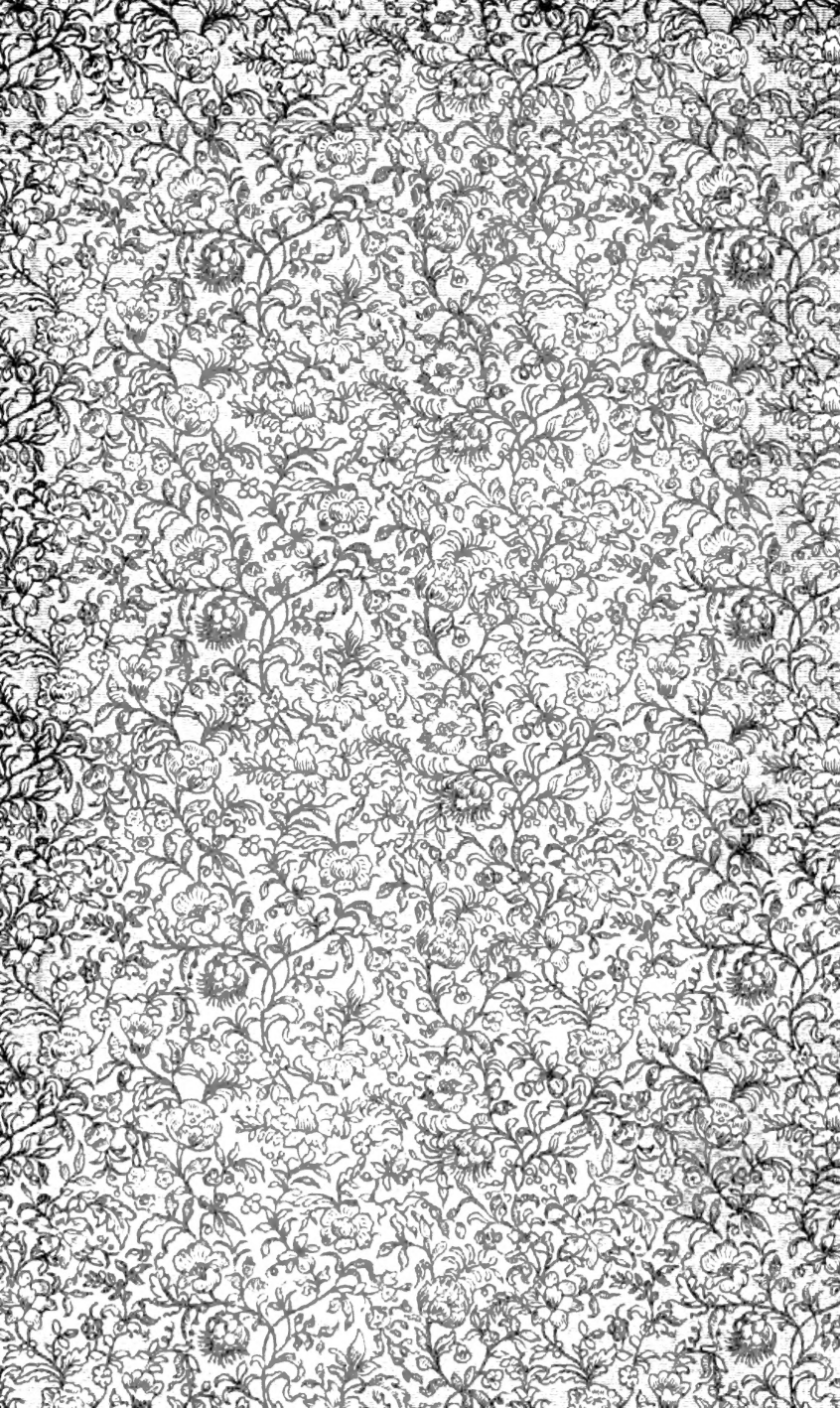
WILD LIFE IN NEW ZEALAND.

PART I.
MAMMALIA.



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WILD LIFE IN NEW ZEALAND.

PART I.—MAMMALIA.

BY

Hon. Geo. M. THOMSON, M.L.C., F.L.S., F.N.Z.Inst.

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OTHER WORKS BY THE SAME AUTHOR.

THE FERNS AND FERN ALLIES OF NEW ZEALAND. Melbourne, 1882. Out of print.

INTRODUCTORY CLASS-BOOK OF BOTANY. Wellington, 1891; second edition, Wellington, 1906.

A NEW ZEALAND NATURALISTS' CALENDAR. Dunedin, 1909.

THE HISTORY OF THE PORTOBELLO MARINE FISH-HATCHERY. Board of Science and Art Bulletin No. 2. Wellington. Now in the press.

THE NATURALIZATION OF ANIMALS AND PLANTS IN NEW ZEALAND. Cambridge University Press. Now in the press.

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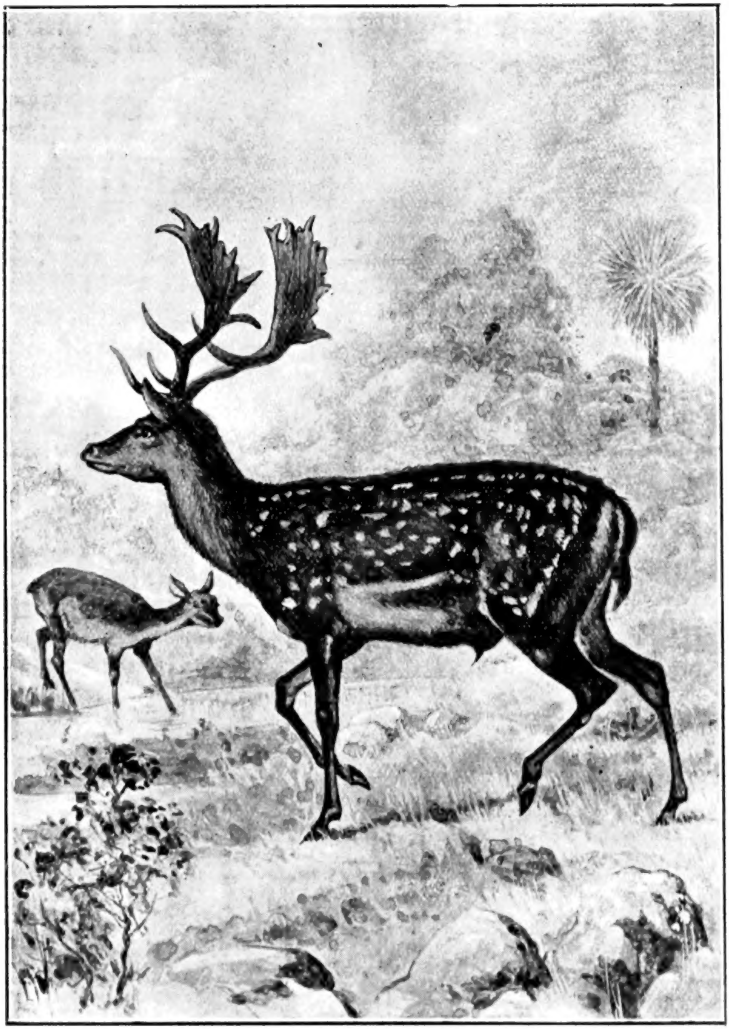


Fallow Deer.

WILD LIFE IN NEW ZEALAND.

PART I.—MAMMALIA.

CHAPTER I.

INTRODUCTION.

IN a land which depends to a very large extent on agricultural and pastoral pursuits and industries some knowledge of the animal and vegetable life of the country should be taught in every school, and the love of Nature in all her varied aspects should be inculcated in every child. The best way of acquiring such knowledge is by observation, and every child is more or less a naturalist from the start. It has been said that man is a classificatory animal, and it is wonderful how most children begin to collect such objects as interest them, and how, unconsciously, they begin to classify them.

But, hand-in-hand with observational work, a certain amount of instruction is very helpful, and if the one can work in harmoniously with the other progress in the knowledge of Nature is greatly facilitated. Books conveying instruction in botany are common enough, but those dealing with the rudiments of zoological work in a form sufficiently attractive to the uninformed reader are by no means numerous. I do not know of any work dealing with the animals which are frequently met with in New Zealand, and in the hope of partly supplying this want I propose to write a few sketches of the wild life of the country, in which I shall attempt to give some account of those which are most common. The late Professor Hutton and Mr. James Drummond, of Christchurch, published some years ago a valuable work entitled "Animals of New Zealand," which should be in every school

library. This, besides being rather expensive for most private readers, is a more or less technical work, and deals only with the higher vertebrate fauna indigenous to these Islands. Excellent little articles appear from time to time in the *School Journal*, but these are not readily procurable.

In all centres of settlement the animal life is almost as much due to foreign immigration as the people are; but observers cannot tell this fact without some assistance, and one of the difficulties with which all embryo naturalists are met is to know which plants and animals are native and which are introduced. Let me illustrate this.

Living as I do in a suburb of Dunedin, just outside the Town Belt, I observe in my walks that in this neighbourhood certain species of birds are very common. They are house-sparrows, blackbirds, thrushes, starlings, and hedge-sparrows. These are all forms which have been introduced from Great Britain. Almost as abundant, but more erratic in their occurrence, are wax-eyes (or twinkies) and goldfinches—the former a somewhat recent immigrant, apparently from Australia, and the latter introduced from Britain. Less abundant in varying degree are grey warblers, tomtits, fan-tailed flycatchers, chaffinches, greenfinches, an occasional yellowhammer, and a little brown owl. The first three are natives, the rest are introduced. The native bell-bird (or korimako) visits the gardens from time to time, especially when the trees are in flower; while occasionally in the outlying districts one hears or sees a tui or a morepork: these are all natives. In the more open country introduced skylarks are common, as are the native ground-larks, or pipits. On the seashore are numerous species of birds, but these are all indigenous species. On still nights one often hears the black swans flying overhead in their migrations from one sheet of water to another: these were introduced from Western Australia.

About the house are occasionally a few mice, and in town brown rats are common. These are not kept in check by the dogs and cats which are common in many houses. During the nights hedgehogs roam about the gardens, and are far more common than unobservant people have any notion of. All these and the other mammals met with, such as horses and cattle, sheep, goats, pigs, and rabbits, were originally introduced, mostly from Britain.

When I go to work in the garden I turn up numerous earthworms, nearly all belonging to introduced species—unless I start to trench in new ground, when I come on native species. The woodlice are introduced; so are the earwigs, which are so common in the north end of Dunedin; so are all the slugs and snails. The bees and humble-bees are introduced, as are the large drone-flies which visit so many of our flowers in autumn and early winter. Nearly all the plants in our fields, orchards, and gardens, cultivated ones and weeds alike, are of foreign origin; so are the aphides and scale insects which infest them. The flies which infest our houses and carry dirt and disease in all directions are foreigners; so are the borers which destroy our houses and furniture; and so also are bugs, fleas, and lice, which are harboured in dirty surroundings.

The question might well be asked, Where do the native species come in? The answer would have to be that wherever man goes certain species of animals and plants follow him, and become established if the conditions are suitable; while another section he either takes with him for their utility or introduces afterwards for various reasons; and the native species gradually get pushed out.

Let us consider these two kinds of introductions. The only mammals in New Zealand which were introduced by man unconsciously are rats and mice. These accompany man wherever he goes and settles, and do so very much against his will. All the other forms—horses, opossums, wallabies, cattle, sheep, goats, pigs, deer, dogs, cats, hares, rabbits, hedgehogs, and guinea-pigs—were introduced of set purposes. All the introduced birds were also brought to this country on purpose. So were the introduced fishes —salmon, trout, carp, perch, tench, turbot, &c. So were the frogs. As we get lower down the scale of the animal kingdom we find the self-introduced forms increasing in proportion and number, and those brought in for definite reasons becoming fewer.

No fewer than twenty-eight species of slugs and snails have been introduced into the country. Of these, one—a water-snail (*Lymnaea stagnalis*)—was brought here for the purpose of feeding imported trout; all the rest were imported among some kind of agricultural or horticultural produce. The case of the insects is especially interesting. About 270 species have been introduced.

Those kinds which were first brought for some definite purpose were silkworms, then honey-bees, and later humble-bees. An unsuccessful attempt was also made to introduce the cochineal insect. The silkworms, which are, of course, not wild animals in any sense of the term, never became established, but they can still be obtained from a few dealers. The humble-bees were brought here for the special purpose of fertilizing red clover; and thus obtaining seed from the plants, instead of having constantly to import seed from abroad. In more recent years eleven species of insects—mostly ichneumons and ladybirds—have been introduced by the Department of Agriculture to cope with other insects which have become pests, the larvae of the former being parasites in the bodies of their prey, the latter feeding directly upon aphides. All the other introduced insects—that is, over 250 species—have been brought here unwittingly.

Nineteen species of earthworms have found their way into the country, most probably among the earth and the roots of introduced plants.

It will thus be seen that wherever people are settled in New Zealand the greatest number of animals to be met with are immigrants like themselves. A popular account, therefore, of the wild life of the country must deal with these introductions, as well as with those native forms which are still to be met with commonly. This, then, must be my apology for writing some sort of consecutive account of the common animals which are now to be found near the haunts of men, as well as of those which take some finding. Descriptions of introduced animals are to be obtained only by reading books of natural history dealing with other countries, or in isolated articles, such as the useful leaflets issued from time to time by the Department of Agriculture.

Nearly all children, and a majority of grown-up people as well, are fond of natural history, and many who have lost the early taste find it revive when they are brought in contact with it later. I should feel rewarded if this little book should stimulate the love of nature in any of its readers, and especially if it would cause a more general desire for nature-study to spring up in our schools.

The first Europeans who landed in New Zealand and who came to know something of the animals which were to be met with were those who came with Captain Cook in his visit here in 1769. They

found that the birds and beasts were very different from those they had known in the Homeland from which they had come. They also noticed that there were very few animals or plants which were desirable for food, or which were likely to furnish food to later arrivals; and Cook was sufficiently far-seeing to recognize that before long many of his countrymen would come to these Islands either to visit them or to stay. These early European voyagers found that the Maoris, whom they met for the first time, and who were far more numerous than they are now, had no domestic animals except dogs, which they kept for food. They also found that a rat was very common in many parts; but they met with no other four-footed animals, except, probably, lizards.

So Cook and those who followed him thought it would be a good thing for the country, and for the Europeans who might come later to live in it, if the best and most useful animals and plants which occurred in Britain were brought to New Zealand. They were, then, the pioneers in starting the introduction of European forms by giving the Natives pigs, goats, fowls, and seeds of several plants. Other animals and plants were brought here from time to time, and as white people increased in number, and gradually occupied much of the land and brought it into cultivation, these introduced forms in certain localities soon displaced many of the native forms. All the thickly peopled and settled parts of New Zealand are much more like parts of Europe as far as animals and plants are concerned than they are like the New Zealand which Cook knew. The reason is that wherever white men go to settle they take with them certain animals and plants, which they keep and cultivate. Besides, as already said, a great many things come into the new country with the immigrants—things which are not wanted, perhaps, but which follow white men wherever they go—and these things frequently become very common. We call the plants "weeds" because they grow where they are not wanted. But we have no name for the uninvited animals—mostly small—which thus come into the country, until perhaps they become very common, and then we just call them "pests"—nasty hurtful things to be destroyed and got rid of.

Now, if we are going to study the natural history of the country —both its native (or indigenous) and introduced animals and plants—we must put away from our minds the idea of "weeds"

and "pests," and look at and think of them as wonderful works of creation, full of beauty and interest. All nature is full of beauty, and if one looks for this it will be found everywhere. It will also be found that the study of the book of nature is unending. It does not stop, like the story of a book, but the more one learns and the more one comes to know the more one will find fresh chapters opening. If you are a naturalist, a true lover of Nature, and study her for half a century, you will find at the end of that time that you are only beginning to learn a little about the wonderful things which occur and exist in this wonderful world in which we live.

In describing the more common animals of New Zealand I am going to follow the regular order in which a naturalist would probably catalogue them.

At this point a word is necessary as to the names to be used. Some people profess to object very strongly to the use of technical names, and say, "Give us English names that we can understand." The objection is absurd, and arises from ignorance and want of thought. How could a naturalist give English names to the thousands of native and introduced moths, beetles, and flies already known? To take a more special case among the beetles alone, how could he distinguish among the twenty-five species of native and the half-dozen or more introduced ladybirds? The thing cannot be done. On the other hand, technical names are given on a definite and simple plan, and are really not difficult to master. We use them every day in speaking of garden-plants—*Anemone*, *Crocus*, *Gladiolus*, *Chrysanthemum*, *Dahlia*, *Fuchsia*, *Veronica*, and so on.

In regard to the animals we are to deal with in this book we hardly need to use technical names, and will do so as sparingly as possible.

The first and highest group in the animal kingdom are the Mammalia. These are vertebrate (or back-boned) animals which are fur-clad, and the females have glands which secrete milk for the nourishment of the young. These glands open to the surface of the body by teats, or mammae, hence the name. Mammals are all warm-blooded animals. There are many other distinctive features by which animals of this group are characterized, both anatomical and physiological, but here we intend to give only the most distinctive points.

Mammals are divided into several orders, and of these six are now represented in the New Zealand fauna. As I do not wish to burden these pages with technicalities, I shall give only the briefest accounts of these orders, and mention the animals found here which belong to them.

1. The animals of the order Marsupialia are popularly known as pouched animals. Their most distinctive character is that the mammae lie within a pouch in which the young are placed while in an imperfect condition. Two kinds of animals belonging to this order are wild in New Zealand—namely, wallabies and so-called opossums.

2. The order Ungulata includes a large assemblage of herbivorous animals of somewhat diverse character. They possess theoretically five toes in each foot, but actually these are reduced to two, or, in the case of the horse, to one toe. This reduction is accompanied by a reduced condition of the ulna, which is fused with the radius, and the fibula is fused with the tibia. The order includes horses, pigs, deer, oxen, sheep, and goats, all of which are, or have been, wild in this country.

3. The third order, Cetacea, forms an extraordinary group of warm-blooded animals, which breathe air and suckle their young, but live in the sea. It includes all the forms known as whales, and all are indigenous to New Zealand.

4. The Carnivora are, as their name implies, flesh-eaters. Their teeth have sharp cutting-edges, and the canines are well developed to enable them to tear the flesh off their prey. The order includes cats, dogs, stoats, ferrets, and weasels, all of which have been introduced; and seals, which are indigenous.

5. The animals of the order Rodentia are only occasionally carnivorous. All possess long incisors furnished with strong chisel-like edges, and with these they are able to gnaw their food, from which circumstance the name is derived. The canine teeth are quite absent. In New Zealand are to be found rats, mice, rabbits, and hares.

6. The last order represented here is the Insectivora, a group, mostly of small animals, which is very difficult to define. The only animal belonging to the order in New Zealand is the hedgehog.

CHAPTER II.

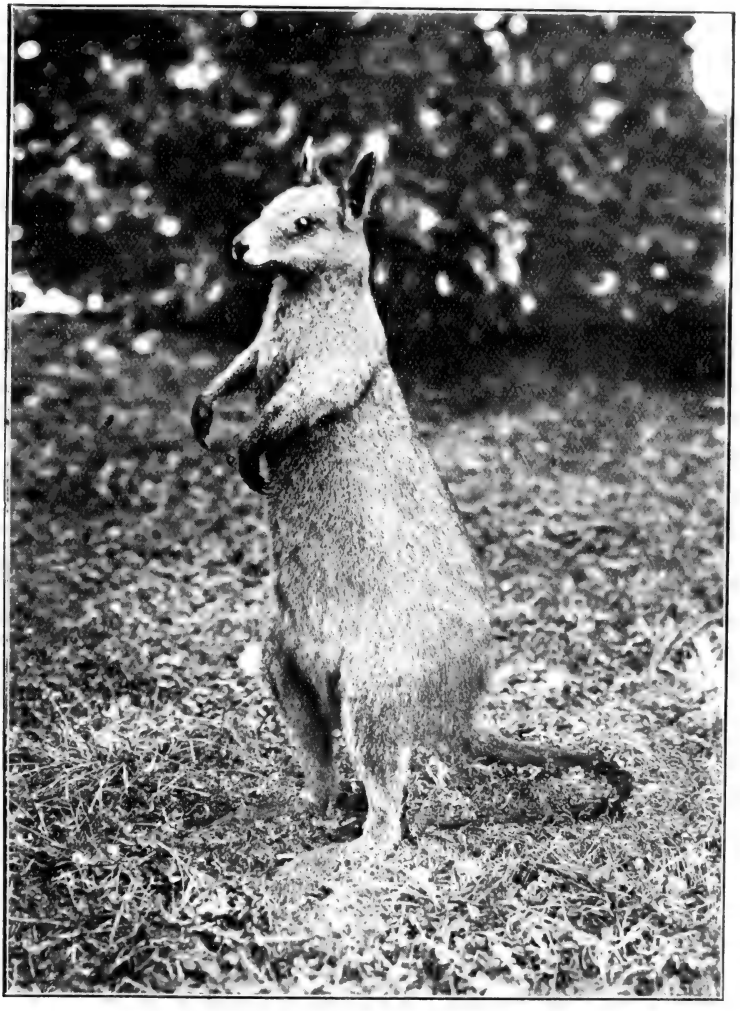
MARSUPIALIA—WALLABIES AND OPOSSUMS.

NUMEROUS attempts have been made to introduce various kinds of marsupials into New Zealand, and several kinds of kangaroos, wallabies, and opossums have been liberated in this country. At the present time there are either three or four species found wild in different parts.

COMMON SCRUB WALLABY; BLACK-TAILED WALLABY (*Macropus ualabatus*).

Some fifty years ago the late Mr. Studholme got some wallabies either direct from Tasmania or from the Canterbury Acclimatization Society, and these were set free in the neighbourhood of his home at Waimate, in South Canterbury. They very quickly increased, till they numbered thousands. They live in the bush, scrub, and fern about the gullies and gorges. They come out in the evenings to feed in the open ground. Their food consists chiefly of grass, but they are very fond of certain trees, particularly *Panax arboreum*, which they scratch and bark pretty badly. The skins of those taken in winter make very fine rugs, as the fur is thick and heavy. The flesh is said to be very palatable, and the tails make excellent soup. They are quite large creatures—small kangaroos, in fact—and the old bucks weigh over 60 lb.

About the year 1870 Sir George Grey imported some wallabies from Australia and set them free on Kawau Island. About the same time Mr. John Reed, of Auckland, also imported some, which he liberated on Motutapu Island, whence they have spread to Rangitoto. Those on Kawau increased to such an extent as nearly to eat out the vegetation, and when the property was sold the new owners allowed the wallabies to be killed out wholesale. They have by now been mostly all destroyed. Even in Sir George Grey's time as many as two hundred would be killed in a single battue. Some got across to the mainland—a swim of three miles—but they cannot be very numerous. They belong to the same species as those so common at Waimate.



[*W. Beken, photo.*

FIG. 1.—THE COMMON SCRUB WALLABY

Common Opossum (*Trichosurus vulpecula*), and Sooty Opossum (*Trichosurus fuliginosa*).

People who live in or near the bush in many parts of New Zealand know that among the trees are to be found numerous furry animals about the size of a big terrier dog, which are popularly known as opossums. The name is a misnomer, like so many popular names. The true opossums are found only in America; they belong to a different family of marsupials, and are carnivorous. Our animals are herbivorous, and ought to be called phalangers; but the other name will always stick to them now.

These animals are not usually seen during the daytime, but they come out at night, and, when other kinds of food are short, may make an attack on the orchards and eat the apples and pears as they are becoming ripe. But because they are chiefly nocturnal in their habits young people seldom see them, and unobservant people may live in a district containing thousands of opossums and never know that they occur in the neighbourhood. These animals are not natives of New Zealand. They were first brought to this country from Australia about sixty years ago, and were liberated near Riverton. Later importations have frequently been made, both private individuals and acclimatization societies introducing them. Thus the Auckland Society and Sir George Grey brought a considerable number from Australia between 1869 and 1876, and Kawau at one time was overrun with them. The Wellington Society liberated nineteen Tasmanian black opossums in the ranges behind Paraparaumu in 1892; and the Otago Society got twelve silver-grey opossums from Gippsland in 1895, and liberated them in the Catlin's district. They have increased greatly in most wooded parts of the Dominion.

