THE KEA: A New Zealand Problem

BY

G·R·MARRINER·

LIAM WESLEY & SON,
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Essex Street, Strand,

THE KEA:

A NEW ZEALAND PROBLEM.

DEDICATED

(with permission of Mrs. Hutton)

to

The late CAPTAIN F. W. HUTTON, F.R.S.,

in humble appreciation of his eminent service in many departments of New Zealand Zoology ;

in warm admiration of the proof he furnished, in character and utterances, that pure religion and true science may keep close company ;

and

in deep gratitude for personal encouragement and help in the writers's early scientific study.

It was a wondrous realm beguiled
Our youth amid its charms to roam ;
O'er scenes more fair, serenely wild,
Not often summer's glory smiled ;
When flecks of cloud, transparent, bright,
No alabaster half so white—
Hung lightly in a luminous dome
Of sapphire—seemed to float and sleep
Far in the front of its blue steep ;
And almost awful, none the less
For its liquescent loveliness,
Behind them sunk—just o'er the hill
The deep abyss, profound and still—
The so immediate Infinite ;
That yet emerged the same, it seemed
In hue divine and melting balm,
In many a lake whose crystal calm
Uncrisped, unwrinkled, scarcely gleamed ;

Where sky above and lake below
Would like one sphere of azure show,
Save for the circling belt alone,
The softly-painted purple zone
Of mountains—bathed where nearer seen
In sunny tints of sober green,
With velvet darks of woods between,
All glassy glooms and shifty sheen ;
While here and there, some peak of snow
Would o'er their tenderer violet lean.
And yet within this region, fair
With wealth of waving woods—these glades
And glens and lustre-smitten shades,

. . . . . .

Ay ! in this realm of seeming rest,
What sights you meet and sounds of dread !

—ALFRED DOMETT.

By kind permission of the Cosmopolitan Club, Wanganui.

From a painting by George Sheriff.

THE SHEEPKILLERS.

THE KEA:

A NEW ZEALAND PROBLEM

INCLUDING

A FULL DESCRIPTION OF THIS VERY INTERESTING BIRD, ITS HABITAT AND WAYS, TOGETHER WITH A DISCUSSION OF THE THEORIES ADVANCED TO EXPLAIN ITS SHEEP-KILLING PROPENSITIES.

BY

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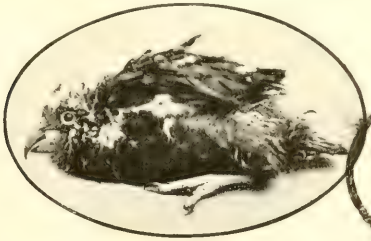

A KEA FLEDGLING

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1908

AUTHOR'S NOTE.

To write a book about a bird may seem to some a needless task. That depends more on the bird than on the writer. The New Zealand mountain parrot we call the Kea presents a topic of importance from many points of view. For half a century he has been accused of being a sheep-killer. That accusation, persistently and vehemently made, has drawn the attention of the scientific and non-scientific alike. For a parrot of but average proportions to develop a furious carnivorous propensity is zoologically remarkable enough. When this alleged habit is held to be the cause of heavy losses to the sheep-farming industry of a country it demands study also on other than zoological grounds. Naturally enough, much has been written and said already. For fifty years the Kea has been a veritable Ishmael, and has been treated on the principle : give a bird a bad name and shoot him. Not all that has been told of him, however, is true. Much has been wildest conjecture ; part is but colourably accurate ; all, until lately, was more or less uncertain. There seemed to be room for a careful and detailed examination of the subject. Such an examination is here attempted.

The writer cannot claim that he is quite alone in either the matter or the method of his investigation. After he had begun his work upon the sheep-killing problem, he found that Professor W. B. Benham, D.Sc., F.R.S., of Otago University, had entered upon the same inquiry, and (as the Transactions of the New Zealand Institute show) had reached a similar conclusion on similar data. To Dr. Benham the writer's thanks are gratefully tendered for much general help given.

For aid in securing the photographs reproduced he desires to thank Dr. L. Cockayne, F.L.S., the Revs. A. B. Chappell and H. E. Newton, Messrs. Harold Larkin, G. E. Mannering, A. P. Harper, R. P. Freville, Malcolm Ross, E. F. Stead and F. Field.

Expeditions into the Kea country have been made possible by

the ungrudging kindness of Mrs. Finlayson (late of Glenthorne Station) and Mrs. Murchison (of Lake Coleridge Station). Under this head is especially noteworthy the hearty and splendid assistance of Mr. R. Urquhart, the manager of Mt. Algidus Station.

Thanks are also due to Mr. E. Waite, Mr. Fougere, Mr. A. E. Currie and Miss Sapsford.

In preparation of material, revision of manuscript and correction of proofs the Rev. A. B. Chappell, M.A., has rendered invaluable aid.

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LIST OF ILLUSTRATIONS.

O bird of twinkling eye and plumage gay,
Soaring in glorious heights beyond our ken,
Threading the branching beauty of the glen,
What clouds have fall'n upon thy shining way !
Preying thyself, thou art become a prey,
A hovering terror feared and cursed of men ;
For faithful shepherd needs must smite again
Whate'er his harmless flock would tear and slay.
A madness like thine alpine torrent's own,
Shrouding thee in the mists of lowering hate,
Hurries thee to the shade of nether gloom,
Dashes thee from thy bush-clad mountain throne
To deep disgrace and ignominious fate,
And seals thee with irrevocable doom.

—ALBERT B. CHAPPELL.

THE KEA:

A NEW ZEALAND PROBLEM.

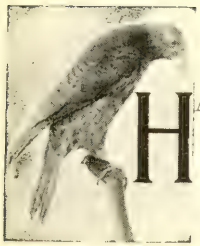
CHAPTER I.

THE KEA COUNTRY.

Ranges on ranges, far crest on crest,
The long Alp-barriers closed the West,
Like the walls of the Median city old,
A guardian girdle sevenfold.

There grimmest ridges looked softer through
The clinging film of their gentle blue,
Where high in the haze of the summits show
The cool, faint streaks of belated snow.

—William Pember Reeves.



HAVE you ever seen "the Kea Country?" The writer has; and the way in which the vision came to him seems worth the telling, especially as an introduction to an attempt to describe and discuss one of the most interesting creatures in a land where the interesting abounds.

For years I had longed to see the haunts of the Kea; and when at length a convenient winter vacation came, bringing no call to roam more pressing than this, I left the laboratory for the mountains. It is not an expedition to be enjoyed alone. But at the last minute my chosen companion failed me, and, rather than lose a rare chance, I went without him.

By train and bicycle I gradually wormed my way from Canterbury's city of the plain into the foot-hill country of the range that stretches along not far from the western edge of our South (or Middle) Island of New Zealand. Back of the lesser heights appeared the glistening peaks of the alpine country, where river beds of shingle and terraces of browning tussock and lakes of deep calm occupied the spaces between the sky-piercing points. As I struck in

KEA COUNTRY: Up the Wilberforce River; showing the bareness of the mountains east of the dividing range.

from Glentunnel, Mt. Hutt towered in front; a gaunt, mute sentinel seven thousand feet in height, with epaulettes and trappings of tussock and helmet of snow. Nothing daunted, I cycled by him deeper and deeper into the ranges by the way the Rakaia River has made for itself in its descent from the heights to the plain.

Here and there great shingle slides come down the mountain slopes, long streams of broken boulders that creep into the gorge and spread fan-like for a mile or so across its broken expanse. In places the river has shorn them off clean; and their massive walls, often a hundred feet in height, bound the river's torrent.

A night was spent at Lake Coleridge Homestead; and then, with my outfit transferred from cycle to horse, I skirted the lake, its wild water-fowl rising in clouds at my approach. About midday I reached the top of the pass.

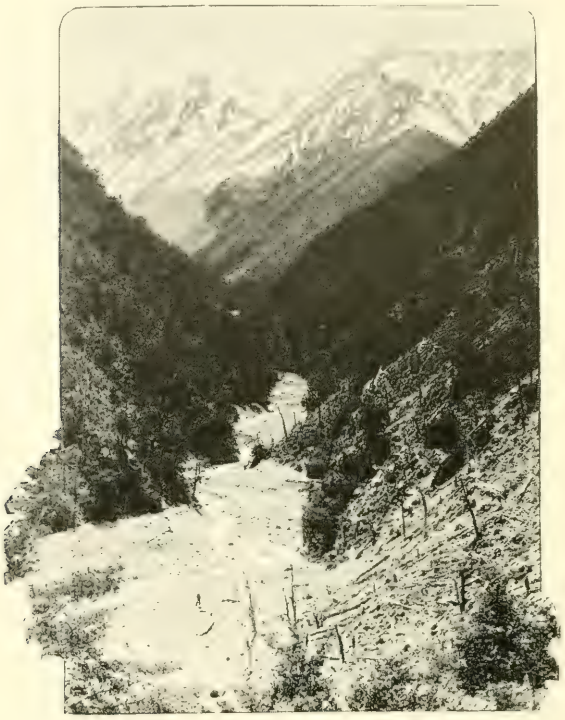
At last! There before me it lay,—the lonely, solemn, weird but fascinating country the Kea chooses for a home. Not a sound broke the great silence as I reined up and gazed across the apparently endless succession of snow-clad peaks. My coming seemed an intrusion. Save for the dray-track that wound easily down for a mile or so to the river-bed, passing an empty galvanised-iron hut as it went, there was no sign of man's presence in this vast wild. Over this scene, looking then much as it does now, the giant moas, whose remains have been found in the gorge, must have strutted in search of food.

Hundreds of feet below lie the Rakaia Forks, where the Wilberforce, Mathias and Rakaia Rivers unite their forces before they charge down the gorge on to the plains. Their reinforcements are called from all the surrounding peaks. They rush from the terminal faces of the glaciers; they trickle from the snow-line; they ripple and bubble through the cushion-like vegetation of the higher slopes. Down amid the dense bush they tumble, forming numerous cascades and waterfalls. Here they rattle under a fallen monarch of the forest. There they slip and slide over the great boulders that in vain stand to stem their progress. Down they scramble, seething over the shingle of the river-bed, sweeping round the hill slopes, hurrying to join the roaring river.

Where the gorge widens out the streams of the Rakaia anastomose like silver network, with the tussocky flats filling up the intervals. Farther away lie great swamps, where

paradise duck and swamp hen thrive, but horse and rider may be hopelessly bogged in awful quagmire.

Westward the three great river-beds spread, first for ten or twelve miles as broad U-shaped valleys and then as deep precipitous gorges leading away to the supplying glaciers. There the streams are lost to view.



KEA COUNTRY (Boundary Creek): A small tributary of the Wilberforce River.

Their flood height can be gauged by the broad reaches of naked shingle flanking the water's edge. Everywhere else below the hardy tussock is supreme. Above, peaks, jagged and white, stretch away to the great heights of the Southern Alps themselves. It is all so appallingly gigantic that man seems helplessly insignificant.

Behind, running away to the east, the Rakaia cuts its way, first for fourteen miles over a shingle-bed about a mile wide, and then, for another eight, rushing through a narrow defile amid some of the grandest gorge scenery of the Dominion.

Away to the left the Mt. Hutt Range continues, until it meets the Arrowsmith Range, capped with snow and girdled with glaciers, standing across the valley. To the right is Peak Hill's lower range, ending in a sharp point, — Mt. Oakden, cut off from the Rolleston Range by the Wilberforce stream, which has been strengthened above by the lesser Harper and Avoca.

All around, the mountain sides are weathered into great shingle slips, marching down to take possession of the plain, debouching here, uniting forces there, now in file, then in column, but always met by the indomitable tussock. The fight goes on, but the tussock is here unbeaten ; life tells ; "a living dog is better than a dead lion."

But these shingle slides—which for size and abundance are said to be seen nowhere else in the world, and accounted for by brittle strata and very sudden changes in temperature —are an annoyance to the traveller. Travelling is frightfully heavy and slow ; and any attempt to ascend their shifting stretches is heart-breaking.

As might be expected, over this vast wilderness sparse settlement only is possible. A few lonely homesteads, each with its shearing sheds and shepherds' huts, are all that can be found in the way of dwellings. The attendant sheds and huts are often separated from each other, and from the central dwelling, by miles of mountain range and stony river-bed. Each homestead is the centre of a sheep-station, which often includes many mountain chains. Life in the central dwelling is as a rule rigorous and lonely enough for the most austere hermit. News from the outer world filters in uncertainly, and usually with intervals of many weeks. For the lonely musterer, or shepherd, in his detached hut, the life is even worse. Little wonder that now and again one becomes mad or misanthropic.

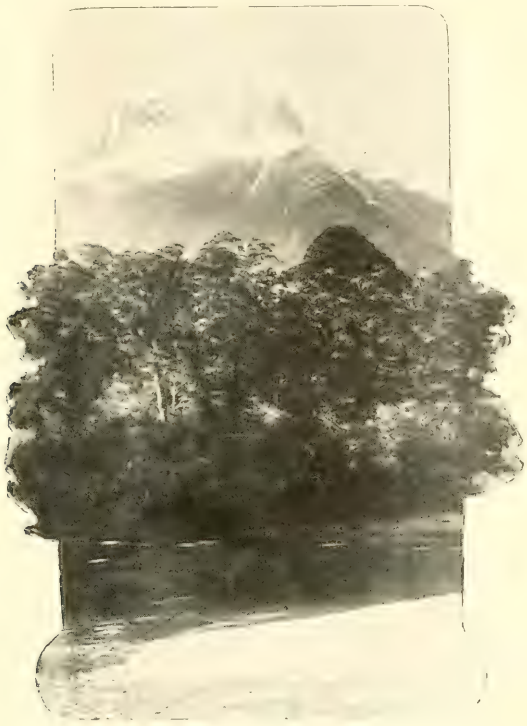
The region is an extremely stormy one. In July of 1907 I stayed some days at the Mt. Algidus Station, a fair sample of those described. It stands about forty miles back from the plains, and includes the Rakaia Forks, shut in among the ranges. On my return journey I had experience of the fury of the winter tempests that sweep over the area. My attempt to

KEA COUNTRY:
GLENTHORNE HOMESTEAD (3000 ft. ALT.), AND THE BIRDWOOD RANGE (7000 ft. ALT.).

make a dash on horseback for the Lake Coleridge Station was made painful and perilous by a snowstorm. It took six hours to do the intervening twenty miles. The drift was blinding, and the snow so caked upon the horse's hoofs that the ride became a stumble through the gale. Soon riding was impossible. The falling snow shut off all but a few yards ahead. Compelled to lead my horse, I fought my way until the pass was crossed and the homestead safely reached.

I was fortunate. Such winter travelling in that wild waste is full of dangers. A false step, and death may be met. Some years before, on the opposite side of this same

gorge, a surveyor was injured by a fall. He lay for days in that land of awful distances, starving, freezing, until his mind wandered and death came to rescue him. His note-book, found beside his body, told a pathetic tale. He had heard the men shouting to their horses as they dragged supplies



KEA COUNTRY.

up to the Mt. Algidus Station; but the help for which he looked never came.

Such storms as I experienced come in close succession in the winter months, burying everything under many feet of snow. The night frosts clutch everything with a grip of iron. Cascades become threads of shining icicles. Nothing but the main body of the streams resists the binding cold.

When spring comes there is a change, but only doubtfully for the better. The biting blasts give place to the warmer winds from the north west. These come over the Tasman Sea, getting charged with moisture on the way, until they strike the rampart of alpine peaks and pour their burden on the snow. At night the scene is weirdly grand. The lightning plays among the rocky crests, darting its fiery fingers again and again down into the valleys. A veritable cannonade of thunder shakes the mountain slopes, while sleet and hail sweep ruthlessly everywhere. Soon every crevice in the mountain side sends forth a torrent; the creeks become rushing rivers; and the river itself awakes to fury, losing its winter gentleness for a violence indescribable. Swollen from bank to bank, it becomes a seething, whirling, irresistible flood. It gouges out the bases of the cliffs and sweeps away the fords, while the roar of its water and the growl of its crunching boulders can be heard miles away. Heavily laden with yellow silt, it rushes out over the plains and discolours the sea for seventy miles out from the coast. The coming of these spring winds effects a devastating transformation, well described in the following stanzas from "The Nor'-Wester," by the late Mrs. F. M. Renner, *née* Craig:-

Then I spring up the slopes of the Alps, but recoil at the touch of their snow,
And wrap myself round in cloud; and my angry eyes, aglow,
Shoot forth the zig-zag lightning; my thunder shakes the air,
And I scatter the great drops thick and fast from off my sea-wet hair.
But never a whit can the Alps stop me,
I leave them soon behind,
And revel and dance in maddest glee,
A riotous Nor'-West wind!

My warm breath frees the waters, and makes the snow flowers die,
And the sides of the Alps are torn as the torrents hurry by;
There's a fresh in the Waimakariri, a flood in the turbid Grey;
Each swollen river is rushing, o'erwhelming all in its way.
And this is my work that none can withstand,
Nor any power can bind;
And I dance and revel throughout the land,
A riotous Nor'-West wind!

During midsummer and autumn only are these vast alpine tracts at all comfortably accessible.

This band of alpine country forms the back-bone of the

South Island of New Zealand, and stretches for about 480 miles, from one end of the island to the other, lying somewhat to the west. It is composed of long parallel ranges of mountains many thousands of feet in height, crossed all along their length by shorter transverse ranges, which taper out to the plains. In between these cross ranges the rivers run, fed all the year round by the alpine snows, and cutting out deep gorges between the mountains, which form picturesque defiles opening to the plains.

These river-beds form the easiest way of access to the alpine country, and usually a road or track stretches along their high banks, cutting across miles of shingly river-bed, over low hills and flat tussocky terraces, until it runs towards the central range, often getting rougher and more hard to follow as it approaches the passes that lead to the West Coast.

On the east side of the dividing range the mountains are clothed with tussock grass, which grows up towards the snow-line, where it gives place to the sub-alpine vegetation. Where the rainfall is sufficient fairly large patches of forest stretch for miles.

On the western slopes, owing to the large amount of moisture deposited by the north-west winds, the barren tussocky scenery changes almost immediately into beautiful snow-clad peaks, covered on their lower slopes by evergreen forest, where ratas, veronicas, olearias, tree ferns and mosses form scenes of exquisite beauty.

From the sides of the steep forest-clad mountains foaming cascades and roaring torrents tumble down into the valleys ; and, when the upper snows melt, waterfalls of all sizes pour from every depression and gully, forming, with the dark evergreen of the bush, scenes of unsurpassed loveliness. Here one leaps from the cliff a hundred feet or so above you, and, arching over the roadway, tumbles with a roar into the valley, drenching the traveller with spray as he passes under its watery arch. There one darts out from some bush-clad precipice, and, when caught by the wind, spreads itself out for some hundreds of feet along the sides

of a dark cliff, like a gigantic silken bridal veil, throwing out iridescent colours as the sunbeams play among its folds.

Northward the alpine country gradually diminishes in height and grandeur, and spreads out almost from coast to coast, forming the hills of Nelson and Marlborough.

Southward the ranges rise higher until the chain is

KEA COUNTRY: SHOWING THE BUSH-CLAD MOUNTAINS WEST OF DIVIDING RANGE.

crowned by Mt. Cook, which well deserves its Maori name of Aorangi, or "the heaven piercer." Snow-clad and grand, it rears up its sharp precipitous peaks some 13,000 feet into the air, surrounded by a large number of minor peaks, second only to itself in height and splendour. Here on all sides the valleys are filled with huge glaciers, stretching out to eighteen miles in length. The glacier streams which flow from their terminal faces fill large glacier lakes; these in turn feed the rivers, which hurry down their gorges to the sea.

Southward beyond this the mountains spread out and cover Otago and Southland; while to the west the scenery along the main chain increases in imposing loveliness. The

rugged, barren peaks give place to bush-clad mountains; peak after peak, range after range, they seem to vie with one another in presenting to the traveller scenes most varied and striking. Here a peak mightier than his comrades shoots up his hoary crest into the blue, his lower slopes clothed in evergreen forest of rata, lancewood, ferns and mosses, often so dense as to be impenetrable. As the height increases the growth dwindles, until near the snow-line it gives place to the celmisia and mountain lily, which in turn give place to the cushiony vegetation of the sub-alpine flora. Above this, plant life ceases to fight against the terrible odds, and the rugged, rocky summits are clad in eternal ice and snow. Alongside this symbol of massive strength and grandeur, a deep, peaceful lake will be found quietly nestled, which, but for the bush-clad precipices and the snow-clad peaks reflecting themselves on its surface and the heavy bush fringing its sides, would fit well in some English country landscape

The whole country about this region is an endless series of craggy peaks, dark mountain gorges, sylvan lakes, picturesque fiords, which for grandeur and beauty are unsurpassed, and draw travellers from all parts of the world to gaze upon them.

This long stretch of alpine country is the home of the Kea. Here he reigns supreme. At times he may be seen flying about the snow-clad peaks and the glaciers, or hopping from rock to rock in search of food. Again, he may be found in the dense bush, seeking berries or prying curiously into the ways of the homesteads. Here, in a region of mountain, forest and flood, the bird has lived and flourished for centuries, until man came unbidden. With man came sheep, and with sheep the great temptation, and soon also the fall that has for ever blackened the character of these interesting mountain parrots. Even yet, with the brand of Cain upon them and every man's hand against them, they find a refuge and a home in the mountain fastnesses.

CHAPTER II.

DESCRIPTION.

In the midst, iridescent and glowing,
Full-breasted, bead-eyed,
Bright as the Argus showing,
Not knowing its pride.

—Johannes C. Andersen.

There is nothing very graceful about the Kea, neither in appearance nor in movement. He is a clumsy, awkward-looking, olive-green bird, somewhat larger than a domestic pigeon, with a flat head and a long, sharp, curved beak. His legs are short, so that his tail is often dragging on the ground; and, when not hopping, at which he is an adept, he moves with an ungraceful waddle. There are four toes on each foot, slate-coloured, as is the tarsus, and not only are they placed two each "fore and aft," but they are long and seem unfit for much walking. To add to his clumsiness, when walking the bird often places the tarsus as well as the foot on the ground, so that feathers on the legs touch the ground.

When the bird settles after flying he appears somewhat graceful, but he very soon ruffles his feathers and hides his symmetry.

The intensity in the colouring of the plumage varies largely according to the season of the year or the age of the bird. Often some appear to be of a dirty, washed-out, brownish green, while others have a beautiful olive-green plumage, tinted with red and brown.

Dull olive-green feathers, edged with black, cover the whole body, except for a band of brick-red feathers (upper tail coverts) over the base of the tail, and a large patch of similarly coloured feathers under each wing.

