

preserving the bill of the American toucan (see *Wanderings*, p. 103), that is to say, by removing with a sharp scalpel the whole of the inner substance, leaving nothing but the outer shell, which then retains its original appearance. The process is a tedious one, but the result amply repays the trouble.

The sexes are alike in plumage, and differ very slightly in size. The whole of the plumage is black, with a green metallic gloss; the tail with a broad terminal band of white. Bill ivory white, darkening to bluish grey at the base. Wattles large, rounded, and of a rich orange colour in the living birds. Legs and feet bluish grey; claws light horn colour.

In some examples the white at the end of the tail is tinged more or less with rufous, while in others the under tail coverts also are tipped with white.

Male.—Length $18\frac{3}{4}$ inches; extent of wings $22\frac{1}{2}$; wing from flexure 8; tail $7\frac{1}{2}$; bill along the ridge $2\frac{3}{4}$, along the edge of lower mandible $2\frac{3}{4}$; tarsus 3; middle toe and claw $2\frac{1}{2}$; hind toe and claw 2.

Female.—Length $19\frac{1}{2}$ inches; extent of wings 21; wing from flexure $7\frac{1}{2}$; tail $7\frac{1}{4}$; bill along the ridge 4, along the edge of lower mandible $4\frac{1}{8}$; tarsus 3; middle toe and claw $2\frac{1}{4}$; hind toe and claw $1\frac{3}{4}$.

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

ART. VII.—*On the Katipo, or Venomous Spider of New Zealand.*

By WALTER BULLER, F.L.S., F.G.S.

[Read before the Wellington Philosophical Society, November 12, 1870.]

So little appears to be known of the natural history of the Katipo, or Venomous Spider of New Zealand, that I have deemed the following observations on its range and habits of sufficient interest to warrant my placing them before the Society.

The first scientific notice, so far as I am aware, of the existence of a poisonous spider in this country, was furnished by Dr. Ralph, formerly of Wellington, in a communication to the Linnean Society, in 1856. (See *Journal, Proc. Lin. Soc.*, Vol. i., Zool., 1856, p. 1-2.) Dr. Ralph's paper contained a short description of the full-grown spider, observations on its nesting habits, and an account of experiments which he had made in order to test the potency of its venom.

The native name, *Katipo*, signifies "night-stinger," (being derived from

two words, *kakati*, to sting, and *po*, the night,) and although more strictly applicable to the venomous spider, is often used to denote a wasp or other stinging insect.

The exact range of this spider—interesting as being the only poisonous vermin in New Zealand—cannot yet be accurately determined; but it appears to be rather local in its distribution, while its habitat is strictly confined to the sand-hills skirting the sea shore. Along the coast from Wainui to Waikanae (on the north side of Cook's Strait), it is excessively abundant. From Waikanae to Horowhenua it is comparatively scarce; but at the latter place, and for a few miles further north, it is said to be abundant. At Manawatu, and thence along the coast for twenty or thirty miles, it is very rare. At the mouth of the Wanganui River, again, it is very abundant, and a story is still current among the natives of the district about a fishing party, all of whom were bitten by this dreaded spider, and, in two cases, with fatal results. I was assured by Matene Te Whiwhi, of Otaki, that in former times a war party to which he belonged, on camping for the night near the mouth of the Wanganui River, had no less than ten men bitten before morning, some of whom suffered very severely. The Rev. Mr. Stannard informs me that he found the Katipo very plentiful, a few years ago, on the sea coast between Waitotara and Patea. On some parts of the Taranaki coast it is known to be very abundant. It is plentiful near the mouth of the Mokau River, but becomes scarcer as we go further north. It occurs, more or less abundantly, on the shores of the Bay of Plenty, but never beyond the littoral zone of sand dunes. It is also found, but less numerously, on the east coast of the Wellington Province. Major Heaphy obtained a specimen at Massacre Bay, near Nelson, in the South Island.

The notices of the Katipo which have hitherto been published contain many inaccuracies of description. In a very interesting paper communicated to the Auckland Institute, by Dr. Wright (*Transactions*, 1869, p. 81), the sea-shore Katipo is described as having a "dark glossy body with a marked red spot on the back." The Rev. R. Taylor, in his *Leaf of the Natural History of New Zealand*, writes thus:—"The Katipo—venomous spider—one kind red, and one black with a red spot upon its back." Major Heaphy expresses his doubts as to the existence of a red Katipo, as described by Mr. Taylor. (*Transactions*, 1869, p. 83.) Dr. Thompson, in his *Story of New Zealand*, says that there are two poisonous spiders—"the one found in the dry sea sand, having a bright red spot on its dark back, the other, found inland, being of a yellow colour." (p. 30.) According to another account, the inland Katipo has "a round black and shining body but without the spot." In his recent work, *New Zealand and its Inhabitants*, Mr. Taylor describes the Katipo as "a black spider very delicately formed, with a red cross on its back, surrounded with white spots; the female being entirely black." Dr. Hochstetter, who had

never actually seen the Katipo, describes it more correctly as "a small black spider with a *red stripe* on its back." Dr. Ralph, in the paper already referred to, mentions that this spider presents a very different appearance at different periods of its age, but he does not attempt to describe these progressive changes towards maturity. Having recently, through the kind assistance of Mr. Knocks, of Otaki, obtained a fine collection of live Katipos, in every stage of growth, together with their cocoons or nests, I am enabled to place before the Society a more detailed description of the species than has ever yet appeared.

