sea birds,"*—which has always served to remind me of Homer's battle between the frogs and mice—in which our little owl, who could not join the great united army of land birds in the long day's sanguinary conflict, owing to his being a nocturnal bird; yet, at the close of that prolonged fight, when the sea birds were utterly routed, distinguished himself by acting as a brave herald-trumpeter, and so added to their fear by joining in the pursuit with his insulting discordant note of ironical derision—*toā koë ! toā koë !*—thou (art) brave ! thou (art) victor ! These words are ludicrously Maorified from the owls' common note of *koū koū ! koū koū !* by a kind of onomatopeia—so common among the Maoris, and which a Maori, by a slight twist in the pronunciation, and more particularly when made in the mimicking tone, would cause them to pretty nearly resemble.

Having referred to that ancient Maori fable of the battle of the land and sea birds, in which nearly all our indigenous land birds are brought to the fore to repel the invaders, to fight and to perform prodigies of valour, even to the including of the piwakawaka, *Rhipidura flabellifera*, Gml.—the pied fantail-flycatcher—I would just call your attention to the grave fact of the total omission of the gigantic moa (*Dinornis*, sps.), and of all allusion to it, as a further proof of what some of you have already more than once heard from me, that *the ancient Maori did not know of its living existence as a bird;* for, if they did, they would have assuredly brought it prominently forward on that occasion as their great hero and redoubted champion, and the dreadful foe of the sea-birds, to whom, as giants in the battle-field, Goliath of Gath, or Og of Bashan, would have been but puny comparisons. That one plain and striking list of negative evidence, *re* the age in which the moa existed, has ever seemed to me to be of far greater value than all the loud and fussy statements of modern Maoris, made to suit the times and the wishes and questions of zealous European inquirers.

ART. XXI.—*On the Birds of Lake Brunner District.*

By W. W. SMITH.

[*Read before the Otago Institute, 10th July, 1888.*]

SINCE the colonisation of New Zealand, less than forty years ago, the flora and fauna of some parts of the country have undergone many changes. This is most marked in the whole

* Translated briefly—together with some other of their ancient fables—by me, in Trans. N.Z. Inst., vol. xi., p. 102.

country east of the central or dividing range, as it has been longer colonised and more adapted to agriculture and the depasturing of sheep and cattle than the bush lands west of the Alps. In the more settled or gold-mining centres of the west coast the same changes—disastrous to the flora and fauna alike—are now proceeding, but nowhere so rapidly as they have done on the east coast. A record of the modification and extinction among the fauna alone since the settlement of the colony would form a volume of great value. But as this is now impossible, it will be well to urge workers in all branches of zoology in New Zealand to collect all available material without delay, and record their researches from time to time. Following this method, I desire to place before this society to-night some observations on the ornithology of the Lake Brunner region of Grey County, West Coast. I am induced to offer a paper on the birds inhabiting the lake district, as the bush remains in its primeval state, and many of the anomalous and more specialised forms, formerly existing, but now extinct, east of the Alps, enjoy in it a fairly genial home. This, however, is destined soon to change, as the new Midland Railway when constructed will extend through part of the valley and near the shores of the lake for half its length. As the country becomes cleared and settled, only a few years will suffice to modify and extinguish much of the rich flora and fauna now existing in these beautiful and stern solitudes.

Very few writers on the zoology of New Zealand have dealt with this subject, yet the ordinary observer cannot fail to have detected the many changes proceeding continuously among various groups of animals. In the orders *Lepidoptera, Coleoptera, Diptera, Orthoptera,* and especially the *Hymenoptera,* a vast number of species have become locally extinct. Some are slowly diminishing, while others remain almost stationary, or continue to increase. In these several orders it will be found that the most specialised forms are the first to succumb. Although many have become locally extinct, or have been driven from their former haunts, some are still found where the features of the country remain unchanged, or the flora less modified. As the land is put under cultivation, or sheep and cattle are put to depasture on the native vegetation, the flora and fauna are soon more or less modified and become partly extinct.

There can be no doubt that the same causes affecting the extinction of our plants and insects can be shown to act in turn on the species of birds now fast dying out. The causes in New Zealand are clearing and cultivation, modification of climate, and the introduction of injurious and predatory forms. As many of our plants and insects are wholly dependent on each other for existence, any cause affecting the one affects the

other. As the supply of insect-food lessens, some species of birds chiefly depending on it decrease according to the supply and rate of reduction. From peculiar habits in the economy of such species, they appear incapable of changing their food, habits, or environment, and ultimately become extinct. The extirpation of other species again is due to the ravages of introduced predaceous animals.

The cold winter of 1883, followed in the spring by severe late frosts, and the continuous cold wet summer of 1883–84, produced a wide-spread failure of the food of many species of birds. In the winter and spring followed the irruption of parakeets, extending over the whole of the east coast of the South Island, and the irruption or "plague" of rats on the west coast, which swarmed into some of the towns and villages. The tui and korimako left their home in the bush and migrated across the open country to procure food. All were in miserable condition and on the verge of starvation. They daily visited the flower-borders, and eagerly probed with their brush-tongues the scarlet and yellow tube-flowers of *Tritomia uvaria*. The same season the wood-pigeon was miserably lean, being compelled to feed on the leaves of the kowhai and other trees, which cannot nourish and fatten like the fleshy nutritious berries of the miro and others. The bush-rats (*Mus rattus*), which depend for food during a part of the year on the ripe berries falling from the trees, were likewise compelled to migrate in search of food. In the same year the habits of the kaka (*Nestor meridionalis*) and the silver-eye (*Zosterops lateralis*) were affected in a similar manner and from the same cause. I collected several specimens of the former in a plantation of English trees near Oamaru, all in a wretchedly weak and lean condition. Their presence was a rare occurrence in the district, which is about thirty-five miles from the nearest native bush. The silver-eye or "blight bird" frequented the gardens in the settled districts in unusual numbers, and attacked the ripe fruits, nothing coming amiss to them. All the species affected were in wretched plumage, and their bodies were infested with a species of *Acarus*.