The green colouration is most vivid on the back and on the sides of the wings, but it gets duller on the ventral surface of the body and towards the head.

The outer webs of the large wing feathers (primaries) have a bright metallic-blue tint, while the inner webs are brownish-black, banded by pale yellow teeth.

THE KEA: SHOWING THE USUAL RUFFLED CONDITION OF THE PLUMAGE.

The under surfaces of these feathers are similar to the upper, except that the metallic blue colour on the outer webs is absent, being replaced by the general blackish-brown hue.

The tail feathers are nearly equal in length, and the upper surfaces are olive-green, getting paler towards the tips. They are crossed at their extremity by a black band.

The upper mandible, or beak, is smooth, and much curved. It is of a brownish-black colour, with a lighter yellow tint at its crown.

The lower mandible is much shorter, and is nearly straight. It is of lighter colour, being in the young bird

mostly yellow, but darkening to a brownish-black as the bird ages.

The eyes are dark brown or black, with a yellow ring of wattle encircling each. There is also some similarly coloured wattle (cere) around the nostrils, which in shade varies from a bright to a dull yellow.

Female. *Male.*

KEAS' HEADS: Showing the external differences between the sexes.

From a number of specimens kindly lent me by Dr. B. Moorhouse, of Christchurch, I obtained the following average measurements:

Length of the bird from the tip of the beak to the end of the tail—20¼ inches: maximum, 23 inches; minimum, 18½ inches.

Length of the upper mandible from tip to gape—2⅝ inches; maximum, 2¾ inches: minimum, 1⅞ inches.

Length of wing from flexure (carpel), 12 3-5 inches; maximum 13 inches; minimum 12 inches.

The female is very similar to the male, but can often be recognised by the duller plumage. If one is at all familiar

with the birds, the beak and general form are good indications; the female is a more slightly built bird, and the beak is neither so stout nor so powerful. There may be some confusion when young birds are encountered, but these can always be identified by the quantity of yellow colouring in the mandibles.

Even the young male bird usually has a more heavily built beak than the adult female.

Like other members of the genus *Nestor*, individuals vary much in the brilliancy of their tints, and sometimes the variation is so marked as to give them an albino or a yellow appearance. Professor F. W. Haslam, of Christchurch, informed me that he saw in one of the Otago homesteads a stuffed Kea that was more or less an albino.

Sir W. Buller gives the following instance of variation in a specimen procured for him from the interior of Otago :— "Bright canary yellow, with a few red feathers interspersed throughout the plumage; vivid red on the rump and upper tail coverts, as well as under the wings. Such a gorgeous bird has never been seen in the district before."

In the supplement of his "New Zealand Birds" he says :—"About seventeen years ago a beautiful yellow Kea was obtained in the Wanaka Country in the far south. At the time there was a Government bonus of two shillings per head for Keas, as the bird had been proving very destructive to the sheep. Every man on the station, as a rule, carried with him a fowling piece on his rounds and came home at night with a bagful of beaks, thus adding not inconsiderably to his weekly wages. Thousands of pounds were paid in the course of the year by way of bonuses in the Wanaka district alone. The last payment made by my informant was £500 in one lump sum. It can be gathered by this what the destruction of Keas was at that time. In consequence of this persistent slaughter they rapidly grew scarcer, till at length there were so few to be seen that the men at work on the round would not encumber themselves with

a gun. When the killing fever was at its height, one of the men on delivering his tale of beaks said: 'I shot to-day the queerest Kea I ever saw — all yellow.' He added that there was another similar bird which he could not catch. Finding that the man, after cutting off the beak, had thrown the body aside, the manager sent out to search for the bird, but was unsuccessful, some vagrant dog or hawk having carried it away. In a

KEAS: Showing the general shape and appearance of the birds.

short time, however, the other was shot and carefully preserved by the manager, who sent it to Mr. C. Turnbull, of Dunedin. The bird has since come into my son's possession, and the whole of the body plumage is vivid canary yellow, deepening on the neck and sides of the body and rump into a rich orange yellow; most of the scapulars and the quills are of the normal colour, except the first primary in each wing, which is yellowish white; tail feathers, canary yellow, excepting two of the outer lateral ones, which are partly normal; lining of wing, delicate orange. Here and there, especially on the

head, there is a feather or two of the normal colour. To be exact, this abnormal example was obtained at the head of the Shotover River, on the western side of the Motutapu."

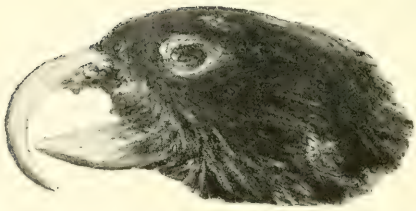
There have come under my notice two malformations of the Kea's beak.

THE KEA (MUSEUM SPECIMEN): SHOWING GENERAL APPEARANCE.

In 1899 a man photographed a Kea that had the upper mandible shot away down to a stump. In spite of this disadvantage the bird was very strong when seen.

I have in my case the head of a Kea shot by Mr. R. Urquhart, near the homestead of Mt. Algidus. The upper mandible by some means had been shot wholly or partly away just at the nostrils, leaving nothing but a stump.

Since then, apparently, a new beak has grown out above the old stump, and has curled round over the lower mandible, until it has formed a half circle. The new beak is much narrower at the base than the old one, and does not taper to a point, but ends bluntly. Owing to the long curve on the upper mandible the two beaks would not come close together, and the bird must have found some difficulty in procuring food. However, in spite of this, it was fairly plump when shot and seemed to have got a good deal of enjoyment out of life.



KEA'S HEAD: SHOWING THE ABNORMAL GROWTH OF THE UPPER MANDIBLE DUE TO A BULLET WOUND.

CHAPTER III.

HAUNTS AND HABITS.

Mountain lilies shine
  Far up against the snow,
And ratas twine
  On the wooded slopes below.
Rata and clematis
  Sweet as bush may hold;
While honey-loving wild birds kiss
  The kowhai's cup of gold.

MARY COLBORNE-VEEL.

It is a well established fact that the Kea is found in the mountainous regions of the South Island of New Zealand; but whether it lives among the snow-capped peaks and glaciers, or lower down near the forest line, is a question that has not so far been satisfactorily answered.

So much romance has surrounded the bird since its discovery that it is difficult to get people to come down to the sober facts of the case. So popular has it become to describe the Kea as the solitary denizen of the lonely snow-bound alpine peaks, that even some of our present-day scientists, without taking the trouble to ascertain its real habits, prolong the popular erroneous belief that the Kea dwells only amid ice and snow.

A recent book states that it lives "up in the mighty mountains where the snow never melts and men seldom go: sometimes it is driven from its stronghold and is compelled to seek food at lower elevations."

Another writer describes the bird as living "far above the dwarf vegetation . . . . in a region often shrouded with mists and driving sleet."

The Kea may often be seen soaring among the silent snow-capped heights; yet it by no means spends most of its me there, but is more frequently found at lower levels.

Though the mountains in the South Island are high, ranging from five to thirteen thousand feet, and though in winter they are covered with a thick coating of snow, yet in summer, owing to the warm winds and rain from the north west, much of their snow is melted. It is, therefore, only

THE KEA: On the look out.

on the main dividing range and several other more or less isolated peaks that much snow can be found; and this is often confined to the greater heights. Again, if the Kea lives far up above the dwarf vegetation, how is it to subsist?

And again, is it likely that a bird would make its home in a wilderness of snow and ice when there are better places for nesting, lower down the mountain, among the very vegetation from which it obtains its natural food?

From what I have personally seen of the Kea's home, it is not a place of eternal ice and snow, but a spot that, in fine weather at all events, is unsurpassed for beauty and situation.

Below is the ever vernal forest, with all its beautiful tints of green, covering the mountain slopes down to the bottom of the valley, where an entrancing panorama of lake, river and flat spreads out before the eye.

Above, the craggy peaks pierce a sky of exquisite blue; while under foot the sub-alpine flora, in all its quaint beauty, forms a carpet of cushion-like plants, dotted over with small white flowers, like so many stars shining in an emerald sky. Away from the heat of the valley, with a wide, grand outlook and a life-giving atmosphere, the bird has surroundings to be coveted. Sometimes it rises and circles the snowy peaks, but more often it swoops down to where the forest and river-bed meet, and revels among the foliage.

A good deal of support has been given to the Kea's alleged preference for snow and ice by the fact that travellers, when climbing the Alps, often see the parrot soaring round, and they too readily conclude that this must be its natural environment.

It seems to me that nothing could be more natural than that a bird of such known inquisitiveness and keen sight should fly up and investigate the dark figure of the climber as he makes his way over the snow and ice.

Sir W. Buller, as early as 1888, made very clear the Kea's true habitat. He says, "I have seen it soaring or flying, often in parties of three or more, from peak to peak, high above the wooded valley; but it is more generally to be met with on the open mountain side, flying from rock to rock, or hopping along the ground amongst the stunted alpine vegetation, in quest of its natural food."

Subsequent writers, however, seem entirely to have passed over this clear statement, and in all the popular articles on the subject that I have seen a wrong habitat is given.

Sir Julius von Haast saw two Keas flying over the Godley Glacier; but, though he saw Keas several times while

THE KEA: HUNTING FOR INSECT LARVÆ.

exploring the alpine country of Canterbury, once only did he meet them in perpetually snow-clad regions and amongst glaciers.

Another significant fact is that many accounts of sheep killing have come from districts which are situated many miles from the region erroneously described as the Kea's home,.

Dr. L. Cockayne, in a communication to me, gives what I take to be the Kea's correct habitat. He says "I have observed the Kea in various parts of the Southern

Alps, from the Humboldt Mountains in the south to Kelly's Hill in Westland. Although frequently met with on the open alpine and sub-alpine hillside, I consider the bird essentially one of the forest limit, where it may be seen in numbers at the junction of the forest and sub-alpine meadows and in the Nothofagus forest where such are pierced by river-beds."

In my travels in the back country, I have frequently made the Kea's acquaintance, mostly around the head-waters of the Rakaia River and also around Mount Torlesse, and, though I have seen it up as high as 5000 feet or more, my observations agree entirely with Dr. Cockayne's statement.

One writer even ridicules the idea of Keas being forest birds, for he says, "I remember being astonished on reading of the Kea living in the forest, for I never, even during the severest winter, saw it perched on trees." It is a well-known fact now that they commonly settle on trees; as early as 1862 Sir Julius von Haast saw one in a tree near Lake Wanaka, and since his time numerous similar testimonies have been borne.

I have, on several occasions, seen the Kea perching on trees. Once in January, 1903, in a forest behind the Glenthorne Homestead, and while camping for several days near the source of the Avoca river, I and others constantly saw them flying in and out of the forest some 500 feet above us.

The fact that these birds were seen so low down in summer disproves the old statement of many writers that they come down to lower altitudes only in heavy weather. Each time that I saw them low down it was mid-summer, and the weather was warm and clear.

At first I thought that possibly the Keas had come to live at low altitudes since they had developed sheep-killing propensities, in order to be near to their quarry; but the fact that before they had learned that habit, namely, in 1866-67, Sir Julius von Haast saw more Keas below than above snow-line disproves the supposition. The very fact that, in winter, the heavy falls of snow, accompanied by cold biting winds, drive the Kea to lower altitudes, seems to me to

indicate conclusively that the bird is not so fond of cold stormy heights as many people suppose.

People have often wondered how the birds manage to exist in the alpine country when an excessively heavy fall of snow absolutely covers the land for many weeks, so that even the sheep out on the open hill-side are buried so deeply as to prevent the birds molesting them. An experience that came to

MOUNTAIN DAISY *(Celmisia coriacea)*: THE KEA IS FOND OF THE ROOTS OF THIS PLANT.

Mr. R. Guthrie, of Burke's Pass, throws a good deal of light on this question. Many years ago he was out looking after sheep on Mistake Station during a heavy snowfall, when, walking on the frozen crust of snow on a hillside, he suddenly broke through and sank first into a bed of snow and then through the tops of some scrub on which the smooth sheet of snow was lying. The snow was so thick that, with the tops of the scrub, it made all dark below. Hearing some odd sounds, he struck a match to see what sort of companions he had fallen in with, and there he found several Keas busy pecking the ground for grubs and gurgling over their work; and further away he could hear

others. Here, then, was an explanation of the wintering of the Keas. The alpine scrub is generally fairly thick where there is any at all, thick enough to form a roof upon which the snow can lie, and stiff enough to bear the weight of it ; and beneath the scrub and snow roof the Keas can be very comfortably housed, out of the reach of frosts and gales, and with a larder under their feet. There may not be much in that larder, but it is enough to keep them alive till the snow disappears.

It is quite a mistake to think that whenever you are in Kea country you will see the birds ; considering the expanse of the country, the Keas are comparatively few, and the traveller may spend days and even weeks without ever seeing a single specimen.

They seem to have favourite valleys and peaks, and, if you can get back into the mountain fastnesses and camp in these places, the Keas in their native haunts can usually be seen.

At other times they may be seen in ones and twos or larger groups scattered throughout the country, but their appearance on the scene is always an uncertainty.

Often they seem to be very timid, and fly high up in the air, giving out their characteristic cries as they sail overhead. Sometimes, on the other hand, they become fearless and poke round one's tent and camp fire in a way that makes them a perfect nuisance.

In some districts, where they were once to be seen in large flocks, the long slaughter has since greatly reduced their numbers.

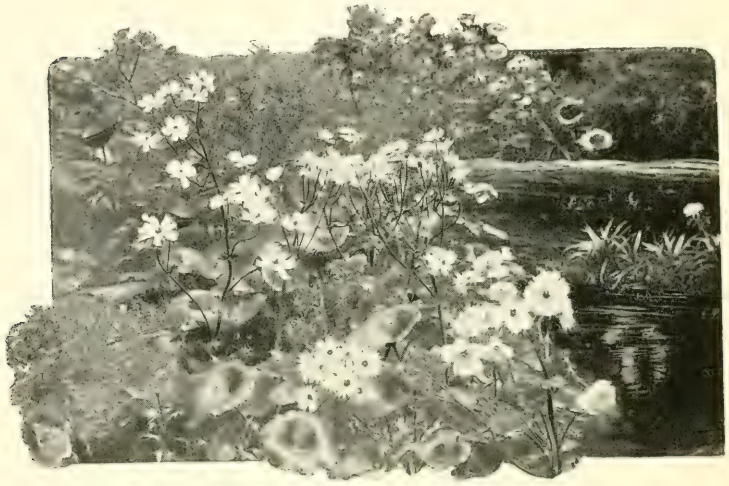
The Kea, like other parrots, is normally a vegetarian, with, as one might expect from its connection with the brush-tongued parrots, a strong liking for honey.

In addition to this it is strongly insectivorous, being specially fond of the larvæ of the insects found on the mountains.

The late Mr. T. H. Potts says that the Kea gathers its subsistence from the nectar of hardy flowers—from the drupes and berries of dwarfed shrubs that contend with the rigorous

climate and press upward almost to the snow-line of our alpine giants. To these food resources may be added insects found in the crevices of rocks, beneath the bark of trees, etc.

A correspondent, in a letter to me on the subject, says: "The Kea eats all the grasses to be found in mountainous country, and besides eating the tender shoots it is particularly fond of the grain or seeds of the blue grass. It turns over the stones and gets the larvæ of the ants, and also eats worms, grasshoppers, grubs and beetles."



MOUNTAIN LILIES (*Ranunculus Lyallii*) AND CELMISIAS: THE ROOTS OF THESE PLANTS FORM PART OF THE KEA'S FOOD SUPPLY.

When the snow covers the sub-alpine shrubs, and insect life is dormant, the Kea is forced to go lower and lower down the mountain to take shelter in gullies, where it feeds on the hard, bitter seeds of kowhai (*Sophora tetraptera*), small hard seeds in the fruit of *Pittosporum*, the black berries of *Aristotelia fructicosa*, (the native currant), as well as on the fruit of the pitch pine (*Dacrydium biforme?*) and the totara (*Podocarpus totara.*).

Mr. Huddlestone gives its bill of fare as follows:—

"Besides grubs, they feed on the berries of various alpine shrubs and trees, such as the snow-berry, *Gaultheria*, *Coprosma*, *Panax* (*Nothopanax*), the little black seed in a white skin of *Phyllocladus alpinus*, and *Pittosporum*, with its hard seed in a glutinous mass, like bird-lime, and the red berry of the *Podocarpus* (*Nivalis*), also on roots of various herbaceous plants — *Aciphylla squarrosa* and *A. Colensoi*, *Ranunculus Lyallii*, *celmisias*, etc."

Professor W. B. Benham, when in the Southern Alps, saw some Keas eating the orange berries of the low-growing heath, *Leucopogon Fraseri*. He says:—"Two birds were feeding on these berries within two yards of where I was sitting; they ate the juicy part of the berry, putting out the skin and usually the 'seed' also, which I found afterwards on the ground, though now and then I heard the bird crack the seed; so that occasionally at any rate it swallows this."

A correspondent, writing on this subject, says:—"I have watched the Kea pecking grubs out of a dead tree, and have frequently noticed them picking into the earth for the roots with their beaks."

Another says:—"I have shot very few [Keas] that have not had mutton in their crops, and next to that are grubs and the roots of aniseed. In summer and autumn they go for berries, such as snow-berries, etc., and also the honey out of the flax seed (*Phormium tenax*)."

Miss Eva C. Izard, of Christchurch, has placed me under obligation by putting her Keas through a special course of food in order to ascertain their particular tastes; and, in addition to this, so tame was one of them that it was given at certain times the run of the orchard and grounds and so could help itself to the many native plants found there. In this way, observing the birds under circumstances as natural as possible, Miss Izard was able to supply me with much useful information regarding their natural foods. I cannot do better than quote her letter:—"I have been putting the Kea through a course of native berries as far as practicable. He likes *Coprosma* best, but he never eats the seed, only the outside. Konini (*Fuchsia exorticata*) will suit him, but he only eats it out

of politeness—not with avidity. He declines the honey out of the white and crimson koromiko *(Veronica sp.)*, but Mr. King [one of her Keas] used to love the flowers of *V. buthiana* and *V. Fairfieldii* only next best to yellow kowhai, to which he was as nearly devoted as to broad-leaf flowers. Even when no flowers were out on the broad-leaf he could always be found busy pecking at the bark of the branches, but I could never find out what he got there. He disliked five-fingered Jack in seed, but patronised the flowers, and was fond of nipping off branches of it. There is a tall umbrella tree, with *Parsonsia* climbing over it, up which he often spent a very busy hour or two in spring, though I can't say what he

MAORI ONION *(Bulbenifera sp.)*.

was sucking. He never cared to go up at any other season. Cabbage trees *(Cordyline)*, matipos *(Pittosporum)*, birches, rangioras *(Bachyglottis rangiora)*, miki-miki *(Cyathodes acerosa)*, and New Zealand holly (*Olearia ilicifolia*) were never interfered with, nor was *Libertia grandiflora*, but he always made a dart for the mountain lily *(Ranunculus Lyallii)* and daisies *(Celmisia sp.)*, roots as soon as ever he was out of his cage. Mr King never interfered with the English trees except one oak, and he never could resist cherry trees when the fruit was ripe. Lettuces ranked next in favour to dandelion *(Taraxacum officinalis)* roots, of which he was very fond, I think because they reminded him of Maori onions *(Bulbenifera sp.)*, as he

always made a point of demolishing each plant we got. He seemed to need roots for his digestion; he was never so well when he did not have them two or three times a week. The Keas always like the flax honey, though they don't care for the seeds. In fact, honey seems much more to their taste than berries, except the *Coprosma*."

The above accounts seem to me to give a fair idea of the Kea's food supply before it took to sheep-killing.

One can easily imagine him in spring and summer fossicking in the cushiony vegetation of the sub-alpine meadows for insect larvæ, or flying in and out of the bush in search of honey and fruits; while in autumn and winter he would be searching for insects among the crevices of the rocks or eating the berries of the forest. Now that he has taken to sheep-killing much of his spare time is used in worrying the sheep, and in winter the mutton must make a welcome addition to his scanty larder.

CHAPTER IV.

NESTING.

But o'er my isles the forest drew
A mantle thick—save where a peak
Shows his grim teeth a-snarl—and through
The filtered coolness creek and creek,
Tangled in ferns, in whispers speak.

And there the placid great lakes are,
And brimming rivers proudly force
Their ice-cold tides. Here, like a scar,
Dry-lipped, a withered watercourse
Crawls from a long-forgotten source.

—Arthur H. Adams.

Though the Kea has become, during the last forty years, the most notorious of all our New Zealand fauna, yet so cunning was the bird, and so secluded was its retreat, that it is only during the last few years that we have pierced the uncertainty that hung around its home life, and have been allowed to gaze with curious eye upon its nest.

The information concerning its home life that has come to hand in recent years is quite in keeping with the notoriety of the bird, and it can be safely said that its breeding habits are the most striking and interesting of those of our avifauna.

Were the Kea surrounded by countless enemies it could not have chosen a more impregnable fortress in which to rear its young ; it is a veritable Gibraltar, and as such it usually remains unmolested.

Not only is the country in which the Kea lives dangerous as well as difficult to travel over, but it is in some of the least inaccessible places in that almost inaccessible country, high up in the mighty peaks, that the Kea makes its home.

I cannot improve upon the graphic description of the Kea's home given by Mr. T. H. Potts. "It breeds in the

deep crevices and fissures, which cleave and seam the sheer faces of almost inaccessible cliffs, that in places bound as with massive ramparts the higher mountains spurs. Sometimes, but rarely, the agile musterer, clambering amongst these rocky fastnesses, has found the entrance to the 'run' used by the breeding pair, and has peered with curious glances, tracing the worn track till its course has been lost in the dimness of the obscure recesses, beyond the climber's reach.

JACK'S HILL AND CHIMERA CREEK.
SHEWING THE PRECIPITOUS FACES IN WHICH THE KEA NESTS.

In these retreats the home or nesting place generally remains inviolate, as its natural defences of intervening rocks defy the efforts of human hands, unless aided by the use of heavy iron implements that no mountaineer would be likely to employ."

Even if the ardent collector manages, with great care, to reach the nest, and is able to obtain a foothold on the side of the cliff, he will often find that a crowbar will make little impression on the opening of the "run," and nothing less

than a charge of blasting powder would suffice to force an entrance.

It is a mistake to suppose that the Kea builds always in such inaccessible positions, though they seem to be the favourite places. The choice is influenced to a large extent by the nature of the surrounding country.

