condition of the bird ; for during sickness they change to lemon-yellow. A recently killed specimen weighed 14½ oz. The palate and soft parts of the throat are bright yellow. The tongue is horny at the tip, bifurcate, and furnished with minute barbs.

THIS is another of those anomalous forms belonging exclusively to New Zealand. Much difference of opinion has existed as to its proper position in our artificial system ; but, till we have some more complete knowledge of its affinities, I am content to leave it among the *Upupidæ*. It may ultimately prove to be the type of a distinct family ; but that it possesses strong affinities to the Hoopoes is undeniable ; and I have been much struck with the close similarity of some of its habits to those of the common *Upupa epops* as recently observed by myself in Egypt.

On the peculiarities of its osteological structure I have been favoured with some valuable notes by Prof. Newton, which will be found embodied in the General Introduction to the present work.

Mr. Gould, who was the first to characterize the genus, was deceived by the great difference in the form of the bill, and treated the sexes as distinct species, naming them respectively *Neomorpha acutirostris* and *N. crassirostris*,—a very natural mistake, “many genera even,” as Mr. Gould observes, “having been founded upon more trivial differences of character.” Mr. G. R. Gray having determined their identity, proposed to substitute the specific name of *Neomorpha gouldi*, in compliment to the original describer; and his example has been followed by others; but I have deemed it more in accordance with the accepted rules of zoological nomenclature to adopt the first of the two names applied to the species by Mr. Gould, and I have followed Cabanis in referring this remarkable form to the genus *Heteralocha*.

In November 1870, I communicated to the Wellington Philosophical Society a paper, which was afterwards published in the ‘Transactions’*, containing all the information I was able to collect respecting this singular bird. As His Excellency Sir G. F. Bowen, in his last Anniversary Address to the New-Zealand Institute, has done me the honour to direct special attention to this article, and as no additional information on the subject has since been obtained, I feel that I cannot do better than reproduce it in these pages:—

An article in ‘Nature’ (June 23), bearing the initials of a well-known naturalist, notices the arrival of a living example of the Huia (*Heteralocha gouldi*) at the Zoological Society’s Gardens, London. The specimen was a male bird; and the writer, in describing the peculiarity in the form of the bill that distinguishes it from the female, observes:—“Such a divergence in the structure of the beak of the two sexes is very uncommon, and scarcely to be paralleled in the class of birds. It is difficult to guess at the reason of it, or to explain it on Darwinian or any other principles.”

Although Dr. Hector, with his usual good fortune, has succeeded in getting a fine series of specimens for the Colonial Museum, this bird undoubtedly ranks as one of our rarest and most valuable species. Ere long it will exist only in our museums and other collections; and, for the sake of science, it is important that every thing connected with its natural history should be faithfully recorded and preserved. In the absence of any published account of its habits, beyond mere fragmentary notices, I have thought the subject of sufficient interest to justify my placing before the Society the following complete account of all that I have been able to ascertain respecting it. The peculiar habits of feeding, which I have described from actual observation, furnish to my own mind a sufficient “reason” for the different development of the mandibles in the two sexes, and may, I think, be accepted as a satisfactory solution of the problem.

Before proceeding to speak of the bird itself, I would remark on the very restricted character of its habitat. It is confined within narrow geographical boundaries, being met with only in the Ruahine, Tararua, and Rimutaka mountain-ranges, with their divergent spurs, and in the intervening wooded valleys. It is occasionally found in the *Fagus* forests of the Wairarapa valley, and in the rugged country stretching to the westward of the Ruahine range, but it seldom wanders far from its mountain haunts. I have been assured of its occurrence in the wooded country near Massacre Bay (Province of Nelson), but I have not been able to obtain any satisfactory evidence on this point. It is worthy of remark that the natives, who prize the bird very highly for its tail-feathers (which are used as a badge of mourning), state that, unlike other

* Trans. New-Zealand Instit. 1870, vol. iii. pp. 24–29.

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species, which have of late years diminished and become more confined in their range, the Huia was from time immemorial limited in its distribution to the district I have indicated.

My first specimen of this singular bird (an adult female) was obtained in 1855, from the Wainuiomata Hills, a continuation of the Rimutaka range, bounding the Wellington harbour on the northern side—the same locality from which Dr. Dieffenbach, nearly twenty years before, received the examples figured by Mr. Gould in his magnificent work 'The Birds of Australia.' I have since obtained many fine specimens, and in the summer of 1864 I succeeded in getting a pair of live ones. They were caught by a native in the ranges, and brought down to Manawatu, a distance of more than fifty miles, on horseback. The owner refused to take money for them; but I negotiated an exchange for a valuable greenstone. I kept these birds for more than a year, waiting a favourable opportunity of forwarding them to the Zoological Society of London. Through the carelessness, however, of a servant, the male bird was accidentally killed; and the other, manifesting the utmost distress, pined for her mate, and died ten days afterwards.

The readiness with which these birds adapted themselves to a condition of captivity was very remarkable. Within a few days after their capture they had become perfectly tame, and did not appear to feel in any degree the restraint of confinement; for, although the window of the apartment in which they were kept was thrown open and replaced by thin wire netting, I never saw them make any attempt to regain their liberty. It is well known, however, that birds of different species differ widely in natural disposition and temper. The captive Eagle frets in his sulky pride; the Bittern refuses food and dies untamable; the fluttering little Humming-bird beats itself to death against the tiny bars of its prison in its futile efforts to escape; and many species that appear to submit readily to their changed condition of life, ultimately pine, sicken, and die. There are other species, again, which cheerfully adapt themselves to their new life, although caged at maturity, and seem to thrive fully as well under confinement as in a state of nature. Parrots, for example, are easily tamed; and I have met with numerous instances of their voluntary return after having regained their liberty. This character of tamability was exemplified to perfection in the Huia.

They were fully adult birds, and were caught in the following simple manner. Attracting the birds by an imitation of their cry to the place where he lay concealed, the native, with the aid of a long rod, slipped a running knot over the head of the female and secured her. The male, emboldened by the loss of his mate, suffered himself to be easily caught in the same manner. On receiving these birds I set them free in a well-lined and properly ventilated room, measuring about six feet by eight feet. They appeared to be stiff after their severe jolt on horseback, and after feeding freely on the huhu grub, a pot of which the native had brought with them, they retired to one of the perches I had set up for them, and cuddled together for the night.

In the morning I found them somewhat recruited, feeding with avidity, sipping water from a dish, and flitting about in a very active manner. It was amusing to note their treatment of the huhu. This grub, the larva of a large nocturnal beetle (*Prionoplus reticularis*), which constitutes their principal food, infests all decayed timber, attaining at maturity the size of a man's little finger. Like all grubs of its kind, it is furnished with a hard head and horny mandibles. On offering one of these to the Huia, he would seize it in the middle, and, at once transferring it to his perch and placing one foot firmly upon it, he would tear off the hard parts, and then, throwing the grub upwards to secure it lengthwise in his bill, would swallow it whole. For the first few

days these birds were comparatively quiet, remaining stationary on their perch as soon as their hunger was appeased. But they afterwards became more lively and active, indulging in play with each other and seldom remaining more than a few moments in one position. I sent to the woods for a small branched tree, and placed it in the centre of the room, the floor of which was spread with sand and gravel. It was most interesting to watch these graceful birds hopping from branch to branch, occasionally spreading the tail into a broad fan, displaying themselves in a variety of natural attitudes and then meeting to caress each other with their ivory bills, uttering at the same time a low affectionate twitter. They generally moved along the branches by a succession of light hops after the manner of the Kokako (*Glaucopsis cinerea*); and they often descended to the floor, where their mode of progression was the same. They seemed never to tire of probing and chiselling with their beaks. Having discovered that the canvas lining of the room was pervious, they were incessantly piercing it, and tearing off large strips of paper, till, in the course of a few days, the walls were completely defaced.

But what interested me most of all was the manner in which the birds assisted each other in their search for food, because it appeared to explain the use, in the economy of nature, of the differently formed bills in the two sexes. To divert the birds, I introduced a log of decayed wood infested with the huhu grub. They at once attacked it, carefully probing the softer parts with their bills, and then vigorously assailing them, scooping out the decayed wood till the larva or pupa was visible, when it was carefully drawn from its cell, treated in the way described above, and then swallowed. The very different development of the mandibles in the two sexes enabled them to perform separate offices. The male always attacked the more decayed portions of the wood, chiselling out his prey after the manner of some Woodpeckers, while the female probed with her long pliant bill the other cells, where the hardness of the surrounding parts resisted the chisel of her mate. Sometimes I observed the male remove the decayed portion without being able to reach the grub, when the female would at once come to his aid, and accomplish with her long slender bill what he had failed to do. I noticed, however, that the female always appropriated to her own use the morsels thus obtained.

For some days they refused to eat any thing but huhu; but by degrees they yielded to a change of food, and at length would eat cooked potato, boiled rice, and raw meat minced up in small pieces. They were kept supplied with a dish of fresh water, but seldom washed themselves, although often repairing to the vessel to drink. Their ordinary call was a soft and clear whistle, at first prolonged, then short and quickly repeated, both birds joining in it. When excited or hungry, they raised their whistling note to a high pitch; at other times it was softly modulated, with variations, or changed into a low chuckling note. Sometimes their cry resembled the whining of young puppies so exactly as almost to defy detection.

Dr. Dieffenbach, in forwarding his specimens of the Huia to Mr. Gould, in 1836, wrote:—"These fine birds can only be obtained with the help of a native, who calls them with a shrill and long-continued whistle resembling the sound of the native name of the species. After an extensive journey in the hilly forest in search of them, I had at last the pleasure of seeing four alight on the lower branches of the trees near which the native accompanying me stood. They came quick as lightning, descending from branch to branch, spreading out the tail and throwing up the wings." I have only had a single opportunity of observing this species in its native

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haunts, and I was struck by the same peculiarities in its manners and general demeanour. In the summer of 1867, accompanied by a friend and two natives, I made an expedition into the Ruahine ranges in search of novelties. After a tramp on foot of nearly twenty miles through a densely wooded country, we were rewarded by finding the Huia. We were climbing the side of a steep acclivity, and had halted to dig specimens of the curious vegetating caterpillar (*Sphaeria robertsii*), which was abundant there. While thus engaged, we heard the soft flute-note of the Huia in the wooded gully far beneath us. One of our native companions at once imitated the call, and in a few seconds a pair of beautiful Huias, male and female, appeared in the branches near us. They remained gazing at us only a few instants, and then started off up the side of the hill, moving by a succession of hops, often along the ground, the male generally leading. Waiting till he could get both birds in a line, my friend at length pulled trigger; but the cap snapped, and the Huias instantly disappeared down the wooded ravine. Then followed a chevy of some three miles, down the mountain-side and up its rugged ravines. Once more, owing to the dampness of the weather, the cap snapped, and the birds were finally lost sight of. I observed that their mode of progression was similar to that of the Kokako, but far more rapid. While in motion they kept near each other and uttered constantly a soft twitter. The tail was partially spread, while the bright orange lappets were usually compressed under the rami of the lower jaw.

We camped that night near the bed of a mountain rivulet, in a deep wooded ravine, and soon after dawn we again heard the rich notes of a Huia. Failing to allure him by an imitation of the call, although he frequently answered it, we crossed to the other side of the gully, and climbed the hill to a clump of tall rimu trees (*Dacrydium cupressinum*), where we found him. He was perched on the high limb of a rimu, chiselling it with his powerful beak, and tearing off large pieces of bark, doubtless in search of insects; and it was the falling of these fragments that guided us to the spot, and enabled us to find him. This solitary bird, which proved, when shot, to be an old male, had frequented this neighbourhood (as we were informed by the natives) for several years, his notes being familiar to the people who passed to and fro along the Otairi track leading to Taupo. On asking a native how the Huia contrived to extract the huhu from the decayed timber, he replied, "by digging with his pickaxe"—an expression which I found to be truthfully descriptive of the operation; and on dissecting this specimen I found an extraordinary development of the requisite muscles. The skin was very tough, indicating, probably, extreme age. The stomach contained numerous remains of coleopterous insects, of the kind usually found under the bark of trees, also one or two caterpillars. In the stomach of another, I once discovered seeds of the hinau (*Elæocarpus dentatus*) and the remains of a small earth-grub. Dr. Dieffenbach states that in the stomachs of his specimens he found hinau-berries, together with dipterous and coleopterous insects.

Of the nidification of the Huia nothing is at present known. I have been assured, however, by a native, that he once found the nest of this bird in the cavity of a tree, that it contained two young birds (a male and a female), and that they differed from the adults in having the wattles flesh-white instead of orange.

The head of the female as figured in 'Nature' (confessedly only a copy) is quite out of all

natural proportion to that of the male, and is apt to give a false idea of its relative size and thickness.

In the generality of specimens, and in the published drawings that have hitherto appeared, the bill is of a yellowish horn-colour; but this, instead of being natural, is caused by the decomposition of the animal matter inside. I have succeeded in retaining the ivory whiteness of the bill, in preserved specimens, by treating them after the manner recommended by Waterton for preserving the bill of the the American Toucan (see 'Wanderings,' p. 103)—that is to say, by removing with a sharp scalpel the whole of the inner substance, leaving nothing but the outer shell, which then retains its original appearance. The process is a tedious one; but the result amply repays the trouble.

Figures 1 & 2. (plate iv. *) represent the heads of the male and female which I had in my possession alive, and will give an accurate idea of the sexual character treated of above. Fig. 3 represents a more highly curved form of the bill than is usually met with, and was taken from the dried head of a Huia given to me, many years ago, by a native who had been wearing it as an ear-ornament.

Since the above was written a live female Huia has been added to the collection of the Zoological Society. I am informed by Mr. A. D. Bartlett, the Superintendent of the Gardens, that this bird (although without a mate of its own species) is perfectly happy and contented in its new home, the cage containing it being placed between those of a Toucan on one side and a Hornbill on the other. It is supplied with a mixed food, in which boiled eggs, fresh meat, and earthworms form the principal ingredients; but its diet requires careful regulation, to prevent scouring, to which the bird is very liable.

Our Plate represents the two sexes, the figure of the male being taken from my Ruahine specimen mentioned above, and that of the female from one obtained in the Wairarapa valley, both of which are now in the Colonial Museum.

* Trans. New-Zealand Institute, vol. iii. 1870.

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HALCYON VAGANS.

(NEW-ZEALAND KINGFISHER.)

- Alcedo sacra*, var. D, Lath. Gen. Syn. Suppl. p. 114 (1790).
Alcedo sacra, var. ε, Bonn. et Vieill. Enc. Méth. i. p. 295 (1823).
Alcedo vagans, Less. Voy. Coq. i. p. 694 (1826).
Alcedo chlorocephala, var. γ, Less. Traité d'Orn. p. 546 (1831).
Halcyon vagans, Gray, Voy. Ereb. & Terror, p. 3, pl. 1 (1844).
Alcedo cyanea, Forst. Descr. Anim. p. 76 (1844).
Todirhamphus vagans, Bonap. Consp. Gen. Av. i. p. 157 (1850).
Dacelo sancta (pt.), Schl. Cat. Mus. Pays-Bas, Alced. p. 37 (1863).
Halcyon sanctus, Finsch, J. f. O. 1870, p. 246; et Hutton, Cat. Birds N. Z. p. 3 (1871).

Native names.

Kotare and Kotaretare; "Kingfisher" of the colonists.

Ad. suprâ sordidè viridis, pileo laterali et dorso postico uropygioque cyanescentibus: loris et supercilio antico fulvis: genis, cum regione paroticâ utrâque circâ collum posticum conjunctâ, nigris vix viridi tinctis: maculâ nuchali et collo toto albidis, torquem collarem latam formantibus: tectricibus alarum cyanescenti-viridibus: remigibus nigricantibus, primariis ad basin et secundariis extûs lætè cyanescentibus: caudâ suprâ cyanescente, subtûs griseâ: corpore subtûs toto lætè fulvescente, gutture albicante: rostro nigro, ad basin mandibulæ albo: pedibus saturatè brunneis: iride nigricanti-brunneâ.

Juv. similis adultis, sed sordidior: tectricibus alarum fulvo marginatis: pectoris et colli postici plumis brunneo marginatis.

Adult male. Crown, shoulders, and scapulars deep sea-green, with an olive tinge; back, tail-coverts, and upper surface of wings ultramarine, changing to green in certain lights; quills and tail-feathers washed with cobalt on their outer webs. A spot of bright fulvous fills the lores, a dash of ultramarine blue, bordered above the eyes and on the occiput with white, surrounds the crown; and a broad band of black, proceeding from the angles of the mouth, completely encircles the hind head. Throat, breast, and a broad nuchal collar buffy white; the rest of the under surface delicate fawn-colour, with deepening tints. Irides black; bill black, with the basal portion of the lower mandible white; feet dark brown, with paler soles. Extreme length 9.75 inches; extent of wings 13.6; wing, from flexure, 4; tail 2.6; bill, along the ridge, 1.75, along the edge of lower mandible 2.1; tarsus .6; middle toe and claw 1.05; hind toe and claw .6.

Female. Tints of the plumage generally duller.

Young. In the young bird the throat is pure white; the underparts fulvous-white, tinged on the sides with fawn-colour; feathers of the breast broadly margined with dusky brown, forming an irregular pectoral zone; loreal spots and nuchal collar rufous, with markings of the same colour on the fore part of the

crown; nuchal collar indistinct and largely marked with brown; plumage of the upper parts darker than in the adult; the wing-coverts margined with yellow, in the form of narrow crescentic bands.

Progress towards maturity. Tints of the plumage brighter; the loreal spots bright fulvous; the sides, flanks, lining of wings, and under tail-coverts bright fawn-colour; pectoral zone indistinct, the dark margins being very narrow; nuchal collar well defined and almost pure white. The full adult dress is not attained till after the second or third moult.

Obs. I have not considered it necessary to give a portrait of this extremely common species. A life-size drawing appeared in the 'Voyage of the Erebus and Terror;' and both adult and young are well figured in Mr. R. B. Sharpe's beautiful 'Monograph of the Alcedinidæ,' which ought to be in every library.

MUCH difference of opinion has existed as to whether this bird is really distinct from the *Halcyon sancta* of Australia. Mr. R. B. Sharpe, in his 'Monograph of the Kingfishers,' pronounces it a good species, being "always of a more robust size, and having the colours much less bright than the Australian bird." Professor Schlegel and Dr. Finsch have united it to *H. sancta*; but, in a letter which I lately received from the latter of these experienced ornithologists, he admits that the species is quite distinct, adding that his former conclusions were based on two specimens only, whereas now he has obtained a good series of skins. I have always contended for the recognition of *Halcyon vagans*; and the question may now be considered fairly set at rest.

In habits the two species are very much alike. The New-Zealand bird is very generally dispersed, being met with in all suitable localities. It frequents alike the sea-shore, the open country, forest-clearings, and the banks of fresh-water streams. It is, moreover, one of those birds that seem instinctively to resort to the habitations of man; and instead of, like many other indigenous species, decreasing, it thrives and multiplies under the altered physical conditions resulting from the colonization of the country. It seeks out the new home of the settler, and becomes the familiar "companion of his solitude." During the winter months especially, it resorts to cultivated grounds in quest of grubs and worms, which at this season constitute its principal food. In the early morn it may be seen perched on the fences, gateways, and out-buildings of the farmyard, sitting upright with contracted neck, looking stiff and rigid in the cold frosty air; and as the day advances, it enlivens the landscape by its darting flight, while it attracts notice by its shrill, quickly repeated call, which is not unlike the note of the European Kestrel. In the pairing-season this species becomes very noisy and lively, the mated birds chasing each other, in amorous play, from tree to tree or from post to post with loud unmusical cries, something like the syllables *cree-cree-cree* uttered in quick succession. They breed late in the year; the brood numbers five or six; and for several weeks after quitting the nest the young family keep together. This will probably account for the abundance of Kingfishers in the autumn months, which has been regarded by some as indicating a seasonal migration.

The flight of this species is short, rapid, and direct, being performed by a quick vibration of the wings. It flies with considerable velocity; and I have known several instances of its dashing headlong through a pane of glass. On one occasion this occurred in the church at Raglan during divine service; and the Kingfisher, after recovering from the shock, remained to the last perched on the end of a pew, looking more devout, says our correspondent, than the Jackdaw of Rheims!

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Another instance occurred more recently at Wanganui, where, according to a local paper, the family of the Rev. C. H. S. Nicholls were startled one day at dinner by the entrance of a Kingfisher, which "flew through a pane of glass in one of the windows, scattering the fragments around," and was forthwith made prisoner by the household cat.

Its food consists of lizards, small fish, grubs, earthworms, locusts, insects of all kinds, and even mice. On examining a young Kingfisher just taken from the nest, I observed the tail of a half-grown mouse protruding from its bill; and on taking hold of it I drew the unmutilated carcass of the rodent from the throat of the bird. I was not previously aware that mice formed part of the Kingfisher's bill of fare. I have often, however, witnessed its fondness for lizards, two species of which (*Mocooa zelandica* and *M. ornata*) are very common in all the open glades. I have seen it seize the nimble little reptile by the tail, and after battering its head against a stone or the branch of a tree, to destroy life, swallow the captive, head foremost. It has been known to attack and kill chickens in the poultry-yard. On one occasion, at Otaki, I saw one of these birds dart down into the midst of a very young clutch; but the old barn-door hen proved too active, and, with one rapid stroke of her bill, put the assailant *hors de combat*. The bird was picked up stunned with the blow, but soon after, recovering itself, escaped from the hands of its captor. In Wanganui it provoked the hostility of the Acclimatization Society by preying on the young of the House-Sparrow (*Passer domesticus*), which had been introduced at much expense; and the Committee encouraged a crusade against the offenders by offering a premium for Kingfishers' heads. According to the Report of the Auckland Acclimatization Society for 1868-69, it has proved very troublesome in destroying birds, and has even attacked and killed a Californian Quail. In Otago it has been accused of purloining the speckled trout; and in Canterbury it was found necessary to protect the newly hatched fish by stretching wire netting over the shallow artificial streams. A valued correspondent, and very careful observer, informs me that on one occasion he killed a blackfish about twelve feet long in Whangarei harbour, and dragged it ashore; and on visiting the place a few days later, he observed an unusual number of Kingfishers present. On watching them, he found that they were preying on the swarms of flies attracted by the dead cetacean, darting after them with the swiftness of an arrow, and capturing them on the wing.

When engaged in fishing, it does not plunge into the stream, like the common British Kingfisher, but dips into it lightly as it skims the surface of the water or darts downwards from its post of observation on a rock or overhanging branch.

The New-Zealand Kingfisher commences to breed towards the end of November or early in December, usually selecting for its nesting-operations a tree denuded of its bark and decayed at heart, standing near the margin of the forest or in an old Maori clearing. By means of its powerful bill it cuts a round passage through the hard exterior surface, and then scoops out a deep cavity, proceeding in a horizontal direction for several inches, and then downwards to an extent of ten inches or more. The bird thus instinctively protects its chamber from the inclemencies of the weather. There is no further attempt at forming a nest, the eggs being deposited on a layer of pulverized decayed wood, the shavings and sawdust, so to speak, of the borer's operations in finishing the cavity. The eggs are generally five in number, sometimes six, broadly oval in form, and measuring 1.2 inch by .95. They are of the purest white, with a smooth or

polished surface, and very fragile in texture; sometimes the shell is marked by minute limy excrescences at the larger end. The labour of boring a cavity is often greatly augmented by natural impediments. If, after drilling through the hard external surface, the bird finds the inner wood too hard for its tools, it at once abandons the spot and sounds the tree in another place. I have counted half a dozen or more of these abortive borings on a single tree, in addition to the finished one, affording evidence of indomitable perseverance on the part of the bird, and a determination not to forsake a tree which it had instinctively selected as a suitable one for its operations. In two instances, however, I have known the Kingfisher to adopt an existing hollow in a partially decayed kahikatea tree, dispensing altogether with the labour of boring and forming it. The nestling of this species is a very curious object. On bursting from the shell, it presents the following appearance: the abdomen, as in most young birds, is perfectly bare; on the other parts each feather is encased in a sharp-pointed sheath of a greyish colour, closely studded, and bristling like the quills of a porcupine. Before the young bird quits the nest, the sheathings gradually burst, exposing the true feathers in all their brilliancy; vestiges, however, of this spiny condition adhere to the fore part of the head for several days after the birds have quitted their cell. On being alarmed or excited, the young Kingfisher utters a prolonged rasping cry, sounding very harsh to the ear. The parent birds are very fierce when their nest is molested, darting into the face of the intruder, and flying off again, with a loud, quickly repeated note of alarm.

In the Canterbury Province, where timber is scarce, it more frequently burrows a hole in a bank, and often near the sea-beach. On examining one of these holes, Mr. Potts observed that the bottom inclined slightly upwards from the entrance, and that the eggs were deposited on a layer of crustacean remains about a foot from the outside. The exuviae within the nest consisted of mud, with numerous remains of crustacea and the wings of coleopterous insects.



EUDYNAMIS TAITENSIS.
(The Young fed by Grey Warbler.)

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EUDYNAMIS TAITENSIS.

(LONG-TAILED CUCKOO.)

- Le Coucou brun varié de noir*, Montb. Ois. vi. p. 376 (1779).
Society Cuckoo, Lath. Gen. Syn. ii. p. 514 (1782).
Cuculus taitensis, Sparrm. Mus. Carls. t. 32 (1787).
Cuculus taitius, Gm. Syst. Nat. i. p. 412 (1788).
Eudynamys taitensis, Gray, Dieff. Trav. ii., App. p. 193 (1843).
Cuculus fasciatus, Forst. Descr. Anim. p. 160 (1844).
Eudynamys cuneicauda, Peale, U. S. Expl. Exp. p. 139, pl. 38. f. 2 (1848).
Eudynamys tahitius, Gray, B. Tr. Isl. Pacif. Ocean, p. 35 (1859).
Eudynamis taitiensis, Cab. & Heine, Mus. Hein. Th. iv. p. 56 (1862).
Eudynamis tahitiensis, Potts, Trans. N. Z. Inst. vol. iii. p. 90 (1870).

Native names.

Koekoea, Kawekawea, and Koheperoa.

♂ *ad.* brunneus, pileo longitudinaliter fulvo striato : corpore reliquo superiore brunneo et pallidè ferrugineo conspicuè at irregulariter transfasciato : tectricibus alarum fulvo maculatis : caudâ brunneo et ferrugineo transfasciatâ alboque terminatâ : remigibus brunneis, ferrugineo maculatis, fascias irregulares formantibus : supercilio angusto fulvo : regione auriculari brunneâ angustissimè fulvo lineatâ : genis et collo laterali albis ferrugineo lavatis et brunneo longitudinaliter striatis : subtus albicans, plumis medialiter brunneo striatis et ferrugineo tinctis : hypochondriis brunneo transfasciatis : subalaribus fulvescenti-albis, angustè brunneo striatis : rostro pallidè brunneo, ad basin saturatiore, mandibulâ flavicante : pedibus viridi-flavis, unguibus brunneis : iride rubescente, interdum flavicante : regione ophthalmicâ nudâ sordidè viridi.

♀ *vix a mari distinguenda* : paullò minor : coloribus sordidioribus.

Juv. pallidior, suprâ ubique albido maculatus, nec fasciatus : caudâ pallidè fulvo transfasciatâ : subtus ochraceus, pectore abdomineque maculis elongatis triquetris notatis ; rostro flavicanti-brunneo : pedibus viridi-flavis.

Adult male. Upper surface dark brown, with a purplish gloss, longitudinally streaked on the head and neck, barred and spotted on the wings and back with rufous ; wing-coverts tipped with fulvous white ; quills dark brown, banded with pale rufous ; tail-feathers marked in their whole extent with narrow alternate bars of dark brown and rufous, tipped with white and finely glossed with purple ; a broad line of yellowish white passing from the nostrils over the eyes, and another extending downwards from the angles of the mouth ; lores and chin white, with numerous black hair-like filaments ; sides of the neck

dark brown mixed with rufous; throat, fore part of neck, breast, and sides of the body pure white, with numerous longitudinal streaks of brown, each feather having a broad mark down the centre; lining of wings fulvous white or pale fawn-colour; femoral plumes and under tail-coverts crossed with broad arrow-head marks of brown. Bill pale brown, darker at the base, and yellowish on the lower mandible; irides reddish brown, inclining in some to yellow; bare skin surrounding the eyes dull green; tarsi and toes greenish yellow; claws dark brown. Total length 16.5 inches; extent of wings 21; wing, from flexure, 7.5; tail 9.75; bill along the ridge 1, along the edge of lower mandible 1.4; tarsus 1.5; longer fore toe and claw 1.4, longer hind toe and claw 1.25.

Adult female. Slightly smaller than the male, and with the tints of the plumage duller, the purple gloss on the upper parts being scarcely perceptible.

Young. Upper surface blackish brown, marked on the crown with narrow streaks, on the hind neck with fusiform, and on the back with rounded spots of fulvous yellow; quills and tail-feathers blackish brown, barred and tipped with fulvous brown. Under surface pale cinnamon-brown; on each side of the throat two longitudinal streaks, and on the breast and sides of the body broad shaft-lines of dusky black; under tail-coverts barred and tibial plumes crossed with marks of the same colour in the form of an inverted V. Bill yellowish brown; tarsi and toes greenish yellow.

Obs. In examples of the young birds much difference is observable both in the ground-tints and in the markings of the plumage. Some are much darker than others, and have the spots on the upper surface pale rufous instead of fulvous yellow; in others, again, they are yellowish white: some have the barred markings on the tail-feathers very obscure, while in others they are as distinct as in the adult, although not so regular in form. The figure of the adult was taken from an example in the collection of Dr. Otto Finsch, and that of the young bird from one in the Bremen Museum, both specimens having been kindly forwarded to me for that purpose.

THE illustration which precedes this article, although it may have the appearance of an exaggeration, is in reality a true picture of bird-life. The Long-tailed Cuckoo, which is a native of the warm islands of the South Pacific, visits our country in the summer and breeds with us; but the task of rearing its young is entrusted to the Grey Warbler (*Gerygone flaviventris*), figured in our Plate—a species that performs the same friendly office for the Shining Cuckoo (*Chrysococcyx lucidus*), another summer visitant.

Drs. Finsch and Hartlaub, in their valuable work on the Birds of Central Polynesia, record the occurrence of this species in Samoa, as well as in the Friendly, the Society, the Marquesas, and the Fiji groups of islands; but although it migrates to New Zealand, there is no mention of its occurrence in any part of Australia or Tasmania.

It begins to arrive about the second week in October, but is not numerous till the following month, when the pairing commences. It is, however, somewhat irregularly dispersed over the country; for in the far north it is at all times a very rare bird. In the southern portion of the North Island, and throughout the wooded parts of the South Island, it is comparatively common. It is seminocturnal in its habits, and its long, shrill cry at night is generally the first intimation we get that it has arrived in the land. It appears to be most plentiful in November and December, becoming scarcer in January and disappearing altogether by the end of February. I have a note, however, of its occurrence at Otaki (in the North Island) as late as the first week in April.

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Young birds are not unfrequently met with in the month of March or even later; but it seems probable that these are only solitary individuals hatched too late to permit of their joining in the return migration, and accordingly left to perish as the cold season advances. As an instance of this, I may mention that a young Shining Cuckoo, which had been picked up dead in a garden, was brought to me at the end of February (long after the old birds had quitted the country), and that I found it excessively fat, and the stomach crammed with caterpillars—strong presumptive evidence that the bird had not suffered from the neglect of its foster-parents, but had succumbed to the exigencies of its late birth.

In the early dawn and during the cool hours of the morning, the Long-tailed Cuckoo resorts to the low underwood and brushes; but although its cry may be frequently heard, it is not easy to find the bird, inasmuch as the sound, though produced within a few yards of the listener, has the effect on the ear of one coming from a remote distance. This species, in fact, appears, like some others of the same family, to be endowed with a sort of natural ventriloquism, and its apparently far-off cry is often very deceptive.

While searching for his food the Koheperoa moves about with much activity; but as soon as the sun is up he betakes himself to the top branches of a kahikatea or other lofty tree, where he remains closely concealed till sunset. He continues to utter, at intervals of ten or fifteen minutes, his prolonged shrill note (quite distinct from all other sounds of the forest, and very pleasant to hear) till about noon, when he remains perfectly silent for two hours or more. As soon, however, as the heat of the day is over, he resumes his cry, and shortly afterwards leaves his retreat to hunt for food again. During the quiet summer nights, too, his note may be heard at intervals till break of day.

This species is more predatory in its habits than is usual with the members of this group. Lizards and large insects form its principal diet; but it also plunders the nests of other birds, devouring alike the eggs and young. From the stomach of one which I shot in December 1856, I took the body of a young bird (apparently a Piopio), partly fledged and only slightly mutilated, showing the enormous capacity of the Cuckoo's throat. This interesting object, preserved in spirits, is now in the collection of the Colonial Museum at Wellington. The large nocturnal beetle (*Prionoplus reticularis*), the various species of *Deinacridæ* and *Phasmidæ*, the Kekereru or fetid bug, the large bush *Cicada*, and different kinds of spiders and caterpillars, all contribute to the support of this bird; for I have found their remains in abundance in the stomachs of specimens I have dissected.

As already stated, it is accustomed to rob the nests of other birds; and whether from this or some other cause, it is an object of constant persecution to the Tui or Parson bird. The instant one of these birds shows itself, the Tui commences its pursuit, chasing it from tree to tree, and fairly driving it out of the woods. I have actually seen three or four of these persecutors at one time following the unfortunate Cuckoo, with loud cries of intimidation, and, finally, compelling it to take refuge in the long grass on the banks of a stream.

Very little is at present known of the breeding-habits of this species. As I have mentioned above, it is parasitical; but to what extent is not yet determined. My own belief is, that it performs itself the duty of incubation, and then abandons its young to the Grey Warbler, which instinctively accepts the charge, and caters untiringly for its support. In the first place it is

difficult to conceive how a bird of the size and form of the Long-tailed Cuckoo could deposit its egg in the domed nest of the last-named species; and even supposing that it did, it would seem almost a physical impossibility for so small a creature to hatch it; and, again, even were this feasible, it is difficult to imagine how the frail tenement of a suspension nest could support the daily increasing weight of the young Cuckoo. Over and above all this, there is the significant fact that I once shot an adult female of the present species in which the underparts were quite denuded of feathers, as if the bird had been long incubating.

Strange as such an hypothesis may appear, we are not altogether without a parallel instance in bird-history; for in the case of the *Chrysococcyx smaragdineus* of Western Africa, it is alleged that this Cuckoo hatches its single egg and then, utterly unmindful of its parental obligations, casts the care of its offspring on a charitable public, and that almost every passing bird, attracted by the piping cry of the deserted bantling, drops a caterpillar or other sweet morsel into its imploring throat! My artist, Mr. Keulemans, assures me that he often witnessed this himself during his residence on Prince's Island.

An egg, forwarded to me some years ago by the Rev. R. Taylor, of Wanganui, as belonging to this species, is almost spherical in shape, with a slightly rough or granulate surface; it is of a pale buff or yellowish-brown colour, and measures 1.25 inch in length by 1.15 in breadth. I ought to state, however, that it was obtained from a native, and that its authenticity cannot be considered quite certain.

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CHRYSOCOCCYX LUCIDUS.

(SHINING CUCKOO.)

- Shining Cuckoo*, Lath. Gen. Syn. ii. p. 528, pl. xxiii. (1782).
Cuculus lucidus, Gm. Syst. Nat. i. p. 421 (1788, ex Lath.).
Variable Warbler, Lath. Gen. Syn. Suppl. ii. p. 250 (1801).
Sylvia versicolora, Lath. Ind. Orn. Suppl. ii. p. lvi (1801).
Chalcites lucidus, Less. Traité d'Orn. p. 153 (1831).
Cuculus nitens, Forst. Descr. Anim. p. 151 (1844).
Cuculus versicolor, Gray, Gen. of B. ii. p. 463 (1847).
Chrysococcyx lucidus, Gould, B. of Austr. iv. pl. 89 (1848).
Cuculus chalcites, Illiger, MS. in Mus. Berol. *undè*.
Chrysococcyx chalcites, Licht. Nomencl. Av. p. 78 (1854).
Lamprococcyx lucidus, Cab. & Heine, Mus. Hein. Th. iv. p. 14 (1862).

Native names.

Warauroa, Pipiauroa, and Pipiwarauroa.

Ad. suprâ metallicè viridis, æneo et cupreo nitens, supracaudalibus lateralibus latè albo semifasciatis: fronte, supercilio distincto et facie laterali albo maculatis, viridi transfasciatis: loris mentoque albidis haud viridi notatis: tectricibus alarum dorso concoloribus: remigibus brunneis, ad basin pogonii interni albidis, primariis extùs æneo nitentibus, secundariis magis conspicuè lavatis et pennis dorsalibus omninò dorso concoloribus: caudâ brunneâ, æneo-viridi nitente, fasciâ anteapicali nigricante, rectricibus tribus exterioribus ad apicem pogonii interni albo maculatis, pennâ extimâ albo conspicuè fasciatâ, penultimâ in medio vix rufescente tinctâ: pectore et subalaribus albicantibus transversim æneo-viridi fasciatis: abdomine puriùs albo, hypochondriis subcaudalibusque conspicuè æneo-viridi transfasciatis: rostro nigro: pedibus brunnescenti-nigris, plantis pedum flavicantibus: iride nigrâ.

Juv. obscurior et sordidior, minùs metallicus: tectricibus alarum brunneo marginatis: caudâ nusquam rufescente: gutture et pectore superiore fulvescenti-albis, fusciscenti-brunneo variis, vix viridi lavatis: corpore reliquo subtùs fulvescenti-albo, hypochondriis et corporis lateribus fasciis interruptis metallicè viridibus notatis: subcaudalibus maculis viridibus triquetris transnotatis.

Adult male. Upper parts bright golden green, changing to coppery purple in certain lights; frontal feathers tipped more or less with white; superciliary streak formed of irregular whitish spots; throat, sides of head, and fore part of neck white, with narrow broken bars of coppery green; breast and underparts generally white, with transverse bands of changing golden green, coppery brown in certain aspects; on the sides, flanks, and under tail-coverts these bands are very regular and conspicuous, each feather being crossed by two broad, equidistant bars; the lower part of the abdomen pure white; quills dark brown, glossed with coppery brown, changing to bright golden green on the secondaries; with the exception of the three outer primaries, all the quills are yellowish white in the basal portion of the inner webs,

forming a broad oblique bar on the under face of the wing; under wing-coverts and axillary plumes indistinctly barred with coppery brown; tail, when closed, bronzy green, with a broad subterminal band of purplish brown; upper tail-coverts bright golden green, the lateral ones largely marked with white on their outer webs. On spreading the tail the outermost feather on each side is found to be blackish brown, with five broad white bars on the inner web, the fifth one being terminal, and with five irregular spots of white on the basal portion of the outer web; the next feather blackish brown, slightly glossed with green, marked on the inner web with two obscure spots of rufous, darker brown towards the tip, and terminated by a round spot of white; the succeeding one similar, but without the rufous markings, and with the terminal spot on the inner web much smaller; and the median feathers coppery brown, glossed with green, and crossed by a darker subterminal bar. Irides and bill black; tarsi and toes brownish black; soles of feet yellowish. Total length 7 inches; extent of wings 11.75; wing, from flexure, 4; tail 2.75; bill, along the ridge .5, along the edge of lower mandible .75; tarsus .5; longer fore toe and claw .8, longer hind toe and claw .65.

Young. Metallic tints of the upper parts duller; upper wing-coverts edged with brown; tail-feathers as in the adult, but with the rufous markings obsolete; throat and fore part of neck yellowish white, clouded and mottled with dusky brown, faintly glossed with green; underparts generally yellowish white, marked on the sides and flanks with fragmentary or interrupted bands of dull shining green; the under tail-coverts crossed by broad triangular spots of the same.

THE Shining Cuckoo is an inhabitant of Australia, and appears in New Zealand only as a summer migrant. Its cry is always welcomed by the colonists as the harbinger of spring; and during its short stay with us its sweet but plaintive notes may be heard in every grove throughout the long summer days. It makes its appearance, year after year, with surprising punctuality, arriving first in the extreme north, and about a fortnight later spreading all over the country. A correspondent informs me that for three successive years, at Whangarei (north of Auckland), he first heard its familiar note on the 21st September, and that on one occasion he noticed it as early as the 3rd of that month. Another correspondent, in the same locality, informs me, as the result of twelve years' careful observation, that this migrant invariably appears between the 17th and 21st of September. For a period of ten years I kept a register of its periodical arrival, and noted its regular occurrence between the 5th and 10th of October. Mr. Potts writes to me from Canterbury that it generally arrives there on or about the 8th October, although in one year (1855) it visited that part of the country as early as the 27th September. It usually departs about the first or second week in January; but in the far north it sometimes lingers till the end of that month. As is always the case with migratory birds, there are occasionally stragglers arriving before the appointed time or lagging behind the departing flights. For example, I have a record of their occurrence in Auckland as early as August 17th, and I have met with a solitary bird in the south as late as April.

During its sojourn with us it subsists almost exclusively on caterpillars, and is, therefore, entitled to a place among the really useful species.

The cry is a remarkable one, as the bird appears to be endowed with a peculiar kind of ventriloquism. It consists of eight or ten long silvery notes quickly repeated. The first of these appears to come from a considerable distance; each successive one brings the voice nearer, till it issues from the spot where the performer is actually perched, perhaps only a few yards off. It

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generally winds up with a confused strain of joyous notes, accompanied by a stretching and quivering of the wings, expressive, it would seem, of the highest ecstasy. The cry of the young birds is easily distinguished, being very weak and plaintive.

Like the Long-tailed Cuckoo already described, this species is parasitic in its breeding-habits, and entrusts to a stranger both the hatching and the rearing of its young.

The little Grey Warbler (*Gerygone flaviventris*) is the customary victim; but Mr. Potts records an exceptional case, where the duty was entrusted to the Black Tit (*Petræca macrocephala*); and Mr. Gilbert Mair assures me that he once saw the young of this species attended and fed by a Korimako (*Anthornis melanura*). Mr. Bennett, writing of the same bird in Australia, states* that the egg of the Shining Cuckoo has been found in the nest of *Acanthiza chrysorhina*, and that he has seen a nest of this bird with five eggs, that of the Cuckoo being deposited in the centre of the group, so as to ensure its receiving the warmth imparted by the sitting bird, and thus less likely to be addled. He also narrates the following circumstance:—
“A White-shafted Flycatcher (*Rhipidura albiscapa*) was shot at Ryde, near Sydney, in the act of feeding a solitary young bird in its nest, which, when examined, was found to be the chick of the Bronze Cuckoo of the colonists. * * * It was ludicrous to observe this large and apparently well-fed bird filling up with its corpulent body the entire nest, receiving daily the sustenance intended for several young Flycatchers.”

As it is usual to find the Cuckoo's egg associated with those of the Grey Warbler, we may reasonably infer that the visitor simply deposits its egg for incubation without displacing the existing ones. But the young Cuckoo is always found to be the sole tenant of the nest; and the following circumstance, related to me by the Rev. R. Taylor, sufficiently proves that the intruder ejects the rightful occupants, and takes entire possession of the nest.

He discovered the nest of a Grey Warbler in his garden-shrubbery containing several eggs, and among them a large white one, which he correctly assigned to the Shining Cuckoo. In due time all the eggs were hatched; but after the lapse of a day or two the young Cuckoo was the sole tenant of the nest, and the dead bodies of the others were found lying on the ground below. At length the usurper left the nest, and for many days after both of the foster-parents were incessantly on the wing, from morning till night, catering for the inordinate appetite of their charge, whose constant piping cry served only to stimulate their activity.

The egg of the Shining Cuckoo is of a broad ovato-elliptical form, generally of a greenish-white colour, often clouded or stained with brownish grey, and measuring $\cdot 8$ of an inch in length by $\cdot 5$ in breadth. One taken by myself, many years ago, from the nest of a Grey Warbler, in the Manuka scrub, on what is now the site of a flourishing city, was of a pale creamy colour; and another, which was laid by a captive bird in my possession, is pure white.

* Gatherings of a Naturalist in Australasia, p. 207.

ZOSTEROPS LATERALIS.

(THE SILVER-EYE.)

- Rusty-sided Warbler*, Lath. Gen. Syn. Suppl. ii. p. 250 (1801).
Sylvia lateralis, Lath. Ind. Orn. Suppl. p. lv (1801, nec Sund.).
Zosterops dorsalis, Vig. & Horsf. Trans. Zool. Soc. xv. p. 235 (1826).
Zosterops lateralis, Reich. Handb. Meropinae, p. 94, t. cccclxiii. (1852).
Zosterops caerulescens, Gould, Handb. B. of Austr. i. p. 587 (1865).
Zosterops lateralis, Buller, Trans. N. Z. Inst. vol. iii. p. 16 (1870).

Native names.

Tau-hou, Kanohi-mowhiti, Karu-patene, Karu-hiriwha, Poporohe, and Iringatau.

Ad. pileo et facie laterali, dorso postico et uropygio, cum tectricibus alarum lætè flavicanti-olivaceis: interscapularibusque sordidè cinereis: remigibus et rectricibus brunneis, extùs dorsi colore limbatis: regione orbitali anticâ nigricante, annulo ophthalmico albo: gulâ albidâ vix flavicante tinctâ: gutture imo cinereo: abdomine medio et subcaudalibus albidis, his flavicante lavatis: corporis lateribus conspicuè badiis: rostro saturatè brunneo, mandibulâ ad basin albicante: pedibus et iride pallidè brunneis.

Adult. Crown, sides of the head, nape, upper surface of wings, rump, and upper tail-coverts bright yellowish olive; back and scapularies cinereous tinged with green; eyes surrounded by a narrow circlet of silvery-white feathers, with a line of black in front and below; quills and tail-feathers dusky brown, margined with yellowish olive; throat, fore neck, and breast greyish white, tinged more or less with yellow towards the angle of the lower mandible; abdomen and under tail-coverts fulvous white; sides pale chocolate-brown; lining of wings white, the edges tinged with yellow. Bill dark brown; under mandible whitish at the base; irides, tarsi, and toes light brown. Total length 5 inches; extent of wings 7.5; wing, from flexure, 2.5; tail 2; tarsus .6; middle toe and claw .6; hind toe and claw .5; bill, along the ridge, .4, along the edge of lower mandible, .5.

Young. The following is a description of a young bird caught in the lawn-grass on the 28th of December, 1869, by my son, Walter Leopold, a little boy of five summers:—Colours paler than in the adult; the throat and breast pale cinereous grey; the sides of the body fulvous brown: the white eye-circle absent, the orbits being still destitute of feathers; tarsi and toes light flesh-colour; bill pale brown; rictal membrane yellow.

Obs. Although I have examined a great number, I have only detected very slight variations in the plumage of the adult birds. But Archdeacon Stock, of Wellington, who is a good practical ornithologist, has favoured me with the following note on this subject:—"I saw on Friday last, November 11, at Wilkinson's 'tea-gardens' (Wellington), what appeared to be a new variety of the Blight-bird. The white circle around the eye was not so distinct; and the head and throat were orange-coloured."

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been a fruitful topic of discussion among those who take an interest in our local natural history. Whether it came over to us originally from Australia, or whether it is only a species from the extreme south of New Zealand, which has of late years perceptibly increased, and has migrated northwards, is still a matter of conjecture*. The evidence which, with Dr. Hector's assistance, I have been able to collect on this subject is somewhat conflicting; but I have myself arrived at the conclusion that the Silver-eye, although identical with the Australian bird, is in reality an indigenous species. The history of the bird, however, from a North-Island point of view is very interesting and suggestive. It appeared on the north side of Cook's Strait, for the first time within the memory of the oldest native inhabitants, in the winter of 1856. In the early part of June of that year I first heard of its occurrence at Waikanae, a native settlement on the west coast, about forty miles from Wellington. The native mailman brought in word that a new bird had been seen, and that it was a visitor from some other land. A week later he brought intelligence that large flocks had appeared, and that the "tau-hou" (stranger) swarmed in the brushwood near the coast; reporting further that they seemed weary after their journey, and that the natives had caught many of them alive. Simultaneously with this intelligence, I observed a pair of them in a garden hedge, in Wellington, and a fortnight later they appeared in large numbers, frequenting the gardens and shrubberies both in and around the town. They were to be seen daily in considerable flocks, hurrying forwards from tree to tree, and from one garden to another, with a continuous, noisy twitter. In the early morning, a flock of them might be seen clustering together on the topmost twigs of a leafless willow, uttering short plaintive notes, and if disturbed, suddenly rising in the air and wheeling off with a confused and rapid twittering. When the flock had dispersed in the shrubbery, I always observed that two or more birds remained as sentinels or call-birds, stationed on the highest twigs, and that on the slightest alarm, the sharp signal-note of these watchers would instantly bring the whole fraternity together. The number of individuals in a flock, at that time, never exceeded forty or fifty; but of late years the number has sensibly increased, it being a common thing now to see a hundred or more consorting together at one time. They appeared to be uneasy during, or immediately preceding, a shower of rain, becoming more noisy and more restless in their movements. They proclaimed themselves a blessing by preying on and arresting the progress of that noxious aphid known as "American blight" (*Schizoneura lanigera*). They remained with us for three months, and then departed as suddenly as they had come. They left before the orchard-fruits, of which they are also fond, had ripened; and having proved themselves real benefactors they earned the gratitude of the settlers, while all the local newspapers sounded their well-deserved praises.