The New Zealand quail (*Coturnix novæ-zealandiæ*) is often cited as showing how rapidly a species will become extinct. Frequently we hear the old colonists speaking of the great numbers of quail inhabiting the grassy plains in the early days of Canterbury. In a few years, however, without any apparent cause, they vanished, until at the present time not a single living quail exists in the islands. Their disappearance is generally attributed by ornithologists to the burning of sheep-runs or native-grass lands. Probably this is the principal cause which has effected the extirpation of this useful and beautiful gallinaceous bird.

In the early days of the colony, when the species flourished on the plains, vast swarms of caterpillars infested the open grassy country, living in the dense tussock (*Poa*). In a few years after the annual burning of the sheep-runs commenced, the caterpillars disappeared from the plains and attacked the cereal crops, working great destruction among them. Some years after the introduction of the house-sparrow, which increased at an unprecedented rate, the caterpillars were soon reduced in numbers, and are now no more trouble to the agriculturist. They were the larva of the yellow underwing moth, still to be obtained feeding on the introduced Cape broom.

The moth (*Botys polygonalis*) is double-brooded, the first brood appearing in August and September, the second in January and February. The larva is abundant every year, often to such an extent as to cause the complete defoliation of the food-plant. The species would unquestionably increase, and probably again become troublesome to farmers, but for the presence of the house-sparrow, which hunts vigorously in the hedges for the larvæ, and keeps them in check. As the plant is not indigenous, the moth has apparently acquired a special taste in selecting it as the food of the larva, the colours of both assimilate closely, which affords some protection to the species.

On good land, where the tussock-grass is thick and allowed to remain unburned for a number of years, the ground is soon covered with a considerable thickness of dead grass. In this, many species of Coleoptera and the chrysalis of moths can, at all seasons, be found. Such were precisely the natural conditions of the plains in the days of the quail, excepting that they were on a superior scale, and the food-supply at all times more abundant. A fire sweeping over a large area of such country* would effectually annihilate all insect life in its course, and leave the country black and bare. Frequently the fires raged for several days and nights

* Some authors, writing on the moa age, maintain that fires were kindled for the purpose of driving the huge birds on to the sea-shore to enable the hunters to capture them more easily. Supposing such a theory to be tenable, it may be asked, "Why did not the quail become extinct with the moas?" In answer, it may be said that, if ever fire was used as an agent to destroy the moa, its ravages would be confined to small limits, and its progress intercepted by the rivers of the plains. I, however, am not a believer in the fire-theory put forth to account for the extinction of the *Dinornis*. To my mind, the thick grass would be a great protection to the hunters, and would be used by them as an ambush when tracking or surrounding the moas. If the quail existed in New Zealand along with the moas, the burning of portions of the grassy plains occasionally would scarcely affect the economy of the species. It is the annual and wholesale burning of the lands, and the clearing and cultivation that followed, which completed the work of extermination.

together, and spread for many miles across the then open country.

Apart from the utter destruction of the food, the dense tussock afforded the natural warmth and shelter for the birds during inclement weather and chiefly inclement nights; the sudden removal of both would, therefore, act powerfully on the economy and habits of the quail. The species, like other birds in their respective orders now becoming extinct in New Zealand, was a highly specialised form among gallinaceous birds, and depended on special conditions, such as I have pointed out, for its existence. The effects of the fires and of clearing and cultivation on the climate, though perhaps at the time inappreciable to man, would aid likewise in exterminating the species.

No more interesting or profitable district could be visited by the botanist or ornithologist in New Zealand than around the shores of Lake Brunner. The magnificent primeval forest is due to the greater humidity of the lake valley as compared with many other parts of the west coast, and to the great depth of vegetable mould, or rich virgin soil, which covered the whole face of the country before the forest spread over it. I have seen most of the great bush-lands of New Zealand, but nowhere can the vegetation of the bush be seen in such profusion and perfection, rivalling in luxuriance the tropical American forests so fully recorded in the admirable works of Bates on the Amazons, and Belt on Nicaragua.

Among the rich groves of tree-ferns the kakapo (*Stringops*) and the kiwi (*Apteryx*) have their home. In the saplings of taller growth and among the branches of the towering timber-trees many birds revel and enliven the bush through the day with their rich and varied notes. As evening comes on, the calls of nocturnal and semi-nocturnal species are heard. In the dwarf ferns, the weka moves stealthily about, silently peering into the tent, ready to pick up any bright object and carry it off, to be left and lost in the bush. In the branches of decaying trees the kaka is busy searching in the bark and hollows for insects, uttering, as it flies from tree to tree, a hoarse discordant scream. The little owl (*Spiloglaux*) answers from all directions the call of "morepork." The croaking of the kakapo, busily, among the ferns and lower branches, consuming the leaves, and the shrill night-cry of the kiwi, are the only sounds which nightly disturb the serene silence of the forest.