The opossum is a marsupial—that is, its young are brought forth in a very rudimentary condition, and are carried by the mother in a special pouch, which is provided with teats. When newly born they are little blind (?), naked creatures, not half as long as one's little finger. The mother takes the little one in her lips and places it in the pouch with its mouth to a teat, and in this position it is carried for about four months. For the next two months it rides on the mother's back, until it is able to look after itself. It leaves its mother when about six months old, and is then nearly half-grown. The opossum has only one young one once

[*W. Beken, photo.*

FIG. 2.—THE COMMON OPOSSUM.

a year. (On the other hand, the true American opossum produces as many as a dozen at a time.) When fully grown the opossum is about 18 in. long. It has a thick, bushy tail, about 11 in. long, the end of which is blackish in colour. From this thick tail these animals are sometimes known in Australia as "brush-tailed opossums." The legs are short and strong, and each foot is furnished with five fingers or toes. The bodies are covered with close, thick, woolly fur. In the first-named species the upper part of the body is a grizzled-grey colour, with the chin blackish, a rusty patch on the chest, and the rest of the under-surface whitish or yellowish. In the sooty opossum the fur is of a dark brownish-black colour. Otherwise the two species are very like one another. The head is small and somewhat fox-like, with rather short ears.

These animals live in trees, taking shelter in holes during the day, and sometimes they make a kind of rough nest at the bottom of the hole. The trees which they frequent are often marked by the tracks scored on the trunk by the sharp claws of the animals as they climb. They ascend the trees in a succession of jerks or short jumps, stretching out their feet and claws as far as possible on each side, and rarely losing their hold. In descending a tree they always come down head first.

In Australia opossums feed on the leaves of various species of *Eucalyptus* (or gum) trees, taking to other food only when these are scarce owing to clearing of the bush. In New Zealand they feed on whatever the bush supplies them with, chiefly leaves and shoots. Mr. F. Hunt, of Round Hill, says of them, "The food the opossum lives on is chiefly leaves of broadleaf, kamahi, broad-gum (*Panax*), and mapau (*Pittosporum*), rata-blossoms, supplejack-berries, berries of fuchsia and makomako, and practically all the seeds and blossoms that grow in this part of the bush. The opossum is not a grass-eating animal. It will eat white or red clover, sweetbrier shoots and seeds, but if an opossum is caged and fed on grass it will die of starvation. Also, if it were fed on turnips it would take as much to feed twelve opossums as one sheep would eat. When I and my brother were catching opossums for the Southland Acclimatization Society we fed them on carrots, boiled wheat, bread, boiled tea-leaves with sugar, and anything sweet. The damage the opossums would do running at large would be very little, seeing that they never come on to open country. The animal is blamed for barking

apple-trees; but the opossum does not bark a tree. It might scratch the bark with its teeth, but it does not strip it off."

Colonel Boscawen, of Auckland, who is a most reliable authority, tells me that as long as there is plenty of green stuff available opossums do not interfere with fruit, but that the damage they are often charged with is the work of rats—presumably black rats. On the other hand, at Kawau, Motutapu, Hawera, and other places they are stated to be destructive in orchards, eating the shoots of apple and plum trees in the spring-time and the fruit in the autumn.

The number of opossums in this country now is enormous. In 1912 it was estimated that over sixty thousand skins were taken in the Catlin's district alone. Some acclimatization societies try to protect these animals, while fruitgrowers seek to destroy them. The law is rather complex on the subject, and few laymen know whether or not it is legal to destroy them. Meanwhile a large number are killed annually; but their skins are often declared as rabbit-skins, though, as a matter of fact, they are worth four or five times as much.

CHAPTER III.

UNGULATA—WILD PIGS.

Most people think they know all about pigs, and hardly associate them with wild life in New Zealand. They usually consider them the dirtiest creatures on earth, and yet, with remarkable inconsistency, they eat ham and bacon without inquiring too particularly how the animals producing them were reared or fed. The pig is naturally one of the cleanest animals and most particular feeders known, and it is only the filthy way in which most people keep them which is responsible for their popular reputation.

Pigs are the commonest of the larger mammals which have become feral in New Zealand, and are the most widespread. They are plentiful in wild bush country from the North Cape to the Bluff, and have also gone wild in the Chatham and Auckland Islands. I hope to be able to tell the majority of my readers some facts about these much-maligned animals which they did not know before.

Pigs (*Sus scrofa*) belong to the section of Ungulates known as the Artiodactyla, or even-toed. They walk on their third and fourth toes, which are the only ones to reach the ground; those on each side, which are much smaller and higher up, are the second and fifth digits; there is no trace of the first. Pigs are distinguished by several characters, of which the most outstanding are the bristly skin, the flexible snout tipped by a fleshy disk within which the nostrils open, the numerous teeth and tusk-like canines, while the teats extend along the underside of the body. They possess a single stomach, and are consequently non-ruminating animals. Pigs increase at a great rate, for they commence to bear young when about a year old, and bring forth several at a birth. Domestic pigs produce twelve, or even more, at a time; but wild pigs seldom have more than six or seven.

We have the most exact data as to their introduction into this country. Captain Cook informs us that while he was in Queen

Charlotte Sound in June, 1773, on his famous second voyage, "Captain Furneaux put on shore, in Cannibal Cove, a boar and two breeding-sows, so that we have reason to hope this country will, in time, be stocked with these animals, if they are not destroyed by the Natives before they become wild, for afterwards they will be in no danger."

Forster, in his journal, says, "They were turned into the woods to range at their own pleasure." In the following year (October, 1774) he says, "We took the opportunity to visit the innermost recesses of West Bay, in order to be convinced, if possible, whether there was any probability that the hogs brought thither about a year before would ever stock those wild woods with numerous breeds. We came to the spot where we had left them, but saw not the least vestiges of their having been on the beach, nor did it appear that any of the Natives had visited this remote place, from whence we had reason to hope that the animals had retreated into the thickest part of the woods." Most probably this is what happened, and these first pigs were probably the progenitors of many thousands.

On the 2nd November of the year 1773 Captain Cook gave a few pigs to some Natives who came off in their canoes near Cape Kidnappers. Thus pigs were first introduced into both the South and North Islands of New Zealand. I do not think there is much doubt that the wild pigs of the South Island—"Captain-Cookers," as they came to be called—were the progeny of those originally set free at Cannibal Cove, though Cook himself recorded in 1777, "I could get no intelligence about the fate of those I had left in West Bay and in Cannibal Cove, when I was here in the course of my last voyage." There is an earlier record of the introduction of pigs into the North Island, for in 1769 De Surville presented the chief of the Natives at Doubtless Bay with two little pigs, but there is no record as to what came of them.

The next introduction was apparently on the occasion of the visit of Captain King, Governor of New South Wales, to the Bay of Islands in 1793, when he gave the Natives two boars and ten young sows. Dieffenbach, who was in New Zealand in 1839, but who is not a reliable authority on any matters relating to Maori stories or traditions, gives a different version of this gift. He says, "Captain King, at the end of last century, landed at the north end of the island, and gave the Natives three pigs, which,

however, were mistaken by them for horses, they having some vague recollection of those which they had seen on board Captain Cook's vessels. They forthwith rode two of them to death, and the third was killed for having entered a burying-ground. A very old man who had known Captain King related this singular story to me." Dieffenbach's credulity seems to have been played on as regards the horses, whatever approximation to truth there is in the other part of the story; it is most improbable that any horses were on board any of Cook's ships.

The pigs introduced into the country in the early days were evidently of more than one kind. Mr. R. Scott, formerly M.P. for Central Otago, tells me that the wild pigs formerly so abundant in this district were "originally a variety of the Tamworth breed—long-snouted, razor-backed, built for speed rather than for fattening, quick and agile in movement. The predominating colour was red or sandy red, with some black, and a few black-and-white, but these may have come from an occasional tame boar which strayed and became wild. At the time when they were most numerous in Otago they were decidedly gregarious, usually three or four generations running together in mobs numbering from half a dozen up to forty or even fifty. When attacked by dogs, if cover, such as flax, scrub, or high grass, was handy, they made for it, and would form a circle, with the older pigs on the outer ring and the younger ones in the centre, for greater protection. The boars, particularly the old ones, lived alone, and roamed far and wide. The habits of the wild pig were clean." The late Mr. Robert Gillies wrote that "in 1848, the year of the settlement of Otago, wild pigs were very common on the site of Dunedin." In 1854 he and a party killed seventy pigs at the back of Flagstaff Hill in two days. "The long, pointed snout, long legs, and nondescript colours of the true wild pigs showed them to be quite a different breed from the settlers' imported pigs. Their flesh tasted quite different from pork, being more like venison than anything else."

The wild pigs of the North Island were a different race from the "Captain-Cookers," and were probably the progeny of animals imported at a later date. Dieffenbach says (in 1835), "The New Zealand pigs are a peculiar breed, with short heads and legs, and compact bodies."

The increase of the wild pigs in pre-settlement days was very remarkable. Nearly every sealing and whaling vessel which visited these Islands between 1800 and 1830 took away quantities of pork as part of the cargo to Sydney. Dr. Monro, who accompanied Mr. Tuckett on his trip through Otago in 1844, speaking of the hill country south-west of Saddle Hill, says, "There is a famous cover for pigs, too, between the upper part of the Teiari [Taieri] Valley and the sea. The whalers come up the river in their boats and kill great numbers of pigs here."

After settlement commenced and people started to cultivate certain areas and to run sheep, wild pigs came to be looked upon as animals to be killed out. Drummond tells us that "they multiplied astonishingly, and enormous numbers assembled in uninhabited valleys far from the settlements. At Wangapeka Valley, in the Nelson Province, Dr. Hochstetter in 1860 saw several miles ploughed up by pigs. Their extermination was sometimes contracted for by experienced hunters, and he states that three men in twenty months, on an area of 250,000 acres, killed no fewer than twenty-five thousand pigs, and pledged themselves to kill fifteen thousand more."

At the present time wild pigs are still common in nearly all scrub or thin bush country which is not too near settlement, and to those who like the element of danger in their hunting they afford good sport. They are usually pursued by dogs, often specially trained for the purpose, which after a time succeed in bailing up their prey. The pigs prefer to take their stand in the hollow of a tree or some such locality, and an old boar will often do considerable damage to the dogs before he is despatched. The orthodox manner is to run in and stab him; but a man without a gun has little chance if he ventures to close quarters with a bailed-up boar.

As to the food of the wild pigs, they root up the ground wherever the bracken fern (*Pteris aquilina* var. *esculenta*) is found, the starchy rhizomes furnishing abundant nutriment. They are also very fond of the thick rootstocks of spear-grasses (*Aciphylla*) and other umbelliferous plants, and have largely eaten out these plants over large areas. In the Chatham Islands they have been mainly responsible for exterminating the fine native forget-me-not, known as the Chatham Island lily. In the Auckland Islands they have destroyed great areas of *Bulbinella* and *Pleurophyllum*.

CHAPTER IV.

UNGULATA—DEER.

EXCLUSIVE of horses and pigs, all the other ungulates which have been introduced into New Zealand and have become established here belong to the group of ruminants, or ruminating animals. They are so called because they "ruminate"—that is, after the food has been rapidly swallowed it is forced back up the gullet and more thoroughly masticated. Belonging to this group we have to deal with deer, oxen, goats, and sheep. These animals agree in the following zoological characters: They have all two digits or toes on the feet, which are therefore popularly known as "cloven." They have no upper incisor teeth, and the canines in the upper jaw are frequently wanting. They are furnished with horns—a very special characteristic—sometimes only on the males, sometimes on both sexes. The stomach has four chambers. The first is the large paunch, or rumen, the organ which in cattle constitutes the well-known article of food termed "tripe." This opens into a smaller bag, the reticulum, or honeycomb bag, so called on account of the network arrangement of the folds or ridges of the mucous membrane which lines it. The reticulum opens into the psalterium, or "many-plies," a globular organ, the interior of which is filled with folds, or laminae, which are arranged like the leaves of a book, and very close together; hence both the technical and popular names. The fourth chamber is the abomasum, or reed, sometimes called the rennet-stomach. This is the stomach proper, in which the digestion of the food is carried on, and it is the part which when removed from calves is employed for the curdling of milk.

Deer are distinguished from all other ruminants by the presence of antlers, which in all our introduced forms occur in the males only. These antlers are very interesting organs. In the commencement of the spring a pair of knobs is to be seen upon the forehead of the adult male animal. This is covered with a nearly smooth dark skin, and a scar can be detected in the middle of each, which is that left by the antler of the year before when it

fell off. With advancing spring these knobs commence to grow, feel warm to the touch, and sprout out, as it were, round the scar. One branch takes a forward direction, whilst a second and larger one makes its way backward. These become in the fully-formed antler the brow-antler and the main beam. As long as the antler, which is composed of genuine bone of very dense texture, is increasing in size it is covered with the same warm, black skin as is the knob from which it sprang, and as this skin is covered with short, fine, close-set hair it has received the name of the "velvet." It is this velvet which secretes the bony texture of the antler from its inner surface; therefore any mishap to it injures the growth of the antler in the part affected. The animals, therefore, during the time they are "in velvet" are more than usually careful to protect their heads, and are inoffensive even to strangers. When the antlers have ceased to grow, the velvet dries up, and the deer rub their horns against any neighbouring trees and force them into the soft earth until the membrane is quite rubbed off. Up to this time they have lived a kind of solitary existence, but now they go forth in their full vigour, seek out their future mates, and fight any other stags which dare to dispute their ascendancy.

The desire to stock the mountain country of New Zealand with large game, so that the Briton's delight in going out to kill something might be satisfied, has led to the introduction of no fewer than nine kinds of deer, in addition to other large animals. Of these, four species—fallow deer, red deer, sambur deer, and white-tailed deer—have established themselves in different parts of the country, and are included among the animals to shoot which licenses are now issued. By law they are strictly preserved, but much poaching has always been and still is done. At the same time, it must be remembered that the poaching is chiefly done by two classes of people—namely, by residents in the neighbourhood of the districts where the game abound, and by mere pot-hunters. For the first class it may be said that many farmers, who take no special interest in acclimatization work or in so-called "sport," who were not consulted in any way on the subject, and who probably object to seeing the undesirable game laws of the Old Country being reintroduced here for the sake of a few wealthy people who are willing to pay a price for the privilege of killing deer, naturally resent the incursions of animals which ignore or break down their

fences, harass their stock, and eat their hay and turnips. Therefore some of this destruction of imported game takes the form of reprisals for injury done to crops, fences, and stock. There is practically little or no poaching, such as is characterized by the name in the Mother-country, done on the property of private individuals, and consequently destruction of game in New Zealand is not looked upon as a heinous offence, as were breaches of the iniquitous game laws of Britain in pre-war days. The game in New Zealand is the property either of the State or of the acclimatization societies, and public opinion on the subject of its destruction is lax in comparison with what it is in countries where game is looked upon as something reserved for and sacred to the sporting instincts of a small, self-constituted, and select class. Still, a very fair measure of protection is ensured to the animals, and they have increased in many districts where they have been liberated. It has been recognized, too, that a wealthy class of tourists can be induced to visit the country if, in addition to scenic attractions, there can be added those things which appeal to the sporting instincts of humanity. This has led the Government of the Dominion in recent years to devote some attention to the subject of introducing various additional kinds of big game to those already brought in by the acclimatization societies.

In addition to the four species already mentioned the following kinds of deer have been introduced into this country :—

Sir George Grey liberated a pair of wapiti (*Cervus canadensis*) in Kawau some time in the "seventies." The doe died, and the buck had to be killed, as he became dangerous. In 1905 the Tourist Department obtained eighteen of these fine deer, which were designated as "elk," from America. Ten of these were a present from President Roosevelt to the Government. These animals were liberated at the head of Nancy Sound, on the south-west coast of the South Island, and are now increasing in numbers.

In 1885 the Otago Acclimatization Society received three Japanese deer (*Cervus nika*) from Mr. J. Bathgate, and they were liberated on the Otekaike Estate, near Oamaru. Five years later they were reported as "doing well and growing into a nice little herd." In the report for 1892 it is stated that "little or nothing has been heard about these deer," and nothing has been reported since. Apparently they have all been destroyed.

In 1905 the Tourist Department obtained six of these deer, and liberated them on the Kaimanawa Ranges, near Taupo. I have heard nothing further about them.

In 1905 the Government purchased five black-tailed (or mule) deer (*Odocoileus hemionus*) in America, and liberated them at Tarawera. In 1915 the Hawke's Bay Society reported them as increasing.

In 1870 the Auckland Acclimatization Society received three South American deer (probably *Cariacus chilensis*) from Mr. W. A. Hunt, but there is no further record of them.

The first attempt to introduce moose, or true elk (*Alches machlis*), was made by the Government in 1900, when fourteen young ones were shipped on board the "Aorangi" at Vancouver. Owing, however, to the rough voyage, only four—two bulls and two cows, nine months old—arrived in New Zealand. They were liberated near Hokitika, but appear to have separated soon, as in 1903 one cow was in one district, another at the gorge of the Hokitika River, while nothing was known of the bulls. In 1913 the last-mentioned cow was "in splendid condition, and as tame as a kitten." The others seem to have disappeared.

In 1910 the Government obtained ten moose, and these were liberated on the shores of Dusky Sound. Two years later a mining party found traces of both old and young moose, and the latest reports show that the animals are increasing.

In 1867 the Otago Society imported seven axis deer, or chital (*Cervus axis*), which were liberated in the Goodwood bush, near Palmerston. In 1871 another stag was landed and added to the herd, which at that time numbered about thirty. Ten years later the Inspector reported that he had seen over forty. Then complaints began to come in from the settlers round about that the deer were a nuisance, and their numbers gradually diminished. Gradually they were killed off, and none have been seen thereabouts for the last twenty years.

In 1898 the Wellington Society received a pair of axis deer from the Zoological Society of Calcutta, and placed them on Kapiti Island, in Cook Strait. Four years later they had not increased, and I have not heard of them since. In 1907 the Tourist Department liberated five axis deer at Mount Tongariro, and in 1909 five in Dusky Sound. No reports have as yet been received regarding either of these latest experiments.

CHAPTER V.

UNGULATA—FALLOW, RED, AND SAMBUR DEER.

Fallow Deer (*Cervus dama*).

On account of its graceful form, beautiful colouring, and comparatively inoffensive manner, this is the favourite deer for parks and pleasure-grounds.

The fallow deer has palmated antlers—that is, they end in a broad expansion, which is divided into several points, and has been compared to a hand with its fingers. These antlers are not developed at all in the fawn; in the second season they are simple snags; in the third the two front branches develop; in the fourth the extremity of the beam begins to assume the palmated form; while the fully developed antler occurs only in the sixth year. It is thus possible to tell the age of a buck by its antlers, and the following terms have been used to distinguish the stags: Fawn, pricket, sorrel, soare, buck of the first lead, and buck complete. The antlers are usually cast about November, but I have no information as to the dates in the different districts, and whether the milder climate of the North Island causes any earlier development. By the middle of February the new horns are almost free from their velvet, and in about five months the antlers are complete. The breeding (rutting) season begins about the middle of April, when the bucks are occasionally heard to utter a sort of grunting bark. This is the only kind of sound uttered by these animals. A single fawn is born each year, usually in the month of December.

Fallow deer are gregarious animals, going about in herds, which consist of bucks by themselves, and of does and their fawns by themselves. These herds coalesce in February and March, and again—at least, in Britain—at the beginning of winter. Sir Harry Johnston suggests that this winter gathering into large herds is a relic of the days when they were forced to band together in large numbers to protect themselves from the attacks of wolves and other carnivorous beasts. It would be interesting to learn whether this habit of winter aggregation is kept up in New Zealand.

Fallow deer are of two main types. The first, which is rather larger than the second, becomes a light reddish-grey or reddish-brown in summer, spotted more or less brightly with white; the legs and belly being cream-colour or pale buff. There is generally a black line right down the centre of the back from the shoulder to the end of the tail; the lower side of the tail and the rump under it are white. In late autumn the fur changes in colour, the spots disappear, and the fur on the upper part of the body becomes a dark uniform brown. The buck of this variety stands about 36 in. high at the shoulder, sometimes a little more, while the does are somewhat less.

In Britain there is a smaller type which is entirely without spots, and which is not nearly as handsome as the other. I do not know whether any of this type were introduced into New Zealand. Most probably those brought here came from park herds, and these are often very brightly coloured and spotted. It would be interesting to learn what types we have in the country.

Fallow-deer venison is considered to be better and more juicy than that of the red deer. In my opinion, venison is not equal to mutton; but one has to bear in mind that when we eat venison we are usually eating the flesh of bucks, or male animals, while we do not eat the flesh of rams. If we did, and compared it with that of deer, we might find cause to reverse our judgment. It is interesting to note in old authors how greatly venison was esteemed, and it was mostly fallow-deer venison which is referred to.

The first introduction of fallow deer into New Zealand was in 1864, when the Nelson Acclimatization Society received three from England. All the early records of the Nelson Society are lost, so we do not know what came of this experiment. Perhaps, however, these animals were the originals of an old-established herd which exists in that district.

In 1867 the Otago Society introduced two deer, in 1869 twelve more, and in 1871 one. All these were liberated on the Blue Mountains, Tapanui, where they have increased to a vast extent, and now form one of the most important herds in the country. Licenses to shoot them have been issued for over twenty-five years.

In 1871 the Canterbury Society had four fallow deer in their gardens, but there is no record now obtainable as to where they came from, nor definitely as to what was done with them. In later

years, however, some were running on the Culverden Estate, and two more deer—obtained from Tasmania—were added to them. This herd did not increase, and apparently they have all been destroyed since.

The Hon. S. Thorne George, who lived on Kawau from 1869 to 1884, told me that the first fallow deer in the colony were introduced there by his uncle, Sir George Grey, but he could not give the exact date of their introduction. However, in 1876 the Auckland Society received twenty-eight deer from London, and, of these, eighteen were liberated on the Maungakawa Range, Waikato, while ten were sent down to Wanganui. The former herd has increased very largely, and is noted for the fine heads of the stags, due, no doubt, to the abundance of food and the favourable climatic conditions. The Wanganui herd is now also a large one. On Motutapu, in the Hauraki Gulf, there is a very large herd, which numbered over a thousand some three years ago. These may either be descended from animals got from Kawau, or were originally obtained from the Waikato herd. Smaller and more recently established herds occur near Timaru, Hokitika, and Lake Wakatipu; so it is seen that this species is widely spread throughout New Zealand.

Red Deer (*Cervus elaphus*).

This handsome animal is found now in many parts of New Zealand, forming great herds, some of which number many thousand individuals. The red-deer stag is a lordly creature in summer, standing over 4 ft. high at the shoulder, with a thickly coated neck of greyish tint, a rich red-brown body-colour, uniformly curved, symmetrical antlers, and a head held high. In winter the coat is longer and of a greyish tint. The new-born calves are brilliantly spotted with white, a character which this species shares with many other kinds of deer. In some species, as in the axis and fallow deer, the spots are retained in the adults, while in the majority they are lost as the animals come to maturity. The inference is that the progenitors of all these deer were spotted animals; but this character has been lost in the course of time by several species, though still retained in the young. The same thing is seen among horses, newly-born foals often showing the characteristic bars on the shoulders which are still found among certain wild races of horses in the adult animals.

The antlers of the red deer are very complex. "In the spring of the year following its birth the antlers are nothing more than straight, conical, and unbranched 'beams,' the animal being then known as a 'brocket.' In the following spring the antler has, besides the 'beam,' a small branch from its base, directed forwards, known as the 'brow antler'; it is then termed 'spayad.' In the third year an extra front branch is formed, known as the 'tres,' and the whole antler is larger. This 'tres' is sometimes seen in the smaller antler of the 'spayad.' In the fourth year the

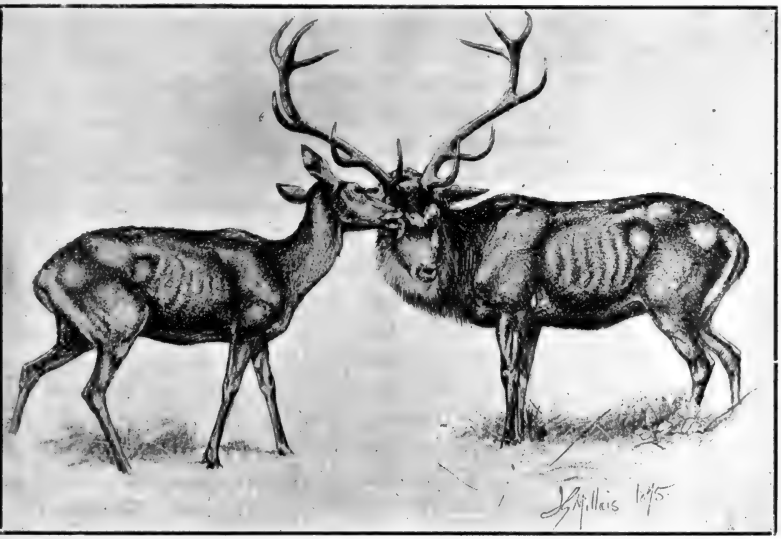


FIG. 3.—RED DEER (AFTER LYDEKKER).

