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BASSIANOBDELLA INGRAMI SP. NOV., FROM TASMANIA (Hirudinoidea: Richardsonianidae).[1]

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(with 1 text figure)

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ABSTRACT

Differs from *B. victoriae* in having a wide marginal black band including the somital sense organs of the supramarginal and marginal lines, and continuous with the black venter.

Two specimens of an aquatic jawed sanguivorous leech from Tasmania, have a linear relationship of the organs on the anterior region of the male paired ducts, elongate cylindrical ejaculatory bulbs, a U-shape caecate vagina with subequal limbs, the procurrent limb terminating with a vaginal duct, and accordingly (Richardson, 1970) are members of the bassianobdellid group in the F. Richardsonianidae of the Australian Region. The vaginal duct is short, the common oviduct not intimately associated with it, both as in *B. victoriae*, but in the Tasmanian leech, the common oviduct is long, subequal in length to the procurrent limb of the vagina, differing from *victoriae* in which the common oviduct is shorter than this limb. A common oviduct of unusual length has been noted elsewhere (v. *Euranophila*, Richardson 1969a) and regarded as possibly generic in value. On the evidence here, it appears to be no more than specific. The short vaginal duct contrasting to the long and strongly muscularized duct in the Torresian species, continues to have value at the generic level.

The previously known bassianobdellids have a median black and three pair of dark longitudinal bands, the outermost bands extending along the line of the supramarginal sense organs, are defined medially by a pale stripe in the intermediate field and laterally by a pale marginal stripe which extends across the supramarginal and submarginal fields and includes the marginal sense organs. In the Torresian species, the pale marginal stripe is sharply separated in the ventral intermediate field from the dark venter. In *B. victoriae*, the pale marginal stripe is continuous with the pale venter. In the Tasmanian specimens, the margin is black, includes both the supramarginal and marginal sense organs, and is continuous with the black venter.

The Tasmanian specimens accordingly show dorsal dark bands only as the median, the inner and middle paired bands of the other known bassianobdellids, the outer paired bands of those leeches being included here in the marginal band which is topographically much wider in the Tasmanian leech.

Both specimens of the Tasmanian leech are closely similar morphologically, and in their morphological detail so closely resemble *B. victoriae* that at this time it would not be possible on morphological grounds to identify to species, specimens totally lacking colour and pattern. In the practice of R. Blanchard, this permits recognition of only one species.

Blanchard (1891, 1897, 1917, etc.) followed Moquin-Tandon (1846) in recognizing colour and pattern as highly variable within the species. Moquin-Tandon described 21 varieties of colour and pattern divided into 7 groups for *Hirudo medicinalis;* 11 varieties for *Haemopis sanguisuga* (the species which Blanchard (1891) made a synonym of *Limnatis nilotica).* Employing only simple diagnostic criteria, now proven neither specific nor generic in value, and completely disregarding the indications of colour and pattern, Blanchard (1897) reduced 15 species which had been described in the classical manner (colour, pattern, locality) to synonymy under *Sanguisuga granulosa* Savigny 1822, and provided a sub-genus *Poecilobdella* in the g.*Limnatis* to contain *granulosa* and *Hirudo javanica* Wahlberg 1855, retaining *javanica* as a species with 7 annuli between the genital pores, and so distinct from *granulosa* having 5 annuli between these pores. A brief examination of Blanchard's plate (1917: pl. vii) showing variation of pattern in *'Haemadipsa zeylanica'* shows the extravagant length to which he followed this principle.

Since 1891, the great majority of workers have been strongly influenced by Blanchard's practice. Johansson (1911) figures from Western Australian specimens and from accounts by various authors, 10 varieties of pattern in *'Limnobdella australis'*, including patterns now recognizable as belonging to three distinct genera, one being the 7-banded pattern of *Bassianobdella.* In his study of the arhynchobdellids of India, Burma, and Ceylon, Moore (1927) made progress against the practice by separating *javanica* and *granulosa* at the sub-generic level on the basis of the distinctive nature of the median regions of the reproductive systems in each; described a new species; re-established *manillensis* Lesson 1842; but could go no further in the recognition of other of the early species. Moore later (1939) described species in the g. *Limnatis* which separate (Richardson, 1969a) into three distinct groups with morphological differences which elsewhere have had generic value. He identified leeches from four separate collections, all as *Limnatis nilotica,* noting variation in colour and pattern as described by Blanchard (1891). I find (Richardson, in press) that one of the collections studied by Moore contains leeches of a second distinct genus, separable by pattern. From his long experience, Moore (1958) concluded that in preserved material, the 'colour and pattern of leeches are as shifting sands for the purpose of taxonomic stability'.

