HELOBDELLA PUNCTATO-LINEATA, A NEW LEECH FROM PUERTO RICO*

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FOR A GENEROUS SUPPLY of living specimens of this leech I am indebted to Dr. W. A. Hoffman and his assistant, Miss Irma Seijo, of the School of Tropical Medicine of San Juan, Puerto Rico. It was due to the latter that this leech was discovered in numbers in aquaria in the laboratory of the Department of Medical Zoology. The contents of these aquaria originated in certain ponds in Guajataca and Isabela in the northwestern part of the Island.

Dr. Hoffman writes:

> Miss Seijo found that under laboratory conditions the leeches fed readily upon *Planorbis corneus* and *Australorbis glabratus*, the latter the intermediate host of *Schistosoma mansoni* in the West Indies and South America. My assistant (Mr. Janer), in conversing with inhabitants of rural areas, was informed that where leeches are abundant few snails (*Australorbis*) are found. The leeches are said to feed upon the molluscs. However, testimony of this nature may not be reliable, for it is possible that the leech they mentioned may have been a blood-sucking species.

In this connection it may be added that many of the smaller species of leeches belonging to the same family (Glossiphoniidae) as the species herein described habitually and almost exclusively fed upon aquatic snails. Predacious leeches of the family Erpobdellidae and of the distichodont division of the Hirudidae also feed upon snails as well as insect larvae, annelids of various kinds, and dead animals of all kinds. The true blood-sucking leeches confine their attacks to vertebrates, except that when hungry and no vertebrates are available they will occasionally attack invertebrates.

From the public health point-of-view the publication of a taxonomic paper in this JOURNAL is justified by the possibility that this and related species of leeches are factors in the control of an intermediate host of an important human parasite and, therefore, indirectly of the parasite itself. On behalf of the author it may be said that while taxonomists do not ordinarily expect to find descriptions of new species in health and medical journals, it is hoped that this paper may direct the attention of resident health officers, medical men, and zoologists to the paucity of our knowledge of West Indian leeches and their possible rôle as vectors

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of human and domestic animal parasites. The taxonomist would be benefited if an interest were aroused in leeches and collections made in this little-known field.

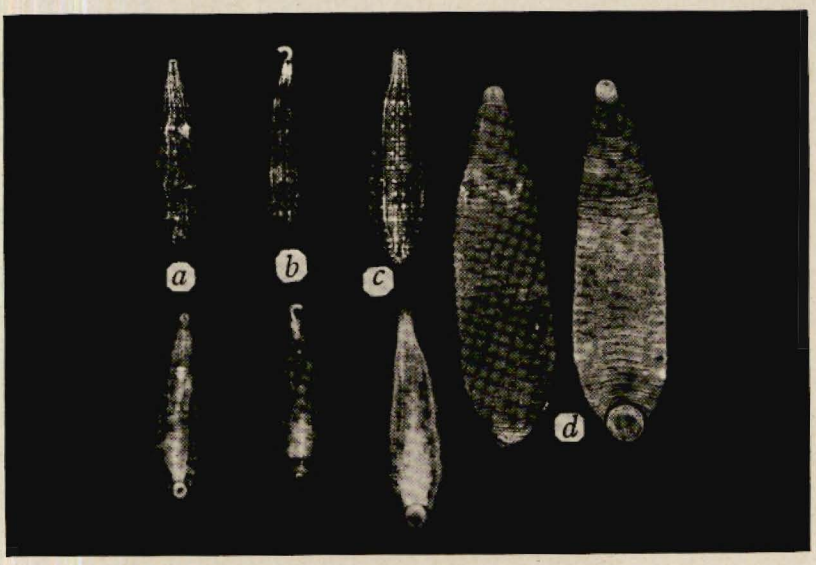

FIG. 1. *H. punctato-lineata.* Photographs of dorsal and ventral aspects of three freshly killed examples in formaline to show variations in color pattern, ×3. *b*, proboscis protruded; *c*, type; also *d*, the large individual shown in fig. 2 fixed in Bouin's fluid.

Like all members of its genus this leech is a small one. The type (fig. 1*c*) measures in mm.: length 10.5, to ♂ pore 3.3; widths, buccal .7, at ♂ pore 1.9, maximum (XX) 2.8, anus, 1.3; depths at same points about .3, .7, .9, .4; diameter of caudal sucker 1.1. Most of the specimens are approximately the size of the type or smaller. One unusually large specimen (fig. 1*d*) has the corresponding measurements 17., 3.6; widths .7, 2.4, 4.5, 1.3; depths .5, 1.3, 1.4, .8; sucker, 1.6.