In my paper to-night it will be impossible to treat the subject so fully as I would wish in the limited time; I will, therefore, confine myself to a few remarks on each species in the list here appended. It is possible, however, that other species omitted from the list may exist in the lake region

If so, they must be of rarer occurrence than any I have enumerated, and were never observed there by me. I may add that my object in writing this paper is to illustrate the ornithology of Lake Brunner *as it is* in 1888, and before the physical features of the country are changed and many of the birds become extinct in the district—a result which will inevitably follow the construction of the Midland Railway and the subsequent clearing and settlement.

Appended is the list of birds inhabiting the lake district.

Hieracidea brunnea (Bush-hawk).

It is intensely interesting to watch a pair of these falcons hovering and circling high above the bush, poising motionless for some seconds, and darting forward at intervals to perform their graceful circling flight, meanwhile uttering their "loud petulant scream." Sir Walter Buller, in his great work on the birds of New Zealand, has described the vehement screaming of this hawk when flying high as an excellent indication of changes in the barometer. As there is more bad weather on the west coast than on the east, and the bird is common, I had good opportunities in the vicinity of the lake of noting the screaming of the bush-hawk in relation to the weather, and invariably found it to be succeeded by bad weather. The days on which they perform their high screaming flights is followed by nights of continuous and loud calling of the wekas and kiwis, both of which are equally good indicators of bad weather approaching.

The nest of this little falcon is placed on the top of some old dead tree-stem, broken off some distance from the ground, or in a hanging mass of climbers. It boldly assails any intruder near its eyrie, and screams vociferously while assailing him. As the food-supply is abundant around the lake, and the birds are rarely molested, they will remain common for some years to come.

Circus gouldi (New Zealand Harrier).

I observed the harrier occasionally circling around the mouth of the Ahuna River, an influent near the top of the lake, but it rarely enters the bush in search of prey. Judging from the direct line of flight I have observed them taking, I am of opinion that they pass up the Arnold River from the coast, and cross the open lake as a near route to the open country at the head waters of the Teremakau River, where the species is common. Owing to the dense bush it cannot procure food in the lake valley.

Spiloglaux novæ-zealandiæ (Morepork Owl).

Common around the lake and the whole course of the Arnold River.

Stringops habroptilus (Owl Parrot, or Kakapo).

This remarkable bird is now becoming rare at Lake Brunner. It was exceedingly plentiful at the time of the Kangaroo gold-rush in the district over twenty years ago. Since then it has diminished in numbers, and bids fair to be numbered with other species now rapidly becoming extinct. Being nocturnal in their habits, they emerge from their hiding-places in the evening to feed, and climb among the lower branches, consuming the soft vegetation. When several are feeding together, they continue throughout the night to answer each other's calls, or hoarse mutterings, uttered while masticating their food. On very dark nights it is pleasing to steal as near them as possible and listen to them nibbling at the tender leaves, while they croak and mutter continuously. By the morning their crops are enlarged to their full extent with the nutritious green food consumed during the night. On moonlight nights their sight is clearer, and they take advantage of this to roam farther from their hiding-places to feed. On the outskirts of the bush several may be seen together waddling leisurely along towards some favourite feeding-grounds, returning, when their hunger is appeased, to their usual hiding-place. The latter is generally in or about the decayed roots of old trees or hollow prostrate trunks. It is sometimes easy to find their homes by the presence of little trodden paths leading to them.

Nestor meridionalis (Kaka Parrot).

The kaka parrot is very common in the lake valley. Belonging to the family of honey-sucking parrots, they repair in the spring to the blooming kowhai trees, and regale themselves on the flowers. While thus engaged, they allow a near approach. It is then most interesting to observe them climbing among the pale-green foliage and seizing a bunch of the yellow flowers, carefully and gently pressing the receptacle of the flowers between the tongue and softly-lined overlapping upper beak, and sucking the honey. The structure of the flower is peculiarly adapted to the process, which is performed without any injury to it. The kaka's repast is not, however, obtained without some effort. Naturally somewhat clumsy in their movements, they sometimes experience difficulties in reaching the masses of flowers on the tips of the branches owing to the very brittle nature of the twigs. They, however, fully realise this, and instinctively select the flowers on the stronger branches. When within reach, they hold firmly to the branch and, stretching the neck to its full length, seize and draw the flowers towards them with the beak. One foot is then used to hold the flowers, while the other holds firmly to the branch and steadies the bird when sucking the honey. The weight

of the bird will sometimes cause the branch to bend down to the lower ones, which affords a slight support.

The kaka's habit of breaking twigs with its powerful beak when searching for food is simply to clear its course and to allow more scope and freedom to its movements.

Nestor notabilis (Kea, or Mountain Parrot).

Although the kea is not, as far as I know, an inhabitant of the naked mountain-tops overlooking Lake Brunner, I may here mention that the range of the species continues to extend farther north every year, and may soon extend to the higher ranges in Westland. When Sir Walter Buller published his last paper on the kea five years ago, he gave the ranges on the upper reaches of the Rakaia as its extreme northern limit. During the last three winters it has visited the ranges above the Otira Gorge, thus showing its range to be extending northwards.