'brow-antler' is doubled, to form the 'brow' and 'bez-tine,' at the same time that the top of the main beam divides into the 'sur-royals' of the 'staggard,' or four-year male. In the fifth year the 'sur-royals' become more numerous, the whole antler of the 'stag' being heavier than previously, only to be exceeded in weight by those of the fully adult 'great hart,' with ten or more points, each being larger and longer than the year before. In Britain the conditions of life and food are not of the quality which develops first-rate antlers; at the same time it is—in Scotland, at least—the habit to shoot those with the finest heads, and so leave the

indifferent specimens to perpetuate the species. In some of the ancient forests of Germany superb herds of the red deer were to ancient forests of Germany superb herds of the red deer were to be obtained [this was before the war, of course], whilst in several of the old castles of that country antler trophies are preserved as memorials of sport in times gone by with as many as six-and-sixty points."

It is clear that there are several distinct strains of red deer in the country, recognized chiefly by the form and growth of the antlers, which are usually what sportsmen look to. This mixing of breeds probably tends to the production of a strong race, and the efforts of the main acclimatization societies are directed—often, it must be admitted, rather blindly—to the elimination of defective deer. In the case of some of the large herds attempts are frequently made to thin out all weeds and deer with malformed antlers. According to Mr. Hardcastle, the majority of malformations occur in the skull and not merely in the horns, the horn-pedicle being often misplaced. In Otago these malforms are most common in open tussock land or open birch bush; they are not met with, as a rule, in rugged gorges or in rough and dense bush country. Perhaps malformation is due to want of nourishment at some period of growth, but there is no definite information on the point, nor is it known whether the trouble is hereditary or not.

The pairing season in New Zealand is in March or April, and at that time the stags are dangerous creatures. They drop their antlers usually about September, the youngest being the latest to do so. The fawns are born in November or December, and the animals continue to increase in bulk and strength till they are about twelve years old. They probably do not live more than twenty years, "though superstition credits them with very many more."

Wherever they are abundant red deer live mostly on certain trees and shrubs, and eat grass only when other food is not obtainable. In the North Island it is stated that fuchsia is the principal food in spring and autumn, but that in winter they take to *Veronica salicifolia* (koromiko) and other shrubs. Probably they eat the majority of the native shrubs. In the South Island forests the following trees are mostly eaten: Broadleaf, species of *Panax*, *Nothopanax*, *Coprosma*, ribbonwood, pepper-tree, milk-tree, and tutu.* But when these are scarce they will eat almost any

* NOTE.—Tutu is not poisonous, but rather fattening, when animals become slowly accustomed to its use.

shrub. They will not eat birch or beech (*Nothofagus*), nor celery-pine (*Phyllocladus*), till other food is exhausted.

The first specimens appear to have been brought—a pair of them—to Nelson in 1851; but the doe was killed soon after, and the buck, after remaining about Motueka for ten years, joined a lot then introduced. In 1861 a stag and two hinds, presented by Lord Petre from his park in Essex, England, were landed in Nelson. The progeny of these animals increased, and rapidly spread themselves over a great part of the high country in the provincial districts of Nelson and Marlborough. Of late years they have farther spread into North Canterbury and over towards the West Coast. Mr. Hardcastle, who in 1906 wrote a report on the red-deer herds in the country, says, "The heads obtained in Nelson are of a good colour and fairly massive, but compared with those of Wairarapa and Hawea they have not the same average of span or spread. Lord Petre's herd had had no new blood introduced into it for many years, so that a particular type of antler had been fixed from which there is no throwing back." According to Mr. Hardcastle, the type of head of the first imported stag continues to persist, and dominates all the deer of the Nelson herd. (In 1900 a herd, descended from Nelson deer, was started in the Lillburn Valley, west of the Waiau River, in Southland.)

In 1862 a stag and two hinds, presented by the late Prince Consort to Governor Weld, were handed over by him to Dr. Featherston, then Superintendent of the Wellington Province, and were liberated on the property of Mr. Carter, East Taratahi, Wairarapa. They did not stay there long, however, but crossed into the Maungaraki Range, where they rapidly increased. Mr. Hardcastle reported in 1906, "The Wairarapa forest is probably the best-stocked red-deer ground on the globe. On Te Awaite Run, bordering on the east coast, the deer may now be seen in bunches of up to one hundred head. At the beginning of last year it was estimated that there were fully ten thousand head on the station. According to information given in *The Field* of the 15th September, 1906, the Windsor Park herd, from which the original stock came, has been replenished from English, Scottish, German, and probably Danish stock. The result has produced in the Wairarapa herd stags that are remarkable for their massive antlers, some of which are of the German type, and others again more resembling the

Scottish form. The antlers do not grow to great length, but some are very wide in spread, and there is a great proportion of 'Imperials,' the most number of points recorded being twenty-two. The stags mature their antlers early. A number of heads have been shot on Te Awaite Station showing the abnormal development of the back tines, such as is seen to be the case in the great Warnham Park stags in England, and which is probably due to the highly favourable conditions of climate, food, and shelter."

In 1871 the Otago Acclimatization Society imported fifteen red deer, some of which were sent to the care of Mr. Rich, of Bushy Park, Palmerston; while seven were liberated on the Morven Hills Run, east of Lake Hawea. Those at Bushy Park spread over into the Horse Range; but they did not succeed, and no definite explanation of the failure has been given. Probably the country was not high and wild enough: on one side they were encroaching all the time on well-stocked sheep-country, and on the other on old-settled farm land; besides which there were many old diggers still about the neighbourhood. From one cause or another they did not succeed. The Otago Acclimatization Society reported them as quite extinct in 1892, but Mr. Hardcastle, writing in 1918, says they are still to be found on the Horse Range.

The deer liberated at Morven Hills were from the estates of the Earl of Dalhousie, in Forfarshire, Scotland. They are the only lot of pure Scottish-bred deer in this country. In their new home in the New Zealand mountains they multiplied at a great rate, and have in these forty-odd years spread over the country between Lakes Wanaka, Hawea, and Ohau. They have worked their way up the Hunter and Makarora Rivers, across the Haast Pass into south Westland, and right up to the neighbourhood of Mount Cook. The most of this country runs from 3,000 ft. to 7,000 ft. in height, and much of it is very steep, rugged, and inaccessible. But it contains much bush in the valleys and gullies, and the open country is well grassed in summer. Hardcastle says, "The North Otago stags maintain the true Scottish type of antler, but they grow to much greater length than the antlers of any stags that have been shot in the British Isles. The antlers are also remarkable for their symmetry and perfection in the development of the tines, and particularly the lower tines. Some magnificent heads have been got, including a seventeen- and an eighteen-pointer,

and two royals, each 46 in. in length of antlers; more recently a head 49 in. in length with a spread of 50½ in., and either one or two with twenty points, have been obtained. The coats of the stags are generally shaggy, owing, no doubt, to the severe climate in winter."

In 1895 the Otago Society obtained two fine stags from the Hunt Club, Melbourne, to add to the North Otago herd; but I do not know what special strain these belonged to. Again, in 1913, the society imported a stag and six hinds from Warnham Park, England, the object in both cases being to introduce new blood into the herds.

In 1897 the Canterbury Acclimatization Society imported nine red deer from the Warnham Park herd, and liberated them in the gorge of the Rakaia River. They have increased rapidly since, herds of forty and more having been seen from time to time. Some of the heaviest heads secured in New Zealand have been got from this herd. The record length head from this herd is 48½ in.; the record spread is 46¾ in.; and the record points twenty-four. The heaviest heads shot in New Zealand have been obtained in the Rakaia Gorge herd, a number of dry skulls and horns from thence weighing from 22 lb. to 23¾ lb. Mr. Hardcastle, my informant, states that he does not think more than an odd head going as much as 20 lb. has been shot in any other herd in New Zealand.

More recent importations have been as follows: In 1903 either seven or eight fawns from Victoria, presented by Miss Audrey Chirnside, of Werribee Park, were liberated at Mount Tuhua, in Westland. In 1906 four more from the same source were added to this herd; and eight were liberated at Lake Kanieri. In 1903 the Tourist Department obtained eight deer from the Duke of Bedford, and liberated them at Lake Wakatipu. In 1908 four were obtained from Warnham Park, Sussex, England, and were liberated at Paraparaumu. In 1909 three were liberated at Dusky Sound.

The original importations of red deer account for the vast numbers of these animals which are now to be met with in so many mountainous parts of both Islands, for many of the acclimatization societies, as well as the Tourist Department, have obtained deer from one or other of these original herds, and have started new herds in other districts—for example, in the country

round Taupo and Rotorua, the West Coast Sounds of the South Island, and Stewart Island—and these are all increasing. In regard to the last-mentioned locality, a conflict has now arisen between the would-be sportsmen of the Southland Acclimatization Society and those who desire to see the rare native bird fauna of Stewart Island preserved. It is to be hoped that no shooting of game will be allowed in the island.

Sambur Deer, or Sambar (*Cervus unicolor*).

This is a handsome deer from the hill-country of India. The stag stands about 5 ft. high, is of a deep-brown colour, with the hair of the neck developed almost into a mane. It is massively built, and carries great antlers over 3 ft. in length, and presenting three powerful points. Above the considerable brow-tine the beam bifurcates high up into two fairly equal snags, and no more, in well-grown antlers. The hind is much less massive, and of a yellowish tint. Captain Kinloch says of the species that "Sambur delights in stony hills where there is plenty of cover, and where they can have easy access to water. They browse more than graze, and are nearly nocturnal in their habits. During the daytime they seek the most shady retreats, and old stags especially are most difficult to find, frequently betaking themselves to almost inaccessible places, where the uninitiated would never dream of looking for them."

The introduction of sambur into New Zealand is difficult to trace. In 1875 the Auckland Acclimatization Society received a buck from a Mr. Larkworthy, and in the following year a doe, but there is no further mention of these deer in the society's reports. However, in the annual report of the Wellington Society for 1894 the following statement occurs: "The Ceylon elk (sambur deer) imported into the Carnarvon district, Manawatu, by Mr. Larkworthy have been brought under the provisions of the Animals Protection Act, and are at present under the control of the society. It has been reported that the herd now numbers about thirty." There is no previous record of these deer in the Wellington Society's reports. In 1900 the herd is reported to number about a hundred, "but there is good reason to think that they are really more numerous. . . . A pair of antlers was found on the

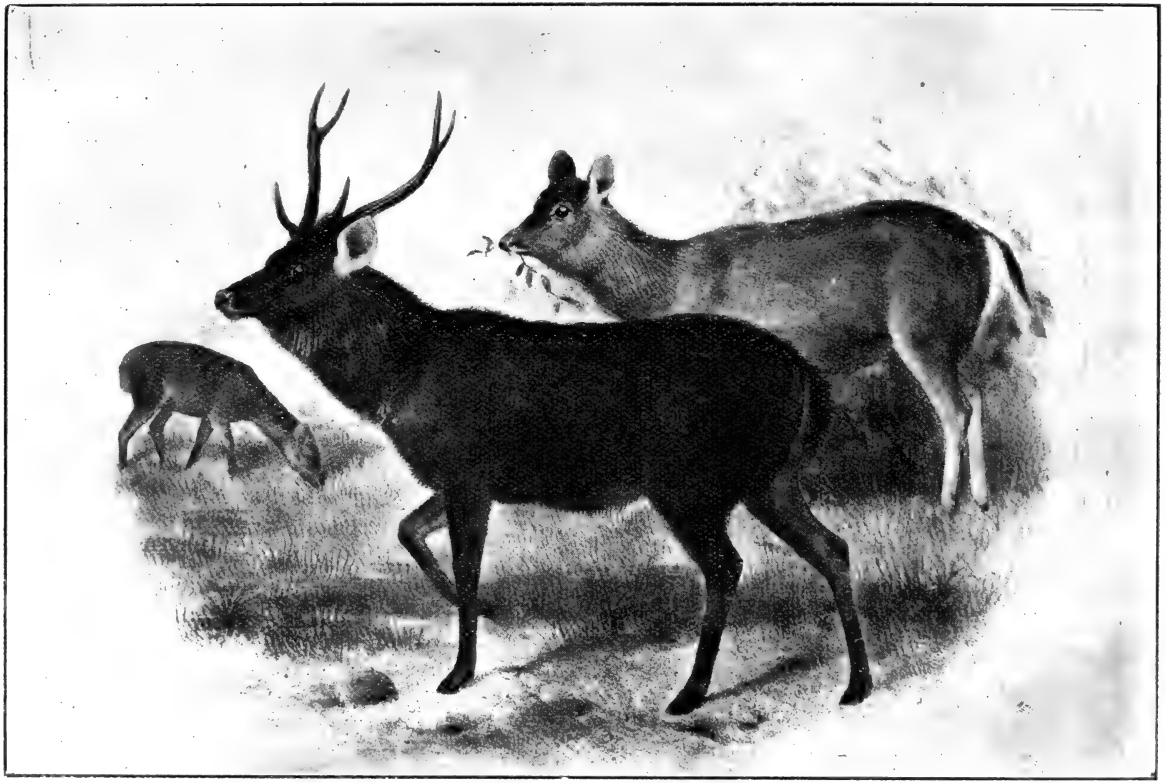


FIG. 4.—SAMBUR DEER (AFTER LYDEKKER).

hills near Cambridge, and two deer were shot there," some two hundred miles from Carnarvon. In 1906 stag-shooting was opened for the first time in the Marton district (Rangitikei), but there were numerous complaints about poaching. The herd seems now to be a fairly large one, but the local Rangers complain of indiscriminate destruction of deer in season and out of season.

In 1907 the Tourist Department imported two sambur deer from Noumea, and liberated them in the Rotorua district, adding to them some others secured in the Manawatu, so as to form the nucleus of a new herd.

Virginian or White-tailed Deer (*Cariacus virginianus*).

In 1905 the Tourist Department imported eighteen white-tailed deer from America, and liberated nine of them at Port Pegasus, in Stewart Island, and nine in the Rees Valley, Lake Wakatipu. The former location should not have been chosen, for Stewart Island was long ago proclaimed a sanctuary for native birds, and its selection illustrates the haphazard way in which acclimatization work has been carried on in this country. The introduction and the location were both apparently the choice of Mr. Donne, of the Tourist Department, who is now in London. These deer have increased to such an extent that in October, 1919, regulations for shooting them were gazetted, which means that the island will cease to be a sanctuary. The white-tailed deer is about 3 ft. high. The upper part of the body is a bright chestnut colour in summer, changing to a yellowish speckled grey in winter, and with black markings on the face and tail. The distinctive feature, from which the popular name is derived, is the white colour of the underside of the tail. The antlers are rather large, up to 14 in. or more between the tips, and have as many as eighteen points in the largest specimens. I do not know whether they are very numerous in Port Pegasus, while there is no information available about the herd in the Lake Wakatipu region.

FIG. 5.—VIRGINIAN OR WHITE-TAILED DEER (AFTER LYDEKKER)

CHAPTER VI.

UNGULATA—WILD CATTLE, SHEEP, AND GOATS.

Wild Cattle.

The animals which form the group called the Bovidae (from the Latin *bos*, an ox), including cattle, sheep, goats, and their allies, differ in several respects from Cervidae, or deer. One of the most important differences is the structure of the horns. Those of the Bovidae are hollow and permanent, while the antlers of deer are made of solid bone and are deciduous, being renewed each year.

The wild cattle of New Zealand are (like the wild pigs) only domesticated animals which have been running in unfenced country for several generations back. They are not nearly so abundant to-day as they were forty or fifty years ago. In these earlier days most of the cattle on the larger runs—to whatever breed they belonged—were more or less wild. They became greatly excited when they saw a man on foot, for they were mostly accustomed to men on horseback, to whom they gave only a passing notice. When mobs of such half-wild cattle were to be yarded, either for branding of calves or for drafting, they were handled pretty roughly. On enclosed roads they were dangerous, and even in open country the presence of people on foot scared and often scattered them. It is no wonder that when such cattle got into wild country where they were undisturbed and never saw human beings they and their progeny quickly became quite wild. When I first came to Southland, about fifty years ago, we were bothered a good deal by wild cattle. They found shelter during severe winter weather in the extensive bush country which formed such a feature of Southland in those days, and they used to come into our paddocks overnight. Fences and ditches never troubled them: they hopped over them as if they were non-existent. In the open country it was impossible to approach them on foot, while even on horseback one had to make a wide circuit to get within range of them. The gradual

settlement and enclosure of the land displaced them in time, and they are now found chiefly in distant and seldom-visited parts.

It is difficult to find exact records of the introduction of cattle into New Zealand. They were no doubt brought over by the missionaries, and also by the whalers who settled along the coast. Thus in 1833 John Bell set out from Sydney for Mana Island, in Cook Strait, with ten head of cattle and 102 sheep. Apart from a reference in Marsden's journal to the landing of some cattle, this is the first record I can find since the days of Cook and Vancouver. In 1839 E. J. Wakefield saw wild cattle on the hills at the entrance of Pelorus Sound. In 1840 he states that they were abundant on Kapiti, and says that they were the descendants of some which were given to the Natives in exchange for flax. The Hon. S. Thorne George, writing to me four years ago, said, "When I first went to Kawau, in 1869, there was a large number of wild cattle. The island was originally occupied as a cattle-station, but owing to the rough country and heavy bush very many were lost and became quite wild." Mr. A. C. Yarborough, of Kohukohu, informs me that forty years ago wild cattle were very numerous in all the bush country, and in those days Hokianga and the large areas of the west coast of the Island north of Auckland were nearly all covered with bush. The Natives used to kill them in large quantities for the sake of their hides, which were valued at 6s. to 12s. each. In later years these wild cattle have been driven farther and farther back, until they are now found only in the ranges distant from settlement. These cattle are merely the descendants of tame ones which have wandered, the Maoris' fences being usually of a defective character.

The wild cattle of these early days were an extremely mixed lot, and it is hard to say to what breed they were most nearly allied. Shorthorns, Ayrshire, and Polled Angus were commonly mixed in the South Island, but all sorts of strains were represented.

Mr. B. C. Aston, who crossed over part of the Wellington district in 1914 and 1915, says, "Wild cattle are abundant in unfrequented valleys and gorges of the Tararua Range. They are apparently Hereford cattle gone wild. They eat out many species of native plants, and have destroyed great numbers of *Ligusticum dissectum*, which is one of the most abundant and characteristic plants of the higher ground." He adds that cattle are particularly

fond of certain native trees and shrubs, such as hinahina, karamu, broadleaf, mangrove, tawa, and karaka. I myself noticed in Ulva, in Paterson Inlet, forty years ago, that the only winter food for the cows was hinahina and similar small trees, which had to be cut down for them. My son Stuart informs me that wild cattle are found in the high country between Lake Wakatipu and the west coast of the South Island; their tracks are numerous, for example, in the valley of the Rockburn.

In 1841 cattle were first introduced into the Chatham Islands. Many of them soon became wild, and used to be trapped by the Natives in the early "sixties." Wild cattle are now very numerous in the central tableland.

In 1850 cattle were landed on the Auckland Islands, but they were all killed off by sealers. In 1894 cattle were landed from the "Hinemoa" at Enderby and Rose Islands for the use of shipwrecked mariners who were unfortunate enough to be cast ashore on these inhospitable shores. Dr. Cockayne tells me that in 1903 there were about fifteen and ten head respectively on these two islands, and Mr. B. C. Aston adds that on Enderby Island they have exterminated the huge tussocks of *Poa litorosa*.

Wild Sheep.

The first attempt to introduce sheep into New Zealand was made by Captain Cook during his second voyage to this country. It was unsuccessful, but the record is interesting. He brought away two rams and four ewes from the Cape of Good Hope, but by the time the "Resolution" entered Dusky Sound in March, 1773, only a ram and a ewe survived, and they were in such a bad state, "suffering from an inveterate sea-scurvy," that their teeth were loose, and they could not eat the green food which was given to them. Forster in his journal states that they "were in so wretched a condition that their further preservation was very doubtful." However, they must have improved, for, considering the country about Dusky Sound too rough and forest-clad for them, Cook took them on to Queen Charlotte Sound, which was entered on the 18th May. In his journal he says, "On the 22nd, in the morning, the ewe and ram I had with so much care and trouble brought to this place were both found dead, occasioned, as was supposed,

by eating some poisonous plant. Thus my hopes of stocking this country with a breed of sheep were blasted in a moment." Most probably they had eaten tutu, which is common in the Marlborough Sounds district.

I cannot find when sheep were next brought into New Zealand, but as soon as settlement began they were freely imported from New South Wales. In those early days fences were very rough, and little or no attempt was made to keep sheep within enclosures. They were therefore allowed to roam freely over the open country, and were mustered at only rare intervals for shearing, tailing the lambs, culling, &c. It was inevitable, therefore, that numbers escaped the musterers, especially in high and inaccessible country, and that thus wild sheep became very common in the mountainous districts of the South Island.

Wild sheep are still abundant in some of the wilder parts of the country, and are especially numerous in the high limestone country of Marlborough. Much of this country is a *terra incognita*, for it is most inaccessible, except in certain rare states of the river-gorges, and very few people know anything about it. Mr. Aston, who recently visited this region on a botanical quest, says, "On the north-west side of Isolated Hill is a gently sloping tussock-land, stretching down towards the Ure River, on which are hundreds of wild sheep in small flocks of about half a dozen in each. All—rams, ewes, and particularly the lambs—are, as far as we could see, in excellent condition. Some were curiously marked and coloured. One had a brown body, black legs and face, and white forehead. The rams had large horns, and all were tamer than ordinary domestic sheep. Their food appears to consist of the silver-tussock (*Poa caespitosa*)—which was well eaten down—spear-grass, and several other native plants and shrubs." In another part of his account he adds, "These sheep destroy the mountain-ribbonwood trees (*Gaya Lyallii*) by eating the bark, which we watched one stripping off in large sheets."

In the district of Strath Taieri, in Otago, some forty years ago certain sheep on one of the runs—probably the progeny of a single ram—were found to be evidently short-winded. Apparently the action of the heart was defective, for when these sheep were driven they would run with the rest of the flock for a short distance, and then lie down panting. The result of this peculiar affection was

that at nearly every mustering these short-winded sheep used to be left behind, being unable to be driven with the rest. Sometimes they were brought on more slowly afterwards, but if it happened to be shearing-time they were simply caught and shorn where they lay. As a result of this peculiar condition a form of artificial selection was set up, the vigorous, active sheep being constantly drafted away for sale, &c., while this defective strain increased with great rapidity throughout the district, for whenever the mobs were mustered for the market, shearing, or drafting, these "cranky sheep," as they came to be called, were left behind.

This defective character appeared in every succeeding generation, and seemed to increase in force, reminding one of the Ancon sheep referred to by Darwin. At first, of course, the character was not recognized as hereditary, but as the numbers of this "cranky" breed increased to a very great extent, and spread over the district, it came at last to be recognized as a local variety. When the runs on which these sheep were abundant were cut up and sold, or released in smaller areas, the purchasers found it necessary, for the protection of their own interests, to exterminate the variety, of which hundreds were found straggling over the country. This was easily and effectively done in the following manner: As soon as a sheep of this variety was observed it was pursued, but after running for a couple of hundred yards at a great rate of speed it would drop down panting behind a big stone or other shelter, and seemed incapable for a time of rising and renewing its flight. It was immediately destroyed, and in this manner a useless—but to the naturalist a very interesting—variety was eliminated.