During the two years that followed, the *Zosterops* was never heard of again in any part of

* The substance of the above article on *Zosterops* was read by the author before a meeting of the Wellington Philosophical Society on November 12th, 1870, and led to a discussion, in the course of which Dr. Hector made the following remarks:—"He said that on the south-west coast of Otago the bird was numerous, and there was very good evidence to show that this region was its native habitat. While exploring there, some years ago, he had remarked that the whole country was covered with forest, which extended down to the sea, and that the whole of the vegetation, both trees and shrubs, especially those near the sea-shore, seemed to have a coating of scaly insects, the entire bush being, in fact, covered with blight. He therefore thought it probable that as these birds increased from the superabundance of their particular food, they in course of time sent out migratory flocks, which worked their way up the coast, and at length spread over the country."—*Trans. N. Z. Inst.* 1870, vol. iii. p. 79.

the North Island; but in the winter of 1858 it again crossed the strait, and appeared in Wellington and its environs in greater numbers than before. During the four succeeding years it regularly wintered with us, recrossing the strait on the approach of spring. Since the year 1862, when it commenced to breed with us, it has been a permanent resident in the North Island, and from that time it continued to advance northwards. Mr. Colenso, of Napier, reports that it was first seen at Ahuriri in 1862. On his journey to Te Wairoa, in that year, he saw it at Aropauanui, and found its nest containing four fledgelings. The natives of that place told him that it was a new bird to them, they having first observed it there in the preceding year, 1861. The Hon. Major Atkinson, on the occasion of a visit, as Defence Minister, to the native tribes of the Upper Wanganui, in April 1864, made inquiries on the subject, and was informed by the natives that the *Zosterops* had appeared in their district for the first time in 1863.

As far as I can ascertain, they penetrated to Waikato in the following year, and pushed their way as far as Auckland in 1865. Captain Hutton reports that in the winter of 1867 they had spread all over the province, as far north as the Bay of Islands, and in 1868 he writes,—“They are now in the most northerly parts of this island.” That they have continued to move on still further northward would appear to be the case from the following interesting notes by Mr. G. B. Owen, communicated to me by Captain Hutton:—“On my passage from Tahiti to Auckland, per brig ‘Rita,’ about 300 miles north of the North Cape of New Zealand, I saw one morning several little birds flying about the ship. From their twittering and manner of flying I concluded that they were land birds, and they were easily caught. They were of a brownish-grey and yellowish colour, with a little white mark round the eye. I saw several pass over the ship during the day, travelling northwards. I arrived in Auckland a few days afterwards, on the 20th of May, when the so-called Blight-birds appeared here in such numbers, and I at once recognized them as the same.” Mr. Seed, the Inspector of Customs, has furnished me with the following interesting particulars bearing on the same point. When on an official visit to the lighthouse on Dog Island, situated about seven miles eastward of the Bluff, he was informed by the keeper that on one occasion a great number of these birds had killed themselves by striking against the lighthouse, either during the night or before the lights were put out in the morning, as he found them in scores lying dead in the gallery. Mr. Seed could not ascertain positively the direction whence they came, but he understood that it was from the southward; and other inquiries at the time led him to conclude that they had come from Stewart’s Island, the extreme southern limit of New Zealand.

This tendency of migration *northwards* appears to me quite inconsistent with the idea of the species having come to us from Australia.

Now let us ascertain something of its recorded history in the South Island. Mr. Potts, a most careful and experienced observer, writes to me:—“I first observed it (in Canterbury) after some rough weather, July 28, 1856. I saw about half a dozen specimens on some isolated black birch trees in the Rockwood valley in the Malvern Hills.” In the Auckland Museum there is a specimen of this bird, sent from Nelson by Mr. St. John (an industrious bird-collector) in 1856. The skin was labelled “stranger,” and in the letter accompanying it, Mr. St. John states that these birds had made their first appearance in Nelson *that winter* (the same in which they crossed to the North Island), and that “no one, not even the natives, had ever seen them before.”

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On a visit to Nelson in the winter of 1860, I saw numerous flights of them in the gardens and shrubberies. The results of very careful inquiries on the spot satisfied me that since their first appearance there, in 1856, they had continued to visit Nelson every year, arriving at the commencement of winter, and vanishing on the approach of warmer days as suddenly as they had come. On every hand the settlers bore testimony to their good services in destroying the cabbage-blight and other insect pests.

About the middle of June 1861, I met with small flocks of this bird on the Canterbury Plains, evidently on their passage northward. I first observed them in the low scrub on the broad shingle-beds of the Rakaia, advancing in a very hurried manner, not high in the air, as migrations are usually performed, but close to the ground, and occasionally resting. But that this bird is capable of protracted flight is evidenced by the form of its wings, which are of the lengthened, acuminate character, common to most birds of passage.

During a visit to Dunedin, in the summer of 1860, the Rev. Mr. Stack observed numerous flocks in the gardens and thickets in the environs of the town. At this season they had disappeared from the Province of Canterbury and all the country further north. In the following summer (1861) I met with numerous stragglers in the northern parts of the Canterbury Province, and I understand from Mr. Potts that since that time it has been a permanent resident there, increasing in numbers every year.

Mr. Buchanan, of the Geological Survey Department, informs me that he observed the *Zosterops* at Otago, on his first arrival there in 1851, five years previous to its appearance in the North Island; and the following extracts from letters communicated to me by Dr. Hector go still further to prove that the species is an indigenous one there, and is only new to the country lying further north.

Mr. Newton Watt, R.M., of Campbell Town (Southland), writes as follows:—"Paitu, a chief here, and I believe the oldest man in the tribe, says it was always here. Howell says that he first noticed them on the west coast, about Milford Sound, in the year 1832, in flocks of thirty or forty, but never noticed them here (Riverton) till about 1863, when he saw them inland and in smaller flocks. On my way back from Riverton, I was mentioning it at the Club at Invercargill, and a gentleman present told me he had first noticed them, about eighty miles inland, about the year 1861, and that his attention was first called to them from the circumstance that they were gregarious,—a habit not common with New-Zealand birds. At Campbell Town it appeared to be more scarce, being seen only in small flocks, varying in number from six to twelve. * * * In 1866 my sons noticed numbers of them among my cabbages, and observed that the cats caught many of them; and, further, that whilst my cabbages in the three preceding years were infested with blight, in that year there was little or no blight upon them till very late in the season. They appear to migrate from this locality in the winter, or at any rate to be scarce."

Mr. James P. Maitland, R.M., of Molyneux, writes:—"From what I hear from old settlers of seventeen or eighteen years standing (whom I can trust as men of observation), I am convinced we have had the birds here for that time at any rate, although all agree that they have become much more numerous everywhere during the last seven years; and this year (1867) in particular I observe them in larger flocks than ever. I confess I do not recollect noticing the bird until about six years ago; but the smallness of their number at that time, and the smallness of the

bird itself, may easily account for its being unnoticed in the bush. The gardens seem to be the great attraction here, and they are the best hands I know at picking a cherry- or plum-stone clean!"

All my own personal inquiries at Otago, during my first visit there in February 1865, led me to the same conclusion.

In the selection of its breeding-home, this bird has manifested with us the same erratic tendencies: thus, for the first three or four years after its permanent location in the North Island, it wintered in the low lands and the districts bordering on the sea-coast, and retired in summer to the higher forest-lands of the interior to breed and rear its young. In the summer of 1865 a few stragglers were observed to remain behind all through the season, and in the following year they sojourned in flocks and freely built their nests in our shrubberies and thickets, and even among the stunted fern and tea-tree (*Leptospermum*) near the sea-shore. From that time to the present it has ranked as one of our commonest birds all the year round; and, what is even more remarkable, it has very perceptibly increased in numbers, while most of our other insectivorous birds are rapidly declining, and threaten ere long to be extinct.

To the philosophical naturalist the history of the *Zosterops* in New Zealand is pregnant with interest, and I feel that no apology is needed for my having thus minutely recorded it.

A specimen which I gave to the Rev. R. Taylor, and forwarded by him to the British Museum, was identified by Dr. J. E. Gray as *Zosterops dorsalis*. A notice thereof appeared in the 'Annals of Natural History' and in other scientific papers, and the supposed migration of the species from Australia to New Zealand excited considerable interest. *Zosterops dorsalis* is found to be identical with *Z. lateralis*, Latham; and Mr. Gould's *Z. cærulescens* is merely a synonym of the same species. The last-named writer informs us that "this bird is stationary in all parts of Tasmania, New South Wales, and South Australia, where it is not only to be met with in the forests and thickets, but also in nearly every garden."

The natives distinguish the bird as Tau-hou (which means a stranger), or Kanohi-mowhiti (which may be interpreted spectacle-eye or ring-eye). It is also called Poporohe and Iringatau, names suggested by its accidental or periodical occurrence.

By the settlers it has been variously designated as Ring-eye, Wax-eye, White-eye, or Silver-eye, in allusion to the beautiful circlet of satiny-white feathers which surrounds the eyes; and quite as commonly the "Blight-bird," or "Winter-migrant."

I have frequently watched the habits of this little bird, and with much interest. As already stated, it is gregarious, flying and consorting in flocks, except in the breeding-season, when they are to be observed singly or in pairs. As soon as a flock of them alights on a tree, or clump of brush-wood, they immediately disperse in quest of food; and, on a cautious approach, may be seen prosecuting a very diligent search among the leaves and flowers, and in the crevices of the bark, for the small insects and aphides on which they principally subsist. I have opened many specimens, at all seasons, and I have invariably found their stomachs crammed with minute insects and their larvæ. In some I have found the large pulpy scale-insect (*Coccus*, sp.), of a dull green colour, which is commonly found adhering to the leaves of the ramarama (*Myrtus bullata*); also small caterpillars, grasshoppers, and coleoptera, and occasionally the small fruity seeds of *Rubus australis* and other native plants. In our orchards and gardens it regales itself freely on

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plums, cherries, figs, gooseberries, and other soft fruits; but it far more than compensates for this petty pilfering by the wholesale war it carries on against the various species of insects that affect our fruit-trees and vegetables. It feeds on that disgusting little aphid known as American blight, which so rapidly covers with a fatal cloak of white the stems and branches of our best apple-trees; it clears our early cabbages of a pestilent little insect that, left unchecked, would utterly destroy the crop; it visits our gardens and devours another swarming parasite that covers our roses and other flowering plants, to say nothing of its general services as an insectivorous bird. Surely, in return for these important benefits, to both orchard and garden, the flocks of *Zosterops* may justly be held entitled to an occasional feed of cherries, or to a small tithe of the ripe fruits which they have done so much to defend and cherish!

This bird emits a soft plaintive cry, repeated at short intervals; but on the wing, and especially when consorting in a flock, it utters a rapid twittering note. During the breeding-season the male indulges in a low musical strain of exquisite sweetness, but very subdued, as if singing to himself or performing for the exclusive benefit of his partner. This song is something like the subdued strain of the Korimako (*Anthornis melanura*), but much softer.

If shot at and wounded it generally manages to escape capture by scrambling nimbly off into the thicket, hiding itself and remaining perfectly silent till the danger has passed. Frequent attempts have been made to keep it caged; but although it will readily feed, it seldom survives confinement many weeks. Only one instance of complete success has come to my knowledge. Mrs. Fereday, residing near Christchurch, kept several of them caged for upwards of two years; and I am indebted to that lady for the following amusing account of these captives:—They were adult birds when taken, but soon became reconciled to the restraints of a canary-cage, and partook readily of bread soaked in milk. They were interesting objects on account of their extreme display of mutual affection, as they were always caressing one another and preening each other's feathers. This demonstration of affection, however, was at length carried too far, as one of them contracted a habit of pulling out his neighbour's feathers, in order to suck the oily matter from the roots of the quills. The practice was commenced during the seasonal moult, when the pen-feathers were present, but was continued afterwards, till it became necessary to turn out the offender and introduce a wild bird in its place. But the practice soon became general, each bird plucking and submitting to be plucked in the most business-like manner. The operation was usually commenced on the neck, and it was very droll, said my informant, to see the bird holding its head up, as a man would sit to be shaved, while the feathers were plucked out one by one. The birds were then separated, but they manifested the utmost distress, crying plaintively and refusing their food. On the first opportunity they resumed their old habit, and at length one of them was plucked completely bare! Finding the case hopeless, Mrs. Fereday then liberated the birds in the garden, where they seemed to suffer from the colder temperature of the open air, and shortly disappeared altogether, probably falling victims to some predatory cat.

Mr. Colenso observes that "when they retire to roost they sleep in pairs, cuddling quite close together, like love-parrots; and before they fold their heads under their wings they bill and preen each other's head and neck most lovingly, uttering at the same time a gentle twittering note."

Mr. Potts informs me that, in Canterbury, this species begins nesting early in October. In one instance, within his own observation, the birds commenced incubation on October 16, the young were hatched on October 25, and left the nest on November 4. In the North Island the breeding-season is somewhat later. As late as the 24th of December I met with a nest in the Taupo-Patea country, containing two perfectly fresh eggs. The nest is a slight cup-shaped structure, with a rather large cavity for the size of the bird, and is generally found suspended by side-fastenings to hanging vines, or to the slender twigs of *Leptospermum*, *Olearia*, and other shrubs, and sometimes to the common fern (*Pteris aquilina*). The eggs are generally three in number (sometimes four), ovoido-conical in form, and of a beautiful uniform pale blue colour.

Nests of this species exhibit some variety, both as to structure and the materials of which they are composed. Of three specimens now before me, one is of slight construction and shallow in its cavity, composed externally of green-coloured lichen, spiders' nests, the downy seed-vessels of the pikiarero (or flowering clematis), and a few dry leaves, lined internally with long horse-hair disposed in a circular form; another is of smaller size, more compact, composed externally of crisp dry moss, and internally of grass-bents with a few long hairs interlaced; while the third has the exterior walls constructed entirely of spiders' nests and stiff fibrous mosses, the former predominating, and the interior lining composed wholly of long horse-hair.

A specimen which I found suspended in a clump of creeping kohia (*Passiflora tetrandra*) was composed externally of the pale green and rust-coloured lichen so abundant on the branches of dead timber, intermixed with spiders' webs, and lined inside with dry fibrous grasses, the whole being laced together with hair, the long straggling ends of which projected from every part of the nest; and another, which was obtained from the low brushwood bordering on the sea-shore, was built of sheep's wool, spiders' nests, pellets of cow-hair, and fine seaweed firmly bound together with long thread-like fibres, apparently the rootlets of some aquatic plant, and lined internally with fine grass-bents and soft feathers. Sometimes the nest is constructed wholly of bents and dry grass.



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PROSTHEMADERA NOVÆ ZEALANDIÆ.

(TUI OR PARSON BIRD.)

- New-Zealand Creeper*, Brown, Illustr. Zool. pl. ix. (1776).
Poë Bee-eater, Lath. Gen. Syn. ii. p. 682 (1782).
Merops novæ seelandiæ, Gm. Syst. Nat. i. p. 464 (1788, ex Lath.).
Merops cincinnatus, Lath. Ind. Orn. i. p. 275 (1790).
La Cravate Frisée, Levaill. Ois. d'Afr. ii. pl. 92 (1800).
Sturnus crispicollis, Daud. Traité d'Orn. ii. p. 314 (1800, ex Levaill.).
Philemon cincinnatus, Bonn. et Vieill. Enc. Méth. p. 613 (1823).
Prothemadera concinnata, Gray, List Gen. of B. 1840, p. 3.
Certhia cincinnata, Forst. Descr. Anim. p. 78 (1844).
Prothemadera circinata, Reich. Handb. Merop. p. 127, t. cccxcii. fig. 3466 (1852).
Meliphaga novæ zealandiæ, Ellman, Zool. 1861, p. 7466.

Native names.

Tui and Koko; the young bird distinguished as Pi-tui or Pikari.

♂ pileo toto metallicè viridi, collo postico, uropygio et supracaudalibus purpurascens: collo undique filamentis albis ornato: dorso reliquo et scapularibus cuprescenti-brunneis: alâ supernè metallicè viridi, tectricibus alarum paullò purpurascens, medianis albo terminatis, fasciam alarem distinctam formantibus: remigibus nigris, extùs viridi metallico lavatis, secundariis latiùs: caudâ nigrâ, suprâ purpurascens-viridi nitente: subtùs metallicè viridis, versus pectus imum purpurascens: abdomine toto cuprescenti-brunneo: hypochondriis elongatis lætè brunneis: gutture imo fasciculis duobus albis globosis ornato: subalaribus nigris: subcaudalibus metallicè viridibus: rostro et pedibus nigricanti-brunneis: iride saturatè brunneâ.

♀ mari similis, sed paullò minor: coloribus sordidioribus: hypochondriis fulvescentioribus.

Juv. schistaceo-niger: tectricibus alarum medianis ut in adultis albis: collo plus minusve albicante: rictu flavo: iride nigrâ.

Male. General plumage shining metallic green, with bluish-purple reflections on the shoulders, rump, and upper tail-coverts; the hind neck ornamented with a collar of soft filamentous plumes, curving outwards and with a white line down the centre; the middle of the back and the scapulars bronzy brown, the latter with blue reflections; the greater wing-coverts are metallic green, those near the arm of the wing shining blackish purple, and the intermediate ones white in their apical portion, forming a conspicuous alar bar; the remiges are black, the primaries having an outer margin of metallic green in their basal portion, this colour spreading on the secondaries till it covers the whole of the web; tail-feathers metallic green on their upper surface, with purplish reflections; lower part of breast metallic green changing into purplish blue; sides and abdomen blackish brown, the long flank-feathers shading

into pale brown; under surface of wings and tail black; the under tail-coverts metallic green. The throat is ornamented with two tufts of white filamentous feathers, which curl in upon each other in a globose form. Irides dark brown; bill and feet blackish brown. Total length 12.75 inches; extent of wings 18.5; wing from flexure 6; tail 5; culmen 1; tarsus 1.35; middle toe and claw 1.55, hind toe and claw 1.25.

Female. The female is somewhat smaller than the male; but the plumage differs in no essential respect. The metallic tints are not so bright, and there is more brown in the plumage of the underparts. The throat is adorned with white tufts as in the other sex, but they are usually smaller.

Young. Uniform slaty black, with a broad undefined patch or circlet of greyish white on the throat, varying in extent and sometimes spreading all round the neck; median wing-coverts white, as in the adult; irides black; rectal membrane yellow.

Obs. In the young bird the plumage is soft and fluffy, and entirely wants the metallic lustre. In the adult state examples vary in the brilliancy of their tints, and some have a bright coppery bronze on their upper parts.

Varieties. Uniform brown-coloured varieties have been occasionally met with; and it is not an unusual thing to find specimens with a single white quill or tail-feather, or marked about the throat and face with scattered white feathers. A beautiful albino was obtained some years ago in the Wanganui district, and now forms part of my collection in the Colonial Museum. The general plumage is pure white; a shining black band fills the lores, crosses the forehead, and spreads down each side of the neck in an irregular patch of sooty black; lower part of back, rump, and thighs sooty black, with white feathers interspersed; wings pure white, excepting the outer secondaries and the long primary coverts, which are glossy black; bill white; tarsi and toes yellowish white. The Hon. Mr. Fox informs me that at Porirua (in the Province of Wellington) he once observed a bird of this species with the entire plumage of a delicate fawn-colour.

THIS bird is one of our most common species, and on that account generally receives less attention in its own country than its singular beauty merits. It was described and figured, as early as the year 1776, in Brown's 'Illustrations of Zoology,' and has since been mentioned by nearly every writer on general ornithology. In 1840 Mr. G. R. Gray made it the type of a new genus, in which, up to the present time, it stands quite alone.

The early colonists named it the "Parson-bird," in allusion to the peculiar tufts of white feathers that adorn its throat, and their fancied resemblance to the clerical bands. To those who are familiar with the bird in its native woods, this name is certainly appropriate; for when indulging in its strain of wild notes, it displays these "bands," and gesticulates in a manner forcibly suggestive of the declamatory style of preaching, or, as Dr. Thompson graphically expresses it, "sitting on the branch of a tree, as a *pro tempore* pulpit, he shakes his head, bending to one side and then to another, as if he remarked to this one and to that one; and once and again, with pent-up vehemence, contracting his muscles and drawing himself together, his voice waxes loud, in a manner to waken sleepers to their senses!"

Owing to its excellent powers of mimicry, and the facility of rearing it in confinement, it is a favourite cage-bird, both with the natives and the colonists. Although of very delicate consti-

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tution, it has been known to live in confinement for upwards of ten years. More frequently, however, it becomes subject, after the first year, to convulsive fits, under which it ultimately succumbs. Cleanliness, a well-regulated diet, and protection from extremes of temperature are the proper safeguards. I had as many as ten of them caged at one time; but they died off one by one, and invariably in the manner indicated. Naturally of a sprightly disposition, it is cheerful and playful in captivity, incessantly flitting about in its cage and mimicking every sound within hearing. It will learn to articulate sentences of several words with clearness, and to imitate the barking of a dog to perfection. One, which I had kept caged in the same room with a Parrakeet (*Platycercus auriceps*), acquired the rapid chattering note of that species; and another, in the possession of a friend, could whistle several bars of a familiar tune in excellent time. The Maoris fully appreciate the mocking-powers of this bird, and often devote much time and patience to its instruction. There are some wonderful stories current among them of the proficiency it sometimes acquires; and I may mention an amusing incident that came under my own notice at Rangitikei some years ago. I had been addressing a large meeting of natives in the Whare-runanga, or Council-house, on a matter of considerable political importance, and had been urging my views with all the earnestness that the subject demanded: immediately on the conclusion of my speech, and before the old chief, to whom my arguments were chiefly addressed, had time to reply, a Tui, whose netted cage hung to a rafter overhead, responded, in a clear emphatic way, "Tito!" (false). The circumstance naturally caused much merriment among my audience, and quite upset the gravity of the venerable old chief Nepia Taratoa. "Friend," said he, laughing, "your arguments are very good; but my *mokai* is a very wise bird, and he is not yet convinced!"

In a state of nature the Tui is even more lively and active than in captivity. It is incessantly on the move, pausing only to utter its joyous notes. The early morning is the period devoted to melody, and the Tuis then perform in concert, gladdening the woods with their wild ecstasy. Besides their chime of five notes (always preceded by a key-note of preparation), they indulge in a peculiar outburst which has been facetiously described as "a cough, a laugh, and a sneeze," and a variety of other notes, fully entitling it to be ranked as a songster. Its flight is rapid, graceful, and slightly undulating, the rustling of the wings as they are alternately opened and closed being distinctly audible. Layard mentions ('Ibis,' 1863, p. 243) the peculiar habit which this bird has of mounting high in the air during fine weather, in parties of six or more, and performing wide aërial circles or indulging in a sportive flight, "turning, twisting, throwing somersaults, dropping from a height with expanded wings and tails, and performing other antics, till, as if guided by some preconcerted signal, they suddenly dive into the forest and are lost to view." High in the air it may sometimes be seen closing the wings and supporting the body for a few moments by a rapid perpendicular movement of the expanded tail; and slowly descending in this manner to a lower level, it speeds forward with half-closed wings and tail, and then rises high in the air again by a rapid vibration of those members.

The food of the Tui consists of ripe berries of various kinds, flies and other insects, and the honey of certain wild flowers. To enable it to collect the latter, the tongue is furnished at its termination with a brush of exquisite fineness, a characteristic common to all the true honey-eaters. When the functions of life are suspended or interfered with, this little brush protrudes from the bill. This occurs not only after death, but in the case of the sickly Tui; and the involuntary protrusion of the tongue may generally be accepted as a fatal symptom. In the months of October

and November, when the kowhai (*Sophora grandiflora*) has cast its leaves and is covered with a beautiful mantle of yellow flowers, its branches are alive with Tuis; and in December and January, when the *Phormium tenax* is in full bloom, they leave the forest and repair to the flax-fields to feast on the korari honey. At these times large numbers are caught in snares or speared by the natives, who thus supply themselves with a delicious article of food. At certain seasons of the year, when its favourite berries have fully ripened, the Tui becomes exceedingly fat; so much so as very much to embarrass the operations of the taxidermist, who finds it almost impossible to keep the feathers free from the oily matter that exudes under the operator's knife. But I am unable to endorse the statement made by the reverend author of 'New Zealand and its Inhabitants' (probably on the authority of a native), that on these occasions the Tui relieves itself of its exuberant fat by pecking its breast and allowing it to escape!

It is easily approached and shot; but I have often remarked its extreme tenacity of life, reminding one of Mr. Gosse's charming account of *Conurus flaviventer*, in his 'Birds of Jamaica.' Sometimes, when mortally wounded, the grasp of the feet by which the bird was clinging to the twigs or vines becomes convulsively tightened, and the falling body is seen suspended, head downward, for several minutes, the wings now and then giving an ineffectual flutter, till at last one foot relaxes its hold and then the other, and the quivering body falls heavily to the ground.

The nest of this species is usually placed in the fork of a bushy shrub, only a few feet from the ground; but I have also found it at a considerable elevation, hidden among the leafy top of a forest tree. It is a rather large structure, composed chiefly of sprays or dry twigs, intermixed with coarse green moss, the cavity being lined with fibrous grasses, very carefully bent and adjusted. Sometimes the interior is composed of the black hair-like substance from the young shoots of the tree-fern, the cavity being sparingly lined with dry bents. The eggs are generally from three to four in number and present some variety both in form and colour: there are some good examples in the Nelson Museum. The eggs (numbering three) in one of the nests are of a pyriform character, being blunt and rounded at the thick end and tapering upwards to a point, measuring 1.3 inch in length by .75 in their widest part; they are white, with a faint rosy blush, stained and mottled at the larger end and lightly freckled or dusted all over with pale reddish brown. Those contained in another nest (also numbering three) are ovato-conical, measuring 1.05 in length by .75; these are of a delicate rosy tint, obscurely freckled, darker and speckled more or less with brown at the thick end. A third nest contains two almost pure white eggs, intermediate in form between those described above, stained and freckled, at the larger end only, with brick-red. There is likewise an interesting series of these eggs in the Canterbury Museum, varying in character from the true ovato-pyriform to a fusiform outline, something like a skittle-head. The former measure 1.5 in length by .9 in width, and are of a pinky-white colour, freckled and spotted at the larger end with reddish brown, and with marbled markings of the same colour at the smaller end: the other extreme form measures 1.7 in length by .8 in its widest part, and the whole surface is white with scattered specks of rust-red at the thick end, each surrounded by a light stain or halo, as if the colour had run; there are also two or three of these specks with the same stained circumference in the anterior or produced portion of the egg. Dr. Hector informs me that Tui's eggs in his possession vary from a decidedly elliptical shape to a narrow oval one, and that both forms are "spotted with round dabs of red."

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ANTHORNIS MELANURA.

(BELL-BIRD.)

- Mocking-Creeper*, Lath. Gen. Syn. ii. p. 735 (1782).
Certhia melanura, Sparrm. Mus. Carls. pl. v. (1786).
Certhia sannio, Gm. Syst. Nat. i. p. 471 (1788).
Philedon dumerilii, Less. Voy. Coq. Zool. i. p. 644, t. 21. fig. 2 (1826).
Anthorniza cœruleocephala, Swains. Classif. of B. ii. p. 327 (1837).
Philedon sannio, Less. Compl. Buff. xi. p. 165 (1838).
Anthornis melanura, Gray, List of Gen. of B. p. 15 (1840).
Certhia olivacea, Forst. Descr. Anim. p. 79 (1844).
Anthornis ruficeps, Von Pelz. Verh. zool.-bot. Gesellsch. Wien, 1867, p. 316.

Native names.

Mako, Makomako, Komako, Kokomako, Korimako, Kohimako, Kokorimako, Kohorimako, Titimako, and Kopara. Of the above names, Korimako is most generally used by the northern and Makomako by the southern tribes. The Ngatiawas call this bird Rearea; and the natives of the Bay of Plenty distinguish the male and female as Kokorohimako and Titapu.

- ♂ *suprà* flavicanti-olivaceus, uropygio vix lætiore: pileo undique metallicè violaceo nitente: loris et mento ipso nigricantibus: tectricibus alarum nigricantibus dorsi colore lavatis: remigibus nigricantibus vix sub certâ luce indigotico nitentibus, extûs angustè olivaceo limbatis, scapis *suprà* nigricantibus, subtûs brunnescentibus: caudâ nigrâ, subtûs pallidiore, rectricibus extûs sordidè indigotico lavatis: subtûs flavicanti-olivaceus, hypochondriis imis paullò lætioribus: crisso et subcaudalibus flavicanti-albis, olivaceo-brunneo variis: subalaribus cinerascentibus, olivaceo lavatis: fasciis axillaribus flavidis: rostro nigro: pedibus plumbeis, unguibus brunneis: iride rubrâ.
- ♀ *mari similis*, sed magis olivaceo-brunnescens, et ubique sordidior: pileo dorso concolori, metallicè viridi obscurè nitente: alis et caudâ brunnescentibus, secundariis fulvo terminatis et rectricibus olivaceo-viridi limbatis: fasciâ mystacali parvâ albidâ: subtûs brunnescens, pectore pallidè ferrugineo lavato, abdomine magis olivascente: subalaribus et fasciis axillaribus sordidè flavidis.
- ♂ *juv.* similis mari adulto, sed pallidior: fasciâ mystacali indistinctâ.

Adult male. The whole of the plumage olive-green, changing to yellowish-olive on the sides of the body and abdomen; beneath plumbeous; forehead, crown, and sides of the head glossed with deep purple; primary quills and tail-feathers dusky black, darker and having a steel gloss on the outer webs; the secondary quills narrowly margined outwardly with olive-green, which colour spreads on the inner ones till it nearly covers the entire web; inner lining of wings, as well as the soft ventral feathers and under tail-coverts, pale fulvous yellow. Irides cherry-red; bill black; tarsi and toes dark leaden grey; the

claws brown. Total length 7.75 inches; wing, from flexure, 3.4; tail, to the extremity of lateral feathers, 3.6; bill, along the ridge .6, along the edge of lower mandible .75; tarsus 1; middle toe and claw .6; hind toe and claw .75.

Adult female. Smaller than the male, with little or no purple gloss on the head, and readily distinguished by a narrow streak of white, which extends downwards from the angles of the mouth, fading off in a line with the ear-coverts. Upper parts dull olivaceous; throat, breast, and underparts generally yellowish brown, strongly tinged with olive; quills and tail-feathers dusky black, margined on their outer webs with olivaceous; lining of wings, vent, and under tail-coverts fulvous white, washed with yellow.

Young male. Plumage lighter than in the adult bird, with a narrow indistinct line of yellowish white from the angles of the mouth.

Obs. The bird described by Herr von Pelzeln (*l. c.*) under the name of *Anthornis ruficeps* was, what I had contended for*, nothing but a flower-stained example of the present species. In acknowledgment of this I have received the following note from my friend Dr. Finsch, of Bremen:—"You are quite right in respect to *A. ruficeps*. The red colour on the face is caused by external influences; for my friend Von Pelzeln has washed the type in the Vienna Museum, and the red tinge has partially disappeared." But, even as far back as 1782, Latham mentions (*l. c.*) the existence of a red stain in some specimens, and ascribes it to the true cause, adding, "this in time rubs off, and the colour of the head appears the same as the rest of the plumage."

THE praises of the Bell-bird were sung, a hundred years ago, by the illustrious navigator Cook, whose 'Voyages' contain the following record:—"The ship lay at the distance of somewhat less than a quarter of a mile from the shore†; and in the morning we were awakened by the singing of the birds: the number was incredible, and they seemed to strain their throats in emulation of each other. This wild melody was infinitely superior to any that we had ever heard of the same kind; it seemed to be like small bells most exquisitely tuned, and perhaps the distance and the water between might be no small advantage to the sound."

This species, formerly very plentiful in every part of the country, appears to be rapidly dying out. From some districts, where a few years ago it was the commonest bird, it has now entirely vanished. In the Waikato it is comparatively scarce, on the East Coast it is only rarely met with, and from the woods north of Auckland it has disappeared altogether. In my journeys through the Kaipara district, eighteen years ago, I found this bird excessively abundant everywhere; and on the banks of the Wairoa the bush fairly swarmed with them. Dr. Hector, who passed over the same ground in 1866, assures me that he scarcely ever met with it; and a valued correspondent, writing from Whangarei (about 80 miles north of Auckland), says:—"In 1859 this bird was very abundant here, in 1860 it was less numerous, in 1862 it was extremely rare, and from 1863 to 1866 I never saw but one individual. It now seems to be entirely extinct in this district"‡.

* Trans. New-Zealand Inst. 1868, vol. i. p. 108.

† Queen Charlotte's Sound.

‡ Mr. Gilbert Mair informs me that on the small island of Motiti, in the Bay of Plenty, the Bell-bird is very numerous, although it is never seen or heard on the mainland opposite. Captain Hutton reports it plentiful on the Great and Little Barrier Islands, in the Gulf of Hauraki.

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The cause of the rapid disappearance in these islands of some species of birds, and absolute extinction of others, is a very interesting question, and I have already called attention to it in various published papers. In a newly colonized country, where the old fauna and flora are being invaded by a host of foreign immigrants, various natural agencies are brought into play to check the progress of the indigenous species, and to supplant them by new and more enduring forms, more especially in the case of insular areas of comparatively small extent. These agencies are often too subtle in their operation to arrest the notice of the ordinary observer; and it is only the ultimate results that command his attention and wonder. But in New Zealand some special cause, apart from this general law, must be assigned for the alarmingly rapid decrease of many of the indigenous birds: in the course of a very few years, species formerly common in every grove have become so scarce throughout the country as to threaten to become extinct at no very distant date.

Various reasons have been suggested to account for this. The natives believe that the imported bee, which has become naturalized in the woods, is displacing the Korimako, Tui, and other honey-eating birds. One of the oldest settlers in the Hokianga district (Judge Maning), speaking to me on this subject, said:—"I remember the time, not very long ago, when the Maori lads would come out of the woods with hundreds of Korimakos hung around them in strings; now one scarcely ever hears the bird: formerly they swarmed in the northern woods by thousands; now they are well nigh extinct." On asking him his opinion as to the cause of this, he told me that he agreed with the Maoris, that the bee, having taken possession of the woods, has driven the honey-eating birds away from the flowers, and practically starved them out; and he referred to the scarcity of the Tui, another honey-eater, in support of this view. But it must be remembered that both of these species subsist largely on berries and insects, and that the comparative failure of their honey-food, even if granted, will not of itself account for the rapid decrease of these birds; while, on the other hand, the Totoara (*Petraeca albifrons*) and other species which do not sip flowers are becoming equally scarce. It appears to me that the honey-bee theory is quite insufficient to meet the case, and that we must look further for the real cause. As the result of long observation, I have come to the conclusion that, apart from the effects produced by a gradual change in the physical conditions of the country, the chief agent in this rapid destruction of certain species of native birds is the introduced rat. This cosmopolitan pest swarms through every part of the country, and nothing escapes its voracity*. It is very abundant in all our woods, and the wonder rather is that any of our insessorial birds are able to rear their broods in safety. Species that nest in hollow trees, or in other situations accessible to the ravages of this little thief, are found to be decreasing, while other species whose nests are, as a rule, more

* In a letter which I had the pleasure of receiving from the Rev. T. Chapman, of Rotorua, some years ago, that gentleman states:—"Wild Ducks were particularly numerous in this district on my arrival here: you saw them by dozens; you hardly see them now by twos. I have no doubt we owe this to the Norway rat. There is a place on the Waikato River, some twenty miles below Taupo, where the chiefs occasionally assembled to act out two important matters,—to discuss politics and eat kouras (crayfish). A few years after the Norway rat fully appeared, the kouras were no longer plentiful; and as the New Testament made Maori politics rather unnecessary, the usage of meeting no longer exists. The natives assured me that the Norway rat caught the crayfish by diving. Rowing up the rivers you see little deposits of shells: upon inquiry I found they were the selections of the Norway rats, who, by diving for these freshwater pipis, provide a *kinaki* (relish) for their vegetable suppers."

favourably placed, continue to exist in undiminished numbers. As examples of this latter class, I may instance the Kingfisher, which usually scoops out a hole for its nest in the upright bole of a dead tree, quite beyond the reach of rats, and appears to be more abundant now than ever; also the *Rhipidura*, *Zosterops*, *Gerygone*, and other small birds whose delicate nests are secured to slender twigs, or suspended among vines and creepers. And the Ground-Lark, again, which nests in open grass or fern land, where the Harrier (*Circus gouldi*) keeps the rat well under control, has of late years sensibly increased, being now very common. As a matter of fact, I have known a case in which half a dozen nests of the Tui, within a radius of a hundred yards, were robbed by rats of both eggs and young.

But to resume our history of the "Bell-bird"—so-called from the fanciful resemblance of one of its notes to the distant tolling of a bell. Its ordinary song is not unlike that of the Tui or Parson bird, but is more mellifluous. Its notes though simple are varied and sweetly chimed; and as the bird is of social habits, the morning anthem, in which scores of these sylvan choristers perform together, is a concert of eccentric parts, producing a wild but pleasing melody. I have occasionally heard a solitary Bell-bird pouring forth its liquid notes after the darkness of advancing night had silenced all the other denizens of the grove. It ought to be mentioned, moreover, that both sexes sing. When alarmed or excited, they utter a strain of notes which I can only compare to the sound produced by a policeman's rattle quickly revolved. This cry, or the bird-catcher's imitation of it, never fails to attract to the spot all the Bell-birds within hearing. The Maoris are accustomed to snare them by means of a *tuki* baited with the crimson flowers of the *Metrosideros*. The bird alights on the treacherous perch to sip the flowers, and a sudden jerk on a running noose secures it firmly by the leg.

In former times, when this species was abundant throughout the whole country, certain forest-ranges were famed as Korimako preserves, and were highly prized on that account by the natives owning them. At the present day, in the investigation of native titles to land, the "snaring of Korimakos" by their ancestors is an act of ownership frequently pleaded in support of the tribal claim.

The flight of this bird is undulating, but very rapid, the wings and tail being alternately opened to their full extent and sharply closed. It sometimes mounts to a considerable height in the air, and I have occasionally observed large parties of them indulging in a playful flight far above the tree-tops.

Its food consists of minute flies and insects, as well as small berries, such as those of the karamu (*Coprosma lucida*) and other shrubs, and the honey of various kinds of bush-flowers. When feeding on the latter, it may be seen hanging by the feet in all positions from the slight flower-bearing twigs, while the slender bill, with the pencilled tongue protruded, is thrust into the corolla of each flower in quick succession.

When the korari (*Phormium tenax*) is in full bloom, the horn-shaped flowers are filled with delicious nectar, which the natives are accustomed to collect in calabashes, to be used as a drinking-beverage for visitors. The Bell-bird, too, loves to regale itself on this saccharine production; and while the season lasts, its forehead is often stained red from the colouring-matter that adheres to the feathers. When the bird, with the change of season again, is feasting itself from the smaller cups of the pretty native fuchsia (*F. excorticata*), the stain on the forehead changes to a very bright purple or blue.

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The Bell-bird commences breeding towards the end of September or early in October, and sometimes even as late as November and December. I have met with a brood of fully-fledged young birds as early as October 28; while, on the other hand, Mr. Potts informs me that he has observed it building its nest at the end of January or beginning of February. It seems probable, therefore, that this species rears two broods in the year. Its nest may be looked for in deep wooded gullies and in the low brushwood along the outskirts of the forest. It is usually placed in the fork of a low branch, and the bird in selecting a site seems generally to prefer those bushes over which the native bramble (*Rubus australis*) has thrown a protecting mantle. It is a common thing to find four or five old nests of former years in the immediate vicinity of the occupied one, as if the birds formed an attachment for a locality once chosen as a breeding-place. The nest is a rather loose structure, composed externally of small dry twigs, sometimes interlaced with the wiry stems of the bush convolvulus, over which there is a layer of fine grass disposed in a concave form, and then deeply lined with feathers. The eggs are usually three in number, but sometimes four; broadly elliptical or slightly ovoido-conical in shape, and measuring .88 inch in length by .65 in breadth. They are pure white, with a broad zone of reddish-brown spots towards the thicker end, besides a few widely scattered dots of red over the general surface. In some specimens the ground-colour exhibits a delicate pinkish tinge, and the reddish markings are more numerous and distinct, often deepening to a dark chestnut-red. Among the examples in the Canterbury Museum, some are pinkish white, blotched at the thicker end and densely freckled all over with pale reddish brown, whilst one of them presents delicate pencilled markings or veins towards the smaller end.

In the selection of feathers for the lining of its nest, this bird shows an extraordinary love of decoration, the preference being given to those of striking colours. The scarlet feathers of the Kaka, the bright green of the Parrakeet, and the ultramarine of the Kingfisher are sometimes found intermixed; the shining breast-feathers of the Wood-Pigeon are invariably used; and in the vicinity of habitations (as a correspondent informs me) the nest is occasionally found supplied from a neighbouring poultry-yard, the spotted plumes of the Guinea-fowl being most conspicuous.

During the breeding-season the parent birds evince much tender solicitude for the safety of their offspring. On leaving the nest, the young have the rictal membrane (at the angles of the mouth) very large and of a bright yellow colour. The old birds hunt for them with untiring industry; and the young brood may be seen perched side by side on a branch patiently waiting for their food, and on the approach of their parents, quivering their wings with excitement, and eagerly gaping their throats, all of them together, to receive the coveted morsel.

I have made frequent attempts to rear the young, but have never succeeded. I have known instances of the adult birds being caged with success; but, like the Tui, they are liable to sudden convulsive fits, and seldom survive their confinement very long. At the present time, however, there is a fine specimen in the Zoological Gardens, Regent's Park, which appears not only healthy, but to retain all its native sprightliness of character.

ANTHORNIS MELANOCEPHALA.

(CHATHAM-ISLAND BELL-BIRD.)

Anthornis melanocephala, Gray, in Dieff. Trav. ii., App. p. 188 (1843).*Anthornis auriocula*, Buller, Essay on the Orn. of N. Z. p. 8 (1865).♂ similis *A. melanuræ*, sed conspicuè major: pileo undique chalybeo, indigotico vel purpureo nitente.♂ juv. (*A. auriocula*, Buller) similis adulto, sed pallidior: abdomine imo cum crisso et hypochondriis imis fulvescentibus: fronte vix chalybeo nitente: filamentis pilei gulæque chalybeo-nigris: fasciâ mystacali indistinctâ, pallidè flavâ: tectricibus alarum, remigibus et rectricibus brunnescenti-nigris, paullò chalybeo lavatis, extùs angustè flavicanti-olivaceo limbatis: rostro nigro: pedibus brunneis, plantis pallidioribus, unguibus saturatè brunneis: iride aureâ.

Adult male. The whole of the plumage olive-green, lighter on the sides of the body and lower part of abdomen; beneath dark plumbeous, this being observable only on raising the feathers; forehead and crown steel-blue, changing to a purplish-blue gloss on the sides of the head, nape, throat, and fore part of the breast, these parts appearing shot with purple and blue in certain lights; quills dusky brown, with yellowish-brown shafts, margined on the outer webs with yellow; the small wing-coverts steel-blue, margined with olive-green; tail-feathers dusky black, with steel-black margins; the soft ventral feathers and under tail-coverts fulvous yellow, the latter with an olivaceous tinge. Irides golden yellow (?); bill black; tarsi, toes, and claws dark brown. Total length 10 inches; wing, from flexure, 4.25; tail 4.5; bill, along the ridge .7, along the edge of lower mandible .9; tarsus 1.5; middle toe and claw 1.05; hind toe and claw 1.15.

Young. After examining the type of Mr. G. R. Gray's *Anthornis melanocephala*, I feel satisfied that the bird obtained by me at the Chatham Islands, and named (*l. c.*) *Anthornis auriocula*, is simply a young male of this species. The following is a description of this specimen, which is now in the Colonial Museum at Wellington:—The whole of the plumage yellowish olive, paler on the underparts, and tinged with fulvous on the abdomen, flanks, and under tail-coverts; faint steel gloss on the forehead; produced filaments on the crown, sides of the head, and throat steel-black; from the angle of the mouth a narrow indistinct streak of pale yellow; wing-feathers and their coverts, also tail-feathers, blackish brown, with a faint steel gloss, their outer webs narrowly margined with yellowish olive; inner lining of wings pale yellow. Irides golden yellow; bill black; tarsi and toes brown, with paler soles; claws umber-brown. Length 9.5 inches; wing, from flexure, 4.4; tail 4.5; tarsus 1.5. (On a close inspection of this specimen two minute feathers of steel-blue on the side of the head give indication of a change of plumage.)

Obs. I need hardly say that the above description of the adult is taken from the specimen in the British Museum (obtained by Dr. Dieffenbach in 1839), because it is well known that this is, at present, the only example recorded. I would remark, however, that this bird is not in full plumage. Three

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of the tail-feathers on one side are dusky black, deepening to glossy steel-black on the outer webs; the rest are, like the wing-feathers, dusky brown, margined with olivaceous green. I have no doubt that in the fully matured state the primaries and secondaries, as well as the tail, assume the dark colour.

THIS species, which is a native of the Chatham Islands, is very similar to the well-known *Anthornis melanura*; but, as will be seen on referring to the measurements given above, it is considerably larger. It differs, moreover, in having the whole of the head and neck brightly glossed with purplish or steel-blue.

During a visit to the Chatham Islands in 1855, I observed this *Anthornis* in the woods near Waitangi, and procured a specimen, although, as already explained, I was unable at the time to identify the species. I observed that its habits were precisely similar to those of the common Bell-bird, but that its notes appeared to be louder and somewhat less musical. Its gregarious instincts are the same; for, on imitating the alarm-cry, I was immediately surrounded by a number of these birds in a high state of excitement.

POGONORNIS CINCTA.

(STITCH-BIRD.)

Meliphaga cincta, Dubus, Bull. Acad. Sc. Brux. vi. pt. 1, p. 295 (1839).*Ptilotis auritus*, Lafr. Rev. Zool. 1839, p. 257.*Ptilotis cincta*, Gray, Voy. Ereb. and Terror, Birds, p. 4 (1844).*Pogonornis cincta*, Gray, Gen. of B. i. p. 123 (1846).*Native names.*

Ihi, Hihi, Tihe, Kotihe, and Kotihewera; male and female sometimes distinguished as Hihi-paka and Hihi-matakiore or Tihe-kiore.

♂ *suprà nigerrimus*: fasciis duabus conspicuis postocularibus albis: dorso imo et uropygio cinerascenti-brunneis, vix olivaceo tinctis: dorsi plumis quibusdam lateralibus lætè aurantiaco terminatis: rectricibus alarum minimis lætè aurantiacis, plagam magnam formantibus, majoribus nigris, extùs aurantiaco marginatis: alæ spurix plumis ad basin albis speculum exhibentibus: remigibus nigris, primariis versus apicem albido, secundariis aurantiaco marginatis: tectricibus alarum majoribus intimis et secundariis dorsalibus purè albis, plagam distinctam formantibus, dorso proximis medialiter nigris: gutture toto et collo laterali nigerrimis: torque pectorali angustâ aurantiacâ: corpore reliquo subtùs cinerascete, hypochondriis et subcaudalibus saturatoribus, illis brunneo striatis: subalaribus cinerascentibus, margine alarum aurantiaco: rostro brunnescenti-nigro: pedibus brunneis: setis rictalibus nigris: iride nigrâ.

♀ *mari omnino dissimilis*: *suprà* brunnea olivaceo lavata, pileo obscuriore: maculâ parvâ postoculari albâ: tectricibus alarum olivaceo-fulvo lavatis, minimis aurantiaco nitentibus, majoribus intimis et secundariis dorsalibus albis, brunneo medialiter lineatis et marginatis, plagam magnam albam formantibus: remigibus et rectricibus cinerascenti-brunneis, extùs latè fulvescente lavatis, primariis ad basin pogonii interni albis: subtùs obscurè brunnea, pectore et abdomine fulvescentibus, obscurè brunneo striatis.

Adult male. Head, neck, and upper part of the back velvety black; on each side of the head there is a tuft of snow-white feathers which the bird has the power of erecting. A band of rich canary-yellow encircles the breast, contrasting finely with the dark plumage immediately above it; narrow in the centre, it widens on both sides and expands on the wings, covering the small coverts and the margins of the scapularies, and becomes very conspicuous when the wings are spread. Underparts light greyish brown, inclining to olivaceous brown on the sides of the body. Primaries and tail-feathers black, margined outwardly with olivaceous brown; the secondaries in their basal portion and their coverts white; the upper tail-coverts olivaceous brown. Irides and rictal bristles black; bill brownish black; tarsi and toes pale brown. Total length 8 inches; extent of wings 12.5; wing, from flexure, 4; tail 3; bill, along the ridge .60, along the edge of the lower mandible .75; tarsus 1; middle toe and claw 1; hind toe and claw .75.