Platycercus novæ-zealandiæ (Red-fronted Parrakeet).
P. auriceps (Yellow-fronted Parrakeet).

Both species are abundant in the bush around the lake, the first-named being the most numerous. In fruitful seasons the food-supply of the parrakeets in this district must be prodigious, the berry-bearing trees being both robust and plentiful. The two great irruptions during the last ten years must have considerably lessened their numbers. Severe, late, or early frosts are probably the chief cause of the failure of their food-supply, compelling them to cross over the ranges and devastate the orchards in the eastern districts. During the two irruptions they perished in thousands, as every possible method was tried to trap and destroy them; yet they compensated the settlers to a great extent by consuming the seeds of many noxious weeds, which they attacked when the green fruit in the orchards had been destroyed by them. I often observed them in large flights, consuming the seeds of *Chenopodium urbicum*, an introduced weed, which grows to the height of 4ft. and 5ft., and spreads rapidly. They vigorously attacked the seeds of the various species of *Sonchus*, or sow-thistles; the dock (*Rumex obtusifolius*), which grows in large masses on the bottom of sluggish watercourses; the Yorkshire fog (*Holcus mollis*); and many other injurious plants.

The present year has been an unprecedentedly cold and wet one on the west coast, the result of which will be worth noting, as bearing on the economy of the parrakeets and other species.

Eudynamis taitensis (Long-tailed Cuckoo).
Chrysococcyx lucidus (Shining Cuckoo).

Both species of migratory cuckoos; they visit the bush in

the Grey Valley and Lake District annually in great numbers. They arrive in the first week in October and depart in the middle of March, the large Polynesian species being the first to depart, followed in a week or ten days by the smaller Australian form. After their arrival the long-tailed cuckoo is an object of almost continual persecution by the tuis, which boldly assail and pursue it through the bush, at the same time uttering their wild alarm-call. The superior and dashing flight of the cuckoo, however, soon places it out of danger for a time, and is its only mode of escape, as it is able to offer only a feeble resistance against a number of angry tuis.

Prosthemadera novæ-zealandiæ (Tui, or Parson-bird).
Anthornis melanura (Korimako, or Bell-bird).

In fine weather the bush along the south shores of Lake Brunner re-echoes with the rich notes of the tui and korimako, busy in their season among the blooms of the kowhai (*Sophora tetraptera*) and rata (*Metrosideros robusta*). There is no picture more beautiful in nature than the sight of these two charming songsters, clinging and swinging in grotesque postures in the sunshine on the brilliant crimson blooms of the rata, sipping the nectar, and flying every few minutes to some bough, and uttering their rich song. When suspended, the deep metallic lustre of the tui's plumage contrasts beautifully with the masses of crimson flowers during the season of rata blooms (March and April) so plentiful at the lake. The tui and korimako come to the trees and remain there so long as the blooms support them. They then disperse among the warmer valleys of the bush, and subsist during the wet winter months chiefly on insects, until the return of spring, when the melliferous blooms of the kowhai again supply them with the necessary food. Although both species have disappeared from, or have become rare in, many former haunts east of the Alps, they still exist in great numbers in the Grey Valley and throughout the Westland bush. The tui is much more numerous than the korimako.

Zosterops lateralis (Silver-eye).

This species is exceedingly common in the bush. As the colder weather sets in they congregate in flocks of several hundreds, and leave the higher bush-lands for the lower valleys, visiting the huts and villages of the diggers, voraciously devouring all suitable food which they meet with in their course. Like the kea (*Nestor notabilis*) they have acquired a stong *penchant* for fresh meat, especially raw fat. They eagerly attack the meat in the butchers' shops, fluttering over and hustling each other in their eagerness to obtain food. While thus engaged they utter shrill excited notes, which are pleasing to hear.

Orthonyx ochrocephala (Yellow-head).

Commonest on the south shores of the lake. In some seasons it is more numerous than in others. Some notes are given on this species, associated with the saddleback.

Gerygone flaviventris (Grey Warbler).

The grey warbler is plentiful in all the forests in Westland. As the chief foster-parent of the two species of parasitic cuckoos, the latter will never, under ordinary circumstances, become rare while the rearing of their young is intrusted to the care of this cheerful and industrious little bird. The warbler's merry song is heard throughout the day, as it actively flits through the undergrowth in search of food. It is exceedingly lively in all its actions. While warbling, the white-tipped tail is often spread to form a fan, and its whole motions are full of life and activity. The beautiful pensile nest it constructs is an interesting object in bird-architecture, the site selected being generally on the outer branches of the manuka (*Leptospermum scoparium*) or other dense small-leaved tree or shrub, where it is safe from the attacks of enemies. Although the grey warbler does not decrease in numbers, it cannot be classed with many otherwise favoured species, owing to its having a "double debt to pay"—namely, the rearing of its own brood and the young of the parasitic cuckoos; but nature has fully compensated for this by endowing the species with a life the most active, cheerful, and diligent of all our native birds, and thus enabling it to perform the onerous duties perfectly.

Acanthisitta chloris (Rifleman).

The feeble note of this diminutive bird is oftener heard in the bush than the bird is seen. It is more common near the summits of the lower bush-covered mountains near the lake than in the valleys. It is a very timid species, and has a habit of keeping on the opposite side of the tree-trunks to that on which the observer is moving, which explains the cause of it being very seldom seen.