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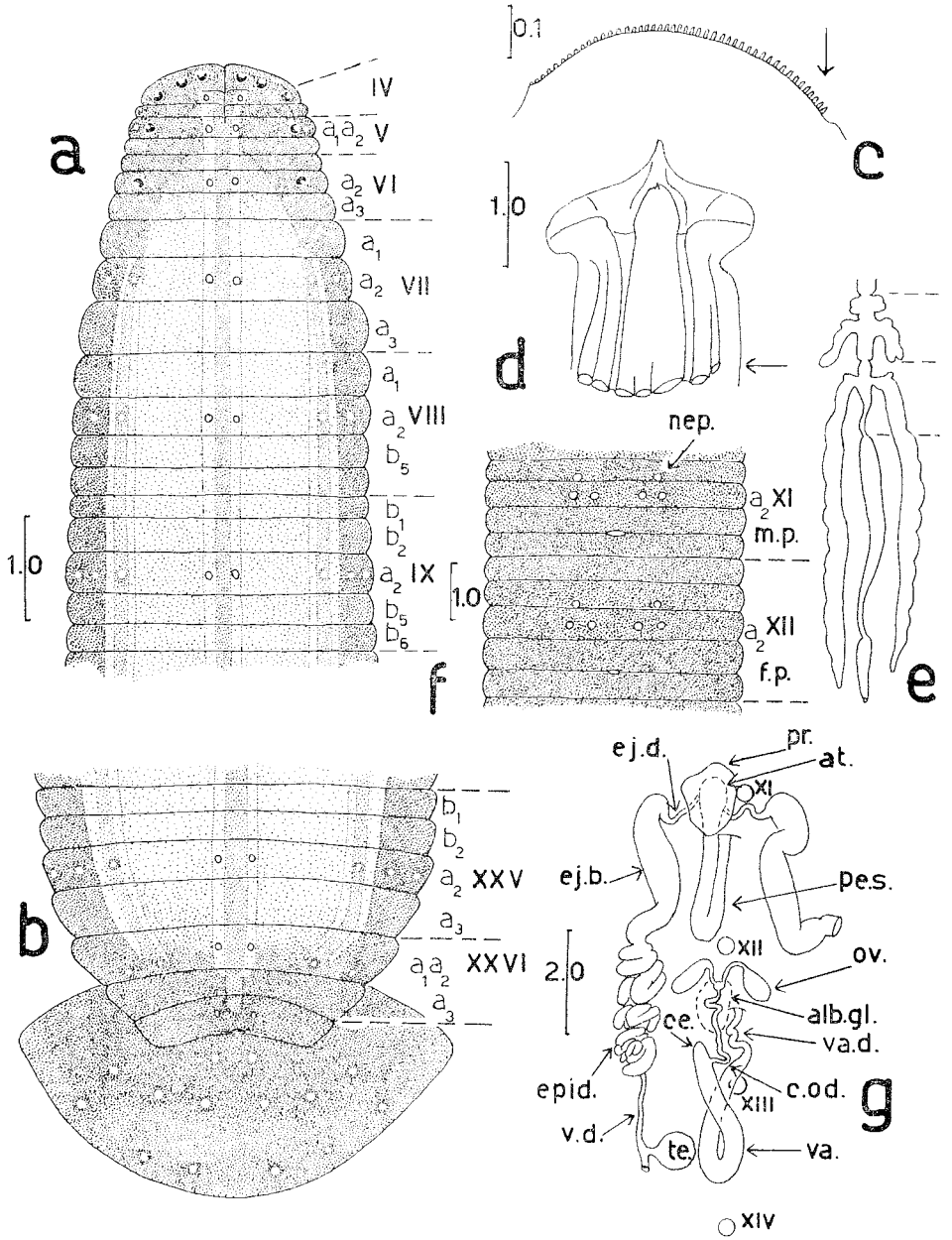

Fig. 1.—*Bassianobdella ingrami* sp. nov. a. Dorsal aspect somites i to ix, and b, somites xxv to xxvii and sucker, to show somital annulation and topography of pattern. c. Ventrolateral jaw of paratype, dental ridge (arrow indicates medial end) and dentition. d. Jaws, and pharynx opened along mid-ventral line to show internal muscular ridges (arrow indicates mid-point in length of pharynx). e. Crop, somites xviii and xix, caecation intestine and rectum. f. Ventral view of somites xi and xii, pattern and genital pores. g. Anterior region of male paired ducts (dorsal aspect lateral in figure), male median region, and female reproductive system.