Female. Obscure olivaceous brown, darker on the upper parts, and changing to pale brown on the abdomen

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and under tail-coverts. The primaries and outer tail-feathers have their external webs narrowly margined with very pale brown; the rest of the quills and tail-feathers are dusky black, edged externally with olivaceous brown. There is a large spot of white on the secondaries corresponding to that in the male, with faint indications of yellow towards the root of the wing; but this is only apparent when the wings are spread. There are a few minute touches of white on each side of the head, corresponding in position to the tufts in the male bird; but these adornments are wanting in this sex. Total length 7.25 inches; wing, from flexure, 3.75; tail 2.75; culmen .55; tarsus 1.

Obs. In some examples of the male the colours are brighter, the pectoral zone being wider and deepening to a clear orange-yellow, while the quills and larger wing-coverts have a narrow external margin of yellowish olive.

Remarks. This species is furnished with hair-like bristles at the angles of the mouth measuring half an inch in length. The tongue has a pencilled or brush-like termination; the hind claw is almost twice the length of those of the fore toes, which are about equal, measuring .25 of an inch in their curvature; the tail is of medium length and slightly cuneiform.

This New-Zealand form approaches closely to a numerous group of Australian birds comprehended under the generic name of *Ptilotis*, among which it was originally placed. It has since, however, been recognized as the type of a distinct genus.

THIS handsome species has only a limited range. It is comparatively common in the southern parts of the North Island, and may be met with as far north as the wooded ranges between Waikato Heads and Raglan, beyond which it is extremely rare. It is never found in the country north of Auckland, with the exception of one locality, the Barrier Islands, where Captain Hutton records it "not uncommon" in December 1868. I have never heard of its occurrence anywhere in the South Island. It affects deep wooded gullies, and is seldom found on the summits of the ranges. In the dense timber covering old river-bottoms or low-lying flats it may be sought for; but it rarely frequents the light open bush or the outskirts of the forest. It is, moreover, a very shy bird; and being most active in all its movements, it is not easily shot. Its food consists of insects, the honey of various bush-flowers, and the smaller kinds of berries. It often frequents the topmost branches of the high timber, where it may be seen flitting about in search of insects. If disturbed by the report of a gun, it will fly off to a neighbouring tree with a light and graceful movement of the wings; but when descending to a lower station, it adopts a different manner of flight, elevating the tail almost to a right angle with the body, and scarcely moving the wings at all.

The male bird erects the tail and spreads the ear-tufts when excited or alarmed; but the female habitually carries the tail perfectly erect. The sexes vary so much in appearance that many of the natives regard them as distinct species, and call them by different names. The male bird utters at short intervals and with startling energy a melodious whistling call of three notes. At other times he produces a sharp clicking sound like the striking of two quartz stones together: the sound has a fanciful resemblance to the word "stitch," whence the popular name of the bird is derived. The female also utters this note, but not the former one; and being recluse in her habits as well as silent, she is seldom seen.

Very little is at present known of the breeding-habits of this bird. A nest assigned to it,

and I believe correctly, was discovered about three years ago in the bush above the Kai-warawara stream, in the vicinity of Wellington, and is still preserved in the Colonial Museum. It is a shallow structure, with thin walls, and measures 4.75 inches across the top, with a cavity of 2.35 by 1.35. It is built of sprays, above which are laid fibres and dry rootlets of tree-fern; and the cavity is formed of fine grass, lined with cow-hair. This nest contained a single egg, of a narrow ovoid form, measuring .75 inch in length by .6 in breadth, of a yellowish-white colour, thickly spotted and clouded with pale rufous.

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ORTHONYX ALBICILLA.

(THE WHITE-HEAD.)

- Fringilla albicilla*, Less. Voy. Coq. i. p. 662 (1826).
Parus senilis, Dubus, Bull. Acad. Roy. Brux. vi. pt. 1, p. 297 (1839).
Certhiparus senilis, Lafr. Rev. Zool. v. p. 69 (1842).
Certhiparus albicillus, Gray, Voy. Ereb. and Terror, p. 6 (1844).
Certhiparus cinerea, Ellman, Zool. 1861, p. 7465.
Mohoua? albicilla, Gray, Ibis, p. 220 (1862).
Orthonyx albicilla, Finsch, J. f. O. 1870, p. 253.

Native names.

Popotea, Poupoutea, Popokotea, and Upokotea.

Ad. pileo undique et pectore superiore albis: dorso toto brunneo, supracaudalibus pallidioribus: tectricibus alarum dorso concoloribus: remigibus saturatè brunneis, extùs dorsi colore lavatis, primariis paullò pallidiùs limbatis: pogonio interno flavicanti-albo marginato: caudâ flavicanti-brunneâ: pectore medio fulvescenti-albo: corporis lateribus brunneis, dorso concoloribus: subalaribus albis, brunneo lavatis: rostro nigro: tarso et pedibus plumbescenti-nigris, plantis pallidioribus, unguibus brunneis: iride nigrâ.

Juv. vix ab adultis distinguendus, sed coloribus dilutioribus et pileo brunneo lavato.

Adult. Head and neck all round, breast, inner face of the wings, and middle of the abdomen white, slightly tinged with brown; sides of the body and flanks pale vinous brown; the whole of the back, rump, and upper surface of wings vinous brown, paler on the upper wing-coverts; quills blackish brown, the primaries narrowly margined on their outer webs with grey, and more broadly on their inner webs with yellowish white; tail-feathers and their coverts pale yellowish brown on their upper aspect, sometimes tinged with rufous, the shafts darker; paler on the under surface, with white shafts. Irides black; bill and rictal bristles black; tarsi and toes bluish black, with paler soles and brown claws. Total length 5·7 inches; wing, from flexure, 2·9; tail 2·75; bill, along the ridge ·4, along the edge of lower mandible ·5; tarsus 1; middle toe and claw ·8; hind toe and claw ·6.

Young. Upper parts pale vinous brown, whitish on the head; throat and underparts greyish white, shading into brown on the sides; wings tinged with yellow on their inner edges.

THIS interesting little bird is distributed all over the North Island, but is replaced in the South by a representative species, the *Orthonyx ochrocephala* or Yellow-head.

It frequents all wooded localities, but seems to prefer the outskirts of the forest and the low bush fringing the banks of rivers and streams. It is gregarious in its nature; and the report of a gun, the cry of a Hawk, or any other exciting cause will instantly bring a flock of them

together, producing a perfect din with their loud chirping notes. It is a curious or inquisitive bird, following the intruder as he passes through the bush, and watching all his movements in a very intelligent manner. If he remains stationary for a few moments, it will peer at him through the leaves with evident curiosity, and will hop gradually downwards from twig to twig, stretching out its neck and calling to its fellows in a loud chirp, and approaching the object of this scrutiny till almost within reach of his hand.

It has a simple but very melodious song, some bars of it reminding one of the musical strains of the Canary. Captain Hutton writes me that he found this species far more abundant on the Great Barrier Island than on the neighbouring mainland, where it is certainly less plentiful than in former years; and he remarks that "the song is very similar to that of the European Yellow Bunting, but without the last drawn-out note, while the alarm is like the *pink pink* of the Chaffinch."

Its food consists of insects and minute seeds. It is very active in all its movements, flitting about among the leafy branches and climbing the boles of the trees, clinging by the feet head downwards, and assuming every variety of attitude as it prosecutes its diligent search for the small insects on which it principally subsists. I have frequently observed it inserting its beak into the flower of the *Metrosideros*, either for the purpose of extracting honey, or, as is more likely, to prey on the insects that are attracted by it. I have also known them occasionally caught on the *tuki* baited with these flowers to allure the Tui and Korimako, which are genuine honey-eaters.

I have found scores of nests of this species, and have made frequent but ineffectual attempts to rear the young in a cage. The nest is usually fixed in the fork of a low shrubby tree, frequently that of the ramarama (*Myrtus bullata*), and is always so placed as to be well concealed from observation. It is a round, compact, and well-constructed nest, being composed of soft materials, such as moss, dry leaves, spiders' nests, shreds of native flax, and sometimes wool, all firmly knit together. The cavity is deep and well rounded, the walls being formed of dry bent and vegetable fibres and thickly lined with soft feathers. The lip or outer edge of the nest is carefully bound in with vegetable fibres, sometimes mixed with spiders' webs, and often presenting a high degree of finish. The eggs are usually three in number, but sometimes four; they are of proportionate size, rather ovoid-conical in form, and with a shell of very delicate texture. Externally they are white, minutely spotted with purplish and brown, the markings being denser towards the thick end, where they form an irregular zone. During incubation the hen bird sits closely, and leaves the nest with reluctance, almost permitting herself to be touched by the hand before quitting it.



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ORTHONYX OCHROCEPHALA.

(THE YELLOW-HEAD.)

Yellow-headed Flycatcher, Lath. Gen. Syn. ii. p. 342 (1783).*Muscicapa ochrocephala*, Gm. Syst. Nat. i. p. 944 (1788, ex Lath.).*Certhia heteroclites*, Quoy & Gaim. Voy. Astrol. i. pl. 17. fig. 1 (1830).*Mohoua hua*, Less. Compl. Buff. ix. p. 139 (1837).*Orthonyx icterocephalus*, Lafr. Rev. Zool. 1839, p. 257.*Orthonyx heteroclitus*, Lafr. Mag. de Zool. 1839, pl. 8.*Mohoua ochrocephala*, Gray, List of Gen. of B. p. 25 (1841).*Muscicapa chloris*, Forst. Descr. Anim. p. 87 (1844).*Orthonyx ochrocephala*, Gray & Mitch. Gen. of B. i. p. 151, pl. 46 (1847).*Native names.*

The same as those applied to the preceding species: "Canary" of the colonists.

Ad. pileo undique et corpore subtùs lætè citrinis, nuchâ vix olivascente, abdomine imo cum cruribus crissoque cineraceis: dorso toto olivascenti-brunneo, flavido lavato, uropygio conspicuè lætiore flavo: tectricibus alarum et supracaudalibus olivaceo-flavis, illarum majoribus saturatoribus, potiùs olivaceo-viridibus: remigibus brunneis, extùs dorsi colore lavatis, primariis cano limbatis, pogonii interni margine lætè flavicante: caudâ olivaceo-flavâ, subcaudalibus et subalaribus olivaceo-flavis, his albido lavatis: rostro nigro: pedibus nigris, unguibus saturatè brunneis: iride nigrâ.

♀ mari similis, sed coloribus obscurioribus.

Juv. similis adulto, sed pileo et nuchâ olivascente lavatis.

Adult male. Head and breast, sides of the body, and upper part of the abdomen bright canary-yellow; shoulders, back, and upper surface of wings yellowish brown, with an olivaceous tinge; upper surface of tail and the outer margins of the secondary quills dark olivaceous yellow; the colours are blended where they meet, the nape being more or less mottled with yellowish brown; lower part of abdomen greyish white; thighs and flanks pale brown; upper and lower tail-coverts yellow; the whole of the plumage is dark plumbeous at the base. Irides black; bill and feet black; claws dark brown. Total length 6 inches; wing, from flexure, 3.25; tail 2.75; bill, along the ridge .5, along the edge of lower mandible .7; tarsus 1; middle toe and claw .87; hind toe and claw .75.

Female. Similar to the male, but with the tints of the plumage generally duller.*Young.* The young bird differs from the adult in having the yellow plumage tinged with olivaceous, especially on the crown and nape, where the latter colour predominates; rictal membrane yellow.*Obs.* The shafts of the tail-feathers are often found denuded at the tips.THIS bright coloured bird is the southern representative of *Orthonyx albicilla*. Its range is con-

fined to the South Island, where it is quite as common as the preceding species is in the North. A narrow neck of sea completely divides their natural habitat,—a very curious and suggestive fact, inasmuch as this rule applies equally to several other representative species treated of in the present work.

The habits of this bird are precisely similar to those of its northern ally; but it is superior to the latter in size and in the richer colour of its plumage, while its notes are louder and its song more varied and musical. A flock of these Canary-like birds alarmed or excited, flitting about among the branches with much chirping clamour, and exhibiting the bright tints of their plumage, has a very pretty effect in the woods.

A life-size drawing of this species, by Mitchell, appeared long ago in the 'Genera of Birds;' but the attitude is unnatural, the bird being placed on the ground instead of a tree.

The nest is thus described by Mr. Potts:—"Measuring across the top 3 inches 3 lines, with a depth of 1 inch 4 lines, it is a beautifully compact structure, cup-shaped, composed principally of moss very closely felted, and neatly interwoven with spiders' webs. In the hollow trunk of the broad-leaf it is sometimes found, and occasionally in a decaying black birch." Mr. Potts, junior, found a nest of this species containing two young birds; it was built of moss, grass, and sheep's wool, with a few feathers intermixed, and was placed in a cluster of young shoots on the side of a black birch, and in the vicinity of a shepherd's homestead.

On comparing the nest of this species with that of *Orthonyx albigilla*, it appears to exhibit more care and finish in its general construction, although composed of the same materials. The eggs are of a regular oval form, measuring .95 inch in length by .7 in breadth, and are white, with obscure spots of reddish brown over the entire surface.

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CERTHIPARUS NOVÆ ZEALANDIÆ.

(NEW-ZEALAND CREEPER.)

New-Zealand Titmouse, Lath. Gen. Syn. ii. pt. 2, p. 558 (1783).*Parus novæ seelandiæ*, Gm. Syst. Nat. i. p. 1013 (1788, ex Lath.).*Parus novæ zealandiæ*, Lath. Ind. Orn. ii. p. 571 (1790).*Parus zelandicus*, Quoy & Gaim. Voy. de l'Astrol. i. p. 210, pl. ii. fig. 3 (1830).*Certhiparus novæ zelandiæ*, Lafr. Rev. Zool. 1842, p. 69.*Certhiparus novæ seelandiæ*, Gray, in Dieff. Trav. ii., App. p. 189 (1843).*Certhiparus maculicaudus*, Gray, *op. cit.* ii. p. 189 (1843).*Parus urostigma*, Forst. Descr. Anim. p. 90 (1844).*Certhiparus novæ zealandiæ*, Finsch, J. f. O. 1870, p. 254.*Native names.*—Pipipi and Toitoi.

♂ *suprà* chocolatio-brunneus, pileo paullulum obscuriore : facie laterali nuchâque cinerascens : tectricibus alarum dorso concoloribus : remigibus brunneis, primariis extûs angustè fulvescente limbatis, secundariis latius dorsi colore lavatis : caudâ rufescenti-chocolatinâ, rectricibus (duabus mediis exceptis) fasciâ nigrâ transnotatis : subtûs rufescenti-albus, corporis lateribus et tectricibus subcaudalibus chocolatio lavatis : rostro et pedibus pallidè brunneis, unguibus fulvescenti-brunneis : iride saturatè brunneâ.

♀ *mari omninò similis.**Juv.* vix ab adultis distinguendus, sed magis vinaceo tinctus.

Adult. Fore part of head, crown, back, rump, and upper surface of wings bright cinereous brown, inclining to rufous ; quills light brown, the outer webs tinged towards their base with rufous ; tail-feathers pale rufous, and, with the exception of the two middle ones, crossed on their inner web, about half an inch from the tip, with a broad band of black ; sides of head and nape cinereous grey ; throat, breast, and abdomen rufous white. Bill, tarsi, and toes pale brown ; claws lighter brown. Total length 5.25 inches ; wing, from flexure, 2.5 ; tail 2.6 ; tarsus .75 ; bill, along the ridge .5, along the edge of lower mandible .6 ; middle toe and claw .6 ; hind toe and claw .6.

Young. Plumage as in the adult, but suffused with vinous brown.*Obs.* The sexes are alike, both as to size and colouring.

THIS lively little species is confined to the wooded parts of the South Island*. I met with it in Nelson and in Otago, but more abundantly in the Canterbury Province. On Banks's Peninsula I found it particularly numerous, but I was never able to discover its nest.

* Captain Hutton, writing from Auckland, in the North Island, states, in a letter to 'The Ibis' (1867, p. 379), that *Certhiparus novæ zealandiæ* is "one of the commonest birds in the bush about here ;" but he was evidently confounding this bird with some other species, probably the well-known *Orthonyx albicilla*.

Like the members of the allied group *Orthonyx*, it is a gregarious species, associating together in small flocks, and hunting diligently for its insect food among the branches and dense foliage of the forest undergrowth. On being disturbed or alarmed they quickly assemble and chirp round the intruder for a few minutes; and on being reassured they disperse again in search of food.

Mr. Potts, who may be called the "John Wolley" of our country, and whose beautiful collection of eggs is now deposited in the Canterbury Museum, has hitherto been baffled by this little bird. He writes* :—"Although this Creeper may be seen in almost every bush from the coast to the distant alpine ranges, we have only once found its nest. This was in the month of December, and far above the Rangitata gorge. The nest, containing three young birds, was carefully built of moss, with a few feathers, placed in a black birch, between the trunk and a spur, from whence sprouted out a thick tuft of dwarfed sprays, about seven feet from the ground." The egg of this common species is still a desideratum in all our local collections, and I am unable therefore to give a description of it.

I carefully examined, with the late Mr. G. R. Gray, the examples in the British Museum on which he founded his distinction between *Certhiparus novæ zealandiæ* and *C. maculicaudus*, and am satisfied that it cannot be maintained—a conclusion in which Mr. Gray, I believe, concurred.

* Trans. New-Zealand Institute, 1869, vol. ii. p. 59.

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GERYGONE FLAVIVENTRIS.

(GREY WARBLER.)

Gerygone flaviventris, Gray, Voy. Ereb. and Terror, p. 5, pl. 4. fig. 1 (1844).*Gerygone assimilis*, Buller, Essay on Orn. N. Z. p. 9 (1865).*Acanthiza flaviventris*, Gray, Hand-l. of B. i. p. 219 (1869).*Native names.*—Riroriro and Koriroriro.

Ad. suprâ grisescenti-brunneus, dorso et uropygio cum supracaudalibus olivaceo lavatis, his lætiùs tinctis : tectricibus alarum remigibusque brunneis, extùs angustè olivaceo limbatis : rectricibus cinerascanti-brunneis versùs apicem conspicuè nigricantibus, duabus externis maculâ anteapicali albâ notatis, reliquis ad apicem pogonii interni albo maculatis : facie laterali guttureque toto sordidè cinereis : corpore reliquo subtùs albicante, abdomine imo et hypochondriis flavido tinctis, his etiam paullò olivascentibus : rostro et pedibus saturatè brunneis : iride rubrà.

Juv. similis adultis, sed coloribus dilutioribus.

Adult. Upper parts brownish grey, tinged on the back with olivaceous brown; throat, fore part of neck, breast, and sides cinereous grey; abdomen and under tail-coverts white, the former slightly tinged with yellow; primaries dark brown, paler on the inner webs; tail-feathers dark brown in their basal, almost black in their apical portion, and, with the exception of the two median ones, having an angular white spot near the tip on their inner webs. Irides red; bill, tarsi, and toes dark brown. Total length 4.5 inches; extent of wings 6; wing, from flexure, 2.12; tail 2; culmen .3; tarsus .75; middle toe and claw .5; hind toe and claw .75.

Young. In the young bird the tints of the plumage generally are paler.

Obs. In some examples the measurements are slightly larger, there is an absence of the yellow tinge on the abdomen, and the white spot on the lateral tail-feathers is terminal.

Note. A figure of this bird in the act of feeding a young Cuckoo will be found on the Plate representing *Eudynamis taitensis*, opposite page 73 of this work.

THIS little bird, of sombre plumage and unobtrusive habits, is an interesting species, whether we regard it merely as the familiar frequenter of our gardens and hedgerows, or, more especially, as the builder of a beautiful pensile nest and the foster-parent of our two parasitical Cuckoos (*Eudynamis taitensis* and *Chrysococcyx lucidus*). It belongs to a group of which there are numerous representatives in Australia, and its habits are in no way different from those of its relations. Its food consists of minute flies and insects and their larvæ, in the eager pursuit of which it appears to spend every moment of its waking hours, moving about with great agility and uttering at short intervals a trilling note of much sweetness, though of little variety. The bird is

easily attracted by an imitation of this note, however rudely attempted, and may be induced to fly into the open hand by quickly revolving a leaf or small fern-frond, so as to represent the fluttering of a captive bird. Layard compares the note to the creaking sound of a wheel-barrow; and I have sometimes heard it so subdued and regular, as to be scarcely distinguishable from the musical chirping of the pihireinga or native cricket.

The Grey Warbler builds a large and remarkably ingenious nest, in which it lays from three to six eggs, and, as I am inclined to think, breeds twice in the season. The construction of the nest, which is of great size as compared with the bird, occupies a considerable time. In one instance noted, I observed the birds collecting materials for their work towards the end of August, and the young did not quit the clump of climbing-rose in which the nest was placed till the first week in October.

Selected on account of its unwearied industry, or because of the peculiar fitness of its warm domed nest for the nurture of a semitropical species, this little bird is the willing victim of our two migratory Cuckoos, the Warauroa and Koheperoa—the former of which, at any rate, deposits its egg in the nest of this species, while both of them delegate to this tiny creature the task of rearing their young.

I have found the intrusive egg of the former in the nest with those of the Grey Warbler, and I have frequently observed the voracious young Cuckoo being attended and fed by the foster-parent, but I have never seen the young of these birds together. Either the parasitic egg being the first hatched, the others are neglected and allowed to perish, or the intruder, finding the accommodation insufficient, by virtue of his superior size and strength casts out the rightful occupants and usurps entire possession of the nest. The latter supposition is the more likely one, as this is known to occur with other species of this family in other parts of the world, while, as already recorded in treating of *Chrysococcyx lucidus*, there is at least one well-authenticated instance of this instinct on the part of our smaller Cuckoo in New Zealand.

Although, as already mentioned, the Grey Warbler appears to lay twice in the season, it would seem that one nest serves the purpose of rearing two broods; for, allowing that the family would require the attention of the old birds up to the middle of October (though probably it would be later), there would not be time to build another nest before the arrival of the Cuckoos to spend the summer with us and to deposit their eggs for incubation. The production of double broods in this case would seem to be a provision of nature to enable this species to maintain its ground, seeing that the demands of the parasitical Cuckoos involve in many cases the loss or destruction of the legitimate offspring. Instead of being scarce, the Grey Warbler continues to be one of our commonest species—a circumstance owing, no doubt, in some measure, to its being a pensile-nest builder, and thus escaping the ravages of the Norway rat, the great enemy to the increase or perpetuation of our indigenous birds.

The young on leaving the nest are extremely nimble and somewhat shy. For several days after quitting their domed cradle they remain in its vicinity, following the old birds about in a restless manner and emitting incessantly a scarcely audible piping note. On these occasions I have noticed that the birds hunt all day long in a wide circle, with the nest-home as a centre; and they probably take their young family back to it at night for shelter and warmth. The nests of most birds, when the young have flown, are polluted and unserviceable, being easily distin-

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guishable as "old nests;" but this is not the case with the nest of the species under consideration. The cavity or chamber is deeply lined with soft feathers; and to keep the interior clean and pure, the young birds may be seen elevating their bodies to the edge of the orifice on the side of the nest, and ejecting the alvine discharge to some distance. Thus the nest is kept in perfect condition for continued use in the manner suggested, or for the rearing of a second brood. At the close of the breeding-season it may be observed that this bird has the shafts of the tail-feathers denuded, often to the extent of a quarter of an inch, the result, no doubt, of its laborious and protracted building-operations.

I have examined a large number of their nests in various parts of the country and in almost every variety of situation; and while invariably exhibiting the pensile character, they are, as a rule, referable to one or the other of two distinct types—the bottle-shaped nest with the porch or vestibule, and the pear-shaped form without the porch. This peculiarity, coupled with the significant fact that in some instances the eggs were pure white, in others speckled or spotted with red, led me at one time to suspect the existence of two distinct but closely allied species; and a manifest difference in the size of some examples tended to strengthen that view. In my 'Essay on New-Zealand Ornithology' (1865) I described the two forms of nest, and proposed to distinguish the builder of the large pear-shaped structure as *Gerygone assimilis*. It may yet be necessary to recognize the existence of a larger and a smaller race, although the subject requires further investigation. It may be considered settled, however, that the ascertained difference is not such as to justify a specific separation. The two forms of nest above alluded to were thus described in my 'Essay' (p. 9):—

"That of the smaller species is a compact little nest, measuring about 6 inches by 3.5. It is 'bottle-shaped,' full and rounded at the base, and tapering upwards to a point, by which it is suspended. It is composed of a variety of soft materials—spiders' nests, dry moss, grass, vegetable fibres, &c. The spiders' nests consist of a soft silky substance, by the aid of which the materials composing the nest are woven into a compact wall, with a smooth and finished exterior. The entrance, which is situated on the side of the nest, is so small as barely to admit the finger, and it is protected from the weather by a very ingenious contrivance. It is surrounded by a protecting rim or ledge, composed of extremely fine roots interlaced or loosely woven together and firmly secured to the groundwork of the nest. This facing is arched at the top so as to form a vestibule or porch, while at the base it stands out boldly from the wall, and is nearly an inch in depth, thus furnishing a firm and secure threshold for the bird in its passage to and from the cell. The interior apartment or cavity is about two inches deep, and is thickly lined with soft feathers; and the nest forms altogether a well-proportioned and symmetrical structure, testifying alike to the skill and industry of the modest little builder. The nest of the other species is of a somewhat similar size; but it is fuller in the middle than the one described, and is pear-shaped towards the apex instead of tapering. The materials composing it are of coarser texture, there is less execution or finish about it, and the ingenious porch, the peculiar feature of the one, is altogether wanting in the other."

A specimen of the nest, with porch entrance, in Dr. Sisson's possession, measures nine inches, and is produced downwards to a point, instead of being rounded as in the typical examples.

As I have previously pointed out, in a communication to the Wellington Philosophical Society (November 12, 1870), among the substances used as building-materials by this bird, spiders' nests are always conspicuous; indeed, in some specimens, the whole exterior surface is covered with them. The particular web chosen for this purpose is an adhesive cocoon of loose texture and of a dull green colour. These spiders' nests contain a cluster of flesh-coloured eggs or young; and in tearing them off the bird necessarily exposes the contents, which it eagerly devours. Thus, while engaged in collecting the requisite building-material, it finds also a plentiful supply of food—an economy of time and labour very necessary to a bird that requires to build a nest fully ten times its own size, and to rear a foster-brood of hungry Cuckoos in addition to its own. Dry freshwater algæ are sometimes used for binding the exterior and giving additional firmness to the structure.

In the Canterbury Museum there is a beautiful nest of this species, composed almost wholly of sheeps' wool intermixed with soft dry leaves. It is almost globular in shape, with the entrance near the top, and is lightly suspended from a branch of *Leptospermum*. There is also another of much larger size, composed of wool and spiders' nests, with fragments of cotton and twine carefully interwoven, and furnished with a hoodless vestibule or porch, composed of fibrous rootlets. The threshold is unusually deep and firm, probably because of the very yielding materials of which the nest is constructed.

Mr. Potts, in his interesting paper on the nests and eggs of New-Zealand birds*, states that this species usually lays six eggs; but, so far as my experience goes, four is the normal number, although there are sometimes more. They differ somewhat in size, and vary in shape from the true ovato-conical to a slightly pyriform type. They are sometimes pure white, but more generally freckled and marked with purplish brown, and are so fragile in texture as to bear only the most delicate handling. Ordinary specimens measure .7 of an inch in length by .5 in breadth. I have remarked that among the highly variable eggs of this species several distinct types may be recognized, and that all the eggs in one nest are invariably alike. Thus there is the spotted variety, in which the whole surface is studded with scattered dots of purplish brown; secondly, the freckled variety, in which the coloration is more diffuse; and, thirdly, the zoned variety, presenting a broad zone of colour near the thick end. Two examples, taken from a nest which contained also an egg of the Shining Cuckoo, had the thick end broadly capped with reddish brown.

* Trans. New-Zealand Inst. 1869, vol. ii. p. 50.

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GERYGONE ALBOFRONTATA.

(WHITE-FACED WARBLER.)

Gerygone? albofrontata, Gray, Voy. Ereb. and Terror, p. 5, pl. 4. fig. 2 (1844).*Acanthiza albofrontata*, Gray, Hand-l. of B. i. p. 219 (1869).

Ad. suprâ olivascenti-brunneus, pileo obscuriore, uropygio et supracaudalibus lætè et conspicuè rufescenti-fulvis: tectricibus alarum et remigibus cinerascanti-brunneis, dorsi colore limbatis: rectricibus cinerascanti-brunneis, versus apicem purpurascanti-nigris et fasciâ fulvescente transversim notatâ, pennis duabus centralibus reliquorumque apicibus omninò cinerascanti-brunneis: fronte, supercilio et facie laterali albidis, loris et regione paroticâ brunneo notatis: subtùs albicans, abdomine imo et hypochondriis flavicantibus: subcaudalibus et tibiis fulvis: subalaribus albicantibus flavido lavatis: iride cruentatâ: rostro brunneo, gonyde pallidiore: pedibus saturatè brunneis.

Adult male. Upper surface rusty brown, lighter on the wings and rump; the whole of the plumage plumbeous beneath; forehead, sides of the head, fore neck, breast, and the underparts generally greyish white, tinged with yellow on the flanks and abdomen; an obscure streak of dusky brown passes through the eyes; wing-feathers dusky brown, with lighter shafts, margined on their outer webs with yellowish brown; inner lining of wings yellowish white; tail-feathers rusty brown, tinged with rufous towards the base, darker brown in their apical portion, with the tips paler; the two outermost feathers on each side with a broad subterminal bar of fulvous white, and the two succeeding ones with an obscure triangular spot of fulvous white on the inner webs; upper tail-coverts rufous brown. Irides blood-red; bill and feet blackish brown. Total length 5.75; wing, from flexure, 2.6; tail 2.5; bill, along the ridge .4, along the edge of lower mandible .5; tarsus .9; middle toe and claw .65; hind toe and claw .65.

Female. Similar to the male, but slightly smaller, and without the yellow tinge on the underparts.

THIS fine species was originally described and figured by Mr. G. R. Gray, in the 'Voyage of the Erebus and Terror,' from a specimen alleged to have been "brought by Dr. Dieffenbach from New Zealand." The specimen itself, however, which is now in the British Museum, is labelled as from the Chatham Islands. My description of the female is from an example recently obtained in the last-mentioned locality by Mr. Henry Travers (of the Geological Survey), and kindly forwarded to me by Dr. Hector.

I have never met with this bird in New Zealand; but it is highly probable that the supposed new species of *Gerygone* lately observed by Mr. Potts and his son in Westland, of which an account will shortly appear in 'The Ibis,' will prove to be the same. Mr. Potts states that the note of this Warbler is readily distinguishable from that of *Gerygone flaviventris*, and that he frequently heard it in the woods between the bluff of Okarita and Lake Mapourika, but always "in the thick bush, and never on the outskirts of the forest."

ACANTHISITTA CHLORIS.

(RIFLEMAN.)

- Citrine Warbler*, Lath. Gen. Syn. ii. pt. 2, p. 464 (1783).
Sitta chloris, Sparrm. Mus. Carls. pl. 33 (1787).
Motacilla citrina, Gm. Syst. Nat. i. p. 979 (1788, ex Lath.).
Sylvia citrina, Lath. Ind. Orn. ii. p. 529 (1790).
Sitta punctata, Quoy et Gaim. Voy. de l'Astr. i. p. 221, pl. 18. fig. 1 (1830).
Acanthiza tenuirostris, Lafr. Rev. Zool. 1841, p. 242.
Acanthisitta tenuirostris, Lafr. Mag. de Zool. 1842, pl. 27.
Motacilla citrinella, Forst. Descr. Anim. p. 89 (1844).
Acanthisitta tenuirostris, Ellman, Zoologist, 1861, p. 7466.
Acanthisitta punctata, Ellman, *tom. cit.* p. 7466.

Native names.

Tititipounamu, Kikimutu, Kikirimutu, Pihipihi, Piripiri, Tokepiripiri, and Moutuutu.

♂ *ad.* suprâ viridis, uropygio lætiore, pileo brunneo lavato: tectricibus alarum nigris, extûs viridi lavatis: alâ spurîâ nigrâ, extûs albicante: remigibus nigricanti-brunneis, extûs viridi (ad basin pennarum lætiore) limbatis, secundariis dorsalibus pogonio externo albo conspicuè maculatis: caudâ nigrâ, ad apicem albo viridi lavato maculatâ: loris, supercilio et facie laterali albidis, strigâ per oculus eunte fuscâ: subtûs albus, vix fulvo tinctus, corporis lateribus flavo lavatis: rostro saturatè brunneo: pedibus pallidè brunneis: iride saturatè brunneâ.

♀ *mari* omninò similis, sed saturatior: pileo magis brunnescente.

Juv. suprâ cinerascenti-brunneus, plumis utrinque nigro marginatis, uropygio olivascente: alâ ut in adultis coloratâ, sed extûs ad basin secundariorum conspicuè flavâ: facie laterali cinerascente, nigricante variâ: subtûs albescens, hypochondriis flavicantibus, gutture et pectore superiore maculis triquetris nigricantibus notatis.

Male. Upper parts dull green, tinged with yellow on the wings and rump; throat, breast, and underparts generally fulvous white, with a tinge of yellow on the sides of the body and abdomen; a streak over and beyond the eyes and a lower-eyelid fringe of fulvous white; wing-feathers black, edged on their outer webs with green, and crossed with a band of dull yellow immediately below the coverts, which are black; the first tertial white on its outer web; tail-feathers black, tipped with fuscous. Irides and bill dark brown; feet paler brown. Total length 3 inches; extent of wings 5.25; wing, from flexure, 1.5; tail .25; bill, along the ridge .4, along the edge of lower mandible .55; tarsus .75; middle toe and claw .6; hind toe and claw .55.

Female. Crown, hind neck, and upper part of back olivaceous yellow, each feather margined with brown;

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lower part of back and rump olivaceous yellow, tinged with green; tail-coverts dull green; underparts buffy white, washed on the sides with yellow; wing-feathers dusky, margined on the outer web and marked at the base with olivaceous yellow; superior wing-coverts black; outer tertials margined with white; innermost secondary with an oblong spot of yellowish white on the outer vane; tail-feathers black, tipped with fulvous.

Young. Plumage generally duller and suffused with yellowish brown; marked on the breast with numerous longitudinal spots of brown.

Obs. Examples vary in the tone of their colouring; and a specimen in my collection (received from the South Island) has the rump and upper tail-coverts almost orange-coloured, without any mixture of green.

THE Rifleman is the smallest of our New-Zealand birds; and although comparatively common, very little is at present known of its natural history. It is very generally distributed over the middle and southern portions of the North Island, in all suitable localities, and throughout the whole extent of the South Island. It is to be met with generally on the sides and summits of the wooded ranges, seldom or never in the low gullies. Captain Hutton found it on the Great Barrier, and was assured by the native residents of that island that it was a migratory bird, coming and going with the Cuckoo!

In its habits it is lively and active, being incessantly on the move, uttering a low feeble *cheep* (like the cry of a young bird), accompanied by a constant quivering of the wings. It is generally to be seen running up the boles of the larger trees, often ascending spirally, prying into every chink and crevice, and moving about with such celerity that it is rather difficult for the collector to obtain a shot. Its powers of flight are very feeble, and it simply uses its wings for short passages from one tree to another. Its tail is extremely short, and is hardly visible when the bird is in motion.

The stomachs of all that I have opened contained numerous remains of minute insects, sometimes mixed with finely comminuted vegetable matter.

It is of so excitable a nature that it may be decoyed into the open hand by rapidly twirling a leaf, so as to simulate the fluttering of a bird, accompanied by an imitation of its simple note.

Mr. Potts found a nest of this species, "very cleverly built, in a roll of bark that hung suspended in a thicket of climbing convolvulus," and, at another time, in a small hole in the trunk of a black birch. A bird-collector at Wellington showed me a brood of three young ones which he had taken from a nest in the cavity of a hinau, at an elevation of 20 feet or more from the ground. Finding the aperture too small to admit the hand, he cut into the tree about a foot below it, and thus disclosed the nest, which he described as being composed entirely of fern-hair, about 10 inches in length, and bottle-shaped, with a long vertical tube forming the entrance to it. In the Canterbury Museum there is a nest of this species, which appears to have been torn out of some natural cavity; it is pear-shaped, with the entrance on the side and near the bottom, and is very loosely constructed, the materials composing it being the skeletons of decayed leaves, the wiry stems of plants, rootlets, and a few feathers.

Mr. Gilbert Mair discovered a nest under the thatched eaves of a Maori hut; and Mr. E. Pharazyn sent me an egg taken from another nest found concealed among the dry roots of a fallen tree.

The Rifleman has been found breeding as early in the year as the month of August; and in a specimen which I killed in the Ruahine ranges on the 23rd of December, the ovary contained an undeveloped egg of the size of buck-shot, while the bareness of the underparts bore indication that the bird had already been sitting. From these facts we may, I think, reasonably infer that this species produces two broods in the season. The companion male bird on this occasion also had the abdomen bare, thus affording presumptive evidence that the sexes share the labour of incubation. The eggs vary in number from three to five; they are very fragile, almost spherical, and perfectly white.

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XENICUS LONGIPES (♂ et ♀)
 XENICUS GILVIVENTRIS (♂ et ♀)

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XENICUS LONGIPES.

(BUSH-WREN.)

- Long-legged Warbler*, Lath. Gen. Syn. ii. pt. 2, p. 465 (1783).
Motacilla longipes, Gm. Syst. Nat. i. p. 979 (1788, ex Lath.).
Sylvia longipes, Lath. Ind. Orn. ii. p. 529 (1790).
Acanthisitta longipes, Gray, List of Gen. of Birds, App. p. 6 (1841).
Xenicus longipes, Gray, Ibis, 1862, p. 218.
Xenicus stokesii, id. tom. cit. p. 219.

Native names.

Matuhituhi, Piwauwau, and Huru-pouamu.

- ♂ pileo umbrino : dorso toto viridi, uropygio lætiore : supercilio distincto albo : plumis anteocularibus nigris : regione paroticâ brunneâ vix viridi lavatâ : tectricibus alarum dorso concoloribus, vix flavido tinctis : alâ spuriâ nigrâ : remigibus brunneis, extûs olivaceo-viridi lavatis : caudâ suprâ olivaceo-viridi, subtûs flavicante : mento albido : corpore reliquo subtûs pulchrè cinereo, pectore vix argenteo-nitente : abdomine imo et subcaudalibus viridibus, hypochondriis olivaceo-flavis : cruribus brunneis : subalaribus et margine alari pallidè citrinis : rostro saturatè brunneo : pedibus flavicantibus.
- ♀ dissimilis : suprâ ferrugineo-brunnea : uropygio vix olivaceo tincto : supercilio lato albo : subtûs pallidè chokolatina, hypochondriis et abdomine imo sordidè flavis.

Adult male. Upper parts dark green, tinged with yellow, shading into dark brown on the forehead and crown ; sides of the head black, with a broad superciliary streak of white extending beyond the ears, and then changing to yellow ; sides, thighs, and rump bright greenish yellow ; fore neck, breast, and abdomen cinereous grey, with a beautiful gloss (sometimes tinged with cobalt), and softening into greyish white on the throat ; lining of wings pale yellow ; quills, on their outer webs, and the tail-feathers olivaceous green. Irides and bill brownish black ; tarsi and toes pale brown. Extreme length 4 inches ; wing, from flexure, 2.25 ; tail 1 (more than half of it concealed by the soft coverts) ; bill, along the ridge .5, along the edge of lower mandible .7 ; tarsus 1 ; middle toe and claw .9 ; hind toe and claw .8.

Adult female. Upper parts umber-brown, tinged with yellowish green, especially on the rump ; crown shaded with purplish brown ; superciliary streak white ; throat, sides of the neck, breast, and upper part of abdomen delicate vinous brown ; sides of the body, flanks, and thighs dull lemon-yellow ; inner lining of wings pure yellow.

Young male. Plumage generally as in the adult, but with the green tints of the upper parts paler, and the silky grey of the breast tinged with purple ; crown of the head and hind part of neck chocolate-brown, blending into the olivaceous green of the upper parts ; superciliary streak broad and conspicuous.

Obs. The figure of *X. longipes* in the 'Voyage of the Erebus and Terror,' which represents a bird with a white eye-circlet and an upturned bill like that of *Acanthisitta*, is copied from a rough half-finished drawing of Forster's (1777), and is strikingly incorrect.

THIS species is confined to the *Fagus*-forests which clothe the sides of our subalpine ranges, never being met with in the low country. Mr. Travers found it numerous in the Spencer ranges (Nelson) at an elevation of 3000 feet; Dr. Hector obtained specimens in the high wooded lands of the Otago Province, where, as he informs me, it was a very rare bird; Dr. Haast met with it frequently during his exploration of the interior of the Canterbury Province; and I observed it in the high wooded ranges forming the inland boundary of Westland. The localities I have enumerated are all in the South Island. There are specimens, however, in the British Museum which are said to have been obtained by Captain Stokes in the Rimutaka ranges (in the Province of Wellington); and, although I never met with the species in that district, or, indeed, in any part of the North Island, an intelligent Maori, to whom I showed a coloured drawing of the bird, appeared at once to recognize it. He said that he had often seen it in the Ruahine mountains, and that during severe winters it sometimes appeared in the low country; and he further spoke of the plumage as being "like silk," an expression so aptly descriptive of its peculiar softness, that I believe the man was quite familiar with the bird.

It is generally met with singly or in pairs, but sometimes several are associated, attracting notice by the sprightliness of their movements. They run along the boles and branches of the trees with restless activity, peering into every crevice and searching the bark for the small insects and larvæ on which they feed. It is strictly arboreal in its habits, never being seen on the ground, in which respect it differs conspicuously from the closely allied species *Xenicus gilviventris*. It has a weak but lively note, and its powers of flight are very limited.

On comparing my specimens of this bird with the type of Mr. G. R. Gray's *Xenicus stokesii* in the British Museum, I feel satisfied that they are referable to one and the same species, the difference of plumage being only sexual.

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XENICUS GILVIVENTRIS.

(ROCK-WREN.)

Xenicus gilviventris, Von Pelz. Verh. k.-k. zool.-bot. Ges. Wien, 1867, p. 316.*Xenicus haasti*, Buller, Ibis, 1869, p. 37.*Acanthisitta gilviventris*, Gray, Hand-l. of B. i. p. 183 (1869).*Acanthisitta haastii*, id. *op. cit.* p. 183 (1869).

♂ staturâ *X. longipedis*, sed hallucis ungue maximo distinguendus: suprâ pallidè viridis, pileo et dorso superiore brunnescentioribus concoloribus: supercilio albo, haud flavo tincto: subtùs dilutè chocolatinobrunneus, crisso cum cruribus viridescentibus, hypochondriis lætè flavis: subalaribus pallidè flavis.

♀ feminæ *X. longipedis* dissimilis et hujus mari magis assimilata: suprâ ochrascenti-brunnea, uropygio vix viridescente: tectricibus alarum conspicuè nigris: remigibus brunneis, extùs dorsi colore lavatis: subtùs pallidè isabellina, hypochondriis viridescentibus.

Adult male. Upper parts dull olive-brown, with a greyish gloss, darker on the forehead and crown, and tinged on the back, wing-coverts, and rump with yellowish green; sides of the head dark brown, with a narrow superciliary streak of fulvous white, widening above the ears; underparts delicate purplish brown, with a silky appearance, and fading into fulvous white at the base of the lower mandible; the sides of the body lemon-yellow; wing-feathers brown, the primaries margined on their outer webs with dull olive, the secondaries with an apical spot of fulvous on their outer webs; tertials and the lesser wing-coverts black, forming a conspicuous triangular spot; inner lining of wings pale yellow; tail-feathers dull olive. Irides and bill blackish brown; tarsi and toes pale brown; claws darker. Total length 3.75 inches; wing, from flexure, 2.1; tail .75 (nearly two thirds of it being concealed by the coverts); bill, along the ridge .4, along the edge of lower mandible .6; tarsus 1; middle toe and claw .9; hind toe and claw .9.

Adult female. Differs from the male in having the plumage of the upper parts dull yellowish brown, shaded with umber on the crown, and tinged with yellowish olive on the wings and rump; the superciliary streak less distinct; and the underparts pale fulvous, stained on the sides of the body with lemon-yellow.

Obs. It will be necessary to obtain a larger series of specimens than is at present available, and to make a closer investigation of the subject, before the differences supposed to be characteristic of the sexes (both of this and the preceding species) can be considered finally determined. It is probable that the colours undergo some change in the progress of the bird towards maturity; and there is likewise reason to suspect that a seasonal change takes place in the plumage of the male.

My first specimens of this bird were received from Dr. Haast, F.R.S., who discovered it in the Southern Alps, during a topographical survey of the Canterbury Province. In a notice which I communicated to 'The Ibis' (*l. c.*), I described the species as new, and named it *Xenicus haasti*,

wishing thus to dedicate it to one of the most earnest pioneers of science in New Zealand. This name, however, must, in obedience to the inflexible law of priority, give place to the far less appropriate one of *X. gilviventris*, a description of the species under that title having previously been published by Von Pelzeln, although it had not then reached the colony. Nevertheless I am glad to be able to quote Dr. Haast's account of the bird's habits as communicated to me at the time:—"It lives exclusively amongst the large taluses of débris high on the mountain-sides. Instead of flying away when frightened, or when stones are thrown at it, or even when shot at, it hides itself among the angular débris of which these large taluses are composed. We tried several times in vain to catch one alive by surrounding it and removing these blocks. It reminded me strongly of the habits and movements of the lizards which live in the same regions and in similar localities."

Dr. Hector found it frequenting the stunted vegetation growing on the mountain-sides in the Otago Province; and Mr. John Buchanan, the artist attached to the Geological Survey, met with it on the Black Peak, at an elevation of 8000 feet. There, where the vegetation is reduced to a height of only a few inches, it was constantly to be seen, fluttering over the loose rocks or upon the ground in its assiduous search for minute insects and their larvæ.

It is worthy of remark that in this species the claw of the hind toe is considerably more developed than in the tree-frequenting *X. longipes*, even exceeding the toe in length—a modification of structure specially adapted to the peculiar habits of the bird.

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MIRO LONGIPES.

(NORTH-ISLAND ROBIN.)

Muscicapa longipes, Garnot, Voy. Coq. i. p. 594, pl. xix. fig. 1 (1826).*Myiothera novæ-zelandiæ*, Less. Man. d'Orn. i. p. 248 (1828).*Miro longipes*, Less. Tr. d'Orn. p. 389 (1831).*Petroica australis*, Gray, Voy. Ereb. and Terror, p. 7 (1844).*Myioscopus longipes*, Reich. Syst. Av. Taf. lxxvii. (1850).*Petroica longipes*, Gray, Ibis, 1862, p. 223.*Native names.*

Pitoitoi, Toutou, Toutouwai, and Totoara.

saturatè cinereus, scapis plumarum albidis: maculâ frontali albâ: tectricibus alarum dorso concoloribus: remigibus brunneis, extûs cinereo lavatis: caudâ nigricante: facie laterali cinereâ, albido magis distinctè striolatâ: abdomine medio albicante: corporis lateribus cinereis: subcaudalibus albidis: cruribus cinereis albido terminatis: subalaribus pallidè cinereis: primariis intûs ad basin albidis: rostro nigricanti-brunneo, mandibulâ brunnescentiore: pedibus pallidè brunneis: iride nigrâ.

♀ pallidior: remigibus brunnescentibus: facie laterali cinerascete, albo striolatâ: pectore superiore pallidè cinerascete, plumis medialiter albido striatis: abdomine albido.

Adult male. Head, neck, and all the upper surface dark slaty grey, plumbeous beneath; the shafts of the feathers greyish white, forming rather conspicuous lines on the crown and nape; a frontal spot at the base of the upper mandible pure white; rictal bristles black; throat, fore neck, and sides of the body paler slaty grey; the lower part of the breast, the middle of the abdomen, the vent, and the under tail-coverts white, blending on the edges with the darker plumage of the surrounding parts; wing-feathers dull smoky brown, with lighter shafts; lining of wings and a broad oblique bar on the under surface of all the quills except the first three primaries pure white; tail-feathers dull smoky brown, the shafts light brown on their upper and white on their under aspect. Irides black; bill blackish brown; tarsi and toes pale brown; soles dull yellow. Total length 6 inches; wing, from flexure, 3·5; tail 2·65; bill, along the ridge ·6, along the edge of lower mandible ·8; tarsus 1·35; middle toe and claw ·95; hind toe and claw ·8.

Female. Slightly smaller than the male and with duller plumage; the upper parts tinged with smoky brown; the throat, fore neck, and sides of the body lighter, the centre of each feather inclining to greyish white.