There is a small extent of sand-hills near Waikanae, on the west coast, noted among the natives for the abundance of Katipo. A settler residing there, named Jenkins, assured me that he could without difficulty "fill a quart measure in less than a day." In 1857, I collected in that locality a considerable number of them, and kept them alive for several weeks in order to study their habits. And I may here mention a circumstance illustrative of the wonderful tenacity of life possessed by some of the *Arachnida*. I shut up a full-grown Katipo in a chemist's chip-box, on the 11th May, and placing it among other objects in my cabinet, it was overlooked and forgotten. I consequently did not open the chip-box again until the 8th October following, when I found the spider alive and active, and apparently none the worse for five months' fasting! As, however, in other instances I have known them perish at the end of a week for want of food, I am inclined to consider the above case corroborative of the Native account, that on the approach of cold weather the Katipo retires to a cell underground, and passes the winter in a torpid state, and that in this condition it may be handled with perfect impunity.

Mr. Taylor, in the published account already noticed, states that "the Katipo does not make any web," but this is a mistake, for on examining its haunts, it will often be found occupying a thick domed web, and on being captured, it may be observed spinning a fine thread of gossamer. This venomous spider may sometimes be found on the leaves of the pouaka, and occasionally in the crevices of drift timber lying high and dry on the sea beach; but its favourite resort is under the tufts of pingao (*Desmoschoenus spiralis*), which grows in abundance on the sand dunes near the coast. On moving aside the long, overlapping leaves, the white web of the spider may be seen attached to the roots of the plant, and within or around it two or more of the venomous Katipo, the bright stripe on the back contrasting strongly with the black of the other parts.

The Rev. Mr. Chapman records a case in which the bite of this spider proved fatal to a girl who was bitten in the region of the abdomen; and he mentions another case, of an English lad who was bitten on the fleshy part of the thigh, and "was three months before he rallied, and probably another three before he fully recovered." (See *Transactions*, 1869, p. 82.) The natives on the west coast have assured me that among them, children have frequently

died from the effects of the bite. But in the generality of cases, and especially if the usual remedies are applied, the poisonous effects of the bite pass away in a few days, causing however much pain and lassitude while they last. The natives have several modes of treating a subject recently bitten, the most effectual one being to scarify the part and to bathe the patient in hot water. Another remedy in repute among them is to anoint the part affected with *kokowai*, or red ochre. This has the effect of reducing the swelling which almost immediately follows the bite, and alleviating the pain; and if the subject be robust and healthy no further inconvenience is likely to ensue. But if no such remedial measures are adopted, and the bite is neglected, very serious consequences may follow. According to the natives, the common symptoms are an aching pain in the part bitten, which soon becomes much swollen and inflamed; then a copious sweat, and a feeling of intense languor and depression of spirits. If not checked, this is followed by a convulsive contraction of the limbs, and the case then assumes a dangerous phase.

During my residence at Manawatu, some years ago, the natives brought me word that a woman had been bitten by a Katipo. I at once placed the case in the hands of the Native Medical Officer of the district, Batten Smith, Esq., to whom I am indebted for the following interesting notes:—

“April 5, 1863. At 2 p.m. I was called to see a woman named Marara, about fifty years of age, and belonging to the Ngatiwhakaterere tribe. It appears that yesterday, about noon, whilst digging potatoes at Wirokino (near the sea coast) she was bitten by a Katipo on the left hip. In a few minutes after, she complained of ‘pains all over her,’ which were followed in the space of two hours by cold shiverings, lasting only for a few minutes and returning at irregular intervals up to the time of my visit. Her husband had applied hot roasted potato to the seat of pain, though without alleviating it. She has always been a strong and healthy woman. I found the left hip slightly swollen and tender on pressure, but neither any noticeable shining blush nor heat of the skin; the tongue clean all over; pulse through, full and strong, reaching only to 75; neither vomiting nor headache, cramps in the muscles of the stomach nor sore throat. Countenance anxious, but not bloated; pupils of the eyes natural, and not over sensitive to light. Pain great in *both* thighs, but greatest at the immediate seat of the bite, which had the same appearance as the prick of a needle or other fine instrument would produce. No swelling of either legs or feet.