Sheep were introduced into the Chatham Islands in the early "forties," but as late as 1855 there were only about two hundred of them. When sheep-stations were organized in 1866 there were about two thousand on the island, and by 1900 they had increased to about sixty thousand, and by this time a great many had become wild. Dr. Cockayne says they have profoundly altered the native vegetation by eating out many characteristic species of plants, such as *Myosotidium nobile*, *Aciphylla Traversii*, *Veronica Dieffenbachii*, and allied species, all of which they eat greedily.

On the Auckland Islands sheep have been liberated at various times since 1890, and on the Antipodes between 1886 and 1900, for the benefit of shipwrecked mariners, but they either died off

or were killed by castaways. They were also liberated on Campbell Island between 1888 and 1890. In 1896 the island was taken up as a sheep-run—a piece of vandalism on the part of the men who did it and the Government which granted it—and in 1903 there were about 4,500 sheep on it. The changes produced in the vegetation have been described and discussed at length by Dr. Cockayne. In 1907, according to Mr. R. M. Laing, there were some eight thousand sheep on the island, and the transformation and destruction of the native flora was going on at a great rate.

Wild Goats.

The introduction of goats dates from Captain Cook's second voyage. He says in his journal, "On June 2, 1773, I sent on shore on the east side of the sound [Queen Charlotte Sound] two goats, male and female. The former was something more than a year old, but the latter was much older. She had two fine kids some time before we arrived in Dusky Bay, which were killed by cold." Forster in his journal says they were left by Captain Furneaux in an unfrequented part of East Bay, "this place being fixed on in hopes that they would there remain unmolested by the Natives, who, indeed, were the only enemies they had to fear."

On the third voyage the "Resolution" was in Queen Charlotte Sound from the 12th to the 25th February, 1777, and Captain Cook says, "I gave Matahouah two goats (a male and a female with kid) and to Tomatongeauooranuc two pigs (a boar and a sow). They made me a promise not to kill them, though I must own I put no great faith in this. The animals which Captain Furneaux sent on shore here, and which soon after fell into the hands of the Natives, I was now told were all dead."

It is popularly believed that the wild goats of New Zealand are descended from those introduced by Captain Cook; but while this may be partly true of those in the South Island, especially at its northern end, it can hardly explain those found in the North Island. It is more likely that they are descended from escaped animals. Mr. F. G. Gibbs tells me that goats were imported into Nelson some time in the "forties." "In the 'fifties' a large number were kept tethered on some hills in the Maitai Valley, still

called the Goat Hills. Some of these goats escaped into the back country, and were the progenitors of the wild goats."

Wild goats are very abundant in many parts of New Zealand. Great numbers of them are to be met with in the rocky and precipitous country west of Palliser Bay, near Wellington. Except when they move they are difficult to see, as their colours blend almost undistinguishably with that of their natural surroundings. They were abundant also on Kapiti Island, but have recently been greatly reduced in number by the caretaker, who has shot several thousands. They also occur, though not so commonly, on the sparsely scrub-clad faces of the west coast north and south of Hokianga, as well as on the outskirts of bush land. In the high country of Marlborough they are very abundant, and are mainly of three colours—black (which is, perhaps, the commonest), khaki, and white. In a trip through the cañon of the Ure River Mr. B. C. Aston says, "The fusillades of stones showered down on us by the goats which we had disturbed were a source of ever-present danger." Mr. W. R. Bullen, of Kaikoura, informs me that they are numerous on his run, but, while they eat very much the same food as the sheep do, they keep the scrub and bush open, so that the sheep can move through it.

Writing of things in the Lake Wakatipu district, Mr. L. Hotop, of Queenstown, tells me that there is an immense number of wild goats spread all over the Lakes district—a moderate estimate gives them as many as thirty thousand. "They are principally at Moonlight, Skipper's, Sandhills, and at the lower end of the lake, seriously interfering with the pasturage in these localities; one runholder has paid year after year for as many as one thousand during the season. At Moonlight a digger, during the past nine months [in 1916], has shot 550. My informant tells me he was offered 2s. 3d. a skin for as many as he could send."

Mr. W. H. Gates, of Skipper's, writing in 1916, said, "There are a lot of wild goats here, almost within rifle-range of my cabin. One sheep-farmer gave 1s. for each pair of ears, and 1s. for each pelt. The male is a rough-looking customer; some have horns 15 in. in length and $2\frac{1}{2}$ in. by $1\frac{3}{4}$ in. at the root, and they grow in a slightly spiral form. I think there is a strain of many breeds running through them all. Some have long hair, but are not the Angora breed. Some are almost white, but the chief colours are

black-and-white or black-and-tan. I have noticed here (and also on the west coast) that the female has her young in the winter, when food is not plentiful. Why this is so I never could understand."

Goats are still found wild on the Galloway Station, Central Otago, though not so abundantly as in former years. They live in the high country, and do not come down to the settlements. Mr. A. Gunn, who managed this large run for many years, tells me that they are of great use to sheep-farmers, as they keep down the "lawyers" (*Rubus australis*), and thus save the sheep from being entangled. In shooting them, if the wind is coming from their direction, you can smell them before you see them; and a billygoat is always found standing on guard while they are feeding. While they are of many colours, black-and-white is the commonest, though brownish-red, grey, and even occasionally a white one is found. They live in the roughest places they can find.

Goats are also found in considerable numbers round the south-east corner of the South Island, but whether they have escaped from the settlements about Preservation Inlet or have worked overland from Southland it is not possible to say with certainty. Probably the former is the explanation of their occurrence from Puysegur Point inland.

The attempts made from time to time to acclimatize goats on the outlying Southern Islands are of interest. Captain Enderby landed some on Enderby Island in 1850, and Captain Norman landed them on both the Auckland and Enderby Islands in 1865, but none appear to have survived. Dr. Cockayne says, "Two or three were landed on Ewing Island in 1895, but none have been seen recently. On Ocean Island, a very small islet in the Auckland Group, goats are numerous at the present time, but I have no details as to how they got there." Captain Bollons, of the "Hinemoa," writing me in February, 1916, speaks also of the last-named island, and adds, "Goats have been sent down from time to time to the Auckland Islands since 1890, most of which have either died or been killed off for food by castaways. At the Snares they were liberated about 1889, but soon died off. At Campbell Island some were landed in 1883 and 1890, and several were alive when the main island was taken up for a sheep-run in 1896. At the Antipodes several were liberated between 1886 and 1900, but were either used for food by the castaways or died off."

Other Species of Bovidae.

The Tourist Department has in recent years introduced various species of large game into New Zealand. Thus a small number of thar, or Himalayan goats (*Capra jemlaica*), are now running wild on the Sealey Range, near Mount Cook. Apparently they are increasing rapidly.

Chamois are also increasing in the neighbourhood of Mount Cook. The first were introduced in 1907, when eight were received as a present from the late Emperor of Austria. By latest accounts there is now a considerable flock in that mountain region.

CHAPTER VII.

CETACEA—WHALES, DOLPHINS, AND PORPOISES.

How little any of us in New Zealand know about the monsters of the deep which are to be met with in the seas round our coasts! I seldom meet with any one who knows anything about them, or who can furnish me with anything beyond the merest shreds of information. I myself have seen a few whales and dolphins, and numerous porpoises; and this is the experience of all who travel by sea and care to observe its wonders. But such observers are few. Most of those whose business takes them on the great waters are concerned with other things than the animal life which the sea contains; and even fishermen, whose occupation takes them out constantly among this animal life, can give little information which is of the slightest value on anything but fishes.

Whales and their allies are not fishes, but are warm-blooded mammals, which suckle their young, and which breathe air—not dissolved oxygen, as fishes do. They constitute the order Cetacea. Twenty or more species are met with in New Zealand seas. Of these many are most imperfectly known, and several are only recognized by their bones.

Zoologically cetaceans are fish-like mammals, which have the tail expanded into horizontal flukes, the anterior limbs converted into fin-like paddles, and the posterior limbs represented by some rudimentary bones. Their bodies are nearly quite destitute of hair, and, as they have to breathe air, their nostrils are represented by a single or double blowhole, which is nearly always situated far back upon the skull. Some of the order have simple conical teeth; others have the jaws furnished with plates of baleen, or whalebone.

Whales include the largest of all vertebrate animals, but their reputed measurements, like those of many fish, have to be received with a grain of salt. The largest whales are the Rorquals, and perhaps 85 ft. is about the maximum recorded length. Compare

that with the biggest dray-horse or the prize fat bullock at a show, and then try to realize what a huge bulk it is.

The whalebone-whales are well represented in New Zealand waters, though individuals are now rare compared with their relative abundance a century ago. A Norwegian company which started operations on a large scale in the North Island a few years ago abandoned the enterprise after trying it for a year or two. There was not enough money in it. Yet whalebone is enormously valuable—it was worth £2,000 a ton twenty years ago, and, in spite of numerous substitutes, it still keeps its place.

The Fin-back, or Rorqual (*Balaenoptera musculus*), runs up to 70 ft. in length, and yet its food seems to consist chiefly of small pelagic crustaceans belonging to the Copepoda. These little creatures, which can be taken by a fine-mesh surface net at all seasons of the year, vary from one-tenth to one-fortieth of an inch in length. It would be a somewhat difficult calculation to find how many of these little creatures would be required to assuage the appetite of a hungry whale. The whale has about 330 baleen plates on each side of its jaw, and these act as strainers to catch the little crustaceans. The production and destruction of inconceivable myriads of organisms are among the extraordinary and awe-inspiring phenomena of the sea.

Two other species of *Balaenoptera* are the Blue Whale (*B. sibbaldii*), which has been taken 85 ft. in length—the giant of its race—and the Pike Whale (*B. rostrata*), which seldom exceeds 30 ft.

The Humpback Whale (*Megaptera lalandii*) is so called because it has a lowish hump on its back, which represents the dorsal fin. Its maximum length is probably 60 ft. None of these whales, which are species with a very wide geographical distribution, are of much commercial value.

Of the "right" whales—which are merely the right kind of whales for the whaler to pursue, as their whalebone is longer and more valuable, and their oil more abundant and superior in quality to that of the other species named—the most important is the Southern Right Whale (*Balaena australis*). This animal is world-wide in its distribution, occurring in all seas but the Arctic regions, where its place is taken by the Greenland Whale (*B. mysticetus*).

Allied to this is the Little Australian Whale (*Neobalaena marginata*), which occurs only in the ocean south of New Zealand and Australia, and which grows only about 16 ft. long.

The most important of all these animals from a commercial point of view is the Sperm Whale, or Cachalot, an animal 60 ft. to 70 ft. in length—nearly one-third of it head—which used to be common in these southern seas, though mainly an inhabitant of warmer regions. The specific name—*Physeter macrocephalus*—refers to its gigantic head. The mouth is ventral in position, and the lower jaw is furnished with a great row of teeth, and according to Frank Bullen, who gives a picture of it, the animal turns over on its back like a shark when it is going to bite. I cannot vouch for the accuracy of this statement.

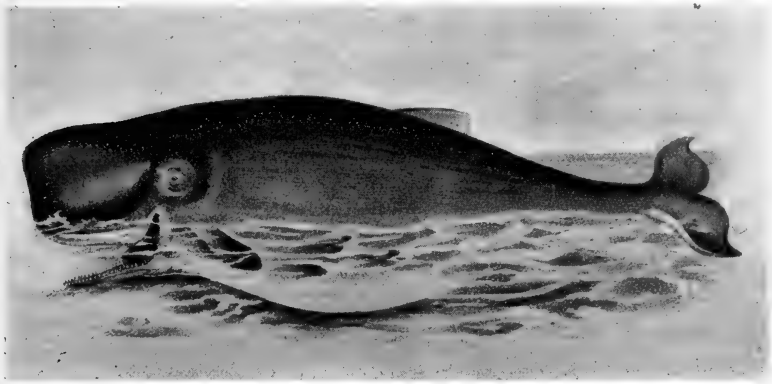


FIG. 6.—SPERM WHALE, OR CACHALOT.

These animals are still fairly common, though they are persistently and unremittingly pursued for their destruction. Bullen, writing of Foveaux Strait in the "nineties," says, "Only three days elapsed after our arrival when whales were seen. For the first time I realized how numerous these gigantic denizens of the sea really are. As far as the eye could reach, extending all round one-half of the horizon, the sea appeared to be alive with spouts—all sperm whales, all bulls of great size. The value of this incredible school must have been incalculable. Subsequent experience satisfied me that such a sight was by no means uncommon here—in fact, 'lone whales' or small 'pods' were quite the exception."

The cavity lying below the skull in the great square head of this whale is filled with spermaceti, which is fluid fat during the life of the animal. Up till as late as the middle of the eighteenth century this oil was regarded as the brain of the cachalot. The most valuable product yielded by the Sperm Whale is ambergris, which is a product of the intestinal canal. When first extracted it has a greasy feel and consistency, and then as it hardens it acquires its characteristic sweet, earthy odour. It is occasionally found floating at sea or washed up on beaches, and it is extraordinary how constantly lumps of fat or tallow thrown overboard by passing vessels get picked up on the shore and are eagerly seized by the finders, who think they have discovered a treasure. I have had numbers of such finds brought to me for identification. They nearly always turned out to be chunks of mutton-fat. The value of ambergris is very problematical—anywhere from 5s. to 10s. per ounce, probably. As far as I know, it is used only in connection with perfumery.

Professor Beddard says of the Sperm Whale, "Its food is chiefly cuttlefishes, and it is said to have a predilection for those colossal cuttlefishes whose existence has until recently been doubted. Mr. Bullen has sketched a conflict between these two giants of the deep. On the other hand, it is said that its large throat, more than big enough to swallow a man (this whale is credited with being that which swallowed Jonah) does not usually admit fishes larger than bonitos and albacores." Bullen's account of this fight is worth reading by all interested in these creatures. It is, of course, unsubstantiated, and the illustration which accompanies it is in part imaginary and taken from the description. But the account is probably correct, and the fact of their choice of food is well authenticated. In another part of his work, describing the contents of the mouth of a captured Sperm Whale, he writes: "In the maw there were, besides a large quantity of dismembered squid of great size, a number of fish, such as rock-cod, barracouta, snapper, and the like, whose presence there was a revelation to me. How in the name of wonder so huge and unwieldy a creature as the cachalot could manage to catch those nimble members of the finny tribe I could not for the life of me divine! Unless—and after much cogitation it was the only feasible explanation that I could see—as the cachalot swims about with his lower jaw hanging down in

its normal position, and his huge gullet gaping like some submarine cavern, the fish unwittingly glide down it, to find egress impossible. This may or may not be the case; but I, at any rate, can find no more reasonable theory, for it is manifestly absurd to suppose the whale capable of catching fish in the ordinary sense, indicating pursuit."

Whaling was a most profitable industry in these Islands a century ago. Waikouaiti was a well-known whaling-station when John Jones started his settlement there over seventy years ago. Otakou (or Otago) was another; and it is not so long ago that the old trying-down plant was still lying about Harrington Point. Stewart Island and Foveaux Strait, Tautuku Bay, and other sheltered spots on the coast were all originally settled by whalers. But these days are gone, and the whales themselves are comparatively rare. Whaling, however, is still carried on by motor-launch from Tory Channel and other places.

Besides the species I have mentioned, another, allied to the Sperm Whale, is occasionally met with. This is the Pigmy Whale (*Kogia breviceps*), which differs in various anatomical respects from its larger relative, but most markedly in its size, for it seldom exceeds 15 ft. in length.

Several species belonging to the family of beaked whales have been described from New Zealand waters by the late Sir James Hector and other naturalists. They are by no means common animals, but one reason of their rarity may be the fact of their being chiefly found right down in the Antarctic Ocean, where they are scarcely disturbed, as they have little commercial value.

Of the Porpoise Whale (*Berardius arnouxi*) only four or five specimens have been met with, yet it is the only well-known species of the genus. "It is 30 ft. to 32 ft. in length, and is of a velvety black colour, with a greyish belly. Instead of lowing like a cow, this whale has been described as 'bellowing like a bull'!"

Of the genus *Mesoplodon*, which are known as Scamperdown Whales, some five species are said to occur in New Zealand. They are moderate-sized whales, 15 ft. to 17 ft. in length, which have a world-wide distribution.

Another whale, known as the Goose-beak Whale (*Ziphius cavirostris*) is probably the only species of the genus, and its distribution is also world-wide. Beddard says of it, "Our knowledge

of *Ziphius* dates from the year 1804, when a skull, 'completely petrified in appearance,' was picked up upon the Mediterranean coast of France, and described by the great Cuvier. It was forty years before another specimen was found. In the New Zealand specimen described by von Haast the body was scored by numerous lacerations. These wounds may have been due to fights among the whales themselves; the forwardly-situated teeth would be capable of inflicting such wounds. But it has also been stated that the armed suckers of gigantic cuttlefish are responsible for these scratches."

Every one who has travelled up and down the coast, and most who have sat by rocks overlooking the open ocean, are familiar with the schools of porpoises which are so common in these southern seas. It is interesting to watch them from the deck of a steamer, and to see how they dash along near the surface of the water with their peculiar gliding movement, curving their bodies as they plunge in and out of the water. They keep a wonderful regularity in their distance from one another, moving as if by mechanical means with a remarkable rhythmic movement. Bullen gives a short account of porpoise-hunting in the "Cruise of the Cachalot." He states that these animals have "no skin—*i.e.*, hide—the blubber or coating of lard which encases them being covered by a black substance as thin as tissue paper. The porpoise-hide of the boot-maker," he adds, "is really leather made from the skin of the *Beluga*, or 'White Whale,' which is found only in the far north." I cannot say whether this is accurate or not, for though I have frequently seen porpoises at close quarters I have never seen them cut up. Our species—*Cephalorhynchus hectori*—is usually from 5 ft. to 7 ft. long; it is quite distinct from the common European species, which, indeed, belongs to a totally different genus.

The dolphin—*Delphinus delphis*—is perhaps the most familiar of all cetaceans. It is a world-wide species, which is particularly common in the Mediterranean. There it has been observed from very early days, and a great number of mythical stories have gathered round it; hence the stories of Arion and others. "The leaping of the dolphin out of the water is exemplified in many Mediterranean coins and coats-of-arms; the heraldic dolphin is represented with an arched back as in leaping." Many of the animals usually claimed as porpoises are really dolphins.

One of the most famous animals of this group, one with a world-wide reputation, is "Pelorus Jack," the pilot-dolphin of the French Pass, known for many years to every traveller between Wellington and Nelson. This famous "whale" has been photographed scores of times, and his general form and large dorsal fin are well known. I am indebted to Messrs. Sharland and Co. (Limited) for permission to reproduce the photograph shown in Fig. 8. For something like twenty years he met every steamer that came through the French Pass, whether by day or night. His "station," if one may use the word, was somewhere off the mouth of Pelorus Sound, and as soon as a passing vessel got within a mile or two of this region "Jack" would be seen racing along

FIG. 7.—THE DOLPHIN (AFTER McCOY).

until he was alongside, when he would escort the boat for some distance before racing off again. Among various yarns told about him was one that he used to rub himself on the vessels, presumably either for a scratch on the back or to divest himself of some of the fish-lice which frequently infest whales. I have seen him on several occasions, and never to greater advantage than when he accompanied the little trawling-steamer, the "Doto," as we were going into the French Pass. He kept alongside and played round the bows for over five minutes, and then sheered off to visit a larger vessel which was coming in from Cook Strait. In Hutton and Drummond's "Animals of New Zealand" he was stated to be a *Beluga*, or White Whale, and was identified as *Delphinapterus leucas;* but this is purely a northern species. Waite considers it is a Risso's Dolphin (*Grampus griseus*), and says "the general

colour of the animal is grey, curiously marked with scratch-like lines, which are probably caused by the cuttlefishes which form the staple food of the grampus." In a pamphlet published in 1911 by James Cowan on "Pelorus Jack" it is stated that "he is a dolphin of a bluish-white colour, tinged with purple and yellow, and with irregular brown-edged scratch-like lines covering the upper surface of his body. His flippers are dark in hue, mottled with grey. He is about 14 ft. in length—as nearly as can be judged, for he doesn't stay still very long—and he is blunt of

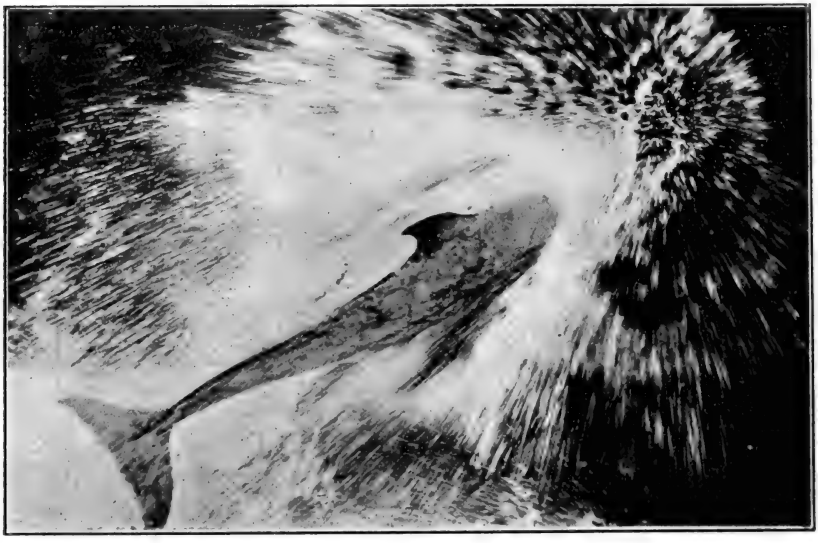


Fig. 8.—Pelorus Jack, a Famous Dolphin.

nose, humped of forehead, with a high falcate (or scythe-shaped) dorsal fin and a narrow fluked tail." By an Order in Council of the 29th September, 1904, it is notified that for five years from that date it would not be lawful for any person "to take the fish or mammal of the species commonly known as Risso's Dolphin (*Grampus griseus*) in the waters of Cook Strait, or of the bays, sounds, and estuaries adjacent thereto." Any person committing a breach of this regulation was liable to a fine of not less than £5 nor more than £100. This regulation was renewed from time to

time, an Order in Council of the 24th April, 1911, extending it for a further period of five years. The regulation was aimed solely at the protection of "Pelorus Jack," the only individual marine animal, I believe, which has thus secured Government protection.

The Maoris believe that Kaikai-a-waro, as they call "Pelorus Jack," has been known to their race for some three centuries, and a considerable body of legend has grown up about him. One European skipper, Captain Turner, of Nelson, met with a big white "fish" in Pelorus Sound nearly fifty years ago, and he thinks this is the same as the whale which afterwards took up its station towards the French Pass.

It was stated in 1911 that the carcase of "Pelorus Jack," bitten by sharks, had been washed up on D'Urville Island. It was found, however, that the animal discovered there was a bottle-nosed whale. Meanwhile it is a fact that the "pilot-whale" has not been seen for some years, and whether he has "passed out" or merely shifted his quarters no one knows.

The list of New Zealand whales is not yet exhausted. Mention has just been made of the Bottle-nose (*Prodelphinus obscurus*), which is not unfrequently met with. A more interesting animal is the Killer Whale (*Orca gladiator*), often spoken of as the "grampus," a word which itself is a contraction of the French *grand poisson*, or big fish. The killer is marked with contrasting bands of white or yellow upon a black body-colour. It is a fairly large species, growing to a length of 30 ft. It is a powerful and rapacious whale, and it is stated that as many as thirteen porpoises and fourteen seals were taken from the stomach of one of them. This is a large order, and perhaps the culprit died of a surfeit; if not, it certainly deserved to.

The killers sometimes combine to attack larger whales, and in Bullen's interesting book he repeats an account of a combat which he witnessed between a bull cachalot and such a combination of enemies. Two hungry killers and a 16 ft. swordfish joined forces to attack the big whale. The swordfish launched himself at the monster, but the latter turned in time to receive the shock on the head, and the blow glanced off it, the fish rolling helplessly over the top of the whale. With a sudden rapid movement the latter turned, grasped the aggressor with his immense jaws and crunched

him into two portions, which he promptly swallowed. Then, with a terrific lash of his tail, he came down on one of the killers, and "crushed it like a shrimp under one's heel." Here is Bullen's conclusion: "The survivor fled—never faster—for an avalanche of living furious flesh was behind him, and coming with enormous leaps half out of the sea every time. Thus they disappeared, but I have no doubt as to the issue. Of one thing I am certain: that if any of the trio survived they never afterwards attempted to rush a cachalot." Bullen is rather mixed in this narrative. According to a Dr. Frangius, "When an Orca pursues a whale the latter makes a terrible bellowing, like a bull when bitten by a dog." He may be referring to a Right Whale, for certainly his remark does not apply to the Sperm Whale, which is a dangerous foe to all its enemies.