Young. The young of both sexes resemble the female in the comparative brownness of the plumage of the upper parts; the rictal membrane is largely developed and of a rich orange-colour.

Obs. In this and the other closely allied species the feathers of the body have loose or disunited filamentous barbs, and are very soft in texture, especially on the upper parts.

Note. I entirely agree with Dr. Finsch that this form should be separated from *Petræca*; but I am unable to follow him in adopting the genus *Myioscopus* of Reichenbach, the name of *Miro* proposed by Lesson having a prior claim in regard to date.

THIS species is confined to the North Island, where it is very common in all the wooded parts of the country; but it is represented in the South Island by a closely allied and equally common species, the *Miro albifrons*. There is a specimen of the North-Island Robin in the Auckland Museum said to have been obtained at Nelson; but I have never found this bird south of Cook's Strait, and *vice versâ* as regards the South-Island Robin. The two species may therefore be regarded as true representatives of each other in the North and South Islands respectively.

Generally speaking, in New Zealand it is only on the outskirts of the woods that we meet with insessorial birds in any number. As we penetrate into the heart of the forest, the birds become fewer, till at length they almost entirely disappear. But there is one species whose range seems to be quite without restraint: common enough in the open coppice, it is to be found also in the gloomiest and most secluded parts of the forest. This bird is the subject of our article—the "Toutouwai" of the natives and the "Robin" of the colonists.

I have been assured by officers who accompanied the celebrated Taranaki Expedition under Major-General Sir Trevor Chute, in 1866, that during that long and irksome march the Robin was the only bird that gave any sign of life to those interminable and gloomy forests through which the army passed. The lively twitter and song of the smaller birds had ended with the first day's march, the harsh cry of the Kaka (*Nestor meridionalis*), which had attended them far into the bush, had gradually ceased to be heard, and the Wood-Pigeon (*Carpophaga novæ-zealandiæ*), whose range extends to the summits of the low wooded ridges of the interior, was no longer to be met with. An oppressive silence reigned around them, broken only by the shrill chirp of the startled Robin as the advanced guard cut a path for the troops through the hitherto untrodden forest. Indeed the presence of this little bird was the only exception to the utter absence of animal life, and almost the only relief to the monotony of the march. Perched on a low branch, it might frequently be seen looking gravely down, as if in silent wonderment, on the weary ranks, as they toiled their way through this virgin forest in the very heart of the enemy's country!

As the popular name implies, it is naturally a tame bird; and in little-frequented parts of the country it is so fearless and unsuspecting of man that it will approach to within a yard of the traveller, and sometimes will even perch on his head or shoulder. It is the favourite companion of the lonesome wood-cutter, enlivening him with its cheerful notes; and when, sitting on a log, he partakes of his humble meal, it hops about at his feet, like the traditional Robin, to "pick up the crumbs."

Like its namesake in the old country, moreover, it is noisy, active, and cheerful. Its note is generally the first to herald the dawn, while it is the last to be hushed when the evening shades bring gloom into the forest. But there is this noticeable difference between the morning and the

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evening performance: the former consists of a scale of notes commencing very high and running down to a low key, uttered in quick succession, and with all the energy of a challenge to the rest of the feathered tribe; and I have sometimes heard a native, when listening to this strain, exclaim "Ka kanga te manu ra!" (How that bird swears!). The evening performance is merely a short chirping note, quickly repeated, and with a rather melancholy sound. Three or four of them will sometimes join in a chirping chorus, and continue it till the shades of advancing twilight have deepened into night.

It lives almost entirely on small insects and the worms and grubs which are to be found among decaying leaves and other vegetable matter on the surface of the ground in every part of the woods.

It generally breeds in the months of October and November. It constructs a large and compact nest, composed externally of coarse moss firmly interwoven and thickly lined inside with the soft hair-like substance which covers the young stems of the tree-fern. It is usually built against the bole of a tree, at a moderate elevation from the ground, being often found attached to and supported by the wiry stems of the kiekie (*Freycinetia banksii*), a climbing parasitical plant which is everywhere abundant. I have found scores of the nests of this species, and almost invariably in the situation described. I found one, however, placed in the fork of a tree at some elevation, and another in the truncated stem of a tree-fern (*Cyathea dealbata*). The eggs are usually three in number, broadly ovoido-conical, and measuring .95 of an inch in length by .70 in breadth; they are of a creamy white colour, thickly freckled and speckled with purple and brown, these markings being denser at the thick end, where they form an indistinct purplish zone.

Should the nest happen to be invaded after the young are hatched, the parent birds manifest the utmost solicitude, hopping about near the intruder with outspread and quivering wings, uttering a low piping note, and showing every symptom of real distress.

MIRO ALBIFRONS.

(SOUTH-ISLAND ROBIN.)

White-fronted Thrush, Lath. Gen. Syn. ii. pt. 1, p. 71 (1783).*Turdus albifrons*, Gm. Syst. Nat. i. p. 822 (1788).*Miro albifrons*, Gray, in Dieff. Trav. ii., App. p. 190 (1843).*Petroica albifrons*, Gray, Voy. Ereb. and Terror, p. 7, pl. 6. fig. 2 (1844).*Turdus ochrotarsus*, Forster, Descr. Anim. p. 82 (1844).*Muscicapa albifrons*, Ellman, Zool. 1861, p. 7465.*Native names.*

The same as those applied to the preceding species.

♂ similis *M. longipedi*, sed multo major et magis fuliginosus, scapis plumarum minus distinctè albis: sed præcipuè pectore et abdomine medio ochrascenti-albis distinguendus.

Adult male. Head, neck, sides of the body, and all the upper surface dark sooty grey, the base of the feathers plumbeous; at the root of the upper mandible a small spot of yellowish white; breast, abdomen, and vent yellowish white, tinged with lemon-yellow on the breast, and forming a tolerably well-defined line against the dark plumage of the fore neck; inner lining of wings, flanks, and under tail-coverts greyish white; quills and tail-feathers smoky black; an oblique bar of white on the inner face of the wings, as in *M. longipes*. Irides black; bill brownish black; palate and soft parts of the mouth yellow; tarsi, toes, and claws dark brown; soles of the feet dull yellow. Total length 7·25 inches; wing, from flexure, 4; tail 3; bill, along the ridge ·65, along the edge of lower mandible ·85; tarsus 1·5; middle toe and claw 1·05; hind toe and claw ·9.

Female. Somewhat smaller than the male, and having the plumage of the upper parts tinged with brown; there is less yellow on the breast, and the grey of the underparts is lighter.

Obs. This species may readily be distinguished from *M. longipes* by its appreciably larger size, its darker coloration, and the more defined patch of yellowish-white on the under surface. The white shaft-lines are not so distinct on the crown and nape, but are far more so on the throat and fore neck, owing to the ground-colour of these parts being darker than in *M. longipes*. The frontal spot is smaller and less conspicuous.

Note. The figure of this species in the 'Voyage of the Erebus and Terror' is incorrect, on account of the exaggerated extent of white on the underparts; but the attitude is a very characteristic one.

THE habits of this bird differ in no respect from those of its near congener *Miro longipes*; and the account given in the foregoing pages may be considered equally applicable to both species.

MIRO TRAVERSI, sp. nov.

(CHATHAM-ISLAND ROBIN.)

♀ omninò niger, remigibus et rectricibus paullò brunnescentioribus: rostro nigro: pedibus nigris, plantis flavis: iride saturate brunneâ.

Adult male. The whole of the plumage black, the base of the feathers dark plumbeous; wing-feathers and their coverts tinged with brown, the former greyish on their inner surface; tail-feathers black, very slightly tinged with brown. Irides dark brown; bill black; tarsi and toes blackish brown, the soles of the feet dull yellow. Total length 6 inches; wing, from flexure, 3·4; tail 2·6; bill, along the ridge ·5, along the edge of lower mandible ·7; tarsus 1·1; middle toe and claw 1; hind toe and claw ·8.

Female. Slightly smaller than the male, and without the brown tinge on the wings and tail.

THIS new species was discovered by Mr. Henry H. Travers during an exploratory visit to the Chatham Islands in the early part of this year; and I have much pleasure in adopting Captain Hutton's proposal to name the bird in honour of this ardent young naturalist.

The specimens described above were promptly sent to me by Dr. Hector; and through the courtesy of His Excellency Sir George Bowen, who forwarded them with others in his despatch-box to the Colonial Office, they have reached me in time to appear in this work in their proper systematic order.

Mr. Travers, sen., states, on the authority of his son, in a communication to the Wellington Philosophical Society (November 25th, 1871), that the habits of this species very closely resemble those of *Miro albifrons*; and this is at present the only information we have on the subject.

MYIOMOIRA TOITOI.

(PIED TIT.)

Muscicapa toitoi, Garnot, Voy. Coq. i. p. 590, t. xv. fig. 3 (1826).*Miro toitoi*, Gray, in Dieff. Trav. ii., App. p. 191 (1843).*Petroica toitoi*, Gray, Voy. Ereb. and Terror, Birds, p. 6 (1844).*Myiomoira toitoi*, Reich. Syst. Av. Taf. lxxvii. (1850).*Muscicapa albopectus*, Ellman, Zool. 1861, p. 7465.*Native names.*

Miromiro, Komiroiro, and Ngirungiru.

♂ *suprà sericeo-niger* : maculâ frontali conspicuâ albâ : tectricibus alarum plerumque nigris, medianis brunnescentibus : remigibus brunneis, primariis interioribus ad basin albo maculatis, secundariis magis conspicuè notatis, plagam albam exhibentibus : caudâ nigrâ, rectricibus tribus exterioribus ferè omninò albis, basi pogonii interni et apice pogonii externi exceptis nigris : facie laterali, gutture toto et pectore superiore nigris, gulâ vix brunnescente : corpore reliquo subtùs albo, basi plumarum nigricante : rostro et pedibus nigricanti-brunneis : plantis pedum flavicantibus : iride nigrâ.

♀ *mari dissimilis* : brunnea, subtùs albida, hypochondriis brunnescente lavatis : loris et facie laterali brunneis, fulvescente variis.

Adult male. Head, neck all round, and all the upper parts black ; frontal spot, at the base of the upper mandible, white ; breast and underparts pure white, the black of the fore neck having a sharply defined lower edge ; wing-feathers crossed near their base by an angular patch of white, which is narrow and interrupted on the primaries, broad and continuous on the secondaries ; tail black, the three outer feathers on each side crossed obliquely upwards by a broad bar of white. Irides black ; bill and tarsi blackish brown ; toes paler, yellow on their inner surface. Total length 5 inches ; wing, from flexure, 3 ; tail 2.25 ; bill, along the ridge .4, along the edge of the lower mandible .5 ; tarsus .75 ; middle toe and claw .8 ; hind toe and claw .65.

Adult female. Upper surface smoky brown, with a minute frontal spot of white ; throat, fore neck, and all the underparts greyish white, more or less clouded with dull smoky brown ; wing-feathers blackish brown, a bar across the base of the secondaries and some indistinct marks on the webs of the outer primaries fulvous white ; tail black, the three outer feathers on each side barred obliquely with white, as in the male.

Young. In the young male the colours are much duller and browner, and the sharply defined pectoral line is wanting ; but the plumage is sufficiently different from that of the female to distinguish the sexes.

Obs. The sexes do not present any perceptible difference in size.

THIS elegant little bird belongs to the North Island, where it has a pretty general distribution, being met with in all localities suited to its habits. It is a familiar species, seeking the habitations of man, and taking up its abode in his gardens and orchards. It is always to be seen in the clearings and cultivated grounds near the bush, moving about in a peculiar fitful manner, and in the early morn may be heard uttering a prolonged trilling note, very sweet and plaintive. Its usual attitude is with the wings slightly lowered and the tail perfectly erect, almost at a right angle with the body. It has a sparkling black eye, and all its actions are lively and sprightly. The strongly contrasted plumage of the male bird renders it a conspicuous object; but the female, owing to her sombre colours and less obtrusive habits, is rarely seen.

It is interesting to watch this active little creature as it flits about the fences and fallen timber in the bush-clearings, where it is to be found at all hours of the day. It rests for a moment on its perch, flirting its wings and tail in a rapid manner, then darts to the ground to pick up a grub or earthworm, and, flying upwards again almost immediately, clings by its tiny feet to the upright bole of a tree or some other perpendicular surface, a peculiar attitude which it appears to delight in. Its food consists of small insects and their larvæ; and it proves itself useful by devouring a destructive little aphide which infests our fruit-trees.

Common as this species is, I have found it difficult to study its breeding-habits, and have never succeeded in finding more than one nest. I met with this in the Upper Hutt valley, in the neighbourhood of Wellington, as late as the 3rd of December. It was placed in the cavity of a tree a few feet from the ground, and contained four young birds apparently about a week old. The nest was composed entirely of dry moss, shallow in its construction, but with a neatly finished rim or outer edge. The parent birds manifested some solicitude for the safety of their offspring while I was handling them. After I had replaced the young birds and retired a few steps from the spot, the female squatted upon the nest, which was sufficiently near the entrance of the cavity to be distinctly visible; and on being disturbed, she fluttered away with wings outstretched and quivering, as if unable to fly, and apparently to divert attention from the nest.

Weston Brown, a bird-collector at Wellington, showed me a pair of newly fledged young birds of this species which he had taken himself. He informed me that he had found them in a rudely constructed nest in the hollow of a whitewood tree, and about 9 inches from the entrance. There were only two young birds in the nest, and these were male and female. The plumage of the former was strongly suffused with brown; but the colours were sufficiently distinct to indicate the sex.

At a roadside inn I was once shown an egg which I felt no hesitation in assigning to this bird. It was of a pale reddish tint, thickly speckled and freckled with light brown; and the lad who had blown it informed me that he took it from a nest in the hole of a dry stump.

MYIOMOIRA MACROCEPHALA.

(YELLOW-BREASTED TIT.)

- Great-headed Titmouse*, Lath. Gen. Syn. ii. pt. 2, p. 557, pl. lv. (1783).
Parus macrocephalus, Gm. Syst. Nat. i. p. 1013 (1788, ex Lath.).
Pachycephalus? macrocephalus, Steph. Gen. Zool. xiii. p. 267 (1826).
Rhipidura macrocephala, Gray, in Dieff. Trav. ii., App. p. 190 (1843).
Miro forsterorum, Gray, *op. cit.* ii. p. 191 (1843).
Miro dieffenbachii, Gray, *op. cit.* ii. p. 191 (1843).
Petroica macrocephala, Gray, Voy. Ereb. and Terror, Birds, p. 6 (1844).
Petroica dieffenbachii, id. *op. cit.* p. 6, pl. 6. fig. 1 (1844).
Turdus minutus, Forst. Descr. Anim. p. 83 (1844).
Miro macrocephala, Bonap. Consp. Gen. Av. i. p. 299 (1850).
Muscicapa macrocephala, Ellman, Zool. 1861, p. 7465.
Muscicapa minuta, Ellman, *tom. cit.* p. 7465.
Myiomoira dieffenbachii, Gray, Hand-l. of B. i. p. 229 (1869).
Myiomoira macrocephala, id. *op. cit.* p. 229 (1869).

Native names.

The same as those applied to the preceding species.

♂ similis *M. toitoi*, sed maculâ frontali albâ minore et pectore flavido distinguendus.

♀ similis feminae *M. toitoi*, sed pectore flavido lavato.

Adult male. Similar to *M. toitoi*, except in the colour of the under surface, which is pale lemon-yellow instead of being white, deepening to orange where it meets the black of the fore neck, and fading away into yellowish white on the vent and under tail-coverts; the white frontal spot, moreover, is somewhat less distinct than in the former bird.

Female. Similar to the female of *M. toitoi*, but having the breast and abdomen washed with pale lemon-yellow, and the wing-bar tinged with fulvous.

Young. In the young of both sexes the yellow is reduced to a scarcely perceptible tinge, and in some examples is altogether wanting. In the young male the breast is obscurely mottled with brown, and in the young female these markings extend to the flanks also.

Obs. Individuals vary much both in size and in the tone of their colouring. A specimen in the Canterbury Museum measures only 4.75 inches in length, corresponding, both in size and plumage, with the type of Mr. G. R. Gray's *M. dieffenbachii*; and I have received equally small examples from the Chatham Islands; but, after a very careful comparison, I am unable to admit the validity of the supposed new species.

THE Yellow-breasted Tit is the South-Island representative of the preceding species, which is

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only found north of Cook's Strait. It appears, however, to enjoy a wider geographical range; for I obtained specimens at the Chatham Islands, and the Antarctic Expedition brought some from Auckland Island.

The habits of this species are similar to those of its northern ally (*M. toitoi*), except that it appears to be less recluse in its manner of nidification.

Mr. Potts, who has frequently found the nest, writes as follows:—"This familiar little bird is one of the most elaborate nest-builders amongst the denizens of the bush, or rather of its outskirts. The nest varies much in shape, according to position: frequently we have found it in the holes of trees; and a favourite site is immediately under the head of the ti tree (*Cordyline australis*). Two nests which we presented to the Canterbury Museum were of remarkable shape: one, a firm compact structure, placed in the forked head of a ti tree, resembled a very neat moss basket with a handle across the top; the second, also from a ti tree, owing, perhaps, to the foundation slipping between the leaves, was built up till it reached the great length of sixteen inches. We have found others placed on a rock; and one, now in the Colonial Museum, was built between the brace and shingles in the roof of an empty cottage"*. In a letter to myself, Mr. Potts adds the following interesting particulars of two other nests found by him:—"No. 1 was built chiefly of sprays of climbing plants, strengthened with grass-bents and a few pieces of split ti-palm leaf, lined with moss, as usual. The whole fabric appeared much rougher and more loosely put together than is usually the case with the nest of this bird. It was placed in a ti palm, and contained two well-fledged young birds and three bad eggs. No. 2: This nest was composed almost entirely of moss, with a few slender strips of bark fixed to the outside, and ornamented inside with a few Parrakeet-feathers; it was placed on a ledge in a mossy recess among the rocks in dense bush, and contained four eggs."

The eggs, which are generally three in number, are ovoido-conical, measuring .75 inch in length by .6 in breadth; they are white, with a broad freckled zone of purplish brown, and with the whole surface dusted or minutely freckled with paler brown; sometimes without the zone, and beautifully speckled all over with various shades of brown.

* Trans. New-Zealand Inst. 1869, vol. ii. p. 59.

SPHENÆACUS PUNCTATUS.

(COMMON UTICK.)

Synallaxis punctata, Quoy & Gaim. Voy. de l'Astrol. i. p. 255, t. 18. fig. 2 (1830).*Sphenæacus punctatus*, Gray, Voy. Ereb. and Terror, p. 5 (1844).*Megalurus punctatus*, Gray, Gen. of B. i. p. 169 (1848).*Native names.*

Mata, Matata, Kotata, Nako, and Koroatito.

Ad. suprà ochrascenti-fulvus, dorsi plumis medialiter nigris, lineas latas longitudinales formantibus: pileo rufescente, fronte immaculatâ, vertice angustius nigro striolato: loris et regione oculari albidis: facie laterali albidâ, brunneo maculatâ, regione paroticâ brunnescente: tectricibus alarum dorso concoloribus et eodem modo medialiter nigris: remigibus rectricibusque nigricanti-brunneis, ochrascenti-fulvo limbatis, his acuminatis, scapis versùs apicem nudis: subtùs albescens, hypochondriis et subcaudalibus ochrascenti-fulvis, latè nigro striolatis: gutture indistinctè, pectore superiore magis distinctè, brunneo punctatis et pectore laterali nigro lineato: rostro brunnescente, mandibulâ flavicante: pedibus flavidis: iride nigrâ.

Adult. Upper parts dark brown, each feather margined with fulvous, shading into rufous brown on the forehead and crown; streak over the eyes white; throat, fore neck, breast, and abdomen fulvous white, each feather with a central streak of black, giving to the underparts a spotted appearance; wing-feathers and their coverts blackish brown, edged with bright fulvous; tail-feathers dark brown, with black shafts. Irides black; bill and feet pale brown. Total length 6.5 inches; wing, from flexure, 2.25; tail 3.25; bill, along the ridge .4, along the edge of lower mandible .6; tarsus .75; middle toe and claw .7; hind toe and claw .6.

Young. The young assume the adult plumage on quitting the nest.

Obs. The tail-feathers have the barbs disunited in their whole extent.

THIS recluse little species is one of our commonest birds, but is oftener heard than seen. It frequents the dense fern (*Pteris aquilina*) of the open country, and the beds of raupo (*Typha angustifolia*) and other tall vegetation that cover our swamps and low-lying flats. In these localities it may constantly be heard uttering, at regular intervals, its sharp melancholy call of two notes, *u-tick, u-tick*, and responsively when there are two or more. When the shades of evening are closing in, this call is emitted with greater frequency and energy, and in some dreary solitudes it is almost the only sound that breaks the oppressive stillness. In the Manawatu district, of the Province of Wellington, where there are continuous raupo-swamps, covering an area of 50,000 acres or more, I have particularly remarked this; for, save the peevish cry of the Pukeko, occasionally heard, and the boom of the lonely Bittern, the only animate sound I could detect was the

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monotonous cry of this little bird calling to its fellows as it threaded its way among the tangled growth of reeds.

Like the other members of the group to which it belongs, it is a lively creature, active in all its movements, and easily attracted by an imitation of its note; but, when alarmed, shy and wary. Its tail, which is long and composed of ten graduated feathers, with disunited filaments, appears to subserve some useful purpose in the daily economy of the bird; for it is often found very much denuded or worn. When the bird is flying, the tail hangs downward. Its wings are very feebly developed, and its powers of flight so weak that, in open land where the fern is stunted, it may easily be run down and caught with the hand; but in the swamps it threads its way through the dense reed-beds with wonderful celerity, and eludes the most careful pursuit. When surprised or hard pressed in its more exposed haunts, it takes wing, but never rises high, and, after a laboured flight of from fifteen to twenty yards in a direct line, drops under cover again. Its food consists of small insects and their larvæ and the minute seeds of various grasses and other plants.

It is a matter of extreme difficulty to study the breeding-habits of species that resort to the dense vegetation of the swamps. Even a systematic search for the nests, in such localities, is of very little use, and the collector must trust to the chapter of accidents for opportunities of examining them. Although so common a bird, I have only once succeeded in finding the nest. This discovery was made many years ago, on the edge of a raupo-swamp, near the old Mission Station on the Wairoa river. The nest was a small cup-shaped structure, composed of bents and dry grass-leaves, not very compact, but with a smooth and carefully lined interior. It was attached to reed-stems standing together, and contained four young birds, which showed remarkable nimbleness, darting out of the nest and disappearing in the long grass on the first moment of my approach.

Mr. Henry Churton, of Wanganui, informs me that he once found a nest of this species containing three eggs.

Mr. Potts describes the nest as of frail construction, and composed of grass-leaves, with generally a few feathers of the Swamp-hen, and sometimes a small tuft of wool. He has several times found it fixed in a grass tussock, a few inches from the ground. He describes the eggs as "three or four in number, white, speckled with a beautiful tint of reddish purple, which at once readily distinguishes them from those of any other bird." They are ovoido-conical in form, and measure, through the axis, $\cdot 8$ of an inch, with a diameter of $\cdot 6$. The breeding-season appears to embrace the months of October and November; for on November 4, Mr. Potts found a nest containing three young birds, and three days later, but in another locality, a nest with four eggs in it.

This pretty little creature is not exempt from the common ills that "flesh is heir to." A specimen brought to me on the 8th March presented a remarkable diseased swelling, larger than a pea, at the root of the beak; after carefully examining it, I turned the little sufferer free, leaving Dame Nature, in this case, to work out her own cure.

SPHENÆACUS FULVUS.

(FULVOUS UTICK.)

Sphenæacus fulvus, Gray, Ibis, 1862, p. 221.*Megalurus fulvus*, Gray, Hand-l. of B. i. p. 206 (1869).

Ad. similis *S. punctato*, sed paullò major: ubique lætiùs fulvescens, plumis vix ita distinctè medialiter lineatis: pectore etiam minùs distinctè maculato: caudâ minùs acuminatâ, scapis plumarum haud nudis, sed ad apicem ipsum plumiferis.

Adult. Upper parts dark fulvous, each feather centred with black; forehead and crown slightly stained with rufous; line over the eyes, throat, fore neck, breast, and upper part of abdomen fulvous white, obscurely spotted on the breast with brown; sides of the body, flanks, thighs, and lower part of abdomen bright fulvous; primaries and secondaries blackish brown, margined on their outer webs, and the three innermost secondaries broadly margined all round, with bright fulvous; tail-feathers fulvous, with a dark shaft-line, and lighter on the edges. Total length 7·5 inches; wing, from flexure, 2·5; tail 4; bill, along the ridge ·4, along the edge of lower mandible ·6; tarsus ·75; middle toe and claw ·7; hind toe and claw ·6.

Young. An example in the Canterbury Museum, so immature that the tail-feathers are only two inches long, has more fulvous in the plumage and no indication whatever of a superciliary streak.

THIS species, which appears to be confined to the South Island, bears a general resemblance to *Sphenæacus punctatus*; but, on comparing them, the following characteristic differences are manifest:—The present bird is larger and has the whole of the plumage lighter; the upper parts have the central marks much narrower, and on the hind neck and rump they are entirely absent; the white superciliary streak is less distinctly defined, the spots on the under surface are less conspicuous, and the tail-feathers, which are much paler than in *S. punctatus*, differ likewise in their structure, the webs being closely set, instead of having loose disunited barbs.

SPHENÆACUS RUFESCENS.

(CHATHAM-ISLAND UTICK.)

Sphenæacus rufescens, Buller, Ibis, 1869, p. 38.*Megalurus rufescens*, Gray, Hand-l. of B. i. p. 206 (1869).

Ad. suprâ saturatè castaneus, pileo concolori : dorso paullò fulvescente, plumis latè medialiter nigris : tectricibus alarum medialiter nigris, dorso concoloribus : remigibus nigris, rufescente limbatis : caudâ rufescente, subtùs fulvescentiore, scapis pennarum nigris : loris et supercilio distincto fulvescenti-albis : regione paroticâ saturatè castaneâ, nigro notatâ : genis fulvescentibus, nigro maculatis : subtùs fulvescenti-albus, corporis lateribus castaneis nigro striolatis, dorso concoloribus : subalaribus stramineis, rufescente lavatis : rostro corneo, mandibulâ flavicante : pedibus flavicanti-brunneis : iride nigrâ.

Adult. Upper parts dark rufous brown, brightest on the crown and hind neck ; streak over the eyes, throat, breast, and abdomen dull rufous white, slightly tinged with yellow on the throat ; sides of the head, ear-coverts, and a series of spots from the base of the lower mandible brownish black ; sides of the body and the flanks bright rufous brown, each feather with a central streak of black ; wing-feathers dusky black, margined on both webs with rufous brown ; the wing-coverts and the scapularies broadly centred with brownish black ; tail-feathers clear rufous brown, with glossy black shafts, paler on their under surface. Irides black ; bill and feet yellowish brown. Total length 7·25 inches ; extent of wings 7 ; wing, from flexure, 2·25 ; tail 4·25 ; bill, along the ridge ·5, along the edge of lower mandible ·7 ; tarsus 1 ; middle toe and claw ·85 ; hind toe and claw ·75.

Note. The figure on the accompanying Plate is taken from the type specimen, which forms part of my collection in the Colonial Museum.

THIS well-marked species is confined to the Chatham Islands, where it was first discovered, in 1868, by Mr. Charles Traill, a gentleman greatly devoted to conchology. He obtained it on a small rocky isle, lying off the coast of the main island, during an expedition there in pursuit of his favourite branch of science ; but was unable to give me much information respecting its habits or economy, merely stating that he observed it flitting about among the grass and stunted vegetation, and succeeded in knocking it over with a stone.

Dr. Hector informs me (by last mail from the colony) that several examples of this species, all from the Chatham Islands, have lately been received at the Colonial Museum.

ANTHUS NOVÆ ZEALANDIÆ.

(NEW-ZEALAND PIPIT.)

- New-Zealand Lark*, Lath. Gen. Syn. ii. pt. 2, p. 384, pl. 21 (1783).
Alauda novæ seelandiæ, Gm. Syst. Nat. i. p. 799 (1788).
Alauda littorea, Forst. Descr. Anim. p. 90 (1844).
Anthus novæ zealandiæ, Gray, Voy. Ereb. and Terror, Birds, p. 4 (1844).
Anthus grayi, Bonap. Consp. Gen. Av. i. p. 249 (1850).
Anthus aucklandica, Gray, Ibis, 1862, p. 254.
Corydalla aucklandica, id. Hand-l. of B. i. p. 253 (1869).
Corydalla novæ zealandiæ, id. op. cit. i. p. 253 (1869).

Native names.

Pihoihoi and Whioi; "Ground-Lark" of the colonists.

Ad. brunneus, fulvescente lavatus, plumis medialiter paullò saturatoribus, uropygio unicolori fulvescenti-brunneo: loris et supercilio lato fulvescenti-albis: lineâ brunneâ per oculum ab ortu rostri ductâ: genis et regione paroticâ albidis, hâc paullò brunneo maculatâ: fasciâ mystacali irregulari brunneâ: colli lateribus dorso concoloribus et eodem modo notatis: tectricibus alarum brunneis, minimis lætè et conspicuè aurantiaco-fulvo lavatis, majoribus angustè fulvido marginatis: remigibus brunneis, primariis angustissimè, secundariis latiùs fulvo marginatis: caudâ brunneâ, fulvo marginatâ, rectrice extimâ ferè omninò albâ, pogonio interno versùs basin brunneo, proximâ versùs apicem obliquè albâ, tertiâ extùs angustè albo limbatâ: subtùs fulvescenti-albus, hypochondriis brunneis: pectore superiore brunneo longitudinaliter maculato: rostro corneo, mandibulâ flavicante: pedibus flavicanti-brunneis: iride saturatè brunneâ.

Juv. similis adultis, sed pallidior, plumis indistinctè fulvo marginatis: collo postico conspicuè fulvescente: tectricibus alarum, remigibus et rectricibus latiùs fulvo marginatis: subtùs sordidè albus, pectore superiore vix distinctè brunneo striolato.

Adult. Upper parts brownish grey, darker on the rump and upper tail-coverts; on the back, each feather centred with brown; from the base of the bill a broad line of white passes above, and an irregular band of black extends across the eyes; cheeks greyish white, minutely spotted with black; chin, or intercrural space, white; throat, fore neck, and upper part of breast fulvous, with numerous broad dashes of brown; underparts white, tinged on the flanks and under tail-coverts with fulvous; sides of the body greyish white, with longitudinal streaks of brown; all the plumage of the underparts plumbeous at the base; wing-feathers and their coverts dark brown, margined on their outer webs with fulvous grey, broadest on the tertiaries, and reduced to a mere line on the primaries; the marginal colour changes to fulvous white on the secondary coverts, presenting, when the wings are closed, a series of small crescentic bands; tail-feathers dark brown, with paler edges, except the two outermost ones on each side, which are white, the inner one crossed by an oblique band of dusky brown, and the outer one with a mere streak of the

same colour near the root. Irides dark brown; bill and feet yellowish brown. Total length 8 inches; extent of wings 12; wing, from flexure, 3·75; tail 3; bill, along the ridge ·5, along the edge of lower mandible ·75; tarsus 1; middle toe and claw ·85; hind toe and claw ·75.

Young. The young has the breast more spotted, and the feathers of the upper parts narrowly margined with pale rust-colour.

Obs. In some examples the under tail-coverts are pure white, while in others the upper wing-coverts are broadly margined with light rufous brown. Allowing for this variation, I cannot see the propriety of admitting the supposed new species from Queen Charlotte's Sound (*Anthus grayi*, Bonap.), which I have accordingly expunged from our list.

Varieties. Albinos, more or less pure, are of common occurrence. The following is the description of an example in the Canterbury Museum:—General plumage pure white, varied on the back and wings with brownish grey; some of the quills and tail-feathers pure white, the others dark brown, as in ordinary specimens; bill and feet white horn-colour; the hind claw conspicuously long, measuring ·55 of an inch.

OF this bird I may remark that it is a true Pipit both in structure and in its habits of life. It bears a general resemblance to an Australian species (*Anthus australis*); but the specific differences are sufficiently manifest on an actual comparison of the two birds.

It is common throughout the country, frequenting the open land, and sometimes resorting to the dry sands along the sea-shore. During the summer months it is gregarious, and may then be observed in flocks varying in number from half a dozen to fifty or more, alternately collecting and mounting in the air with a loud cheerful note, and scattering themselves again on the open ground to search for their food, which consists of insects and their larvæ, small earthworms, and occasionally minute seeds as well. On the approach of winter the flocks disperse, and the birds appear to pair off at once, and remain so till the breeding-season arrives. They are always plentiful on the settlers' farms, and may be seen during the summer months perched in large parties on the roofs of the country houses or on the surrounding fences and outbuildings. They may sometimes be observed in similar situations within the towns, and notably on the roofs of churches and other lofty edifices. They love to resort to the roads and beaten paths, where they amuse the traveller by their playfulness, running before him as he advances, then rising in the air with a sharp but pleasant chirp, settling down again and running forward as before. During the heat of the day they may often be seen sitting on the logs or fences with their beaks wide open as if gasping for air. They repose at night on the ground, finding shelter among the grass or fern on the open ridges or on the wayside, where the benighted traveller, as he plods along, may often disturb them and hear the sharp rustling of their wings as they rise startled at his very feet.

When searching for food, a flock of these birds will spread themselves out in all directions; but the instant a Hawk appears in sight, or some other common danger threatens, they will rise into the air together with much clamour, and sometimes mount to a considerable height. I have frequently seen a number of them pursue and harass the Bush-Hawk, which is doubtless their worst natural enemy. Their ordinary flight is rapid and undulating, being performed, as it were, by a succession of jerks. During the breeding-season the male bird frequently soars, mounting to

a height in the air, and then descending with tremulous wings and outspread tail, and uttering a prolonged trilling note, very pleasant to the ear.

This is one of the few species that appear to thrive and increase in the cultivated districts; and in localities where formerly it was only tolerably plentiful, it has kept pace with the progress of colonization, becoming every year more abundant. It is never met with in the woods; and I have observed that in the open country it is rarely seen to alight on a green tree or shrub, although often poisoning itself on the slender stalks of the *Phormium tenax* or on a bunch of fern. I have occasionally seen it dusting itself after the manner of some gallinaceous birds, rolling in the dust with evident delight, and then shaking its feathers, probably in order to free the body of parasitic insects.

The breeding-season of the New-Zealand Pipit extends from October to February or March, and, like the other members of the same group, it appears to rear two broods; for I have seen well-fledged young ones in November, while nests containing eggs are often met with as late in the season as January or the early part of February. The nest is composed of dry grass and other fibrous substances loosely put together, and is always placed on the ground, generally in a horse's footprint or in some natural depression, and under shelter of a tussock or clump of rushes. The eggs are usually four in number, rather ovoido-conical in shape, measuring .9 of an inch by .65, and marked over the entire surface with numerous spots or freckles of dark grey on a paler or ashy ground. Among the examples in the Canterbury Museum there are some darker ones, blotched and mottled with purplish brown.

The call of the young resembles the sharp note of the Silver-eye (*Zosterops lateralis*); and when engaged in feeding them, the parent bird displays an unusual degree of caution in the presence of an intruder, alighting ten or fifteen yards from the nest, and loitering about for a considerable time with the food in its bill before attempting to deliver it.

The natives catch this bird by means of a running noose at the end of a long stick; and there are various modes of trapping it, very generally known and appreciated among colonial school boys.

I have noticed that this species is very subject to a disease of the foot, which takes the form of a large irregular swelling. This may probably result from accidental burns; for I have often observed these birds alight on ground over which a fire had recently passed, leaving a light surface of smouldering ashes, and rise again immediately in evident pain.



TURNAGRA HECTORI. TURNAGRA CRASSIROSTRIS.

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TURNAGRA HECTORI.
(NORTH-ISLAND THRUSH.)

Otagon tanagra, Schl. Ned. Tijdschr. Dierk. iii. p. 190 (1865).

Turnagra hectori, Buller, Ibis, 1869, p. 39.

Turnagra tanagra, Gray, Hand-l. of B. i. p. 284 (1869).

Keropia tanagra, Finsch, J. f. O. 1870, p. 323.

Native names.

Piopio, Korohea, and Tiutiukata.

Ad. statura T. crassirostris sed rostro crassiore, suprâ olivascenti-brunneus : pileo nusquam striolato : uropygio caudâque clare rufis : gutture albo : pectore superiore cinerascente : abdomine medio albo, parte imâ et subcaudalibus conspicuè flavicantibus : hypochondriis olivascentibus : rostro et pedibus saturatè brunneis : iride flavâ.

Adult. Crown of the head, hind neck, and upper parts generally clear olive-brown; throat pure white; breast and abdomen ashy grey, darker on the former, the abdomen and the under tail-coverts tinged with yellow; sides olive-brown, washed with yellow; wing-feathers dark olive-brown, dusky on their inner webs; tail-feathers and their upper coverts bright rufous, paler on their under surface, the two middle ones tinged above with olive-brown. Irides yellow; bill and feet dark brown. Total length 11 inches; wing, from flexure, 5.25; tail 5; bill, along the ridge .8, along the edge of lower mandible 1; tarsus 1.25; middle toe and claw 1.25; hind toe and claw 1.

Young. Birds of the first year differ in having the feathers at the base of the upper mandible, the tips of those covering the crown and sides of the head, the small feathers fringing the eyelids, and a broad zone on the upper part of the breast bright rufous; the primary and secondary wing-coverts are also largely tipped with the same colour, and the grey of the underparts is darker.

In January 1869 I communicated to 'The Ibis' the description of a new species of Thrush inhabiting the North Island, and differing from the South-Island bird (*Turnagra crassirostris*) not only in plumage, but in its superior size and more strongly developed bill; and I named it in compliment to Dr. James Hector, F.R.S., Director of the Colonial Museum and Geological Survey of New Zealand. This was done not merely as an expression of personal friendship and esteem, but as a tribute to one who may justly be termed the father of the scientific institutions of the colony.

In an editorial footnote to my paper, Professor Newton suggested that this species might be identical with one described, in a Dutch work, by Professor Schlegel, four years before, without, however, any habitat being assigned to it. This opinion has since been verified by a careful comparison of the specimen I have figured with the type of Schlegel's *Otagon tanagra*, in the

Museum at Vienna; and under ordinary circumstances the name I have proposed would of course be reduced to a synonym. It will be observed, however, that Professor Schlegel has used a common generic name to distinguish the bird specifically, while he refers the form to the genus *Otagon*, established by Bonaparte in 1850. As I can see no valid reason for setting aside the generic title of *Turnagra* proposed by Lesson as early as 1837, and as the adoption of the older specific name would, according to this view, give the confused result of *Turnagra tanagra*, I have deemed myself justified in retaining the distinctive appellation of *T. hectori*. At the same time I am anxious to give due prominence to the fact that Professor Schlegel was the first to discover the existence of this new species.

Comparatively common in all suitable localities throughout the southern portion of the North Island, this bird is extremely rare in the country north of Waikato. A specimen which I shot in the Kaipara district in the summer of 1852 (doubtless a straggler from the south) was quite a novelty to the natives in that part of the country; it was recognized, however, by one old Maori, who called it a "Korohea," a name quite unknown in the south, and who stated that in former years it was very abundant in all the woods.

We have only to look forward a few years to its being equally scarce elsewhere; and it is high time, therefore, that its biography were written.

There is a peculiar charm about the New-Zealand forest in the early morning; for shortly after daylight a number of birds of various kinds join their voices in a wild jubilee of song, which, generally speaking, is of very short duration. This was the morning concert to which Captain Cook referred in such terms of enthusiasm; and the woods of Queen Charlotte's Sound, where his ship lay at anchor, are no exception to the general rule. In illustration of this, I take the following from an entry in one of my field-note books. "Tuesday, 5 A.M.—At this moment the wooded valley of the Mangaone, in which we have been camped for the night, is ringing with delightful music. It is somewhat difficult to distinguish the performers amidst the general chorus of voices. The silvery notes of the Bell-bird, the bolder song of the Tui, the loud continuous strain of the native Robin, the joyous chirping of a flock of White-heads, and the whistling cry of the Piopio—all these voices of the forest are blended together in wild harmony. And the music is occasionally varied by the harsh scream of a Kaka passing overhead, or the noisy chattering of a pair of Parrakeets on a neighbouring tree, and at regular intervals the far-off cry of the Long-tailed Cuckoo and the whistling call of its bronze-winged congener; while on every hand may be heard the soft trilling notes of *Myiomoira toitoi*." For more than an hour after this concert had ceased, and the sylvan choristers had dispersed in search of their daily food, one species continued to enliven the valley with his musical notes. This bird was the Piopio, or New-Zealand Thrush, the subject of the present article, and unquestionably the best of our native songsters. His song consists of five distinct bars, each of which is repeated six or seven times in succession; but he often stops abruptly in his overture to introduce a variety of other notes, one of which is a peculiar rattling sound, accompanied by a spreading of the tail, and apparently expressive of ecstasy. Some of the notes are scarcely distinguishable from those of the Yellow-head; and I am inclined to think that the bird is endowed with mocking-powers. The ordinary note, however, of the Piopio, whence it derives its name, is a short, sharp, whistling cry, quickly repeated.

It was when I obtained a caged Piopio that I first became acquainted with its superior vocal powers. In 1866 I purchased one for a guinea from a settler in Wellington, in whose possession it had been for a whole year. Although an adult bird when taken, it appeared to have become perfectly reconciled to confinement; but on being placed in a new cage it made strenuous assaults on the wire bars, and persevered till the feathers surrounding the beak were rubbed off and a raw wound exposed. It then desisted for several days; but when the abraded part had fairly healed, it renewed the attempt, and with such determined effort that the fore part of the head was completely disfigured, and the life of the bird endangered. On being removed, however, to a spacious compartment of the aviary, it immediately became reconciled to its condition, made no further efforts to escape, and for a period of fifteen months (when it came to an untimely end) it continued to exhibit the contentment and sprightliness of a bird in a state of nature.

I observed that this bird was always most lively during or immediately preceding a shower of rain. He often astonished me with the power and variety of his notes. Commencing sometimes with the loud strains of the Canary, he would suddenly change his song to a low flute-note of exquisite sweetness; and then abruptly stopping, would give vent to a loud rasping cry, as if mimicking a pair of Australian Magpies confined in the same aviary. During the early morning he emitted at intervals a short flute-note, and when alarmed or startled, uttered a sharp repeated whistle.

This caged bird was generally fed on dry pulse or grain; but he also evinced a great liking for cooked potato and raw meat of all kinds; in fact he appeared to be omnivorous, readily devouring earthworms, insects of all kinds, fruits, berries, green herbs, &c. He was supplied daily with a dish of fresh water, and was accustomed to bathe in it with evident delight. At one time he occupied the same division of the aviary with a pair of Australian Ring-Doves which had commenced to breed. The Doves were allowed to bring up their first brood in peace; but when the hen bird began to build a second time, she was closely watched by the Piopio, and immediately the first egg was deposited he darted upon the nest and devoured it. The innocent little Ring-Dove continued to lay on in spite of repeated robbery, and had at length to be placed beyond the reach of her persecutor.

During the day the Piopio was unceasingly active and lively; at night he slept on a perch, resting on one leg, and with the plumage puffed out into the form of a perfectly round ball, the circular outline broken only by the projecting extremities of the wings and tail. Every sound seemed to attract his notice, and he betrayed an inquisitiveness of disposition which in the end proved fatal; for having inserted his prying head through an open chink in the partition, it was seized and torn off by a vicious Sparrow-Hawk in the adjoining compartment of the aviary.

In the wild state this species subsists chiefly on insects, worms, and berries. I have shot it on the ground in the act of grubbing with its bill among the dry leaves and other forest débris. Its flight is short and rapid. It haunts the undergrowth of the forest, darting from tree to tree, and occasionally descending to the ground, but rarely performing any long passage on the wing. It is very nimble in its movements; and when attempting on one occasion to catch one of these birds with an almost invisible horsehair noose, it repeatedly darted right through the snare, and defeated every effort to entrap it.

Nothing positive is known respecting its habits of nidification. A native, however, once described the nest to me as being of large size, and composed of moss, twigs, and dry leaves. He assured me that he had twice met with it in the high scrub near the Manawatu River, and that in both cases the nest contained two eggs, of "smaller size than the Tui's, and white spotted with red at the thicker end."

In the Ruahine ranges I met with a breeding-pair of these birds late in December. The sudden disappearance of the female and the cautious demeanour of the male satisfied me that I was in the immediate vicinity of the nest; but I nevertheless failed in my endeavours to find it.

TURNAGRA CRASSIROSTRIS.

(SOUTH-ISLAND THRUSH.)

- Thick-billed Thrush*, Lath. Gen. Syn. ii. pt. 1, p. 34, pl. xxxvii. (1783).
Tanagra capensis, Sparrm. Mus. Carls. pl. 45 (1787).
Turdus crassirostris, Gm. Syst. Nat. i. p. 815 (1788, ex Lath.).
Lanius crassirostris, Cuv. Règn. Anim. p. 338 (1817).
Campephaga ferruginea, Vieill. Nouv. Dict. d'Hist. Nat. x. p. 48 (1817).
Tanagra macularia, Quoy et Gaim. Voy. de l'Astr. i. p. 186, pl. vii. fig. 1 (1830).
Keropia crassirostris, Gray, List of Gen. of B. p. 28 (1840).
Turnagra crassirostris, id. *op. cit.* p. 38 (1841).
Loxia turdus, Forst. Descr. Anim. p. 85 (1844).
Otagon turdus, Bonap. Consp. Gen. Av. i. p. 374 (1850).
Ceropia crassirostris, Sundev. Krit. Framst. Mus. Carls. p. 9 (1857).
Turnagra turdus, Gray, Hand-l. of B. i. p. 284 (1869).

Ad. suprâ olivaceo-brunneus, pileo vix cinerascens irregulariter fulvo striato: tectricibus alarum dorso concoloribus, rufo terminatis, fasciam duplicem alarem exhibentibus: remigibus brunneis, extus dorsi colore marginatis, primariis ad basin rufo lavatis: supracaudalibus rufo tinctis, imis omninò rufis: caudâ lætè rufâ, rectricibus duabus mediis et reliquarum apicibus olivaceo-brunneis: loris cum regione oculari genisque brunneis pallidè rufo maculatis: regione paroticâ pileo concolori, angustè fulvo striatâ: subtus olivascens, gutture toto rufescente lavato, plumis medialiter fulvescentibus: pectoris plumis medialiter albidis, utrinque olivaceo marginatis, quasi striatis: pectore superiore vix rufescente lavato: hypochondriis magis olivascentibus: abdomine imo et subcaudalibus flavo lavatis: subalaribus rufis: rostro pedibusque saturatè brunneis: iride flavâ.

Adult. General plumage olive-brown, darker on the upper parts; forehead, lores, throat, and sides of neck largely marked with rufous; breast, abdomen, and under tail-coverts covered with broad longitudinal spots of yellowish white, narrower towards the sides of the body; on the abdomen and under tail-coverts less of the olive-brown, with a strong tinge of yellow; wing-feathers dark olive-brown, dusky on their inner webs; the superior and lesser wing-coverts largely tipped with rufous, forming two broad transverse bars; lining of wings pale rufous; tail, for the most part, with the upper coverts bright rufous, the two middle feathers and the apical margins of the rest olive-brown, only slightly tinged with rufous. Irides yellow; bill and feet dark brown. Total length 11 inches; wing, from flexure, 5; tail 5; bill, along the ridge .7, along the edge of lower mandible .8; tarsus 1.25; middle toe and claw 1.15; hind toe and claw 1.

Young. May be distinguished from the adult by the larger amount of rufous colouring on the forehead, sides of the head, throat, and upper wing-coverts.

Obs. In some specimens the bend of the wing and the exterior edges of the outer primaries are also marked with rufous. The colour of the bill likewise varies, in different examples, from a light brown to dusky black.

THIS fine species is confined to the South Island. Formerly it was excessively abundant in all

the elevated wooded country; but of late years it has become comparatively scarce, while in some districts it has disappeared altogether. This result is attributable, in a great measure, to the ravages of cats and dogs, to which this species, from its ground-feeding habits, falls an easy prey.

Dr. Hector informs me that, during his exploration of the West Coast in the years 1862-63, he found it very abundant, and on one occasion counted no less than forty in the immediate vicinity of his camp. They were very tame, sometimes hopping up to the very door of his tent to pick up crumbs; and he noticed that the camp-dogs were making sad havoc among them. He is of opinion that in a few years this species also will be numbered among the extinct ones.

Mr. Buchanan, of the Geological Survey, assures me that in the woods in the neighbourhood of Dunedin, where it was formerly very common, it has been quite exterminated by the wild cats. It may be here observed that there is no indigenous cat in our country; but ill-fed or ill-used members of the race, in the struggle for existence, frequently quit the settlers' houses and betake themselves to the woods, where they, in course of time, produce a purely wild breed. To this cause is partly owing the almost entire extermination of the Quail and other ground species.