Xenicus longipes (Bush Wren).

Common some distance up the bushy slopes, where the vegetation is not so dense as near the lake. It delights to climb the moss-covered saplings, searching for minute insects secreted among the moss. When disturbed it utters alarm-notes, which are answered by others near; at the same time it endeavours to conceal itself in the thickest scrub, or, hopping and climbing up the trees, it disappears among the higher branches.

Miro albifrons (South Island Robin).

The wood-robin is an almost constant attendant when roaming in the bush or about the tents. Its habits are in some respects similar to the yellow-breasted tit (*Myiomoira macrocephala*)—jealously chasing each other round the tents, and disputing their rights to crumbs of bread or other food thrown to them. When seated outside the tent they will frequently settle on the boots, darting off to pick up crumbs, returning again and again, and becoming very familiar. They are encouraged and protected by the gold-diggers, who allow them to enter their tents and huts and to hop on the table to share their own meals. The song of the wood-robin in the lonely bush is in all seasons enjoyable. It is the first astir with the earliest streak of dawn, and, with the fantails, is the last to retire in the evening, when the gloomy twilight silently closes over the bush.

Halcyon vagans (Kingfisher).

The kingfisher is abundant about the lake, frequenting the mouths of the streams flowing slowly into it. The food-supply is enormous, as the shallow edges of the streams teem with the small bull-trout.

In autumn, when the grayling ascends the Arnold River, large numbers of kingfishers withdraw from the lake and subsist on the smaller-sized fish of this beautiful and useful species. When the colder months set in many descend the Arnold to the more open and sunny flats on the Grey River, subsisting on insects and small bull-trout "or bullys" until the arrival of the whitebait.

In the Grey during the whitebait season (September and October) the birds are very numerous, and can be seen sunning themselves on dead trees or old naked stumps all along the lower Grey Valley.

Myiomoira macrocephala (Yellow-breasted Tit).

Among the undergrowth of the bush the sprightly yellow-breasted tits flit gracefully about, and sportingly chase each other through the branches, gently fluttering their wings, erecting their crests, and uttering a suppressed twitter as they sit eyeing each other on the boughs or clinging to the stems of the trees, and exhibiting the peculiar jealousy of the wood-robin about the tents. They are plentiful in the district, and more wary than many other species. In the bush near old settled districts on the west coast they are still abundant. Their food, which consists of worms, larvæ, chrysalides, and insects, is plentiful in all seasons in the bush.

Rhipidura flabellifera (Pied Fantail).
R. fuliginosa (Black Fantail).

On the outskirts of the bush the pied and black fantails are daily on the wing, eagerly consuming the sandflies so troublesome in the bush. In dull or wet weather these birds are busy on the shores of the lake, flitting lightly over the water beneath the overhanging branches, and performing graceful evolutions in the air in pursuit of their prey. Both species are abundant around the lake. Their food, the common sandfly (*Limulia australiensis*), is abundant—a fact which is well known to visitors or dwellers in the West Coast bush.

Turnagra crassirostris (South Island Thrush).

The South Island or thick-billed thrush is still fairly numerous at the lake, but has disappeared from the lower gullies of the Arnold, between Stillwater (now named Richardson) and the Arnold gold-diggings. Fifteen or twenty years ago this species existed in great numbers on the Maori Gully goldfield, and fed around the huts and tents of the diggers, frequently entering and hopping on the floors picking crumbs, but gradually their numbers diminished until at the present time not a single thrush exists on the goldfield. Like the British species (*Turdus musicus*), the early morning or evening is the best time to hear its splendid notes and call, or to study its habits, it being then most active. A few hours after sunrise they cease to sing or to answer each other's notes, and generally remain silent in fine weather during the day among the tree-ferns and lower branches of the trees. In dull or wet weather they move about among the higher branches in search of food, and avoid the heavy drip of the thick undergrowth. Like other species, as the wood-robin, the yellow-breasted tit, the crow, and weka, it is easily attracted to the spot where any unusual noise is produced in the bush near its haunts, often coming almost within reach of the individual attracting it, spreading its beautiful rich brown tail, moving sideways along the branch, and turning its body right and left, meanwhile examining the stranger closely. It is, however, a powerful flier, and flies with great precision through the tangled vegetation. I have observed it several times performing such flights; resting almost motionless for some minutes on a high limb of a tree, it would suddenly ruffle its feathers, and, dropping from the limb, fly with great force through the thick undergrowth, reappearing again on a high limb some distance away. One bird I watched uttered a wild jubilant note as it dropped from its perch to repeat its flights from tree to tree. It is probably a habit peculiar to the

pairing season, as I never observed them performing such flights at other times of the year.

Glaucopis cinerea (Yellow-wattled Crow).