The Cowfish (*Tursiops tursio*) is a beaked whale, some 12 ft. long, which has been taken in New Zealand waters. The colour of the back varies from black to lead-colour, while the under-parts are white. It is a species of world-wide range.

So is the last of the whales which I shall mention, the Blackfish (*Globicephalus melas*), known in the Hebrides and the west of Scotland as the "ca'ing whale." This is one of the largest of the dolphins, reaching some 20 ft. in length. It is a gregarious species, moving about in great schools or shoals. Its sheep-like habits enable it to be easily driven on shore in herds, when the animals are easily harpooned. Schools of Blackfish not unfrequently visit the inlets and shores of the North of Auckland. Bullen gives an account of an attack on an immense school of Blackfish which the "Cachalot" encountered when near Christmas Island in the mid-Pacific.

Any one interested in the natural history of the sea will find the study of its cetaceans is still in a very incomplete state. Few people know anything about them scientifically, because their occurrence and the opportunity of studying them at first hand are so erratic and rare. When a whale comes ashore it is usually in some inaccessible place, and if the fact is communicated to a museum the finder usually places a considerable price on his discovery, which makes the investigation too expensive to be undertaken. When our fisheries are properly organized it will be possible to study the cetacean fauna much more closely and accurately than is at present the case.

CHAPTER VIII.

CARNIVORA—CATS AND DOGS.

FIVE species of carnivorous animals (exclusive of menagerie specimens) have been introduced into New Zealand. Cats and dogs are domestic animals of which numerous individuals have gone wild from time to time; while ferrets, stoats, and weasels have been liberated and are now common.

One of the most characteristic features of the land carnivora is "the looseness of their skin, which, instead of being stretched on the body as tightly as a drum-parchment, as it is in grass-eaters—for instance, the ox or hippopotamus—is quite 'baggy,' having between it and the flesh of the beast a layer of the loosest possible fibres. It is for this reason that the skin of any but a very fat dog can be pinched up so readily, while of an herbivore it may be said, in the words of eulogy uttered by Mr. Squeers of his son Wackford, 'Here's firmness, here's solidness! Why, you can hardly get up enough of him between your fingers and thumb to pinch him anywheres.'" As Parker says, "The use of this loose skin will be very evident to any one who will take the trouble to watch the great cats playing together at the Zoological Gardens. They are continually scratching one another, but the loose skin is dragged round by the claws, which in consequence can get no hold and do no harm; with a tight skin, on the other hand, the slightest scratch of such a claw as a tiger's would cause a serious wound. The looseness of the skin is very evident in the puma and jaguar, in which it hangs in a fold along the middle of the belly, like a great dewlap."

The skull is very strongly developed, and has great bony ridges for the attachment of the jaw-muscles. In herbivorous animals the brain-case is small and the face much prolonged; but in carnivores—especially cats—the face is very short relatively to the cranial portion of the skull. The higher carnivora cannot chew or grind their food; they only tear it and mince it. Cats and dogs walk on the toes, the under-surfaces of which are covered with

soft leathery pads, so as to ensure a soft, silent footstep. What looks like the knee is really the wrist, and what looks like a backward-turned knee in the hind leg is the heel, the true elbow and knee being almost hidden by the skin. In all carnivores the canine teeth are relatively very large. All of them have the senses of sight and hearing very well developed. The young are always born in a comparatively helpless condition, and are generally blind for some time after their birth.

The Cat.

There is no record as to the first introduction of cats into New Zealand; but no doubt they were brought here by the very first settlers—perhaps earlier even, by the crews of vessels which called at Kororareka and other parts of this country in the very early whaling days. They do not seem to have strayed far from the haunts of men until rabbits began to multiply. Then, when the sheep-farmers found that the capacity of the country for carrying sheep was being seriously reduced by the vast increase of rabbits, they resorted to all sorts of devices to cope with the pest. One method was to purchase cats in the towns, take them out to the back country, feed them for a time till they became somewhat habituated to the locality, and then turn them loose. No doubt some died, but most of them became more or less wild, and learned to subsist on the smaller animals of the neighbourhood. Probably native ground-birds suffered most from their presence. They certainly destroyed many young rabbits, but it is also true that they were frequently found living and rearing their young in burrows alongside families of rabbits. They cleared off the rats, which were formerly so common, and they also largely exterminated lizards. My son, Dr. Allan Thomson, tells me that in the Awatere Valley, in Marlborough, rabbit-hunting cats are greatly esteemed by the settlers, and are believed to be much more efficient than stoats and weasels. They are only partly wild, as frequently the domestic cats feed their young on rabbits and interbreed freely with wild cats living near the homesteads. He observed a cat at Awapiri teaching two kittens to kill. She would leave the house, and in about ten minutes' time would return with a baby rabbit, evidently obtained from a stop. When the kittens were very young she killed the rabbit and skinned it. A week or two later she would

give them the dead rabbit with the skin just partially turned back, and they quickly learned to complete the skinning. Still later she gave them the live rabbit, with which at first they played, but in a very short time they learned to approach the rabbit from behind and grip it by the neck, lying practically on top of it and pinching the gullet until the rabbit was strangled. Cats, in his opinion, become rabbit-killers only when they are thus taught by their mothers, but once they acquire the habit they feed on little else.

Dieffenbach, writing of the Piako district in Auckland Province in 1839, says, "The cats, which, on becoming wild, have assumed the streaky grey colour of the original animal while in a state of nature, form a great obstacle to the propagation of any new kinds of birds, and also tend to the destruction of many indigenous species." This statement about the colour of wild cats has been made much of. It is true to only a very limited extent, and I have always felt that such statements—coming from a traveller who had only limited means of observing the facts, and apparently founded his conclusions on a few isolated observations of the settlers—are not always safe to generalize from. In the present instance they led Darwin (in "The Variation of Plants and Animals under Domestication") to quote him, and to use the statement as a proof of the strong tendency to reversion shown by the cat when it escaped from domestication. At the time Dieffenbach wrote settlement was quite in its infancy, and cats had not long been introduced. It is probable, therefore, that his statement, whether the result of his own or other people's observations, referred to cats which were themselves progeny of grey animals. It certainly is the case that in Central Otago, where cats were freely liberated to cope with the rabbit pest, animals of many and varied colours are now found wild. Mr. Robert Scott, formerly M.P. for Central Otago, who had exceptional opportunities for observing the facts, has recently given me most interesting information regarding this question. He says, "The wild cat was, no doubt, the descendant of the shepherd's and miner's tame cat. The predominating colour was grey-striped (or tiger-striped, as some people called them), occasionally yellow, and rarely black or black-and-white. The time I write of was the 'seventies'—say, from 1870 on to the time when poisoning the rabbits with phosphorized grain came in.

The cats, though not numerous, were fairly common, especially in districts where cover, such as fern and scrub, was plentiful. They grew to an immense size, and were game to the last if attacked; in fact, no dog would tackle one single-handed. They were always in the pink of condition, which may be accounted for by the abundance of feed available in the shape of wekas, ducks, and rats, with perhaps a dead sheep or bullock occasionally. When the rabbit-poisoning came in that class or variety of cat disappeared along with the wild pig and weka. The reason for the extermination of the cat is because is prefers the entrails to the flesh. Since that time, up to the present, cats have been turned out in considerable numbers, but the rabbit-trapping has effectually prevented their increase, and the survivors still retain their original colours—that is, black, black-and-white, grey, grey-and-white, &c.; but they are much smaller than the wild cat of forty years ago. My opinion is that had the original cat survived till to-day the colour would have invariably been grey, or, rather, grey-striped."

Mr. H. C. Weir, of Ida Valley Station, Otago, states that on high country, where rabbit-traps are seldom if ever used, they grow to a very considerable size, and are most commonly of a grey colour; but yellow, grey-and-white, and black are also to be met with. He adds, "I cannot say I ever saw any approaching the tiger-like stripe of the Home-country wild cat, and I have seen a good few of them in the wilds of Sutherlandshire, Scotland."

Some people consider that wild cats are responsible for much of the failure which has followed the constantly renewed attempts to naturalize game birds. At the annual meeting of the Wellington Acclimatization Society in 1898 a member said, "Cats are more destructive to game than all the hawks, weasels, and stoats in the colony. Most of the bush coverts are full of these cats, a fact which I myself proved near Feilding, where, with the assistance of traps baited with smoked fish, I caught many." I think they may have contributed to some extent to this failure, but only in a few parts of the country, and then chiefly in the neighbourhood of settlements. Personally, I do not think that wild cats have had much to do with the extermination of introduced game. The whole question is a difficult one to get any definite knowledge upon, opinions differ so much. Thus Mr. Charles J. Peters, of Mount Somers, considers that wild cats are far more effective in keeping

down rabbits than are stoats or weasels, and estimates that cats will kill more rabbits in a month than one of the others will in six months.

Mr. B. C. Aston, in a paper on the Kaikoura Mountains, speaks of the half-wild cats which are found about deserted fencers' and musterers' camps as retaining "all their love for man's comradeship if encouraged, but they invariably refuse to eat anything that they have not killed themselves. They probably exist on rabbits, birds, and mice. As a result of their hunting habits their chest and forelegs are largely developed, and they have a look different from the ordinary cat, being leaner, and quicker in action."

Wild cats, so my son Dr. Allan Thomson tells me, are the bane of the island sanctuaries of New Zealand, being present on Kapiti Island, Little Barrier Island, and Stephen Island, in which last they kill and eat the tuatara. They have been reduced to small numbers by shooting, but their complete extermination has not yet been accomplished.

When the Russian Commander Bellingshausen visited the Macquaries in 1820 he found numbers of wild cats hid among the foliage. There were at the time, however, two parties of traders (seal-hunters?) on the island, one of thirteen and the other of twenty-seven men, and these probably accounted for the cats.

Captain Musgrave, who was a castaway from the schooner "Grafton," when she was wrecked on the Auckland Islands in 1864, found a cat in a trap more than a year after the date of the wreck. "She soon cleared the hut of mice, which were dreadfully common."

In 1868 Mr. H. H. Travers, in his account of a visit to the Chatham Islands, states that wild cats were very abundant, and that they destroyed a great number of the indigenous birds.

Wild Dogs.

It may seem strange to speak of dogs as wild animals in New Zealand, and it is questionable whether there are any wild dogs at the present time, but in the early days of settlement they were fairly abundant, and were truly feral. Dogs are the most thoroughly domesticated of animals, and in none has the moral

and intellectual faculties been more highly developed. But just as some men degrade these faculties to the basest uses and become a menace to the rest of their race, so some dogs—only a few, it must be admitted—go wild and become a menace to their human companions and masters.

It is of interest to remember that when Captain Cook came to New Zealand the Natives had dogs, which they had brought with them from their original homes in Polynesia. Most of the histories of the migrations of the Maori refer to the fact of their bringing dogs with them, so that they had probably been in the country for some centuries before the date of Cook's visit in 1769. Crozet, who visited these Islands in 1772, saw these dogs, and described them as follows: "The dogs are a sort of domesticated fox, quite black or white, very low on the legs, straight ears, thick tail, long body, full jaws, but more pointed than that of the fox, and uttering the same cry. They do not bark like our dogs. These animals are only fed on fish, and it appears that the savages only raise them for food. Some were taken on board our vessels, but it was impossible to domesticate them like our dogs: they were always treacherous, and bit us frequently. They would have been dangerous to keep where poultry was raised or had to be protected: they would destroy them just like true foxes."

Forster, in his account of Cook's second voyage, writing of the Queen Charlotte Sound Natives in 1773, says, "A good many dogs were observed in their canoes, which they seemed very fond of, and kept tied with a string round their middle. They were of a rough, long-haired sort, with pricked ears, and much resembled the common shepherd's cur or Count Buffon's *chien de berger*. They were of different colours, some quite black and others perfectly white. The food which these dogs receive is fish, or the same as their masters live on, who afterwards eat their flesh and employ the fur in various ornaments and dresses." Later on in the same journal he says, "The officers had ordered their black dog to be killed, and sent to the captain one-half of it. This day (June 9), therefore, we dined for the first time on a leg of it roasted, which tasted so exactly like mutton that it was absolutely undistinguishable. . . . In New Zealand and in the tropical isles of the South Sea the dogs are the most stupid, dull animals imaginable, and do not seem to have the least advantage in point

of sagacity over our sheep. In the former country they are fed upon fish; in the latter, on vegetables."

Bellingshausen, who visited New Zealand in 1820, says, "We saw no quadrupeds except dogs of a small species. Captain Lazarew bought a couple. They are rather small, have a woolly tail, erect ears, a large mouth, and short legs."

Dieffenbach, writing nearly seventy years after Cook's visit, remarks that "the native dog was formerly considered a dainty, and great numbers of them were eaten; but the breed having undergone an almost complete mixture with the European, their use as an article of food has been discontinued, as the European dogs are said by the Natives to be perfectly unpalatable. The New Zealand dog is different from the Australian dingo; the latter resembles in size and shape the wolf, while the former rather resembles the jackal."

The Rev. Richard Taylor, author of "Te Ika a Maui," who is not always a reliable authority where natural history is concerned, says, "The New Zealand dog was small and long-haired, of a dirty white or yellow colour, with a bushy tail. This the Natives say they brought with them when they first came to these Islands." Then he adds, "It is not improbable, however, that they found another kind already in the country, brought by the older Melanesian race, with long white hair and black tail: it is said to have been very quiet and docile."

The Maori dog has totally disappeared. Mr. S. Percy Smith, of New Plymouth, tells me that the last one he heard of was about 1896. But I have mentioned it here because it was in part the progenitor of the wild dogs which afterwards became such a dangerous nuisance to sheep-breeders.

When settlement began European dogs must have crossed freely with the native animal, and many, both of the introduced and crossed dogs, became truly wild, especially as there were sheep and goats to worry, and pigs to chase and kill.

Dr. Lyall, who was surgeon on H.M.S. "Acheron" during the survey of the coast of New Zealand in 1844, says of the kakapo, or owl-parrot, that "at a very recent period it was 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 exterminated the kakapo wherever they

have reached." Brunner, who visited the West Coast a few years later, makes a similar statement in his Journal. The early settlers could not distinguish between Maori dogs and these wild, half-bred curs. Thus R. Gillies, writing in after-years of the early days of the Otago settlement, which was formed in 1848, says, "For some years after the settlers arrived here the wild dog was the terror of the flockmaster, and the object of his inveterate hostility." W. D. Murison, formerly editor of the *Otago Daily Times*, writing at the same period (1877), tells how in 1858 he and his brother took up country in the Maniototo Plains, which they reached by the valley of the Shag River. The wild dogs were very troublesome. The first was caught by a kangaroo-dog, apparently imported from Australia for the purpose of hunting them. "This particular wild dog was yellow in colour, and so was the second killed; but the bulk of those ultimately destroyed by us were black-and-white, showing a marked mixture of the collie. The yellow dogs looked like a distinct breed. They were low-set, with short pricked ears, broad forehead, sharp snout, and bushy tail. Indeed, those acquainted with the dingo professed to see little difference between that animal and the New Zealand yellow wild dog. It may be remarked, however, that most of the other dogs we killed, although variously coloured, possessed nearly all the other characteristics of the yellow dog. The wild dogs were generally to be met with in twos and threes; they fed chiefly on quail, ground-larks, young ducks, and occasionally on pigs. On one occasion, when riding through the Idaburn Valley, we came across four wild dogs baiting a sow and her litter of young ones in a dry, tussocky lagoon. To our annoyance our own dogs joined in the attack upon the sow, and the wild dogs got away without our getting one of them. . . . In all we destroyed fifty-two dogs between September, 1858, and December, 1860."

Taylor White, writing in 1889, says, "I consider these dogs entirely distinct from the European dog. For the wild dogs met with on the Waimakariri River, in the alpine ranges of Canterbury, during the year 1856, were in colour and markings identical with those found in the alpine region of Lake Wakatipu in 1860, a distance of several hundred miles apart. There seems little room to doubt that they were an original Maori dog. The fact of their wanting the two tan spots over the eyes mostly seen in European

dogs of approximate colour is a very strong evidence also in favour of this opinion."

At one time wild dogs were so common in Marlborough and did so much damage on the sheep-runs that packs of hunting-dogs were bred for the special purpose of running them down. As settlement proceeded and the country became opened up wild dogs were gradually exterminated. The only ones which are now met with are curs which have taken to rabbits or to sheep-killing, and have managed to escape from their owners.

Bellingshausen reported wild dogs on the Macquaries in 1820, but it is improbable that they long survived the sealers, who probably generally brought them to the islands. As soon as the killing of seals and sea-lions stopped the dogs in all probability died out. Captain Musgrave, who was wrecked on Auckland Island in 1864, discovered wild dogs, like sheep-dogs, on the island. Their case, however, was probably similar to those on the Macquaries, for I am not aware that any subsequent visitor to the island has seen them.

In a reprint from the Auckland *Herald* of the 18th November, 1866, we read, "It is not generally known that about Otamatea and the Wairoa the bush is infested with packs of wild dogs, as ferocious, but more daring, than wolves. These dogs hunt in packs of from three to six or eight. They are strong, gaunt, large animals, and dangerous when met by a man alone. Not long since a Maori, when travelling from one settlement to another through the forest, was attacked by three of these animals at dusk, and only saved himself by climbing into a tree, where he was kept prisoner until late the next day. The extensive district over which these packs roam was once well stocked with wild pigs, but most of these have fallen victims to the dogs, and since this supply of food has failed the dogs have ventured after dark to the neighbourhood of Native settlements and the homesteads of European settlers in quest of prey."

CHAPTER IX.

CARNIVORA—FERRETS, STOATS, AND WEASELS.

THE Mustelidae, or weasel family, is the most heterogeneous assemblage of all the carnivorous group. Though differing much among themselves, they possess certain important characters in common. One of the most familiar is the presence of anal glands, situated beneath the root of the tail, which contain a more or less noxious and evil-smelling fluid. The three members of the family which have been introduced into New Zealand belong to the genus *Putorius*, which receives its name from the Latin word *putor*, a stench. The most notorious example is the American species, the skunk, whose perfume is so strong that David Harum records how a man who killed one went into the woods for a week and "hated hisself."

Of all intentional introductions to this country that of the animals of this family is the most unfortunate and undesirable. The history of the business is, to my mind, a depressing one, for it shows what people are prepared to do to save their own pockets, whatever the effect may be upon others. These animals have not done what was expected of them—namely, suppressed the rabbits, or even kept them in check, but they have exercised a most baneful influence on the bird-life of the country. The characteristics of the three species are somewhat similar. They have been called vermiform animals, for they have a singularly worm-like appearance. The body is long, narrow, and cylindrical in shape, while the legs are relatively extremely short. The neck is also very long, and bears a small, flattened head; the eyes are small, savage-looking, and glittering.

The ferret is closely allied to the polecat, but is a domesticated variety, and is zoologically interesting, because it is a true-breeding albino, having white fur and pink eyes. It originated in Africa, and retains this characteristic of its warm origin: that it is unable to endure great cold; hence if it goes wild in New Zealand it usually

survives only in warm and sheltered localities. It is from 12 in. to 15 in. long, and is a stouter animal than either of the others. Though a semi-domesticated animal, it never shows the slightest affection for its master, and has usually to be kept in confinement. My son, Dr. Allan Thomson, tells me that about Kekerangu, in Marlborough, wild ferrets are at present very numerous.

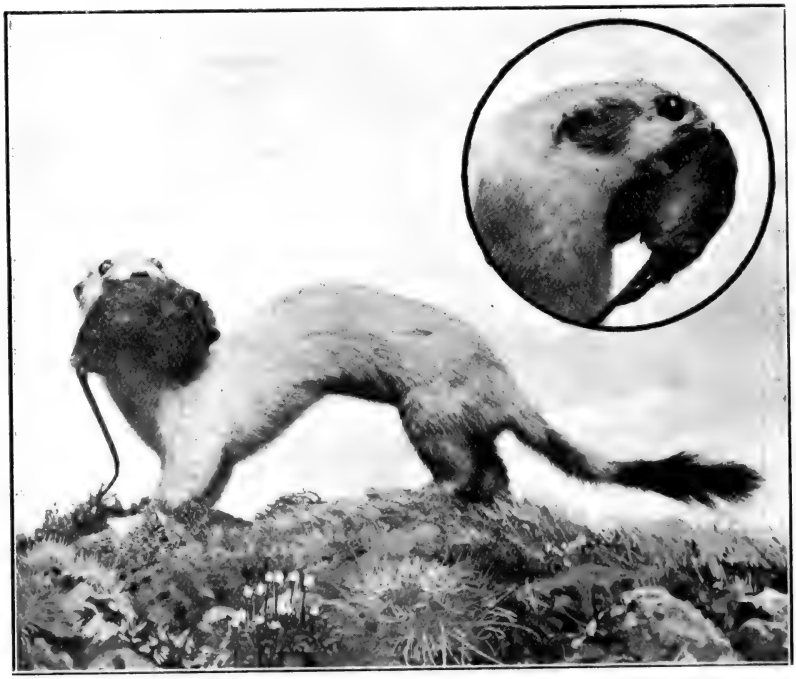
I have no record of the introduction of the true polecat (*Putorius foetidus*) into these Islands; but some five or six years ago Mr. Anderton, curator of the Portobello Marine Fish-hatchery, shot two animals which were too large for stoats, being about 18 in. long. They were not ferrets, in that they were brown-coloured. Unfortunately he did not keep the bodies, their smell,

FIG. 9.—THE FERRET. [*J. Macdonald, photo.*

for one thing, being so offensive; so their specific character was not determined.

The stoat is about 1 ft. long and is somewhat distinctively coloured. "In summer the upper parts vary from yellowish-brown to mahogany-brown, while the underside is white tinged with sulphur-yellow, except on the throat, which is pure white. The tail is tipped with black. The brown upper and white under surfaces are separated by a perfectly distinct line of demarcation, which extends from the snout to the root of the tail, dipping down at the limbs, so as to include the outer surfaces of the latter in the dark area. In winter, on the other hand, the skin is—with the

exception of the tip of the tail, which always remains black—pure white, tinged here and there with sulphur-yellow. Intermediate states between full winter dress and full summer dress are often found." In winter, when the fur is white, the animal is known as the ermine, and white stoats are well known in winter in the South Island. The favourite food of the stoat consists of rats

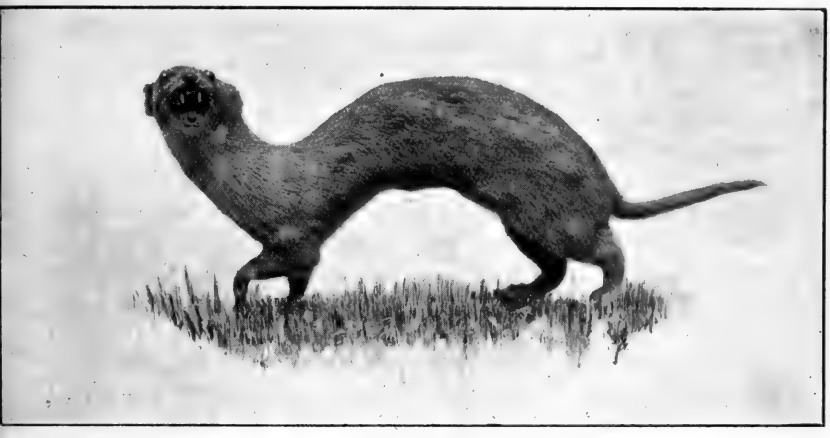


[*J. Macdonald, photo.*

FIG. 10.—THE STOAT.

and mice, but it is fond of birds, and thus is a danger in a poultry-yard. It occasionally attacks lambs. These creatures seem often to kill for the mere sake of killing. In my boyhood days I at one time kept a large number of rabbits in an enclosure. One night a stoat got in and killed the whole lot—over a dozen—and left each with a hole in the back of its head. These animals are fairly abundant over New Zealand at the present time.