The habits of this bird differ in no respect, so far as I am aware, from those of its congener in the North Island. The following incident is illustrative of its predaceous nature:—My brother, Mr. Fletcher Buller, while residing in Canterbury, obtained a live one from the woods, and placed it in a cage with a pair of tame Parrakeets (*Platycercus novæ zealandiæ*). On the following morning he found, to his dismay, that the newly introduced bird had slain both of his fellow prisoners, and was actually engaged in eating off the head of one of them!

HYLOCHELIDON NIGRICANS.

(AUSTRALIAN TREE-SWALLOW.)

- Hirundo nigricans*, Vieill. N. Dict. d'Hist. Nat. xiv. p. 523 (1817).
Dun-rumped Swallow, Lath. Gen. Hist. of B. vii. p. 309 (1823).
Hirundo pyrrhonota, Vig. & Horsf. Tr. Linn. Soc. xv. p. 190 (1826).
Herse nigricans, Less. Compl. Buff. viii. p. 497 (1837).
Herse pyrrhonota, id. tom. cit. p. 497 (1837).
Cecropis nigricans, Boie, Isis, 1844, p. 175.
Collocalia arborea, Gould, B. of Austr. ii. pl. 14 (c. 1845).
Chelidon arborea, id. op. cit. i. Intr. p. xxix (1848).
Petrochelidon nigricans, Cab. Mus. Hein. i. p. 47 (1850).
Hylochelidon nigricans, Gould, Handb. B. of Austr. i. p. 111 (1865).

Ad. suprâ purpurascenti-niger: fronte conspicuâ ferrugineâ indistinctè nigro maculatâ: uropygio rufescenti-fulvo, scapis plumarum brunneo indicatis: supracaudalibus brunneis uropygii colore lavatis, scapis eodem modo indicatis: tectricibus alarum minimis dorso concoloribus, majoribus et remigibus brunneis, concoloribus: caudâ brunneâ, rectrice extimâ pogonio interno albo notatâ: remigum rectricumque scapis suprâ brunneis, subtùs albidis: loris cum regione oculari et paroticâ nigricantibus: genis et colli lateribus sordidè fulvis brunnescente variis: subtùs fulvescens, corporis lateribus et subalaribus ferrugineis: gutture lineis longitudinalibus parvissimis, pectore et hypochondriis lineis angustioribus et longioribus striatis: rostro brunneo: pedibus brunneis: iride nigrâ.

Juv. similis adulto, sed suprâ magis brunnescens: uropygio fulvescenti-albido: subtùs albicans, corporis lateribus vix rufescente tinctis.

Adult. Forehead chestnut-brown; crown of the head, hind neck, the whole of the back, and the small wing-coverts glossy steel-blue; rump and inferior upper tail-coverts yellowish buff mixed with pale rufous, each feather with a narrow shaft-line of dark brown; longer upper tail-coverts dark brown with paler edges; throat, fore part and sides of neck, and all the under surface pale yellowish buff, marked on the throat with numerous touches of brown, stained on the sides of the body, inner lining of wings, and under tail-coverts with chestnut-brown; quills and tail-feathers dark brown, with paler shafts, greyish on their under surface and slightly glossed above. Irides black; bill, tarsi, and toes light brown. Total length 5.25 inches; wing, from flexure, 4.5; tail, to extremity of lateral feathers, 2.25 (middle feathers .4 shorter); bill, along the ridge .25, along the edge of lower mandible .5, breadth at the gape .4; tarsus .4; middle toe and claw .55; hind toe and claw .45.

Young. Plumage of the upper parts duller, the head and back being dark umber-brown with only a slight steel gloss; the rump and tail-coverts yellowish brown, with darker shafts; the underparts altogether lighter, the abdomen and under tail-coverts being fulvous white, and the throat more distinctly spotted with brown.

THE Tree-Swallow, which is a native of Australia, is admitted into our list of birds on the authority of a specimen shot by Mr. Lea at Taupata, near Cape Farewell, on the 14th of March, 1856, and fortunately preserved in the Otago Museum. Mr. Gould informs us that in its own country it is a migratory species, visiting the southern portions of Australia and Tasmania, arriving in August and retiring northwards as autumn advances. In the summer of 1851, Mr. F. Jollie observed a flight of Swallows at Wakapuaka, in the vicinity of Nelson, and succeeded in shooting one, thus placing the matter beyond all question. There can be no doubt that these occasional visitants are stragglers from the Australian continent, and that to reach our country they perform a pilgrimage on the wing of upwards of a thousand miles!

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THE

RHIPIDURA FLABELLIFERA.

(PIED FANTAIL.)

- Fan-tailed Flycatcher*, Lath. Gen. Syn. ii. pt. 1, p. 340, pl. xlix. (1783).
Muscicapa flabellifera, Gm. Syst. Nat. i. p. 943 (1788, ex Lath.).
Rhipidura flabellifera, Gray, in Dieff. Trav. ii., App. p. 190 (1843).
Muscicapa ventilabrum, Forst. Descr. Anim. p. 86 (1844).
Rhipidura albiscapa, Cass. U. S. Expl. Exp. p. 150 (1858, nec Gould).

Native names.

Piwaiwaka, Tiwaiwaka, Piwakawaka, and Tiwakawaka.

Ad. suprâ olivascenti-brunneus, pileo nigricante: lineâ supraoculari albidâ: tectricibus alarum brunneis, olivaceo lavatis, albido terminatis: remigibus nigricanti-brunneis extûs dorsi colore lavatis: caudâ sordidè albâ, scapis purè albis, rectricibus duabus centralibus nigricantibus ad apicem albidis, reliquis extûs brunnescenti-nigris, pennâ extimâ omninò albidâ: facie laterali pileo concolori: gulâ albidâ: torque pectorali nigrâ: subtûs aurantiaco-fulvus, pectore superiore et subcaudalibus pallidioribus: cruribus nigricantibus: rostro nigro: pedibus brunnescenti-nigris: iride nigrâ.

Juv. similis adulto, sed suprâ magis brunnescens: gutture grisescenti-albo: corpore reliquo subtûs sordidè fulvescente: torque pectorali absente: tectricibus alarum fulvido apicatis, et secundariis extûs eodem colore marginatis.

Adult. Crown, nape, and sides of the head sooty black; the whole of the back, rump, and upper surface of wings dark olive-brown; the small wing-coverts tipped with fulvous white; rictal bristles black; throat and mark over the eyes greyish white; across the fore neck and upper part of breast a broad band of sooty black; lower part of breast and all the under surface fulvous, tinged with cinnamon, the base of the feathers plumbeous; quills dark olive-brown, with paler shafts, the inner secondaries edged with fulvous white; the two middle tail-feathers brownish black, with pure white shafts, and tipped with greyish white; the lateral feathers greyish white and, with the exception of the outermost one on each side, margined on their outer webs with brownish black, all having pure white shafts. Irides and bill black; feet blackish brown. Total length 6.5 inches; extent of wings 8; wing, from flexure, 2.75; tail 4; bill, along the ridge .3, along the edge of lower mandible .4; tarsus .7; middle toe and claw .6; hind toe and claw .5.

Young. The young bird has the throat greyish white; the breast and all the under surface dark fulvous brown; the small wing-coverts are largely tipped and the secondaries narrowly edged with fulvous brown, and the plumage of the back is more or less tinged with the same colour.

Obs. I have observed birds in the young plumage as late as the middle of March; but the adult livery is certainly assumed at the first moult.

THE Pied Fantail, ever flitting about with broadly expanded tail, and performing all manner

of fantastic evolutions, in its diligent pursuit of gnats and flies, is one of the most pleasing and attractive objects in the New-Zealand forest.

It is very tame and familiar, allowing a person to approach within a few feet of it without evincing any alarm, sometimes, indeed, perching for an instant on his head or shoulders. It will often enter the settler's house in the bush, and remain there for days together, clearing the window-panes of sand-flies, fluttering about the open rooms with an incessant lively twitter during the day, and roosting at night under the friendly roof. It is found, generally in pairs, on the outskirts of the forest, in the open glades, and in all similar localities adapted to its habits of life. It loves to frequent the wooded banks of mountain-streams and rivulets, where it may be seen hovering over the surface of the water collecting gnats; and I have counted as many as ten of them at one time so engaged. It affects low shrubby bushes and the branches of fallen trees; but it may often be seen catering for its insect-food among the topmost branches of the high timber.

In winter it generally frequents the darker parts of the forest, where insect-life is more abundant at that season; but it is nevertheless to be met with, wherever there is any bush, all the year round. It is a true Flycatcher, subsisting entirely by the chase: darting forth from its perch, it performs a number of aerial evolutions in pursuit of invisible flies, the snapping of its mandibles as it catches its prey being distinctly audible, and generally returns to the twig from which it started. It hops about along the dry branches of a prostrate tree, or upwards along the tangled vines of the kareao (*Rhipogonum scandens*), with its tail half expanded and its wings drooping, seizing a little victim at almost every turn, and all the while uttering a pleasant twitter. When hurt or alarmed it immediately closes its pretty fan, and silently flies off in a direct course, disappearing in the denser foliage.

It breeds twice in the season, producing four young ones at each sitting. It generally commences to build in September, and brings out its first brood about the last week in October. The second brood appears to leave the nest about the beginning of January.

The nest is a beautiful little structure, compact and symmetrical. A forked twig is the site usually selected; and the nest, instead of being placed within the fork for support, is built around it, the branchlets being thus made to serve the purpose of braces and stays to strengthen the work and to hold it together. It is, therefore, generally impossible to remove or detach the nest from the branch without tearing it to pieces. In form it is cup-shaped, the upper part towards the rim being closely interwoven and securely bound, while the base is left unfinished or loosely constructed. The materials composing the foundation are light fragments of decayed wood, coarse mosses, and the skeletons of dead leaves. The centre and upper portion of the nest consist principally of the tough and elastic seed-stems of various mosses finely interwoven. There is an exterior wall composed of cow-hair, the downy seed-vessels of plants, and other soft materials, and the whole is admirably bound together with fine spiders' webs. The interior cavity, which is rather large in proportion to the nest, is closely lined with fibrous grasses, or bent, disposed in a circular form. I have examined numbers of nests, and I have observed that the materials employed vary slightly, according to the locality, specimens collected in the vicinity of farmhouses disclosing tufts of wool, fragments of cloth, remnants of cotton-thread, &c. among the building-materials; nevertheless, in every instance that has

come under my notice, the use of spiders' webs for binding the walls has been adhered to, thus manifesting a very decided instinct. The eggs are usually four in number, slightly ovoido-conical, and measuring $\cdot 7$ of an inch in length by $\cdot 5$ in breadth; they are white, with numerous purplish-brown freckles, denser and forming an obscure zone towards the larger end.

Mr. J. H. Gurney, in his account of the Red-throated Widow-bird (*Vidua rubritorques*, Swains.), says:—"These birds build among the grass in the open country. The nest is curiously built. They select a convenient tuft of grass, and interlace the blades as they stand, without breaking them off; so that the nest is green during the whole term of incubation, and is very beautiful when thus seen." This brings to my recollection a very pretty nest of the Pied Fantail which I found in the Kaipara woods many years ago. It was smaller and more cup-shaped than the generality of these nests, and was composed chiefly of moss firmly bound together with spiders' webs; but it was an "old nest," and the winter rains had soaked it, causing the moss to vegetate afresh; and when it came into my hands it was covered on the outer surface with a luxuriant growth of stunted moss of the brightest green, and presented a very beautiful appearance.

To any one having any experience of bird-craft, it is very easy to discover the nest of this species. The movements of the old birds, properly interpreted, are a very sure index. As you approach the nest, the Fantails, which follow your steps with an incessant twitter, become ominously silent. If you fail immediately to discover the object of your search, and chance to wander away from it, the anxious little birds give vent to their joy by an exuberant strain of notes, which, as I have often thought, might be appropriately compared to the supposed merry laugh of one of Gulliver's Liliputians. On one occasion I succeeded in capturing the old bird on the nest, which was found to contain four unfledged young ones. I placed my captive in a cage, together with the nest and young: she refused food, and vented her rage by pecking her young ones to death. On the following morning I liberated the parent, regretting much that I had invaded her domestic happiness.

The multiplication of numbers by second broods, in the proportion of four to one, as already noticed, appears to me a wise provision of Nature to save the species from extinction. At the close of the breeding-season the Fantails, principally in the immature plumage, are excessively abundant; by the end of the year their numbers have been considerably thinned, owing to the joint ravages of the wild cat, the Bush-Hawk, and Morepork, to all of which this defenceless little creature falls an easy prey. The reproduction by each pair of eight young ones every season seems, therefore, almost necessary to preserve the very existence of this species in the balance of life.

Long may the Pied Fantail thrive and prosper, in the face of cats, owls, naturalists, and the whole race of depredators; for without it our woods would lack one of their prettiest attractions, and our fauna its gentlest representative.

RHIPIDURA FULIGINOSA.

(BLACK FANTAIL.)

Muscicapa fuliginosa, Sparrm. Mus. Carls. pl. 47 (1787).*Muscicapa deserti*, Gm. Syst. Nat. i. p. 949 (1788, ex Sparrm.).*Rhipidura melanura*, Gray, in Dieff. Trav., ii. App. p. 191 (1843).*Leucocerca melanura*, Bonap. Consp. Gen. Av. i. p. 324 (1850).*Rhipidura tristis*, Hombr. et Jacq. Voy. Pôle Sud, Ois. iii. p. 76, pl. ii. fig. 5 (1853).

Ad. nigricans, dorso alisque brunneo tinctis: maculâ postauriculari parvâ albâ: subtus dilutiùs brunneus: rostro nigro, mandibulâ versùs basin albicante: pedibus nigricanti-brunneis: iride nigrâ.

Adult. Entire plumage black, tinged on the back and wings with rusty brown, and on the under surface with paler brown; behind each ear a small spot of white. Irides black; bill black, white at the base of the lower mandible; tarsi and toes blackish brown. Total length 6.5 inches; extent of wings 8; wing, from flexure, 2.75; tail 4; bill, along the ridge .3, along the edge of lower mandible .4; tarsus .7; middle toe and claw .6; hind toe and claw .5.

Female. Similar to the male, but with the white spots behind the ears much reduced.

Obs. In the full-plumaged male, the white mark described above usually consists of twelve diminutive feathers. In an example which came under my notice at Kaiapoi this feature was exaggerated, the white spreading entirely over the ear-coverts and surrounding feathers. In some it is scarcely visible, while in others (probably young birds) it is altogether wanting.

THIS dark-coloured species is restricted to the South Island, where it is far more common than the preceding one. Mr. G. R. Gray gives Cook's Strait as its habitat; but although common enough on the Nelson side, I know of only one instance of its occurrence on the northern shore of the strait, or in any part of the North Island. After very stormy weather in May 1864, I shot a specimen in a flax-field near the mouth of the Mananatu River, on the south-west coast of the Wellington Province. It was evidently a straggler from the opposite mainland, and having by some means been deprived of its ample tail, which serves to balance the body, it had probably lost command of itself, and thus been borne across the sea by the prevailing gales.

That the Flycatcher does sometimes indulge voluntarily in a water excursion, I have myself had proof; for in April 1869, when entering the Whangarei Heads, a Pied Fantail (*Rhipidura flabellifera*) flew off from the shore, and after making a circuit of our little steamer, apparently to satisfy its curiosity, returned to the land. The life-history of this species differs in no respect from that of its congener, as described in the foregoing pages. The stomachs of two which I dissected contained, in addition to the remains of small dipterous insects, the minute seeds of some wild berry.

On the nesting-habits of this bird, Mr. Potts furnishes the following interesting notes:—

“The Black Fantail breeds under conditions so very similar to those of the preceding species, that one description will serve for both. To my view, the most remarkable feature in the breeding-habits of our Flycatchers is the situation usually selected for rearing their young. Security does not appear to be the first consideration; security by concealment seems the leading feature which guides most arboreal birds in choosing the site of their home, and it is one in which the most admirable displays of instinct may be frequently observed. The Flycatchers rather appear to be led by the same consideration which actuates many sea-birds in selecting the position of their breeding-place—proximity to the food supply. Stroll carefully along the rocky bed of a creek which rambles through some bushy gully, and you may perchance see the beautiful nest perched on some slender bough, in so delicate a manner that it appears scarcely so much to be fixed as to rest balanced there. There is no concealment amongst tangled creepers, guarded with their sharp recurved prickles; it is not buried amidst a mass of waving leaves, nor is it hidden away in the dim twilight of some hollow tree; but there, a few feet above the water, it sways gently with the subdued breeze that reaches the quiet ravine through the leafy canopy that is spread around. Over the shady creek our Flycatcher is in the midst of sand-flies, and the position chosen for its nest affords comparatively as good a vantage ground for supplying the wants of its young as the nesting-place on the craggy mountain-side bestows on the dashing Quail-Hawk.”

Mr. Potts has also called attention to the interesting fact of the two species occasionally interbreeding. There is a union nest of this sort in the Canterbury Museum, containing three eggs. It was taken, in October 1870, by Mr. Potts himself, who informs me that the female was a dark bird and the male a pied one. The eggs are decidedly like those of *Rh. fuliginosa*, having a very distinct zone of purplish-brown spots near the thick end. In another case of intercrossing which came under his notice the relative position of the sexes was reversed, the female being *Rh. flabellifera*: the eggs proved to be fertile, and the young assumed the plumage of the female parent.

The eggs of this species are of similar size and shape to those of the Pied Fantail, but I have remarked that they usually have a darker zone of purple and brown spots.

GRAUCALUS MELANOPS.

(BLACK-FACED SHRIKE.)

- Black-faced Crow*, Lath. Gen. Syn. Suppl. ii. p. 116 (1801).
Corvus melanops, Lath. Suppl. Ind. Orn. p. xxiv (1801).
Rollier à masque noir, Levaill. Ois. de Paradis, pl. 30 (1806).
Ceblepyris melanops, Temm. Man. d'Orn. i. p. lxii (1820).
Graucalus melanops, Vig. & Horsf. Tr. Linn. Soc. xv. p. 216 (1826).
Graucalus melanotis, Gould, P. Z. S. 1837, p. 143.
Campephaga melanops, Gray, Cat. B. N. Guin. p. 32 (1859).
Colluricincla concinna, Hutton, Cat. B. New Zealand, p. 15 (1871).

Ad. suprâ cinereus : tectricibus alarum dorso concoloribus : remigibus nigricanti-brunneis, primariis angustè, secundariis latiùs albido marginatis : rectricibus nigricanti-brunneis, parte basali cinereâ, pennis externis ad apicem albis, duabus exterioribus graduatim obliquè albis, rectrice extimâ etiam albo marginatâ : facie laterali totâ nigrâ : gutture et pectore superiore cinereis dorso concoloribus : corpore reliquo subtùs albo : rostro nigro versùs basin mandibulæ brunnescente : pedibus saturatè brunneis.

Adult. General plumage light cinereous or ashy grey ; a patch of black fills the lores, crosses the eyes, and covers the cheeks and ear-coverts ; on the upper part of the breast the grey fades into white, with a purplish tinge ; lower part of breast, lining of wings, flanks, abdomen, and under tail-coverts pure white ; wing-feathers dark brown, the primaries narrowly and the secondaries broadly margined with greyish white ; tail-feathers dark brown, the two middle ones tinged with ashy grey, especially in their basal portion ; the lateral ones tipped progressively outwards with white, the outermost one on each side having an inch at the extremity and a narrow line along the apical portion of its outer web pure white. Bill black, changing to brown at the base of the lower mandible ; legs blackish brown. Total length 13 inches ; wing, from flexure, 8 ; tail 5.5 ; bill, along the ridge .9, along the edge of lower mandible 1.25 ; tarsus 1.12 ; middle toe and claw 1.2 ; hind toe and claw 1.

THE example from which the above description is taken was shot by Mr. Giblin at Motueka, in the Province of Nelson, and now forms part of the public collection in the Nelson Museum. Mr. Huddleston informs me that he saw the bird in the flesh, and knows the precise locality in which it was shot. There can be no doubt, therefore, as to the authenticity of the specimen, although this is the only recorded instance of its occurrence in New Zealand. As the bird appears to be quite unknown to the natives of the country, we may safely assume that this was merely an accidental visitant from Australia, where this species is very plentiful.

PLATE I

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CREADION CARUNCULATUS.

(Adult and Young.)

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CREADION CARUNCULATUS.

(THE SADDLE-BACK.)

- Wattled Stare*, Lath. Gen. Syn. iii. p. 9, pl. 36 (1783).
Sturnus carunculatus, Gm. Syst. Nat. i. p. 805 (1788, ex Lath.).
Creadion pharoides, Bonn. et Vieill. Enc. Méth. p. 874 (1823).
Icterus rufusater, Less. Voy. Coq. i. p. 649, pl. xxiii. fig. 1 (1826).
Xanthornus carunculatus, Quoy et Gaim. Voy. de l'Astr. i. p. 212, pl. 12. fig. 4 (1830).
Oxystomus carunculatus, Swains. Classif. of B. ii. p. 270 (1837).
Creadio carunculatus, Cab. Mus. Hein. Th. i. p. 218 (1850).
Creadion cinereus, Buller, Essay N.-Z. Orn. p. 10 (1865).

Native names.—Tieke, Tiraweke, and Purourou.

♂ *ad.* nitidè niger : dorso cum tectricibus alarum, supracaudalibus et subcaudalibus lætè ferrugineis : carunculis rictalibus miniatis : rostro et pedibus nigris : iride nigricanti-brunnèâ.

♀ mari similis, sed minor et carunculis minoribus distinguenda.

Juv. (*C. cinereus*, Buller) cinerascenti-brunneus, subtùs pallidior : scapularibus alisque umbrino lavatis : supracaudalibus et subcaudalibus lætè rufescentibus : tectricibus alarum minimis rufo maculatis.

Adult male. General plumage glossy black ; back, wing-coverts, upper and lower tail-coverts bright ferruginous. Irides blackish brown ; bill and legs black ; wattles varying in tint from a clear yellow to a bright vermilion, being apparently affected by physical conditions, such as the health of the bird or the temperature of the weather. Total length 10 inches ; extent of wings 12·5 ; wing, from flexure, 4 ; tail 3·5 ; bill, along the ridge 1·25, along the edge of lower mandible 1·4 ; tarsus 1·5 ; middle toe and claw 1·25 ; hind toe and claw 1·1.

Female. Of inferior size to the male, and having the wattles much reduced.

Young. The entire plumage dark cinereous brown, paler on the underparts, and tinged with umber on the wings and scapulars ; the upper and lower tail-coverts and a few spots on the small wing-coverts bright rufous.

Obs. After examining the specimens in the Canterbury Museum exhibiting transitional states of plumage, I cannot resist the conclusion that my *C. cinereus* is nothing but the young of this species ; but it is a very remarkable circumstance that it has never yet been met with by myself or, so far as I am aware, by any other collector in the North Island. Dr. Haast's southern series consists of four specimens, all obtained in one locality :—No. 1 has the entire plumage cinereous brown, tinged with rufous, the upper and lower tail-coverts and the margins of the smaller wing-coverts dull rufous, and the fleshy wattles

very small: No. 2 presents a few black touches on the sides of the head and neck: No. 3 has some new black feathers between the crura of the lower mandible, also on the sides of the head and along the edges of the wings; the upper wing-coverts bright ferruginous; the half-grown new secondaries and tail-feathers perfectly black, the back and rump presenting indications of change: No. 4 is in the plumage of the adult male as described above. Mr. Buchanan has observed the so-called *C. cinereus* in Otago in the summer, and Captain Hutton saw four birds in this plumage near Collingwood in the month of August; while, in the North Island, I have obtained fully coloured examples of *C. carunculatus* all the year round. It is sufficiently obvious, therefore, that the former cannot be a seasonal state of plumage.

THIS bird derives its popular name from a peculiarity in the distribution of its two strongly contrasted colours, black and ferruginous, the latter of which covers the back, forms a sharply defined margin across the shoulders, and sweeps over the wings in a manner suggestive of saddle-flaps. The colours, in the male bird especially, are of so decided a kind as to attract special attention, to say nothing of the loud notes and eccentric habits of this remarkable bird. The bill is strong, sharply cut, and wedge-shaped, being well adapted for digging into decaying vegetable matter in search of larvæ, grubs, and insects, on which this species largely subsists. From the angle of the mouth on each side there hangs a fleshy wattle, or caruncle, shaped like a cucumber-seed, and of a changeable bright yellow colour. The wings are short and feeble, and the flight of the bird, though rapid, is very laboured, and always confined to a short distance.

The range of this species extends as far north as the Lower Waikato, beyond which district it is only rarely met with. It is numerous in the wooded ranges between Waikato Heads and Raglan, and is occasionally found in the neighbourhood of the Hunua coal-fields; but I have never heard of its occurrence in the Tauranga district, on the east coast, although I have an excellent ornithological correspondent there. In the summer of 1852 I obtained a pair at the Kaipara; but the bird was decidedly a *rara avis*, few of the natives in that part of the country being familiar with it. Mr. Gilbert Mair met with it once at Kaitaia, near the North Cape, and he afterwards saw a pair in the Maungatapere bush, near Whangarei. These are the only instances I can give of its occurrence on the mainland north of Auckland; but, strange to say, it is very plentiful on the Barrier Islands, in the Gulf of Hauraki. Mr. Layard was the first to notice its existence there, having shot a specimen on the Little Barrier, which he visited, in company with Sir George Grey, in 1863. He speaks of it (*Ibis*, 1863, p. 244) as "an apparently very rare bird;" but Captain Hutton, who visited these islands in December 1867, found it on both the Great and Little Barrier, and "very common" on the latter*.

It is comparatively abundant in the wooded hills in the vicinity of Wellington and in those skirting the Tararua and Ruahine ranges; and it occurs also, and more plentifully, in many parts of the South Island.

Dr. Hector has informed me of a peculiarity in the habits of this species, as observed by him in Otago. It is accustomed to follow the flocks of *Orthonyx ochrocephala* through the bush; but for what purpose it is difficult to imagine. Wherever he saw a flock of Yellow-heads there was invariably one of these Saddle-backs in attendance, mingling freely with them and, as it were, exercising a general supervision over the flock. He assures me that during many months'

* *Trans. New-Zealand Inst.* 1868, vol. i. p. 160.

residence in the woods he had almost daily opportunities of verifying his observations regarding this very curious fact.

Active in all its movements, it seldom remains more than a few seconds in one position, but darts through the branches or climbs the boles of the trees, performing the ascent by a succession of nimble hops, and often spirally. It is naturally a noisy bird, and when excited or alarmed becomes very clamorous, hurrying through the woods with cries of "tiaki-rere," quickly repeated. At other times it has a scale of short flute-notes, clear and musical; but the most remarkable exhibition of its vocal powers takes place during the breeding-season, when the male performs to his mate in a soft strain of exquisite sweetness. This love-song is heard only on a near approach, and it is at first difficult to believe that so clamorous a bird could be capable of such tender strains.

Captain Hutton discovered the nest of this species on the Little Barrier Island. It was situated about two feet down the hollow stem of a dead tree-fern that had been broken off at the top, and from which he saw a Saddle-back emerge. The nest was roughly composed of stems of *Hymenophyllum* and dead fibres of nikau (*Areca sapida*), and lined with the fine papery bark of the *Leptospermum*; and it contained three eggs, which, at the time they were found (December 27), had been slightly sat upon. One of these specimens was kindly forwarded to me by Captain Hutton; it measures 1.4 inch in length by 1 in breadth, and is white, marked and spotted, especially at the thicker end, with purplish brown of different shades.

I was informed by an intelligent Maori that this bird is accustomed to repair, for many successive seasons, to the cavity in which it has once reared its brood, and that, although the number of eggs is generally three, he has occasionally found a nest containing four.

GLAUCOPIS WILSONI.

(BLUE-WATTLED CROW.)

Glaucopis wilsoni, Bonap. Consp. Gen. Av. i. p. 368 (1850).*Callæas wilsoni*, Gray, Ibis, 1862, p. 227.*Callæas olivascens*, Pelz. Verh. zool.-bot. Gesellsch. Wien, 1867, p. 317, note.*Glaucopis olivascens*, Finsch, J. f. O. 1870, p. 324.*Native name.*—Kokako.

Ad. supra schistaceo-cinereus, subtùs paullò cyanescens: loris cum vittâ frontali angustâ, regione oculari mentoque nigerrimis: facie laterali et gutture paullò canescentibus: fronte posticâ et supercilio indistincto albidis: carunculâ rictali ovali utrinque cyaneâ: remigibus et rectricibus nigricantibus dorsi colore lavatis: rostro et pedibus nigris: iride saturatè brunneâ.

Juv. dorso toto olivaceo-fusco: abdomine toto cum hypochondriis et subcaudalibus pallidè cinereo-brunneis: carunculis minoribus, pallidè cyaneis.

Adult male. General plumage dark cinereous or bluish grey, tinged more or less on the upper surface of the wings and tail and on the rump and abdomen with dull brown; a band of velvety black, half an inch broad, surrounds the base of the bill, fills the lores, and encircles the anterior portion of the eyes; immediately above this band and continued over the eyes light ashy grey, shading into the darker plumage; quills and tail-feathers slaty black. Irides blackish brown; bill and legs black. The wattles, which form a distinguishing feature in this bird, are, during life, of a bright ultramarine-blue; but they fade soon after death and in the dried state become almost black. Total length 16.5 inches; extent of wings 20.5; wing, from flexure, 7.25; tail 7.75; bill, along the ridge 1.25, along the edge of lower mandible 1; tarsus 2.5; middle toe and claw 2.15; hind toe and claw 1.5.

Female. Similar to the male, but more deeply tinged with brown on the lower part of the back, rump, and abdomen.

Young. The young of both sexes have the whole of the back and the upper surface of the wings and tail, as well as the sides of the body, dull olivaceous brown; the abdomen and under tail-coverts yellowish brown; the wattles smaller than in the adult and of a pale blue colour.

Note. Captain Hutton is of opinion that the female is "rather larger than the male;" but I have found the size very variable in both sexes. Both the figure on our Plate and the measurements given above were taken from an unusually fine male bird, shot by myself in the Upper Manawatu, and now in the Colonial Museum.

Obs. As will be seen from the above synopsis, I am unable to admit the so-called *Glaucopis olivascens* to the rank of a distinct species. It was founded on a specimen collected at Auckland by M. Zelebor,

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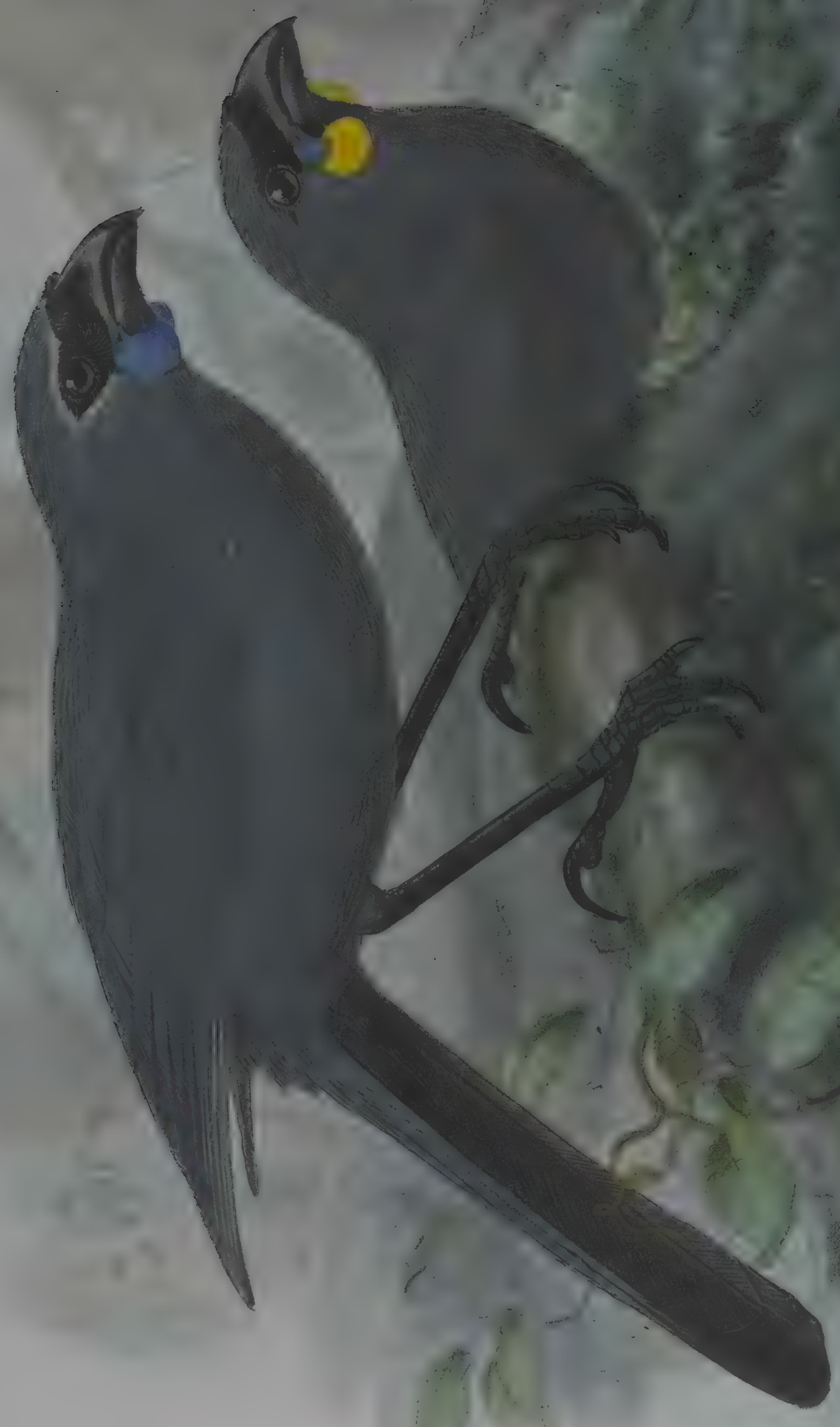
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GLAUCOPIS CINEREA.

GLAUCOPIS WILSONI.

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and the diagnostic characters by which it is distinguished from *G. cinerea* are the brownish-olive colour of the back, wings, and tail, the greyish olive of the underparts, its greater size, and the "dusky colour of the mouth-caruncles." As I have already shown, this description applies to the young of *G. wilsoni*. The dusky colour of the wattles is of no value as a specific character, because, as already mentioned, these appendages entirely change colour in dried specimens, leaving no trace of the original blue. Even in the living bird the colour of the wattles varies considerably in its tone, according to age and other physical conditions; and Dr. Hector has observed that when in confinement its wattles undergo remarkable variations, the exterior margin sometimes assuming a decided yellowish tinge, and again changing back into blue. Dr. Hector writes me that of three specimens caught together, and carefully sexed by him, two with olive-brown backs and very small wattles proved to be males, while the third, which had large wattles, of a deep blue colour, and only a slight tinge of brown on the upper parts, was unmistakably a female; and he expresses his belief that *Glaucopis olivascens* is the male of *G. wilsoni*. Accepting the result of Dr. Hector's dissection as conclusive evidence of the sex in each case, I should be inclined to pronounce his two brown-backed males birds of the first year, and the female an adult in full breeding-plumage. I may add that the bird from which my description of the adult male is taken was shot in company with two others (an adult female and a young male), all of which were carefully sexed by myself.

THIS singular representative of the Crow family is sparingly dispersed over the North Island, being very local in its distribution. It is met with more frequently in the wooded hills than in the low-timbered bottoms, but its range is too eccentric to be defined with any precision. During many years' residence at Kaipara, north of Auckland, I never obtained more than five specimens, all of which were shot in the low-wooded spurs of the Tangihua ranges. In particular localities, however, even further north, it is comparatively plentiful: for example, between the headwaters of the Wairoa and Whangarei rivers there are several strips of forest in which I never failed to meet with the Kokako; and in the Kaitara ranges in the Whangarei district it was, till within the last few years, rather abundant. I have heard of its occurrence in various parts of the Waikato district*, and in certain localities in the Hawke's Bay and Wellington Provinces it is far from being an uncommon species.

The Kokako is adorned with fleshy wattles of a brilliant blue colour, which spring from the angles of the mouth, and when the bird is in motion they are compressed under the chin. The first specimen obtained from the Tangihua ranges was a fine bird in full plumage; but the Maori who brought it had torn off the beautiful wattles and pasted them, by way of ornament, on his dusky cheeks.

The notes of the male are loud and varied; but the most noticeable one is a long-drawn organ-note of surpassing depth and richness. I have not been able to discover whether the female is similarly endowed, but I have often heard two or more Kokakos, each in a different key, sounding forth these rich organ-notes with rapturous effect; and it is well worth a night's discomfort in the bush to be awakened at dawn by this rare forest music. Another of its notes may be described as a loud cackle, while others, again, are scarcely distinguishable from those of the Tui, resembling the soft tolling of a distant bell; but it is only in the early morning that they can be heard to perfection.

* The Maoris state that it is common at Taupo and at Maungatautari, one of those whom I questioned on the subject observing, "Where the range of the Huia ceases, that of the Kokako begins."

This species subsists chiefly on small fruits and berries. I have sometimes found its crop distended with the ripe pulpy seed of the tataramoa (*Rubus australis*), or with the berries of the kaiwiria (*Parsonia albiflora*); and it is said to feed also on the leaves of the thistle and wild cabbage.

Its wings are small and rounded, and its flight is consequently feeble and generally limited to very short distances. Its progression through the forest is usually performed by a succession of hops, the wings and tail being partially spread—a movement precisely similar to that of the Huia (*Heteralocha acutirostris*) already described.

In disposition the Kokako appears to inherit the characteristics of the Crow family, being very shy and crafty. I purchased a live one from the Otaki natives in the winter of 1862, and as it shared my apartments for nearly a week (much to the discomfiture of my excellent landlady), I had a good opportunity of studying its habits and character. I was often much amused with the tricky manœuvres of this sprightly bird, and I regretted the accident which deprived me of so intelligent a companion. It generally remained concealed under a side-table in a dark corner of the room; but in cold weather was accustomed to steal quietly to the inside of the fender, in order to get warmth from the fire. My presence had become familiar to it, but on the entrance of a stranger it would immediately spring out and hop away to its dark retreat under the corner table.

Nothing is yet positively known of the breeding-habits of this species. A young settler, who, in addition to being a son of the soil, was well skilled in all bush-craft, assured me that he once met with a Kokako's nest fixed in a mass of kareao vines (*Rhipogonum scandens*), and he described it as being of very large size and composed of moss and dry twigs—such a nest, indeed, as we should naturally expect to find tenanted by a bird of this family. A Maori at Wellington described the nest to me in similar terms, with the further information that the Kokako lays a single egg, and after hatching it, leaves its offspring to the care of the Popokatea (*Orthonyx albicilla*)! He stated this as a verity, declaring that he had himself witnessed this little bird feeding the young Kokako; and while unable, at present, to accept so new a fact in natural history, I am bound to admit that the accounts which my informant gave me of the breeding-habits of the Warauroa (*Chrysococcyx lucidus*) and other birds about which I questioned him were perfectly correct.

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GLAUCOPIS CINEREA.

(ORANGE-WATTLED CROW.)

Cinereous Wattle-bird, Lath. Gen. Syn. i. p. 364, pl. xiv. (1781).*Glaucopis cinerea*, Gm. Syst. Nat. i. p. 363 (1788).*Cryptorhina callæas*, Wagl. Syst. Av. *Cryptorhina*, sp. 5 (1827, ex Forster, MSS.).*Callæas cinerea*, Forster, Descr. Anim. p. 74 (1844).*Native name.*—Kokako.*Ad. similis G. wilsoni*, vix saturator, paullò minor: carunculis aurantiacis ad basin tantùm cyaneis distinguendus.*Adult.* Similar in plumage to *G. wilsoni*, but with less of the brown tinge on the lower parts, and the tail-feathers blackish towards the tips. It is readily distinguished, however, by the colour of the wattles, which are of a rich orange, changing sometimes to vermilion, and blue at the base. Irides blackish brown; bill and feet black. Total length 16 inches; wing, from flexure, 6.25; tail 7; bill, along the ridge 1.25, along the edge of lower mandible 1; tarsus 2.5; middle toe and claw 2.15; hind toe and claw 1.5.*Partial albino.* There is an interesting specimen in the Colonial Museum, which was obtained by Mr. Henry Travers at the foot of Mount Franklin, in the Spencer ranges, in January 1869. The general plumage as in ordinary specimens; hind head, sides and fore part of neck, and the whole of the back largely marked with pure white: one or two of the quills in each wing are either wholly or partially white, and there are a few scattered white feathers on the sides, abdomen, and thighs.

THIS species is the South-Island representative of *Glaucopis wilsoni*, to which it bears a general resemblance, except in the colour of its wattles and its rather smaller size. Like the North-Island species also, its distribution is very irregular: thus, in Otago, Dr. Hector found it very plentiful on Mount Cargill and in a strip of bush near Catlin River, but never in the intervening woods; while, in the Nelson Province, as I am informed by Mr. Travers, its range is exclusively restricted to certain well-defined localities, although the berries on which it is accustomed to feed abound everywhere. It is said to be very abundant on some of the wooded ranges of Westland, and Dr. Haast has obtained numerous specimens from the Oxford ranges in the Province of Canterbury.

The habits of this bird differ in no essential respect from those of the preceding species. Mr. Buchanan, of the Geological Survey, has mentioned to me a very curious circumstance frequently observed by himself at Otago: he has seen these birds travelling through the bush on

foot, Indian fashion, sometimes as many as twenty of them in single file, passing rapidly over the ground by a succession of hops, and following their leader like a flock of sheep; for, if the first bird should have occasion to leap over a stone or fallen tree in the line of march, every bird in the procession follows suit accordingly!

I saw a pair of caged ones in the possession of Mr. M^oNee at Hokitika, who told me that he had snared them in the woods with perfect ease; they were apparently quite reconciled to confinement, hopping from perch to perch in a very lively manner, and occasionally meeting to utter a low chuckling note, as if in confidential intercourse. I observed that they usually carried the wattles firmly compressed under the rami of the lower jaw.

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CARPOPHAGA NOVÆ ZEALANDIÆ.

(NEW-ZEALAND PIGEON.)

- New-Zealand Pigeon*, Lath. Gen. Syn. ii. pt. 2, p. 640 (1783).
Columba novæ seelandiæ, Gm. Syst. Nat. i. p. 773 (1788).
Columba zealandica, Lath. Ind. Orn. ii. p. 603 (1790).
Columba spadicea, Less. Voy. Coq. i. p. 710 (1826).
Columba spadicea leucophæa, Hombr. & Jacq. Anp. Sci. Nat. xvi. p. 319 (1841).
Carpophaga novæ seelandiæ, Gray, in Dieff. Trav. ii., App. p. 194 (1843).
Columba argetræa, Forst. Descr. An. p. 80 (1844).
Hemiphaga novæ-zealandiæ, Bonap. C. R. xxxix. p. 1077 (1854).

Native names.—Kuku, Kukupa, and Kereru.

Ad. dorso æneo-ferrugineo: pileo antico lætè metallicè viridi, posticè cum nuchâ et colli lateribus magis æneo nitentibus, his cyanescente tinctis: dorso postico et uropygio nitidè viridibus cyanescente lavatis, supra-caudalibus olivascenti-viridibus æneo lavatis: tectricibus alarum minoribus et majoribus dorso proximis æneo-ferrugineis dorso concoloribus, majoribus et medianis exterioribus nitidè viridibus: remigibus nigris suprâ cyanescenti-viridi nitentibus, secundariis æneo lavatis: caudâ nigrâ suprâ saturatè viridi lavatâ, subtùs nigricante, pennis omnibus versùs apicem cinerascentibus: facie laterali cum gutture toto et pectore superiore lætissimè metallicè viridibus: corpore reliquo subtùs purè albo: subcaudalibus cinerascentibus: subalaribus cinereis: rostro coccineo, versus apicem flavicante: pedibus coccineis: iride coccineâ, annulo ophthalmico pallidè rubro.

Adult male. Head, neck, and fore part of breast shining gold-green, changing according to the angle of view; nape, shoulders, and upper surface of wings, as far as the carpal joint, coppery purple, with bright metallic reflections where this colour blends with the green of the surrounding parts; back and rump greyish green, with dull metallic reflections; quills and their coverts bronzy green, with the inner webs dusky, the secondaries tinged with coppery purple; an obscure band of grey (more conspicuous in the young bird) crosses the outer webs of the primaries, being widest on the fifth and sixth quills; tail-feathers black, with blue reflections on their edges, and terminally margined with brown; under surface of tail-feathers silvery grey towards the base, especially on the outer ones, blackish in their apical portion, with lighter tips; their upper coverts dull shining green; underparts from the breast downwards pure white, the lower tail-coverts tinged with yellow; lining of wings delicate ash-grey. The line of demarcation between the lustrous green and the white is well defined, crossing the breast with an easy curve and terminating immediately above the insertion of the wings, so that when the bird is at rest a narrow margin of white appears over the bend of each wing. Irides and feet carmine-red; soles yellow and covered with small flattened papillæ; claws black; bill carmine-red in its basal half, changing to yellow towards the tip; eyelids pale red, with a reticulate margin, imparting to the brilliantly coloured eyes a very soft expression. Total length 21 inches; extent of wing 32; wing, from flexure, 10.75;

tail 8.5; bill, along the ridge .75, along the edge of lower mandible 1.4; middle toe and claw 2.25; the lateral toes equal, being .75 shorter; hind toe 1.4.

Female. Hardly distinguishable from the male, but with the metallic tints of the plumage somewhat duller.

Young. In the young bird the underparts have a rufous tinge, which is deepest on the flanks and under tail-coverts; the bill and irides are of a lighter colour than in the adult, and the feet instead of being carmine are of a bright coral-red; the soles pale brown instead of yellow.

Obs. Before arriving at full maturity the plumage is subject to slight variations. It is not unusual to find the under tail-coverts pale rufous and the white plumage of the underparts clouded or marked with grey.

Varieties. Partial albinos, or light-coloured varieties, are occasionally met with. A specimen presented to me by Mr. Edward Hardcastle, of Hokitika, has the head, neck, fore part of the breast, and all the upper parts pale yellowish brown, more or less glossed with purple; the wing-coverts and scapulars stained towards the tips with coppery brown; the quills and tail-feathers uniform pale yellowish brown, tinged with vinous, the tips of the latter paler. In another specimen, shot at Maungakamea, near Whangarei, and for which I am indebted to Mr. Henry Mair, the neck, shoulders, back, upper tail-coverts, scapulars, and wing-coverts present scattered feathers of pure white, imparting to the plumage of the upper parts a spotted appearance. Both of these specimens are now in the Colonial Museum. A third example, in the possession of Mr. William Luxford, of Wellington, has the head, neck, shoulders, and upper wing-coverts coppery brown, and the rest of the upper parts pale grey; the primary quills tinged with brown at the tips; the under parts of the body white. The occurrence of these varieties will sufficiently account for the notice, by Hombron and Jacquinot, of *Carpophaga spadicea leucophæa*, which they describe as follows:—"back and wing-coverts undulated with rufous; head, occiput, cheeks, and back of neck grey, marked with paler; quills and tail sooty grey, the latter tipped with white; underparts of throat and breast brownish grey, traversed with grey more or less pure; belly and under tail-coverts all white."

Remarks. The head is small, the neck of moderate length, and the body full, with a prominent and rounded breast; the primaries graduate upwards to the third and fourth, which are generally of equal length; the fifth is slightly shorter, and the rest are rapidly diminished; the secondaries are broad and rounded; the tail-feathers large and even, forming together an ample fan when the tail is expanded. The plumage is thick and compact, and each feather is furnished with a dense undergrowth of downy plumules of extreme fineness, which branch laterally from both sides of the shaft. This peculiarity is most fully developed in the long plumage of the back, where only the tips of the feathers assume the surface character. By this wise provision of nature, the bird is perfectly clothed in a thick undercovering of soft down, and much warmth imparted to the body. The tarsus is completely concealed. On moving the lowest feathers, however, two broad scutella are exposed; on the middle toe there are 11 scutella, on the outer toe 10, on the inner toe 7, and on the hind toe 4.

OF the large and well-defined group of fruit-eating Pigeons found dispersed over the sea-girt lands of the southern hemisphere, the single species inhabiting New Zealand is undoubtedly one of the finest both for size and brilliancy of plumage. As the habits of Pigeons, however, are very much the same all the world over, I do not consider it necessary to enter very minutely into the history of the present bird.