If the mountain sides are pierced by these long narrow tunnels, running for many feet into the rock, these are used; but, if they are not available, the Kea makes use of whatever comes to hand, such as a cairn of stones or a hole in a clay bank.

Even as late as 1882 its egg was unknown to science, and Mr. Potts at that time said it was yet to be described. Even to-day Kea's eggs are scarce, and one collector has a standing offer to pay £1 per egg.

Though there are several rough descriptions of Kea's nests already published, I have never seen a description that goes into much detail; and, as far as I know, there were no photographs of nests until those I got were secured.

In order to see a nest myself, and also to procure some photographs of the tunnels in which the Kea builds, I made an excursion up the Rakaia Gorge, into the heart of the Southern Alps, in July of 1907.

Through the kindness of Mr. R. Urquhart, the manager of the Mt. Algidus Station, I was able to make my headquarters at that homestead, one of the centres of the Kea-infested districts. In 1906 Mr. Urquhart had discovered a nest in a gorge, and, as it was practically undamaged, he had offered to lead me to the spot if I could pay him a visit.

The day of our excursion was preceded by a night of heavy hail and snow storms, which swept round the homestead with terrific force. The morning broke wet and gloomy, and the whole adjacent country was enveloped in driving clouds and sleet. Nothing could be seen of the mountain ranges that hemmed us in on every side, except their wooded bases, over which torrents of muddy water streamed down to the valley.

It was ideal weather to see the Kea, but certainly not the weather one would have chosen for a long ride on horseback in order to take photographs on an open mountain side.

We were away in good time ; and, with my camera protected with sacks, we slowly made our way over the saddle that separated us from the Mathias River. We crossed the summit in the face of a biting wind, and took the track leading down to the river flat. This was steep and

NATURAL ENTRANCE TO A KEA RUN : The hole goes ten feet into the rock.

slippery, and it was only the surefootedness of the horses that prevented nasty falls. Once down on to the river-bed, we found the air less keen ; but the sleet and low hanging clouds made the scene lonely and depressing. "Just the weather," remarked Mr. Urquhart to me, "for the Keas to kill sheep." For a long time we rode on, with the river on one side and

the snow-clad Rolleston Range on the other, until we suddenly came upon some proof of the Keas' presence. On the ground in front of us a fine merino ram lay dead, with a ghastly hole torn in its back, and its neck stretched out as if it had died in agony.

Having photographed it, we pushed on to where the Chimera Creek joins the Mathias River ; and here, tethering our horses to the bushes, we commenced to climb the steep, slippery side of Jack's Hill.

The Chimera Creek flows almost through the centre of the hill, and on its way has cut a deep narrow gorge, which is about two hundred yards wide where the stream issues on to the river flat. This gorge runs back for some miles towards the centre of the range. On each side high and prependicular cliffs shut out the sunlight, and, rising as they do from two hundred to a thousand feet in height, they form a long, deep, narrow gorge.

At last we came to the nest, which, fortunately for us, was not in an altogether inaccessible position, but situated in a long narrow tunnel, whose opening was in a small ravine running at right angles to the top of the gorge and opening over it.

It was situated on the top of the western cliff, but, owing to the walls of rock rising sheer out of the bed of the creek, we could not get a foothold anywhere ; in order to reach it, we had to climb along the top of the cliff. Owing to the thick drizzle that had now set in, and the fact that the ground sloped to the edge of the gorge, we had to take great care that we did not slip over into the dark ravine below.

In August, 1906, while trying to destroy some Keas that had been killing sheep for some time, Mr. Urquhart discovered the nest and determined not only to rob it, but at the same time to kill the old birds.

So one night, with several of his men, armed with spades and crow-bars, he climbed along the edge of the cliff ; but owing to the darkness they were unable at first to locate the nest. As a last resource one of the men imitated the well-known

call of the Kea, and the little ones in the nest immediately responded.

The opening of the "run" in which the nest was situated was thus found; yet, owing to the narrowness of the tunnel, the men were still unable to reach the nest. However, with the aid of a crowbar, a large rock was removed from the entrance, and the young birds were captured. The mother bird was killed, and the men put the little ones inside their shirts

NATURAL ENTRANCE TO A KEA RUN: After the removal of a large rock from the entrance. From this nest the four young Keas were taken.

for warmth and safety, and they were thus carried back to the station.

The father bird escaped; and, though Mr. Urquhart returned the next day and stayed an hour or two about the place, he did not catch a glimpse of him until, about to give up the search in despair, he espied the old fellow watching in artful silence from a tree, where he had been probably perched throughout the proceedings. The bird carefully avoided any closer acquaintance.

As no one had been near the nest since then, it was almost intact when we found it ; and with the exception of the stone removed from the entrance it was just as the birds used it. To call their breeding place a nest is almost to use a misnomer ; for the birds choose a natural tunnel in the rocks, one with a narrow opening, just wide enough to allow them to pass in and out, and then place a few pieces of tussock grass at the far end, where the female lays her eggs.

Such was the one I saw. The tunnel or "run" went about six feet into the rock. The opening, after the removal of the large stone, was in the shape of a triangle. The distance from apex to base was fourteen inches, and the base measured nineteen inches. I squeezed in as far as I could, and found, on lighting a match, that the tunnel narrowed as it approached the end, and here in the narrowest part the nest was placed. This nest, at the time it was robbed, contained four young birds.

On the opposite side of the small ravine were the remains of another nest ; but the opening was so narrow that I could not get even my head in, and nothing less than dynamite would have widened it. This hole was thirty inches deep and thirteen inches across at its widest part, but it narrowed rapidly as it left the surface. It ran back some ten feet into solid rock and there again enlarged greatly.

After taking notes of both nests, I set to work to photograph them ; and not only was the situation awkward owing to the proximity of the cliff, but our troubles were augmented by the rain and mist, which owing to the lateness of the afternoon made the light very feeble. However, as I had come especially to obtain photographs of this phase of the Kea's life history, I fixed my camera up in the wet, and, after consulting photometer, gave the plates nearly fifteen minutes' exposure.

Fortunately, on development the negatives came up well. As already remarked, I think they are the first photographs ever taken of a Kea's nest.

While trying to trap some Keas on the Glenthorne Homestead in January, 1908, Mr Edgar F. Stead was

fortunate enough to find a Kea's nest, which he describes as follows: "A bird came over and began calling, but would not come near the traps, staying down by the male bird we had caught the night before. I went back and saw her, with tail spread and wings drooping, run to the edge of a bluff and fly off into the ravine without a sound. I guessed immediately that she had a nest, and as soon as there was enough light we started looking for it. When we were just giving up hope of finding it, and were going to turn the male bird loose and follow him, we heard the female call away down in the bottom of a big rock slip, and I caught a glimpse of her as she moved. Hurrying to the spot, we found a lot of loose feathers and droppings, which indicated the presence of a nest. We soon located it, in a long hole, the entrance of which was formed by two enormous boulders, which leaned against one another, forming a triangular space, partly blocked by a third stone. This latter we removed by using a thick vine as a rope, and after much scratching and scraping I reached in, and striking a match, saw the bird on her nest. More scraping and digging among the small stones and earth, and again I reached in, but quickly withdrew my hand, minus a small piece of the middle finger. I then wrapped a handkerchief round my hand, and very soon had the bird out. I handed her to Mr Murchison to hold, and she immediately took a piece out of his coat and clawed him pretty thoroughly, but my attention was on the nest, and, to my joy, I found four pure white eggs. They were laid on the ground among a few chips of rotton wood and bark, about five feet from the entrance of the hole.

"More than satisfied with our night's work, we returned to the Lake, and that afternoon H. and myself, with many thanks for the hospitality and assistance we had received, left for the Point, en route for home."

As the Kea is really king of the Alps, and drives all the other birds away from its domain, it is difficult to explain the reason why it chooses such a stronghold for its nest. It is only of late years that the weasels and stoats, introduced from Europe, have made their way up to the snow line, and

I doubt if these rodents would be a match for an infuriated Kea.

The most likely reason is, I think, that nesting as they do in a season of fierce storms and cold weather, and their young having to stay for some months in the nest, the parent birds are forced to choose a place where the young may be kept warm and dry.

The Kea's breeding season commences about June and is continued on to September or even later. The usual time for the eggs to be laid is in July, though some say that eggs have been seen in June. This is, however, the exception rather than the rule. I think it is one of the most striking and interesting facts in New Zealand ornithology that the Kea, living in alpine country, where the severity of the winter is especially felt, builds its nest, lays its eggs, hatches and rears its young, all during the severest months of the winter. During this time, its domain is swept by a succession of severe storms of cold wind, accompanied by snow, which covers the ground many inches deep for months; and, when the sky is clear, very severe frosts set in, which turn everything into a solid frozen mass.

That some birds in warm countries nest in the winter is known; but that a bird should rear its young in winter,* at an altitude of from 3,000 to 5,000 feet, in a country where even near the sea level the other birds dare not nest until the spring comes is, to say the least, most extraordinary. Again, not only must the parents have a difficulty in finding food for themselves among the often frozen surroundings, but at this most difficult time of the year they have to supply extra food for their young.

So far I have heard of no good reason why the Kea should nest in midwinter, and I know of none, unless it be to enable the young to be fully developed before the severe weather again comes round.

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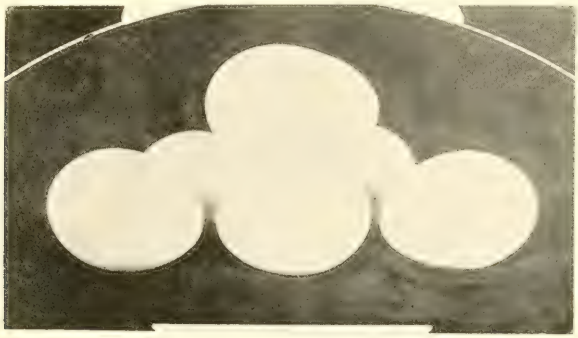
*The fact that Mr. E. F. Stead found a nest with eggs early in January, 1908, seems to show that the birds may nest at any time of the year, the choice depending largely on the severity of the seasons and the time when the severe storms occur.

The eggs, of which as many as four have been found in one nest, are naturally rare and difficult to obtain. They are about the size of the egg of a domestic pigeon, and in appearance are white, with rough shell and no markings.



KEA EGGS.

Through the kindness of Dr. B. Moorhouse, Christchurch, I am able to take notes from six eggs in his collection.

The results are given in the following table :—

	Length	Breadth	Long Circum.	Broad Circum.	
	c.m.	c.m.	c.m.	c.m.	
Rangitata Gorge	4·8	4·0	14·5	11	(maximum)
Rakaia Gorge A.	4·2	3·4	11·5	10·5	(minimum)
,, ,, B.	4·2	3·5	11.5	10·4	
,, ,, C.	4·4	3·3	11·2	10·7	
Mt. Cook A.	4·5	3·4	12·0	10·3	
,, ,, B.	4·5	3·4	12·0	10·5	
Average	4·43	3·45	12·29	10·57	

The eggs vary somewhat in shape and size, as can be seen from the above table, but otherwise there seems to be very little difference.

The young birds stay in the nest for an exceptionally long time. One correspondent states that he found young ones in September and took them out of the nest in December ; and

from all accounts they seem to stay until they are nearly full grown.

The young Kea's cry somewhat resembles that of the fully grown bird, but it is weaker and very plaintive. The fledglings' one drawback as pets is that, even when kept in clean apartments, they have a most objectionable odour.

Mr. Urquhart was good enough to send me two live Kea nestlings from Mt. Algidus, and I was therefore able

From a drawing. *Buller's "Birds of New Zealand."*

NESTLING KEAS.

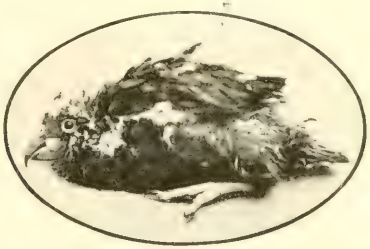
to see for myself these interesting birds at this stage of their development.

They were about two months old when I received them at Christchurch, but, though they were nearly the size of a small pigeon, they were quite unable to move about or feed themselves. Their wings were fairly strong, and were sometimes flapped when food was given to them. Their legs were large, yet they seemed devoid of capacity for muscular action, and were never used. Indeed, so helpless

were they that when being photographed they did not stir from the position in which they were placed. They kept very healthy, and had an ever-increasing appetite for food. Since their capture, nearly two months before, they had been fed on strips of kidney, which had to be poked down their capacious throats with a small stick.

The following is a description taken two months after hatching :—

HEAD.—Beak : Upper mandible large and black in colour, with the exception of a slight tinge of yellow on the top of the arch. It is neither so long nor so curved as that of the adult bird. Lower mandible of a yellow colour, except the



NESTLING KEA.

tip, which is black. The wattle around the nostrils is plentiful and of a light yellow colour. The mouth large, with a drooping sac-like structure on each side of the angle of the beak, which stretches for some distance towards the tips of the mandible. (These sacs were very conspicuous, being composed of a yellow material, closely resembling wattle, and their function seems to be to prevent the food tumbling out of the mouth ; for when the beak is open the two sacs are stretched across the gape of the mouth, and form a safe passage for the food to pass down.)

BODY.—Most of the body, except under the wings, is covered with short quills or feathers. Those expanded resemble the adult plumage, being dark green, fringed with dark brown. The large feathers of the wings and tail are just

coming out of their quills. The legs are large, dark grey in colour, with black claws, very weak in muscular action, and at present useless. The body and head are still to a large extent covered with long light grey down, which, however, is fast disappearing.

The larger bird was able, after a few days, to swallow food by itself, but the smaller one still required the food to be poked down its throat.

The suggestion has been made that, owing to the continued change of diet in the Kea, the taste for meat has become hereditary, and in proof of this it is stated that young Keas only a few days old have been known to eat meat.

As far as I can ascertain there is at present no proof in support of the suggestion; for, though young Keas can be nourished for some time on meat, this in itself does not prove that the taste for it is natural.

Other cases are known where birds have taken readily to a new diet and yet heredity could have had no influence in the matter.

Through the kindness of Dr. Cockayne and Mr. E. Jennings I am able to publish the following incident:—

While they were on a tour of the Southern Islands of New Zealand in the Government steamer "Hinemoa," in 1904, a specimen of the flightless duck (*Nesonetta Aucklandica*) was captured and brought alive to Dunedin. From the time of its capture it was fed solely on bread and milk, which it seemed to take to readily. Now, this duck is found only on the Auckland Islands, where it feeds on crustaceans, etc., which are found among the rocks and the kelp (*Durvillea*) of the sea shore.

These islands are uninhabited, and are practically never visited by any ship except the Government steamer "Hinemoa," which pays them a semi-annual visit.

It can almost be taken for certain that this particular bird had never seen bread, much less tasted it; and yet when caught, it at once took to this new food, so entirely different from its natural supply.

Mr. C. V. Rides, of the Acclimatisation Gardens, Christchurch, in a letter to me on the native birds, says that when kept in captivity they change their character to a large extent, and the wild duck, whose natural food is largely young green shoots and herbs and any small fresh-water animals available, prefers cakes and buns to the usual wheat and maize.

If birds, as in the cases cited, take readily to new food, it seems to me that the mere fact that the young Keas will eat meat does not in any way prove that the taste has become hereditary.

CHAPTER V.

AT PLAY.

Living, real, alert for charm or evil,
Hurrying in every breeze,—and haunting,
Heavy-winged, the vistas of the forest.

—Arthur H. Adams.

The Kea may be a marked bird throughout the whole Dominion; it may ravage the flocks and bring dismay to the sheep farmer; but for all this there can be no gainsaying the fact that it is a most lively and interesting companion. In places where it has not been too much harassed by the Kea-hunter it shows little fear of man, and the traveller can always depend on an hour or two of amusement whenever the bird appears. When one is camping out among the ranges, the birds often come round and amuse themselves at the traveller's expense. They seem to take the whole oversight of the preparations for camp; they investigate the camp fire; they pull the cooking utensils about; they test the strength of the tent ropes; and, if not driven away, they will scatter the contents of the "swag" far and wide.

Indeed, you can never suffer from ennui while they remain with you; for, while you are driving one away from your tent, another will be trying his beak on the coat that you have hung up on a tree for safety. With their merry eyes, and their shining coats, their perky ways, and their tameness and extreme inquisitiveness, they are welcome and unwelcome at the same time.

The Kea is one of the most inquisitive birds imaginable, and, indeed, it is this trait in his character that has partly brought about his downfall.

Keas make a loud din when together; and, when one is camping out, their incessant screeching and calling are a

perfect nuisance in the early mornings, sleep being often impossible.

However, the trouble does not stop there: they will often pay a visit of inspection to the tent, and keep one on the *qui vive* as to what new mischief they will do. Perhaps you hear them rattling the cooking untensils about. That is the merest trifle; but, when they begin to tear the tent,

KEAS AT PLAY: INVESTIGATING A CAMP.

there is nothing to do but to get up and strike camp as soon as possible.

An experienced Kea-hunter says:—"There is something freakish about the Kea. You have got to the high tops, and perhaps have rested on a rock, keenly alert for any sign of your quarry. There is no indication of a Kea being within a mile of you, but after you have started again and look back, there is a Kea on the very spot that you have just left. Where it comes from is a mystery you don't pretend to solve. But this is the Kea's way: sometimes it will shriek to let you know that it is near at hand; at other times it will silently appear by your side, coming apparently from nowhere."

They seem to be exceptionally lively around the Ball Hutt Mt. Cook, in the early morning, for numbers of tourists complain of their noise.

Mr. Fitzgerald, in his book "Climbing in the New Zealand Alps," describes them thus:—"The Kea parrots disturbed our sleep that night by walking up the iron roof, and (to judge from the sounds) tobogganing down and falling off the edge, with shrieks of terror and rage."

Several people have actually seen them tobogganing down the corrugated iron roofs,—sliding down on feet and tail, following one another in line, falling off when they reach the edge of the roof, and then flying away with shrieks of delight.

Dr. F. W. Hilgendorf gives the following instances of their quaint ways:—"The Kea occurs in large numbers, up to forty-five being seated on the roof of the Ball Hut at one time, and I myself saw them every morning that I stayed there.

"There is one that always comes round when any visitors arrive. The hut is built on a little stone platform, and, when boots are put there to dry, the Kea always pulls them off and throws them over the platform, rolling them with his head from behind, if they are too heavy to pull with his beak. He will even go into the hut and pull boots out from there. He has also been seen to roll stones down a hill, apparently with the object of watching their fall.

"All the Keas about the hut exhibit great curiosity, and when an alarm clock went off in the building they gathered round shrieking at the top of their voices. When a rag was thrown to them, about six of them would swarm on to it and pull it to pieces; but they still more delight in pulling out the packing of a saddle or any other object which presents sufficient resistance.

"They even settled on the backs of the horses that are taken to the Ball Hut, four or five getting on the back of one horse, clawing and scratching there until the horse kicks up and drives them away."

They are not so tame now as they were in the early days

but their curiosity is so great that, if anything takes their fancy, they come and inspect it, and talk to one another and shake their heads like a group of solemn judges.

Mr. Fitzgerald gives an interesting instance which he noted when on Mt. Cook. "They were so tame," he says, "that, if you sat down quietly for a few minutes and held up any bright object that glittered in the sun, they would come and hop all over you, curiosity apparently being their strongest characteristic. . . . . On this present occasion

A KEA: On the Ball Glacier.

their chief interest seemed to centre on a nickel-plated drinking cup, which I had laid on the rocks close by to dry.

"They are of an inquisitive nature, and did not rightly gather what the shiny object might be meant for; so they came up in line and circled round it, one or two of the bolder spirits even pecking at it.

"This evidently did not satisfy them, so they retired to a neighbouring rock, and gathered in a group to consult, which meant a tremendous screeching and jabbering.

"It is the manner of Keas to gather together thus and talk to one another in a way which seems quite comprehensible to themselves.

"We threw stones at them to try and make them shift their quarters, but this only had the effect of bringing them back to renew their investigation. Finally we stopped their hideous clamour by hiding the drinking cup, whereupon they slowly dispersed with an injured air."

Not only do they worry and plague the traveller while he is in camp, but they often follow him up a mountain as though loth to see the last of him. Mr. A. P. Harper gives the following amusing incident in his book.

"Ever since sunrise I have been the object of considerable attention from some Keas.

"At first there were only two or three, but afterwards their numbers increased to fifteen or more. They joined me on the south side of the Fox Glacier, and annoyed me considerably by their inquisitiveness, while I was taking some bearings and photographs, one of them alighting on my back as I was looking at my compass. When crossing the Chancellor Ridge, the Keas that I referred to followed me on the wing; but, owing to the ice being very slippery, my progress was too slow for them; therefore, alighting on the ice, they began to follow me on foot.

"Whenever a Kea makes its appearance we are prepared for some good fun, as their antics are most ludicrous, and their conversation, which is incessant, is almost expressive enough to enable one to understand what they mean. I have had considerable experience with these birds, but have never seen such an extremely funny proceeding as on this particular morning.

"The Keas, having settled on the ice, began to follow in a long straggling line, about fifteen of them. They have a preternaturally solemn walk, but when in a hurry they hop along on both feet, looking very eager and very much in earnest. To see these fifteen birds hopping along behind in a string, as if their lives depended on keeping me in sight, was ridiculously comic.

"The ice was undulating, with little valleys and hummocks, and the birds would now for a second or two disappear in a hollow and now show on a hummock, pause a moment, and then hop down again out of sight into the next hollow.

"To judge by their expressions and manners they were in a great state of anxiety on emerging from a hollow to a hummock as to whether I was still there. Now and then the one in front would appear craning his neck, and, on seeing me still ahead, would turn round and shriek 'Ke-a,' as much as to say 'It is all right, boys; come along,' and the others, putting their heads down, would set their teeth, or rather their beaks, and travel for all they knew, a fat one in the rear evidently making heavy weather of it."

They seem to be ever on the look-out for mischief; and, when a good joke is in view, they take good care not to lose it.

A story is told of a dog that was lying asleep near a hut, when several Keas came down, and (evidently bent on mischief) walked round him, laying their plans.

The boldest Kea then crept up and bit the dog's tail, thus causing him to wake up and growl; but hardly was his head laid down on the ground again when Kea number two had a pull.

This went on for some time, until at last the dog got tired of it, and retired growling to the verandah.

Their playfulness, though amusing, often becomes a great nuisance, as they can do a lot of damage in a very short time.