“Treatment:—Solution of nitrate of silver 10 grains to 1 ounce of water, washed over the hip; and she was given the following mixture,—Carbonate of ammonia 2 scruples, laudanum 40 drops, chloric æther $\frac{1}{2}$ drachm, peppermint water to 8 ounces. Two table spoonfuls to be taken every second hour.

“At 9 p.m. the rigors and pain having abated, she was given,—*Hyd. Chlor.* 3 grains, *s. s.*, and *Hst. Alb.* 1 ounce, *s. m.*

"April 6. Better, but tongue rather yellow. Repeated mixture with an increase of ammonia.

"April 7. Every bad symptom abated.

"April 8. Discharged well."

Dr. Wright, in describing a case within his own practice at Auckland, states that the patient, who was a stout strong man, within an hour after being bitten by a Katipo, on attempting to eat, found that he could not open his mouth, or was scarcely able to articulate in consequence of stiffness about the jaws. The symptoms grew rapidly worse, and the patient became faint and almost pulseless. His extremities were cold and flaccid, his respiration almost ceased, and his two medical attendants had fears that he was about to expire. Spirits of ammonia were applied to the wound, which had the effect of reducing the swelling and abating the pain; ammonia and water, afterwards combined with brandy, were administered in considerable doses. Under this treatment the patient gradually improved, and in two hours was able to return home, but for several days after was unable to return to his work. Dr. Wright concludes that "from the symptoms of this case, the man was powerfully affected by a narcotic and irritating poison, which being absorbed into the circulation, affected the heart, brain, and nervous system to a very considerable extent, almost amounting to fatal syncope,—that the stimulants, by exciting the heart's action, gradually aroused the excretory functions so as ultimately to remove the poison from the system."

Enough has been said to show that the bite of the Katipo, although seldom fatal, is very painful and distressing. It is important, therefore, that those whose avocations lead them to the sea shore, should be able to distinguish it readily from other spiders, and to know its haunts, so as to avoid them. I have satisfied myself that in common with many other venomous creatures, it only exerts its dreaded power as a means of defence, or when greatly irritated; for I have observed that on being touched with the finger, it instantly folds its legs, rolls over on its back, and simulates death, remaining perfectly motionless till further molested, when it attempts to escape, only using its fangs as the *dernier ressort*.

The cocoon, or nest of the Katipo, is perfectly spherical in shape, opaque, yellowish white, and composed of a silky web of very fine texture. The eggs are of the size of mustard seed, perfectly round, and of a transparent purplish red. They are agglutinated together in the form of a ball, and are placed in the centre of the cocoon, the exterior surface of which is sometimes encrusted with sand.

The Katipo undergoes the following changes in its progress towards maturity. In the very young state, it has the body white with two linear series of connected black spots, and an intermediate line of pale red; under parts brown, legs light brown with black joints. In the next stage, the fore

part of the body is yellow with two black "eye-spots;" sides black with transverse marks of yellowish white; dorsal stripe bright red, commencing higher up than in the adult, and with the edges serrated; thorax dark brown; under parts black with an obscure spot of red; legs yellowish brown, black at their joints. At a more advanced age, the stripe on the back is brighter and is narrowly bordered with yellow, and there are some obscure markings on the sides. In this condition the thorax and legs are nearly black.

Adult Female.—Examples differ considerably in size, the body which is almost spherical, varying in development from the size of pigeon shot to that of a small green-pea. In the fully adult condition, this spider is a very handsome one, both in form and colour. In my largest specimens, the outspread legs, measuring across, cover a space of three-quarters of an inch. Thorax and body shining, satiny black. A stripe of bright orange-red passes down the centre of the body, the edges being tinged with yellow. At the anterior extremity, this stripe is broader and angular, and it is surmounted by an open, narrow mark of white in the form of a nail-head. Below this, and immediately above the junction of the thorax there are two divergent spots of orpiment yellow with white edges. Legs black, with the extremities inclining to brown. On the under surface there are two transverse spots of dark red. In some examples there is a dark line down the middle of the bright dorsal stripe, while in others the sides are ornamented with transverse marks of yellowish white. One of the specimens in my collection, more beautiful than the rest, has two triangular spots of yellow above the junction of the thorax, then two letter V marks with their angles joined, succeeded above by two similar but larger marks, their inner arms forming the nail-head which caps the bright dorsal stripe of red.

Adult Male.—The male is considerably smaller than the female. Body shining blackish brown, with an obscure narrow line of yellow down the centre of the back, broader towards the posterior extremity, and a similar interrupted line on each side; legs dark brown, with black joints.

ART. VIII.—*Notes on the Genus Deinacrida in New Zealand.*

By WALTER BULLER, F.L.S., F.G.S.

(With Illustrations.)

[Read before the Wellington Philosophical Society, November 12, 1870.]

[A PORTION of the following notes on a curious group of New Zealand insects appeared in the *Zoologist* for August, 1867. It has been considered advisable to reprint the paper after revision by the author, who now adds the description of an additional species.—ED.]