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In its native country it is less esteemed for its beauty than for its value as an article of food ; and to both Maoris and colonists, in every part of New Zealand, pigeon-shooting, at certain seasons of the year, affords agreeable recreation, while to many it is a source of profitable employment. Owing to the loud beating of its wings in its laboured flight it is readily found, even in the thickest part of the bush, and being naturally a stupid bird it is very easily shot ; so that in a favourable locality it is not an unusual thing for a sportsman single-handed to bag fifty or more in the course of a morning. In some districts the slaughter has been so great during a productive season that the Pigeons have never afterwards recovered their numbers ; but in most of our woods, notwithstanding this persistent persecution, they reappear in each successive year in undiminished plenty. The "season" is indicated by the ripening of certain berries on which this species subsists ; and the abundance of the birds is regulated to a great extent by that of the food-supply, which is more or less variable. A sporting gentleman pointed out to me a taraire grove at Ramarama, near Auckland, where in 1869 he found the Pigeons so numerous that he shot eighty-five in the course of two mornings ; but in the following year, owing to the partial failure of the taraire berry, there was hardly one to be seen there.

In the spring and early summer it is generally very lean and unfit for the table ; but as autumn advances and its favourite berries ripen, it rapidly improves in condition, till it becomes extremely fat. It is esteemed most by epicures when feeding on the mast of the miro, which imparts a peculiar richness to the flesh. In January the berries of the kohutuhutu, poroporo, kaiwiria, puriri, mangiao, and tupakihi constitute its ordinary bill of fare. From February to April their place is supplied by those of the tawa, matai, kahikatea, mapau, titoki, and maire. It is worth remarking that in localities where it happens to be feeding exclusively on the pulpy fruit of the kahikatea, it is not only in very poor condition, but acquires a disagreeable flavour from the turpentine contained in the seeds. Towards the close of this period also, the ti-palm, which comes into full bearing only at intervals of three or four years, occasionally supplies this bird with an abundant feast. These tropical-looking palms often form extensive groves in the open country or in swampy situations ; and when the Pigeons resort to them they are speared and snared in great numbers by the Maoris, an expert hand sometimes taking as many as sixty in a single day. In May and June it feeds chiefly on the miro and pate, when it reaches its prime and is much sought after. From July to September it lives almost entirely on taraire in the north, and on hinau, koeka, ramarama, and other smaller berries in the south. During the months of October, November, and December it is compelled to subsist in a great measure upon the green leaves of the kowhai (*Sophora tetraptera*) and of several creeping plants. It also feeds on the tender shoots of the puwaha, a kind of sow-thistle ; and the flesh then partakes of the bitterness of that plant. When the bird is feeding wholly on the dark berries of the wawao the colour of its flesh is said to become affected by that of the food.

The Pigeon-season, however, is to some extent contingent on locality : for example, in the spring of 1863, I found these birds in the Upper Manawatu living on kowhai-leaves, and so lean in body as to be scarcely worth powder and shot, while in the low timbered flats under the ranges, where they were feeding on the ripe berries of the karaka (*Corynocarpus laevigata*), they were in excellent condition.

Mr. Gilbert Mair, who kept a winged bird in his possession for about eight months, informs

me that it fed readily on boiled potato, rice, wheat, and berries of every kind, and that it ultimately died of sheer fatness. It continued shy and untamable to the last, and on being handled would strike fiercely with its wings. The late Dr. Allison, of Wanganui, however, succeeded in rearing a young one which became perfectly tame and associated with his domestic pigeons. I may also mention here, as a somewhat curious fact, that at the Chatham Islands, in 1855, I observed one of these birds flying and consorting with a flock of common dove-cot Pigeons which had taken to the woods and become partially wild.

The New-Zealand Pigeon is strictly arboreal, and appears, as a rule, to prefer the densest foliage. When not engaged in filling its capacious crop with fruit or berries, it generally reposes on a thick limb, with the tail drooping and half spread, the wings closely folded, and the head drawn in; but on the slightest alarm it stretches up its lustrous neck, and gently sways its head to and fro, uttering a scarcely audible *coo*, slowly repeated.

This species retires to the high wooded lands of the interior to breed; and its nest is therefore seldom met with. It is a very rude, flat structure, composed of twigs loosely placed together, and containing generally only one, but sometimes two eggs. These are rather elliptical in form, measuring 1.5 inch in length by 1.1 in breadth; the surface is smooth without being glossy, and as a rule pure white, but sometimes marked with obscure purplish spots at the thicker end. Mr. J. D. Enys informs me that on the 8th of January, 1862, he found a nest containing one egg perfectly fresh, on the 31st of the same month another containing a young Pigeon fully fledged, and on the 3rd of February two more nests, in both of which there was a solitary half-grown bird.

I have remarked a peculiar soaring habit which this bird indulges in during the breeding-season. Mounting high in the air, in a direct upward course, it suddenly opens its wings and tail to their full extent, and glides slowly downwards in an oblique direction, and without any apparent movement of those members.

I very frequently observed this peculiar soaring flight during my ascent of the Upper Wairoa river, north of Auckland, where the solitudes of the endless pine-forests afford this species a secure and quiet breeding-place.

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COTURNIX NOVAE ZEALANDIAE.
(Male and Female.)

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COTURNIX NOVÆ ZEALANDIÆ.

(NEW-ZEALAND QUAIL.)

Coturnix novæ Zealandiæ, Quoy et Gaim. Voy. de l'Astr. (Zool.) i. p. 242, pl. 24. fig. 1 (1830).*Native name.*—Koreke.

- ♂ *ad.* suprâ rufescenti-brunneus: dorsi plumis medialiter fulvo striatis, utrinque nigro marginatis, plumis quibusdam nigro irregulariter maculatis aut vermiculatis: pileo saturatiùs brunneo, supercilio et lineâ verticali fulvescentibus: collo postico et laterali fulvescente: facie laterali et gutture toto castaneis, genis et regione auriculari paullò nigricante variis: tectricibus alarum minimis et medianis dorso concoloribus, his magis fulvescentioribus: remigibus nigricantibus, secundariis angustè fulvo vermiculatis: rectricibus nigris, fulvo transfasciatis, scapis etiam rufescenti-fulvis: subtùs albicans, pectore superiore et abdomine imo fulvescentibus: pectoris plumis nigro marmoratis, fasciâ latâ nigrâ transfasciatis, abdominis plumis fasciis sagittiformibus nigris notatis: hypochondriis rufescenti-fulvis nigro transversim irregulariter fasciatis, et conspicuè medialiter albo striatis: crissò et subcaudalibus nigro notatis et fasciatis: subalaribus albidis, angustè brunneo marginatis, margine alari brunneo vario: rostro nigro, versùs apicem dilutiore: pedibus pallidè carnis: iride pallidè brunneâ.
- ♀ *ad.* mari similis, sed paullò major, ubique dilutior: facie castaneâ et pectore nigro absentibus: facie laterali guttureque fulvescenti-albis, illâ brunneo maculatâ: corpore reliquo subtùs rufescente, abdomine medio albicante, plumis omnibus nigro marginatis, pectoris plumis et hypochondriis medialiter albo lineatis.
- ♂ *juv.* similis feminae adultæ, sed facie laterali et gutture pallidè rufescentibus: corporis subtùs plumis latiùs nigro marginatis.
- ♀ *juv.* similis feminae adultæ, sed corporis subtùs plumis magis distinctè nigro marginatis.

Adult male. Crown of the head and nape dark brown edged with paler, a series of feathers down the centre and on the sides marked in the middle with yellowish white; shoulders, mantle, and all the upper surface rufous brown, beautifully varied with black, and marked with numerous lanceolate stripes of white. On closer examination it will be found that this effect is produced by each feather having a broad lanceolate mark of white down the shaft, bordered on each side with black, dark brown on the webs, fancifully rayed, or banded transversely, and largely tipped with rufous brown. Lores, line over the eyes, sides of head, and throat rufous, with a lunar mark from the ear-coverts on each side, and an anterior edging or border of black; lower part of the neck mottled or obscurely spotted with black and white, the former preponderating; examined separately, however, each feather is black crossed by irregular bands and largely tipped with white; sides and long plumage overlapping the thighs rufous brown, each feather margined and marked down the centre with white, and handsomely streaked and barred on the webs with brownish black; abdomen fulvous white, the under tail-coverts barred with black; primaries and outer secondaries dark brown, the latter rayed on their outer webs with zigzag lines of paler brown; inner secondaries and all the wing-coverts, as well as the tail-feathers, greyish brown, varied with pale rufous, each feather with a narrow shaft-line of white. Irides light hazel; bill black, paler at the tip; tarsi and toes pale flesh-brown. Total length 8.5 inches; extent of wings 14; wing, from flexure, 4.25; tail 1.5; bill, along the ridge .5, along the edge of lower mandible .6; tarsus 1; middle toe and claw 1.25.

Adult female. In the female there is no rufous colour on the face or throat; the upper surface is light ferruginous brown mixed with fulvous, and handsomely varied with black; the lanceolate stripes are yellowish white, changing to fulvous on the longer secondaries and on the lower part of the back; the throat, fore neck, sides, and flanks ferruginous brown, and the breast fulvous white, all more or less varied with black; on the neck and breast each feather is marked near the tip with a broad crescent, and on the webs with irregular spots of brownish black; the feathers covering the sides, and the long feathers overlapping the thighs, have a broad stripe of white down the shaft and are streaked and marbled on both webs with black; the abdomen is white, the sides fulvous and the under tail-coverts dark fulvous varied with black. The female is, moreover, slightly larger than the male in all its proportions.

Young male. In the young male the prevailing colour of the upper surface more nearly approaches that of the adult female. The rufous colouring on the cheeks and throat is very pale, and the lunate marks are less distinct than in the adult. The plumage of the underparts is largely washed with fulvous, and the dark crescents are broader and more conspicuous.

Young female. The only perceptible difference in the markings of the young female is that the dark crescents on the under surface are better defined and less blotched than in the adult bird. In my collection there are two young females from the same nest, in one of which the prevailing tint of the plumage resembles that of the adult female, while in the other it approaches very near to that of the adult male.

Very young state. Crown of the head light fulvous varied with dark brown; ear-spots black; back and upper surface of wings yellowish brown, with dull black markings, each feather with a lanceolate stripe of fulvous white down the centre; throat and foreneck buffy white; breast and underparts pale buff, each feather marked near the tip with two converging elongate spots of a dull black colour. Bill, tarsi, and toes pale brown.

Obs. A beautiful male specimen obtained many years ago at Whangarei, in the North Island, and presented to me by Major Mair, differs from all my South-Island examples in having the whole of the plumage darker, the breast being almost entirely brownish black, relieved only by a few touches of fulvous white; the rufous colour on the face and throat is brighter, the lanceolate markings on the upper surface are very distinct, and the abdomen is fulvous.

Note. Our drawing of the male is from a specimen obtained by Mr. French in Canterbury more than twelve years ago, and now in the possession of George Dawson Rowley, Esq., at Brighton. The figure of the female is from a specimen belonging to the Marquis of Huntley.

THIS handsome species—the only indigenous representative in New Zealand of the order Gallinæ—is now on the verge of extinction. In the early days of the colony it was excessively abundant in all the open country, and especially on the grass-covered downs of the South Island. The first settlers, who carried with them from the old country their traditional love of sport, enjoyed some excellent Quail-shooting for several years; and it is matter of local history that Sir D. Monro and Major Richmond, in 1848, shot as many as forty-three brace in the course of a single day within a few miles of what is now the city of Nelson: while a Canterbury writer has recorded that “in the early days, on the plains near Selwyn, a bag of twenty brace of Quail was not looked upon as extraordinary sport for a day’s shooting.” But, partly owing to the introduction of dogs,

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cats, and rats, and partly to the prevalence of the so-called "bush-fires," or burning of the runs (a necessary incident of sheep-farming in a new country), the Quail has rapidly disappeared, and it will ere long be numbered among the many extinct forms of animal life in New Zealand. Its place, however, has been more than adequately supplied by several introduced species, all of which appear to thrive well and multiply in their new home. Among these we may enumerate the following as being now permanently established in the country, viz. the common English Pheasant (*Phasianus colchicus*), the Chinese Pheasant (*P. torquatus*), the Partridge (*Perdix cinerea*), the Californian Quail (*Ortyx californicus*), and the Australian Quail (*Coturnix pectoralis*). The last-mentioned bird closely resembles the subject of this notice both in appearance and habits; and it will be curious to observe whether it will succeed in resisting for any length of time those physical conditions which have proved so fatal to the indigenous species.

The Hon. Mr. Stafford related to me the following circumstance in illustration of the suddenness with which the Quail disappeared from localities where it had once been plentiful:— On one occasion about the year 1848, accompanied by two other sportsmen, he went out to his own estate, about thirty miles from Nelson, for a day's Quail-shooting; and in the course of a few hours the party bagged 29½ brace. In the hope of preserving the game, he prohibited any shooting over this ground during the following year; but in the ensuing season, when he naturally looked for some good sport, there was not a single Quail to be found!

Mr. Weld (the present Governor of Western Australia), about the same period, tried a similar experiment on his property at Stonyhurst, but with no better success. Finding the Quails very abundant in a particular locality, and being anxious to preserve them, he protected a suitable cover of about 2000 acres, never allowing the sheep upon it, nor permitting fires to overrun it. When this protection was first extended, there were almost incredible numbers of Quails on the land; but in less than a year they had all disappeared. In 1851 Dr. Shortland found it very numerous on the open downs of Waikouaiti*; and as late as 1861, as we learn from Dr. Haast's 'Journal of Exploration in the Nelson Province,' it was "still very abundant on the grassy plains of the interior, rising close to the feet of the traveller at almost every step."

A specimen was shot by Major Mair at Whangarei in 1860; Dr. Hector reports the taking of a pair at Mangawhai in 1866; Mr. Gilbert Mair saw one at Maketu in 1867; and the Hon. J. C. Richmond met with some in the Taranaki district in the months of November and December 1869. These are, I believe, the last recorded instances of its occurrence in the North Island. In the more retired portions of the South Island it is still occasionally to be found; but it has entirely disappeared from the settled country on the eastern side of the Alps.

In the autumn of 1860 I met with a bevy of nine on a dry grassy ridge in the midst of some shallow swamps about two miles from Kaiapoi (in the Province of Canterbury); and having with me a good pointer, I fortunately succeeded in bagging the whole of them. They afforded capital shooting, rising quickly and, after a low rapid flight of fifty yards or more in a direct line, dropping suddenly into the grass again. The stomachs of those I opened contained green blades of grass and a few bruised seeds, as well as some small fragments of quartz. The bevy consisted of an adult male and female, with seven birds of the first year; and as we may infer from the circumstances under which they were found that they comprised a single family, we have some

* Southern Districts of New Zealand, p. 187.

evidence that this species is not less prolific than the other members of the extensive tribe to which it belongs.

Mr. Potts has furnished* the following interesting observations on the habits of this expiring species:—

“On the ground their movements are active; sometimes they may be seen indulging in a dust-bath, as they lie basking in the sun; unless suddenly startled, they almost always maintain that plump rounded appearance which characterizes several genera of the *Tetraonidæ*. From tolerably close observation, we are inclined to suppose that their organs of hearing are far less acute than those of sight. They often give utterance to a low purring sound that one might suppose to proceed from an insect rather than from a bird. The call is indulged in most frequently during moist or wet weather; it sounds something like “twit, twit, twit, twee-twit,” repeated several times in quick succession. In very stormy gusty weather these birds appear dull and silent, secreting themselves among thick tussocks. When flushed, they do not rise perpendicularly, but still very straight for a few feet from the ground. In confinement they are fond of picking about amongst sand, and thrive well on soaked bread, grain of various kinds, and the larvæ of insects. The male is not an attentive mate at feeding-time; and where several are kept in the same enclosure, constant little bickerings take place without actual hostilities being indulged in. The eggs require twenty-one days’ incubation; and the chicks are most active directly they emerge from the shell. They grow very rapidly; and at about four months old the young cannot very readily be distinguished from adult birds, either by contrast of size or plumage.”

There is a specimen of the egg of this species (probably the only one in Europe) in Professor Newton’s fine collection at Cambridge; and there are five examples in the Canterbury Museum which exhibit a slight variation in form and a considerable difference in colour. Two of them (presumably from the same nest) are of a regular oval form and of equal size, measuring 1.3 inch in length by 1 in breadth; these are of a pale yellowish-brown or buff colour, thickly marked with umber, the dark colour often preponderating and having the appearance of daubs or smudges on the outer surface of the shell. Two others (also exactly alike) are of a slightly larger size and of a thicker or broader form; these are of a dull cream-colour, sprinkled and minutely dotted all over with blackish brown. In one of them the spots are confluent at the larger end, forming a greyish-brown patch nearly half an inch in diameter; and in both the more conspicuous spots have a light or faded centre. The fifth egg is smaller and more rounded than any of the rest; it is of a yellowish-white colour, covered all over, but more thickly at the ends, with small smudgy spots of umber; and it has likewise a more glossy appearance than the others.

On comparing the eggs of this species with those of *Coturnix pectoralis*, of Australia, there is a manifest difference, those of the latter bird being, as a rule, creamy white, with very obscure surface-spots.

* Trans. New-Zealand Inst. 1870, vol. iii. p. 93.

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OCYDROMUS EARLI.

(NORTH-ISLAND WOODHEN.)

Ocydromus earli, Gray, Ibis, 1862, p. 238.*Native name.*—Weka.

Ad. ♂ rufescenti-fulvus : plumis corporis superioris medialiter nigricantibus, rufescenti-fulvo marginatis : pileo summo et collo postico saturatè rufescenti-fulvis indistinctè nigro variis : supercilio distincto sordidè cinereo, parte anticâ fulvescente : facie laterali rufescente, regione paroticâ fulvo variâ : genis cum collo laterali imo et gutture toto sordidè cinereis : pectore superiore et laterali rufescente : corpore reliquo subtùs lætiùs cinereo, hypochondriis rufescenti-brunneis : rostro brunneo, versus apicem cinerascenti-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 cinereous, 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 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 ; 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.

Fledgeling. 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.

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.

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 the natives, it was extremely plentiful in every part of the country; but for a period of more than twenty 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 Mangawhare, 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

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

Mr. Henry Mair enabled me to establish the identity of the species. In the Wellington Province 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-dunes bordering on the sea, I have at all times found it tolerably abundant. But every year the struggle for existence is becoming harder, its numbers are diminishing, and ere long it must take its place among the species that were.

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.

On the osteology of this highly aberrant form of Rail I propose to give some further particulars in the Introduction to the present work, and will only notice here a curious fact already 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 *Struthionæ*) 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 distinguishing characters in his proposed scheme for the classification of birds, under the two divisions of *Carinatae* and *Ratitæ*.

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.

As will appear further on, the Woodhen inhabiting the South Island is a totally distinct species, although closely resembling the present one both in form and habits of life. Now it is a curious fact that while the southern species is 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 Dr. Hector attributes to its "greater experience of the treachery of man," the North Island having always possessed a large Maori population.

* Proc. Zool. Soc. 1865, p. 732.

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 Dr. Hector has observed the Woodhens attacking full-grown rats, and Dr. 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 spite, however, of the natural wildness of this bird, and the apparent impossibility of fully taming it, in localities contiguous to its native haunts it is sometimes seen mingling with the domestic fowls; and, however incredible such a fact may appear, there are several well-authenticated instances of its crossing with the barn-door hen and producing a veritable hybrid! I saw one of these, many years ago, at a settler's homestead at Waikanae; and more recently I carefully examined another in the possession of Dr. Hewson at Otaki. I was informed that Dr. Hildebrand, of the Wairarapa, had a clutch of several from one hen; and several other instances might be cited. The hybrid is covered with a peculiar hairy plumage of a yellowish-brown colour, and unites with a general fowl-like appearance a disproportionately long head, Rail-like legs, and a genuine Weka's tail.

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 male always taking the lead. He 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 female is pitched in a different key.

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In the day-time 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.

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*.

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).*Ocydromus brachypterus*, Lafr. Mag. de Zool. 1842, pl. 42.*Native name.*—Weka.

Ad. suprà lætè stramineus, dorsi plumis medialiter brunneis, quasi latè striatis: pileo saturatiore, magis rufescente: supercilio distincto sordidè albicante, posticè cinereo: facie laterali brunneâ vix cinerascente: 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, secundariis magis stramineo lavatis, dorso concoloribus: pectore superiore aurantiaco-fulvo, laterali stramineo, plumis medialiter brunnescentibus: pectore medio cinereo lavato: abdomine cinerascendi-olivaceo: hypochondriis et subcaudalibus stramineis, brunneo vel nigro transfasciatis: subalaribus olivascentibus, imis rufescentibus nigro transfasciatis: rostro brunneo, versus basin rufescente: pedibus pallidè coccineis: iride læte 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 tibia 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.

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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 blackish down, which changes to brown as the chick gets older.

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." 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. My brother, Mr. John Buller, assures 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.

Albinoes, more or less pure, are occasionally met with. The 'Canterbury Press' records the capture of one on the Four-Peaks run, by one of Mr. Walker's shepherds. This beautiful bird had the entire plumage pure white, 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.

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. I am glad, however, to add the following further particulars from the pen of Mr. T. H. Potts, whose long residence in Canterbury has enabled him to study the habits of this bird to the best advantage:—

"One of the best walkers amongst our birds, the Weka's step is usually deliberate and slow; its carriage is particularly noticeable, it is so remarkably bold and confident, yet wary—the neck raised, with the head carried forward with a listening and yet contemplative air; one is loth to believe that the bird is such a mischievous rogue. When at full speed, the neck is extended,

the head lowered, with the point of the beak slightly depressed; if pursued, it turns and doubles, rapidly availing itself of any shelter in which to find refuge. It regains confidence quite as readily as it exhibits fear, and if left in peace emerges from its place of concealment with the same coolness of demeanour that usually distinguishes it. I have caught a whole family of them, old and young; after being released they started off, but returned soon afterwards with their ordinary air of inquisitiveness. When two males quarrel, they fight with determination, sometimes coming out into the open ground; the victor becomes a relentless persecutor, driving off his antagonist at every opportunity; on these occasions one can appreciate the speed and alertness which both pursuer and pursued display in getting over the ground and threading the interlaced maze of shrubs and grassy tussocks. Although mercilessly persecuted, this Ishmael amongst birds may be found or heard in most up-country districts, but in greatly diminished numbers. The size of the Wekas that are now usually met with is much smaller than it used to be: a 4-lb. bird is now almost unknown; yet, years ago, such a weight was not an uncommon one for a fine hill-bird. The greatest sin we can lay to its charge is the ruthless manner in which it destroys ducks' eggs, a practice in which it is second only to the Harrier. It is, moreover, very destructive to poultry. I have seen it kill a well-grown Spanish chicken, six weeks old, with one blow of its powerful bill. So many choice Dorking chickens has it carried off that I have been compelled reluctantly to destroy it near our homestead.

"As an article of food, it is in far less repute than when we first settled here in the days of dear meat. We have since bought sheep at 1s. per head—our taste has become more fastidious; and the Weka is too often only killed for mere wantonness, or the pleasure of taking life. The Maoris of Arowhenua make expeditions in the winter for obtaining a supply of these birds, which they preserve in their own fat. On one run, near Burke's Pass, I have been told that over two thousand Wekas were secured by a party of natives at one of these hunts. Numbers are also killed by the settlers for their oil, which is much esteemed for dressing saddle-straps and for a variety of purposes.

"It is generally distributed over the Canterbury Province, and I do not know any place except near the towns where its loud and rather melancholy call is not more or less frequently heard. Its thievish propensities render it sometimes very troublesome. I have known it carry off a merschaum-pipe, spoons, pannikins, boxes of matches; and on one occasion, in Alford Forest, it actually stole a watch from a bushman's hut. But the Weka, unlike the Jackdaw, does not appear to care for a secret hiding-place in which to deposit its pilferings, and the stolen watch was fortunately recovered, although only by mere accident. The loud screaming of this bird is most frequently heard at night and before rain. The young I have seen early in October. The nest is found in a variety of situations, such as in a tuft of *Celmisia*, under a grass tussock, or sometimes in a thicket of young plants on the outskirts of the bush. I have even observed it under the shelter of a rock, without any attempt at concealment, which the tussocks growing close by would have afforded. Grass is usually the staple material of its home, which is large and basin-shaped within. The colour of the down of the young affords a fair indication of their age, the darker shade of brown characterizing extreme youth; yet the lighter shade, which their plumage gradually assumes, offers great variety. Whilst being led forth hunting, the brood

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is most sedulously attended by the old birds; they may be observed, like chickens, following the hen bird, who collects them around her with the call *tum, tum, tum*, repeated quickly and much lower in tone than the booming note to which the Weka sometimes gives utterance, and which is probably the call of the male. Insects, worms, lizards, &c. seem their principal food, yet nothing comes amiss to these omnivora. When the parent bird is aware of a lizard lying *perdu* beneath the sharp-pointed leaves of an *Aciphylla*, the beak is thrust into the plant in defiance of threatened wounds, the wings are suddenly thrust forward, and the adroit Weka backs out with her writhing prey which the young instantly devour”*.

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 sardinetin 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.”

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.

* Portions of the above notes have already appeared in the ‘Transactions’ of the New-Zealand Institute.

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.*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.

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 Dr. 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.

THIS species of Woodhen, which is quite distinct from the two preceding ones, 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. 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 can no longer be any doubt about their identity.

Dr. 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.

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.

My 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 brown Woodhen (*Ocydromus earli*), 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.'"

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

RALLUS PHILIPPENSIS.

(STRIPED 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).*Native names.*

Patatai, Popotai, Mohotatai, Moho-patatai, Moho-pereru.

Ad. suprâ brunneus, interscapulio saturatiore, plumis omnibus latè olivaceo-fulvo lavatis et marginatis, plerisque albo maculatis aut interruptè transfasciatis, uropygio tantùm unicolori, supracaudalibus minùs albo notatis : pileo summo olivascenti-brunneo, unicolori : 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 extùs fulvo, intùs castaneo conspicuè maculatis : alâ spurîâ remigibusque brunneis castaneo transfasciatis, primariis extùs fulvescente notatis et albo angustè transversim lineatis : caudâ brunneâ olivascente lavatâ : mento albo : genis et gutture toto cinereis, parte inferiore paullò olivascente lavatâ : corpore reliquo subtùs cinerascanti-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,

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sciato: torque pectorâ
zicantibus albo distinctè
ricanti-brunneo, ad basin

lineatis: caudâ brunneâ
paullo olivascente lavatâ:
sciato: torque pectorâ
zicantibus albo distinctè
ricanti-brunneo, ad basin



RALLUS DIEFFENBACHII.

RALLUS PHILIPPENSIS.

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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.

Young. The colours generally are duller, the pectoral band is reduced to a mere wash of yellowish brown, and the bars on the underparts of the body are far less conspicuous than in the adult.

Chick. A newly hatched chick, brought to me by a native, and assigned (I believe correctly) to this species, was covered with glossy black down.

Varieties. 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 recently died in the Zoological Society's Gardens, and was kindly forwarded to me by Dr. Selater for examination, has 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 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.

ALLOWING that the varieties commerated above are all referable to one and the same species, we

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

find that the Striped 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 unlimited range northwards, migrating from one part of the country to another with the changes of season. It occurs also in Polynesia proper, 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. Its only note is a sharp cry uttered singly and at short intervals; and this is generally heard after sunset or in the early morning.

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 order. 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.

The eggs of the Striped 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.

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RALLUS 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 modestus*, Hutton, Ibis, 1872, p. 247.*Native name.*—Moeriki.

Ad. supra brunnescenti-olivaceus, ochraceo et nigricante irregulariter transversim fasciatus: dorso postico et uropygio olivascenti-brunneis, supracaudalibus aureo-fulvo transfasciatis: pileo summo brunneo unicolori: strigâ longâ superciliari, genis et gutture toto cinereis: 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 olivascenti-brunneis, unicoloribus: collo laterali inferiore et pectore superiore nigris albido transfasciatis: pectore fulvescenti-ochraceo, nigro transfasciato: corpore reliquo subtùs nigro, albo transversim lineato: subcaudalibus latiùs fulvo transfasciatis: rostro brunneo, versus basin saturatiore: pedibus pallidè brunneis: iride rufescenti-brunneâ.

Juv. (R. modestus, Hutton) olivascenti-brunneus, unicolor, plumis quibusdam interscapulii et tectricibus alarum majoribus paucis indistinctè fulvo fasciatim terminatis: supracaudalibus fulvo magis distinctè transfasciatis: facie laterali vix cinerascete: gutture sordidè cinereo, brunnescente obscurato: corpore reliquo subtùs brunneo, dorso concolori, sed angustè et magis distinctè fulvo transfasciato: rostro et pedibus pallidè brunneis: iride pallidè 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 margins 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.

Young. 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.

Chick. Uniform brownish black.

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 our drawing and descriptions are taken, is unique; but after carefully comparing therewith the type specimen of Hutton's *Rallus modestus* (forwarded to me by Dr. Hector), and submitting the matter to the judgment of other competent ornithologists, I have no hesitation in considering it the same species, in an immature state of plumage.

In answer to my inquiries, a Chatham-Island correspondent, Kirihipu Roiri Te Rangipua-ahoaho, wrote as follows in August 1863:—"Na, ko to kupu mo te manu. I ngaro tera manu, te 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. The two specimens described by Captain Hutton (*l. c.*) were obtained by Mr. Henry Travers on Mangare, a small satellite of Chatham Island.

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ORTYGOMETRA AFFINIS.

ORTYGOMETRA TABUENSIS.

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ORTYGOMETRA TABUENSIS.

(SWAMP-CRAKE.)

- 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. supra obscure chocolatinus, alis dorso concoloribus, primariis nigricantibus, extus dorsi colore lavatis : caudâ nigricante vix dorsi colore lavatâ : pileo sordidè plumbescente, obscure brunneo adumbrato, facie laterali pallidè pallidiore : corpore subtus sordidè cinereo, hypochondriis crissoque obsoletè, subcaudalibus latius et magis conspicuè albo transfasciatis : subalaribus cinerascenti-brunneis 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 eyelids 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.

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 freshwater 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. 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!

ORTYGOMETRA AFFINIS.

(WATER-CRAKE.)

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.*Native name.*—Koitareke.

Ad. suprâ ochrascenti-olivaceus, dorsi plumis medialiter nigris et albo vermiculatim 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 extùs maculis albis notatis : caudâ nigrâ saturatè ochraceo lavatâ : supercilio distincto, facie laterali et corpore subtùs toto cinereis, abdomine imo cum hypochondriis et subcaudalibus nigricantibus, albo aut maculatis vel transfasciatis : subalaribus cinerascentibus, albo notatis : rostro et pedibus pallidè brunneis olivascente 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. 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.

Obs. 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.

THIS handsome little Crake 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 of aquatic insects and small freshwater mollusks. 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 (*O. palustris*) inhabiting Australia.

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.

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PORPHYRIO MELANOTUS*.

(SWAMP-HEN.)

Porphyrio melanotus, Temm. Man. d'Orn. ii. p. 701 (1820).*Black-backed Gallinule*, Lath. Gen. Hist. ix. p. 427 (1824).*Native names.*—Pukeko and Pakura.

Ad. suprâ 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 cum abdomine imo et cruribus nigris: subcaudalibus albis: rostro et pedibus pallidè coccineis: iride læte 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. 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 recumbent along the frontal plate, evidently for the protection of its tender edges; cubitus perfectly bare and flesh-coloured; legs dusky cinereous.

* The description of *Porphyrio cyanocephalus*, Vieill. N. Dict. 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*.

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.

Varieties. 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 dirty 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. 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.

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 of life, 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

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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 many times had an opportunity of witnessing.

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. 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.

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 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.

It usually breeds in swampy situations, the nest, which is composed of dry grass and flags, being in some instances entirely surrounded by water. Mr. T. H. Potts has described* one 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." Dr. Haast informs me that he 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 Mr. Potts has collected eggs as late as the 13th of December. We may therefore assume that this species is accustomed to breed twice in the season.

The number of eggs in a nest varies from two to seven; but five may be considered the complement. They are broadly ovoidoconical 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 sur-

* Trans. New-Zealand Inst. 1870, vol. iii. p. 102.

face 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, 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.

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NOTORNIS MANTELLI.

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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 cum corpore subtùs toto nigricantibus, ultramarino nitentibus: tectricibus alarum cyanescentibus viridi lavatis: remigibus nigris, primariis extùs cæruleo marginatis, secundariis intimis dorso concoloribus: caudâ suprâ viridi dorso concolori: subcaudalibus albis: rostro lætè rubro, versus 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.

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, 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

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

† Geological Journal, vol. iv.

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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 pahs 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 continent—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 known, having been carefully mounted by Mr. Bartlett, now stand side by side in the National Collection of Great Britain, and, like the remains of the Dodo in the adjoining case, daily attract the attention of thousands of eager visitors!

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 por-

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tions 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 melanotus*) 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.

TRINGA CANUTUS.

(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).
Grisled 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.

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, grisescenti-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 : supercilio parvo albo : facie laterali, collo undique et pectore superiore albis, minutè brunneo striatis vel maculatis : gulâ albâ : corpore reliquo subtùs albo, hypochondriis paullis grisescente variis : subalaribus et axillaribus albis, his vix grisescente notatis : rostro nigro : pedibus olivascenti-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 : subtùs lætè rufus, abdomine albicante, hypochondriis 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

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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.

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

THIS cosmopolitan species is occasionally obtained in New Zealand, but only in its winter plumage. There are several specimens in the Canterbury and Otago Museums, all of them obtained on the east coast. It has not yet been recorded in the North Island; but there is no reason why it should not occur there also. Captain Hutton is in error in stating that I shot one of these birds at Wanganui*, the specimen which I presented to the Colonial Museum having been received by me from the South Island.

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.

* Catalogue of the Birds of New Zealand, 1871, p. 77.

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).*Gallinago pusilla*, Buller, Ibis, 1869, p. 41.

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, secundariis dorso concoloribus et eodum modo nigro maculatis et extùs latè stramineo limbatis : caudâ brunneâ, rectricibus centralibus rufescente variis, exterioribus pallidè cinerascentibus 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 cinerascenti-brunneis : 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, the breast obscurely spotted, the sides and flanks varied with crescentic marks of rufous brown. Irides black ; bill greyish brown ; tarsi and toes pale brown. Length 8·5 inches ; extent of wings 13 ; wing, from flexure, 4 ; tail 1·5 ; bill, along the ridge, 2 ; tarsus ·85 ; middle toe and claw 1·1 ; hind toe and claw ·3.

IN 1868 I received from Dr. Hector a small Snipe collected 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 obtained in the same locality, was deposited by that gentleman in the Colonial Museum. On comparing these birds with Mr. Gray’s description of *Gallinago aucklandica*, I concluded that the species was a distinct one, and characterized it accordingly (*l. c.*) as *Gallinago pusilla*. Captain Hutton and Mr. Kirk have since recorded its occurrence in the Gulf of Hauraki, near Auckland ; and Mr. Henry Travers has recently brought further examples from the Chatham Islands.

Having brought with me to England one of Mr. Traill’s original specimens, and carefully

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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 Mr. Gould, I have come to the conclusion that, notwithstanding the great difference in the length of the bill, they are referable to one and the same species—or, at any rate, that till further specimens have been obtained it would be unwise to separate them.

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.

LIMOSA BAUERI.

(BARRED-RUMPED 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.

Native name.—Kuaka.

Ad. ptil. hiem. suprâ brunnescens, pileo summo unicolori: 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 grisescenti-brunneis, extùs albido limbatis: caudâ brunneâ, rectricibus centralibus cinerascentibus conspicuè albo terminatis: loris et genis albicantibus: corpore subtùs sordidè albo, collo inferiore et pectore summo cinerascentibus, hypochondriis vix brunneo fasciatis: subalaribus et axillaribus albis brunneo transfasciatis: rostro brunneo, mandibulâ ad basin rufescente: pedibus saturate plumbeis: iride nigrâ.

Adult in winter. 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 and axillary plumes white, faintly barred with brown; 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 are 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.

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Adult in summer. Has the plumage of the upper surface darker and largely varied with rufous, the sides of the head, throat, fore neck, breast, upper part of abdomen, sides of the body, and flanks bright rufous. 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.

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.

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. There can be no doubt that this was the species originally described (*l. c.*) as *Limosa baueri*; and I have accordingly restored its original name. But even supposing that, as the authors already cited have contended, Naumann's description is too vague to fix the species, and that Gray's *L. brevipes* is open to the same objection, then *Limosa novæ-zealandiæ* (Gray) would undoubtedly stand in preference to a name bestowed by Gould at a later period.

This Godwit is the eastern representative of the European *Limosa lapponica*, to which it bears a close resemblance; and, like that species, it has a very extensive geographical range. Both of them are alike migratory in their respective hemispheres; and while the other species breeds in the high northern latitudes of Europe and retires in winter to North-west and East Africa, our bird spends a portion of the year in Siberia, and visits, in the course of its annual migration, the islands of the Indian archipelago, Polynesia, Australia, and New Zealand. 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, 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*.

* Fauna Central-Polynesiens (1867), p. 181.

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. Rising from the beach in a long line and with much clamour, they form into a broad semicircle, and, mounting high in the air, generally take a course due north: sometimes they rise in a confused manner, and, after circling about at a considerable height in the air, return to the beach to reform, as it were, their ranks, and then make a fresh start on their distant pilgrimage. 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 flocks begin to reappear at the north early in November, and then rapidly disperse along the coast.

In some localities these birds afford tolerably good shooting, although they are not much esteemed for eating. When spread over the 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 recent 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."

Although the natives speak confidently of an extensive nesting-place at the Awanui, I have never obtained any satisfactory proof of this species breeding with us, nor am I aware of its eggs having yet been found in any other country; so that they are at present even greater desiderata with collectors than the rare and much-prized eggs of the Bar-tailed Godwit of Europe.

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RECURVIROSTRA NOVÆ HOLLANDIÆ.

(RED-NECKED AVOCET.)

Recurvirostra novæ hollandiæ, Vieill. Nouv. Dict. d'Hist. Nat. iii. p. 103 (1816).*Recurvirostra rubricollis*, Temm. Man. d'Orn. ii. p. 592 (1820).*Avocetta novæ zealandiæ*, Ellman, Zool. 1861, p. 7470.

Ad. pulchrè niveus, scapularibus imis nigricantibus : capite cum collo postico et laterali guttureque toto saturatè ferrugineis : pileo antico et vertice cinerascentibus, 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 : subtùs niveus : rostro nigro : pedibus plumbescenti-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 in the closed wing is 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.

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 is taken was killed on the mud-flats near Christchurch in 1864, and was forwarded to me at once by Dr. Haast for determination. It now forms a part of his magnificent collection of New-Zealand birds in the Canterbury Museum. I understand that, more recently, further specimens have been obtained through the exertions of his excellent taxidermist, Mr. F. Fuller.

In Gould's 'Birds of Australia,' where it is distinguished as *Recurvirostra rubricollis* (Temm.), the following account of its habits is given:—"Like its European representative, the Red-necked

Avocet frequents the shallow parts of lakes, inlets of the sea, and the muddy banks of rivers, often wading knee-deep in the water, and readily swimming when necessity requires it so to do. Its food consists of minute marine mollusca and insects, which it gathers from the surface of the mud with its delicately organized bill, the structure of which is admirably adapted for the purpose: not less appropriate is the structure of its feet, which, being partially webbed, enable the bird to pass over the soft surface of the ground with far greater ease than could be effected by any of the Sandpipers, whose toes are divided to their base. In Western Australia the favourite localities of this bird are the lakes in the neighbourhood of Perth and on Rotnest Island, where it is seen in small flocks in company with the *Himantopus leucocephalus*. In South Australia the river Murray and the shores of Lake Alexandrina afford situations equally adapted for its existence. The sexes are alike in plumage, and differ but little in size."

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HIMANTOPUS LEUCOCEPHALUS.

(WHITE-HEADED STILT.)

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

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, cinerascete lavatâ, pennis duabus centralibus omninò cinerascetibus: corpore toto subtùs purè albo: rostro nigro: pedibus cruentatis: iride rubrâ.

Juv. suprâ niger, brunneo tinctus: 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 red; bill black, sometimes horn-coloured at the tip; legs and feet deep pink flesh-colour. 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.

Young. 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; 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.

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 attitudes. When on the wing, the legs are trailed behind, with a slight swaying motion as if to preserve the equipoise; and the bird utters a sharp, quickly repeated note, like the yelping of a small cur.

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. Mr. Potts reports that, according to his experience, it usually commences to breed in October; and 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 ovoid-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.

The young can run nimbly almost immediately after quitting the shell. 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 had 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*.

I have observed that the Stilt sometimes feigns lameness to draw intruders away from the vicinity of its nest; and on the occasion to which I have already referred, when I captured the chick the old birds became excited, flew round me in circles, and repeatedly darted up to within 2 feet of my head, uttering all the time a sharp yelping cry.

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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 name.*—Kaki.*Ad. ptil. æstiv.* suprâ nitidè virescenti-niger: subtùs fuliginoso-niger, loris et facie laterali pallidioribus: rostro nigro: pedibus cruentatis: iride rufescenti-brunnâ.*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 tectricibus alarum nigricanti-brunneis, fulvo marginatis: primariis pallidè cinerascens terminatis: caudâ cinerascens-brunnâ, rectricibus exterioribus versus 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; 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; back, wings, and tail glossy greenish black; the rest of the plumage pure white.*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.

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.

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 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 third 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 tarsi, 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, 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 Province, and further south. Dr. 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 is rarely seen. I have met with it more abundantly in the large river-courses of the South Island; and Mr. Potts, who has found it nesting there, writes:—"It breeds early in the season, seeking the sandy river-beds for that purpose. The labour of nidification is very trifling; sometimes a nest of grass is roughly constructed; and now and then this apology for a nest may be discovered on a log of drift-wood; much more frequently, however, a slight depression in the sandy spit answers all the requirements of this Stilt as a nesting-place; and it is never very far from water. The young can run almost as soon as they are hatched; when disturbed, they conceal themselves behind stones, or some other shelter in the most artful manner. The parent birds exhibit the utmost assiduity in attempting to lead intruders from their eggs or young, and their numerous cunning devices are carried on with surprising cleverness and perseverance." The same observer records a nest, with three eggs, on Rakaia river-bed on the 13th of September, and another, con-

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taining 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.

* Trans. N. Z. Instit. 1869, vol. ii. p. 70.

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 name.—Tuturiwhata.

Ad. ptil. æstiv. suprâ sordidè cinereus, ochraceo-rufo lavatus, plumis omnibus hâc 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, scapis albis, remigibus minoribus et secundariis extimis basin versùs albis et conspicuè albo terminatis, secundariis dorsalibus dorso concoloribus: caudâ saturatiùs brunneâ, rectricibus externis magis cinerascensibus albo terminatis, pennâ extimâ ferè albidâ: loris et supercilio distincto fulvescenti-albis: regione paroticâ brunnescente: subtùs ochrascenti-rufus, genis et gulâ pallidioribus: hypochondriis cum crisso et subcaudalibus albidis: subalaribus et axillaribus albis: rostro nigro: pedibus plumbeis: iride nigrâ.

Ad. ptil. hiem. similis ptilosi æstivæ, sed sordidior: suprâ dilutè cinereus, haud rufescente lavatis: subtùs albicans, pectore superiore laterali cinerascente.

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 pale chestnut; 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.

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. Dr. Haast has 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

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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 Province of Nelson, at an elevation above the sea of fully 8000 feet!

It subsists chiefly on small crustaceans, mollusca, and sand-hoppers, and pursues its prey on foot. 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.

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."

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 thicker end. In size they average 1·8 inch in length by 1·2 in breadth.

CHARADRIUS BICINCTUS.

(BANDED DOTTEL.)

- Chestnut-breasted Plover*, Lath. Gen. Hist. ix. p. 324 (1824).
Charadrius bicinctus, Jard. and 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.—Tuturiwhata and Pohowera.

Ad. æstiv. suprâ obscurè cinereus, supracaudalibus exterioribus albo terminatis: tectricibus alarum dorso concoloribus, majoribus angustè albo terminatis: remigibus brunneis, extûs et versûs apicem saturatioribus, scapis medialiter albis, primariis internis ad apicem albis, remigibus minoribus albo conspicuè terminatis, secundariis dorsalibus dorso concoloribus: caudâ saturatè brunneâ, rectricibus exterioribus cinerascentibus et albo terminatis, rectrice extimâ albicante: fasciâ frontali latâ suprâ oculos angustius ductâ albâ, fasciâ alterâ nigrâ frontali utrinque marginatâ: plumis infraocularibus pallidè cinerascentibus: regione paroticâ cinerascete, dorso concolori: fasciâ mystacali nigrâ cum lineâ anteriore frontali conjunctâ: subtûs albus, torque jugulari latâ nigrâ, alterâ pectorali castaneâ: subalaribus albis, imis cinerascentibus: 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 and 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 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.

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; a broad zone of dark mottled grey encircles the fore neck; but there is no indication of the pectoral band of chestnut.

Fledgeling (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.

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.

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 nests in the localities which it commonly frequents; and there appears to be very little attempt at concealment, although the old birds manifest considerable solicitude for the safety of their offspring, and adopt the usual devices for alluring intruders away. 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 thicker 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.

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, Descr. 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 conspicuè 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. estiv. 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 and 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.

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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.

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 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 Palæarctic 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 Kamschatka in 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,' Professor Schlegel has recorded a list of specimens, more than sixty in number, contained in the Leiden 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 states 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 always in winter plumage.

Mr. Swinhoe 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."

THINORNIS NOVÆ ZEALANDIÆ.

(NEW-ZEALAND SAND-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 dudoroa, 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. and 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 name.—Tuturuatu.

Ad. supra 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-brunneâ, 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. (Th. rossii) 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 ; 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.

Young (Th. rossii). 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.

pl. 11 (1844).

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THINORNIS NOVE ZEALANDIÆ.
(Adult and Young.)

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Obs. In the 'Voyage of the Erebus and Terror,' where both *Thinornis novæ zeelandiæ* 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.

THIS handsome Wader appears to be 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 found a pair on the ocean-beach near Port Chalmers, and records it "a very rare species" in that locality. The Colonial Museum possesses examples obtained more recently from the Hauraki Gulf, in the Province of Auckland.

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 given a figure of it in that character.

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).

Ad. suprâ dilutè cinereus, scapularibus et tectricibus alarum dorso concoloribus: alâ spuriâ brunneâ: remigibus cinerascenti-brunneis, versùs apicem conspicuè saturatoribus, scapis albidis: secundariis cinereis, dorso concoloribus: caudâ cinerascenti-brunneâ, rectricibus exterioribus pallidè cineraceis, extimibus albicantibus: fronte et supercilio 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 cinerascantibus: 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, 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 with the pectoral band much narrower and of a duller black.

Young. Plumage of the upper parts as in the adult, but paler; 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 white down mottled on the upper parts with grey; bill greyish black, brownish at the tip; legs greyish olive.

Remarks. The structural peculiarity from which this Plover derives its name is thus minutely described by

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Potts from a fresh specimen:—Bill longer than the head, pointed, curved to the right or off side, curled slightly on itself in a leaf-like manner, a long groove on each side of the upper mandible, the nostrils long, pierced not far from the base of the bill, fitted with a membranous process, which, apparently furnished with a system of nerves, extends some distance along the mandible; interior of both upper and lower mandibles concave or sulcate, which form is maintained to the point; thus the inside of the bill when the mandibles are closed, becomes a curved pipe, with a very slight twist; the sharp edges of each mandible are horny and semitransparent; from the base of the bill the upper mandible flattened on the top for a distance of about 6 lines, it then assumes a raised and slightly rounded form, till it gradually sweeps down into the point. The mandibles are connected by a membrane fringed with a tough black border, forming itself, when the beak is closed, into a slightly projecting fold at the gape; the upper mandible (or roof of the mouth) is armed with a triple row of very fine spines, set like the teeth of a saw, pointing to the base of the mandible. The tongue, when at rest, lies well within the lower mandible; it is partly sulcate in form, tapers to a fine point, is much shorter than the beak, leaving a vacant space of 6 lines from its extremity to the end of the lower mandible; the base is furnished on either side with a few spines (three or four) planted in the same direction as those in the roof of the upper mandible; the thick portion of the tongue is indented with four or five very slight longitudinal furrows, terminating in the channel into which the tongue now resolves itself till it ends at the very acute point; this sulcate form is attained by the edges being raised. From this peculiar form of tongue, it may be observed that no hindrance is presented by that organ to the sucking up of water; the spines would prevent the escape of the most slippery or minute prey, which could be crushed by the closing of the beak and the pressure of the tongue against the upper mandible, the water finding ready egress.