Somites and somital ganglia indicated by Roman figures; annuli, 'a_n', etc. Abbreviations: alb.gl., albumin gland; at., atrium; c.od., common oviduct; ce., caecum; ej.b., ejaculatory bulb; ej.d., ejaculatory duct; epid., epididymis; f.p., female pore; m.p., male pore; nep., nephropore; ov., ovary; pe.s., penis sheath; pr., prostate; te., testis; v.d., vas deferens; va., vagina; va.d., vaginal duct.

All scales in mm. Drawings from the type, excepting c. from the paratype.

Above, briefly, is evidence of the inadequate systemtization and confusion of species which led to persisence of the Moquin-Tandon/Blanchard tradition.

In my experience with the Australian arhynchobellids, pattern is definable topographically and stable within the species. There has been no indication that ongitudinal bands increase or decrease significantly in width in the individual leech held under a variety of onditions, nor in specimens from widely differing abitats. There is evidence that pattern develops rapidly n some species, later in others in which it passes proressively through juvenile and intermediate stages to he adult form, initially with wide dark bands, these ivided later lengthwise by light stripes in terrestrial awed sanguivores (Richardson, 1969b), and also in quatics. In both, I have specimens showing the ccasional survival of a juvenile pattern into the adult, ven asymmetrically as an obvious anomaly with the attern adult on one side, pre-adult on the other. Colour aries in intensity, primary colours ranging from light o full density; secondary colours (brown, orange, etc.) ary also in hue according to the relative representation f the basic primaries. Where the margin is pale, discontinuous with the venter, the venter may darken, as lso the margin; but the two remain distinct and discontinuous. Although the Tasmanian leeches appear o exhibit a dark phase, the continuity of the margin nd venter, and the topographic width of the margin n the dorsum, would remain in a light phase.

Accordingly, with the recognition of the Tasmanian eeches as a distinct species in the g.*Bassianobdella,* there s departure from the Moquin-Tandon/Blanchard radition. Unfortunately, *B. victoriae* is known only in he preserved contracted condition, which does not ermit reliable evaluation of some morphological differnces known in the two leeches: the distinct longitudinal issure median on the dorsum of i to iv, was not eliably indicated in *victoriae*; vii a_3 would seem longer han viii a_1 in both, not equal as I reported for *ictoriae;* the position of the paramedians as central in he length of xxvi a_1 a_2 with the intermediates and upramarginals posterior, is very definite in the Tasnanian leech, and most unusual, yet these seemed all orrectly posterior at the same level in *victoriae;* nterior secondary crop caeca were not evident in *ictoriae;* the posterior level of fusion of the dorsal nternal muscular ridges in the pharynx of the Tasmanian eech, contrasts to the fully anterior fusion close to the ase of the jaw in *victoriae;* the long common oviduct ontrasts to the short duct in *victoriae*. Differences of uch nature may in time prove to be specific. Certainly, mall differences in the size and number of the teeth arlier relied on for specific separation, have no such alue within adequately defined genera.

The bassianobdellids as so far known to me, are eeches of moderate size, excepting a large and possibly ew species from near Bathurst, N.S.W. Relaxed and reserved, this is 81.0 mm. long, generally dark greenish rown, the venter slightly paler; median band, black; aired bands, brownish black; intervening stripes, dark reenish brown; the margin, paler than and distinct from he venter. On the morphology of the reproductive ystems, this leech belongs to the g.*Bassianobdella* and eems to be, at this time, a distinct species. This leech has: vii a_3 distinctly longer than viii a_1; in the midnephric series of somites, xv to xxi, the annuli are almost subequal, $b_1 = b_2$ slightly $< a_2 = b_5 = b_6$, and in the anterior and posterior series $a_2 = b_5 > b_6 > b_2 = b_1$; the somital sense organs, all central in xxvi a_1 a_2. Excepting the latter feature, there is conformity in *B. victoriae*, the Tasmanian leech, and the Bathurst leech, in vii a_3 being distinctly longer than viii a_1, in a_2 being the longest annulus and the 'b' category graded in complete 5-annulate somites. Both contrast to the Torresian species where vii a_3 is essentially equal in length to viii a_1, and the annuli in typical complete 5-annulate somites are equal in length, $b_1 = b_2 = a_2 = b_5 = b_6$.