One is frequently asked what is the difference between a stoat and a weasel. According to one authority, the one "is stoatally different from the other, and weasely distinguished." But this does not help us much. The weasel "in length, from snout to root of tail, does not exceed 8 in. The tail is about 2 in. long. The fur is light reddish-brown above, and white below." The size and black-tipped tail best distinguish the stoat. The weasel is a good climber, and makes use of its skill in this accomplishment to prey upon birds, their eggs and young. Rats and mice are its favourite food.



[*J. Macdonald, photo.*

FIG 11.—THE WEASEL.

The history of the introduction of these vermin into this country is characteristic of the acclimatization methods of the past. Ferrets have been introduced from early times by dealers in birds and animals. The first authentic record is that of the Canterbury Acclimatization Society, which received five in 1867. They were apparently not liberated, nor were subsequent introductions for some time. When rabbits began to increase to an alarming extent various suggestions were made as to the importation of what was called "the natural enemy." The fox is the real natural enemy of the rabbit, but this was too risky a proposal to be made. The Victorian Govern-

ment had already allowed some idiots to introduce foxes into that country in order to allow them the pleasures of fox-hunting, and the result has not been encouraging. One well-known public man in New Zealand proposed to introduce Arctic foxes "because their fur would be so valuable." When it was pointed out to him that they would probably prefer lamb to rabbit, he replied that, as they did not know anything about lambs in their native haunts, it was improbable that they would take to eating them in New Zealand. Fortunately his proposal was not given effect to. Meanwhile sheep-owners brought pressure to bear on the Government, and as a result steps were taken to obtain ferrets. Numbers of these were introduced in 1882, and in the following year Mr. Bailey, Chief Rabbit Inspector, recommended the introduction of stoats and weasels. To show the scale on which these recommendations were carried out, I summarize from Mr. Bailey's reports as follows:—

(*a.*) In July, 1883, it is stated that since March, 1882 (fifteen months), the Agent-General had made thirty-two shipments of ferrets from London, numbering altogether 1,217 animals. Of these, only 178 were landed, at a cost of £953. Of 241 purchased in Melbourne, 198 were landed, at a cost of £224. Thus the total number landed was 376, and the cost £1,177, or £3 2s. 7d. per head. The natural increase was 122, but 157 died of distemper. At this period it would seem as if the Government kept a perfect menagerie of these animals. In the same year a substantial bonus was offered to any one who would introduce a certain number of stoats or weasels in a healthy condition.

(*b.*) In 1884 he reports "nearly 4,000 ferrets were turned out; 3,041 in Marlborough alone, and about 400 on Crown land in Otago." The rest appear to have been sold to private individuals. It is evident that there was no study of the suitability of a semi-domesticated subtropical animal becoming acclimatized in this country, and, as a matter of fact, the ferret has not gone wild in the South Island to any great extent. Mr. Bailey also stated in this report that "an agent has been sent Home to procure stoats and weasels." Mr. Rich, of Palmerston, imported some of these latter in a sailing-vessel, but how many I cannot learn.

(*c.*) In 1885 two lots of stoats and weasels were received from London—viz., 183 weasels (out of 202 shipped) and 55 stoats (out of 60). Of these, 67 weasels were released at Lake Wanaka on a

peninsula of 8,000 acres, on which they reduced the rabbits, but by no means exterminated them; 28 weasels were liberated at Lake Wakatipu; 15 weasels near the Waiau River, in Southland; and 8 stoats at Ashburton. The rest were sold at Wellington, Christchurch, and Dunedin.

(*d.*) In 1886 the Government introduced two lots. Of these, 82 stoats and 126 weasels were distributed in about equal lots to the Wilkin River, the Makarora, at the head of Lake Ohau, and on the Waitaki; and 32 stoats and 116 weasels were distributed between Marlborough and West Wairarapa. A private shipment of 55 stoats and 167 weasels was also received for Riddiford's station in West Wairarapa. The localities selected for these animals were those in which rabbits were most abundant. Mr. Bailey also reported that "ferrets were turned out by thousands," but the success was only partial.

In the same year a meeting was held at Masterton to consider the administration of the Rabbit Act, and the best means of dealing with the pest. One of the resolutions carried was, "That the introduction of ferrets, stoats, and weasels in large numbers is in the opinion of this meeting the only means by which the rabbit pest can be successfully put an end to, and that every owner of land infested with rabbits should either turn out ferrets in proportion to his acreage or contribute to a fund for the breeding and purchase of ferrets, stoats, and weasels to be turned out in the district. That the landowners present form themselves into an association for the purpose of providing the natural enemies." An association was accordingly formed with this object in view, large sums of money were subscribed, and hundreds of stoats and weasels were introduced into the district. Several of the acclimatization societies took strong exception to the action of the Government and of the sheepowners directly concerned; but as the societies were themselves directly responsible for the rabbits to a large extent their protests were ineffectual.

These animals have not exterminated the rabbits; they do not even keep them in check in most parts. They have, however, helped in the practical extermination over wide areas of many species of indigenous birds, for they have penetrated into quite unsettled and unbroken parts of the country, where apparently they feed on the avifauna.

Every one who has had any experience of these vermin has his own view as to their usefulness or otherwise, but it is seldom that careful observers put their experiences down on paper. I have collected some evidence on this subject, and give here a few of the observations which have been recorded.

Mr. George Mueller, Chief Surveyor of Westland, in his report on the "Reconnaissance Survey of the Headwaters of the Okuru, Actor, and Burke Rivers" (Reports N.Z. Survey Department for 1889–90, p. 50), says, "Several weasels and ferrets were caught and killed at the Okuru and Waiatoto Settlements, within about a mile from the sea-coast. . . . No rabbits were met with until near the Actor, nineteen miles from the coast, and they were only seen in numbers at the very headwaters of the Okuru. . . . Meanwhile the kakapos, kiwis, and blue ducks have nearly disappeared from the district."

Mr. Richard Henry, writing from Lake Te Anau in September, 1890, says, "I have known the ferrets to take young paradise ducks out of a clutch often in 1888, and last year the same pair of ducks reared only two young ones; but away from the lake I have seen larger families. I found two black teal ducks killed by a ferret, though it is seldom any of their work is seen, for they always drag their prey under cover. The black teal are getting scarce." Mr. Henry adds, "I think very few ferrets at liberty survive the winter for want of food." My own opinion is that they cannot endure the cold.

Mr. Richard Norman, Albert Town, writing in the *Otago Witness* of the 2nd October, 1890, says, "I think that Mr. E. H. Wilmot's experience in the Hollyford Valley, as recorded in the *Witness* a year or two ago, conclusively proves that the imported vermin kill the native wingless birds. He encountered there a ferret-warren, and the weka, kiwi, and kakapo were almost exterminated. In the Makarora Valley these used to be plentiful, but since the advent of the stoats and weasels they are very rare, and rabbiting tallies have not depreciated."

Mr. Charles J. Peters, of Mount Somers, writes about these animals (1916): "Since the stoats and weasels became fairly numerous the rabbits have increased 100 per cent. and more. I have found weasels' nests both in heaps of fencing-material and also in rabbit-burrows. These nests have always been made of

skylarks' feathers. I have also found parts of young hares at weasels' camps, but never a sign of a rabbit."

Mr. Yarborough, of Kohukohu (Hokianga), states that stoats and weasels do not seem to be so numerous now (1916) as they were some few years ago. At that time a great number of these intrepid little animals appeared on the eastern side of Hokianga Estuary, and were occasionally observed swimming across the river, which is about a mile wide. For the last year or more they have neither been seen nor heard of. The same observation has been made of the occurrence of these animals on the peninsula on which the Portobello Marine Fish-hatchery stands. Three or four years ago they were very abundant, but recently there are few to be seen.

In Taranaki a correspondent informed me last year that either stoats or weasels destroyed a litter of nine sucking-pigs in one night. Another informant states that "at Lee Stream, in the Taieri district, I saw a rabbit paralysed with fright and uttering squeals of terror, and on looking for the cause observed a stoat fully 10 ft. away walking deliberately towards its victim. The rabbit was killed by one bite on the neck. A few weeks ago a lady informed me that she had seen a somewhat similar occurrence at Brighton, but in this case the rabbit struggled to the lady for protection, and fell trembling at her feet, while the stoat disappeared."

A few years ago stoats were fairly common in the suburbs of Wellington, and made great depredations amongst poultry, entering the fowlhouses at night. My son describes seeing a couple playing in a vacant section at Hataitai, and taking not the slightest notice of passers-by.

CHAPTER X.

CARNIVORA—SEALS.

THE wild life of New Zealand includes members of the marine Carnivora and of the Cetacea; but these animals are known only to the relatively few persons who "go down to the sea in ships, that do business in great waters," and to some residents of the sea-coast. I say "some residents" because too many who live by the seaside know nothing of the wonders of the ocean.

The marine Carnivora belong to the section Pinnipedia—literally "fin-footed"—so termed because the limbs are modified into flippers.

When New Zealand was discovered by Europeans seals were extraordinarily abundant on the coasts, but they shared the fate of similar unprotected animals in other parts of the world. Their fur and oil were valuable and were easily obtained, and the animals were slaughtered so mercilessly that they were nearly exterminated. Only one species, the fur-seal (*Arctocephalus forsteri*), occurred commonly on the shores of the three main islands of New Zealand, though the sea-leopard (*Ogmorhinus leptonyx*) was an occasional visitor. As these animals are now protected, a few stray ones still come inshore, but they are somewhat rare visitors.

Before referring at length to the fur-seal I may with advantage quote what Sir James Hector had to say about other species in a report he prepared for the Minister of Marine in 1892. He states that the hair-seal, or sea-lion (*Eumetopias hookeri*), used to take up its station on the west coast of the South Island about December. The animals are polygamous, and the males are enormously larger than the females. The males arrive first. "Soon afterwards the cow seals appear, and on landing give birth to the young, each male securing a harem of ten to twenty cows, and protecting the mothers and young pups. The rutting season is in January, after which the males (or lions) leave the mothers to bring up the young

until May, when they all leave the coast for the winter. The mode of life of the hair-seals has, however, been much altered since 1863, when I made my first observations, and I believe that the New Zealand hair-seals have now become much more solitary, and that they will soon become extinct."

When I was in the extreme south of Stewart Island in 1874 I found the tracks of these animals in the scrub close to the water's edge, though I did not meet with the sea-lions themselves. I have not heard of one being seen for many a long day.

Speaking of the sea-leopard, Hector wrote as follows: "This is common round the New Zealand coast, but is a solitary animal. They frequently come on shore, and, notwithstanding their feeble powers of locomotion, they scramble far back into the bush in flat country, and occasionally ascend rivers for a long distance. For instance, one of the seals ascended the Waikato River a few years ago as far as Hamilton, and was claimed by the Maoris as being a real *taniwha*."

The fur-seal (*Arctocephalus forsteri*) is named after J. R. Forster, the naturalist who accompanied Captain Cook on his second voyage of circumnavigation. When in Dusky Bay the seals were found in great numbers on the rocks in the sound. Forster described them as seals with ears (the northern seals being earless), free hands, feet webbed on the under-surface, naked between the fingers, and hardly nailed. "Gregarious in habit, they are timid, and fling themselves off the rocks into the sea on the approach of man; but the most powerful resist when attacked, bite the weapons used against them, and even venture to assail the boats. They swim with such rapidity that a boat rowed by six strong men can scarcely keep up with them. Tenacious of life to a degree, a fractured skull did not despatch them." These animals are from 6 ft. to 7 ft. in length; the anterior flipper is about 30 in. long; and the posterior about 15 in. Full-grown males weigh 260 lb. and over, and females from 200 lb. to 220 lb. The hair is soft and black, with reddish-grey tips, and the under-fur is a delicate reddish colour. In old specimens the hairs are tipped with white.

Hector, writing in 1892, says, "I spent from June, 1863, to January, 1864, in the western sounds of Otago, and have since made occasional visits at other seasons, but chiefly during the

summer months, from February to May. I have always observed the seals closely, and have collected many specimens. The male fur-seal used to arrive about the 5th November on inaccessible rocky platforms outside the entrance to the fiords or sounds, and the cows began to arrive about the 1st December. At the same date all the young stock—males up to seven and females up to three or four years old—went to still more exposed places by themselves, and spent the moulting season until about the end of March, when, having acquired the new fur coat, they proceeded to sea. The last of these 'hauling-grounds,' as they are called, I have known in New Zealand was at Cape Foulwind, but formerly they were all round the coast. In the breeding-grounds, or 'rookeries,' the old males keep guard on the females and newly-born pups until the close of the rutting season, about the 15th February, and then desert them, being then in a feeble and emaciated condition from having fasted, and fed only on their own fat, for several months. The females remain with the pups until they learn to swim and to catch fish for themselves, and about the end of May they all leave the coast, only occasionally a groggy old bull remaining behind for the winter months."

Soon after the discovery of New Zealand by Cook the abundance of the fur-seals on the coast led to the exploitation of this source of wealth by sealers—many from Sydney, but others from far-distant ports of Europe and America. Sealing from Sydney appears to have commenced as early as 1791, but it was not till 1801 that the trade was "free to British subjects, as to foreigners, although as a concession granted by a private company" (the East India Company), according to Dr. McNab. Sir Joseph Banks, in a memorandum on the "Present State of the Colony of Sidney, in New South Wales," dated the 4th June, 1806, says of the fur-seal, "The island of Van Diemen, the south-west coast of New Holland, and the southern parts of New Zealand produce seals of all kinds in quantities at present almost innumerable. Their stations on rocks or in bays have remained unmolested since the Creation. The beach is incumber'd with their quantities, and those who visit their haunts have less trouble in killing them than the servants of the Victualling Office have who kill hogs in a pen with mallets. While this is the case the utmost encouragement should be given to those colonists who will embark in search of the seals. . . .

There can be no doubt that at all times hereafter seals will be attainable in great quantities—as is now the case in Newfoundland—by stationary fishers, who know the courses they take in their migrations, and can intercept them in their progress by nets and other contrivances. Thus, if we encourage our new settlers to disturb as speedily as possible every seal-station they can discover, we shall receive from them an immense supply of skins and oil in the first instance; shall prevent the interference of foreign nations in future in the sealing fishery; and secure to ourselves a permanent fishery hereafter, because it will be carried out by means which none but stationary fishermen can provide."

To show how far out Banks was in his estimate of the permanency of the seal fishery, I may quote a sentence from a despatch sent by Surgeon Luttrell to Under-Secretary Sullivan, dated the 8th October, 1807: "A few of the ships that have arrived have had a Home freight of whale-oil and seal-skins, but the latter trade is greatly on the decline, as the seals are all nearly destroyed on the southern islands in this coast, or, from the constant molestation they have suffered, have abandoned the islands." In the course of a parliamentary inquiry held in England in 1819 a Mr. McDonald, who had been sealing on the New Zealand coast, gave some evidence on this subject, from which I summarize the following: The seals were taken at two different seasons, the best being in April, when the pups are six months old, and the other about Christmas, when the females come to the males. The pup seals yield about 2 gallons of oil, and the "wigs," or old males, from 5 to 6 gallons. The skins brought from 5s. to 8s. each. On the first voyage he was out they brought over some 11,500 skins. Asked if the skins were becoming scarce on the coast of New Zealand, he stated that they were not, but they required to be well sought after.

From 1803 to 1805 several small vessels visited the south and south-west coasts of New Zealand and carried off many thousands of seal-skins; but even by that date the seals must have been reduced in numbers, and the sealers had turned their attention to the Southern Islands. Thus in 1806 the American ship "Favourite" reached Sydney with 60,000 seal-skins, said to have been obtained on the "east coast of New Zealand." As a matter of fact, they were taken on Antipodes Island.

A Mr. Scott, on the authority of Mr. Morris, an old Sydney sealer by profession, remarks that "to so great an extent was this indiscriminate killing carried that in two years (1814–15) no less than 400,000 skins were obtained from Penantipod, or Antipodes Island, alone, and necessarily collected in so hasty a manner that very many of them but were imperfectly cured. The ship 'Pegasus' took home 100,000 of these in bulk, and on her arrival in London the skins, having heated during the voyage, had to be dug out of the hold, and were sold as manure—a sad and reckless waste of life."

Later on the Bounties were visited; then the Auckland Islands were discovered and exploited; and still later the Campbell and Macquarie Islands. It is quite impossible to arrive at any estimate of the quantity of oil and seal-skins taken in this destructive trade; and, further, many of the most successful sealers did not state too definitely where they obtained their catches.

A letter written in Sydney about 1824 states that "I do assert of late the southern and western coasts of New Zealand have been infested with Europeans and New-Zealanders who without consideration have killed the pups before they are prime, and the clapmatches before pupping, for the sake of eating their carcases, the consequence of which is that the increase of [*sic*] seals will be totally extinct in about three years on the coast. This circumstance will illustrate what I am about to observe when I state that the seals will not resort to the ground frequented by man." According to the late Dr. McNab, the great seal trade of New Zealand was practically over by 1830. Captain Benjamin Morrell, of the American schooner "Antarctic," visited the Southern Islands in that year, and here are his own words: "Although the Auckland Islands once abounded with numerous herds of fur and hair seals, the American and English seamen engaged in this business have made such clean work of it as scarcely to leave a breed; at all events, there was not one fur-seal to be found on the 4th January, 1830. We therefore got under way on the morning of Tuesday, the 5th, at 6 o'clock, and steered for another cluster of islands—or, rather, rocks—called 'the Snares.' . . . We searched them in vain for fur-seal, with which they formerly abounded. The population was extinct—cut off, root and branch."

CHAPTER XI.

CHIROPTERA—NEW ZEALAND BATS.

How many people—especially young people—in New Zealand have seen native bats? Two species occur in the country, and one of these at one time was fairly common. Now they are very rarely seen in the settled districts. It is some years since I have seen one in the Dunedin Town Belt, a locality in which they formerly were common. In Hutton and Drummond's "Animals of New Zealand" it is said that "a peculiar interest is attached to these creatures. One has become very rare; the other is on the brink of extinction, and may, indeed, even now have ceased to exist. They are popularly called the 'short-tailed' and the 'long-tailed.' As if to make up in one respect for deficiency in another, short-tail has long ears, and long-tail has short ones." I do not think this estimate of their occurrence is a correct one. Bats still occur in forest regions, and in the wide and quite unsettled areas lying between the open country of Otago and Southland and the West Coast Sounds it is quite probable that the short-tailed species is still to be met with. The only people likely to come across bats are the few explorers who traverse these almost unknown regions, and bushfellers and sawmill hands, for these animals hide themselves from all ordinary observers. Bats hide away in holes in trees and in rock caves during the day, and even when flying at night are not easily caught, unless one stretches out a white sheet, when they sometimes flap right into it.

The short-tailed bat (*Mystacops tuberculatus*) seems to have first been met with by Dr. Knox, of Auckland, who got one and presented it to the British Museum in July, 1843. In 1871 he got another, I think, in the Hutt Valley. In the same year, when H.M.S. "Clio" was in Milford Sound, several of these bats were caught when the sails were being hung out to dry. When Hutton described this species in 1871 there were only two specimens in the Colonial Museum—one from the Hutt Valley and the other from the "Clio."

The feet of bats are peculiar. The toes are all about the same length, and the first (or great) toe is nearly in a line with the others; all are furnished with sharp claws. They are not fitted to walk on the ground, but to grasp the branches of trees, and Hutton says this species "has adaptations which led to the conclusion that it hunts for its insect prey not only in the air, but also on the branches and leaves of trees, among which its peculiarities of structure must enable it to creep and crawl with ease and security." The length of this little bat is about 2·8 in., and the spread of its wings about 12 in. Knox says of it, "A well-defined line ran from the wrist-joint, sweeping round to the elbow, knee, and setting on of the tail, dividing the wing-shaped pectoral extremity, so that on the internal segment hair was developed, whilst on the external segment the integumentary expansion was perfectly smooth, so that when the forearm and hand was completely drawn in or retracted, the tail being free, the animal resembled in every respect, even in that of colour and short silky hair, a little mouse; and the small, short thumb, with its peculiar nail, would rest on the ground."

The long-tailed, short-eared bat (*Chalinolobus morio*) is found all over New Zealand. Hutton says of it, "Up to 1885 it was common about Christchurch, but it is thought that the destruction of the old wooden bridge over the Avon, where numbers used to gather together, has driven it away. It measures about 2 in. in total length, being slightly smaller than the other species, and is about the same size as the 'flitter-mouse,' the commonest species in England." Knox gives rather larger dimensions for this bat. One he measured was 3½ in. long and had a spread of wing of 10·8 in. Buller, writing of these animals in 1892, says that both species, according to the Maoris, live in communities, inhabiting the cavernous interior of some dead and hollow tree, congregating there in hundreds and thousands, and clinging to the sides in successive tiers, packed so closely as to occupy the entire surface.

Mr. Caldwell, a District Surveyor, gave Buller the following information about this bat: "I left Carterton, together with two companions," he said, "for a walk into the hills at the right-hand side of the Waiohine, going by way of the Belvedere Road. We got fairly up the hills by about 10 a.m., and climbed a high range covered with black-birch. Getting warm we sat down on the moss

to rest. Then my attention was attracted by a smell of a kind I had not noticed in the bush before, and one that reminded me of a flying-fox camp in Queensland. I followed the smell for some distance to a large birch-tree, with an opening about 4 ft. from the ground. I had evidently traced the smell to its source, for at the opening it was fairly stifling. I could see nothing, so I lighted a bunch of dry leaves, and thrust it through the opening into the tree. As I did this a bat flew out in my face, then another and another. The smoke increased, and the bats streamed out in hundreds. I had no means of computing the number; but one of my men, having a small switch in his hand, kept striking at the stream, the result of which I afterwards counted. There were exactly a hundred bats killed. For one killed at least ten must have passed and flown away. Large numbers dropped down in clusters through the blazing opening. I had no idea there were so many bats in the Wairarapa, and would not have believed it had I not seen them. I have never seen in New Zealand another such collection." My first comment on reading this account was disgust and indignation at the wanton slaughter of these rare and inoffensive animals. Buller adds that "most unfortunately the fire took possession of the tree, which was in a very dry and combustible state, and the whole colony perished in the conflagration." It is no wonder these animals have become rare!

Cheeseman records numerous other instances of the great congregations of these bats in bush-covered districts. Many hundreds were found in a hollow tree in the Wangapeka Valley, Nelson, in 1881. Later on a colony of several hundreds was found in the Thames; and in 1893 a bushfeller in the Kaipara district found hundreds of them in a tree which he cut down. He brought twenty-two of them alive in a box to Mr. Cheeseman, who, being anxious to see how they would behave in a room with closed doors and windows, liberated them. "The experiment justified to some extent the belief that bats enjoy an acute sense of touch, probably unequalled throughout the animal kingdom. They took to their wings at once, and commenced to circle round the room with that quick, soft, and noiseless flight which they are enabled to pursue by means of their velvety wings. The presence of full daylight did not affect them in the slightest degree, and they made no mistake in estimating their distance from an object. They circled

round the room, flying in and out of the corners, skimming just below the ceiling, and hovering over the furniture, but never coming in contact with anything. Nor did they dash themselves against the window-panes, as birds would have done in similar circumstances, but they treated the glass in precisely the same manner as the walls of the room. After satisfying themselves that there was no mode of escape from the room, they began to settle down on the tops of the architraves of the doors and windows, hanging, head downwards, by the claws of their forewings. Ultimately they collected in clusters of four or five, cuddling quite close to one another, and they were then easily transferred to their cage."

CHAPTER XII.

RODENTIA—RATS.

The gnawing-animals, which constitute the order Rodentia, form the most sharply defined group of the Mammalia, the distinguishing characters and name being derived from their teeth. These are of two kinds only—viz., incisors and grinders—there being two efficient incisors in each jaw, and from three to six molars. There are no canine teeth at all; consequently it is easy to recognize the skull of a rodent by its dentition. The animals are mostly small, the beaver being about the largest; while some kinds of mice are hardly more than a couple of inches long.

Seven species of rodents have been introduced into this country at one time or another. Of these, three species of rat, the mouse, and the guinea-pig belong to the simple-toothed rodents—that is, they never have at any period of their life more than two incisors in the upper jaw. The rabbit and the hare belong to the double-toothed rodents. These have each two large incisors in the upper jaw, and behind them two small—almost rudimentary—incisors.