The late Mr. Potts is responsible for the following story. "On one occasion a hut was shut up, as the shepherd was elsewhere required for a day or two. On returning he was surprised to hear something moving within the hut, and on entering he found that it proceeded from a Kea which had gained access by the chimney; this socially-disposed bird had evidently endeavoured to dispel the ennui attendant on solitude by exercising its powerful mandibles most industriously. Blankets, bedding, and clothes were grievously rent and torn; pannikins and plates were scattered about;

everything that could be broken was apparently broken very carefully; even the window frames had been attacked with great diligence."

Another case is told of these birds and their love of fun, or mischief, as the case may be.

"On a back country sheep run, a mule, packed with a full load of stores and sundries for one of the out-stations, was peacefully pursuing its way, when on a sudden a Kea perched on the neck of the animal. The unexpected arrival was too much for the gravity of the mule; startled from its

READY FOR MISCHIEF: Browning Pass.

accustomed demure and patient demeanour, it plunged and kicked till it had freed itself from the Kea as well as its well-packed burden."

A shepherd from the back country says that "Tents get a fair amount of attention from the Kea. I have left a tent in the morning in good order and condition; and when I returned, at the end of the day's muster, I have found it torn beyond repair, and the birds seemed to be quite

enjoying the fun. Clothes hung out to dry at the shepherds' huts or camp often get torn up, coloured clothes more than white. I, along with two or three other men at a musterer's camp, saw a Kea take a piece the size of its beak out of a turkish towel, with one peck, almost as clean as it could have been done with a pair of scissors. The towel was almost a new one, so that you will have an idea of the strength of the beak."

A botanist was one day working among the ranges, and for convenience' sake left a bundle of precious specimens on a rock. A Kea that must have had a decided taste for botany began to investigate; and when the man returned he found that the whole of his rare collection had been tumbled down the precipice, far beyond recovery.

Not only do they play most outrageous pranks, but they often display a good deal of method in their madness.

One of my correspondents gave me the following instance:—"To show you how tame and inquisitive a Kea is; I was one day resting on a hill when one perched on my shoulder. I caught him and put him in a box an inch thick, but he cut it through by the morning and got out. I then chained him with a dog's chain, with a leather strap round his leg. The Kea would run the iron chain through his beak until he got to the leather, and then with a stroke or two of his beak he cut it right through."

Mr. Kinsey of Christchurch, narrates the following curious incident concerning the Keas at Mt. Cook Hermitage:—

Wishing to take some live Keas to town, he had several placed in a wooden box; and, in order to secure them, he placed several fairly large stones on the top of the cage. His daughter some time afterwards found that the stones had been removed, so, after putting them on again, she went and told her father. He, however, knew nothing about their removal; but by keeping watch he was able to discover the culprits.

Through his field glasses, he saw several birds alight on

the box, and by dint of pushing, with their heads down, they were able to roll the stones off.

Whether it was done for fun, as the birds have been known to do at the Hermitage, or whether it was done as an attempt to rescue their imprisoned mates, I am not prepared to say.

At the shepherd's hut at the Mt. Algidus Station there was a tame Kea, who kept the inmates from becoming dull by the mischief into which he was always getting. What he loved most of all was to creep into the kitchen, when the cook was absent, and try all the tempting dishes on the table. He would sample the butter, put his feet into the milk, take a mouthful of jam, upset the sugar-basin, and would usually end up by walking into the treacle pot. When he heard the cook returning he would make a dash for the door, and, as his feet were more or less gripped by the treacle, he would upset the pot and leave the table in a state of chaos. At other times he would interfere with the bread and try the meat, but, as soon as he saw the cook's hand steal towards the long-handled broom, the bird almost fell over himself in his anxiety to get to the door. Outside he worried the kittens and fowls, and once while playing with a ball of string he got so tangled up that he had to be helped to get free.

The birds make very interesting pets, but are very noisy and destructive, and they need a very strong cage in which to confine them.

Though very tame and inquisitive, they are not so easily caught in their wild state as one would imagine. To give a good idea of this I cannot do better than quote from a short article by Mr. E. F. Stead, of Christchurch, who has devoted much splendid practical investigation to the bird life of New Zealand. He gives the following graphic account:—

"The call bird, which had never been in a small cage before, and was very wild when we first put her in the evening before, had got quite used to the surroundings, and had learned how to hang on with her feet and beak, so that she was not knocked about when being carried. It is marvellous

how quickly a Kea will adapt itself to circumstances. This particular bird, after I had carried her on my back for five or six hours, got so accustomed to the motion that she would call softly to herself, or eat strawberries out of my hand as we went along. If the climbing was rough and the cage was temporarily upside down, she would brace herself with feet and beak, and quietly wait until she was righted. So quiet, indeed, did she become, and so docile, that we

UP TO MISCHIEF: A KEA PLAYING WITH A CAMERA BAG, ON THE FOX GLACIER.

called her Angela. . . . . We chose a rocky promontory, with a stunted birch on the end of it, for our traps, as it commanded a fine view of the gully and could be seen from our camp.

"Here we set our traps, and, it being already dark, we returned to camp for the night.

"One of the call birds we kept in a wire-netting run near the tent, and also in sight of the bird up by the traps. The advantage of this was that if our distant bird saw others early in the morning, and began calling, the bird at camp would answer and wake us up.

"At about half past four next morning our ornithological alarm went off, and I got up and hurried up the mountain side. When half way up to the traps, I heard a wild screaming behind me, and looking round saw him sailing over me from across the gully. Almost immediately two others further up answered, and all three presently arrived at the traps. They were a pair and an old male bird, and I sat quietly among the tussocks a few yards away, waiting for them to rush joyfully into the traps after the meat. But not a bit of it; after thoroughly inspecting 'Angela' and her cage, and bestowing a casual glance at the traps, they came over and subjected me to a searching scrutiny.

"Finding that I was an object of interest to them, I moved nearer to the traps and tried in vain to call their attention to the dainty viands displayed therein. It was no use. If I sat quite still they went over and had a chat with 'Angela,' sitting on the roof of her cage the while; if I moved they hopped blithely round me and my ways. The place they did not hop on was the space covered by the traps.

"As they came quite fearlessly to within a few feet of me, I decided to try and snare them, so I went into a little clump of bush near by and got a rod and a piece of fine creeper for a noose. The Keas accompanied me, hopping round in the trees above my head while I cut the stock and prepared my snare. Having got everything ready, I returned to the promontory, and squatted quietly down under a big boulder.

"Almost instantly a head appeared over the edge above me, and the owner of it gave a quiet little call. Another head appeared, and another, and then, within three feet of me, the birds sat and watched me with a whole world of curiosity in their bright little eyes. Gently I raised the snare and brought it towards the middle one. He took no notice until it was almost over his head and then he quietly took it on his beak and began chewing it.

"Realising that I could not snare them, I went half-way down the hill and called to H. to bring up a coil of wire-netting

that we had. This we used to make a little run, at the entrance of which we placed 'Angela' in her cage, hoping that we could drive the wild birds into it, but half-an-hour's vain endeavour convinced us of the futility of this scheme.

"Then I decided that I would return to camp for a camera, so that I could photograph the birds, even though unable to capture them. I descended *via* a shingle slide, and the noise of the stones rattling down with me attracted the birds, which accompanied me down to camp, and when I got back with the camera only one had returned. The sun had by this time risen over the mountain behind us, and the day was bright and hot. Everything was propitious for good pictures, but before I had the camera ready the bird flew screeching up the gully. Very disappointed and hot, we returned to camp.

"That evening at four o'clock we again climbed to the traps. Shortly after our arrival we saw a bird, and I called it down, when it proved to be the unattached male of the morning, readily distinguished by the state of his moult. We set a trap out on the ledge of a rock, evening up the surface with small stones. The bird came down, and taking the stones one by one, dropped them over the edge. Next, standing well outside the trap, he began chewing one of the sticks, with the result that the cage fell down. It was very laughable, but it scared the Kea, and he flew away; nor did we see him again."

CHAPTER VI.

EARLY RECORDS.

Like a black hawk swooping
I shall whirl upon the Southern Island,
Sweep it with my name as with a tempest,
Overrun it like a play of sunlight,
Sigh across it like a flame, till Terror
Runs before me shrieking!

—Arthur H. Adams.

It was not until about ten years after the discovery of the Kea that the bird began to acquire the bad habit that has since been its downfall and can end only in its complete extermination. From being one of the least known of our avifauna, its name soon became a by-word throughout the Dominion, and its specific cognomen *(notabilis)* became only too appropriate.

When killing sheep for home consumption, on the Lake Wanaka Station, North-West Otago, in 1867, the shepherds noticed from time to time what they took to be a new disease on the loins of the animals; and during shearing in 1868 these mysterious scars were again observed.

On close examination the supposed disease revealed severe wounds in different stages of healing or festering.

On some sheep there was merely a patch of bare skin, but on others there was either a half-healed wound or a raw patch of festering flesh, while others again had each a large hole torn in the side, from which the entrails were often protruding.

Many a long discussion was held as to who the culprit could be, but no one could thrown any light on the mystery. One man did suggest that the Kea might be the author of the damage, but he was ridiculed so unmercifully that he thought it wise not to repeat his suggestion.

Suspicion fell at once on the Black-back Gull (*Larus dominicanus*), and the Harrier Hawk (*Circus Gouldi*), but it was soon pointed out that it was only the sheep of the alpine country that were attacked, while the gulls and hawks scoured the plains as well as the mountains.

It was a well-known fact that the gulls would pick at the eyes of a very young lamb, or even of a sheep, when it had fallen, but they had never been known to attack the sheep over the loin, in the manner of the unknown culprit.

Wild dogs were next suggested, but they were then practically unknown, and the fact that there were never any injuries found on the sheep, except those on the loin went to prove that the sheep could not have been pulled down and worried by dogs.

About this time the suggestion that the Kea might be the culprit was strengthened by the fact that the bird had been seen picking the refuse around the meat gallows.

Some poisoned mutton was spread out in a likely place, and soon the Keas were observed to come down and devour it so greedily that in a short time their dead bodies were lying around their unfinished meal.

This experiment gave the clue as to the direction in which investigation must be made in order to solve the mystery; and at once Mr. Campbell (of Lake Wanaka Station) ordered his men to keep a sharp look-out when working in high country. Not long after this, these suspicions were substantiated by the observations of Mr. James McDonald, at that time head shepherd at Lake Wanaka Station, and now a sheep-farmer at Dipton, Southland. Through the kindness of Professor Benham, of Dunedin, I am able to give Mr. McDonald's own description of the first recorded case of sheep killing by Keas. He thus described what he saw:—

"I do not know whether I was the first to see the Kea attack sheep, but I was the first to report it to Mr. Henry Campbell, of Wanaka Station. . . . . In 1868 my orders were to go all over the run after the snowfall and see that the sheep were evenly distributed over the ground, that no hill or spur had more sheep on it than it could well carry.

While I was at this work, the snow being about 2ft. deep, I went out to the tops; in a small basin under the top on the west side, facing a rocky country that we called 'Skay,' there was a mob of sheep snowed in and unable to get out.

MR. JAMES McDONALD, DIPTON, SOUTHLAND.

There I saw the Kea at work. He would come down from the rocks, settle on a sheep's loin, and peck into the sheep, which would run through the mob; but the bird stuck to the sheep all the time till he got a piece out of it; then he would fly to the rocks. I watched the bird at this work and did not disturb him until I was fully satisfied. . . . . Then I went down to the station and reported to Mr.

Campbell. He would not credit me, and all hands on the station refused to believe that the birds would do it; so I was ordered to go to another hill, called the Black Hill, and Mr. Campbell came with me, and some more men, and at the first mob we came to Mr. Campbell and the rest saw the Keas at work."

It seems to me to be a great pity that the early writers on this question did not take the trouble to get authenticated evidence; for, if this had been done, much of the confusion and uncertainty as to the Kea's real habits would have been prevented.

However, instead of obtaining the above evidence from Mr. McDonald, which would, at least, have recorded the names of two men who had actually seen the Kea killing sheep, most early writers make use of an indefinite extract which appeared in the "Otago Daily Times," an extract which, though correct in itself, was not at all conclusive. It runs as follows:—

"For the last three years the sheep belonging to a settler, Mr. Henry Campbell, in the Wanaka district (Otago), appeared affected with what was thought to be a new kind of disease; neighbours and shepherds were equally unable to account for it, not having seen anything of the kind before. The first appearance of this supposed disease is a patch of raw flesh on the loin of the sheep, about the size of a man's hand; from this, matter continually runs down the side, taking the wool completely off the part it touches; and in many cases death is the result. At last a shepherd noticed one of the mountain parrots sticking to a sheep, picking at the sore, and the animal seemed unable to get rid of its tormentor. The runholder gave directions to keep watch on the parrots when mustering on the high ground; the result has been that, during the present season, when mustering high up on the ranges near the sky-line, they saw several of the birds surrounding a sheep, which was freshly bleeding from a small wound over the loin; on other sheep were noticed places where the Kea had begun to attack them, small pieces of wool having been picked out."

Though this record casts very grave suspicion on the Kea, it does not by any means prove that the Kea was the culprit.

In the first instance, the bird is stated to have been seen merely picking at a sore on a sheep's back, just as to-day starlings are commonly seen at the same task; and to say that this proves that the sheep was being killed by the Keas is putting more weight on the evidence than it will bear.

In the second instance it is stated that the shepherds saw several Keas "surrounding" (notice, not "attacking" nor "pecking") a wounded sheep, and, with the uncertainty which existed at that time as to the true culprit, it might easily have turned out that some other animal had wounded the sheep and the Keas had only been attracted by its struggles.

This latter account, and not Mr. McDonald's, was unfortunately the one that was published in standard books on our avifauna; and it has been partly responsible for many years of arguing and disagreement between the sheep-owners and scientific men.

However, though nearly fifty years have passed since the record was first published, there has not been one thorough-going attempt to enquire into the case; and, up to the end of 1905, this is the only definite case recorded where a man actually saw a Kea picking at a live sheep. Of course many articles have been written, both in magazines and scientific works, but I cannot find one writer who says that he ever saw a Kea attack a sheep, nor is the name of any man given who said that he had seen the bird at work.

It has been since proved that there were, and are at the present time, many men who have been eye-witnesses of the birds' depredations, but from the records available in 1905 not one could be found. It seems a great pity that writers should publish on such meagre evidence, as though it were an indisputably proved fact, the statement that the Kea has become not only carnivorous, but also a bird of prey.

I think I am justified in saying that all the literature published, up to 1905, stating that the Kea was guilty of the

crime, had given to the world, as a substantiated fact, a statement that had not been satisfactorily proved.

If there is anything that ought to be most conclusively proved it is a statement of alleged scientific fact, and as long as investigators continue to publish, as true, half-proved theories, only error and confusion can be the result.

As might be expected from such unsatisfactory evidence, later investigation does not always uphold the conclusions so hastily reached by early writers.

It is rather surprising to find that no one questioned the weight of the evidence until 1905, when Dr. L. Cockayne, the retiring President of the Canterbury Philosophical Institute, while reading a paper "On some little known Country in the Waimakariri District," made the following statement :—

"I have never seen it [the Kea] attack sheep, nor have I ever met with anyone, shepherd, musterer, or mountain traveller, who has done so ; the most that my enquiries have elicited is that sheep are found from time to time with holes in their backs, and that Keas have been seen hovering round sheep."

A very warm discussion followed this rather unexpected statement, for people had begun to believe that there could be no doubt about the matter of the Kea killing sheep ; but, when they found on enquiry that practically no authentic evidence could be found among the records, they naturally became very sceptical.

Dr. Cockayne and his supporters did not, as many people state, say that the Kea was innocent, but that at that time the recorded evidence was quite insufficient to prove the bird's guilt.

Let us run through the most conclusive recorded evidence, and see on what flimsy and unscientific reasons the bird's guilt had been declared proved.

About the year 1871, Mr. T. H. Potts condemned the Kea, but on what appears to be hearsay evidence only. He writes as follows :—"Through the kind offices of Mr. Robt. Wilkin, the writer has been greatly assisted with valuable notes, acquired by sheep-farmers, owners of stations, shepherds,

etc." Unfortunately he does not state that any of his informants ever saw a Kea at work or whether the notes were merely the sheep-station rumours, of which a bookful could be collected to-day.

I fully believe that many of Mr. Potts's correspondents were eye-witnesses of the Kea's depredations, but in finding the truth we cannot take supposed facts to be authentic evidence.

In 1978 the Hon. D. Menzies, in a paper on the Kea, wrote as if certain of the bird's guilt, but he gives no authority for his statement.

In a book entitled "The History of the Birds of New Zealand," Sir Walter Buller gives a fairly complete description of the bird and its habits, and also an illustration of a Kea attacking a sheep, but again one searches in vain for the name of actual eye-witnesses. There is mention made of a shepherd who saw a Kea attacking some sheep while he was driving them, but no name was given; and, as nothing is known of the man, the evidence dwindles away to nothing.

There is, however, a correct description of the method of the Kea's attack (forwarded to Sir W. Buller by Mr. J. G. Shrimpton), but its writer does not state that he ever saw the bird killing or attacking flocks.

In 1884 Reischeck wrote an article on the Kea, but, though he saw them eating the carcases, and also found wool and fat in their crops, he never saw one attack a sheep.

Mr. C. C. Huddlestone, in 1891, gave an account of his experiences in Kea country, and strongly condemned the bird, but he himself never saw the bird in the act of murdering.

In 1894 Mr. Taylor White accused the bird of sheep killing, but yet does not seem to have been an eye-witness. He bases his conclusions on hearsay, for he says:—"One day my brother John came home and said that he knew what caused the holes in the backs of the sheep. It was done by the Kea. This surprised me greatly, but I soon afterwards had evidence of the fact myself, for when some of these birds had once found out that blood of the sheep was good for food, others were initiated into the performance."

What Mr. White or his brother saw is not recorded, and I think that, if a Kea had been seen attacking a sheep, that fact would almost certainly have been included in the paper. I have since had a letter from Mr. T. White, in which he states that he never saw a Kea attack a sheep.

In February, 1906, at a meeting of runholders held at Culverden, some strong remarks were made about the loss of sheep caused by the Kea, and the Wellington Philosophical Society was ridiculed for upholding the statement that at the present time the recorded evidence against the Kea was not sufficient to condemn it. However, in spite of all their talk, only one speaker was reported to have seen the Kea attacking sheep. The rest all spoke from hearsay, and I have since received a letter from the reported eye-witness, stating that the newspaper had misrepresented his remarks, for he had not said any such thing at the meeting. This meeting was the means of leading many people to believe in the Kea's guilt; and yet, when the evidence there available was sifted, not one man had seen the Kea in the act of attacking.

This is the pith of the recorded evidence up to the end of 1905, and, in spite of all that has been written on the subject, I was unable to find the name of one writer who said that he had seen the bird attacking sheep.

Though the evidence of eye-witnesses was lacking, the circumstantial evidence was very strong, and may be classed as follows:—

I. Against the Kea:—

a. The account of the Wanaka shepherds.

b. Only where Keas were known to live were the sheep wounded after the Kea's method. Where they were unknown, no instance of this special kind of sheep-killing had been seen.

c. If sheep had been killed, and the birds in that place were shot, the killing at that place ceased.

d. Keas had been seen to fly off the bodies of sheep, and wool and fat had been found in their crops.

e. Some Keas in captivity would eat meat, fat, skins, etc.

At first sight this evidence seems quite conclusive enough to condemn the Kea, but we must remember that circumstantial evidence can never by itself prove a scientific fact.

To see how far we can err from the truth by depending on this kind of proof, we have only to go back to the days of supposed witchcraft and note how an English court of law condemned many people to punishment and death for what it honestly believed to be an undoubted fact. We can see, now, how the level-headed men of those times came to an absolutely wrong decision, because the evidence that seemed so conclusive was merely circumstantial.

On the other side there was also some evidence to show that the Kea might be innocent. This may be classed as follows:—

II. For the Kea:

a. The lack of the records of eye-witnesses.

b. In many places where Keas were known to live, no sheep had been killed after the Kea's method.

c. Many Keas in captivity would not eat meat, etc.

d. Many of the men who accused the bird were paid for exterminating them, and they would naturally wish the story to be believed.

Over this circumstantial evidence a war of words has waged for many years, and once or twice it has seemed as if the Kea would be exterminated before the question was finally settled.

In order to try to bring this important question to a final conclusion, I set to work to collect written statements from actual eye-witnesses, who lived or had lived in Kea country, and by carefully sifting and arranging this evidence to obtain the actual facts about this interesting bird.

In response to several requests, kindly published for me by the newspapers, I have received a large amount of evidence from men who live, or have lived, in the Kea country, viz., musterers, shepherds, head-shepherds, managers of stations, runholders, and station owners.

These, it is true, are probably not trained scientific observers. Nevertheless, they all live in contact with facts; and it seems to me that we are sure to get nearer to the truth by taking the experiences of men who have spent most of their lives in Kea country in preference to those of men who judge the birds mostly from caged or preserved specimens.

To make the evidence as reliable as possible, the following precautions have been taken :—

I. Nothing but the accounts from eye-witnesses themselves has been taken.

II. Evidence without the writer's name and address has been cast out.

III. All details, such as year, have been forthcoming (as far as possible) in each case.

IV. The witnesses, if necessary, have been cross-examined by post.

V. All the accounts of Keas attacking sheep have been forwarded with a written statement to the effect that, if necessary, the writer will swear to his evidence before a Justice of the Peace.

The result of this investigation has already been published,* including the eye-witnesses' names and addresses, as well as many of their written accounts.

I am fully aware that, in spite of all these precautions, inaccuracies may creep in, and I have already proved that some men will even tell lies for the sake of having their names published.

However, in order to substantiate the records, I have made several trips into the Kea country, and can testify to many of the facts myself.

To some people this question will never be satisfactorily proved until some man of scientific standing has actually seen the Kea killing the sheep. In order to satisfy these doubters, I would suggest that a number of sheep should be fenced in on some station where Keas are plentiful, and that some one of

*Transactions of the New Zealand Institute, Vol. xxviii. page 271.

scientific standing should watch. The Kea's method of attack could be witnessed in surroundings that are quite natural, and no forcing or starving of the bird would be needed.

However, I think I am justified in saying that, as far as human evidence can be relied on, I have conclusively proved that the Kea has not only taken to meat-eating, but that it does actually attack and kill sheep.

CHAPTER VII.

THE SHEEP KILLER.

In sin and shame o'ertaken,
Thy glory shall sink in gloom.
—John Liddell Kelly.

The Keas have several methods of attacking sheep, and it depends largely upon the kind of ground as to which one is used in a particular instance.

They may attack in large numbers up to one hundred and twenty, or merely in ones and twos. Usually one or two old birds, known as "sheep-killers," do the killing, and the others share the spoil.