Form ovate-lanceolate, with the maximum width at somite XX but undergoing little change from XV to XXII, caudad of which it becomes rapidly reduced in a wide curve to the caudal peduncle. The cephalic end, including the clitellar and preclitellar regions, becomes slender and tapers rapidly to the small head. Moderately depressed, with the dorsum convex, the venter flat and the margins rather sharp in the post-clitellar region, becoming progressively more rounded toward the head. The form of the fixed specimens differs little from the living at rest except in being slightly flatter.

Head very small, not at all expanded, with a very slightly raised rim and nearly flat, faintly corrugated venter, in which the small mouth pore lies slightly anterior to the center. One specimen has the proboscis

protruded fully. It measures 1.6 mm. long and 3 mm. in diameter with twelve fine marginal denticulations at the end. On the dorsum annuli are well defined to the tip, there being four preoculars, representing the prostomium and somites I-III. At the prostomial apex there is on most specimens a slight median emargination which is the termination of a short ventral groove. Eyes one pair situated in somites III and IV, the pigment cups lying in the anterior part of the first or larger annulus of IV but the sensory cells reaching the surface in the first annulus of III. They are large, well separated by about one and one-half times their diameter, with the densely black pigment cup directed dorso-cephalad and slightly laterad.

There is no nuchal constriction and no nuchal gland or plate. Annuli sharply defined throughout by strongly developed furrows and well-marked marginal and profile serrations. Anterior annuli short but increasing in length caudad, with the intersegmental furrows deeper than the interannular; 3rd annulus (*a 3*) of somites VII to IX usually larger than the others. Beginning with XIV or XV, the somites and annuli rapidly increase in length and continue large to XXII, with the middle annulus (*a 2*) larger and more prominent. On these somites five or seven series of small but distinct warts or papillae on the dorsum of the middle annulus (*a 2*). Those of the median series are largest and usually tipped with black pigment, the paramedian and intermediate series smaller and the supra-marginals still smaller and on many specimens not discernible under a magnification of fifteen diameters. Paired papillae usually lack black pigment and each is tipped with a single conical sense organ. This arrangement exists on somites XIII or XIV to XXV, anterior to which the papillae are very minute or even absent. Behind XXV they are often irregular and in part, especially the median, absent. Sensillae lie just lateral to or partly on each of the paired papillae. On posterior somites they are commonly somewhat elongated transversely. No marginal and no ventral sensillae were detected. No special preparations to demonstrate them were made, but if present they must be very small. Besides the aggregated sensillae there are numerous, minute scattered sensory papillae. The genital orifices, especially the female, are very small and difficult to see in surface views and were determined with certainty in sections. They are separated by a single annulus, the ♂ at XII *a1/a2*, the ♀ at XII *a2/a3*. On actively breeding examples the ♂ at least would be large. Anus, a well-marked opening in the usual position behind XXVII followed by a small annulus. There is no well defined caudal peduncle and the caudal sucker is a very small flat disk directed ventrad.

The *color* is described from life and the pattern and much of the original colors are well preserved in examples preserved in formalin (fig. 1). The general color on the dorsum, as seen by the naked eye, is longitudinally brown-lined on a pale yellowish ground with rows of whitish spots, giving an effect of alternating light and dark lines. The integuments are translucent so that the internal organs show through and the long preocular region, margins of body and most of the caudal sucker are colorless and transparent. Although varying in intensity and exact distribution of pigment, the arrangement of the brown lines is very constant. The median stripe which extends from the eyes to the anus is darker than the others and the pigment tends to be concentrated at the margins, leaving a median paler line which in some examples is so definite that the median stripe is divided into a pair of brown lines (fig. 1*c*). Generally, however, denser pigmentation on the median papilla of the sensory annuli (*a2*) break this median pale line into a series of dashes. The paired paramedian fields each includes four brown lines which coalesce anteriorly and fade out before reaching the head. They are grouped into two pairs, the pale line between the second and third being wider than that between the others. The intermediate fields also have four brown lines, the distance between which increases slightly medio-laterad. In the photograph, owing to the foreshortening due to the convexity of the dorsum all of these appear merged into a broad brown stripe. The ground in all of these five fields is more or less speckled and streaked with brown chromatophores which are nearly or quite absent from the translucent supra-marginal and marginal fields. More conspicuous than these fields are three pairs (paramedian, intermediate, and supra-marginal) of pale yellow, narrow, longitudinal stripes which bound the five fields and extend from about somite VIII to XXV. On the sensory annuli they expand into circular or transversely elongated spots of clearer yellow, in most of which is an aggregation of sulphur yellow reserve cells. On intermediate and supra-marginal stripes these spots tend to spread laterad. The sensillae lie within these pale spots laterad to the corresponding papillae.

