

ART. XXI.—*On a New Species of Leech* (*Hirudo antipodum*) recently discovered in New Zealand.

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M.R.S. Tasm.

[Read before the Otago Institute, 9th June, 1903.]

Plate VIII.

THREE years ago Professor Dendy, in association with one of his pupils at Canterbury College, published\* a description of a small aquatic leech (*Glossiphonia novæ-zealandiæ*) collected in Lake Takapuna. This is the first certain record of the occurrence of a member of the class *Hirudinea* in this country.

Nevertheless, from time to time people have referred to "leeches" as occurring in various parts of the bush or in lakes—as, for instance, Reischek,† in his interesting account of his ornithological expeditions, mentions being bitten by leeches; and I have heard, in correspondence, of their occurrence. And Dr. Chilton some years ago took Home specimens caught at Lake Hayes, near Queenstown, and gave them to Mr. F. E. Beddard, but nothing has since been heard of them.

Moreover, in the United States National Museum there are two individuals of a terrestrial leech, *Geobdella limbata*, ascribed to "New Zealand."‡ It is very doubtful whether this locality is the correct one. Mr. Moore, who identifies them with the species originally described by Grube under the name *H. (Chthonobdella) limbata*, and found at Sydney,§ writes to me that no information is forthcoming beyond the writing on the bottle (or tube), "New Zealand." Now, it seems to me extremely unlikely that land-leeches, if they occur in New Zealand, would have been overlooked by the various collectors and naturalists who have contributed so much to our knowledge of the natural history of New Zealand during the last few years, and that yet they should have been obtained during a short visit to this colony by the United States Exploring Expedition of 1853. Mr. Moore promises me that he will look through the records of this Expedition and endeavour to find out any details as to these leeches. If they are really from New Zealand, it is probable that they do not belong to

\* Dendy and Olliver, Trans. N.Z. Inst., xxxiii., 1900, p. 99.

† Reischek, Trans. N.Z. Inst., xvii., p. 197.

‡ Moore, Proc. U.S. Nat. Mus., xxi., 563.

§ Grube, "Anneliden in Reise Fregatte 'Novara,'" 1863, p. 41.

the species above mentioned; but more probably they were not obtained from these Islands.\*

In view, therefore, of the very scanty information as to this group of animals in our Islands, it was with very great interest that I received from Mr. L. Cockayne, of Christchurch, seven specimens of a leech of considerable size which had been collected by Mr. Dunlop, late of Orepuki, during a botanical and zoological excursion made by these gentlemen to Open Bay Island, off the west coast of the South Island.

These leeches were discovered in a way that suggests why it is that these animals have not been hitherto discovered by collectors. It appears that Mr. Dunlop was searching for insects known as "wetas" under soft tussock-grass in the burrows formed by "mutton-birds" (*Puffinus* sp.). The burrows were in quite moist earth on a hillside, and while plucking up the tufts of grass and groping amongst the roots, which were imbedded in swampy soil, he felt a bite on his wrist. Fortunately, Mr. Dunlop is keenly interested in natural history, and he carefully withdrew his hand and found a leech attached thereto. He proceeded to examine the nest further, with the result that he found six more individuals and some cocoons.

From this account, given to me verbally by Mr. Dunlop, I imagined that we had to do with a land-leech, but examination of the specimens shows that it belongs to an aquatic genus—at any rate, a genus all the species of which, hitherto described, live in water or marshy places—viz., *Hirudo*. I was certainly scarcely prepared to find this widely spread genus in New Zealand. It is to it that the medicinal leech of Europe and Japan and elsewhere belongs, and one would

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\* Since writing this article I have received a letter from Mr. Moore, dated 19th November, 1903, as follows:—

"Since returning to Philadelphia I have re-examined the land-leeches attributed to New Zealand, and find that my former identification is correct, so far as one can be certain from comparison with Grube's descriptions and figures alone.

"I have traced all clues known to me which might throw light on the authenticity of the label. No one recognises the handwriting, and no trace can be found of the few notes on annelids made by Professor Dana while on the Wilkes Expedition; nor is there any mention in the narrative or reports of the Expedition of any land-leeches encountered either in Australia or New Zealand. The notes were at one time in the possession of [a gentleman] who, so Professor Verrill informs me, became insane as the result of a sunstroke during the Civil War, and has been confined for many years in an asylum.