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 a very interesting notice of the habits of this little Plover was communicated by Mr. Potts to the Wellington Philosophical Society*, from which I take the following extracts:—

"I have had much pleasure in presenting to the Museum specimens of the adult, and also the young bird in the state in which it may be found probably some ten days from the date on which it emerges from the shell (as figured in the Transactions). These specimens were obtained on the shingly bed of the Rakaia, which is one of the largest of the snow

* Trans. N. Z. Inst. vol. ii. 1869, p. 68; and vol. iii. 1870, pp. 93-97.

rivers that intersect the Plains of Canterbury. The *Anarhynchus*, be it understood, is not confined to that locality; in fact it is of frequent occurrence, and may be observed during several months of the year at least, near the streams or back-waters of almost any of the rivers, which in their course disclose sandy spots and wide areas of shingle. The breeding-season extends from September to December. At this season this Plover is less wary than any of its congeners; and 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. Its oval-shaped eggs are three in number, grey stone-colour, with the whole surface minutely dotted over with black specks. On the nest being approached, the old bird trots slowly away, assuming a broader and somewhat flatter appearance, by slightly extending the wings, making at the same time a low purring sound. . . . The young, if undisturbed, remain for some time near the spot where they were hatched; to escape observation they lie concealed behind stones, &c.; 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. The parent birds never appear to separate far from each other during the period of incubation; on being disturbed they exhibit the peculiar habit already described of partially extending the wings, the head at the same time being carried very low, the bill just clearing the ground, whilst a low purring sound is emitted. 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. The young birds are covered with grey down, and appear to have legs of a length quite out of all proportion to the size of the body. At this early stage the peculiar deflection of the bill, although slight, is perceptible; and it is always turned to the right or off side. A consideration of the natural features of its favourite haunts permits us to indulge in surmises as to the convenience and adaptation of its remarkable form of beak for obtaining its food. Where we have seen this bird, it has never been far from water; and if, as I presume, the species is peculiar to this country, I can point to our larger river-beds as affording it admirable feeding-grounds. These rapid shallow streams are perpetually wandering and shifting in their course, cutting new channels after every freshet, whether occasioned by heavy rainfalls or by the melting of snow from the alpine crests of the 'back country.' Any one acquainted with our 'plains' must have observed, here and there, how certain parts (termed by geologists 'fans') are thickly covered with stones, as, for instance, some miles below the gorges of the Rakaia and Rangitata. However unpromising or useless they may appear to the inexperienced, the practical grazier is aware that these stones assist in keeping the ground cool and in retaining beneath them a certain amount of moisture, which during the drier portion of the year (when the parching north-west winds prevail) thus invigorates the thirsty rootlets of many valuable grasses; and the result is the maintenance of a fair number of sheep on

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this rather barren-looking stretch of country. When any of these stones are disturbed from their bed, who can have failed to notice the commotion produced amongst the insect community thus suddenly disclosed to view? What scuttling ensues to gain fresh concealment from the garish light of day! In a somewhat similar manner, after a stream has deserted its temporary bed, numerous forms of aquatic insect life, attracted in all probability by the moisture, are to be found in the sand in which the shingle lies half embedded. The horny point of the bill of this bird, from its peculiar form, is sufficiently strong to be used for thrusting between and under stones and pebbles. The flexibility of the upper mandible derived from the long grooves and flattened form (extending to nearly half its length) tends materially to assist the bird in fitting its curved bill close to a stone, and thus aids it in searching or fossicking around or beneath the shingle for its food, while at the same time the closed mandibles would form a tube through which water and insects could be drawn up, as water is sucked up by a syringe. As the flexure of the bill is lateral, the bird is enabled to follow up retreating insects by making the circuit of a water worn stone with far greater ease than if it had been furnished with the straight beak of the Plover, or the long flexible scoop of the Avocet. The inspection of these specimens must clear away any little cloud of doubt that might remain on the minds of persons unfamiliar with the bird, and convince them that this singular form of bill, so far from being an accidental deformity, is a beautiful provision of nature, which confers on a Plover-like bird the advantage of being able to secure a share of its food from sources whence it would be otherwise unattainable."

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.

As already explained, the curvature in the bill is congenital, being equally present in the embryo chick, although not so fully developed; and this fact furnishes a beautiful illustration of the law of adaptation and design that prevails throughout the whole animal kingdom. A bird endowed with a straight bill, or with an upcurved or decurved one, would be less fitted for the peculiar mode of hunting by which the *Anarhynchus* obtains its living, as must be at once apparent to any one who has watched this bird running rapidly round the boulders that lie on the surface of the ground and inserting its scoop sidewise at every step, in order to collect the insects and their larvæ that find concealment there. But there is another feature in the natural history of this species that is deserving of special notice. As already described, the fully adult bird is adorned with a black pectoral band, which, in the male, measures .75 of an inch in its widest part. Now it is a very curious circumstance that this band is far more conspicuous on the right hand side, where, owing to the bird's peculiar habit of feeding, there is less necessity for concealment by means of protective colouring. This character is constant in all the specimens that I have examined, although in a variable degree, the black band being generally about one third narrower and of a less decided colour on the left side of the breast, from which we may, I think, reasonably infer that the law of natural selection has operated to lessen the colouring on the side of the bird more exposed to Hawks and other enemies whilst the *Anarhynchus* is hunting

for its daily food. There can be no doubt that a protective advantage of this sort, however slight in itself, would have an appreciable effect on the survival of the fittest, and that, allowing sufficient time for this modification of character to develop itself, the species would at length, under certain conditions of existence, lose the black band altogether on the left-hand side.

I do not propose to enter here into a discussion of the theory which a consideration of these facts seems necessarily to involve; but I see myself no difficulty whatever in reconciling this view of the evolution of species by means of natural selection with a belief in the unity of design in Creation, and with the acceptance of the great truths of revelation.

STREPSILAS INTERPRES.

(TURNSTONE.)

- Tringa interpres*, Linn. Syst. Nat. i. p. 248 (1766).
Tringa morinella, Linn. Syst. Nat. i. p. 249 (1766).
Tringa hudsonica, Müller, Syst. Nat. Suppl. p. 114 (1776).
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. pileo et cervice albis, plumis medialiter nigris, quasi striatis: fasciâ nigrâ frontali antè oculum decurrente et unâ cum 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 versûs 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: gulâ 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.

DR. FINSCH, writing in September 1870*, 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 Province of Canterbury. All of these were females in winter plumage; but Dr. Haast has, I believe, since obtained a male; and Captain Hutton, writing to me on the 18th April, 1872, says:—"I have just seen a specimen of *Strepsilas interpres* in the summer plumage shot at the Wade on April 1st."

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.

* Journal für Ornithologie, 1870, p. 349.

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 name.*—Torea.

Ad. suprà niger, dorso postico et uropygio cum supracaudalibus albis, his nigro notatis: tectricibus alarum majoribus conspicuè 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 cruentato: pedibus cruentatis: 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.

Young. Plumage as in the adult, but with the white of the underparts less pure, and the feathers of the back and wings narrowly margined with fulvous brown; bill reddish brown; legs 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; legs dark grey.

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's Straits. 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. 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.

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. 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.

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HÆMATOPUS UNICOLOR.

(BLACK OYSTER-CATCHER.)

Hæmatopus unicolor, Wagler, Isis, 1832, p. 1230*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 coccineis.*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 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.*Obs.* Examples are not unfrequently met with exhibiting a white abdomen and a dull whitish bar on the wings. 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 particoloured 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, although far more abundant in New Zealand than the Pied Oyster-catcher, appears to have a more confined range, for it has never yet been recorded elsewhere. Its habits are the same, with the exception that it is less gregarious, being met with generally either singly or in pairs; and its eggs are quite undistinguishable from those of the former species.

ARDEA SYRMATOPHORA.

(WHITE HERON.)

Herodias flavirostris, Gray, Voy. Ereb. & 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.*Native name.*—Kotuku; "White Crane" of the Colonists.*Ad.* ubique alba : scapularibus plumis elongatis filamentosis ornatis : rostro lætè flavo : pedibus nigris : iride flavâ.

Adult. The whole of the plumage snowy white. Irides yellow; loreal 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.

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.

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; but I suspect that this is peculiar to the summer plumage, inasmuch as apparently adult birds are sometimes met with entirely devoid of this adornment. 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. I have never seen a specimen with a black bill, although I have examined scores obtained at all seasons of the year; and I do not believe that any seasonal change of colour ever takes place, in which respect our bird appears to differ from the other closely allied species. My friend Dr. Finsch first of all referred it to *Ardea intermedia*, then to *A. alba*, and lastly to *A. egretta*; and although it may ultimately be found necessary to sink the species, I have thought it better, for the present, to keep it distinct. Mr. Gould, in surrendering his own appellation of *syrmatophorus*, quotes Blyth's remarks on the subject (Ibis, 1865, p. 36); but I am informed by Mr. Blyth himself that in the Indian bird the change in the colour of the bill, from yellow to black, and *vice versâ*, 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 life-time (He Kotuku rerenga tahi).

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.

The Hon. Mr. Fox has 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."

Mr. Potts, who has since visited this locality, 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 Mr. Fox is no doubt right in considering the Okarita Heronries very nearly, if not actually, the last of their kind.

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 cærulea, 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. Brit. Mus. *Grallæ*, 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 cinerea, Ellman, Zool. 1861, p. 7469 (nec Linn.).
Ardea (Herodias) albolineata, Gray, P. Z. S. 1859, p. 166.

Ad. suprâ fuliginoso-schistaceus, pileo laterali, collo postico et scapularibus elongatis clariùs cinereis : alâ et caudâ fuliginoso-schistaceis, tectricibus alarum et remigibus extûs clariùs cinereo lavatis : subtùs omninò 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. 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, 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.

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Irides yellow; loreal 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.

Nestling. Covered with slate-coloured down.

Remarks. The history of this species has been worked out in an exhaustive manner by Drs. Finsch 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' (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.

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."

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.

There is a single egg of this species in the Canterbury Museum; it is of a regular ovoid-elliptical form, measuring 1.9 inch in length by 1.3 in breadth, of a delicate greenish white, and with a finely granulated surface.

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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).*Demi egretta novæ hollandiæ*, Gray, Hand-l. of B. iii. p. 28 (1871).*Native name.*—Matuku-moana.

Ad. supra dilutè schistaceo-cinereus, pileo cristato saturatiore: interscapulio scapularibusque pallidioribus, cinereis, quasi strigatis: tectricibus alarum dilutè cinereis: remigibus schistaceo-nigricantibus, secundariis clarè cinereo lavatis: rectricibus schistaceo-cinereis, versus apicem brunnescentibus: fronte et supercilio lato, facie laterali et gutture toto albis: regione paroticâ et collo laterali cinereis: subtus pallidè cinereus, collo 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; 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.

"Some nests," continues this naturalist, "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. Kermode 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."

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.

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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, versùs 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.

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 sixteen years ago; and several instances have since been reported of its occurrence in the South Island.

I quote the following interesting account of this species from Gould's 'Birds of Australia:—
 "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."

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ARDETTA 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 zelandiæ*, Purdie, Trans. N.-Z. Inst. iii. p. 99 (1870).*Native name.*—Kaoriki.

Ad. ♂ pileo cæruleo-nigro: supercilio distincto, facie et collo lateralibus sordidè ferrugineis, regione paroticâ stramineâ: dorso toto nigro, plumis quibusdam brunneo, ferrugineo aut stramineo extùs 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 subtùs 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 versùs basin flavicanti-viridi: pedibus lætè viridibus, tarso superiore digitisque brunneo tinctis: iride aureâ.

Juv. ♂ mari similis sed sordidior: tectricibus medianis alarum stramineis medialiter brunneis: gutture minus distinctè notato.

Adult male. 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 male. 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.

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 male 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.

THIS Little Bittern is undoubtedly the true representative in our hemisphere of the *Ardetta 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 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."

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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 veranda 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-pools 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 veranda 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.

Nothing whatever is at present known of the breeding-habits of the Little Bittern; but as the eager search for gold is speedily opening up the rough country on our west coast, we may reasonably look for further particulars before long regarding this and other rare or little-known species.

* Trans. New-Zealand Inst. 1870, vol. iii. p. 98.

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 Aust. vi. pl. 64 (1848).
Botaurus pæciloptila, Bonap. C. R. xl. p. 723 (1855).
Botaurus poicilopterus, Gray, Ibis, 1862, p. 236.
Ardea pæciloptera, 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, interscapulii plumis paucis et scapularibus exterioribus irregulariter fulvescente transvermiculatis: 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: lineâ 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 zig-zag lines and arrow-heads. The broad feathers coverings 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 irre-

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gular 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 the statement (Handbook of the Birds of Australia, p. 314), "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.

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 "Matuku-karourou;" 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 Province, 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.

The Bittern breeds in swamps, forming its rude nest of raupo and other aquatic vegetation loosely placed together. In the 'Transactions of the New-Zealand Institute' for 1869, there is a good sketch (plate iv. fig. 7) of a nest found by Mr. Potts, near Lake Tripp, which he describes as having a flat top, raised about 6 inches above the water, which was ankle-deep all round. 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 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.

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(Male and Female.)

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(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.).
Casarka 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 cervice virescenti-nigerrimis: collo undique nigricante, ochraceo vermiculatim vario: dorso saturatè cinerascanti-fusco, plumis omnibus albido transvermiculatis, plumis castaneis absentibus: dorso postico nigricante obscurè albido transvermiculato: uropygio et supracaudalibus purpurascanti-nigris: remigibus nigris, minoribus extùs pulcherrimè viridibus, secundariis extùs lætè castaneis, intùs cinereis, versùs apicem albo vermiculatis: caudâ nigrâ: corpore subtùs reliquo cinerascanti-fusco, albido transversim vermiculato: abdomine medio castaneo obscurè nigro transfasciato: subalaribus albis, imis cinerascantibus, marginalibus paullò nigricante vermiculatis: rostro plumbescanti-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 caudâ ut in mari coloratis: pileo undique et cervice 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 reflections; 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 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 cheeks, 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.

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 its range does not extend beyond lat. 39° S. It is difficult to understand why it should be thus confined; but, with the exception of a flock of five seen some years ago in the Kaipara district, I have never heard of its occurrence north of this line. 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,

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whether reposing on the water or feeding 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 large 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.

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 a 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; they are of a regular oval form, measuring 2.6 inches in length by 1.9 in breadth, perfectly smooth on the surface, and of a yellowish cream-colour.

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:—

“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 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

* Trans. N. Z. Instit. 1871, vol. iv. p. 207.

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 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."

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."

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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 sandwichensis*, Bonap. C. R. xliii. p. 649 (1856).*Anas mülleri*, Bonap. C. R. xliii. p. 649 (1856).*Native name.*—Parera.

Ad. suprâ brunneus, plumis omnibus fulvescente 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 versûs 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, versûs 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.

Obs. The sexes are alike in plumage, but differ slightly in size.

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.

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.

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 feed is coarser.

In its habits, it 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

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failure—although I have met with one or two striking instances to the contrary, and with one case of its crossing with the Domestic Duck.

It usually breeds among the sedge and tangle in low situations in the immediate vicinity of its haunts; but 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 flags or other soft materials placed loosely together in a circular form; and the interior is lined with down. 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.

ANAS CHLOROTIS.

(BROWN DUCK.)

Anas chlorotis, Gray, Voy. Ereb. & Terror, p. 15, pl. 20 (1844).*Native names.*—Tarawhatu, Pateke, and Tete-whereo.

♂ *Ad.* suprâ saturatè brunneus, dorsi plumis vix olivaceo lavatis et obsoletè fulvo marginatis, tectricibus alarum cinerascenti-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 limbatâ: pileo sordidè rufescenti-brunneo, nigro vario: regione oculari albidâ: facie laterali brunneâ, genis rufescentibus: regione supraparoticâ viridi versùs 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.

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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 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.

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.

Obs. The female is somewhat smaller than the male.

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 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 fresh-water streams which run into them, where the overhanging vegetation affords ready shelter and concealment. 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.

QUERQUEDULA GIBBERIFRONS.

(LITTLE TEAL.)

Anas (Mareca) gibberifrons, Müller, Nat. Gesch. Land- en Vogelk. 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).*Native name.*—Tete.

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 cinerascanti-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 concoloribus: caudâ brunneâ, rectricibus obsoletè fulvescente marginatis: gutture toto fulvescenti-albido, unicolori: corpore reliquo subtùs brunnescenti-fulvo, plumis medialiter saturatè brunneis, quasi marmoratis, hypochondriis magis distinctè, pectore medio et abdomine obsoletiùs notatis: rostro pallidè brunneo, versùs 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.

I OBTAINED my first specimens of this very 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

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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.

The form of this Duck is remarkably slender and graceful, the contour of the body being almost as elongate as that of a Gannet.

Although of rare occurrence in 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 Dr. Haast from Australia with the true *A. gibberifrons*. This circumstance was noticed by me in a communication to the 'Ibis'*; and I have since had an opportunity of further verifying the fact by the examination of several specimens in the Sydney Museum.

* Ibis, 1869, p. 42, note.

SPATULA 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.*Native names.*

Tete, Putaitai, Kuruwengi, Kahoho, and Wetawetangu. "Spoon-bill Duck" of the Colonists.

♂ suprâ 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 extùs pulcherrimè viridibus, secundariis elongatis versùs apicem medialiter albis, remigibus dorsalibus extùs pulchrè cyaneis: supracaudalibus exterioribus lætè viridibus: caudâ brunneâ, rectricibus albido marginatis et terminatis: gutture imo et collo laterali albis, plumis plus minusve distinctè medialiter nigris: pectore superiore ochrascente, plumis ad basin albis et brunneo crescentim transfasciatis: corpore reliquo subtùs 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: suprâ brunneus, uropygio virescente, plumis omnibus latè fulvo marginatis: facie et collo lateralibus fulvescentibus brunneo striatis, gutture sordidè fulvescente: corpore reliquo subtùs ochrascenti-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; cheeks, sides, and anterior portion of hind neck dark grey, with beautiful green reflections, 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

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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 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 the perfection of maturity the dark crescents on the sides of the body are often wanting, being represented merely by a few transverse bars of dark brown.

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. Punctation 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.

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, if it is not in reality identical with, *Spatula rhynchotis*, of the Australian continent; but Mr. Gould assures me that, although probably a hundred examples of the latter have passed through his hands, he has never seen one with so much white on the sides of the neck and breast as the New-Zealand bird exhibits, and he has no doubt whatever about their being specifically distinct. Whether the two species present other differences of plumage in their earlier states cannot at present be determined, inasmuch

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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*.

It is by no means a common species in any part of New Zealand, while in the northern portions of the North Island, so far as I am aware, it has never yet been met with. 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 toe-toe 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;

* Since the above was written I have seen a young male of the Australian bird in the Natural-History Museum at Edinburgh (wrongly labelled *S. clypeata*): it very closely resembles our *Spatula variegata* in the same stage; but the breast is decidedly darker.

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 birds 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 Kaiapoi (Canterbury) containing no less than thirteen.

* Trans. New-Zealand Inst. 1870, vol. iii. p. 103.

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 brunnea, tectricibus alarum magis cinerascentibus: remigibus brunneis, extûs et versûs 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, versûs 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.

Mr. Gould states that "it is a very excellent diver, and gains much of its food beneath the surface of the water, readily descending to the bottom in search of small mollusca, crustaceans, insects, and aquatic plants."

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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 vermiculatum punctulatus: tectricibus alarum paullò brunnescentioribus viridi nitentibus, haud vermiculatis: remigibus brunneis, extûs et versûs apicem nigricantibus, scapis rufescentibus, minimis extûs ad basin albis, fasciam alarem conspicuam formantibus, secundariis intimis sordidè virescente lavatis: caudâ nigricante: capite summo purpureo, faciei et colli lateribus viridi nitentibus: pectore sordidè purpurascenti-brunneo: corpore reliquo subtûs albicante, minutè brunneo transversvermiculato, hypochondriis rufescentibus: subcaudalibus nigricantibus: subalaribus albidis, exterioribus brunnescentibus: rostro cyanescenti-nigro: pedibus saturate brunneis: iride læte 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; back 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 closed 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

MALACCA-1123

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.

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*.

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.

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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.

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 malacorhyncha*, Forster, Descr. Anim. p. 94 (1844).*Native name.*—Wio.

Ad. ubique clarè plumbescens, 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 lætè 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; 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 water-worn 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 readily 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.

I believe this Duck is to be found at the sources of all our 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. 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 I opened were filled with a species of "caddis-worm;" 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 only the 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.

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 marked 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."

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.

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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, versùs 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 hyponchondriacis 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 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 dull 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 Province 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

* Cat. Birds of N. Z. 1871, p. 77.

† Trans. N. Z. Instit. iv. 1871, p. 213.

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 aware either of the size or colour of the eggs; neither did we see any young birds during the period of our observation, 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*.

* Handbook to the Birds of Australia, vol. ii. p. 376.

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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).*Megalestris 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.

THERE is a single specimen of this fine Skua in the Otago Museum, from which the above description was taken. It was collected by Dr. Hector, who sends me 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."

STERCORARIUS PARASITICUS.

(BUFFON'S SKUA.)

The Arctick Bird, Edwards, Nat. Hist. of B. iii. p. 148, pl. 148 (1750).*Le Stercoraire à longue queue*, Briss. Orn. vi. p. 155 (1760).*Larus parasiticus*, Linn. Syst. Nat. i. p. 226 (1766).*Le Stercoraire à longue queue de Sibérie*, Buff. Pl. Enl. ix. pl. 762 (1784).*Cataractes parasita*, Pall. Zoogr. Rosso-Asiat. ii. p. 310 (1811).*Lestris buffonii*, Boie, Isis, 1822, p. 562.*Lestris crepidata*, Brehm, Vög. Deutschl. p. 724 (1831).*Lestris parasitica*, Swains. and Rich. Faun. Bor.-Am. Birds, p. 430 (1831).*Cataractes longicaudatus*, Macgill. Man. Brit. B. ii. p. 258 (1842).*Stercorarius cephus*, Gray, Gen. of B. iii. p. 653 (1845).*Stercorarius longicaudatus*, Degl. Orn. Europ. ii. 298 (1849).*Stercorarius cephus*, Lawr. in Baird's B. N. Am. p. 840 (1860).

Ad. suprâ cinerascenti-brunneus, tectricibus alarum saturatoribus, supracaudalibus 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, hypochondriis cum crisso et subcaudalibus cinerascenti-brunneo lavatis: subalaribus et axillaribus cinerascenti-brunneis: remigibus brunneis, extûs nigricantibus, intûs ad basin albidis, scapis brunnescenti-albis, exteriorum purè albis, secundariis intimis dorso concoloribus: caudâ saturatè brunneâ: rostro saturatè brunneo: pedibus cinerascenti-nigris: iride nigrâ.

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.

THE above description is taken from an example shot by myself on the sea-beach at Horowhenua, in the Province of Wellington, on the 30th of April, 1864, this being the only known instance of the occurrence of this bird in New Zealand.

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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 sickly 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.

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.

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-flavicantibus vix grisescentibus: iride argenteo-albâ.

Juv. supra 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 cinerascenti-brunneo, versùs basin mandibulæ pallidiore, ad apicem corneo: pedibus saturatè brunneis.

Pull. ubique saturatè cinerascenti-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;

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legs and feet greenish yellow, inclining to grey. Length 24.5 inches; 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 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.

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; but these were, of course, merely accidental varieties.

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 Cape-Pigeon, on whose domain it has thus far trespassed. 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 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. 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.

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 sea-weed, 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 overhead in a very confused manner; 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. The young bird has a very shrill cry; and as it grows older, this changes to a prolonged squeal. The adult bird utters a loud laughing note when alarmed or excited, and at other times a short peevish whistle. 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.

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LARUS SCOPULINUS.

(MACKEREL-GULL.)

- Larus scopulinus*, Forst. Descr. Anim. p. 106 (1844).
Larus novæ hollandiæ, Gray, Voy. Ereb. & Terr. Birds, p. 18 (1844).
Gavia andersonii, Bruch, J. f. O. 1853, p. 102.
Gelastes andersoni, Bonap. Naumannia, 1854, p. 212.
Lestris scopulinus, Ellman, Zool. 1861, p. 7472.
Xema jamesonii, Gould, B. of Austr., vol. vii. pl. 20 (1848, nec Wils.).
Bruchigavia jamesonii, Gould, Handb. B. of A. p. 387 (1865).

Native name.—Tarapunga.

Ad. pileo undique albo: corpore suprâ clarè cinereo, tectricibus alarum dorso concoloribus, tectricibus primariorum albis versùs apicem cinereo lavatis: primariis nigris, albo apicatis, duobus exterioribus subterminaliter plagâ magnâ albâ notatis, interioribus plerumque albis intùs cinereo lavatis nigro subterminaliter transfasciatis: secundariis dorso concoloribus: dorso postico cum uropygio caudâque albis: subtùs purè albus, subalaribus cinereo lavatis: rostro cruentato, culmine et apice pallidioribus: pedibus pallidiùs cruentatis: iride argenteo-albâ: annulo ophthalmico cruentato.

Juv. scapularibus et tectricibus alarum brunneo maculatis et marmoratis: primariis albo minùs 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.

Young (Larus jamesoni, Hutton). The young bird of the first year has the upper wing-coverts shaded and blotched more or less with brown; 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.

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 eagerly 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 Mackerel-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 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

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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.

During the breeding-season, which extends over December and January, it 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 or no attempt at preparation. 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.)

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.

Ad. suprâ dilutissimè cinereus: pileo cum collo postico et interseapulio, dorso postico uropygio et corpore subtùs toto, albis: plagâ nuchali indistinctâ brunneâ: tectricibus alarum dorso concoloribus, exterioribus et alâ spuriâ purè albis: remigibus dilutissimè cinereis 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-brunneis: iride argenteo-albâ.

Juv. dorso et scapularibus obscurè brunneo notatis, plumis albo terminatis subterminaliter grisescenti-brunneo fasciatis: tectricibus alarum medianis grisescenti-brunneis 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; 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 the scapulars obscurely spotted with brown, each feather having a white tip bounded below by an irregular spot of greyish brown; the median wing-coverts greyish brown with a whitish margin; the long inner secondaries largely marked in their central portion with greyish 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 *Bruchigavia melanorhyncha*; but as the retention of Bonaparte's subdivision is considered undesi-

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rable, 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, Captain Hutton has done me the honour to associate my name with the present species, which is now figured for the first time.

Another local naturalist, Mr. T. H. Potts, whose name is of frequent occurrence in the course of this work, has paid me a similar compliment in proposing the name of *Larus bulleri* for a Yellow-billed Gull, which he considers distinct. While I take this opportunity of expressing my acknowledgments, I am unable at present to recognize the supposed specific distinction. On a careful comparison of the two birds, I find that they correspond 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, is in the colour of the bill and legs; and as it is well known that several members of this group undergo a seasonal change in this respect, the distinction cannot be accepted as having any specific value till it be shown that the difference of colour is constant in both birds all the year round. As opposed to the latter view, I may mention that in the autumn of 1871 I 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 appears to me, a transition to the black bill characteristic of the full winter plumage.

Dr. Finsch, to whom I forwarded skins of both for examination, concurs in this opinion; but he also goes further, and refers the species to *Larus pomare* of Bruch (supposed to be from the Sandwich Islands), although he complains of the extreme confusion and insufficiency of all Bruch's descriptions. While I attach great weight to the opinion of so careful an ornithologist as Dr. Finsch, I am unable to adopt his view in the present case; for having visited the Museum at Mayence and examined the type of *Larus pomare* for myself, I find that it has 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, has dark ear-coverts, and a brown terminal band across the tail.

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; so that, assuming my identification to be correct, the Black-billed Gull is 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.

On the habits of this species, as observed by Mr. W. T. L. Travers on Lake Guyon, in the Province of Nelson, I have much pleasure in quoting the following account from the pen of that gentleman:—

“The Black-billed Gull breeds on the main river-bed; and one or more pairs usually frequent 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" *.

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.

* Trans. New-Zealand Inst. 1871, vol. iv. p. 209.

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.
Thalasseus imperator, Coues, Pr. Phil. Acad. 1862, p. 538.

Native name.—Tara-nui.

Ad. ptil. æstiv. suprâ dilutè cinereus, uropygio et supracaudalibus albis : caudâ albâ : tectricibus alarum dorso concoloribus : remigibus extûs canescentibus, primariis versùs apicem saturatoribus, scapis albis, pennis minoribus et secundariis dorsalibus pallidè cinereis : pileo et nuchâ cristatâ nigris : facie laterali a narium basi ductâ cum collo laterali et corpore subtùs toto albis : rostro lætè corallino, flavo vario, versùs 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, 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.

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 '*tschegrava*, 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 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 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 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. Its ordinary cry is harsh and unmusical, consisting of a loud rasping note; at other times it utters a long peevish squeal or whistling cry.

The breeding-season of this species extends from November to January. 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.

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STERNA FRONTALIS.

(WHITE-FRONTED TERN.)

Sterna frontalis, Gray, Voy. Ereb. & 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. hiem. similis ptilosi æstivæ, sed fronte albâ latiore et vertex 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. Irides 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 varied or spotted with white.

Young. Forehead, crown of the head and nape greyish black, mottled with white; the whole of the back, the feathers composing the mantle, and some of the larger wing-coverts dark silvery grey, varied with white, and handsomely mottled and barred with 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.

Fledgeling. Feathers of the back and the scapulars greyish white, with broad crescentic marks of 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.

THIS elegant species is extremely abundant on our coasts, flocks of a hundred or more being often met 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 manœuvres 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 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*.

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. The eggs are deposited on the bare rock, often within reach of the sea-spray; and, as a rule, there is only a single egg 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, and ascribed by Mr. Potts with certainty to this species) 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.

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STERNA ANTARCTICA.

(GREY TERN.)

Sterna antarctica, Wagler, Isis, 1832, p. 1223.*Hydrochelidon albostriata*, Gray, Voy. Ereb. & 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 cinerascentibus, intùs albis, scapis albis, primario primo extùs nigricante: caudâ dilutè cinereâ, rectricibus versùs basin albis, rectrice extimâ ferè omninò albâ, versùs apicem cinerascete: rostro lætè flavo: pedibus lætè flavis, unguibus saturatè brunneis: iride nigrâ.

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

Juv. pileo summo et laterali saturatè cinerascentibus: lineâ a basi rostri per oculus 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 lôres, a mark beyond the eyes, and a narrow nuchal collar obscurely mottled with black; 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.

THIS handsome Tern is very common in every part of the South Island, but is only occasionally

met with on the north side of Cook's Strait. In the autumn of 1867 I observed a flock of them at the mouth of the Rangitikei river; and on another occasion I saw a few near the Wanganui heads; but I do not remember having ever met with it further north.

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. 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*.

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-ground 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 by Mr. Potts on the 22nd of October) has the entire surface covered with small round spots.

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.*Sterna alba*, Potts, Trans. N.-Z. Instit. 1870, vol. iii. p. 106.*Native name.*—Tara-iti.

Ad. ptil. æstiv. suprâ dilutè cinereus, tectricibus alarum dorso concoloribus : remigibus intùs albis, extùs cano lavatis, primariis duobus externis extùs nigricantibus, scapis albis, pennis minoribus versùs apicem albis, secundariis intimis dorso concoloribus, dorso postico et uropygio cum supracaudalibus albis : caudâ albâ : pileo postico et nuchâ cum regione oculari et supraparoticâ nigris : fronte latâ, genis et facie laterali et corpore subtùs 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 fusciscenti variis : lineâ crescente ab oculo postico circâ nucham productâ nigrâ : suprâ dilutè cinereus, plumis versùs 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.

Its note is a harsh scream; and during the breeding-season it is very clamorous, especially when its nesting-ground is invaded, or even approached. It 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. supra nitidè niger, dorso et scapularibus paullo 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: rectricibus 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 Province 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 'Handbook;' and as it is unquestionably the same form as that inhabiting the Palæarctic region, the species enjoys a wide geographical range.

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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.—Torea.

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 versùs pallidioribus, scapis flavicanti-albidis : scapularibus albis, ad apicem nigris : dorso postico et uropygio, supracaudalibus caudâque albis, hac nigro apicatâ, rectricibus exterioribus basaliter brunneo irregulariter transversimulatis : subtùs pure albus, pectore indistinctè brunneo vermiculatim fasciato : rostro albido, carnoso vix tincto, ad apicem flavicanti-corneo : pedibus carneo-albicantibus : iride saturatè brunneâ : annulo ophthalmico viridi-purpurascete.

Juv. suprâ fuliginoso-brunneus : alis caudâque fuliginoso-nigris, scapis flavicanti-albis, versùs apicem nigris : fronte cum facie laterali et gutture purè albis : subtùs fuliginoso-brunneus, abdomine magis cinerascete : subalaribus et axillaribus albis, his versùs 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 tips ; legs and feet flesh-white, sometimes with a pinky tinge. Total length 42·5 inches ; extent of wings 40 ; 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. 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. Forehead and the whole of the face and throat pure white; crown of the head, nape, neck all round, back, and scapulars sooty brown; upper surface of wings and tail sooty black, the shafts of the quills yellowish white, changing to black at the tips; breast and all the underparts sooty brown, inclining to ash-grey on the abdomen; lining of wings and axillary plumes pure white, the latter with vermiculations of sooty brown near the tips. Irides brownish black; bill white horn-colour; legs and feet flesh-white.

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.

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. Captain F. W. 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 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

* *Philosophical Magazine*, August 1869.

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.

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; but the Auckland Islands are enumerated among its known breeding-stations. Dr. McCormick, surgeon of H.M.S. 'Erebus,' who found it nesting there 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 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."

DIOMEDEA MELANOPHRYS.

(BLACK-EYEBROWED ALBATROS.)

Diomedea melanophrys, Boie, in Temm. Pl. Col. v. pl. 456 (1828).*Native name.*—Torea.

Ad. albus: interscapulio et scapularibus cum alâ totâ schistaceo-nigris: dorso postico, uropygio et supra-caudalibus albis: caudâ schistaceo-nigrâ, scapis albidis: regione oculari delicatè cinereâ, suprâ oculum saturatiore, supercilium formante: rostro sordidè flavo: pedibus flavicanti-albis, cyanescente vix lavatis, plantis etiam cyanescente tinctis: iride pallidè brunneâ.

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.

Young. Captain Hutton, in his 'Notes on some of the birds inhabiting the Southern Ocean,' writes of this species:—"According to my observations the head in the young is grey, which, as the bird grows older, becomes white—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. The beak remains dark blue for some time after the plumage has assumed the colours of the adult. The feet and legs of the young bird are light blue."

THIS species of Albatros is far more common in our seas than *Diomedea exulans*, and approaches nearer to the coast, often following a vessel to the very entrance of the harbours. 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.

Captain 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

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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."

It would appear from the above observations that Captain Hutton is mistaken in his conclusion that this species is "quite diurnal in its habits, both at sea and on land" (Ibis, 1865, p. 278).

Nothing very positive has been ascertained respecting its breeding-habits, although it is said to breed in the Falkland Islands.

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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, culmine cum ungue et maculâ parvâ ad basin mandibulæ positâ lætè flavis : pedibus cyanescenti-albis.*Adult.* Plumage similar to that of *D. melanophrys*. Bill black, with the culmen and hook, and a basal spot on the lower mandible yellow ; 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.

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 am informed, were obtained off the New-Zealand coast, although the proper range of the species appears to lie in more northern latitudes.

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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 pulchrè cinereo lavatis: culmine et gonyde sordidè flavis: pedibus flavicanti-albis.*Juv.* similis adulto, sed pileo colloque saturatiùs cinereis: rostro nigro, culmine medialiter flavicante et gonyde obscurè 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 crura, 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.

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. My description of the youthful state is taken from this 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 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).*Phæbetria fuliginosa*, Reich. Natürl. Syst. Vög. p. v (1852).*Native name.*—Torea-pango.

Ad. fuliginoso-cinereus, alis caudâque saturatoribus: 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-brunneâ.

Adult. The entire plumage deep sooty grey, darker on the upper surface of the wings and tail, and shading into blackish grey on the face; the eyes surrounded posteriorly by a distinct mark of white; the shafts of the primaries are 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.

Young. Differs only in having the plumage of the upper parts largely tinged with brown, the margins of the feathers paler, and the marks encircling the eyes light grey instead of white.

THIS well-known species, which appears to be generally distributed over the temperate latitudes southward of the Equator, is comparatively common in the New-Zealand seas. Its long cuneated tail at once distinguishes it from all the other members; 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 in a live state many miles from the sea, apparently blown inland by the violence of the prevailing storms.

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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 subtùs paullò pallidioribus: dorso et tectricibus alarum pallidiore cinereo angustè marginatis: rostro flavicanti-corneo: pedibus cinerascenti-nigris, unguibus albicanti-corneis: iride nigricanti-brunneâ.

Adult. Entire plumage dull slaty brown, paler 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. Irides blackish brown; bill yellowish horn-colour; legs and feet greyish black, the claws whitish horn-colour. 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. Albinos are not uncommon.

THE Giant Petrel, or "Nelly," as it is called by sailors, is by no means uncommon in our seas, and occasionally ventures into the deep sounds or estuaries. Many years ago a fine specimen (now in the Auckland Museum) was caught on shore by the men of H.M.S. 'Pandora,' and eventually came into my possession. There is an equally fine specimen in the Canterbury Museum, collected by Mr. J. Fuller, who informs me that he observed it with several others in the Akaroa harbour following the carcass of a dead whale, and engaged in tearing off the blubber.

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.

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.

Captain 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.

DAPTION CAPENSIS.

(CAPE-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 totius 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.

So familiar is the so-called "Cape-pigeon" to all who have made a voyage in the southern seas, and so fully has its history been recorded, that it seems scarcely necessary, in giving an account of the birds of a particular country, to do more than notice its occurrence.

It is numerous off the New-Zealand coast at most seasons of the year; and 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.

Captain 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.)

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PROCELLARIA 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, *Proc.* p. 22 (1863).*Fulmarus glacialoides*, Gray, Hand-l. of B. iii. p. 105 (1871).

Ad. suprà dilutè argentescenti-cinereus : pileo undique et corpore subtùs toto albis : pectoris lateribus dorsi colore lavatis : primariis extùs nigricanti-brunneis, intùs albicantibus : rostro albicanti-corneo, carnosio tincto, nigro apicato, culmine ad basin cyanescente : pedibus carnosio-cinereis, digitis exterioribus externè saturatoribus : 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.

The late Sir Andrew Smith, who was the first to discriminate the characters which distinguish this species from *Procellaria 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.

PROCELLARIA PARKINSONI.

(BLACK PETREL.)

Procellaria parkinsoni, Gray, Ibis, 1862, p. 245.

Majaqueus parkinsoni, Gray, Hand-l. of B. iii. p. 108 (1871).

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.

Obs. The above description 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 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—*P. gouldi* being extremely vicious, fighting savagely even with a dog when attacked, whereas *P. parkinsoni* would allow itself to be seized by the hand in its burrow almost without resistance.

An egg of this Petrel in the Auckland Museum is broadly oval in form, measuring 2.75 inches in length by 1.95 in breadth, and is of a creamy-white colour.

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PROCELLARIA 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 lessonii*, 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 lessonii*, Gray, Hand-l. of B. iii. p. 106 (1871).

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, versùs apicem cinerascentibus : tectricibus alarum fuliginoso-brunneis, majoribus extùs cinereis : remigibus fuliginoso-brunneis, intùs cinerascentibus : 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, varied 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 in New Zealand, and it is evidently very rare. The example figured in our Plate was obtained at the Bay of Islands, and is now in the British Museum.

Mr. Gould has given the following account of this species 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.

PROCELLARIA 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).

Pterodroma fuliginosa, Bonap. C. R. xlii. p. 768 (1856).

Pterodroma atlantica, Bonap. Consp. Av. ii. p. 191 (1857).

Æstrelata fuliginosa, Coues, Proc. Phil. Ac. 1866, p. 157.

Fulmarus atlanticus, Gray, Hand-l. of B. iii. p. 107 (1871).

Ad. Omnino fuliginoso-niger, gutture pallidior: subtus brunneo lavatus: rostro et pedibus nigris: iride nigra.

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.

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PROCELLARIA CINEREA.

(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, Descr. An. p. 208 (1844).
Procellaria hasitata, Gould, B. Austr. fol. pl. 47 (1848).
Priofinus 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. 835 (1860).
Puffinus kuhlii, Cass. Pr. Phil. Acad. 1862, p. 327.
Procellaria adamastor, Schl. Mus. Pays-Bas, Proc. p. 25 (1863).

Ad. supra cinerascenti-brunneus, dorsi plumis et supracaudalibus pallidiore brunneo terminatis: remigibus et rectricibus brunnescenti-nigris: facie et colli lateribus obscurè cinerascentibus brunneo variis: subtùs albus, pectoris lateribus brunneo lavatis: rostro flavo, versùs 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.

CAPTAIN 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 species 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."

PROCELLARIA 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).

Ad. suprâ clarè cinereus, pileo summo brunnescente lavato : tectricibus alarum minimis et alâ spuriâ brunnescentibus : remigibus extûs brunnescenti-cinereis, intûs albis, secundariis clariûs cinereis : caudâ obscurè cinereâ albo terminatâ, rectrice extimâ albicante : fronte, loris, supercilio indistincto, facie laterali et corpore subtûs toto albis, pectoris superioris lateribus et hypochondriis 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.

THERE IS only one specimen of this Petrel in the Auckland Museum ; and it does not occur, so far as I am aware, in any other collection in the colony. Mr. Gould, however, states that he found it "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.

PROCELLARIA 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).

Ad. suprâ saturatè cinereus, plumis quibusdem pallidiùs terminatis: alâ totâ nigricanti-brunnâ, primariis et secundariis intùs albis, his ferè omninò albis: recticibus centralibus cinerascentibus, reliquis albo variis, duabus externis intùs purè albis: fronte albâ, cinerascenti-nigro variâ: regione sub-oculari 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, the tips of some of the feathers paler; 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, imparting a spotted appearance to 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 yellowish brown, with paler webs. 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; bare tibia .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. The species appears, however, to be very rare; and I have never met with it, although Captain Hutton informs me that there is a specimen in the collection of the Rev. R. Laishley, at Auckland.

PROCELLARIA 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).*Ad.* fuliginoso-niger, subtus brunnescentior: fronte, loris, et facie anticâ albicanti-cinereis: rostro et pedibus nigris: iride nigrâ.*Adult.* 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.*Remarks.* The form of this Petrel is rather slender; the tail is long and cuneate; 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. Captain 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."

An egg of this species, in the Auckland Museum, which was obtained on Katikati Island, 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.

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).*Prion ariel*, Gould, Ann. N. H. xiii. p. 366 (1844).*Halobæna typica*, Bonap. C. R. xlii. p. 768 (1856).*Procellaria ariel*, Schl. Mus. Pays-Bas, Proc. p. 18 (1863).*Pseudoprion turtur*, Coues, Proc. Phil. Acad. 1866, p. 166.*Pseudoprion ariel*, Coues, Proc. Phil. Acad. 1866, p. 166.*Native name.*—Whiroia.

Ad. suprâ pulchrè et saturatè cinereus, scapularibus brunnescentibus albo terminatis: tectricibus alarum dorso concoloribus, minimis brunnescentibus: remigibus fuliginoso-brunneis, intùs albis, secundariis cinereis: caudâ cinereâ, ad apicem brunneo fasciatâ: facie anticâ albâ minutè cinereo punctulatâ: supercilio albo ab oculo postico suprâ regionem paroticam ducto: plumis subocularibus et regione paroticâ cinereis: facie laterali et corpore reliquo subtùs albo, pectore laterali summo et hypochondriis imis pulchrè cinereis: subalaribus albis: rostro clarè cinereo, ad basin nigricante: pedibus pallidè cinereis, anticè viridi lavatis, palmis albicanti-canis: 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 10 inches; extent of wings 20.5; wing, from flexure, 6; tail 3.5; bill, along the ridge 1, greatest width at base .4, length of lower mandible .75; tarsus 1.1; middle toe and claw 1.5.

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 wind-

ward, 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.

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.

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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, *Proc.* 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.

THE propriety of retaining the above specific distinction appears to me very doubtful; but I am unwilling to dismiss the supposed species till the subject has been further investigated.

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 comparatively rare; and the local museums possess very few specimens.

* 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).

Ad. similis P. banksii, sed saturatior: pileo et facie laterali nigricanti-cinereis: tectricibus alarum brunneo lavatis: staturâ majore et rostro conspicuè latiore faciliè distinguendus.

Adult. Similar to *P. banksi*, 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. Total length 12·5 inches; 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. I have taken the above measurements from a fine specimen obtained by Mr. Henry Travers on Pitt's Island.

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.

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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. suprà nitenti-niger, scapularibus albo apicaliter vix notatis: collo laterali fuscescenti-cinereo: fronte brunnescente: subtùs albus, hypochondriis cinereo lavatis: rostro nigro: pedibus cyanescentibus, viridi tinctis, palmis cyanescenti-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.

THE Diving-Petrel is very common in the seas surrounding New Zealand, consorting in flocks, and living on medusæ and other marine productions. Its flight consists of a rapid fluttering movement along the surface of the water; and it 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.

PELECANOIDES BERARDI.

(BERARD'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.

I HAVE taken the above description 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. It is very closely allied to *P. urinatrix*; and its habits of life are doubtless the same.

PUFFINUS BREVICAUDUS.

(BRANDT'S SHEARWATER.)

Puffinus brevicaudus, Brandt, MS. ; *undè**Puffinus brevicaudus*, Bonap. C. R. xlii. p. 769 (1856).*Nectris brevicaudus*, Bonap. Consp. Gen. Av. ii. p. 201 (1857).*Nectris brevicauda*, Coues, Pr. Philad. Acad. 1864, p. 127.*Puffinus brevicaudatus*, Hutton, Cat. Birds New Zeal. p. 45 (1871).*Native name.*—Titi.*Ad.* omninò fuliginosus, corpore superiore brunnescente lavato : rostro nigricanti-brunneo, mandibulâ pallidiorè : pedibus vinascenti-cinereis : iride nigrâ.*Adult.* 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.

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.

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 $18\frac{1}{2}$ geographic square miles of ground."

Mr. Gould describes the egg as being of snowy whiteness, and measuring 2.75 inches in length by 1.9 in breadth; and he adds:—"The white or albumen forms a very large proportion of its contents; and it is remarkable that a small part of both the yolk and the white remains soft and watery, however long the egg may be boiled."

PUFFINUS TRISTIS.

(SOMBRE SHEARWATER.)

Procellaria tristis, Forster, Descr. An. p. 205 (1844).*Puffinus tristis*, Gray, Ibis, 1862, p. 244.*Nectris amaurosoma*, Coues, Pr. Philad. Acad. 1864, p. 124.*Puffinus amaurosoma*, Gray, Hand-l. of B. iii. p. 102 (1871).

Ad. similis P. brevicaudo, sed major et obscurior, plumis corporis superioris sordidè brunneo marginatis : subtùs interdum pallidior : rostro cinerascenti-nigro, culmine flavicanti-brunneo : pedibus dilutè cyanescen-
tibus, 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. Irides black ; bill dull greyish black, inclining to yellowish-brown on the ridge ; tarsi and toes pale blue, the webs pale brown. 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.

THIS bird, of which there are two specimens in the Canterbury Museum, resembles *Puffinus brevicaudus*, but is appreciably larger, as will be seen on referring to their respective measurements. I believe Captain Hutton is right in his identification of this species as the true *P. tristis* of Forster's description, the type of which is in the British Museum.

It is said to be extremely abundant at Stewart's Island and on the adjacent coast of New Zealand. The egg is described as white, stained with reddish brown, and measuring 3·25 inches in length by 2 in breadth.

PUFFINUS GAVIUS.

(FORSTER'S SHEARWATER.)

Procellaria gavia, Forst. Descr. Anim. p. 148 (1844).*Puffinus opisthomelas*, Coues, Pr. Philad. Acad. 1864, p. 139.*Æstrelata gavia*, Coues, Pr. Philad. Acad. 1866, p. 154.*Puffinus assimilis*, Hutton, Trans. N.-Z. Instit. vol. i. p. 161 (1868, nec Gould).*Ad. suprà* nitidè brunnescenti-niger : facie laterali et corpore subtùs toto albis : rostro sordidè plumbeo, mandibulâ pallidiore : pedibus flavicanti-albis, extùs nigro limbatis : iride nigrâ.*Adult.* Crown of the head, nape, and all the upper surface, including the wings and tail, glossy brownish black ; sides of the face, throat, fore neck, and all the under surface white. Irides brownish black ; bill dark grey, lighter on the under mandible ; tarsi and toes flesh-white, inclining to yellow, and stained with black on their outer edges. Total length 14 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.

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. I have in this manner obtained very fine examples on the northern shore of Cook's Strait ; and the various local Museums contain specimens from other parts of the coast, both north and south.

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THALASSIDROMA MELANOGASTER.

(BLACK-BELLIED STORM-PETREL.)

Procellaria grallaria, Licht. Verz. Doubl. p. 83 (1823).*Thalassidroma melanogaster*, Gould, Ann. N. H. xiii. p. 367 (1844).*Fregatta melanogastra*, Bonap. C. R. xlii. p. 769 (1856).*Procellaria melanogastra*, Schl. Mus. Pays-Bas, *Proc.* p. 6 (1863).

Ad. fuliginoso-brunneus, tectricibus alarum majoribus pallidius brunnescentibus : gulâ albo variâ, plumis basalliter 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 March 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. Its habits and general economy are of course very similar to those of the other members of the genus.”