Annulation is very distinct throughout (fig. 2). Somite I and the minute prostomial component together form a small apical annulus, the former bearing a pair of paramedian sensillae and the latter the marginal taste cells. II is uniannular and bears paramedian and intermediate sensillae. While quite distinct from I, the separating furrow is shallow. III is biannulate (*a1 a2*)>a3, and bears the eyes, which are paramedian, besides intermediate and supra-marginal sensillae. IV is biannulate but with a small annulus (*a1*) differentiated from the

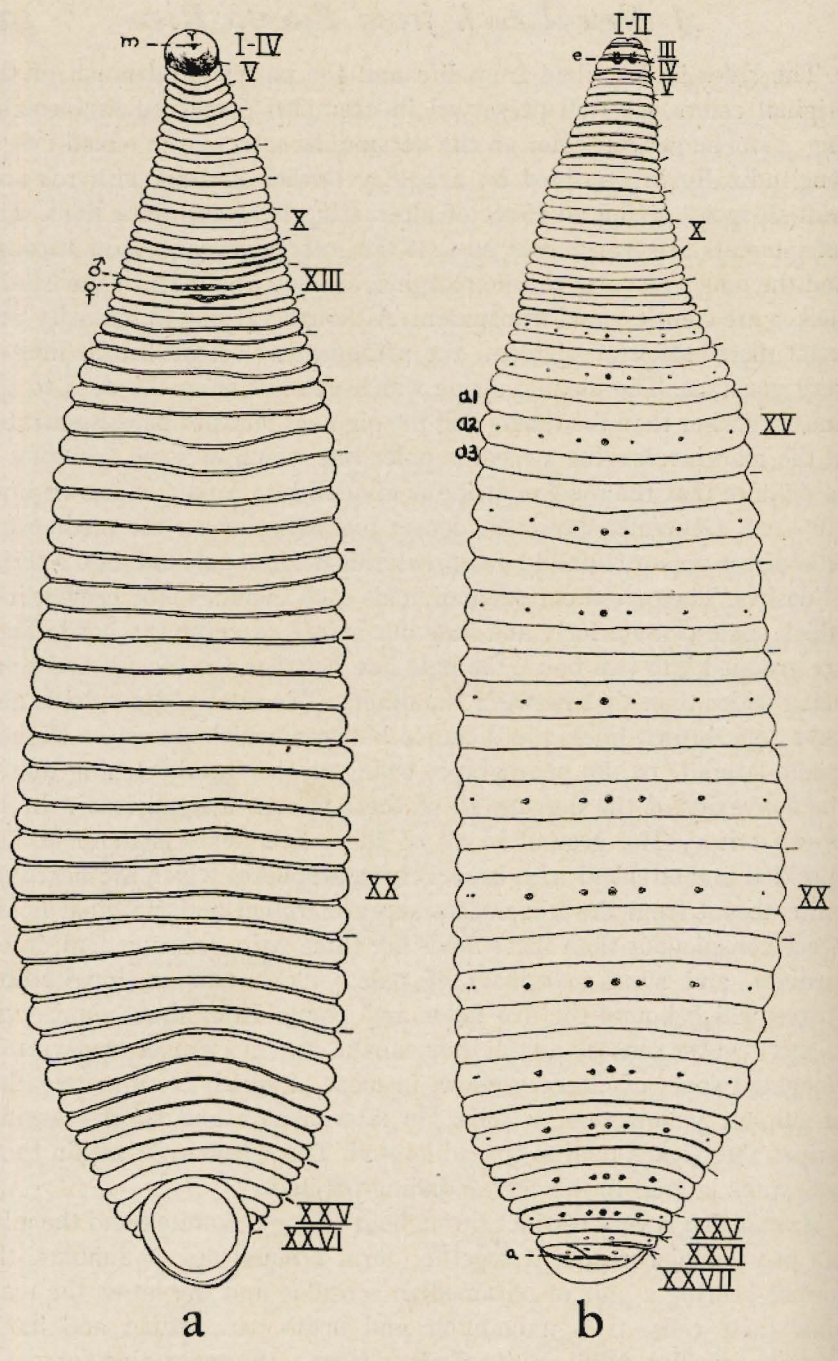

FIG. 2. *H. punctato-lineata*. Annulation of largest specimen, ×15. *a*, ventral, *b*, dorsal aspects. Roman numerals indicate the somites. On the ventral view the furrows have a double contour which on the drawing gives them the appearance of small inserted annuli. *a*, anus, *e*, eyes, *m*, mouth, ♂ and ♀, male and female sex pores. Papillae are indicated by small circles and associated sensillae by dots or minute elipses.