"As I understand that errors in locality were frequent on the labels accompanying the Wilkes collections, and considering all the circumstances, it seems probable that the specimens were collected at Sydney, one of the stopping-places of the Expedition. In any event, I now consider them as valueless in establishing the occurrence of the species in New Zealand.—Very truly yours,

"J. PERCY MOORE."

have expected that a new genus would represent it here. It is possible, as I indicate below, that a new genus should be formed for it, but in the absence of the necessary time I must leave the more detailed examination of internal characters till a future occasion. At present I discuss only the external features, all of which agree precisely with those enumerated by Professor Whitman\* as being characteristic of *Hirudo*. This genus is represented in Australia—at any rate, in New South Wales—by *H. australis*, Besisto, described by Grube (*loc. cit.*, p. 40) and figured by Schmarda.† But this species differs from the New Zealand species in colour, size, and the character of the jaws.

***Hirudo antipodum*, n. sp.**

*Diagnosis.*

The general *coloration* (in specimens preserved in formol) is as follows: Ground-colour of a pale coffee-brown, faintly toned with reddish ventrally. On the dorsal surface are 5 black bands—viz., (a) a median band of considerable width (about a quarter the breadth of the body); (b) a supramarginal band rather narrower than this, and separated from the former by a space wider than itself; and (c) a linear streak separating this strip of ground-colour into two nearly equal strips. The ventral surface pale-brown, slightly speckled with black, and usually with an irregular line of small black dots near the margin.

*Size.*—The largest specimen is 48 mm. in length by 12 mm. in breadth, the greatest diameter being in the posterior third of the body; sucker 8 mm. in diameter. Smallest individual, 21 mm. by 6 mm., and the sucker 3 mm.

*Jaws.*—Small, concealed by three large fleshy folds arranged alternately with the jaws; the latter are longer than broad, with a straight inner margin and convex outer border. There are no distinct denticles, but mere irregularities of the inner margin.

*Locality.*—Open Bay Island, off the west coast of the South Island, New Zealand. In amongst the wet roots of grasses, &c., at the bottom of nests of *Puffinus* sp.

*Description.*—The specimens were preserved in formol. The colour in the preserved leeches is a coffee-brown, but in formol a pigment has been extracted which colours the solution green. Some of the individuals were, on arrival at the Museum, transferred to alcohol. This is not discoloured, and the worms are a little darker in tint than the others.

\* Whitman, Q.J. Mic. Sci., xxvi., 1886, p. 316.

† Schmarda, Neue Wirbellose Th., 1, (2), 1861, pl. xvi., fig. 140.

The median dark band varies in width and in density of pigmentation. In some cases the pigment-spots are so close together as to form a black band; in other cases they are less close, so that the ground-colour shows between them and interrupts the continuity of the band. In some cases the lateral margin of this band extends outwards irregularly at intervals across the neighbouring field of ground-colour, and this may take place to such a degree that the median band coalesces with the intermediate linear streak (c). In one specimen the median band (a) is separable into 3 bands—viz., a pair of admedian black linear streaks and a median area in which the pigment-spots are less closely aggregated. Naturally, the width of the supramarginal band varies to some degree, though there is always a distinct band of ground-colour between it and the actual margin of the body.

As to size, it is evident that some of my specimens are quite young and probably immature. The cocoons are empty: perhaps the smallest individuals are but recently hatched.

DIMENSIONS IN MILLIMETRES.

—				Length.	Breadth.	Height.	Sucker.
(a)	..	..	..	48	12	8	8
(b)	..	..	..	40	10	6	7
(c)	..	..	..	39	9	6.5	7
(d)	..	..	..	26	7	..	7
(e)	..	..	..	24	10	6	5
(f)	..	..	..	21	6	4	3

One of the individuals (g), which may be the one that bit Mr. Dunlop, is gorged with blood, and is much redder than the rest. It is strongly convex ventrally, and the back is longitudinally bent upwards. Its dorsal length (along the curve) is 22 mm., and ventrally (along the curve) 38 mm., greatest breadth 11 mm., and height 8 mm. The sucker is only 5 mm. diameter with margins inflated; it is thus a small individual.

I have placed this leech in the genus *Harudo*, for it possesses 5 pairs of eyes, on annuli 1, 2, 3, 5, and 8; and the segmental sensillæ on annuli 8, 11, 14, 19, and subsequently on every fifth annulus up to the 94th. Then we come to abbreviated segments, and the sensillæ occur on the 97th and 99th, but I could not detect any on the 101st annulus. Both the 101st and 102nd are very small, and the anal depression affects them both.