It is quite a mistake to suppose that all Keas kill or even attack sheep. Just as we have comparatively harmless tigers, who will not attack man except under provocation, and also "man-eaters," who seem to take a special delight in killing men ; so, among the Keas, many of them never attack sheep, while others, usually old birds, seem to enjoy nothing better.

Again, the Keas do not, as many people suppose, choose the lambs or weaklings, but in most cases the choicest of the flocks is killed.

The usual mode of attack seems to be as follows. The bird settles on the ground near its quarry, and, after hopping about here and there for some time, leaps on to its prey, usually on the rump.

If it cannot obtain a firm grip with its claws, the movement of the sheep may cause it to fall, but the Kea seems rather to enjoy the sensation, and so tries again until it has securely perched itself on the sheep's back.

Then the murderer begins cruelly to pull out the wool with its powerful beak, until it gets down to the flesh.

The sheep, which for some time has been moving uneasily about, gives a jump as the beak enters the flesh, and then commences to run wildly about here and there in vain efforts to rid itself of its tormentor.

When, however, the poor beast discovers that it cannot dislodge its enemy, it seems to lose its head, and rushes blindly about, usually at a high speed.

Sometimes the birds run the sheep to death, and then gorge themselves on the dead body. At other times they

A SHEEP KILLED BY KEAS. A Merino Ram found on Top Flat, Mt. Algidus Station.

never really reach a vital part of the animal's anatomy, but, after severely wounding it, they leave it, and the poor brute wanders about with a large gash, sometimes four or five inches across, on its rump, and torn open so much that the transverse processes of the vertebræ can be seen. The sheep struggles

along until blood-poisoning, caused by filth and exposure, sets in, and the unfortunate beast lies down and gives up the struggle. The animals must suffer very severe torture as they wander about, the large wound exposing the flesh to insects and to extremes of weather.

This method of killing accounts for the number of sheep that are found in the paddocks at shearing time, wounded or dead, with nothing but a scar showing on their rumps.

While staying at the Mt. Algidus Station, I was fortunate enough to see three sheep that had been attacked in this way by the Keas.

On the Top Flat, near the base of the Rolleston Range, on a large terrace sloping down to the Mathias River, we found a splendid merino ram, lying dead just where two wire fences met at right angles. It looked as if the sheep had been cornered there and wounded.

There was an ugly wound on the rump about eleven inches from the base of the tail, the gash measuring four inches by five in width and about two inches deep. One half had been torn down to the sinews, while the lower half was eaten down to the bone ; the body cavity, though just pierced, did not seem to have been disturbed. From all appearances the animal had died from blood-poisoning and exhaustion, as the wound was very black and dirty.

Just near this, belonging to the same mob, we found a live ram running about with the others, with a dirty gash on its rump, in a situation similar to that of the wound in the other animal.

The wound was V-shaped, and along the sides it measured four inches by six inches. It had partly healed, but was festering very badly, so that there was very little hope for the unfortunate sheep.

At Lake Coleridge Station, near the homestead, a four-toothed merino ewe was found wandering about with a large circular wound on its back, somewhat nearer the head than in the former cases. It was put into the yards to await my arrival, but it died before morning. The wound was four inches by three in size, and had just entered the body cavity.

When this sheep was skinned it was seen that the whole back was more or less black, which seemed to point to blood poisoning, as none of the organs were injured.

Though the cases cited are horrible enough, the wounds are often more severe; for not only are the kidneys injured, but often the intestines are torn and pulled out through the wound. Sheep have been found with yards of their intestines, all hardened by exposure to the sun and air, dragging along the ground.

In discussing the effect of the horrible cruelties practised on the sheep by the Keas, Sir W. Buller gives the following account.

"On the surgical operation performed on the living sheep by the Kea, an interesting paper was read before the Pathological Society of London in November, 1879, by the distinguished surgeon, Mr. John Woods, F.R.S. He exhibited the colon of a sheep in which the operation known as colotomy had been performed by this parrot, of which likewise he produced a specimen, both having been sent to him for that purpose by Dr. DeLatour, of Otago.

"Mr. Woods was informed by his correspondents that, when the sheep are assembled, wounds resulting from the Kea's 'vivisection' are often found upon them, and not infrequently the victims present an artificial anus, a fistulous opening into the intestines, in the right loin.

"The specimen exhibited was from a sheep that had been so attacked. It consisted of the lumbar vertebræ and the colon, showing the artificial anus between the iliac crest and the last rib on the right side, just in the place, that is, where the modern surgeons perform the operation know to them as Amussat's; below the wound the intestine was contracted, while it was enlarged and hypertrophied above.

"The sheep was much wasted. The *mōdus operandi* was described as follows:—The birds, which are very bold and nearly as large as rooks, single out the strongest sheep in the flock. One bird, settling on the sacrum, tears off the wool with its beak and then digs its beak into the flesh until the sheep falls from exhaustion or loss of blood.

"Sometimes the wound penetrates to the colon, when, if the animal recovers, this artificial anus is formed. It may be on the left, but is more frequently on the right side. It has been suggested that the bird aims at the colon in search of its vegetable contents, but the Kea's carnivorous appetite has been too frequently noticed to necessitate any such hypothesis."

One of my correspondents gives the following account:—"One solitary wether I found on the Kingston Flat, still alive and standing, with a hole half-way down the right flank, and about eighteen inches of the double of his small gut on the ground. I afterwards saw him dead at the same place."

Often the birds seem to delight in prolonging the sheep's misery, for a shepherd writes as follows:—"Along with another shepherd, I was out on the ranges attending to the sheep, when we heard the Keas making a great noise. On looking up to where they were, we saw a sheep standing on a ledge of rocks; one Kea kept jumping on to the sheep's back and pecking at him. The sheep was trying to get away, but could not get off the ledge. Evidently it had been chased by the Keas, and it had jumped on to the ledge. The Keas were at the sheep for fully half-an-hour, and we could not get near to drive them off When we left, the birds were still worrying the sheep."

Another shepherd gives the following account:—"I have noticed a wounded sheep standing on steep faces, and the Keas walking round and round it. The sheep would also keep turning round so as to face its tormentors, butting at them and trying to keep them off. They would keep on until the sheep would lose its footing and would fall to rise no more."

The position and attitude of the bird while on the sheep's back is well described in the following:—"It was in the afternoon, I was mustering in Boundary Gully, Mount Cook Station, at the time, and had a mob of sheep in hand and was about two chains away, when a Kea, one of several that were flying around, settled on a sheep. The beast at

first gave a jump or two, and then made down hill at a great rate. When the sheep got into motion, the bird spread out its wings, and, as the pace became faster, the wings came together at the perpendicular. The sheep continued its race until both were lost to view, after going some distance through the storm."

These blind rushes often end even more tragically. The sheep in its blind rush often comes to a precipice, and, with the same impulse that brought it so far, it leaps over the edge and is dashed to pieces on the ground below. In this case the Kea leaves its hold as soon as the sheep begins to fall, but follows the unfortunate animal in the descent to satisfy its hunger on the result of its labours.

Mr. Robert Guthrie, of Canterbury, who has spent a large number of years in Kea country, gives the following graphic description of Keas attacking the sheep at their nightly camps :—"At last one clear night, when there was about half a moon, I made my way up to the sheep camp. After a good deal of trouble, I got into a crevice in a rock that I had selected in daylight, within twenty feet of the nearest sheep, and without disturbing them. I lay there for some hours and, just two or three minutes before the moon went down, fifteen Keas alighted, within ten feet of where I was lying, as silent as spectres. They immediately became exceedingly active, running about and picking at this and that amongst the sheep, jumping on and off the sheeps' backs, the sheep not taking the slightest notice of them. All at once the moon left me, and I could see no more. I waited for more than an hour longer, and during that time there were a few commotions among the sheep, but not a sound from the Keas. I got one dead sheep next day. The next night I was again in my place in the rocks, and had only a few minutes to wait, when the fifteen Keas lit again, as silently as on the night before. They again scattered round the camp, and seemed to be exceedingly busy and active, running to and fro, picking at this and that. It seemed to me that they were after small grubs that are usually found about a sheep camp. They eventually began jumping on the sheeps' backs and

sometimes as many as four would be on one sheep at a time. One would give a peck, the sheep would give a bound forward, and they would all come off. They did not seem to follow the same sheep, but just hopped on to the first one they came to. Sometimes when one got on a sheep's back in a good position—behind the kidneys facing the head —it would keep pecking and so keep the sheep jumping round and through the mob for a long time. I am quite certain that they thoroughly enjoyed the fun of riding on the sheep

CLOSE VIEW OF A WOUND MADE BY KEAS ON THE SHEEP FOUND ON TOP FLAT, MT. ALGIDUS STATION.

and falling off. After about an hour of this sport, I noticed one that had got in a good position on a sheep's back striking it more quickly and more vigorously than any of the others. It kept the sheep careering in and through the camp in an awful state, until at last it disappeared down the ridge leading down to some overhanging rocks. After about a minute, I heard a Kea call far down the gully. Next day I got a dead sheep at the foot of the rocks where the sheep disappeared. I did not see the Kea come

back to the camp, but no doubt it did directly the sheep went over the rocks. At any rate, less than twenty minutes afterwards I again saw a Kea in the correct position on a sheep's back, viciously striking, and I distinctly saw it lift its head and give one strong peck, when the sheep immediately collapsed and fell down among the other sheep. I think the Kea then left it. I waited for some time, and then went out as quickly as I could. The mob drew out of the camp, but the injured sheep was still sprawling about. I tried to make it stand, but it could not. I came back next day and found it lying in the same place, but black and very much swollen. I cut its throat, and left my gun in my hiding place during the day and came back at night. I got six of the fifteen Keas that night and the others during the next three weeks. There was never a sheep killed on this camp after the night I saw the sheep struck down."

The case of a sheep jumping over a precipice in its terror is not an altogether uncommon occurrence, as can be seen by the number of marked sheep found dead at the foot of the precipices.

Writing on this subject, one of my correspondents says:— "I write to say that I have seen the Kea at work at a sheep. The latter was driven frantic by the bird's attack, and ran wildly in any and every direction, eventually making a bee-line down a steep slope, as if blind, took a 'header' over a precipice more than a hundred feet high, and was dashed to pieces on the rocky and shingly bottom. The Kea hung on to its prey until the moment the unfortunate animal left *terra firma*, when the bird relaxed its hold, and flew down almost on the very track of its prey, when it was lost to view by the writer and a shepherd who was there also."

Sometimes the sheep tears round the flock until it is played out and cowed, when it sinks to the ground and lies with its neck stretched out, a picture of misery.

At other times the terrified sheep, as if making a last despairing attempt to get rid of its enemy, rushes madly forward in one direction, usually down hill, at a terrific speed, quite oblivious of rocks and pitfalls, the Kea

meanwhile holding on and balancing itself with outstretched wings. Very soon the sheep strikes a rock or stumbles and rolls over and over down the hill, only to get on its feet again and repeat the performance time after time. When the beast stumbles the Kea rises on its wings, and settles down again on the sheep when it has regained its feet.

This awful race is continued until, bruised by its numerous falls, utterly exhausted by its death struggles and maddened with pain, the terrified animal stumbles to rise no more, and becomes an easy prey to the Kea.

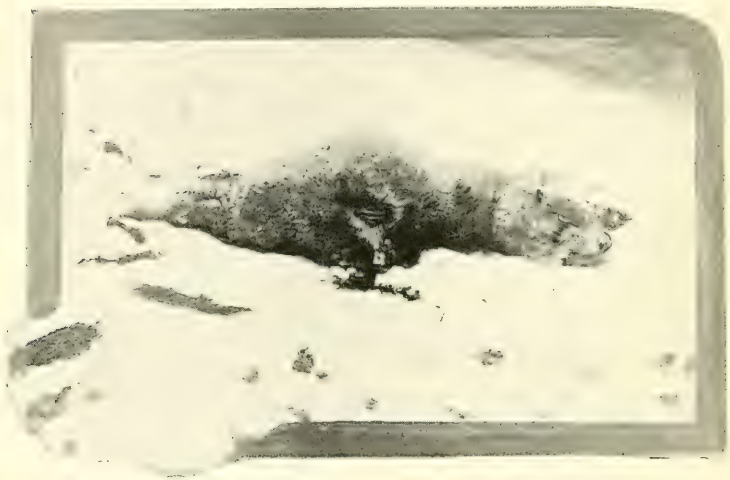
Several men have witnessed these awful rushes, and have also come upon the murderer gorging himself on the live sheep, tearing at the kidney fat and pulling at the entrails.

The following are a few instances illustrating this method of attack.

Mr. J. Sutherland writes:—"In 1887 I was keeping a boundary where Keas were numerous, and on several occasions I saw them attack sheep. I saw a sheep running down the hill with a Kea hanging on. I followed after it, and found the sheep lying in the gully with the Kea tearing away at it. I drove it off. The sheep was not dead, but the wool and the skin were torn, and a hole was made in the sheep's back, just above the kidney, a wound from which it would have died; however, I killed it to put it out of pain."

Mr. H. E. Cameron gives the following account:—"One day while mustering in the summer time of 1895, I saw a Kea on a sheep's back clinging to the wool and digging his beak into its back, and a number of others flying about. I went down to the sheep with some other men. Some entrails had been pulled through a hole in its back and we had to kill the sheep. I was camped at the foot of Davies' Saddle (Longslip Station) one foggy day, and at three o'clock heard a great screaming of Keas; so I went out to see what they were at. On going down the creek a short distance I saw a sheep coming down the face of the hill as fast as it could, with a Kea on its hips and twelve more birds following and screaming. The sheep, when it got to the foot of the hill, ran under a bank and went down on its

knees, the Kea picking away at its back and the others watching as if waiting for a feed. I went up to the sheep, after throwing stones at the birds. When I got up to the sheep, it had two holes in its back, and the kidney fat had been eaten, but the kidneys were lying bare in the sheep. The entrails were pulled out through the hole in the back. The sheep was not dead, but had to be killed."



A SHEEP KILLED BY KEAS. A four-toothed Merino Ewe found on Lake Coleridge Station.

Mr. A. S. Smith, of Fairlie, writes:—"The first occasion on which I actually saw a sheep killed was one time while mustering. I noticed two sheep that had been passed some little distance, and while in the act of hunting a dog for the sheep, a Kea flew down to the back of a sheep, which made headlong down the hill with the bird all the while on its back. After running some little distance, the beast stumbled and fell; then the bird rose to its wings, and the sheep continued its race down hill, evidently much terrified. The bird then flew on to the sheep's back again while it ran. This occurred, I should say, three or four times, before the

bottom of the gully was reached. When I went to investigate, I found the sheep not quite dead, but bleating with evident pain, it would appear on account of a hole in its back close up to the shoulder."

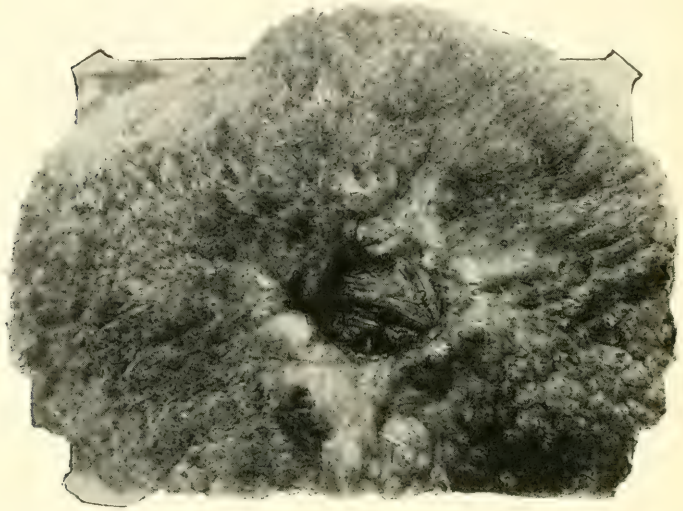
Mr. H. Heckler, of Lumsden, writes:—"I was keeping boundary at the Gladstone Gorge after snow muster, and was gathering the stragglers off the high country, when I came across about twenty Keas. Two of them were on a sheep's back, the balance were flying round him (a stray wether), making a terrible noise. The sheep was going at full speed down the spur. I watched him where he ran to, and followed him down for about three miles. When I got down the sheep was dead, with two holes (one on each side of the backbone) in him, and most of the mob of Keas were picking out the kidney fat. I crawled to the rock where the poor sheep was lying, and the Keas were so busy that I killed three with my stick."

Mr. Andrew Watherston, writing to me of his experiences in 1904, says:—"I was looking out a mob of wethers, and found that the Keas had been killing them and there were eight dead. As it came on a dense fog I had to return to my hut. Early on the following morning I went out to the wethers again. Arriving where the sheep were camped sometime before sunrise, I could hear the Keas calling, and following up the sound I got to where there were about forty of them. They had about there or four hundred wethers rounded up. The sheep were huddled close together, and the Keas were flying over them, and alighting on their backs. When the Keas started to pick the back of a sheep, it would start to run round and round the mob; the Kea would rise, but as soon as the sheep stopped the bird was on its back again. This continued for a little time; the sheep, apparently getting sulky, lay down with its neck stretched out and its lower jaw resting flat on the ground, when it showed no further resistance but allowed the Kea to pick away at its back. I never knew a sheep, after it once sulked, to show any further resistance. I shot nineteen Keas and left the mob, but, on looking round, I found that they had killed

thirty-eight wethers, most of them being quite warm and in splendid condition."

Many more such instances could be cited, but enough has been said to show the methods and the results of the Keas' attacks on sheep.

The greatest damage is done to the flocks in winter, when the country is snow-bound. In the mountainous regions, the sheep are usually kept down on the low



CLOSE VIEW OF WOUND MADE BY KEAS ON THE SHEEP FOUND AT LAKE COLERIDGE STATION.

country until the mountains get a good coat of snow, for once the tops are covered there is very little danger of the sheep going far in the snow.

However, if the sheep have been allowed to remain on the tops of the ranges until the snow comes, as is sometimes the case on a big run, they gather together in a basin near the summit and are buried by the snow. It is at this time that the Kea finds them an easy prey, and many a bloody battlefield, the snow being deeply tinged with red, shows

where the helpless benumbed sheep have been literally torn to pieces while alive by the relentless birds. Even when men, wading waist high in the snow, climb up to dig the sheep out, the brutal birds will often not leave their prey, but fall victims to the musterer's alpenstock.

Here are some accounts from eye-witnesses.

Mr. McIntosh, of Lake Tekapo, says :—"I saw again another mob stuck in the snow, in a very rough place which we shepherds could not get to. I watched from the other side of the gully, and, by the aid of my glasses, saw the parrots actually eating the sheep alive while they were caught in the snow."

Mr. Logan, another of my correspondents, says :—"The sheep were held up by snow, and there were thirteen Keas attacking them. They had some killed and others maimed beyond recovery. They were sitting on the living and the dead, but only one or two of the birds seemed to be attacking the living."

Mr. Hugh McKenzie writes :—"In 1884, on Lorne Peak Station, Wakatipu, in the month of July, there came a heavy fall of snow. One morning early, myself and two other men went out to look up the sheep ; at 10 a.m. we sighted a mob. As we got within about a quarter of a mile of them, we could make out a number of Keas flying about the sheep, making a great screaming noise. We at once hastened on to the sheep, which were stuck on a point of the spur about 3,000ft. in altitude. At a distance of three or four hundred yards, we saw two sheep floundering in the snow with a Kea perched on the rump of each sheep, and at work on the loins. These sheep would be distant from the mob about eighty yards, and fully twenty yards from each other. As we sighted them, however, notwithstanding our singing out, and hurrying up to the sheep, neither Kea quitted his position until we were within twenty yards of them. They, however, did not damage the sheep enough to cause death, as we arrived just in time."

The last instance is given by Mr. O'Brian :—"Three of us were sent to muster the sheep off this spur, where the snow was, according to our judgment, fullythree feet deep on the top

and deeper in places. On reaching the summit of what we called the main top we came across a mob of sheep more or less snowed in. These we dug out of the snow, and, having let them roll down the hill as far as they would, we went further up the spur to see how many more we could find. After a short climb we came across a mob of fifty, also snowed in, and here I caught the Keas in the act of murdering. The birds had already killed three, and several others were dying. The dead ones were very much torn about, and what especially attracted my attention was the way in which the small gut was pulled out through the flank and stretched yards away. There were fully a dozen Keas attacking the mob around the hole, and the place was literally stained with blood, no doubt from the Keas' blood-stained feet. The birds seemed thoroughly to enjoy killing sheep, and were very bold. I was up to my waist in snow alongside the sheep, and when I was standing still the Keas would come boldly up to me to within five feet. After we had driven the Keas off they flew almost straight to the first mob, and, according to my mates, who went back for the first mob, attacked those sheep in a similar way."

CHAPTER VIII.

GETTING INTO BAD HABITS.

I must be free as the wildest thing
. . . . . .
Free to laugh in the beams of day,
Free on the blast to be borne away."
—William Pember Reeves.

I am almost certain that too much emphasis has been laid on the fact that the Kea, a member of the brush-tongued parrot family, has changed its ordinary diet and taken to eating meat and fat. When we consider the natural diet of the bird, the change seems more or less natural, for there seems to be very little difference between eating a large plump grub and a piece of fat.

The more interesting fact is that, in addition to this, it has changed its character, and, from being a harmless parrot, has become a bird of prey of no mean order.

Other birds, in confinement at all events, have been known to eat meat, though in nature they seem to content themselves with fruit and seeds. For example, many parrots and cockatoos seem thoroughly to enjoy cleaning up bones with particles of flesh on them. Again, in New Zealand, the little white-eye (*Zosterops cærulescens*), whose natural food is blight, small insects and fruit, can be easily trapped, in winter especially, by means of suet fat or meat bones, both of which it devours readily.

Therefore it seems to me that there is nothing very wonderful in the fact that the Kea enjoys a little meat and fat in addition to its ordinary food.

Another interesting case is that reported by Captain Hende, of British East Africa, and forwarded to "Nature" by Professor E. Ray Lankester, on 10th August, 1900. It runs as follows:—"The common rhinoceros bird (*Buphaga*

erythrorhyncha) here formerly fed on ticks and other parasites which infest game and domestic animals; occasionally, if an animal had a sore, the bird would probe the sore to such an extent that sometimes it killed the animal. Since the cattle plague destroyed the immense herds in Ukamihani, and nearly all the sheep and goats were eaten during the late famine, the birds, deprived of their food, have become carnivorous, and now any domestic animal, not constantly watched, is killed by them. Perfectly healthy animals have their ears eaten down to the bone, holes torn in their backs and in the femoral region."