This is another remarkable and beautiful species now rapidly approaching extinction. Like other ground-feeders it is exceedingly tame, and falls an easy prey to dogs and cats, large numbers perishing annually from this cause alone. The nest, which is generally placed in some low scrub, is easily reached by cats and rats, and in some localities where both are numerous the parent birds rarely succeed in rearing a brood. While staying at Lake Brunner for fourteen months, and travelling great distances in all directions every day, excepting in wet or windy weather, we never obtained or observed a single young crow. Occasionally an adult bird came around the tents, moving spiritedly, and hopping tamely about the tent-door, picking crumbs or other suitable morsels of food, but only once did we observe a pair together. This occurred two miles up the Ahuna River from the lake, being at the end of October. They were probably paired for the season, and both were in perfect condition, the orange-coloured wattles being most conspicuous. One bird was slightly longer than the other, which, no doubt, was the male. We watched them silently for over an hour to ascertain if they were nesting. They, however, moved on through the bush towards the lake, when we left them, and returned on our course up the river.

Like the preceding species, the South Island crow is a beautiful object in its native haunts, its exceeding tameness allowing a close and perfect study of its habits. When observed clinging to the pale lichen-covered trunk of some old tree, or swinging on the large fronds of tree-ferns, it supplies a picture of bird-life only to be realised by studying birds in their native haunts.

An intelligent workman employed in the Land Survey Department informs me that the species is still plentiful in some of the south-west sounds.

Carpophaga novæ-zealandiæ (Wood-pigeon).

The wood-pigeon is exceedingly common in the Lake District. In fine weather large flights change quarters daily, flying from shore to shore or from one part of the bush to another to visit some favourite or seasonable berry-bearing trees. The presence of numbers of this splendid pigeon in March and April among the graceful foliage of the miro trees (*Podocarpus ferruginea*), moving through the branches and plucking the large fleshy scarlet berries, is another charming picture of bird-life in the New Zealand bush. A plentiful season of miro berries is invariably followed by a season of fat

pigeons. The berries are much relished by the birds, and are exceptionally nutritious and fattening. The nest of this species is placed in the thickest branches of the white and silver pines. As little wind blows in the spring in the forests of the west coast, they experience few difficulties in rearing a good brood annually.

The plumage of the wood-pigeon high among the branches is striking, the bronze-burnished pectus and white abdomen contrast beautifully with the green forest around.

Creadion carunculatus (Saddleback).

This species is sometimes gregarious, and moves through the bush during the colder months of the year in flights of from a dozen to fifty or more together. Several of the old gold-diggers on the River Arnold informed me that they have frequently observed flights of the saddleback following the flights of canaries (*Orthonyx ochrocephala*) as they fed through the bush. Probably no scene in bird-life is more attractive or beautiful than to observe a flock of yellowheads followed by a flock of saddlebacks. On the 2nd June, 1887, I rambled up Stoney Creek, a small stream which flows into the lake a little above the outlet of the Arnold. I had travelled on the banks and bed of the creek about a mile when I turned to the right, up a small narrow gully, in search of ferns or other botanical rarities. On reaching nearly the top of the gully, I heard the shrill, ringing notes of a flock of yellowheads. As I noticed them crossing the gully some distance above me, I moved on gently until I was under the branches on which the birds were passing over the gully. They numbered about two hundred, and were in rich plumage. They fed eagerly for some minutes among the branches of the trees; then, simultaneously uttering their call, they flew forward some yards and began to feed, until they again sounded the signal to advance, repeating it at short intervals, and passed on through the bush in this order.

Before the yellowheads had quite disappeared I heard the rich flute-notes of a flock of saddlebacks advancing. I climbed up the side of the gully and stood on the edge. Two males were the first to appear, followed by the remainder of the flock. They advanced in the line of the yellowheads; not so high among the branches as the latter, but more among the tree-ferns, while some fed among the ferns and mosses covering the ground. When they noticed me some approached closely, twittering, and elevating their tails. They moved about in a sprightly manner on the lower branches, within a few feet of my face, scanning me carefully, and wondering, perhaps, at the intruder on their solitary domain. They were exceedingly tame, and moved with great activity, halting at

intervals, and resting their breasts for a few seconds on the boughs, and again proceeded, searching eagerly for food among the ferns and mosses covering the ground. They were in the perfection of plumage. The saddle-shaped patch of rich brown extending over the back and shoulders, on the lustrous black ground, contrasted well with the deep green fronds of the tree-ferns. The sexes were about equal, and the plumage of some paler than others, which were young birds. They remained hopping on the branches and ferns near me for about seven minutes, and disappeared slowly in the track of the yellowheads.

The purpose served in the saddlebacks' economy in following the flocks of yellowheads is unquestionably to obtain food. The latter, in moving through the bush, will disturb numerous large insects, which they reject, and which are consumed by the saddlebacks following them. The rich insect fauna in some parts of the bush in Westland at certain seasons will account for the appearance of flocks of the native insectivorous birds in these districts. The flights of yellowheads must be entirely regulated by, or restricted to, the supply of food. Where the bush remains in its primeval state they remain numerous; where it is partly cleared or disturbed, this species and many others diminish in numbers and ultimately vanish from the locality. Although the saddlebacks are not dependent on the flights of yellowheads for food, they are able to obtain such by following them, and do not always travel in flocks, as they are occasionally seen singly and in pairs, in some of the gullies of the Arnold and around the lakes, but are now very rare compared to the numbers which inhabited the banks of the Arnold fifteen or twenty years ago.

I was attracted early one morning in March towards some old fallen and decayed timber, where I heard some peculiar tapping sounds. On cautiously reaching the place I found a saddleback busily digging in the decayed timber for the larvæ of the huhu beetle (*Prionoplus reticularis*). The tappings and actions of the bird resembled much those of the green woodpecker (*Picea viridis*) of Britain in its mode of procuring food.