Of the sensillæ I could detect 3 rows on the dorsal surface, but I could not detect any on the ventral. The sensillæ are all situated on the ground-colour, and were very distinct

in the formol specimens when I examined them on arrival, but at the present time I find it more difficult to distinguish them; and they were much less evident in the alcohol specimens. In the formol the sensillæ appeared of a different tint from the surroundings—of a more orange colour; and the sense-organ at the tip of the papilla was whitish.

With regard to the head, I carefully looked for any pre-ocular annuli, such as Castle\* refers to, but there are none in this species. Indeed, the first distinct annulus crossing the body transversely is that which carries the 3rd. pair of eyes. The anterior semicircular margin of the head is marked by a series of furrows at right angles to the margin, and traceable on to the ventral surface into the oral sucker. Thus, at the extreme anterior extremity the grooves are sagittal, and as we trace them backwards they gradually assume a more transverse direction till the 3rd eye is reached. These furrows delimit small quadrate areas, and of these there is a couple between the right and left eye of the first pair—*i.e.*, one on either side of the median line. The 1st eye lies in the second of such areas; then between the 1st and 2nd eye is an area; the 2nd eye occupies one; then another between 2nd and 3rd eye. These small areas appear to bear the same relation to these eyes as does the annulus between the 3rd and 4th eyes. It may be that each such "area" represents an annulus of some primitive leech, but I find no mention of them in Whitman's paper, though in the beautiful drawing by a Japanese artist of *Hæmadipsa japonica* (pl. xvii., fig. 6) similar "areas" exist, having the same general arrangement. In this case, however, they resemble the quadrate, flattened papillæ which cover the surface of the body generally. My material of hirudineans, and the literature at my disposal, does not permit me to pursue the subject further; but as we have reason to believe that the "head" is composed of abbreviated somites, and this abbreviation is more or less marked in different genera, it seems a possible view that these "areas" have some connection with the missing annuli of the ocular region.

The first complete annulus is the 5th. This "buccal" annulus forms the edge of the hinder margin of the oral sucker, or mouth; and it is distinct from the 6th, though it is very narrow in the ventral region.

The genital pores have the usual position—*viz.*, between the 30th and 31st annuli; and between the 35th and 36th there is a fairly long protrusible cirrus. I have been unable to detect the nephridiopores.

\* Castle. Proc. Amer. Acad. Arts and Sci., Philadelphia, xxxv., 1900, p. 285.

Of internal anatomy I can only note that the alimentary canal is similar to that of the medicinal leech, since I have not as yet examined the other organs.

The most characteristic feature about this new species is the existence of three fleshy folds concealing the jaws. If the mouth, or oral sucker, be viewed from below three semi-circular ridges are seen, one transversely disposed—ventral ridge—the other two being obliquely placed, and meeting in the median dorsal line. These folds may be termed “lips,” and correspond to structures which occur, indeed, in *Hirudo medicinalis* (with which alone I have had an opportunity of comparing them by personal observation), but are quite feebly developed and inconspicuous. In our native leech, on the other hand, they are so prominent as to be mistaken at first for the jaws, but that they are arranged in the wrong way. Microscopic examination, however, shows that they are highly vascular in structure and hood-like in form, each being concave towards the median plane and convex externally, with a thickened free margin.

On turning these aside, or by cutting away the ventral “lip,” the true jaws are exposed in the usual position—viz., a median dorsal jaw and a pair of latero-ventral jaws—alternating, therefore, with the “lips.” But the form of the jaws differs from that of other species of *Hirudo* (so far as I am aware) in that they are not semicircular, with the basal axis longer than the vertical axis. On the contrary, in *H. antipodum* the vertical axis is greater than the basal axis, the median (*i.e.*, oral) margin is nearly straight, and the outer margin convex. Further, there is practically an absence of denticles, such as occur in the other species of the genus. Nevertheless, the oral margin has its cuticle raised into a series of irregular rounded prominences, which appear to be due to oblique foldings of the cuticle, and these are arranged in a single series. But, although practically edentulous, we have the evidence of Mr. Dunlop that the jaws are sufficiently armed to pierce the human skin.