It will thus be seen that at least three kinds of insectivorous and fruit-eating birds are known to eat fat and meat on special occasions.

When we look at the circumstances that forced the Kea to add to its diet, it would have been more wonderful if the bird had refused to touch the new food.

Unfortunately for science, as the Kea had learned to kill sheep before men were aware of it, we shall never be able now to decide finally what set of circumstances caused him to change; but I think that the truth is confined to the last two of the following three theories.

Whether the change of diet was influenced in the way explained by either one or both of those theories it is hard to say; but so far no other reason can be given to which it is worth while giving serious consideration.

THE VEGETABLE SHEEP THEORY.

This was the earliest and for many years the most popular; but, when further investigation brought to light many new facts, the theory lost favour, though even to-day some people adhere to it.

The vegetable sheep, after which I have named the theory, is one of the most interesting of our alpine plants. Owing to its cushiony appearance it is often erroneously termed a moss or fungus. The name includes two closely allied plants, which grow especially on the mountainous country of

the northern half of the South Island, at an altitude of from 4,000 feet to 6,000 feet above sea-level.

Dr. L. Cockayne makes the following comment upon them:—"The rocks of the alpine summits weathering away, and the rain not being sufficient to bear all the debris down into the valleys, an enormous quantity of angular stones collects on the mountain sides in many places, which may form steep slopes for thousands of feet. As the climber wearily ascends

THE VEGETABLE SHEEP *(Raoulia eximia)*, Mt. Torlesse, Canterbury.

these shingle slips, as they are called, progress is slow; the tones continually slip beneath his feet, and slide down the slope. No place could seem more unlikely to support vegetable life. It is in truth a veritable alpine desert. . . . . On these shingle slips the wonderful vegetable sheep are encountered. These grow, not on the shingle, but on the rocks which the stones have nearly buried. Large examples form great hummocks six feet long by three feet across, or

even more. Really they are shrubs of the daisy family, and are provided with a thick, stout, woody main stem and strong roots, which pass far into the rock crevices. Above, the stems branch again and again, and towards their extremities are covered with small woolly leaves, packed as tightly as possible. Finally stems, branches and leaves are all pressed into a dense, hard, convex mass, making an excellent seat for a wearied botanist. Within the plant is a peat made of its rotting leaves and branches, which holds water like a sponge, and into which the final branchlets put their roots: thus the plant lives in a great measure on its own decay."

There are two kinds; a finer one (*Raoulia eximia*) which is of a greyish blue colour, and is found over many mountains in Canterbury, and a coarser kind (*Haastia pulvinaris*) which is of a yellowish brown colour and is confined to the mountains just north of Canterbury.

At a distance a number of these plants do somewhat resemble a few sheep lying down; hence the name.

The supporters of the theory hold that the Kea was in the habit of tearing open these plants in order to get out the large white grubs, which were said to live in them; and that, when sheep first wandered into the birds' domain, they were mistaken for the woolly vegetable sheep. The bird, with the intention of digging out the grubs, was supposed to tear open the animal's skin, and, finding meat and fat even more appetising than the grubs, persisted in its efforts and so acquired the habit of sheep-killing.

All this sounds very reasonable, but unfortunately for the theorists it will not bear investigation.

The first objection is that, where the Kea was first known to attack sheep, the true vegetable sheep are unknown, and many mosses are just as conspicuous as the species of *Raoulia* that grows around Lake Wanaka. *Raoulia eximia* does not grow further south than Mt. Ida in Central Otago, at present its only known habitat in that province.

Secondly, no large white grubs, big enough to cause the Kea to tear up these tough plants, have ever (as far as I can

ascertain) been found in such numbers as to attract the birds; and, though I have often torn the plants to pieces, I have never found any large insect larvæ.

Thirdly, if the Kea feeds on the grubs that are said to live in these plants, one would expect to find the shrubs partly torn up; but I can find no evidence in favour of this. Though I have been upon the ranges where both Keas and vegetable sheep were numerous, I have always found the plants intact.

Lastly, when the Kea first attacked sheep, according to the first accounts, the shoulder or the rump, the latter in preference, was the part chosen. Now, if the bird were in the first instance looking for grubs, he would almost be certain to have worked right along the back: but the evidence disproves this.

It therefore seems to me that, unless some very strong new evidence is forthcoming in support of this theory, we have no alternative but to leave it in future out of consideration.

THE CURIOSITY THEORY.

The supporters of this theory say that it has been nothing but the Kea's insatiable curiosity and love of investigation that has got it into the habit of sheep-killing.

As has been shown in a previous chapter, it is never happier than when it is pulling something to pieces, and anything with a strange appearance is always a temptation too strong for the Kea to resist. Now, the suggestion embodied in the theory is this—that, when sheep first wandered into the Kea's domain, as the bird had very likely never before in its life seen anything that walked on four legs, this woolly animal at once aroused its curiosity. With the Kea, to wish to investigate is to do it, and the sheep became a centre of attraction.

The bird would no doubt walk round these strange animals and inspect them from all sides, and when satisfied with the view from the ground it would fly on to the sheep's back.

This would naturally cause the sheep to move, and the

Kea would soon tumble off, no doubt thoroughly enjoying the novelty.

In this way, by repeated failures, the bird would soon acquire the knack of holding on to a sheep while it was running.

Once on the back of a sheep, the bird would now want some other novelty to amuse itself with, and the woolly fleece would become the next object of investigation.

Soon the flesh and fat would be reached; and, the bird finding these new morsels much to its taste, the art of sheep-killing would soon be acquired.

In this country the heavy snow storms often bury or practically bury many sheep. The struggles of a half-buried beast would soon attract the Kea; and, finding the animal an easy prey, it would soon begin its depredations.

This theory has something in its favour, and no doubt does to some extent account for the bird's change of character.

THE HUNGER THEORY.

This one appears to me to explain to a larger extent the cause of the Kea's downfall, and as food is a necessity the fall was somewhat natural.

There is a good deal of evidence to show that lack of ordinary food greatly influenced the Kea towards sheep-killing.

As the Kea feeds on berries, grubs, roots, etc., there is no doubt that in winter and spring the excessive snow and heavy frost, so prevalent in Kea country, must often make the procuring of food very difficult. Again, as at this period the eggs are sometimes laid, and perhaps the young ones have to be fed, the lack of ordinary food must at times make the bird desperate.

If this did not in the first instance cause the parrot to kill sheep, it seems now to affect the number killed, for usually a severe winter, accompanied by heavy snow-falls, means a heavy death toll levied on the flocks by Keas.

The pastoral homesteads are scattered in the valleys of the foot-hills. The Kea, wandering about in quest of

something to satisfy its intense hunger, would, on reaching the lower levels, come across the meat gallows, where very likely the carcase of a sheep would hang, or at least some skins with pieces of meat and fat still adhering to them would be thrown over the fence to dry.

In trying everything with its powerful beak to see if it were edible, it would soon taste the pieces on the skins or

THE MEAT GALLOWS ON WHICH SHEEP FOR HOME CONSUMPTION ARE HUNG AFTER THEY HAVE BEEN KILLED.

even from the carcase itself; and, finding them much to his taste and easily procurable, it would soon acquire a liking for them.

If the skins and carcase were absent, there would always be a number of sheep's heads scattered around the gallows, and the Keas could there always find something to eat.

It is said that, in the early days, miners prospecting for gold often killed a sheep for food, and, roughly skinning it, would leave the skin and much offal on the ground, thus giving the Kea ample opportunity to get the taste for meat.

Once having acquired the carnivorous taste, it would soon find out that the dead sheep lying about the station contained the same kind of food, and that by tearing off the wool a good meal was always to be had. Tearing at the half-dead sheep, buried in the snow, would be its next step on the downward course; and, finding a lack of dead sheep, it would soon begin to attempt to eat the animal while it was running about. The wounds thus caused would soon mortify and cause the animal's death, and so the Kea would find an ever accessible method of acquiring a meal.

Some early writers suggest that, as the bird formerly fed on insect larvæ, the finding of a dead sheep in an advanced stage of decomposition gave them the taste for meat. In this way, the carcases being often full of maggots from the eggs of the ever-present blow-fly, as the Kea picked out the maggots it would at the same time eat pieces of meat and so acquire the taste for flesh.

This may in some measure have influenced the bird; at any rate, it would largely account for some Keas being fond of bad meat.

The following information, forwarded by Mr. James McDonald, adds weight to the hunger theory, especially as the killing first began on the station of which he speaks.

In a letter to me he says:—"I would like to say one thing in answer to the question why the Wanaka Station suffered first by the Kea. My opinion is that it was because this station was the first to send men out to the out-huts in winter where they had to kill their own mutton. The skin was hung up on a fence or a bush, and the birds, driven to lower levels by the heavy snow which covered everything, came down in numbers to pick at the skins and entrails. When deprived of this they began to kill sheep for themselves,

after having acquired the taste from the food obtained at the huts."

What particular group of facts covered by the Hunger Theory really caused the Kea to change I do not know; but I think that this theory indicates in what direction the true cause may be found.

CHAPTER IX.

THE KIDNEY THEORY.

How o'er the fascinating features flits
The genuine passions of the nether pit!

—Alfred Domett.

One of the most popular (yet, as I think, erroneous) statements about the Kea, is that the bird chooses the part of the sheep where the kidneys are situated, and then, burrowing into the living animal by means of its powerful mandibles, devours this delicacy.

Nearly every writer on the subject repeats the statement, and some even quote it as a proof of the Kea's intelligence.

In his "History of New Zealand Birds," Sir W. Buller quotes a letter from Mr. W. Chamberlain, of Harbourne Hall, Birmingham, who cited the statement as an indication of the parrot's reasoning powers. He says:—"Consider for a moment the sequence of events and the extraordinary change of habit attributed to the parrot. Between 1865 and 1870 the Kea first comes in contact with the shepherd, and commences to steal his meat, with a marked preference for the kidneys. This is natural enough, and any other parrot with a tendency to animal food might do the same, and here the matter would ordinarily rest. The shepherds would protect their meat, and the parrots would return to their natural food. Not so with the Keas. Between five and six years later they found not only that kidneys are somewhere inside living sheep, but where abouts and the nearest point on the back from which to reach them."

Mr. Chamberlain is quite right in his statement of the fact, but I think that his deductions are far from correct.

Dr. Alfred Russel Wallace quotes a similar misstatement in his book entitled "Darwinism;" for, after describing the methods of the Kea's attack, he says:—"Since then it is stated that the bird actually burrows into the living sheep, eating its way down to the kidney, which forms its special delicacy."

These incorrect statements were made possible by the loose way in which some of our writers have collected their evidence, and, in some cases, have made use of mere sheep station rumours.

It was Mr. C. C. Huddlestone who first disputed the statement, and said that the Kea attacked sheep for the kidney fat and the flesh.

This idea of Mr. Huddlestone's is supported by the evidence sent to me by men who have seen many sheep killed and wounded by the Kea, for they all (with one exception) state that the kidney is not the special attraction, but that the meat and fat are the object of the bird's desire.

The witness who was the one exception, in another part of his letter, writes as follows:—"I have shot many Keas by dead sheep, and they vomit fat;" so there seems to be evidence, even in this exception, that the bird ate the fat rather than the kidneys.

Of course, the Kea's taste may have changed since its first attempt at sheep-killing; yet many witnesses, ranging back to some of the earliest, do not support the kidney theory. A shepherd, in a letter to me, says:—"I have not examined many sheep that have been killed by Keas, but in the ones that I have investigated I have always found the same result,—the fat eaten and the kidneys left. Of course, the kidneys have been found mauled, but they were not sufficiently torn to give the impression that the Keas had been eating them."

Another correspondent says:—"I was walking quietly along and came to the edge of a slight depression in the ground, and there, right at my feet, a Kea rose from the body of a sheep. I examined the sheep. It was a fat merino wether,—perfectly sound; but it had been severely injured

by the Kea. A hole had been made in the sheep's loin,—the kidneys were protruding, and some of the fat had been eaten."

Other correspondents write in a similar strain, stating that the kidneys were usually untouched and the fat eaten.

If the kidneys were the special delicacy, as "Darwinism" states, then the Keas, I am certain, would have devoured them as soon as they were exposed.

Whatever may have been the attraction in the early days, the Kea does not now kill sheep for the sake of the kidneys.

People have been led to suppose that the Kea always went for the kidney, because it always attacked the sheep just over these organs; but, after having gone through the accounts of about fifty eye-witnesses, I cannot find any trustworthy evidence in support of the kidney theory.

Without crediting the Kea with any special powers of reasoning, there are several better reasons that easily explain its procedure; and these show that the bird simply attacks in the easiest, most natural and most effective way. It is, I think, too much to assume that the Kea has inherited from its parents the knowledge as to where the sheep's kidneys are situated; and yet from the first the rump has been the favourite part of attack. The shoulders are injured sometimes, but this is only in the case of sheep buried in the snow. Even if we assume that the Kea has intelligence enough to discover the position of the kidneys, we are still left with a difficulty. We are asked to believe that, within the last fifty years, or even a much shorter period, the acquired character of being able to locate the sheep's kidneys has become an inherited character and is passed on to the offspring. In believing this we accept as a basis for agrument that which is a matter for keen controversy among our leading biologists, and is by no means decided. No good case can be built on such insecure foundation. We must look in some other direction for an explanation of the Kea's habit.

If we look at the facts we shall see that the Kea

injures the loin, not because the kidneys are there, but because it is the easiest and in some cases the only possible point of attack. Nearly all my correspondents say that, from what they have seen, the Kea with few exceptions always settles on the sheep's hind-quarters.

The first reason for this is that the rump is the widest and most solid part of the sheep's back, and so forms a firm platform for the bird to alight on. Some eye-witnesses say that it is the only place where a Kea can retain its hold on a sheep.

One states :—"It is almost impossible for a Kea to stick on a sheep's back, while pecking it, in any other position than behind the kidneys facing the head. I have seen them trying to hang on to the sheep's back, but unless they were in the position described they could not stay on for ten yards."

A musterer, writing to me concerning Keas that had worried some sheep in a sheep-camp, says :—"They did not seem to follow the same sheep, but just hopped on to the first one they came to. Sometimes, when one got on a sheep's back in a good position—behind the kidneys, facing the head,—it would keep pecking, and would keep the sheep jumping round and through the mob for a long time."

Secondly, when the Kea flies after a sheep the rump is the nearest and handiest part to settle on, and, as the sheep often stumbles and throws the bird off, it will often have to regain its seat while the poor beast is running ; so it is no wonder that this part is nearly always selected.

Thirdly, when the Kea is once perched on the sheep's back, it will naturally begin to peck at the handiest part, and this is certainly the loin. Fortunately for the bird, that part is the least protected portion of the whole sheep, for the loins are the only places where the internal organs are unprotected by ribs or other bone. Thus the bird can easily tear its way into the body cavity.

There seems to be very little doubt that the preceding reasons do more to determine the Kea's point of attack than the presence of the kidneys or kidney fat. Though the bird

is fond of the kidney fat, I do not consider that there is enough evidence to show that this part of the beast is the main attraction.

This is supported by the fact that many cases are known of sheep-killing where the fat is untouched.

In July, 1907, I saw several sheep which had undoubtedly been killed by the Kea, and, though the muscles along the backbone had been torn off, the kidney fat was untouched.

The birds appear in many cases to eat whatever part comes first. Starting at the skin, they eat through the flesh, then on to the fat. Often the fat is only partially eaten, while the intestines have been pulled out and may be found dragging for some distance on the ground.

A correspondent states that one day he came suddenly upon two or three Keas pecking at the loin of what he supposed was a dead sheep. There was a hole in the sheep's back, and the birds were putting their heads right through to the inside of the animal and pulling out portions of the intestines. He went over, and to his surprise found that the sheep was not dead: he killed it to put it out of pain.

It seems that the birds do not mind what part they eat when they are hungry, so long as they obtain a meal. Mr. Ewen Cameron, of Otago, gives the following instance:—"A snow-slip carried some sheep with it, and I found a sheep stuck in the snow, where it had landed, still alive, with its legs eaten to the bone, and half a dozen Keas tearing away at him."

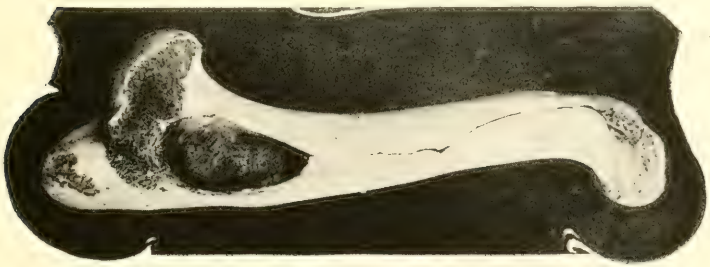
The evidence that has been received up to date definitely proves that the Kea does not kill the sheep for the sake of the kidneys only, and I doubt very much if they are in any way the source of attraction. As for the kidney fat being the coveted delicacy, there is some evidence to support it; but there is good reason to believe that mechanical reasons and not physiological ones determine the point of attack.

The case of the Kea is certainly unique in the fact that an insectivorous and fruit-eating parrot should develop the characteristics of a bird of prey. But, when we understand the reasons that led the bird to change its habit, much of the wonder ceases.

The stout grasping feet, made for holding on to rocks and trees, were naturally fitted for holding on to a sheep's back; and the powerful beak, used for grubbing in the earth or tearing off the bark of trees, was admirably fitted for tearing off the flesh of sheep.

Therefore, being, as it were, naturally adapted for such attack, it is not so very strange that the Kea, having been forced into a new way of procuring food, soon developed into a bird of prey.

There is an interesting point mentioned by Professor Benham, in a paper on the Kea, published in the "Transactions of the New Zealand Institute, 1906."



HUMERUS OF SHEEP, SAID TO HAVE BEEN SPLIT OPEN BY KEAS.

Quoting from a correspondent's paper he says:—"There is another matter I would like to point out to you about Keas; when they have eaten all the flesh off the bone then they tackle the shoulder (i.e., humerus) and leg bone and take all the marrow out of them by chipping them with their beaks until they obtain an entrance. I am sending you four shoulder bones, some old and some fresh ones killed last year."

Professor Benham kindly gave me one of the bones, which I have here figured, and also lent me the correspondent's letter.

I wrote letters to those men who might be able to give me information on this point, and even went so far as to ask for evidence through the newspapers which circulate through the Kea country, but I received nothing to support the suggestion made in the letter.

In order to ascertain on what authority the statement was made, I wrote to the correspondent and asked him to let me know if he had ever seen the Keas breaking the bones, and also if he could furnish the names of men who could give me authentic evidence on this very interesting point; but I received no answer.

Nowhere else in all the Kea country did I hear of any similar instance of bone-splitting by Keas, and therefore, until more conclusive evidence is forthcoming, the matter must be regarded as a supposition merely. I cannot trace any teeth marks on the bone; as the Kea has been known to split thin flakes from the soft rocks, it may, by commencing at the head of the bone, which is somewhat soft, be able to split a bone open.

It is certain from the appearance of the bone that some animal has split it open; but from the evidence to hand we cannot be sure that this was the work of the Kea.

CHAPTER X.

TIME OF ATTACK.

Oh! the dew of darkling mornings on the grasses green and grey!
Oh! the flush before the saffron, and the blushes of the snow!
Dark ratas stalking down the gorge (a-waiting for the day)
To the sheen of rippling waters in the shingle sweep below.

—M. C. Keane.

Winter and early spring are the periods of the year when the Keas are most aggressive in their attacks on sheep, and this fact seems to intimate that the lack of ordinary food does much to instigate the attacks, for a heavy winter generally means a heavy loss of sheep, apart from accidental losses.

This season in the Kea country is usually a very severe one, so much so that some of the other birds make for the plains until the warmer weather returns.

Owing to the high altitude, the cold becomes so intense that the ground is frozen hard for long periods, especially on the shady side of the mountains. These parts for many weeks or even months are as hard as iron, the birds being thus prevented from obtaining the insect larvæ which may be concealed under the ground. The Keas must find it very difficult, in severe seasons, to obtain much vegetable food; and this very probably, as we have seen, drives them to satisfy their craving by killing and feeding on sheep.

That very little insect food is obtainable at this season, in some parts, can be seen from the fact that, when at the Mt. Algidus Station in July, 1907, though I spent nearly a whole day in searching in the frozen ground for larvæ, etc.,

that I thought the Kea might fancy, hunting in all likely situations, both in the forest and the mountain side, I found only a very meagre supply.

Not only is food scarce in winter, but the sheep are easier to kill, for the heavy snow-storms which cover the country bury or half-bury a large number of sheep, and as they are in many cases unable to move they become an easy

KEA COUNTRY: ARTHUR VALLEY, LOOKING DOWN FROM MCKINNON PASS.

prey to the hungry birds. In early spring the climatic conditions are if anything intensified, and ordinary food is still scarce.

To add to this, the Kea often nests at this time, and the work of feeding his family makes him very bold and daring. During the late spring and early summer the

ordinary food is more plentiful ; the birds kill fewer sheep, and they do not become a menace again until the middle of the summer.

This summer trouble may be accounted for by the fact that at this season most of the snow on the lower slopes has been melted ; and the sheep, keeping to their usual habit of making for the sky line, soon find themselves among the Keas. The birds' opportunity is intensified by the fact that every night the sheep return when possible to particular places on the mountain side to sleep. These are termed "camps," and here the murderers are sure of finding a large supply of animals on which to experiment.

Their attacks, however, are not altogether confined to any special time, for they have been known to attack sheep at all seasons of the year. Still, from what I can gather, autumn seems to be the time of fewest attacks. No doubt the plentiful food supply, and perhaps the fact that the sheep have been shorn, thus giving the birds a poor hold on the animals' backs, account for this.

All my correspondents agree that the favourite times of the day for the bird to commit its depredations are the early morning and the evening ; for, like its cousin, the Kaka, whether killing sheep or not, it is always lively at these times.

For this reason it is difficult to obtain photographs of the birds actually attacking sheep, for the lack of light and the absence of the shepherd at these times makes the chance of obtaining a snap-shot extremely small. They have been known to attack at all hours of the day ; but they seem to confine most of the work to the early or late hours.

When attacking in the middle of the day it is nearly always in dull or foggy weather, though rare cases are known of their killing sheep even in bright sunshine.

CHAPTER XI.

THE DAMAGE DONE.

Ay! In this realm of seeming rest
What sights you meet and sounds of dread!
—Alfred Domett.

It is no wonder that in the early days people came to look upon the Kea as a terrible menace to the sheep-farming industry of New Zealand, for some of the stories told and published about its depredations are enough to stop any sheep farmer from settling in the country.