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.

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.

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THALASSIDROMA FREGATA.

(WHITE-FACED STORM-PETREL.)

Procellaria fregata, Linn. Syst. Nat. i. p. 212 (1766).*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).

Ad. suprâ cinerascenti-fuliginosus, pileo saturatiore: uropygio imo et supracaudalibus clariùs cineraceis: tectricibus alarum brunnescentibus, majoribus pallidioribus: remigibus et rectricibus brunnescenti-nigris: fronte cum supercilio distincto, facie laterali et corpore subtùs toto albis: plumis circumocularibus et regione auriculari cinerascenti-fuliginosis: collo laterali, hypochondriis imis et subcaudalibus clariùs cineraceis: 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.

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 preceding species, although the habits of the two birds appear to be precisely alike. 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 is described as being pure white, and measuring 1.5 inch in length by 1.15 in breadth.

THALASSIDROMA NEREIS.

(GREY-BACKED STORM-PETREL.)

Thalassidroma nereis, Gould, P. Z. S. 1840, p. 178.*Procellaria nereis*, Bonap. C. R. xlii. p. 769 (1856).

Ad. pileo 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, versùs basin mandibulæ 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.

THERE is a single example of this rare species of Storm-Petrel in the Canterbury Museum.

It 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. This naturalist informs us that the sexes are alike in plumage, and do not present any material difference in size.

The species is readily distinguishable from the other Storm-Petrels by the absence of white on the rump.

SULA 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.*Native name.*—Takapu.

Ad. albus: pileo et collo postico clarè ochrascenti-fulvis: remigibus brunnescenti-nigris, scapis flavicantibus, versùs apicem brunneis, secundariis intimis albis dorso concoloribus: caudâ albâ, rectricibus quatuor centralibus brunneis, ad basin albis: rostro saturatè cano: regione ophthalmicâ nudâ cyanescenti-canâ: plagâ nudâ ad basin rostri et fasciâ gulari nudâ nigricanti-canis: pedibus saturatè brunneis, tarso et pedibus anticè viridibus: iride pallidè argentescenti-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.

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.

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 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.

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.

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 with grey down, and were packed so closely together, that it was almost impossible to distinguish the occupants 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. 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 caldron, 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, there is a bare rock, known to sailors as Gannet Island, where another extensive breeding-place exists.

The eggs of the Gannet are very elliptical in form, measuring 3.1 inches in length by 1.8 in breadth, the shell being of a greenish-white colour, covered over with a chalky substance, originally white, but yellowish-brown when soiled, and often much scratched by the action of the bird's feet.

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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, 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-brunneis, viridi-nigro marginatis : primariis nigricanti-brunneis : caudâ nigrâ, suprâ vix cinerascete lavatâ : plagâ latâ ab oculo postico et subter gulam conjunctâ albidâ : corpore reliquo subtùs indigotico-nigro, viridi nitente, plagâ hypochondriacâ maximâ albâ : rostro albido, culmine et apice brunnescentibus : plagâ ophthalmicâ gulâque nudis lætè flavis : pedibus nigris : iride thalassino-viridi.

Adult. 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 ; bare skin round the eyes and on the gular pouch rich yellow ; 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.

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.

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 Captain 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. Ereb. and Terr. p. 20) it was changed to *Gracalus*; 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).

AFTER comparing a large number of specimens, I feel no hesitation in keeping this form distinct from the well-known *P. carbo* of Europe, although the two species are closely related and have doubtless sprung from a common ancestor. In thus separating it, I am supported by Mr. Gould, who had frequent opportunities of investigating the subject in Australia and Tasmania, where this bird is very generally dispersed. The same view was taken by Mr. G. R. Gray in his latest arrangement of the group (Hand-list of Birds, 1871); and Mr. R. B. Sharpe has since adopted it in his classification of the specimens in the British Museum. Dr. Finsch, on the other hand, is of opinion that the New-Zealand bird ought not to be regarded as a species, and he accordingly unites it to *P. carbo*. In this he is followed by Captain Hutton, who, however, in a letter quoted by me on a former occasion*, expressed a very positive opinion to the contrary, adding:—"I was well acquainted with the latter in all seasons in the Crimea, and I am pretty well acquainted with *carbooides* up here (Waikato), and I feel sure that they are different." In the critical notes appended to his 'Catalogue' (1871), he writes:—"Having compared many New-Zealand specimens with one from Australia in the Colonial Museum, and with another from Scotland in the Nelson Museum, I am convinced that they cannot be separated!" Conclusions thus hastily formed, and resting on such imperfect data, do not appear to me entitled to much weight; and if Captain Hutton has since had an opportunity of examining the fine European examples of *P. carbo* in the Canterbury Museum, it is quite possible that he has once more changed his 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 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, rises into the air with a laboured flapping of its wings, and flies off in the direction of the sea, into which it speedily

* Trans. N. Z. Instit. 1870, vol. iii. p. 55.

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plunges. 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.

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. The eggs, which are usually three in number, are of a perfect elliptical form, measuring 2.5 inches in length by 1.6 in breadth, and are greenish white, with a thin covering of chalky matter.

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.
Graculus varius, Gray, in Dieff. Trav. ii. App. p. 201 (1843).
Graculus varius, Gray, Voy. Ereb. & Terr. 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 cum uropygio et supracaudalibus sordidè indigotico-nigris: inter-scapulio, scapularibus et tectricibus alarum saturatè cinerascentibus, plumis omnibus angustè viridi-nigro marginatis: remigibus brunneis, extùs cinerascentibus, secundariis interioribus cinerascentibus 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, versùs apicem et ad basin mandibulæ pallidiore: pedibus nigris: iride pallidè thalassino-viridi: regione ophthalmicâ nudâ lætè indigoticâ.

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 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; bare space in front of the eyes bright orange; eyelids and naked skin below rich indigo-blue; bill dark horn-colour, 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; middle toe and claw 3.75.

Young. Similar to the adult, but mottled with brownish black on the front and sides of the neck, and on the underparts of the body.

Obs. The sexes are precisely alike in plumage.

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THIS species frequents the freshwater rivers, and is very seldom met with on the sea-coast. 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.

Dr. Haast has contributed* the following observations on the habits of this bird:—

“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.”

It usually nests in trees overhanging the water, several pairs being generally associated; and it repairs to the same station for many successive seasons. There is a “shaggery” of this description on the banks of the Wairoa river, north of Auckland, which appears to have been occupied for ten years or more, in spite of repeated molestation by the natives. I visited this place on several occasions, but never succeeded in finding the eggs. I observed that the nests were formed of a mass of twigs pressed into a compact structure, and that each of them contained two young birds.

* Ibis, 1862, p. 102.

sordide indigotico-nigris: inter-
omnibus angustè viridi-
interioribus cinerascens
facie laterali totà et corpore
subalaribus brunneis
pedibus nigris

... and thighs shining greenish
... grey, each feather bordered
... under surface of wings black,
... all the under surface pure
... and sides of the neck, and ca

PHALACROCORAX BREVIROSTRIS.

(WHITE-THROATED SHAG.)

- Phalacrocorax brevirostris*, Gould, P. Z. S. 1837, p. 26.
Graculus brevirostris, Gray, Voy. Ereb. & 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).

Native name.—Kawau-paka.

Ad. suprà nitenti-niger, interscapulii plumis medialiter sordidè cinerascensibus: scapularibus et tectricibus alarum cinerascensibus conspicuè velutino-nigro marginatis: remigibus et rectricibus nigris, canescente paullò lavatis: frontis nuchæque plumis elongatis, 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 cinerascensibus: 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; 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.

Young. Entire plumage glossy black, inclining 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.

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

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PHALACROCORAX CARUNCULATUS.

PHALACROCORAX BREVIROSTRIS.

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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 is very active 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.

Large numbers are sometimes congregated in the 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.

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 "shaggery" 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. The eggs are generally four in number, elliptical in form, but varying in length from 2 inches to 2.5, with a breadth of 1.5; they are of a delicate greenish white, when freshly laid, and are slightly incrustated with a chalky matter of a disagreeable odour.

PHALACROCORAX CARUNCULATUS.

(ROUGH-FACED SHAG.)

- Carunculated Shag*, Lath. Gen. Syn. iii. pt. 2, p. 603 (1785).
Tufted Shag, Lath. Gen. Syn. iii. pt. 2, p. 606 (1785).
Pelecanus carunculatus, Gm. Syst. Nat. i. p. 576 (1788, ex Lath.).
Pelecanus cirrhatus, Gm. Syst. Nat. i. p. 576 (1788, ex Lath.).
Phalacrocorax imperialis, King, P. Z. S. 1831, p. 30.
Carbo purpurascens, Brandt, Bull. Sci. Acad. Imp. Pétersb. i. p. 56 (1837).
Graucalus cirrhatus, Gray, in Dieff. Trav. ii., App. p. 201 (1843).
Graculus cirrhatus, Gray, Voy. Ereb. and Terror, Birds, p. 19 (1844).
Urile carunculatus, Bonap. C. R. xlii. p. 575 (1856).
Leucocarbo carunculatus, Bonap. Consp. Av. ii. p. 176 (1857).
Graculus cirrhatus, Gray, Ibis, 1862, p. 251.
Graculus carunculatus, Finsch, J. f. O. 1870, p. 375.

Ad. pileo cristato cum collo postico, dorso postico, uropygio et supracaudalibus nitidè purpurascens: interscapulio, scapularibus alarumque tectricibus sordidè olivaceo-viridibus, illo purpurascens lavato, tectricibus alarum minimis interioribus albis, fasciam albam conspicuam formantibus: remigibus brunneis, secundariis olivaceo lavatis: caudâ sordidè nigrâ, rectricibus duabus centralibus medialiter cano lavatis, scapis ad basin albis: facie et collo lateralibus purpurascens-nigris pileo concoloribus: corpore reliquo subtùs purè albo: hypochondriis imis purpurascens-nigris: subalaribus brunneis: rostro saturatè brunneo, ad apicem albido: pedibus pallidè brunneis: iride pallidè brunneâ.

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 scapulars 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; 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.

My figure and description of this very handsome species are taken from a fine male bird obtained by Mr. Henry Travers on Pitt's Island on the 21st August, 1871; but I am unable to give any further information respecting it. The colours of the soft parts were carefully noted by Mr. Travers while the specimen was fresh.

PHALACROCORAX MELANOLEUCUS.

(FRILLED SHAG.)

Phalacrocorax melanoleucus, Vieill. N. Dict. viii. p. 88 (1817).*Phalacrocorax flavirhynchus*, Gould, P. Z. S. 1837, p. 157.*Graculus 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.*Halieus 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. It 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.

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PHALACROCORAX CHALCONOTUS.

(GRAY'S SHAG.)

- Graculus auritus*, Gray, in Dieff. Trav. ii. App. p. 201 (1843).
Graculus chalconotus, Gray, Voy. Ereb. & Terr. Birds, p. 20, pl. xxi. (1845).
Phalacrocorax glaucus, Hombr. & Jacq. Voy. Pôle Sud, Zool. iii. p. 127, pl. 31. fig. 1 (1853).
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: subtus 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.

THIS species is extremely rare in New Zealand; and it has not yet been met with elsewhere.

My description 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.

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.

BY THE ANGE

OTUS

1843
p. 127, pl. 11, fig. 1-153

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PHALACROCORAX PUNCTATUS.
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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).
Graucalus 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 cristatis: pileo et collo toto postico sordidè cinerascensibus, viridi-nigricante lavatis, hâc lateraliter plumulis albis ornato: fascia 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: interscapulio, scapularibus et tectricibus alarum pulchrè cinerascensibus, plumis 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 supracaudalibus viridi-nigricantibus: dorso imo lateraliter plumulis albis ornato: caudâ nigrâ, suprâ obscurè cinerascensibus lavatâ: subtûs pulchrè grisescens cinereus: abdomine imo et subcaudalibus viridi-nigricantibus: subalaribus brunneis, nigricante lavatis: rostro brunnescenti-flavo: pedibus aurantiacis: iride viridi.

♀ pallidior, dorsi plumis minùs distinctè apicatis: dorso postico et uropygio cinerascensibus: pileo et collo postico toto cinerascensibus: facie et collo lateralibus et corpore subtûs toto albidis, pectoris lateribus et hypochondriis imis cinerascensibus.

Adult male. 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 interscapulars, and impart to the plumage a very lively effect; the small coverts along the edges of the wings and at the humeral 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 extremity 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.

Female. 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. Bill dark yellow, brownish on the culmen; legs and feet orange-brown. Total length 27 inches; wing, from flexure, 9.5; tail 4.5; bill, along the ridge 2.4, along the edge of lower mandible 3.1; tarsus 2; longest toe and claw 3.5.

Obs. The bird here described as the female of *P. punctatus* has no crest, nor has it any of the ornamental white plumelets. Whether I am right in considering this the adult female condition, or whether it is only a seasonal state of plumage, I am by no means certain; and the subject deserves further investigation. Both Dr. Haast and Mr. Fuller are of opinion that it will prove to be a distinct species.

Young male. In my collection there are two specimens of what I take to be the young male. 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 transitional state of plumage; upper surface as in the adult male, 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 is 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, as may be fairly inferred, being characteristic of the young.

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 another was shot in the Gulf of Hauraki, near Auckland: and these are the only instances I know of its occurrence in the North Island.

It associates in large flocks, and frequents the open sea in the vicinity of the coast, as well

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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. 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. I have never had an opportunity of examining the eggs; but I understand that three is the usual number.

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. It was referred by Captain Hutton to *Graculus africanus*; but having had an opportunity of examining the original specimen, which was courteously forwarded to me through the Colonial Office, I am satisfied that it represents a totally new and hitherto unrecorded species.

I have 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 desire to pay a slight tribute to one who, having originally assisted in founding a colony at the Antipodes, has devoted more than thirty years of his life to its political affairs, and now fills the important office of its Agent General in Great Britain. I do this the more readily as Dr. Featherston has always used his influence to encourage and promote scientific researches in New Zealand, while he has manifested a special interest in the progress and success of the present work.

As will be at once apparent on a comparison of the accompanying Plates, 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.

1881

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PHALACROCORAX FEATHERSTONI.

FREGATA 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).

Spec. nigricans, plumis versùs apicem brunnescentibus et sub certâ luce chalybeo nitentibus: tectricibus alarum brunnescente latè terminatis, medianis albido marginatis: remigibus nigris, secundariis sordidè olivascenti-brunneis et pallidiore brunneo terminatis: rectricibus nigris brunneo marginatis, scapis albis: pileo et collo undique cum pectore anteriore albis, hóc pallidè ferrugineo lavato: pectore laterali cum tibiis, crisso, subcaudalibus et subalaribus brunnescenti-nigris: abdomine toto albo; rostro cinerascete, ungue corneo versùs apicem nigro: pedibus carneo-brunneis: iride nigrâ.

Example (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 reflections, 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 reflections, 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 second-

aries 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 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 Rangiwakaoma, 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 from him; 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. It is not unlikely 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

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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. 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."

Till a comparatively recent date 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 is 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.

FREGATA MINOR.

(SMALL FRIGATE BIRD.)

Lesser Frigate Pelican, Lath. Gen. Syn. ii. pt. 2, p. 590 (1785).*Pelecanus minor*, Gm. Syst. Nat. i. p. 572 (1788).*Tachypetes minor*, Vieill. N. Dict. d'Hist. Nat. xii. p. 144 (1817).*Atagen ariel*, Gray, Gen. of B. iii. p. 669, pl. 104 (1845, ex Gould MSS.).

Spec. 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 rectricum exteriorum albis: rostro nigricanti-cano: plagâ gulari lætè rubrâ, flavo tinctâ: pedibus brunnescenti-rubris: iride nigrâ.

Example. General plumage black with bluish metallic reflections, 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

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another nest, the proprietors of which were feeding it as if it had been their own: I am sure of this fact, because there was no other nest near it containing two young birds. Some of the eggs were quite fresh, while others had been so far sat upon that we could not blow them; and many of the young birds must have been hatched some two or three weeks. We regarded these birds as the Falcons of the sea, for we repeatedly saw them compel the Terns, Boobies, and Gannets to disgorge their prey, and then adroitly catch it before it fell to the ground or water. We never saw them settle on the water, but constantly soaring round and round, apparently on the watch for what the smaller birds were bringing home. I have found in their pouch young turtles, fish, cuttlefish, and small crabs."

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EUDYPTES CHRYSOCOMUS.

(YELLOW-CRESTED PENGUIN.)

- Aptenodytes chrysocome*, Forst. Comm. Soc. Reg. Sc. Gott. iii. p. 135, pl. 1 (1781).
Eudyptes pachyrhynchus, Gray, Voy. Ereb. & Terr. Birds, p. 17 (1844).
Eudyptes chrysocome, Gould, B. of Austr. fol. vii. pl. 83 (1848).
Chrysocoma pachyrhynchus, Bonap. C. R. xlii. p. 775 (1856).
Eudyptes nigrivestis, Gould, P. Z. S. 1860, p. 418.
Spheniscus chrysocome, Schl. Mus. Pays-Bas, *Urinat.* p. 6 (1866).
Eudyptes pachyrhyncha, Gray, Hand-l. of B. iii. p. 98 (1871).
Eudyptes nigriventris, Gray, Hand-l. of B. iii. p. 98 (1871, err.).

Native name.—Tawaki.

Ad. suprâ nigricans, sordidè cyanescente nitens : subtùs albus, pectore laterali dorso concolori : alâ quoque dorso concolori, secundariis angustè albido terminatis : supercilio distincto a naribus ducto et pileum marginante, posticè cristato, dilutè sulfureo : facie laterali gulâque nigricantibus vix brunnescenti-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 yellowish brown ; bill rich nut-brown, darker on the lower mandible, blackish at the base, and horn-coloured at the tip ; feet 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. Differs from the adult in the character of the crests : instead of the broad superciliary band of golden yellow, there is a narrow line of pale yellow, beyond which there are a number of narrow straggling feathers, forming, so to speak, occipito-lateral crests. Moreover, in the specimens that I have examined, the black appears to extend further down the throat, the white on the fore neck forming a less acuminate termination.

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EUDYPTES CHRYSOCOMUS.

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THIS fine Crested Penguin is occasionally met with on the shores of both North and South Islands; but it is by no means numerous; and nothing is at present known of its breeding-stations.

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.

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 obscure cyanescens, nigro minutè varius: alâ saturiore, margine carpali angustè, margine apicali latiùs flavicante: subtùs argentescenti-albus, pectoris lateribus dorso concoloribus: pilei plumis rigidis, pilosis, pallidè sulfureis, nigro medialiter lineatis: supercilio lato nucham cingente pallidè sulfureo: genis anticis pallidè sulfureis nigro lineatis: facie reliquâ et collo superiore laterali gulâque brunneis, hâc multò pallidiore: rostro obscure brunnescenti-aurantiaco: pedibus saturatè brunneis.

Adult. 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.

THERE is a single example of this large Penguin in the Otago Museum, obtained at Oamaru, on the east coast of the South Island. My description, however, is taken from one of the specimens in the British Museum, in a more matured condition of plumage.

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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).*Native name.*—Korora.

Ad. suprâ obscurè cyanescens : subtùs argentescenti-albus : facie laterali brunnescente lavatâ : alâ sordidè cinereâ, albo marginatâ et latiùs apicatâ : rostro cyanescenti-cano, culmine saturatiore : pedibus carneo-albidis, membranis interdigitalibus brunnescenti-nigris : iride flavicanti-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.

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 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; 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 that represented in our Plate; 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 produces 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. 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.

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EUDYPTULA UNDINA.

(LITTLE BLUE PENGUIN.)

Aptenodytes undina, Gould, P. Z. S. 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 supra 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. 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.

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, while 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."

PODICEPS RUFPECTUS.

(NEW-ZEALAND DABCHICK.)

Podiceps (Polioccephalus) rufpectus, Gray, in Dieff. Trav. ii., App. p. 198 (1843).

Podiceps rufpectus, Gray, Voy. Ereb. and Terr., Birds, p. 17, pl. 16 (1844).

Native names.—Weweia and Totokipio.

Ad. suprâ nigricans vix viridi nitens, interscapulii plumis scapularibusque pallidè brunneo marginatis: pileo nuchâque sordidè chalybeo-nigris, facie et collo lateralibus brunneis, genis et pilei lateribus filamentis pilosis albidis ornatis: tectricibus alarum dorso concoloribus: remigibus cinerascanti-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 olivascentibus, 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

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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 darker, the facial streaks described above gradually disappearing, but the lengthened plumes with the white pencilled markings still wanting, this being characteristic of the fully adult plumage; breast dark rufous brown.

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, it is rarely or never met with in the far north; indeed the only instance that has come to my knowledge of its occurrence in the district north of Auckland is 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 collection in the Colonial Museum.

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 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 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.

On the breeding-habits of this species, Mr. Potts writes*:
—“The nest is rather a large and

* Trans. N.-Z. Instit. 1869, vol. ii. p. 73.

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somewhat clumsy structure, formed of the roots and leaves of various aquatic plants. We have found it built against the stem of the *Carex virgata*, beneath the drooping leaves of which it was perfectly concealed from casual observation. Situated just within the swampy side of a small lake, it was raised a few inches only above the water-level. When alarmed on the water, the parent birds have a knack of tucking the young under the wing, so that its head is alone visible; they dive and swim thus encumbered with the greatest ease."

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.

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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).

Ad. supra nigricans, remigibus brunnescentibus, minimis albis: pilei plumis utrinque elongatis, fascias duas erectas formantibus: loris et lineâ superciliari angustâ cum facie laterali gulâque albis: regione oculari, collo laterali guttureque cristatis, ferrugineis, nigro marginatis: corpore subtùs argentescenti-albo, lateribus brunneis: rostro cinerascenti-brunneo, versùs apicem pallidiore: pedibus olivascenti-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.

Young. Crown of the head and nape black, with dull steel-reflections; 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; 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.

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.

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.

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 the white secondaries proved afterwards to be merely accidental; but, as I have already pointed out in a paper read before the Wellington Philosophical Society*, there appears to be a distinct race inhabiting some of the South-Island lakes, and distinguished by the dark colour of the underparts. Dr. 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 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*.

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

* Trans. N.-Z. Instit. 1869, vol. ii. p. 388.

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have had less favourable opportunities of studying this 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.

“The eggs are usually three in number, and are somewhat peculiar in form, having an apparent thickening in the middle and tapering towards both ends. When first laid they are of a chalky and slightly greenish hue, but soon become completely discoloured. Whether this discoloration is solely due to contact with the materials of the nest, or whether the birds themselves, under the influence of some instinctive habit, contribute towards it, I am not prepared to say.

“It has been suggested by observers that the discoloration of the eggs of some of the water-birds is due, in part at least, to voluntary action of the parent birds. In this connexion the Rev. J. C. Atkinson, a very close observer, tells us, in reference to the eggs of *Podiceps minor*, that ‘when first extruded they are perfectly white, but seldom remain long so, gradually becoming a stale blood-stained hue, from which are gradations to a more or less dirt-bedabbled white, all eventually becoming of one dirty, muddy red-brown;’ and he inquires, ‘to what cause is this colouring due? is it intentional on the part of the bird, or is it accidental?’ He does not believe that the colour ‘is, in any case, due to mud from the feet of the bird, nor that it is altogether derived from the weeds with which the eggs are usually covered during the absence of the birds from the nest;’ for he mentions that he met with a nest of *Podiceps minor* with a single egg in it, evidently very recently laid, uncovered as it lay in the nest, but which was stained of a dull mottled dirt-colour all over. He worked at it with water and his fingers, and after much labour brought it back to a dirty mottled white; but he says ‘that had he expended one tenth part of the same labour upon a soiled hen’s egg, he would have succeeded in restoring its original whiteness.’ But this point is one which I merely suggest here for the consideration of future observers, having formed no absolute opinion of my own upon it. I am, however, inclined to think against any intentional action on the part of the bird in producing the discoloration of the egg; for I believe that, were such a discoloration necessary for the protection of a species having so wide a range, it would be exhibited by the egg itself immediately upon its extrusion, as in the case of Gulls and other birds which form slight open nests in exposed situations, in which cases the eggs (and even the young birds proceeding from them) are so much assimilated

in general colour to the ground on which they are deposited, as not to be detected without close search.

“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 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 cases 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 than usual 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 one 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

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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. I have seen the parent frequently endeavouring to shake off the young one, which, judging from its outcries, disliked and resisted the attempt, until removed in the manner I have mentioned. Nor is the suggestion of Mr. Yarrell at all consistent with the fact that the Grebe, when diving, uses its wings to add to its velocity.

“Although the Grebe reluctantly takes to flight, there is no doubt that it flies without any great difficulty; for it is found in situations which it can only reach by rising considerably above the general level of the ground.

“I have never seen two or more pairs of birds associating together or mingling with the various species of ducks also inhabiting the same lake; no pair, however, appears to confine itself to any particular station, except when accompanied by young ones, in which case they do not ramble far from the nest until the young ones have attained a considerable size. I visited the nests frequently at night, but never found them occupied after the young were hatched out; but I have found it warm, as if recently occupied. The birds no doubt left it on the approach of the boat, but their quiet stealthy motion prevented my hearing them do so.”

According to my experience the eggs of this species are ovoido-elliptical in form, measuring 2.25 inches in length by 1.45 in breadth, and greenish white thickly smeared and stained with yellowish brown, and often presenting a very dirty appearance. Mr. Potts has sent me a coloured drawing of a specimen in his possession of a uniform dark reddish-brown tint.

APTERYX MANTELLI.

(NORTH-ISLAND KIWI.)

Apteryx australis, Gould, B. of Austr. vi. pl. 2 (1848, nec Shaw).*Apteryx mantelli*, Bartlett, P. Z. S. 1850, p. 275.*Native names.*—Kiwi and Kiwi-parure.

Ad. rufescens: dorsi plumis rufescentibus ad basin pallidioribus, utrinque nigro marginatis, quasi striatis, scapis plumarum productis, duris: pileo et collo postico nigricanti-brunneis, plumis ad basin grisescentibus: fronte et facie laterali clariùs grisescentibus, illâ pallidiore: 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.

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 dark brown; claws the same, 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.

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

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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 rufous brown, with the tips of the shafts and the produced hair-like filaments black; paler or greyer on the head and throat.

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. 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 lanceolate 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 nearly 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.

Whether we are justified in separating this form, as a species, from the one inhabiting the South Island, originally described and still known as *Apteryx australis*, is a point on which ornithologists are not yet agreed. My reasons, however, for adopting this course will be found in my account of the last-named species at a subsequent page.

Some thirteen 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 Manganioteao, 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 residence in Wanganui, I have 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 the last stronghold 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 has been placed beyond all dispute by Mr. T. Kirk, who lately obtained several himself on the Little Barrier.

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 earth-worms. 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

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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 Dr. Knox) to Professor Newton, of Cambridge; and it now 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.

The stomach of a recently killed wild bird which I dissected, contained a Hinau-berry (*Elæocarpus dentatus*) and rounded fragments of white quartz. Dr. Day writes me:—"In its very muscular stomach I have usually found the remains of beetles, pebbles, and many hard kernels of the Hinau-berry."

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In preparing my specimens I was astonished at the toughness of the skin, even in the very young birds; and Mr. Dawson Rowley, writing of the dried skin, sends 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. In *Nestor notabilis* we find the skin tough (fit to make gloves), but not near so stout as in *Apteryx*."

On the eve of my departure from New Zealand I purchased from a Wanganui native a very fine example of this species for presentation to the Zoological Society, and shipped it by the 'Wild Duck;' but (as I have since been informed) it unfortunately died when crossing the Equator. Others have been more successful; and at the present time very healthy specimens of three species (*Apteryx mantelli*, *A. australis*, and *A. oweni*) are to be seen in the Society's unrivalled menagerie at Regent's Park.

The following notes by Mr. Bartlett, on the incubation of the Kiwi in the "Gardens" (P. Z. S. 1868, p. 329), are full of interest:—

"In 1851 Lieut.-Governor Eyre presented to the Society an *Apteryx*. This bird proved to be a female of *Apteryx mantelli*. 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. I have witnessed the breeding of the Mooruk, the Cassowary, the Emu, and the *Rhea*; and the mode of proceeding of the *Apteryx* fully justifies me in believing the habits of this bird to be in no way materially different from those of its allies."

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 Hamburg 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.

An egg of this species, obtained at Whangaroa, is broadly elliptical in form, measuring 5·3 inches in length by 3·1 in breadth, with a granulate surface, or, more correctly, covered with minute puncta, and of a creamy-white colour, more or less stained. The one I have described is, of course, a very large example. They vary not only in size, but also in form; and on the latter point I have the following note from Mr. Kirk :—“During a recent visit to Maretai I was shown an egg of the Kiwi decidedly ovoid, widest in the middle, and tapering towards each extremity in a remarkably uniform manner; and I have since seen eggs of a similar shape obtained at Whakatane. But the egg we have in the Auckland Museum [measuring 5·25 inches by 2·85] is of a different shape, very little wider in the middle than at one fourth the total length from each extremity.”

Some examples are nearly pure white, with a smoother surface; others, again, are marked with small excrescences, and with irregular furrows or interruptions in the granulation of the shell.

* Trans. New-Zealand Inst. 1870, vol. iii. p. 73.

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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).*Native names.*—Kiwi and Tokoeka.*Ad. similis A. mantelli*, sed pallidior et magis griseus: tergo tantùm vix castaneo tincto: scapis plumarum haud conspicuis, itaque ptilosi molliore distinguendus.*Adult.* Differs from *Apteryx mantelli* 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.*Obs.* As a rule the South-Island birds are larger than those from the North Island; but occasionally examples of *Apteryx mantelli* 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 also 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.* A specimen in the Canterbury Museum has the head 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 Mr. Dawson Rowley's private collection of New-Zealand rarities at Chichester House, Brighton, there is a specimen of the chick, apparently younger than those in the Canterbury Museum, and differing from them in the lighter tone of its plumage, especially on the upper parts.

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 con-

founded 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).

Mr. Bartlett stated further, that the *Apteryx* belonging to Dr. Mantell was collected by his son in Dusky Bay, whence the original bird, figured and described by Dr. Shaw, was also obtained, and that, so far as he had been able to ascertain, all the known specimens of *Apteryx mantelli* were from the North Island.

In a "Report on the present State of our Knowledge of the Species of *Apteryx*," by Drs. Sclater and Hochstetter, read at a meeting of the British Association in September 1861, and published for general information in the 'New-Zealand Gazette' in May 1862, the following observation occurs respecting *Apteryx australis*:—"In fact, the species is so closely allied to the *Apteryx mantelli* as to render it very desirable that further examples of it should be obtained, and a rigid examination instituted between the two. For the present, however, we must regard this form of *Apteryx* as belonging to the southern portion of the Middle Island."

Mr. Gould, in the Appendix to his 'Handbook to the Birds of Australia' (p. 568), retains the original name for the species, but remarks:—"If Mr. Bartlett's view be correct, it is probable that the bird figured by me is the one he has named *Apteryx mantelli*."

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.

Since that paper was written I have had an opportunity of examining a fine series of South-Island *Apteryges* in the Canterbury Museum, and of comparing them with examples from the North Island; and I am now 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 (*Apteryx mantelli*), owing to a

* Trans. N.-Z. Instit. 1870, vol. iii. pp. 37-56.

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, adopting at the same time the distinctive names originally proposed by Mr. Bartlett. 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 belongs to Dr. 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, who has had a recent opportunity of comparing the birds, has arrived at an opposite conclusion; but 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*)*.

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.

* Journal für Ornithologie, 1873, p. 263.

APTERYX OWENI.

(LITTLE GREY KIWI.)

Apteryx owenii, Gould, P. Z. S. 1847, p. 94.

Native name.—Kiwi-pukupuku.

Ad. griseus, 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.

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Young. 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.

Very young state. A chick of this species, in the possession of G. Dawson Rowley, Esq., at Brighton, is of a uniform yellowish-brown colour, with the tips of the feathers lighter. Dr. J. F. Knox has 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.

In the Sydney Museum there is a more perfect albino, the whole of the plumage being greyish white, very obscurely streaked with brown.

Remarks. In this species the bill is straighter than in *Apteryx mantelli*; 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 mantelli*; 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 mantelli* 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. It does not occur, however, in any part of the North Island.

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 Dr. Haast informs me that he has sometimes taken its nest from under a dense tussock or from the cavity formed by an overhanging stone on the slope of a wooded hill.

The male, female, and young, described above, were all taken from one nest by Dr. Haast himself during one of his explorations on the west coast of the Canterbury Province.

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 Mr. E. 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 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.

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APTERYX HAASTI.

(LARGE GREY KIWI.)

Apteryx haasti, Trans. N. Z. Instit. 1871, vol. iv. p. 204.*Apteryx maxima*, Hutton, Cat. Birds of N. Z. 1871, p. 23 (nec Bp.).*Native names.*

Roa or Roarua, and Kiwi-Karuai.

Ad. similis A. oweni, sed multò major, saturatior, et tergo castaneo tincto.

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 its 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.

ONLY two specimens of this fine *Apteryx* are at present known, both of which are in 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.

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THE BIRDS OF NEW ZEALAND.

BY WALTER LAWRY BULLER, Sc.D., F.L.S., &c.

EXTRACTS FROM REVIEWS.

"BIRDS, as most people know, or ought to know, form the most important part of the vertebrate fauna of New Zealand; and their importance is maintained not only when they are compared with their compatriots of other classes, but when regarded in reference to members of their own class in the world at large.

"The birds of New Zealand, therefore, merit especial attention, and we are happy to say they receive it at the hands of the authors whose works are above cited. Taking the field in or about the year 1865, Mr. Buller, till then unknown to fame beyond the limits of his native colony, brought out an 'Essay on the Ornithology of New Zealand,' which at once attracted notice in this old world of ours. Some of his views were challenged by Dr. Finsch, then of Leyden, who had paid attention to this extraordinary avifauna; and a controversy ensued. This, to the credit of the controversialists, was carried on in a spirit very different from that in which many another war in natural-history circles has been waged; and the happy result is that on most points the combatants have arrived at the same conclusion, thereby giving assurance to the general public of its being the right one. The Essay we have mentioned may be regarded as the preliminary canter which a race-horse takes before he puts forth his full strength; and Mr. Buller's book, or that part of it which is as yet published, shows what he can do now that the colonial authorities have allowed him to come to England for the express purpose of completing his design.

"Captain Hutton is known as an observer who, during several long voyages, had proved that some rational occupation could be found at sea even by a landsman; for, instead of devoting his energies to the ordinary time-killing amusements of shipboard, he watched the flight of the various oceanic birds which presented themselves, and speculated on the mode in which it was performed and the

forces it brought into operation—to some purpose, as the Duke of Argyll and Dr. Pettigrew have testified. The pamphlet whose title we give is in some respects a not less significant, if a less ambitious, work than Mr. Buller's; and though to the last must belong the crown of glory, we by no means wish to overlook the useful part which Captain Hutton's publication will play. If here we do not notice it further, it is because its value will be most appreciated in the colony itself, while Mr. Buller's beautiful book appeals to a larger public.

"Of the Kakas (*Nestor*) Mr. Buller admits three species—*Nestor meridionalis*, *N. occidentalis*, and *N. notabilis*—the two first of which, we think, are barely separable. This very remarkable genus of Parrots includes some two or three other species, one of which, the *N. productus* of Phillip Island, is believed to have gone the way of so many animals that only inhabit small islands; and the same fate in all likelihood awaits its congeners. Most animals suffer from not being able to accommodate themselves to change of circumstances; but the very adaptability of the Mountain-Kaka, or Kea, will tend to its early destruction; for, though belonging to the group of Parrots distinguished by their brush-like tongue, and deriving a considerable portion of their subsistence in a manner worthy of the Golden Age, from the nectar of flowers, this wretched Kea (*N. notabilis*), since the introduction of sheep to New Zealand, has incurred the imputation of a fondness for mutton-cutlets à l'*Abyssinie*; and the charge, whether true or false, is likely to bring about its doom, since the shepherd is apt to practise what in good old times was called 'border justice,' and the species will probably suffer extinction before its guilt is fully proved or extenuating circumstances admitted. The Common Kaka (*N. meridionalis*), on the other hand, is ably defended by Mr. Buller as one of the most useful birds in the

EXTRACTS FROM REVIEWS.

country; yet this also is rapidly diminishing. 'In some districts,' he says, 'where in former years they were excessively abundant, their cry is now seldom or never heard;' and though he adds that 'in the wooded parts of the interior they are as plentiful as ever,' it requires no prophetic eye to see that, with the extension of settlement, the Kaka must succumb.

"Here we must pause. Mr. Buller's book is in every way worthy of its subject; and we trust that we have shown that the subject is worthy of close attention—whether we regard the various forms of New-Zealand birds from the point of view of their intrinsic interest, or from that of so many being now on the verge of extinction. It is easy to be wise after the event, and ornithologists at home do not in these days look back affectionately towards their predecessors who have let so many species pass away without tracing the process of extermination."—*Nature* (July 18, 1872).

"New Zealand is especially fortunate in the possession of many admirable Naturalists, including geologists, botanists, and zoologists. One of the latter (born and bred in the colony), a gentleman who has made many zoological contributions to the 'Transactions of the New-Zealand Institute,' and whose acquirements, more especially as an ornithologist, have been recognized by his having had conferred upon him the Degree of Doctor of Science, as well as the Fellowship of the Linnean, Geological, Royal Geographical, and Zoological Societies, is at present in London passing through the press a magnificent work on the Birds of New Zealand, one that cannot fail to bring prominently into notice the present aspects of scientific culture in that colony."—*Constitutional* (Nov. 18, 1872).

"It is not often that thorough practical knowledge, both in the field and at home, is possessed by the author of a work like the present; but Dr. Buller has studied his subject in both aspects, and the value of his book is clearly enhanced thereby. Moreover he has set about his task in a way that shows us that he thoroughly appreciates the difficulties surrounding it. His personal acquaintance with the birds themselves has been followed up by a critical and impartial investigation of the writings of previous authors; and, lastly, an independent examination of many of the typical specimens in England has placed him in a position to speak with great precision upon intricate points of synonymy. The consequences to many of the indigenous birds of New Zealand, arising out of its colonization by Europeans seem likely to be so disastrous, that it is high time that authentic histories of them should be put on record before they finally disappear. Dr. Buller's work, therefore, supplies what might have proved a serious omission in ornithological literature. It is not too late to write a full life-history of those New-Zealand birds whose num-

bers are rapidly diminishing; but a few years hence it is more than probable such a task could not be accomplished. Though the present active causes may be novel, the rapid destruction of the indigenous fauna of New Zealand dates back to far beyond historic times; for though Maori tradition may give an approximately recent time when the Moa still survived, numbers of other similar forms have succumbed whose remains are now found in a semi-fossilized state, and of these we have not another vestige of record. They, like the Dodo and the Solitaire, seem to have fallen victims to some enemy suddenly introduced into their domain, against which they were powerless to make successful resistance. The remains of these extinct birds have furnished the materials for Prof. Owen's series of exhaustive memoirs on *Dinornis* and its allies. Dr. Buller's will form a fit companion work, and thus provide us with a very complete record of the birds of New Zealand both past and present."—*The Ibis*.

"The first work professing to give a complete account of the ornithology of New Zealand must needs be an important one. This ornithic fauna presents so many points of general biological interest, that only those of the islands east of Africa can be compared with it. It was high time that a complete account of this fauna should be given by a competent naturalist. Some of the most interesting forms have already become almost, if not quite, extinct; others are fast expiring, or obliged to accommodate themselves to the changed conditions of the country. We do not say that the majority of the native species will not survive, though in diminished numbers of individuals; but it is quite probable that some of these survivors will be preserved by accommodating themselves to the new state of things, modifying in a more or less perceptible manner their nidification, food, or some other part of their mode of life: and if such changes should occur, the student of a future generation will find in Dr. Buller's work the means of comparing the birds of his time with those of the past. The author has shown unremitting care in adducing all the information that can possibly throw light on his subject; he has spared no pains in illustrating it in the most perfect manner; and the result is that a most valuable work is placed before the student of ornithology, which will offer to every lover of natural history real and permanent enjoyment, and which, by its attractive form, will allure many a young man in that colony from the pursuit of other branches into the camp of ornithology."—*Annals and Magazine of Natural History*.

"A mind may be so imbued with the views of Darwin as to be blind to the evidence of his eyesight, deaf to the logic of facts; but there is no proof that Dr. Buller is either: he is evidently friendly to Darwin's celebrated

ypothesis, but such. Happily for Science, an official position in to visit every part of course with the n quiring the inform complete. soundest natural-his in an eminent degre The illustrations in published, are exact always aims at the than the conventional They are well and rendered as ornate mend the 'History readers of the 'Zoo success.'—*Zoologist*

"The accounts w given to the world have been hitherto although forty year publications made information on this they may be con Mr. George Gray pioneer of New-Z an actual explorer tion gave him un by means of the n time passed throu antipodean species

"When Mr. Go the Birds of Austr second volume, which were s name; and in the latest publi few months s work made its comparatively, has New Zealand hav past in working country; and the societies contain logy from such Mr. Potts, and th have our friends to become a remark ably th "We recognis first attempt wh complete history

EXTRACTS FROM REVIEWS.

ypothesis, but sees, hears, and thinks for himself.
Happily for Science, the author for twelve years has held an official position in New Zealand which has enabled him to visit every part of the country, while his frequent intercourse with the natives has greatly assisted him in acquiring the information required for making such a work complete. It contains a vast amount of the soundest natural-history teaching, and seems to combine in an eminent degree the new with the true. The illustrations in the first number, the only one yet published, are excellently drawn by Mr. Keulemans, who always aims at the representation of living birds rather than the conventional attitudes of birdstuffer's specimens. They are well coloured by hand, and thus the work is rendered as ornamental as useful. We cordially recommend the 'History of the Birds of New Zealand' to the readers of the 'Zoologist,' and we sincerely wish it every success."—*Zoologist*.

"The accounts which naturalists from time to time have given to the world of the birds inhabiting New Zealand have been hitherto but fragmentary and incomplete; and although forty years have elapsed since the first of such publications made its appearance, the available sources of information on this subject are still so few in number, that they may be enumerated almost in a breath. The late Mr. George Gray might deservedly be regarded as the pioneer of New-Zealand ornithologists; for, although never an actual explorer of the country himself, his official position gave him unusual facilities for studying its avifauna by means of the numerous collections which from time to time passed through his hands, and not a few of these antipodean species were originally described by him.

"When Mr. Gould, in 1868, published his 'Handbook to the Birds of Australia,' he gave, by way of appendix to his second volume, an account of various New-Zealand species which were scarcely known to English readers, save in name; and in point of date this would seem to have been the latest publication on the subject in this country until a few months since, when Part I. of Mr. Buller's splendid work made its appearance. But, although so little, comparatively, has of late been published here, naturalists in New Zealand have been actively engaged for some years past in working out the natural history of their adopted country; and the transactions of two of their scientific societies contain many excellent contributions on ornithology from such able naturalists as Dr. Haast, Dr. Hector, Mr. Potts, and the author of the work now before us. Nor have our friends in Germany been behindhand in their zeal to become acquainted with an avifauna perhaps the most remarkable in the world.

"We recognise in Mr. Buller's publication, however, the first attempt which has been made to give anything like a complete history of the birds of New Zealand; and it would

not be easy to overrate the importance which attaches to such an undertaking.

"Those who had an opportunity of seeing the Huia, which lived for some time in the Parrot-house in the Zoological Gardens, could scarcely have noticed it without wishing to learn something of its haunts and habits; and to them Mr. Buller's account of it will prove most entertaining. In the following extract we seem to get a peep of the country which it inhabits, as we search for and find this very curious bird. Such sketches as these go far to enliven a comprehensive work on birds, which, in other respects, is strictly scientific. As regards the illustrations Mr. Buller has been most fortunate; for, under his direction, his artist, Mr. Keulemans, has produced some of the most life-like and beautiful pictures of birds which we have seen. We understand the work is to be completed in five Parts, two of which have already appeared, and a third is in active preparation. It will assuredly become the text-book for all students of New-Zealand ornithology."—*The Field*.

"Dr. Buller has just produced Part IV. of his great work on the ornithology of New Zealand; and we may now fairly say that the high anticipations we had formed as to the author's capabilities have been fully realised. In the book before us we find the two great requirements of science combined—namely, a thorough appreciation of the necessary details which are expected of a scientific work in the present day, and the ability to write in appropriate and entertaining language the life-histories of the birds of which the author has to treat. So rarely are these two qualities found combined in a scientific writer, that the greatest credit is due to the learned author for the admirable manner in which he has performed his task.

"The ornithology of New Zealand is especially interesting, from the fact that the indigenous species are being gradually extinguished; and we read with regret that even within the memory of the author certain birds, which were formerly common, have almost ceased to exist.

"The work contains elaborate scientific diagnoses of the various birds, and a classification of the different names by which they have been known to different writers.

"The coloured plates are really exquisite examples of the lithographer's skill. In every respect the work is a most valuable addition to the scientific student's library, as well as to that of the more general reader, and seems to contain the fullest information on every point connected with this interesting study."—*Land and Water*.

"Although several more or less complete treatises on and lists of the Birds of New Zealand have been published, they were rather of a tentative and preliminary character; and the work before us is the first which gives a full

EXTRACTS FROM REVIEWS.

account of this ornithic fauna, which, in zoological interest, is not excelled by that of any other country. There can be no doubt that Dr. Buller, well known in Europe by his preliminary ornithological publications, is eminently qualified to fulfil this task. His long residence in the colony and his official position have given him rare opportunities of making observations and collecting materials; and by a lengthened visit to England he has derived the great advantages of studying typical examples and of availing himself of that typographic and artistic skill in which this country excels. To judge by the first part issued, Dr. Buller has succeeded in producing a work of real excellence. The text is clear, instructive, and not overloaded with unnecessary detail; while the illustrations are beautiful and life-like."—*The Academy*.

"New Zealand may be congratulated on having outstripped the other colonies in the race for scientific honours. Even Canada, with all the resources at her command, has produced nothing at all comparable with the 'Transactions of the New-Zealand Institute.' Now we have before us something of a far more ambitious kind—namely, a complete life-history of the birds of New Zealand, adapted to the present advanced state of ornithological science, and most beautifully illustrated with coloured plates. The descriptive part of the text is very carefully worked out, both in English and Latin; and the history of each species is given in the most complete and exhaustive manner. The plates are extremely beautiful, and are rendered more attractive by the introduction of botanical accessories, representing the indigenous flora of the country. The volume, when complete, will not only be a valuable contribution to scientific literature, but will be an elegant drawing-room companion; for, to adopt the language of a

leading scientific journal respecting it, 'the plates are as beautiful in execution as the text is excellent in quality.'"
—*Home News*.

"The lamentable way in which the indigenous birds are expiring in that country before the progress of civilization and other natural causes, has rendered it a necessity that a work should be prepared that will rescue from oblivion the feathered denizens of those places which in a short lapse of time 'shall know them no more.' This it has fallen to Dr. Buller's lot to accomplish; and it were small praise indeed to say that his task is executed in an admirable manner. Few ornithological works that have been written come up to the standard of the subject of this notice; and none have yet surpassed it, nor will it be possible to do so. Certainly the author brings to his aid unusual advantages; but even these might fail in the hands of a less conscientious person than Dr. Buller has shown himself to be. In the part now before us the history is given of thirteen birds, ten of which are figured; and this brings us down to the end of *Accipitres*, *Psittaci*, and *Picariæ*. No one since the time of the late Professor Macgillivray has so successfully combined the two branches of cabinet and field ornithology as Dr. Buller; and his experiences, and those of his numerous coadjutors, are told in a pleasing and instructive manner, which cannot fail to interest and amuse his readers. Indeed it is seldom that we have seen a book which so thoroughly calls for unqualified praise as the present. We have only, in conclusion, to perform the pleasing duty of offering our congratulations to the inhabitants of New Zealand on their possession of so distinguished a naturalist as Dr. Buller, and to the author on the complete success with which his arduous task promises to be crowned."—*European Mail*.

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THE BIRDS OF NEW ZEALAND.

BY WALTER LAWRY BULLER, Sc.D., F.L.S., &c.

Proposed Series of Supplementary Plates.

THE author having received the following Memorial, thinks it only due to those who have signed it, thus to make known their wishes—and at the same time to add that he will have great pleasure in complying with so flattering a request, provided a sufficient number of Subscribers can be obtained.

“ November—December 1872.

“The undersigned Subscribers to Mr. Buller’s ‘Birds of New Zealand,’ believing that the very remarkable avifauna of that country deserves full illustration, and knowing that many of the species of New-Zealand birds have hitherto been figured only in various works, some of which are difficult of access, request Mr. Buller to issue a Series of Supplementary Plates, so as to include a coloured representation of every species of New-Zealand bird.

(Signed)

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BRAYBROOKE.	G. E. SHELLEY.
J. GOULD.	JOSEPH D. HOOKER.
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