Ocydromus australis (South Island Weka).

Common on the bushy slopes of the mountains on the north side of the lake. It is more common in the valley of the Crooked River than near the shores. They are exceedingly tame and inquisitive, and come about the tents, often remaining around the camp for weeks, picking up crumbs of bread or scraps of meat thrown out. When a number collect near the camp it is almost impossible to sleep, owing to their loud calls through the night. They give much trouble

in camp by entering the tents and pulling or tossing over all movable objects, unless all is left secure.

Ocydromus fuscus (Black Weka).

This darker species or variety is not so plentiful as the preceding one. It inhabits the slopes of the lower bush-clad mountains bounding the lake on the south. It is also a more timid form. But there is no appreciable difference in their call, excepting that this species is slightly the shriller of the two.

Ortygometra tabuensis (Swamp-crake).

The swamp-crake is uncommon about the lake. It frequents the shallow lagoons, concealing itself in patches of *Carex* growing around them.

Porphyrio melanotus (Swamp-hen).

Common in the more open places. They appear to obtain good food, as all I observed were exceptionally fine birds, in perfect plumage.

Himantopus leucocephala (White-headed Stilt).
H. novæ-zealandiæ (Black Stilt).

Both species frequent the shores of the lake and the narrow sandy flats on the Ahuna and Crooked Rivers, the former being the most numerous. It is interesting to stand among the thick vegetation, or behind some tree, and watch them stalking gracefully along the shallow shores in search of food, suddenly taking flight and flying some distance, to recommence the search in fresh places.

Strepsilas interpres (Turnstone).

Occurs among the rough beds of boulders on the Ahuna River, but never at any time numerous.

Hæmatopus longirostris (Pied Oyster-catcher).
H. unicolor (Black Oyster-catcher).

I observed three specimens only of the first-named species at the lake, but I occasionally heard them flying over the district seawards at a great height. The black species inhabits the sands near the mouth of the Ahuna River, but is never very plentiful.

Ardea alba (White Heron).

This magnificent bird—the white crane of the Europeans, the kotuku of the Maoris—still lingers among the secluded lagoons on the bush-flats in the vicinity of Lake Brunner. They are beautiful objects when seen sitting leisurely on the edge of the water. When alarmed they rise, flapping somewhat clumsily, ascending spirally in the air until a considerable height is reached; then, taking some more direct course, the legs are drawn up close to the tail, and they sail away

lightly through the air. I regret that time will not allow of my adding a few more remarks on this splendid species.

Ardea sacra (Blue Heron).

Common in the summer and autumn, when eels and grayling are plentiful in the Arnold and the lake.

Ardea maculata (Little Bittern).

I lately sent a note to the *Ibis* announcing the capture of two specimens of the little bittern on the west coast within the last four years. One was taken at Lake Brunner four years ago; the other was shot last year in a lagoon north of Okarita, and is now in a private collection at Ross. In a rough country like the west coast, still imperfectly explored by ornithologists, it is probable the species may exist in good numbers among the remote lagoons. Naturally an exceedingly shy form, it would readily escape notice, as it is difficult for dogs to work or flush game out of the thick grass and sedges which generally cover the water in a dense mass. I have no doubt that other specimens will be collected as the country becomes cleared.

Botaurus pœciloptilus (Bittern).

Not uncommon among lagoons formed by small arms of the lake, or in the small bays choked with weeds. Also a shy species.

Anas superciliosa (Grey Duck).

During the shooting-season they appear in immense flocks on the lake. They are probably driven thither or take refuge on its waters from the guns of sportsmen in the Grey Valley and other localities. The food-supply is abundant in the weedy creeks and bays of the lake. All the birds we procured were in good condition.

Hymenolæmus malacorhynchus (Blue Duck).

More common on the Arnold River below the lake than elsewhere, where they rest on the stones jutting out of the rapid stream. They ascend the creeks in the bush where they find an ample supply of food. When wounded they are expert divers, diving in the rapid waters and reappearing long distances down stream.

Querquedula gibberifrons (Little Teal).

Common in some parts of the lake, about the sluggish creeks entering it.

Fuligula novæ-zealandiæ (New Zealand Scaup).

Not uncommon in the smaller bays, where it takes refuge among the beds of *Carex* and raupo.

Casarca variegata (Sheldrake or Paradise Duck).

This beautiful species is the largest and handsomest form in the order *Anseres* in New Zealand. It delights to live in the open country near broad river-beds composed of shingle and sand, or on grassy flats near lakes or pools of clear water. It is generally met with in pairs, but can often be seen flying in flocks, changing quarters from one district to another. Occasionally they reach Lake Brunner and disperse along the shores to feed for several days. Reassembling in a flock, they again take flight and leave the lake. Some years they are common in the valleys of the Grey and Teremakau Rivers, frequenting the sandy flats. Owing to the periodical flooding of these two great rivers they are compelled to seek fresh feeding-grounds, and during these short migrations they visit the lake.

C. variegata (Shoveller Duck).

The shoveller or spoonbill duck frequents the larger bays on the west side of the lake. I have detected them among the flocks of grey ducks resting in clear weather on the open lake, but never numerous. They are beautiful objects on the water in spring followed by a brood, and allow a near approach, gliding gently along the shore or into some sluggish creek to nibble among the weeds, or macerating vegetation to procure food for their young. On the west coast their food must differ considerably from that on the east, where they generally inhabit the estuaries of rivers.