Not only did the man on the sheep station put down most of the annual loss among the flocks to the unfortunate bird, but several standard books published such exaggerated and false stories that one can only wonder how they were ever credited.

Unfortunately, these idle tales are still believed, and are quoted in other parts of the world against the Kea.

Here are some of the worst.

The late Mr. Potts, in his book "Out in the Open," says:—"On one outlying portion of a lake run the birds were so destructive that, although there were 30,000 acres of good grass land, the occupiers decided not to place stock upon it; the losses had been so great that it was found better to abandon the country."

The late Sir W. Buller, in his "History of New Zealand Birds," says:—"In some parts of the country the Kea menace has risen to such a pitch that the run-holders have been fairly driven off the country."

He also publishes the following newspaper report:—"Mr. D. A. Cameron, one of our oldest run-holders in the Lake Country, Otago, is throwing up his run at the Nokomai,

through the Keas, which, if not more numerous, are according to report becoming greater adepts at the destruction of sheep."

From these reports one can naturally fill in the sad details. One can see vast stretches of good sheep country

KEA COUNTRY: CLINTON RIVER AND MT. MACKENZIE.

left to the ravages of the hare and the north-wester; and, where flocks of sheep once fed and flourished, a great loneliness reigns.

In the valleys the empty homesteads and the lonely back huts show how far man once penetrated into the fastnesses, ere the flying terror, decimating his flocks, drove him

with the remnants of his fortune from that plague-infested region.

Such would be the idea given to the reader from perusing these accounts; yet, when we look into the question, nine-tenths of the stories seem to be absolutely false. At any rate, not a piece of evidence can be found to-day in support of these wild tales.

In order to test for myself the truth of these statements made by early writers, I asked for information through the newspapers that circulate in the very country mentioned by them.

KEA COUNTRY: LAKE ADA, ARTHUR VALLEY, NEAR MILFORD SOUND.

By this method, and by writing personally, the following replies have been received:—

Mr. W. E. Stevens, M.R.C.S., F.R.C.P., Kurow, says:—"I know nothing about the throwing up of the Nokomai run through the depredations of the Kea in 1880, or of any runs about the cold lakes district."

Mr. W. Robinson says:—"I have to inform you that Mr.

D. A. Cameron is still the lessee of the run in question, and whilst writing I can see his stock from my window."

Mr. Alex. Elliott, from Kinloch Bay, Elgin, adds his testimony, saying:—"I am sure that Mr. Buller made a great mistake when stating that Mr. D. A. Cameron of the Nokomai surrendered his run through the Keas. I know the Nokomai very well, and also Mr. Cameron, and can safely say that the Kea was never any trouble there."

Finally, in order to satisfy myself thoroughly, I wrote to Mr. D. A. Cameron himself and received the following reply:—

Nokomai,
24th June, 1907.

"Dear Sir,

My son Alec has handed me your letter of the 19th inst., re "Kea." There is no truth in the statement that I ever intended to give up my run owing to excessive damage done by Keas. Many years ago we had a few here, but they did not do much damage to the sheep; but on the Closeburn run on Lake Wakatipu they were very troublesome. I have been informed that the Lake County paid 2s. 6d. each when they were at their worst, in order to destroy them. Of late years they have not been troublesome on that run either. I have no idea where Mr. Buller and the papers got their information.

Yours truly,
(Signed) D. A. CAMERON.

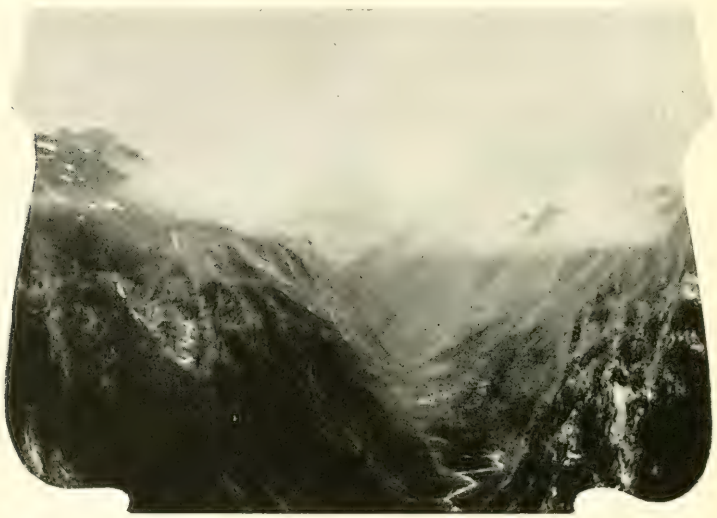
Apart from these erroneous published reports it is almost impossible to get any true estimate of the annual losses, owing to the nature of the country and the uncertainty of the reports sent in.

The country is so vast and mountainous, and the sheep are only mustered at such long intervals, that when the annual loss is estimated it is impossible to know what percentage must be debited against the Kea.

There is always a large annual loss due to roughness of the country, this causing many sheep to be killed by their falling over cliffs or being buried in the snow.

The damage done by the nefarious birds is sometimes very serious, and often large numbers of dead sheep, showing the Kea scar, testify to the seriousness of the menace. However, very rash statements are made by many writers and musterers, and it is never clear whether the percentage is on one flock, one run, or the whole Kea-infested country.

Again, one is never certain whether the killing was continued throughout the year or confined to one occasion only ;



KEA COUNTRY : CLINTON VALLEY, LOOKING DOWN FROM MCKINNON PASS.

and consequently many erroneous and often exaggerated statistics have been quoted from time to time.

If the Kea killed sheep all through the year at the rate that it does on certain occasions, or if the Keas in all parts of the Kea country were equally troublesome, then the loss would be so severe that sheep-owners would be afraid of stocking that part of the country with sheep.

Fortunately, however, this is not the case, for the Keas

seem to kill at uncertain intervals; and, after a big slaughter of the sheep, weeks and months may pass before they again begin their depredations.

Yet again, they usually confine their attacks to certain localities, and when the birds there are shot the killing may cease for years, if not altogether. Some shepherds put the annual loss in the Kea country at 30 or 40 per cent., but from what I can ascertain this is an exaggeration, for, if this percentage were killed annually, there would soon be no sheep left in the Kea-infested area.

Sometimes, at special places, the killing may be so severe that it becomes a very serious menace to the sheep-farmers, as can be seen from the following instances.

A musterer writes:—"I put a mob of sheep off the flat on to the hills at Makaroa Station, and, on going up the spur two days afterwards to where the sheep had encamped, I found six dead."

Another gives the following:—"On the Minarets Station, I remember a mob of almost 1300 hoggets being put on a spur, and we only mustered 700 off it. The Keas no doubt were responsible for a large number of them."

Three more must suffice.

"One year I had a bad muster; 400 woolly sheep came in at the beginning of winter when the snow fell and the sheep could not get away. I placed them, as I thought, in a safe position, on the hillside quite close to where I lived. In spring, when I went to have a look at them, the Keas had killed about 200 of them."

A shepherd, on going to his flock, which he had left the night before, says:—"I shot nineteen Keas, and on looking round I found that they had killed 38 sheep during the night. Most of them that I found were warm and in splendid condition. The flock consisted of 1600 sheep, and during the winter the Keas killed 300 out of that number, and, as there were a good many birds about, we shifted the sheep."

A run-holder wrote to me, in 1907:—"No later than last week we came on 60 valuable ewes killed by them. One of my shepherds, Watherston, who has communicated with you

on this subject, came on eight Keas killing a ewe. The ewe was still living, and the lamb was torn out through her ribs. He succeeded in shooting all the birds."

There seems very little doubt that in many instances the birds must kill either for sport or in order to have a number of dead sheep to feed on for some time, for often many are killed and are left almost untouched.

It seems as if the birds get a murderous frenzy, and do a lot of damage before their thirst for slaughter is satiated.

Reckoning over the whole Kea country, I am certain that 5 per cent. of the flocks would well cover the annual loss due to Keas. Of course, in some runs at certain times this number is very much exceeded; but, taking the evidence from all sides, I think that this percentage is near the mark.

CHAPTER XII.

KEA HUNTING.

The speargrass crackles under the billy and overhead is the winter sun;
There's snow on the hills, there's frost in the gully, that minds me of things that I've seen and done.
. . . . . .
I mind the time when the snow was drifting and Billy and me was out for the night—
We lay in the lee of a rock, and waited, hungry and cold, for the morning light.

—David McKee Wright.

When it was discovered that the Kea was probably responsible for the annual loss of a large number of sheep, men at once set to work to try to exterminate him.

Incited by the sheep-owner and encouraged by the Government, an organised massacre was begun, and has continued during the last forty years, resulting in the slaughter of thousands of these interesting birds.

At first nearly every shepherd and musterer carried fire-arms, and while going about their work they lost no opportunity of shooting any Keas that came within gunshot. The half-crown per head given by the sheep-owner did much to stimulate the shooting. When, however, owing to being much hunted, the Kea became difficult to approach, the men were unable to afford the necessary time to stalk the bird, and other means of keeping down the pest had to be adopted.

The station-owners then employed men whose sole duty was to kill Keas and rabbits. The position was no sinecure, for only the strong, agile and fearless could undertake the work.

The hunters were usually supplied with fire-arms, ammunition, food, horses, etc., and besides receiving a weekly wage they were paid so much per head for all Keas shot.

In order to give a graphic idea of the ordinary routine of a Kea-hunter's life, I cannot do better than quote from a letter from Mr. J. S. Ryan, who for many years hunted this mountain parrot around Mt. White, Canterbury.

He writes as follows:—"To hunt the Kea for pleasure or profit is an undertaking that only those who are sound in wind and limb can indulge in with safety. It is not for the untrained plainsman or the 'tired Tims,' who would most propably take more time thinking how to get to the mountain top than they would spend in climbing there. Kea hunting is mostly combined with rabbiting, since one could hardly hunt the Kea from day to day throughout the year without a spell. Rabbiting 'between whiles' on the low lands affords the necessary change. The usual thing is a weekly wage, and so much per head for Keas, free *'tucker' for self and dogs, a pack-horse, a riding horse, camping outfit (consisting of tent, ‡'billy,' knife and fork, tomahawk, and piece of wire for grid), bread and flour, currants for †'duff' on wet days, butter (if there is any), with as much mutton and potatoes as you care to pack up. To these you add the weekly sporting paper and magazines. A good appetite between meals comes of its own accord. You start 'out back,' say, on Monday morning after coming in for supplies. You have a fair day's ride to the 'out back' hut, where you pull up for the night, hobble the horses and sleep like a top after the usual good tea of chops, potatoes and 'billy' tea. Next morning you leave half your supplies at the hut, load up the pack-horse with the remainder, and then start on your way again. Now comes the river, which you cross continually as you work your way up to its source in the same gorge, until you reach the very heart of the mountains, and the towering rocky walls close in on you on either side. It is here that the shrill whistle of the blue mountain duck strikes on your ear through the rush and roar of the river as it twists and leaps among the boulders and dashes its spray on to the bush that comes right

*Food. ‡A tin can for boiling water. †Pudding

down to the water's edge. You now look out for the best camping ground you can find. Having found a place that suits you, you hobble the horses, after taking them back to the last bit of good feed you passed, pitch your camp, tie up and feed the dogs, break birch twigs for a bed, get supper, read for a while before 'lights out,' and then sleep. And how you sleep among the mountains after a long day's ride or climb! Now you are in the very heart of the Kea country, and perhaps you

KEA COUNTRY: In pursuit of the Kea in Summer. Fording the Avoca River.

rouse up to hear the dogs barking and the Keas singing out overhead. Or you have been dreaming that you are on your way back to the station with the pack-horse loaded up with Keas' heads and your fortune made, and you wake to find a dog loose among the 'tucker.' In either case it's time to get up and get a move on if you are to be among the Keas before they camp for the day. Having breakfasted on the inevitable chops, you pack your lunch for the day's hunting, the said lunch consisting of more chops (cold), slice of bread

and butter, a †'chunk' of ‡'brownie,' and tea and sugar, for you always take the 'billy' with you. Cartridges and a light single-barrelled gun slung over the shoulder finish your equipment. You put out the fire, unloose a dog, see that the others are all right, and give them a parting word and pat, grip your stick, on which your life may depend in ticklish places, and off you go for a two or three hours' climb to the top, just as dawn is beginning to show in the east and there is still hardly light to enable you to pick your way among the boulders and fallen timber. The reason you always take a dog with you in Kea hunting is that if you should have the ill-luck to break your neck the dog in time will, owing to hunger, find his way back to the homestead, and thus give silent notice that something has happened to his master. Then the search parties go out. Nip, my favourite spaniel, could spot a Kea on the wing long before I could. When the birds are flying far overhead they will call out 'keo-o,' with the last 'o' long drawn out. When Nip heard this characteristic note, up would go his head, and he would almost stand on his hind legs. To see him hunt for that Kea in the sky was laughable indeed. I could tell when he found the bird by his intense gaze, and by the beating of his stumpy tail on the ground. Then I would whistle to the Kea, and unsling my gun, telling Nip to watch the Kea as it circled round and dived down. The old dog has fallen backwards many a time, so intent was he on keeping the Kea in sight. Down would come the bird, well within gun-shot —I have had to walk away so that I should not blow one to pieces. When one is paid for killing the birds and five shillings depend on the shot, you do not give the bird a sporting chance by firing at it on the wing. In hunting the Kea you must be up on the mountain top about daylight, to catch the birds going home after their night's carouse. The Kea, however, will be out feeding and courting all day and all night as well. I have killed them at all hours, from the first streak of dawn to the last faint glimmer of

†Piece ‡A kind of currant loaf.

daylight. The best time, however, is either in the evening or the morning, when they are going to their feeding grounds or leaving them. They mostly go in pairs in the breeding season; then, when the young are able to fly about, they travel for a while in families, and afterwards towards the winter they club together. I once counted over thirty in a mob, but alas, through having been among the rabbits, my ammunition had almost run out, and I only got nine out of them. The Kea is,

KEA COUNTRY: AUTHOR'S CAMP.

I am confident, the most inquisitive bird alive. One may be just visible as a speck in the sky, but if it has no important engagement on hand a whistle will often bring it down to you at once. It was my habit when shooting Keas to pick off the outsiders or timid ones first, if there were more than two,—I always took two at a time. At the report from the gun the others would give a nervous start, erect the few feathers that

do duty for a top-knot and look at me as much as to say 'What the dickens was that noise?' You may go for days without seeing a single bird, for Kea hunting is rather a lottery, but I would keep going where they had been seen at the sheep, and I was bound to get them in the long run. The Kea-hunter's life is not all 'beer and skittles,' still, with all the hardships through getting caught in fog or snow on the tops, and so forth, there is something fascinating about it.

KEA COUNTRY: In pursuit of the Kea in winter.

When once you have got a taste of the free life, fresh air, and sunshine of a kind which is only found amongst the mountains, you can never forget it, and at times the longing to climb once again is almost irresistible."

As Kea hunting is taken up by men all over the Kea country, and each man has to find out the most successful method of killing the birds, there were and are many different ways employed. The commonest method is by shooting them with a shot gun, and as the birds are extremely tame and inquisitive it is not usually very difficult to get near them once they are in view.

Several devices are employed to entice the birds within range, and one which is very successful is the using of a decoy. A tame Kea is chained to a rock, and his noisy, excited cries soon attract other Keas that are in the vicinity. As these appear they are shot by the Kea-hunter, who is hidden behind a rock.

An extension of this device is to get two Keas in separate cages and to place them so that they cannot see one another, yet near enough to hear each other's cries. This causes them to make a great fuss in trying to attract each other, and is generally successful in bringing down a lot of their wild mates.

One man I knew used to take a square yard of scarlet cloth, which he carefully spread out over a rock, placing stones on it to prevent the wind from carrying it away. The vivid colour can be seen a long distance away, in contrast to the sombre colouring of the mountain side; and the Keas, sighting it, heedless of the hidden danger, fly down to satisfy their curiosity, and so become spoil for the hunter's gun.

Some men have learned to imitate the Kea's peculiar call, and this seldom fails to add heads to the heap already obtained.

When a number of Keas is present and the Kea-hunter has no more cartridges, the following trick is sometimes resorted to. While in full sight of the birds, he walks behind an overhanging ledge of rock and remains quiet; the Keas, who have been watching his every movement, are almost overwhelmed with a longing to know where he has vanished. They fly on to the rock, and have a somewhat animated discussion as to the reason of his disappearance. Finally one bird walks to the edge and peeps over at him as much as to say, "What on earth are you doing there?" This is the Kea-hunter's chance; there is a swift blow from his stick, and the Kea topples over. The other birds, seeing that number one has not come back to report, but has also disappeared over that mysterious ledge, likewise go to inspect, and often quite a number are killed in this strange way.

The second general method is to shoot the birds while they are feeding on the remains of a sheep. The men take the bearings of some sheep that has been killed, and if they cannot find a carcase they sometimes kill a beast and then camp near it at night. Moonlight nights are generally chosen, so that the birds can be seen at the body, and usually a number of Keas fly down from the surrounding peaks and begin to gorge themselves. The men do not shoot them at once, but wait until the birds have stuffed themselves with meat and fat. Then they are shot one after the other, for they are too lazy and full to hasten away.

One correspondent gives the following account:—"At Makaroa Station in spring I was shooting Keas pretty well every night when I carried a gun. I would hunt about for dead carcases. If I came on a freshly-killed sheep, or one partly eaten, I was always sure of a good haul. I would wait about until the Keas came. Sometimes they would arrive in mobs; at other times in a straggling way. I would then take up my position, a little distance off the meat, and wait until they got on to it to feed. My object was to line them so as to get as many as I could at one shot. Though they would fly off at each shot, they would be back again almost immediately. I would keep at them in this way until they got a little frightened, then I would follow them up and shoot them as I could. I think the largest number that I ever got in that way was sixty-three off two dead sheep. I have at other times got from twenty to fifty; but often I would only get about six or seven, and at other times none at all."

Mr. Robert Guthrie, an old Kea-hunter, thus describes his experience in connection with one "camp," where the Keas were very troublesome:—"The 'camp' was as usual high up; it was situated on a large plateau, where it was impossible to get near without disturbing the sheep and the Keas. I used to wait till well on in the night, and go, as quietly as possible, straight to the camp. The Keas, nine of them, were there the first night. I got two of them, and they came fairly regularly until I had got them all but one. This one was

from the very first in the habit of rising rather wild, and I got to know it well from an unusual call that it had. However, although I got eight out of the nine, the killing went on as badly as ever. Sometimes as many as three sheep would be killed in one night, but, try as I would, I could not steal unawares upon the culprit, for he was always alert and became very sparing with his peculiar call. After many nights of weary walk and disappointment (I had a ten mile tramp each time, five miles there and five miles back), it struck me that its call, after it had flown away, always came from the same direction. This was across a deep gorge, among some almost inaccessible rocks.

"The next day I went and carefully examined the rocks, and I could see in an open crevice, about sixty feet above me, a hole, which I was satisfied was the Kea's run. I came to the conclusion that this would be a likely place for him to spend the time after his night's carnival; and I determined, therefore, at first full moon to bring my gun and watch below for his home coming.

"After a good many disappointments, I was sitting on a stone about three o'clock one clear frosty morning in August just beneath the crevices, and was just dropping off to sleep, with my gun on my knees, when a black shadow crossed the stones at my feet.

"I looked up, and saw a Kea just alighting on the edge of the rock. I had it down in a twinkling. It was no doubt the old bird, for in my time on the station there were no more sheep killed in the camp."

The last general method employed is a very effective one, though sometimes risky, and consists in poisoning the dead carcases of the sheep that have been killed by the Kea. Strychnine is sometimes used alone; but more often this is mixed with arsenic, which is found to be very effective.

A dead sheep, preferably one killed by the Kea, is half skinned and the poison is rubbed in, sometimes the Kea wounds alone being treated.

During the night the birds come to feed on the remains of their earlier carousal, and usually by daylight a number

of Keas will be found lying on or around the dead body.

One Kea-hunter says:—"Another camp where the Keas used to kill was very high up, in a rough place which was almost inaccessible at night. I shot what Keas I could find about in the day time, but never the right one, for the killing still continued. I half skinned a sheep they had killed in the camp, and put strychnine in it. When I came back in a few days I found five dead Keas. That ended the killing of the sheep in that camp."

From North Otago, where the Keas are still plentiful, comes the following account:—"We then baited three of the sheep carcases with strychnine, and sent a man out to camp on the spur. He picked up eight poisoned Keas, two of which were actually on top of the carcase, as well as shooting twenty more of the birds."

The poisoning has this advantage, that, if it does not always poison the Keas that kill the sheep, it at least kills those who gather round to share the spoil.

But this method, though very effective, has its disadvantages, for the poisoned carcase may remain for months and be a continual menace to all sheep-dogs passing that way. Shepherds are continually travelling up and down the country accompanied by numerous sheep-dogs, which owing to their splendid training are invaluable in the rough country. It is almost impossible to keep them always in sight; and, as they seem to be ever hungry, unless great care is taken they get at the poisoned carcase. In this way a shepherd, in attempting to rid his station of Keas, may lose more by the death of his dog than he has through the ravages of the birds all the winter. Therefore poisoning has to be done with great care; and, rather than leave the carcase to rot, it is often finally burnt and the remains are buried.

Even since suspicion fell on the Kea he has been legally branded as an outlaw. No game laws protect him. He knows not the peace of a close season. Regarded as having his beak against every man, every man's hand has been against him.

Unfortunately, no full record has been kept of the numbers killed, but the following statistics will give some idea of the

carnage. The Selwyn County Council has paid out, since 1887, £262 9s. 6d.

The Ashburton County Council since 1891 has paid out £24 16s. 6d., while the Amuri County Council received 531 heads in one season. Mr. Rolleston, from a small run of his in Ashburton County, received 800 heads in one season; and the Lake County Council up to 1884, had paid for 2000 beaks.

Another office received 1574 heads; while, since 1889, the McKenzie County Council has paid out £193 6s. 6d. for 3866 Keas.

KEAS' HEADS: As they are received at the County Council Offices.

The price paid per head by the different Councils depends a good deal on the amount of damage done, though usually 2s. 6d. is the price; to-day several men do not consider 10s. per head too high a price.

Mr. E. B. Milton, of Birch Hill Station, Canterbury, in a letter to me on the payment for Keas' heads, says:—"I have

paid ten shillings per head since 1900, and in my experience the damage done to the sheep has not been serious since a substantial reward was instituted. The payment of a high price for heads is the best means of keeping shepherds and others, engaged in the hill country, continually on the war path. Four of my neighbours now pay ten shillings each for heads."