So different are these jaws from other species of *Hirudo* that one is tempted to make a new genus for our species; but as in all other external features, at any rate, this species agrees with other species of the genus *Hirudo* I have considered it better to leave it in this genus till I have worked out the internal anatomy, and especially after reading Whitman's remarks (*loc. cit.*, p. 366) on the genus *Hæmopsis*, which he includes within the genus *Hirudo*, since the only character in which the two genera differ lies in the less number of denticles in the former: “In view of the great variability in the number of denticles not only among different species of one and the same genus, but also among different individuals of

the same species, and even in the different jaws of the same individual, this distinction hardly deserves generic rank." On the next page (367) he considers this question a little more fully, and proceeds, "So long as the denticles are sufficiently numerous and well formed to enable the leech to live by sucking blood it is plain that the reduction has not reached a point at which the formation of a new genus becomes imperative." It is true that much systematic work has been done since Whitman's paper was published, but as I have not access to R. Blanchard's papers (except that dealing with the Italian leeches, in the *Boll. Mus., Zool. Torino*, ix., No. 192), and as my species does not fit into any of the genera (other than *Hirudo*) enumerated in Perrier's "*Zoologie*," I prefer, as I have said, to leave our New Zealand species in the genus *Hirudo*.

It may be well to mention that the edentulous leeches of Japan, referred to the genus *Whitmannia* by R. Blanchard (= *Leptostoma*, Whitman), differ in the details of the annulation of the body as well as in the position by the genital pores. Moreover, the genus consists of land-leeches.

#### *The Cocoon.*

The cocoon, of which I give a figure, agrees generally with the account given by Moquin-Tandon\* of that of *Hirudo medicinalis* (p. 177 and pl. xi.). It is regularly ovate, of dark-brown colour and horny texture; it measures 14 mm. by 8 mm. over all. The outer surface consists of stiff horny filaments projecting outwards from a continuous horny membrane. The latter is marked by numerous shallow depressions, each irregularly circular, or, more properly, hexagonal or polygonal, in outline. The low walls which separate the depressions give origin, at the point where two or more meet, to short vertical filaments; these branch into two or three shorter threads, lying in a plane at right angles to the vertical filaments: these threads terminate in a small thickening, and interlace, or may even be united with neighbouring threads. In this way a very loose and easily broken felt-work is produced. The basement membrane, though tough, is quite thin, and on the inner surface is smooth and shiny, and marked by feebly convex areas corresponding with the shallow pits seen on the outside. I opened one cocoon, which was empty; and as they both floated in the preserving fluid I judge that the other is also empty. Probably the smaller leeches captured are only recently hatched, but there is no perforation in the wall of the cocoon.

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\* Moquin-Tandon; *Monogr. d. l. Fam. des Hirudinées*, 1846.

## EXPLANATION OF PLATE VIII.

- Fig. 1. Outline of *Hirudo antipodum* ( $\times 2$ ) taken from a small specimen, which was not curved. (It appears desirable to insert this figure, as so few people in New Zealand seem to know a "leech"; the land-planarian is commonly referred to by this name.)
- " 2. View of the dorsal surface of the head (enlarged), showing the arrangement of eyes and sensillæ and pigmentation.
  - " 3. View of a short portion of another individual, dorsal surface, in which the median black band is broken up into three narrow streaks. ( $\times 2$ .)
  - " 4. Under-surface of the head; *a*, *b*, the peculiar fleshy lips. (Enlarged.)
  - " 5. The same, still more magnified, after a median incision through the body-wall and ventral lip has been made; the lips are turned aside so as to expose the three jaws (*j*). *m*, the muscles thereof.
  - " 6. One of the jaws (camera, Oct. 1, obj. 3, Leitz), showing the feeble development of the denticular ridges.
  - " 7. A cocoon (enlarged), the surface only partly filled in. In the middle is seen the external surface of the basal membrane; and, marginally, the felt-work. A, shows a piece of the surface, still more enlarged. B, the cut edge of the wall, showing the relation of the felt-work to the basal membrane.

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ART. XXII.—*A Note on the Oligochæta of the New Zealand Lakes.*

By W. B. BENHAM, D.Sc., M.A., F.Z.S., Professor of Biology in the University of Otago.

[Read before the Otago Institute, 11th August, 1903.]

DURING the year 1902 two young naturalists from the Old Country—Messrs. Keith Lucas and Hodson—visited this colony for the purpose of making a biological and topographical survey of the principal lakes. Mr. Lucas was good enough to hand over to me for identification all the *Oligochæta*, or annelids, which were collected by him. Naturally, I was delighted to have the opportunity of investigating the character of the deep-water fauna of our lakes, especially as, in the first place, such an opportunity is, in all probability, not likely to recur for several years; and, secondly, because our knowledge of the fresh-water annelids of the colony can be compressed into a very small compass. I propose to-night to give merely a brief summary of my results, a full and illustrated account of which I have sent to the Zoological Society.

The material upon which this paper is based consisted of thirty-three small tubes, containing about a hundred and fifty specimens, which, after examination, I find represent about a dozen species, all new to science, referable to nine genera (of which one is new), belonging to five families.