A species of rat was one of the four land-mammals occurring in these islands when Captain Cook first visited New Zealand, the others being a dog and two species of bats. Sir Joseph Banks says in his Journal, "On every occasion when we landed in this country we have seen, I had almost said, no quadrupeds originally natives of it. Dogs and rats, indeed, there are—the former, as in other countries, companions of men, and the latter probably brought hither by the men. Especially as they are so scarce that I myself have not had an opportunity of seeing even one."

This was not Forster's experience, for in his account of the second voyage of Cook (in 1773) he says, "Our fellow-voyagers [Furneaux in the 'Adventure'] found immense numbers of rats upon the Hippah Rock [Queen Charlotte Sound], so that they were obliged to put some large jars in the ground level with the surface, into which these vermin fell during the night by

running backwards and forwards, and great numbers of them were caught in this manner." It is now almost certain that this native rat was the same species (*Mus exulans*) as is still common in many of the South Sea islands and throughout the Pacific, and it probably came with the original immigrants, the ancestors of the Morioris and Maoris. It is, however, probable that the common European black rat (*Mus rattus*) came also into the country with the various ships which touched at these shores from 1769 onwards. Indeed, Yates, who wrote in 1835, says, "The Natives tell us that rats were introduced in the first ship by Tasman." He is certainly not an authority on the subject, and too much importance need not be attached to his statement; but it is nevertheless interesting. In Cassell's Natural History, Dallas, who writes on the Rodentia, says, "New Zealand at the time of its discovery harboured a rat known as the forest-rat, or Maori rat, which was a favourite article of food with the Natives, and is now almost extinct. It has been proved by Captain Hutton to be identical with our black rat (*Mus rattus*), and was probably introduced by the ancestors of the Maoris."

I do not know when this was written, for Messrs. Cassell and Co. take the precaution not to put dates on many of their books. But Hutton, in vol. 20 of the "Transactions of the New Zealand Institute" (1888), speaks of the rats which invaded Picton and the Marlborough Sounds as *Mus maorium*, and says, "This rat is certainly different from *Mus huegeli*, from Fiji, and, I should think, from *M. exulans*." The whole subject has recently been investigated by Oldfield Thomas, who is the greatest living authority in this group, and he is certainly of opinion that the kiore, or Maori rat, was the common Pacific species, *M. exulans*. Endless confusion occurs, however, among early writers in speaking of rats and their species, and this must be borne in mind in reading the accounts of these animals.

The Rev. R. Taylor—who is not always, however, a reliable authority—says that this Maori rat was in general size about one-third that of the brown, or Norway, rat. The Maoris used to make elaborate preparations to catch them, and hundreds of them would be captured at one hunting. He says the animal is reported to run only in a straight line, and that the Maoris made special lines of roads in order to lead them into their traps, which were baited

with miro and other berries. If these roads were crooked, they said, the rats ran into the forest at the bends. They fed entirely on vegetable matter, and were greatly prized as food by the Natives, who also extracted much oil from them.

The native rat quickly disappeared before other rats and also cats; it was extremely rare thirty or forty years ago, and is probably quite extinct now. As, however, the species is common in Polynesia, occasional immigrants may arrive in New Zealand from time to time. The popular belief among both Maoris and Europeans was that it was exterminated by the Norway rat (*Mus decumanus*). It is, however, probable that the latter is a more recent immigrant than the old European black rat, which is still an extremely common animal here. That the Maori rat was once very abundant seems to be proved by the fact that the Natives always erected their storehouses for food on various kinds of piles as a protection against the depredations of these animals. This habit, according to Judge Maning ("Pakeha Maori"), was the custom before Europeans landed in the country.

Tancred, writing of Canterbury in 1856, says, "The native rat forms numerous burrows, rendering the soil unsafe for a horse." He also repeats the statement about its being exterminated by that formidable invader the Norway rat. Mr. W. T. L. Travers, writing in 1869, says, "It has been the fashion to assume that before the arrival of Europeans in this colony this creature [the native rat] was common, and to attribute its destruction to the European rat; and, indeed, the Natives have been credited with a proverb in relation to this point. It is not in effect impossible that the ultimate destruction of those which still existed when trade was first opened between Europeans and the Natives, long after the colonization of New Zealand, may have been hastened by the introduction of the European rat; but I am satisfied that before that time they had become very scarce, and, indeed, I have been told by gentlemen who have lived in the northern part of this [the South] Island for upwards of forty years that they never saw a specimen."

Speaking of Nelson in 1842, Judge Broad said, "Native rats were an intolerable nuisance; they ate everything, ran about the houses in the dark, and had no fear of man. They drove the cats away, and only disappeared when rat-killing dogs were intro-

duced." I do not think these were native rats at all, for the latter ate only vegetable matter, and these vermin seemed to eat everything.

Dr. Hocken has an interesting statement in his "Early History of New Zealand," as follows: "In 1840 Messrs. Dodds and Davis, of Sydney, established a farming settlement at Riccarton, close to where Christchurch now stands, and sent down James Heriot (or Hariot) as manager, two farm hands, and two teams of bullocks. They ploughed and cultivated about 30 acres of land and secured their crops. But in less than a year they decided to abandon all further efforts. Numberless rats attacked the garnered stores, and the bar at the mouth of the river or estuary proved a sad obstacle to shipping whatever grain had been spared by the scourge of rats." We do not know now which species this was, though I think it was probably the black rat.

It is rather interesting that in 1870 Sir Walter Buller wrote a paper "On the New Zealand Rat," and he both figured and described the European black rat (*Mus rattus*). I have already said that this rat probably arrived with some of the first ships which came to the country. Oldfield Thomas in a paper written in 1897 in the "Proceedings of the Zoological Society" says that the rats normally inhabiting ships are not, as is commonly supposed, *Mus decumanus*, but *Mus rattus*, and in most cases these are of the grey variety of that animal, with white belly, though the black form may often be caught in the same ship as the grey.

The black rat became enormously abundant in the early days of settlement, and moved about the country in vast armies. The settlers, bushfellers, and sawmill hands of fifty or seventy years ago recorded how invasions of them in countless swarms used to move through their district, climbing everywhere, and eating everything before them that was of a vegetable nature. Oldfield Thomas, in the article already referred to, says, "All the world over, *Mus rattus* takes to roofs and trees on meeting its formidable rival, *Mus decumanus*, to which it leaves the gutters and cellars."

In early days in Southland we often heard about rat invasions, and the popular belief then was that these were migrations of native rats. I think there is little doubt that they were black rats, which are not necessarily black-coloured. I propose to quote now from

various writers on the subject, to show how common these rodents were at times.

Taylor White states that on the west coast of the South Island they came in vast crowds, climbed trees, tent poles and ropes, and ate everything. On the shores of Lake Wakatipu they lived under the dead leaves of the wild-spaniard or spear-grass (*Aciphylla squarrosa* and *A. Colensoi*).

Rutland records how, in 1856, the district of Collingwood, on the western side of Blind Bay, was visited by a swarm, and in 1863 he was informed of a swarm on the Shotover, Otago. I have heard of this one also. Old miners used to tell how they were

FIG. 12.—THE BLACK RAT.

nearly eaten out of provisions by an invasion of rats. Repeated swarms occurred in Picton in 1872, 1878, 1880, 1884, and 1888. Rutland says, "These rat-swarms invariably take place in spring. A few of the animals appear in August; they increase in numbers till November, when all disappear again gradually as they came. While in a locality dead rats are seen lying about in all directions —on roads, in gardens, and elsewhere. Very few have any marks of violence on their bodies; nor have they died of hunger, since, on examination, they are generally found fat. In 1884, in Picton, forty-seven dead rats were found lying together under the floor of the sitting-room in one house. In another thirty-seven were found dead under the kitchen. The whole town was pervaded with the

odour of dead rats. The average weight of a full-grown specimen is about 2 oz. The fur on the upper portion of the body is dark brown, inclining to black; on the lower portion white or greyish-white. They run awkwardly and slowly on the ground, but run very quickly on the trees. When suddenly startled or pursued they cry out with fear. The extremely few females that occur amongst the countless hordes is a fact that shows that, if breeding does take place at all during these periods of travel, it must be on a very limited scale."

I think a probable partial explanation of this problem is that only the males migrate, while the females, which are producing young at that very season—the beginning of spring—remain in their usual haunts.

"They do little damage, their food being green vegetables. Though they enter dwellinghouses and barns, it is evidently not in quest of food, as shown by corn and other eatables being left untouched by them." Rutland adds, "Among English country people, who have the best opportunity of observing them, it is commonly asserted that in litters of young rats the males produced outnumbered the females by about seven to one."

Meeson describes a plague of rats in 1884: "Nelson and Marlborough—in other words, the whole of the extreme northern portion of the South Island of New Zealand—is enduring a perfect invasion. Living rats are sneaking in every corner, scuttling across every path; their dead bodies in various stages of decay, and in many cases more or less mutilated, strew the roads, fields, and gardens, pollute the wells and streams in all directions. Whatever kills the animals does not succeed in materially diminishing their numbers. Young and succulent crops, as of wheat and peas, are so ravaged as to be unfit for and not worth the trouble of cutting and harvesting. A young farmer the other day killed with a stout stick two hundred in a couple of hours in his wheat-field." Among reasons suggested for the visitation he suggests the pressure of famine: "Last summer was very wet, and last winter very cold; the amount of snow lying on the high lands in the interior was very great. Another is the excessive increase in numbers, producing an intense struggle for existence." It is thus seen that his conclusions are somewhat different from those reached by Mr. Rutland, who did not think that hunger was an impelling

cause. He goes on to say, "I have examined many of these animals, and have not found a single female. One of my neighbours has examined two hundred of them, and a Maori, at the pa beyond Wakapuaka, one hundred, with the same negative result. Some females have, however, been taken, and in one case they were found breeding. He is more like a big field-mouse than a Norway rat; and besides being considerably smaller he is slightly darker in colour, and less malodorous. He climbs trees and flax-plants, and is phytophagous rather than carnivorous."

Hutton, writing in 1887, said, "The rat appears to have invaded Picton at the end of March, and to have suddenly disappeared by the 20th April. Old Maoris recognized it as the rat they used to eat in former times, and said that swarming on to the lowlands periodically was always characteristic of it. These rats were often noticed climbing trees. In the Pelorus, where they stopped longer, they built nests, like birds, in trees."

Kingsley, in 1894, records it as nesting on the branches of small trees, 4 ft. to 5 ft. from the ground, near Totaranui, and gives examples from Motueka, Riwaka, Collingwood, Nelson, and Taranaki. I myself have seen tall thorn hedges at Whangarei full of their nests—large, shapeless structures, which at first I thought must have been made by house-sparrows which had taken to building in hedges.

At the present time black rats are extraordinarily common about Christchurch. Mr. Speight, the curator, informed me three years ago that Canterbury Museum was infested with them. A good deal of the damage said to be done to orchards by opossums is almost certainly the work of the black rat.

Marriner reports that he met with grey rats at North-west Bay in Campbell Island, which Waite, of the Canterbury Museum, thought were probably specimens of *Mus rattus*.

The brown, or Norway, rat (*Mus decumanus*) is ubiquitous, and, though there is no record of its arrival in New Zealand, it no doubt arrived here in the earliest days of settlement. Early in last century Russell, or Kororareka, in the Bay of Islands, was the chief port of the young colony, and rats must have become very abundant there. Charles Darwin, who visited the Bay of Islands in 1835, says in his account of the voyage of the "Beagle," "It is said that the common Norway rat, in the short space of two years, annihilated

in this north end of the Island the New Zealand species." Dieffenbach, writing some time later, said he never could obtain a native rat, "owing to the extermination carried on against it by the European rat." There is no doubt that this species has had a considerable share in the destruction of the native avifauna, and it is also responsible for much of the difficulty experienced by acclimatization societies and private individuals in their attempts to establish introduced game-birds, but I do not think it is responsible for the disappearance of the Maori rat.

During visits to Stewart Island and the West Coast Sounds between 1874 and 1880 I was struck by the abundance of these

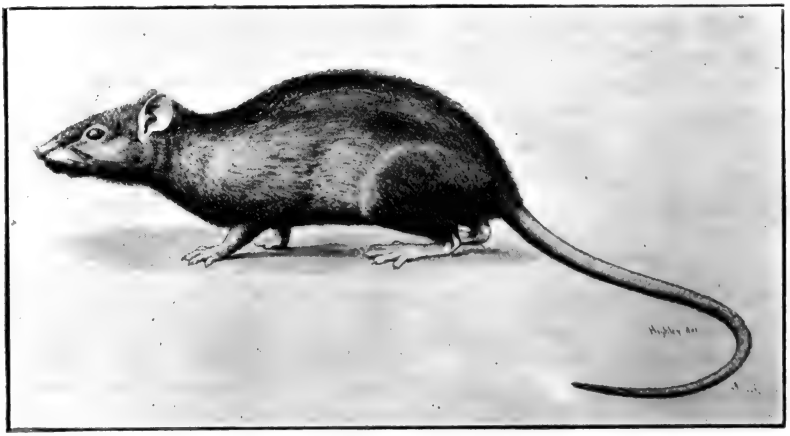


FIG. 13.—THE BROWN OR NORWAY RAT.

animals in regions uninhabited and almost unvisited by man. One day I remember that the late Mr. Robert Paulin and I emerged from the bush on the south side of Thule, in Paterson Inlet, when the tide was low, exposing a wide stretch of beach nearly a mile long. We were much impressed by noticing that the whole beach was alive with large rats, which were feeding on the shell-fish and stranded animals which the tide had left exposed. As soon as they saw us they ran for the shelter of the bush; they were literally in hundreds. I am inclined to think that the rat which frequents all sheltered beaches on the coast is this common brown rat, and that it depends on the animal life of the sea-coast for its livelihood.

In 1868 H. H. Travers reported these brown rats as very abundant in the Chatham Islands; and Captain Bollons, of the "Hinemoa," states that they are very numerous round the homestead on Campbell Island.

A few years ago, when a scare arose about the bubonic plague, a feeble and intermittent crusade against rats was inaugurated, especially in Auckland; but it was, as might have been expected, absolutely futile. It is, of course, well known that rats are the carriers of the plague germs, or at least that they harbour the fleas which are the real carriers. In the fifth and sixth chapters of I Samuel there is a very interesting account of the plague which attacked the cities of Philistia, and which produced emerods—that is, haemorrhoids or swollen glands—as a conspicuous symptom. The lords of the Philistines, in sending back the ark of God to the Israelites, because they thought it was the cause of the malady which affected them, accompanied it by models of emerods in gold, and also golden mice. These were probably golden rats, and seem to show that in these early days, three thousand years ago, the connection between the plague and the rats was well recognized.

While brown rats are still very abundant, especially about the towns, there is no doubt that the spread of weasels throughout the country has vastly diminished their numbers, especially in the open, for a weasel prefers a rat to a rabbit any day.

CHAPTER XIII.

RODENTIA—MICE AND GUINEA-PIGS.

The Mouse (*Mus musculus*).

It is probable that the mouse was introduced into New Zealand early in last century, yet the first notice of the appearance of this familiar little animal in the North Island is recorded by Dieffenbach, who wrote as late as 1839. Pastor Wohlers, long a missionary working among the Natives on Ruapuke, in Foveaux Strait, states that mice were first brought to that island in the "Elizabeth Henrietta," which was wrecked there in 1824, and that even as late as 1873 they continued to be known as "henriettas." The late Mr. Robert Gillies, who arrived in Otago in 1848, writing in 1872, says that it is quite certain there were no mice in Otago in 1852; but a year or perhaps two years after they were noticed, in Dunedin first. They quickly travelled south, but the Molyneux stopped their migration for a time, and it was considerably later before Molyneux Island (Inch-Clutha) was touched by them. Taylor White speaks of mice appearing in the Canterbury Plains in the early days of settlement (from 1855 onwards) "suddenly in thousands." In 1866, during a discussion which arose at a meeting of the Canterbury Acclimatization Society as to the reported destruction of small birds by hawks, Mr. W. T. L. Travers reported "that he had opened a large number of hawks, and in all cases found their food to consist entirely of mice and grasshoppers."

The mouse has never been found very far from the haunts of men, either in this country or elsewhere. It is abundant in all settled parts, and is also common on the Auckland, Antipodes, and Campbell Islands. Though it follows man so closely, it frequently stays in localities where men have been and have left, and there it is apt to have a bad time. Mr. Philpott, writing to me on the 2nd January, 1918, said, "There is a plague of mice in the district west of the Waiau. From Bluecliff to the Knife and Steel, near the Big River and beyond, each hut [the Government huts on the now abandoned telephone track to Puysegur Point] was overrun with them. And not only at the huts, but on the

beach and in the dense bush, wherever we went, they were plentiful. At the Hump, near Lake Hauroto, they were as numerous as elsewhere. This prevalence of mice is certainly not usual; I have been on the Hump four or five times since 1911, and last year tramped along to the Knife and Steel, but, apart from an odd one or two, no mice were in evidence on former trips. One noticeable thing about these little creatures was their boldness: they were evidently very hungry. The wekas caught many of them, swallowing them whole, head first."

How terrible a pest these rodents can be is shown by the state of affairs which has prevailed in the wheat-growing districts of Australia during the past season or two. The following note, taken from the Melbourne *Age* of the 17th July, 1917, gives some idea of the dimensions the pest has reached: "At Brooklyn there are nearly seven million bags of wheat, forming three and a half miles of stacks, and it is estimated that close on two million bags have yet to be railed thither from country stations. At Spotswood three million bags, most from the 1915–16 crop, are stacked. . . . The mouse plague in its myriads has attacked the Brooklyn stacks. The very air reeks with the smell of the mice, dead and alive. Daily to Brooklyn roll from seven hundred to eight hundred railway-trucks, loaded at the country stations mainly in the mouse-riddled areas of the Wimmera and the Mallee. From the Goulburn Valley the trucks bring with them, it is observed, mice that are few in comparison with those from the Wimmera and the Mallee. Every truck from these two regions contributes its mice to the swarming community at Brooklyn. And of the manner of the reception of these mice the instances afforded on an inspection on a week-day are at least suggestive. The average truck, when rolled alongside the wheat-stacks, is received by a handful of labourers. The bags are hauled up by tackle from truck to stack. When the last bag is lifted the doors of the truck are thrown open, and the chaff and the spoilt wheat broomed out. With the waste come flying out the mice—no great number in some trucks, but, clearly, on the average delivery of trucks a day, adding hundreds of mice to the pest, which has bitten deeply into the stacks at Brooklyn. Scattering, scampering, the mice race down the rails. A fox-terrier or two, wearing a *blasé* demeanour, condescend to catch a couple of mice as an example to the others. The rest of the new arrivals

find shelter in the base of the wheat-stacks, or the low pile of damp, reeking bags of wheat awaiting reconditioning. Little if any effort seems to be made by the labourers to check the pest in an ordinary truck; and, indeed, a great deal of effort would be needed to be effective, and the reception and despatch of trucks must be inevitably delayed. Only when a badly infested truck, smeared with the flour of mouse-gnawn wheat, announces its contents by a vile reek of rotting mouse—an announcement beyond all risk of contradiction—it is detached, hauled off to another track, and left loaded to await special treatment."

Two methods are adopted in Victoria to cope with the pest in the wheat-trains. One is to plug all the holes in the truck, place a sack in each corner with its mouth propped open with an iron hoop, and then proceed to lift the bags of wheat out of the truck on to the stack. The escaping mice jump into the sacks until they are nearly half-full. But if the mice are too numerous to be dealt with in this way, then they are gassed in the truck. I am not sure whether carbon disulphide or carbon dioxide is employed—probably the former. This takes at least an hour, and perhaps ten thousand mice are afterwards shovelled out of each truck; and, as hundreds of trucks full of wheat were arriving at Brooklyn each day, it is easily seen that the plague certainly was not stayed. What happens at Brooklyn has been happening in other parts of Australia, and we may be thankful that in New Zealand we have no such gigantic pests to cope with.

As the mouse breeds all the year round and produces five or six young at a birth, its rapid increase under favourable circumstances is easily understood.

The Guinea-pig (*Cavia porcellus*).

On the banks of the Rio de la Plata, and in the country lying to the northwards, a little animal, considered by many naturalists to be the wild form from which our domesticated guinea-pig is derived, is found in thousands. It is known as the "restless cavy." It generally lives in moist situations, usually near the border of the forest, but never in the forest itself or in the open fields. Other authorities consider that the name "guinea-pig" is a corruption of Guiana-pig, and that the first specimens may have come from that part of America. The prevalent colours of the

guinea-pig, as is well known, are white, black, and yellow, and in this respect it differs a good deal from the "restless cavy."

It is hardly correct to include the guinea-pig among the wild animals of New Zealand, as, although it has been frequently liberated, it has never succeeded in establishing itself. At one time I had a number of guinea-pigs running wild in my garden in Maori Hill, and noticed that violets growing among the grass increased remarkably all the time they were about. The guinea-pigs kept the grass very closely nibbled, but would not touch the violets. These animals had a well-sheltered run under a thick mass of periwinkle which grew along a raised bank. They throve remarkably till a host of little ones, not much bigger than the end of one's thumb, began to appear. This was too much for the cats in the neighbourhood. These creatures began to haunt the garden day and night. They soon ate all the little ones, and, having acquired a taste for this kind of game, they never stopped till they had destroyed all the stock but a few old bucks. There is no reason why guinea-pigs should not become wild in this country, except for the prevalence of cats.

The only record I find of the introduction of these animals into this country is by the Auckland Acclimatization Society in 1869; but they have been repeatedly brought in by dealers for the last fifty or sixty years. I believe that guinea-pigs are very good for food, for they are very dainty feeders. But there is a considerable prejudice against them on the part of most people. I had a bachelor acquaintance in London who used to give very *recherché* dinners to his male friends. On one occasion they got a dish of a new and very palatable kind, which they all enjoyed, until they learned that they had been eating guinea-pig, when some of them highly resented their host's experimenting upon them. But it was only prejudice from which they suffered. They reminded me of the lady who enjoyed stewed eel until she learned what she had been eating, when she promptly retired from the table and managed to get sick.

The family of the cavies, to which the guinea-pig belongs, is chiefly characterized by the form of the teeth. The fore feet have four and the hind feet three toes, all armed with hoof-like nails. The tail is rudimentary or wanting; hence the common warning to children that if one lifts a guinea-pig by the tail the eyes will drop out.

CHAPTER XIV.

RODENTIA—RABBITS.

Everybody in New Zealand knows something about rabbits; a great many know a good deal about their habits, their value for fur and for gastronomic purposes, and their destructiveness; but very few know about the history of their introduction.

Probably every one knows that the rabbit (*Lepus cuniculus*) is a burrowing-animal, which thrives particularly in more or less dry regions. A wet climate does not suit it, and although there are regions in New Zealand where rabbits are to be met with but only rarely, yet, as a general rule, they are particularly abundant where there is a limited annual rainfall. They increase at a great rate, the female producing several litters of young in a season, and commencing to breed when about six months old. The young are born blind and naked, and are housed by the mother in a warm nest which is lined with fur pulled from her own body.

Rabbits have long been domesticated, and several well-marked breeds have been developed. For example, in the "lop-eared," the ears are large flaps pendent on each side of the head, and often touching the ground. They are of many colours—white, black, brown, and fawn—sometimes of one nearly uniform hue, but more often mixed. It is clear that many of our New Zealand wild rabbits are descended from tame ones, for they still retain their mixed colours. Albinos, with white fur and pink eyes, form a distinct variety by themselves, and breed true. The Angora rabbits have long fur, and are nearly always albinos.

The introduction of the rabbit into New Zealand has produced such far-reaching effects and wrought such changes throughout the country that it requires more than the sober language of the naturalist to describe them. One thing is quite certain—namely, that the animal was deliberately introduced into the country not by one individual, but by numbers of persons, and by several acclimatization societies. But no one will accept the blame for

their introduction, so I may as well detail all the facts known to me about their early history in New Zealand.

According to the Rev. Richard Taylor, author of "Te Ika a Maui," the early missionaries were the first to introduce rabbits into the country; but, unfortunately, he gives no dates. If he is correct, however, they were almost certainly brought from New South Wales to the far northern part of the colony between 1820 and 1830. They probably never increased to any great extent; for, though there are rabbits in a few localities north of Whangarei (I will specify localities later), they are scarcely a pest there.