cephalic margin of the larger *a2*. The pigment cups of the eyes lie in the cephalic part of the larger annulus but the sensory cells reach the surface in the first annulus of III. V triannulate dorsally, *a1* and *a2* less distinctly separated and *a3* slightly larger; ventrally biannulate, *a1* and *a2* being united to form the post-buccal ring. VI to XXIV each triannulate both dorsally and ventrally. On VI to IX the third annulus (*a3*) is usually slightly larger, on the others the second or sensory annulus (*a2*) is larger and more prominent. XXV is biannulate, XXVI uniannulate or imperfectly biannulate and XXVII uniannulate. On the last two somites of the large specimen figured certain irregularities and imperfections appear. The remaining seven somites constitute the sucker and its short peduncle.

The *internal anatomy* as observed on several whole mounts presents several features of interest but in general resembles *Helobdella fusca* (Castle). The retracted pharynx is short, thick and straight, with no loop or fold at the oesophageal end. On most specimens it reaches from about VIII/IX to the caudal end of XII but in one begins in VII *a2*. The oesophagus also is short and straight, with no loop. Salivary glands are diffuse, composed of large, single, secreting cells which form masses on each side of the pharynx and stomach beginning in X and in different specimens extending from XIV to XVI, mostly the latter. The ducts become aggregated into a single pair of fascicles emptying into the caudal end of the pharynx. Gastric caeca usually five pairs arising in XV to XIX inclusive but in one case with an additional, slightly developed pair in XIV. In all cases the first pair is merely a slight bulging on each side of the stomach. The others are definite tubular evaginations which increase in length from the first to the last, the first being straight and reaching about half way to the margins of the body, the others bent caudad nearly at right angles but confined to their somites, except in the case of the last pair which is long and slender, arises in XIX and bends caudad by the sides of the intestine to XXIII *a3*. All of the caeca have a ragged appearance the projections assuming the size of small lobes on the somewhat enlarged terminal portions of the larger ones. The last pair form a series of waves or festoons with the lateral convexities in each of the somites through which they pass slightly irregularly bulbous with lateral projections like the preceding caeca. Intestine with four pairs of caeca as long as the next to last gastric caeca but more bulbous and smoother distally; first three pairs turn cephalad, the last caudad. The post-caecal section of the intestine is irregular in course and diameter, with a sub-triangular expansion ending in a small

pair of lateral caeca immediately caudad of the last pair of principal caeca.

The reproductive organs are inactive and not fully developed in any examined in dissections, whole mounts and sections. The normal number of testes appears to be four pairs situated at XV/XVI to XVIII/XIX, but one specimen has an additional one on the right side at XIV/XV and only three on the left side, the one at XVI/XVII being absent. All testicular sacs are small and irregular and contain few or no mature spermatozoa. The sperm ducts are relatively little developed. There is no long, enlarged loop or seminal vesicle and the epididymes are little developed, being short open snarls on each side of somite XII, the ectal ends opening into the apex of the atrial cornu. The latter, in which the paired portions of the spermatophores are formed, are divergent, curved and conical, differing in relative length and thickness in different individuals and united beneath the nerve cord at the median atrial chamber. The ovisacs also are little developed and contain no mature ova. The two extend caudad side by side for two or three somites.

The living specimens examined by me were sluggish and spent most of the time resting on the bottom of a small vessel of water. They were disinclined to move and when irritated rolled into a tight ball. Possibly a lower temperature than that to which they had been accustomed depressed their activity. The alimentary canals were nearly, or quite, empty and there was no indication of breeding activity. None carried eggs or young.

In all, sixteen specimens were studied, the original source being ponds in Guajataca and Isabela in northwestern Puerto Rico. Type in my collection.

The genus *Helobdella* is richly represented in species in Central and South America, with fewer species in North America and elsewhere. The exact limits of the genus and the standing of the nominal species is still open to question, but Autrum's (1936) recent review may be taken as a basis of sound practice. The present species belongs to the *fusca-simplex-conifera* group, in which the ♂ and ♀ sex pores are situated at XII *a1/a2* and XII *a2/a3* respectively, separated by a single annulus. From *H. fusca* (Castle) and *H. simplex* Moore it differs particularly in the reduced number of testes and from *H. conifera* (Moore), which is an African species, especially in details of annulation. The color pattern is very close to *H. luteopunctata* Apathy and *H. moorei* Caballero but in the former the sex pores are at XII *a2/a3* and XII/XIII and in the latter at XII *a1/a2* and XII/XIII.

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