Up to 1906 the Government paid 6d. per head, but this has been raised to 1s.; and, as the station owners usually pay 1s. 6d., the men receive altogether 2s. 6d. per head.

When the birds are shot either the upper mandible is pulled off and kept in a match box until the station is reached, or else the head is screwed off and, when brought in to the homestead, threaded on a string or wire.

It is quite a common sight on the back stations to see a number of old decaying heads hanging on a nail in some little-used shed. Here they usually remain until a stock inspector visits the place or some one pays a visit to the nearest town. It naturally follows that the heads become so decayed that the offensive odour given out from them makes it almost impossible to count them out.

One County Council clerk promised to send me down a large supply of heads for scientific purposes, but they smelt so badly that he knew the railway authorities would refuse to carry them, and so he buried the heads to get rid of them.

CHAPTER XIII.

DISTRIBUTION.

From the dark gorge where burns the morning star,
I hear the glacier river rattling on
And sweeping o'er his ice-ploughed shingle-bar,
While wood-owls shout in sombre unison.
And fluttering southern dancers glide and go;
And black swans' airy trumpets wildly, sweetly blow.

—Anne Glenny Wilson.

The area of the Kea's distribution is continuous, but very limited. It is confined solely to the mountain country of the South Island of New Zealand, which extends for 400 miles in one direction and 80 miles in the other, making altogther an area of some 40,000 square miles.

Wherever there is mountainous country in the South Island, with the exception of the Kaikoura Mountains in the North East, the Kea can be found.

It was first discovered by Mr. W. Mantell in 1856 in the Murihuku district, which embraces practically all Southland. It was a *rara avis*, and some thought that it was confined to Southland. However, as soon as men pierced the mountain fastnesses that run up the west coast of the island, its distribution was found to be much wider. A few years after its discovery others were found, not only in Southland and Otago, but in Canterbury as far north as the Rangitata Gorge, about 200 miles north from where it was first seen. In 1859 Sir Julius von Haast saw it in the Mount Cook region, and a year later Sir W. Buller found it in the Rangitata Gorge.

As early as 1862 Sir James Hector noticed it in most of the snow mountains of Otago, during his Geological Survey of that province, and in the same year Sir Julius von Haast saw one on the Godley Glacier. In 1865 Sir Julius found it a long way above its supposed limit, — around Browning's

Pass at the source of the Wilberforce River; and two years later he saw it still further north, near Arthur's Pass on the West Coast road.

In 1868 Keas had become common around the Lakes which lie on the borderline of Otago and Canterbury, and ten years later they had increased all round the spot where they were first found, for Sir W. Buller speaks of them as being plentiful in Southland.

In 1881 they were again seen at Arthur's Pass, for Dr. L. Cockayne (in a communication to me) states that his brother-in-law, Mr. A. Blakely, shot one there at that date.

A year later, in 1882, Mr. W. Potts reported that Keas were known at Grassmere on the West Coast road, and in Lochinvar Station, North Canterbury, and at the head waters of the Esk and Hurunui, that is, about forty miles still further north of Arthur's Pass their then supposed northernmost limit.

In view of all these facts it is surprising to find Sir W. Buller, in 1883, quoting a letter from a Mr. Shrimpton to the effect that the Keas' area of distribution did not extend north of the Rakaia River. This is the more striking, because both Dr. Haast and Mr. Potts had already published records of Keas seen northward of that limit. The former found them at Arthur's Pass, 40 miles north of the Rakaia, in 1867; and the latter tells of their being seen at Hurunui, another 40 miles north of Arthur's Pass.

Later, in 1888, Mr. W. W. Smith, in a published article, says that Keas had, during the previous three years, just reached the ranges above the Otira Gorge. However, like Sir W. Buller, he had evidently not seen the report of Dr. Haast as to their being seen years before at Arthur's Pass, which is as far north as the Otira Gorge.

It has been freely stated by writers on the Kea that, since its discovery in Southland, the bird has gradually migrated northward through the Otago and Canterbury provinces. This suggestion has not only been published, but has been almost universally adopted as true. This wide-spread

acceptance is unfortunate; for, on looking up all the available records, I find that the evidence does not support the statement. The evidence rather indicates that, whenever and wherever men have penetrated the mountainous country of the three lower provinces of the South Island, Keas have been found in the parts explored. It was because the Otago and Southland mountains were explored first, and the Canterbury mountains a little later, that the idea of the northern migration was suggested, and very likely, if Dr. Haast and Sir James Hector had explored the Canterbury alpine region first, the alleged migration might have had its direction reversed.

Even if we take the dates and places of the Kea's discovery, the facts do not uphold the theory. In 1856 Mr. W. Mantell found the Kea in Southland,—the exact spot is not recorded. Then, instead of finding it a few miles further north in Otago, Dr. Haast discovered it three years later at Mt. Cook in Canterbury, about two hundred miles further north, thus missing the large Otago province which lies between. It was not till three years later that Sir James Hector reported it to be among the snow mountains of the intervening province.

In the same year Dr. Haast saw it at Browning's Pass, about 80 miles still further north, and in 1867 it was known at the Lochinvar Station, sixty miles further north again of Browning's Pass. We have no record of the Kea being found further north than the Lochinvar Station until 1882. This is very likely due to the fact that no scientific man explored the country. If one did, he left no available records.

It will thus be seen that, instead of the Kea's area of distribution being increased a few miles further north year by year, as would have been the case had the birds travelled north, the birds were found at different places, sometimes 200 miles north of their previous location, while they were not found in the intervening country until many years afterwards.

It is also very unlikely that, the moment the birds were discovered, they made a rush northward, so that in eleven years they had migrated 300 miles from their old homes.

There are two pieces of evidence entirely against this unlikely proceedure.

First, if the Keas had migrated, then they should have become rare in Otago and Southland; but in fact they were not very plentiful in the south until after 1868, and by this time the Kea was recorded at Lochinvar, some three hundred miles further north.

Second, the reason given for the Kea's migration is that the systematic slaughter in the early days drove them north; but the whole idea falls to the ground when we remember that, in 1867, a year before the bird was even suspected of sheep killing, and so a year before the slaughter of the bird began, the Kea was recorded from the Lochinvar district, that is, the very country into which it was alleged to have been driven by the aforesaid systematic slaughter.

There is however, a lot of sound evidence to show that the Keas' area of distribution is widening. This widening is due, as far as I can ascertain, to the great increase in their numbers; for, though their numbers have been thinned by forty years of continuous slaughter, they are still numerous in many parts.

It was noticed that, soon after the birds began to kill sheep and eat them, their numbers increased so that where they had been seen in tens they could be seen in fifties. Many sheep owners put this down to the plentiful supply of food obtained from the dead animals.

This would appear at first sight to show that all Keas killed sheep; but I have already, I hope, made clear that only a comparative few do the killing, though the rest may join in the feast.

This increase has naturally caused the Keas' area of distribution to expand; and now, instead of confining themselves to the main ranges, they come down even as far as the foot hills on the east and the sea coast on the west. The latter limit is supported by the fact that they have been seen at Koiterangi, near Hokitika, and at Mahitahi, near Bruce Bay; while in June of 1906 Captain Bollons, of the

Government Steamer, "Hinemoa," told me that he saw one flying along the beach at Bruce Bay itself.

To the east they have come down to the edge of the plains, and south almost to the coast line. The only direction in which the birds can now extend is north into Nelson and Marlborough; and, though the Keas' northernmost limit remained at the head waters of the Esk and Hurunui Rivers for about forty years after their discovery, there has been during the last few years a spreading into these two northern provinces. The stations around Hanmer have been troubled with Keas for some years, and in 1903 Mr. Edward Kidson, while climbing Mt. Robert near Lake Roto-iti, Nelson, saw one at close quarters. This spot is about 40 miles south-west of Nelson city and 40 miles north of Hanmer. Mr H. M. Bryant, who was accompanying Mr. Kidson at the time and has done a lot of mountaineering in the Nelson province, states that he had never before seen one in that district; while the late owner of the station at Mt. Robert told him that it was the first time that a Kea had been seen on his run.

Through the kindness of Mr. G. R. Kidson, I am able to record two other instances in the Nelson province. In 1904 a Kea was caught by Mr. A. G. Hammond at Appleby, only thirteen miles south-west of Nelson city, and in the same year Mr. T. S. Rowling caught one at Riwaka, a few miles north of Motueka, about 50 miles north-west of Nelson and 95 miles north of Hanmer.

This is at present the northernmost limit of the Kea's area of distribution, which may be defined on the north as reaching the shores of Cook Strait.

Through the aid of Mr. T. E. Currie, I can now publish reports of the Kea's presence in the Marlborough province, where before it was practically unknown, showing that in addition to travelling up north-west through Nelson, they are also travelling up north-east through Marlborough.

In January, 1906, one was found at the head of the Waihopai River, at a place known as the Glazebrook Whare.

Again, in May, 1906, one was seen on the Tarndale

Station, about halfway up the Saxton River, some miles north of the homestead.

Another correspondent reports that he has seen one thirty miles only from Blenheim, the capital of the province.

Now that Keas have reached the north coast of the South Island, one wonders if the Cook Strait will prove a sufficient barrier to prevent them from flying over to the North Island and spreading there.

The two islands are only 15 miles apart at their nearest points, and on a clear day the opposite coast can easily be seen.

This northern extension of recent years does not, I consider, in any way support the old idea that the birds migrated northward for a decade or so after their discovery.

They were known at the Lochinvar Station about 1866-7, and since then they have practically not made any further advance until 1900; but at the present time they are certainly spreading northward.

The migration may be due to the increased numbers, or perhaps to the incessant slaughter which has been going on for some years.

What really started the northern migration theory was knowledge of the fact that, though the Keas themselves never migrated northward in the early days, yet the habit of sheep-killing has extended from Otago northward to Nelson. No one thought of recording the Keas' presence as long as they did no harm, but as soon as they began to harass the flocks reports were sent to the daily papers.

As the habit gradually spread northward many jumped to the conclusion that the birds had just arrived, whereas in many instances we know that the birds were on some of the stations years before they commenced to kill.

For instance, at Browning's Pass the Keas were seen in 1865, but no cases of sheep-killing were known until 1886.

The first instance recorded of sheep-killing was in 1868 in the south near Lake Wanaka; and thence the killing has spread south to Lake Wakatipu and north to the Amuri district, including Hanmer. About 1880 the bird's depredations were recorded at the lakes south of Canterbury, and by 1886,

after passing north through the Peel Forest and the Ashburton Gorge, the Kea had commenced to kill sheep around Mt. Torlesse. Since then it has slowly extended north to the stations in the Amuri District, and so badly affected were they that in 1906 a meeting of runholders was held in Culverden to try to abate the nuisance.

So far I have no records of sheep-killing in Marlborough and North Nelson, though the Keas are now found there.

In Westland also the Keas have spread, for in 1906 Mr. Condon, of Bruce Bay, South Westland, for the first time had some sheep killed by Keas.

BONES OF KEA: Found in Chatham Islands.

The fact that no fossils of Keas have been found in the North Island of New Zealand seems to indicate that the birds never extended further than the South Island; but, while in the Museum, Christchurch, I unexpectedly came across two wing bones and a lower mandible of a Kea, obtained from the Chatham Islands. These interesting specimens were presented to the Museum by Mr. J. J. Fougere, of Te One, on the main island, and were identified by the late Capt. F. W. Hutton. These, with some more Keas' bones and other sub-fossils, were found in some drifting sand-hills at Petre Bay, by Mr. Fougere, in 1897. In a letter he states: "I do

not think the Kea or Kaka were ever numerous in the Chatham Islands, as their remains are rare in comparison with the other fossil avi-fauna."

From the number of fossils already discovered, there seems to have been a much larger avi-fauna on the islands than at present.

This is supported by a pamphlet written by Dr. Arthur Dendy, (then Professor of Biology, Canterbury College), who visited these islands in 1901.

He says :—"All who have studied the question are agreed that the fauna and flora of the Chatham Islands are simply isolated detachments of those of New Zealand, although the striking differences which we have had occasion to notice imply a long period of isolation. This view of the case requires us to believe that the islands, though now separated by 400 miles of open ocean, were at one time either actually connected with the New Zealand mainland, or, at any rate, much more nearly so than at the present day, a belief which is strongly supported by the fact that the sea between New Zealand and the Chathams is comparatively shallow, only from 500 to 1000 metres in depth, while further to the east it sinks at once to 4,500 metres (Diels). In the Upper Pliocene period it is probable that the area of New Zealand was greatly extended so as to embrace, for example, Chatham Islands in the east, Lord Howe Island in the north-west, Auckland and Campbell Islands in the south. . . . . This condition is supposed to have lasted on into the Pleistocene times, and to have been followed by another depression, which left the islands very much in their present condition. The former land connection thus roughly sketched out, together with the ocean current already referred to, would be quite sufficient to account for the great resemblance between the fauna and flora of the Chatham Islands and those of New Zealand."

The geology of the islands seems to indicate that they once formed part of the large area, as is shown by the presence of schists and similar rocks, while the finding of limestone seems to point to a depression at a later period.

The land thus seems to have been elevated and again depressed, leaving it very much in its present condition.

This closer connection between the two groups of islands may explain the presence of Kea fossils on the Chathams.

This theory, however, only adds mystery to the strange fact that no Keas or Kea-fossils have ever been found in the North Island, situated only 15 miles away.

THE KEA'S EXTINCTION.

As early as 1888, Sir W. Buller says that he is certain that these interesting birds would soon be extinct, but in spite of the thousands that have been killed they are still common in the mountainous country of the South Island. No doubt the almost inaccessible position of their nests, and the rough nature of the country in which they live, are responsible for their preservation.

When harassed they often retreat to the most inaccessible fastnesses of the Alps. Here they are practically safe, for this exceedingly rough country can never be of much use except for scenic purposes. It is, therefore, doubtful if the Kea will become extinct for many years to come.

If, however, closer settlement of the land, accompanied by the destruction of the forest and the systematic slaughter now going on, should threaten to exterminate the Keas, I would suggest that, in order to prevent these interesting birds from becoming absolutely lost to the scientific world, a number of them should be placed on one of the outlying islands, where they could live and flourish without doing injury to any one. The most suitable islands, as far as I can ascertain, are the Aucklands, which lie 190 miles south-by-west from the most southerly point of Stewart Island. There would be very little chance of the birds returning to the mainland ; and though the hills rise to a height of about 2,000ft. only, there seems to be enough forest and high country to make a very satisfactory reserve for these interesting parrots.

ATTACKING OTHER ANIMALS.

Though the sheep are favourite objects of the Kea's attack, it does not seem to confine itself to them, for several instances

are reported where horses, dogs and rabbits have been mauled. I do not consider that these attacks are really made to procure food, but rather for fun and mischief.

One correspondent gives the following account of an attack upon a horse :—"The pack-horse was tethered on a piece of flat ground about ten chains from the camp. After we had tea, I strolled over to where there was a large flock of Keas on a little knoll above the pack-horse. This would be about an hour before dusk. One or two flew down on to the horse's back. He was an old, stiff-built cobby horse of very sluggish nature. He took no notice of the Keas when they flew off and on his back for some time, giving him an occasional peck. At last an old fellow perched on his back and started operations in a most serious manner. He soon had the old horse showing more life than he had ever done before ; in fact, before he got the Kea dislodged, he was almost mad. When I got down to him, he was in a heavy sweat, and the blood was trickling slightly over his loins. On examination I found a nasty wound that took a long time to heal, as it became very dirty. Ever after, the horse would go almost frantic when there were any Keas about."

Shepherds report that rabbits are sometimes killed by them, while dogs are often worried by their attentions. The birds are sometimes found eating the carcases of deer.

One case is known where a human body was torn about by them. On the Minarets Station a musterer was sent out to attend to some sheep on high country. The station is famous for its rugged and dangerous peaks, and is said to contain some of the wildest country on a sheep run. At night the man failed to report himself, and a search party was sent out to seek him. They found his body lying in a gully, where he had evidently fallen from the heights above. It was attended by two or three Keas, who had torn holes in his clothes, and already torn the flesh about. This is, I think, the only instance known where the Keas have attacked a human body. From the position of the body it is almost certain that the man was dead a long time before the birds began to maul him.

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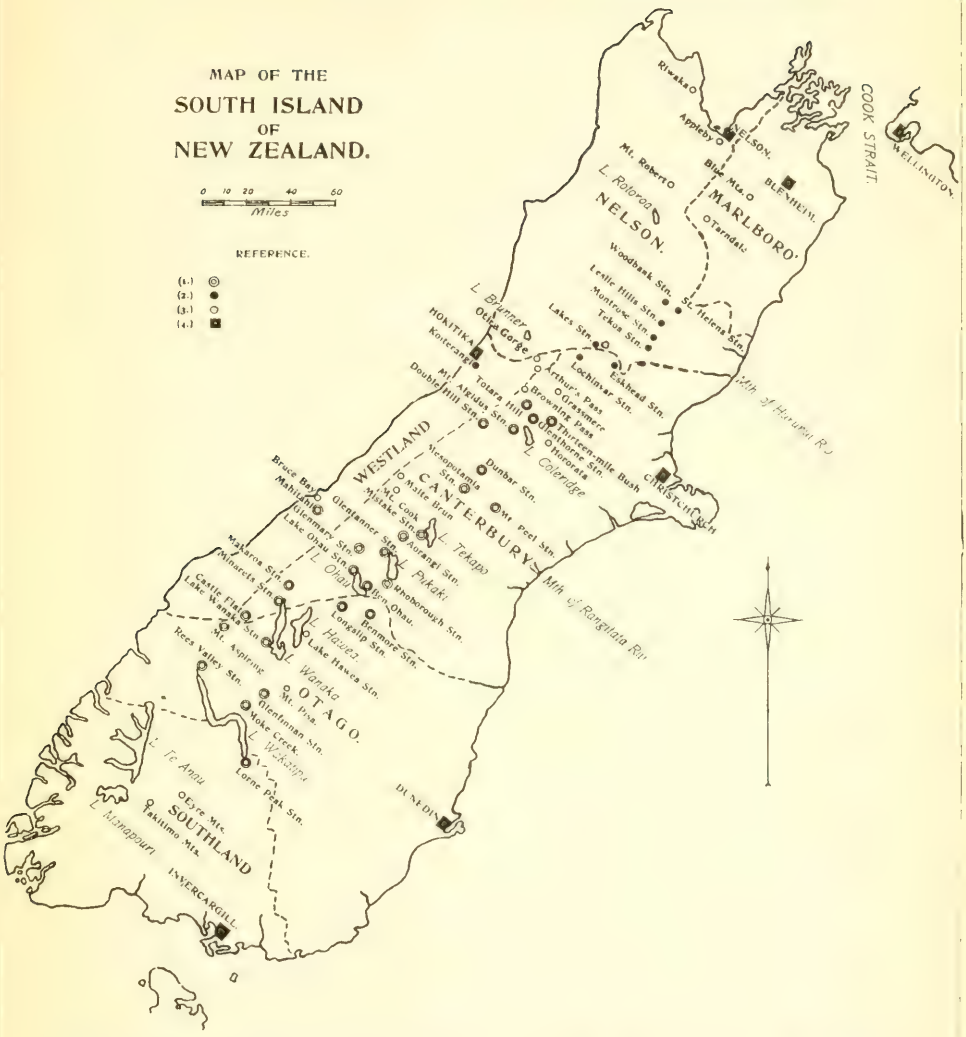


MAP OF THE SOUTH ISLAND OF NEW ZEALAND, SHOWING THE KEA'S DISTRIBUTION.

1—Places where Keas have been seen to attack sheep and from which authentic accounts have been sent in.

2—Places where Keas have been reported to have attacked sheep, but from which no account has been sent in.

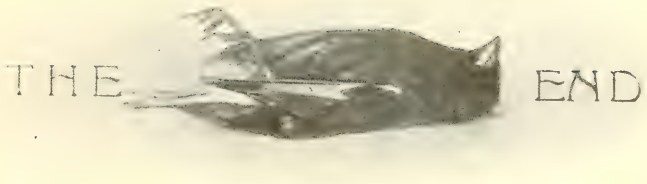
3—Places where Keas have been reported to have been seen.

4—Capital towns of the provinces.

LITERATURE.

"Animals of New Zealand," p. 135.
"Australasia," Wallace, p. 290.
Brehm's "Thierleben-Vogel," vol. i., p. 166.
"British Museum Catalogue," vol. xx, p. 4.
Cambridge Nat. Hist. Birds, Evans, pp. 364, 374.
"Climbs in New Zealand Alps," Fitzgerald, p. 360.
"Darwinism," Wallace, p. 75.
"Dictionary of Birds," Newton, p. 627.
"Geology of Canterbury and Westland," Haast: (a) p. 22; (b) p. 36; (c) p. 117; (d) p. 148.
"History of New Zealand Birds," Buller: vol. i., (a) p. 165; (b) p. 167; (c) p. 169.
"Journal fur Ornithologie," Marz, 1872.
"Nature," vol. iv., p. 489.
"Nature," vol. v., p. 262.
"Nature," vol. lxii., p. 366.
"Nature," vol. lxxiii., p. 559.
"New Zealand Journal of Science," 1891, p. 203.
"Otago Daily Times," February 16, 1906.
"Otago Daily Times," March 22, 1906.
"Out in the Open," Potts: (a) p. 188; (b) p. 189.
"Press," Christchurch, July 12, 1907.
"Proceedings of the Zoological Society," 1856, p. 94.
"The Scientific American," vol. xcvii., No. 9, p. 154.
"Transactions of the New Zealand Institute," vol. iii: (a) p. 13; (b) p. 52; (c) p. 86.
"Transactions of the New Zealand Institute," vol. iv., 210.
"Transactions of the New Zealand Institute," vol. xi., p. 376.
"Transactions of the New Zealand Institute," vol. xvi., p. 316.
"Transactions of the New Zealand Institute," vol. xvii., p. 449.
"Transactions of the New Zealand Institute," vol. xviii.: (a) p. 98; (b) p. 113.

"Transactions of the New Zealand Institute," vol. xxi., p. 212.
"Transactions of the New Zealand Institute," vol, xxvii., p. 273.
"Transactions of the New Zealand Institute," vol. xxxix., p. 71, and p. 271.
"Transactions of the New Zealand Institute," vol. xl., p. 934.
"Westland, : Geology of Hokitika Sheet, North Quadrangle," 1906, p., 13.
"Zoologist," 1871, vol. xxix.
"Zoologist," 1881, p. 290.
"Zoologist," 1883, p. 276.

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