Larus dominicanus (Southern Black-backed Gull).

L. scopulinus (Mackerel Gull).

The former is very common during the summer; the latter is an occasional visitant at the lake.

Sterna antarctica (Grey Tern).

Common in the nesting-season in the lake valley.

Podiceps cristatus (Crested Grebe).

The crested grebe has here a safe retreat from the ravages of sportsmen or collectors. No eye can equal the grebe's in its quickness of vision, nor can any bird compare with it for rapid diving. When feeding unobserved along the shore they are gentle and graceful, yet wary, in their movements. When alarmed they draw off into the open lake and are soon lost in the expanse of water.

Podiceps rufipectus (Dabchick).

Not uncommon on the lake; likewise expert divers. They frequent the bays on the north-west shore more than elsewhere, and are generally met with in pairs.

Phalacrocorax novæ-zealandiæ (Black Shag).
P. varius (Pied Shag).
P. brevirostris (White-throated Shag).

All these species inhabit Lake Brunner and the rivers of the lake valley, the pied and white-throated species being most plentiful. There is an ample supply of food at all seasons in the form of eels, grayling, and the two species of bull-trout. There are two shaggeries of *varius* on the Arnold, one on each side of the river below the lake, having about sixty nests in each, placed on trees all more or less overhanging the river. In fine weather they delight to rest in groups of young and old together on gnarled leaning stumps along the shore, some leisurely picking and oiling their feathers, others in easy natural positions, with the head under the wing or drawn close into the body, the plumage of the white-throated shag reflecting brilliantly in the sunshine. Like the blue duck, they rest frequently on the projecting boulders in mid stream, enjoying the spray of the surging waters.

Apteryx australis (South Island Kiwi).

The South Island kiwi exists in considerable numbers in the bush around the lake. It is most numerous on the east and north-east sides, where large patches of *Sphagnum* moss (*S. cymbifolium*) cover the damp bottom of the bush, in the places where the trees and undergrowth are thinnest. They generally live in pairs, and during the night visit the beds of *Sphagnum* moss, probing carefully through it with their long sensitive bill in search of minute larvæ, chrysalides, and worms. They affect the beds of leaf-mould, and probe vigorously through it procuring the large worms existing in the mould. They ramble through the night among the dense beds of ferns, consuming nocturnal insects. Their shrill call is heard loudest on dark and drizzly nights, or before rain, and is answered by other kiwis in every direction.

After examining some of the secluded habitats of the rarer species of birds on the west coast, I have no doubt that an ornithological ramble through the Westland bush, accompanied with one or two good dogs, would yet reveal the existence of *Notornis mantelli*, as the species is of shy and retiring habits. It would in all probability be found in the swampy parts of the bush, or about the sedgy lagoons some distance inland on the southern rivers of Westland. The country is difficult to explore, being composed for the most part of dense and trackless forest. The capture of a single specimen of this *rara avis* would, however, amply repay for all patience and toil expended in exploring the bush. If the *Notornis* still lingers in the South Island, the district I have mentioned is

one of the most favourable where a search may be made for this much prized bird.

The roaroa, or great kiwi (*Apteryx haasti*), is captured occasionally by survey-parties in southern Westland; and this, along with other valuable species, would probably reward the ornithologist for a trip through the west coast bush.

Art. XXII.—*On* Apteryx bulleri.

By R. Bowdler Sharpe, F.L.S., F.Z.S., Hon. Mem. N.Z. Inst.

[*Read before the Wellington Philosophical Society, 13th June, 1888.*]

During a recent examination of some skins of *Apteryges*, in company with Sir Walter Buller, I became firmly convinced that the ordinary brown *Apteryx* of the North Island is certainly specifically distinct from the *Apteryx australis* of the South Island; and I was a little surprised to find, on going over the literature of the subject, that, notwithstanding a similar verdict on the part of such excellent naturalists as Sir James Hector, Sir Julius von Haast, Professor Hutton, Mr. Potts, and others, the North Island bird has not yet received a distinctive name. It has generally been called by naturalists *Apteryx mantelli* of Bartlett, under which name it appeared in the first edition of Buller's "Birds of New Zealand;" and it is the *Apteryx australis* var. *mantelli*, of Finsch's paper in the "Journal für Ornithologie," 1873, p. 263. The characters given by Mr. Bartlett for his *Apteryx mantelli* are founded on the natural variations in *Apteryx australis*, of which *A. mantelli* is a pure synonym; and the North Island *Apteryx* awaits a title. The pair of adult birds in Sir Walter Buller's collection are relatively much smaller than the corresponding sexes of *A. australis*, and the colour is of a blackish brown instead of a tawny tint; while the curious harsh structure of the plumage, especially of the feathers of the rump and nape, is a further character of importance.

It gives me great pleasure to adopt a suggestion of my friend Dr. Finsch that the North Island *Apteryx* should be called *Apteryx bulleri*, after the learned author of the "Birds of New Zealand," a work which in its first edition seemed to me to be as complete as it was possible to make a history of the birds of any single area, until I saw the magnificent new edition on which Sir Walter Buller is now engaged, and on the completion of which I should think any one would find it difficult to write anything more about the birds of New Zealand.