I am told that Jerningham Wakefield reported them as being placed on Mana and Kapiti Islands, in Cook Strait, in 1840 or 1841, but I cannot find any verification of the record. The first definite notice I have discovered is in Mr. Tuckett's diary of his expedition to the South Island, which is printed as an appendix to Dr. Hocken's "Contributions to the Early History of New Zealand." Speaking of the country between the mouths of the Clutha and Mataura Rivers, Tuckett writes, under date the 19th May, 1944, "Palmer has grown wheat and barley as well as potatoes, and has plenty of fine fowls and ducks and some goats. . . . Returning from Tapuke [Taukupu], we landed on the island, and, with the assistance of a capital beagle, caught six rabbits alive and uninjured." He does not say whether any were liberated on the mainland, nor whether it was possible for those on the island to get ashore.

Mr. James Begg, who has given me some very valuable information as to the earliest attempts to introduce these animals, tells me that "when Willsher and party settled at Port Molyneux in the early 'forties' they sent to Sydney for rabbits, but whether they obtained them or not I am unable to say. From early days there was at least one colony of rabbits on the upper Waitaki. These remained quite local in their habits, and did not increase to any great extent. They were finally overwhelmed by the invasion of the grey rabbit from the south. The late Mr. Telford, of Clifton, introduced some rabbits and bred them in hutches till they numbered about fifty. They were then liberated on Clifton, near the banks of the Molyneux, but died out in a short time. This was about the year 1864. Mr. Clapcott also liberated some at the old

homestead at Popotunoa Station [Clinton], but they also failed to thrive, and disappeared. It is probable that there were other attempts to acclimatize rabbits, all more or less unsuccessful."

From the point of view of a naturalist the failure of these attempts is very interesting. It shows that there is a vast difference in the aggressive power of the various breeds, for the country on which these various lots of rabbits failed to make good has since been completely overrun by other rabbits. It may be that they were unable to establish themselves until a certain amount of clearing had been done, and till a considerable number of wekas had been destroyed by tussock fires and other means. Whatever the cause, it is the case that no rabbits were able to establish themselves freely in New Zealand before 1860.

Dr. Menzies, who was at the time Superintendent of the Province of Southland, is usually credited with having been the successful introducer of them to the south of the South Island, an achievement the credit of which has not been very eagerly sought after. They were liberated on the sandhills between the ocean and the New River, a place known as Sandy Point.

According to Mr. Huddlestone, silver-grey rabbits were first introduced into Nelson in or about 1865; but there is no record as to what came of this importation. Sir George Grey also appears to have introduced them at or about the same time, for in the annual report of the Canterbury Acclimatization Society in 1866 it is said that "an enclosure has been set apart for the silver-grey rabbits presented by Sir George Grey, which have thriven well and increased to a great extent, and *have been distributed to members far and near.*" Later in the same year the society passed this minute: "The suggestion of giving as a reward for the destruction of hawks and wild cats some silver-grey rabbits was approved."

There is a very popular impression that the Otago Acclimatization Society has no responsibility in connection with the rabbit plague. Well, here are the figures taken from one of their own reports: "In 1866 the society liberated sixty rabbits, twenty-three in 1867, and eighteen in 1868. There is no record as to where these came from."

These are the only records I have been able to secure so far as to the introduction of rabbits into this colony, but there is still a source of information to be searched—namely, the publications

of the Provincial Government of Southland. But there can be no doubt, I think, that what happened in the south happened elsewhere at every port where settlement took place, and that private individuals at Nelson, Wellington, New Plymouth, and Napier also imported rabbits. But when the animals became a pest, and their increase was recognized to be a calamity to the country, every one was desirous of repudiating the responsibility for their introduction. Thus the framer of the annual report of the Canterbury Society for 1889, not having read the statement in the report for 1866, says, concerning "the rabbit, that great scourge to our large runholders—that the introduction of these cannot be laid to the charge of this society." Similarly, Mr. A. Bathgate, of Dunedin, in 1897, wrote, "It is to them [the Provincial Government of Southland] that we are indebted for the presence of the rabbit."

The repudiation of the responsibility for the rabbits is almost as funny as that for the sparrows. As soon as an animal turns out differently from what was expected of it, and becomes a pest instead of a blessing, then no one will admit having had anything to do with the initial mistake of bringing it into the country.

From 1866 onwards the spread of the rabbits was phenomenal. I quote part of Mr. Begg's account of this increase: "About the year 1874 they began to make their presence felt in an unpleasant manner. By 1878 they had reached Lake Wakatipu, leaving a devastated country behind them. At the same time they had reached as far east as the Clutha River, and in a few years later had overrun the greater part of Otago as well as the whole of Southland. Those were evil days for farmers in that part of New Zealand, and especially for the squatters, who occupied large areas of grazing-country. The fine natural grasses on which the sheep and cattle grazed were almost totally destroyed. Sheep perished from starvation by hundreds of thousands, and it is no exaggeration to say that the majority of the squatters were ruined. On the old Burwood Station the number of sheep fell in one year from 119,000 to 30,000. This was partly due to heavy snow, but the rabbits prevented any recovery. It is doubtful if the same country to-day carries more than 40,000 sheep. From the year 1878 onwards immense areas of grazing-land were abandoned, as the owners gave up the unequal struggle with the rabbits. In the early days hunting with dogs, shooting, digging out the

warren, poisoning with various baits, and trapping were the methods by which farmers tried to rid themselves of the pest. Later, wire netting, the introduction of stoats, weasels, and ferrets, fumigating the burrows with poisonous gases (such as carbon disulphide and hydrocyanic acid), and the stimulus given to trapping by the export trade in frozen rabbits, have been relied upon to reduce their numbers. In the writer's experience practically no progress was made in reducing the numbers of rabbits till about the year 1895. From that year there has been a steady diminution. For twenty years the rabbits had the upper hand, and, though many millions were killed annually, no reduction in their abundance was noticeable. In the last twenty years there has been a steady decrease. Large areas of hill country in the wetter districts are now completely clear of rabbits, though they still persist in favourable situations. In the dry country in Central Otago they are still very troublesome and very vigorous, and their evil effects are there seen on hundreds of square miles of country, once the finest grazing-land in New Zealand, now little better than a desert."

It must not be assumed that every one regards the rabbit as a nuisance. Many a successful farmer of to-day got a start as a rabbiter. The killing of rabbits actually became one of the principal industries of the province. Their presence directly led to the subdivision of large estates, and may have been quite as effective in this direction as all the legislation on the subject. Since the war rabbit-skins have become extraordinarily valuable, so that, instead of landholders paying for the destruction of rabbits, rabbiters offer premiums for permission to go on to land to trap the rabbits.

The introduction of rabbits had a lasting effect on acclimatization generally. Before their advent partridges and pheasants had become numerous, but they have entirely disappeared in Otago. In the effort to cope with the rabbits the country was annually sown with poisoned grain. This had a disastrous effect on both native and imported game. Had rabbits not become a nuisance it is unlikely that weasels and other vermin would have been introduced. These animals are largely responsible for the decrease in the numbers of native birds, and also make the successful introduction of new varieties more difficult.

The economic waste caused by the vast increase of rabbits in New Zealand is incalculable, and certainly represents a loss in the stock-carrying capacity of the country which probably runs every year into millions of pounds. It is not only that they eat up food which would support some millions more sheep than are at present reared, but they destroy large areas of country, and yield very little return for the damage they do. The annual export of approximately three million rabbits, valued at (in pre-war times) about £70,000, and of some eight millions of skins, valued at about £115,000, is all the return they give, but it represents only a small proportion of the pest. In all parts where rabbits abound their destruction entails a heavy expense on the occupiers of the land. There are no data available to enable any one to estimate how many rabbits are destroyed every year, but far more are killed by phosphorus than by trapping. The latter method alone furnishes any statistical data; the former is an unknown quantity, but it represents a very large figure.

Probably the most ghastly exhibition of the work of rabbits is to be found in the grass-denuded districts of Central Otago, parts of which have been reduced to the condition of a desert. It is improbable that this state of affairs could have been brought about by rabbits alone. Before their advent the runholders who had possession of the arid regions, in which the rainfall probably averages 10 in. to 12 in. annually, and certainly never exceeds 15 in., were doing their best to denude the surface of the ground by overstocking with sheep and by frequent burning. The latter was resorted to because many of the large tussock-forming grasses, especially such as the silver-tussock (*Poa caespitosa*), yielded coarse and rather unpalatable fodder, but after burning the tufts a crop of tender green leaves sprung up, which were very readily eaten. Unfortunately the burning not only got rid of most of the coarse growth of the tussocks, but it also swept off the numerous bottom grasses which occupied the intervening spaces, which were the mainstay of the depasturing flocks. Even before the rabbits arrived the work of denudation of the grass covering had been proceeding apace through the causes mentioned. Thus Buchanan, writing in 1865, said, "It is no wonder that many of the runs require 8 acres to feed one sheep, according to an official estimate." Mr. Petrie thought this an unduly severe estimate, "as in the mid-

'seventies' the sheep-runs of Central Otago were reputed to carry at least one sheep to 3 acres, or somewhat less."

Mr. Petrie, who has reported to the Department of Agriculture on these grass-denuded lands of Central Otago, knows more about this subject than any one else who has written on it, and I quote him at some length. He says, "Before the rabbit invasion began the hill-slopes carried a fairly rich and varied covering of tussock and other grasses, and, except on the steeper rock and sun-baked faces, had not been seriously depleted even in the early 'nineties.' The earlier stages of this depletion may now be seen in several of the Central Otago ranges, as on the spurs of the Rough Ridge and the Morven Hills districts. The northern slopes of the spurs are almost, in many instances, entirely bare of grass, while the southern shaded slopes still carry a fair amount of pasture. The grass covering generally stops abruptly at the bottoms of the valleys, even when those are not worn into water-channels. The vastly greater depletion of the pasture on the northern slopes is easy enough to understand. They are more exposed to the sun and to the frequent violent parching north-west winds; they lose their covering of snow earlier in spring than the southern slopes, and are thus more closely grazed at a critical season for the pasture; and sheep at all times show a preference for feeding on the warmer sunny slopes. When the pasture on the exposed slopes fails, that on the shaded slopes has to feed all the stock that is about, and unless the stocking is reduced to meet the new conditions the remaining grasses are sooner or later eaten out. The desert, with all its problems, is then established."

In his account of how desert conditions arise in Central Otago Mr. Petrie refers only to the effects produced by sheep, because it is the loss in sheep-carrying capacity which is so serious; but later on, after describing a typical specimen of the country, and showing that in inaccessible situations a considerable variety of vigorous grasses live on, he adds, "This is one of the facts that go to indicate that the extermination of the grasses in this desert country is mainly due to eating out by overstocking, rabbits as well as sheep being included among the stock carried. . . . The desert and the greatly denuded lands are not wholly destitute of vegetation. In most of their lower areas greyish, flattened, firm, nearly circular patches of scabweed (*Raoulia australis* and

R. lutescens) are thickly dotted about the bare ground. Though otherwise useless, these moss-like composite plants help to keep the soil from being blown or washed away, and when old supply, in the decayed centres of the patches, spots with some amount of humus where grass-seeds can more readily settle and grow.'' These plants are never eaten by either sheep or rabbits.

In regard to other native plants, rabbits have nearly exterminated the wild spear-grasses (*Aciphylla squarrosa* and *A. Colensoi*), which used to be so abundant. They particularly attack these plants when the ground is covered with snow. Mr. Petrie, writing me three years ago, said, ''When I first visited inland Otago, in 1874, *Aciphylla Colensoi* was most abundant. In riding about it was almost impossible to deviate from well-beaten tracks or roads because the spines pricked the legs and feet of the horses.'' In later years these plants have become rare. Captain Hutton, writing me in March, 1892, said, ''As to the extermination of the wild-spaniards (*Aciphylla*), I believe it to be due to rabbits. When I was in the Nelson District in 1872–73 there were no rabbits on the eastern side of the Upper Wairau near Tarndale, but they were abundant on the western side. Spaniards were abundant on the eastern side, but almost destroyed on the western. The rabbits seemed to burrow under the plants, and then eat the roots.''

Several species of *Celmisia* (notably *C. densiflora*) have been greatly checked, and others are almost exterminated. Mr. B. C. Aston, in his ascent of the Kaimanawas in 1914–15, found that at a height of 4,200 ft. *Panax Colensoi* was nearly exterminated by rabbits, which had ring-barked all the young trees. This mischief is done after heavy falls of snow, when the rabbits are driven down from the tussock-land into the gullies of the scrub and forest zones. Trees of *Panax Edgerleyi* from 19 ft. to 20 ft. high were found to be ring-barked and dead.

In a good many rabbit-infested districts, particularly in the North Island, these animals have aided very materially in producing a certain amount of erosion and washing-down of alluvium by burrowing extensively in the banks of rivers and small streams. When floods came down, these undermined portions were commonly swept away where the firmer banks resisted the impact of the water. Dr. C. A. Cotton, of Wellington, considers that this action has caused a slight rejuvenation of erosion in certain districts

and river-systems. Cattle, sheep, and goats assist in this work, but rabbits are the most active agents in it. The Rev. A. Don, writing to me in 1901, said, "The rabbits, by stripping the ground of vegetation and burrowing into the faces of the slopes, are converting what were once nice green hillsides into shingle-slopes, because when once the face is so bared and its surface broken it begins to slip." Mr. Petrie also refers to this process in his report, as follows: "The soil on the grass-denuded slopes, which is by no means infertile, being no longer held together by the roots of plants, is being rapidly removed by wind and rain, and pebbles and angular stones are now closely dotted over great stretches of hillside that not many years ago were covered with soil. On the steeper slopes, indeed, the soil is being rapidly sluiced down into the gullies and thence into the river, and deep, narrow, chasm-like watercourses are being dug out."

I was at one time under the impression that in this new country, where the causes—especially the natural enemies—which kept them in check in their original home were wanting, and there seemed to be nothing to arrest their development in any direction, there might arise new varieties of rabbits, with modified habits, structure, &c. Particularly did it seem likely that colour variations would thrive unchecked, and the traveller passing through certain districts in Otago is certainly surprised at the number of conspicuously coloured animals to be seen. I was down at Romahapa recently and saw some rabbits at the edge of the bush, and among a dozen of them there were some with white, buff, and black. I was informed also that there are a number of them in the district with a white ruff round the neck. Other observers bear me out in the prevalence of coloured varieties among the wild rabbits. Thus Mr. W. H. Gates, of Skipper's, a keen observer of nature, writing me two years ago, said, "As for colour, they are of all colours—grey-and-white, tan-and-white, grey with a black ridge down the backbone, grey with a white ring round their necks, cream with a darker shade down the backbone, and buff." Other observers speak of the prevalence of black, black-and-white, and yellow rabbits. Grey is certainly the best colour to hide a rabbit in sandy ground covered with somewhat dry herbage, and in a district like Central Otago, where rabbits are as "thick as locomotives"—as a certain Gaelic acquaintance of mine with a limited

knowledge of English and of locusts put it—one can almost walk over the rabbits, as long as they sit still, without seeing them. The warning white tail of the rabbit is a danger-signal to other rabbits, for whenever a rabbit is running for shelter its white scut warns all the others which it passes to run also. To find out with some approximation of accuracy whether my idea of the prevalence of coloured rabbits was correct or not, I applied to Mr. R. S. Black, of Dunedin, who is a very large exporter of rabbit-skins, for information. Mr. Black informed me that, while they are of all colours, yet 95 per cent. of the skins exported are grey. The other colours appeal to the eye, but they are not so common, after all.

That the rabbits of aberrant colours should survive is not to be wondered at, seeing that in this country there are no foxes, and neither owls nor hawks large enough or active enough to tackle a full-grown rabbit. The common harrier hawk takes a considerable toll of young rabbits, but is quite unable to keep them in check. In many districts wild cats live mainly on rabbits.

I have from the far north an interesting record of a curious habit among rabbits. Mr. Yarborough, of Kohukohu, writing in August, 1916, tells me that rabbits became quite common in a district near Kawakawa, at the head of the Bay of Islands, many years ago. Recently they have reached the eastern side of the Hokianga River, and it is not unusual to see them occasionally. Then he adds this interesting statement: "I have never heard of any rabbit-burrows, as they appear to breed among the rocks and roots of trees." Another observer from an adjacent district says that these animals are not uncommon near Kaikohe, where they do make shallow burrows. The comparatively heavy rainfall of Hokianga, amounting to from 60 in. to 70 in. in a year, has no doubt a good deal to do with the comparative scarcity of the rabbit in that part of New Zealand.

CHAPTER XV.

RODENTIA—HARES; INSECTIVORA—HEDGEHOGS.

The Hare (*Lepus europaeus*).

Hares, like rabbits, are animals destitute of any special means of defence against their enemies except the rapidity of their movements, and they are exceedingly shy and timid. Their eyes and ears are instantly cognisant of even distant warnings of danger, and the limbs are admirably adapted for the most rapid flight. The hind limbs are nearly twice as long as the fore limbs, and are very muscular. Owing to their great length the animal, when moving slowly in search of food, goes awkwardly about, "but the moment there is occasion for him to move rapidly the disproportionate hind limbs stand him in good stead, and he shoots along the ground by a series of long leaps and with great swiftness. At the same time, it is observed that the length of its hind legs causes the hare to run with much greater facility uphill than down, and in fact it is said that in descending steep inclines the animal is obliged to run obliquely in order to escape overbalancing itself. When pursued the hare has the art of making sudden turns in its course, known as 'doubles' or 'wrenches,' by which the dogs in chase of it are thrown out. Greyhounds are swifter of foot than hares, but they are incapable of changing their course so sharply, and thus, while they are carried some distance onwards by their own impetus, their intended victim is making off in a different direction."

Hares can swim well, and have been seen crossing an arm of the sea a mile wide. Hares do not burrow, but live in a small hollow of the surface of the ground, which is known as the "form." They select a shady spot in summer, a sunny one in winter, and go under cover when it rains. They live chiefly in cultivated country, but in New Zealand are not uncommon on grass-land and on riverbeds, though I have met with them far up the slopes of Mount Egmont. They feed on most vegetable materials.

Hares begin to breed when they are about a year old, and produce several broods each year, each consisting of from two to five young. I have been informed that in New Zealand hares usually produce three or four young in a litter, whereas in England they seldom have more than two. It is also stated that the animals are larger here than in Britain. Both statements require verification, but if these are facts they are probably due only to the abundance of the food-supply.

It is just about fifty years since hares were first introduced into New Zealand, and the most remarkable thing about this fact is that the numbers originally brought here were so small. The Otago Acclimatization Society appear to have been the first to bring them here. They got three from Geelong, in Victoria, in 1867, and liberated them at Waihola, where two years later they were reported to be plentiful. Another was obtained in 1868, and three more in 1875. The Canterbury Society got two in 1868 and four in 1873. The Southland Society imported some (the number is not recorded) in 1869 from Victoria, two more in 1871, and two in 1874, and then forty in 1887. The Nelson Society introduced some (again the number is not specified) in 1872, and it is stated that these increased so rapidly as to become a nuisance in the district. These are all the records I can find of importations from abroad into the South Island, and, considering the casual manner and small numbers in which they were introduced, their subsequent increase is most remarkable. They soon spread all over the flatter parts of the Island, keeping mostly about cultivated land, and especially in districts where rabbits were not abundant. They are now common from Foveaux Strait to Cook Strait.

In the North Island the Auckland Society introduced two hares in 1868 and nine in 1871. I can find no other record. From the Auckland District they spread south, and other acclimatization societies assisted to distribute them far and wide. Wellington liberated two in 1874, fourteen in 1875, and four in 1876; and in 1885 reported them as "numerous in the vicinity of Wellington and the lower end of the Wairarapa Valley." In more recent years they are reported as in large numbers about Marton, increasing about Pahiatua, and as seen in almost every part of the Eketahuna district. The Taranaki Society introduced them in 1876, and they were reported as thriving in 1884. On Mount

Egmont at the present time they are common about the bush-line, and in the summer months up to 6,000 ft. In 1905 the Waimarino Society purchased and liberated a number, and protected them for two years. Later on they became so numerous that they were declared to be no longer game, and all restrictions about shooting them were removed. I learn from Mr. E. Phillips Turner, of the New Zealand Forest Department, that they are found all through the volcanic plateau of the North Island from Rotorua to Waiouru.

In no part of New Zealand have they increased to a greater extent than in South Canterbury, where they became so abundant that a considerable export trade sprang up, mostly from the Port of Timaru. Thus the total number of frozen hares exported from New Zealand in 1910 was declared at 10,744, and in 1911 at 11,418. The number has varied in subsequent years, but is still very considerable. It is probable that a good many hares are exported but declared in the Customs returns as rabbits.

In some parts of New Zealand hares tend to become white in the winter season, just as they do in parts of the Old Country, following the same seasonal variations as occur in ferrets, stoats, and other sub-Arctic animals. Several observers state that this is a familiar phenomenon in South Canterbury.

The Hedgehog (*Erinaceus europaeus*).

This interesting little animal belongs to an order called the Insectivora, not because they are the only mammals which eat insects, but because the latter creatures, with worms and other "small fry," constitute the whole, or nearly the whole, of their food. Hedgehogs are small, stoutly-built animals, with very short tails, and the greater part of the hairs on the upper surface are converted into spines. They have the power of rolling themselves into balls, and these spines thus constitute a most powerful defensive armour. The spines are about 1 in. long, and are hard and sharp; they are greyish in colour, with a dark-brown or nearly black ring a little above the middle. The legs are short, so that the animal runs with its belly nearly touching the ground, and the feet have five toes. A full-grown hedgehog is about 10 in. long. When a tame hedgehog is poked on the forehead it puts

its head down, erects its bristles like a crest, and utters little short grunts; sometimes they make this grunting noise at night. In the cauldron scene in Macbeth Shakespeare makes the Second Witch say, "Thrice and once the hedge-pig whined."

In the colder parts of Europe the hedgehog becomes torpid in winter, and lies asleep for months in a nest of moss or leaves, usually in a hole or sheltered hollow. I do not know how long it hibernates in New Zealand. It wakes up in spring, very hungry, and in its excursions, which are undertaken at night, it proceeds to make up for lost time, and runs about with a quick shuffling gait. It is particularly fond of beetles, but it eats all sorts of

[*J. Macdonald, photo.*

FIG. 14.—THE HEDGEHOG.

insects, as well as worms, slugs, and small snails. Occasionally it goes for bigger things, such as frogs and mice, young birds, and especially eggs. It has been credited with turning a hen off her nest and eating her eggs. Sometimes it eats vegetables, and I am told that about Christchurch it digs the potatoes out of the rows. On the whole, however, it is a beneficial animal in a garden.

The first hedgehogs brought into New Zealand were received in 1870 by the Canterbury Acclimatization Society, which got a pair, but I do not know what came of them.

In 1885 a shipment of one hundred was made to the Otago Society, but only three survived the voyage. These were liberated in a suburban garden, but were very sluggish, though the weather

was warm; this was probably due to their having lost their usual season of hibernation. Others were probably imported later, for in 1890 hedgehogs were found near Port Chalmers.

In 1894 the late Mr. Peter Cunningham, of Merivale, Christchurch, sent a consignment of wekas Home, and got twelve hedgehogs out in exchange. They were placed in a pigeon-house, but got out under the wire netting and escaped. For years nothing was heard of them, but they gradually increased and are now extraordinarily abundant. Mr. Edgar F. Stead, of Riccarton, writing in March, 1916, says, "If I hunted through my garden with my dog I could get a dozen now, and I frequently kill them. They are extraordinarily destructive to chickens, their depredations being readily identified by the fact that they eat their victim's stomach first, whereas a cat eats the breast first, and rats and weasels go for the head and neck. Once a hedgehog starts eating chickens he will go on until caught or the supply runs out. I know of many cases where a trap set and baited with the remains of a chicken has caught the marauding hedgehog."

These animals are now very abundant between Christchurch and Dunedin. Two pairs were introduced into the gardens at New Plymouth in 1913, and they are now increasing rapidly in Taranaki.

Old superstitions and beliefs are difficult to eradicate. Among my correspondents, one who hails (over forty years ago) from Surrey, England, is a firm believer in the myth that hedgehogs visit the cows during the night and suck their milk; and he warns me that the milking-qualities of cows are frequently destroyed by them. I can find no satisfactory evidence of this.

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