The indications are that these differences in somital annulation will have systematic value. So far as I have seen, such differences have not yet been utilized in this way in the hirudiniform leeches.

The Tasmanian species is named after Miss D. Ingram in appreciation of her studies on Tasmanian leeches, the first attempt at a regional fauna, and a valuable contribution to the knowledge of the Australian leeches.

In that work, Miss Ingram (1957) had available only a single specimen of aquatic jawed sanguivore from Tasmania, 52.0 mm. long, fixed in Bouin's, and from this it was possible to do no more than briefly describe the externals, revise the somital annulation, and following Goddard, refer it to *Limnobdella australis* (Bosisto 1859), so providing the first record of such leeches in Tasmania.

Miss Ingram's specimen, from lagoons North of the Interview River/12 miles North of the Pieman River, had 16 complete 5-annulate somites; the dorsum brown, darker than the venter, and with only a dark median longitudinal 'streak', differing in this from the 5-banded pattern of leeches in the *'australis'* complex (Richardson 1970). For this reason, it seemed probable that it might be a member of the 7-banded bassianobdellid group, leeches which when preserved show only the median as a prominent band, the paired bands diminish in intensity to be detectable with some difficulty; but nothing further can be taken from Ingram's account.

With this second species, the g.*Bassianobdella* can now be more closely defined. I am still unable to reach a proper understanding of the nature of the vaginal duct. The present specimens confirm the difference in appearance and morphological relationships from the strongly muscularized duct known to me in other leeches (Richardson, 1969a).

g. *Bassianobdella* Richardson 1970.

Richardsonianidae; 16 complete 5-annulate somites; xxv, 4-annulate; teeth minute, about 45 to 50; no salivary gland papillae on jaws; pharynx terminating at viii/ix; primary caeca and postcaeca median on crop compartments; ejaculatory bulbs elongate, cylindroid, folding in contraction; median regions, bimyomeric mesomorphic, both formed on a primary loop, the caecate vagina extending along the recurrent and procurrent limbs of the loop to be elongate, U-shaped with subequal limbs, the procurrent limb tapering into a short moderately muscular vaginal duct distinctly shorter (¾ or less) than the recurrent limb of the vagina; common oviduct not intimately associated with the vaginal duct or the body of the vagina.

Size, medium. Pattern, continuous longitudinal dark bands, a median band and three paired bands of differing intensities.

Type species: *Bassianobdella victoriae* Richardson 1970. Bassian (Victoria).

Other species: *Bassianobdella ingrami* sp. nov. as below.

Bassianobdella ingrami sp. nov.

Fig. 1, a to g.

Type: Deposited, Tasmanian Museum and Art Gallery, Hobart. Coll. No. K 231. One specimen 51.0 mm. long; from a pond, ¼ mile from the beach, 6 miles East of the mouth of the Mersey River, Tasmania. Sept. 1969. Coll., P. Sabine. Dissected; left ventrolateral jaw removed, lost in preparation.

Paratype: Deposited, Australian Museum, Sydney. Coll. No. W 4268. One specimen, 46.0 mm. long; same location, date and collector as the type. Dissected; right ventrolateral jaw mounted separately.

The following description is taken from the type, excepting the jaw and dentition from the paratype.

General form.

In life: of medium size, capable of considerable extension. At rest, extended: elongate, moderately depressed, the obtusely rounded margins parallel along the greater length of the body, and the posterior sucker wider than the body when attached; moderately contracted: pregenital region, subconical, the body widening and low convex over the genital and testicular regions, the maximum width in the third quarter, the posterior sucker about ½ the maximum width; fully contracted: thickened, sub-elliptical in outline, dorsum moderately convex, margins obtuse, venter low convex, posterior sucker about ⅓ of maximum width. Swimming: extended, strongly depressed, margins widening slight along the pregenital region and then parallel, sharp but not strongly keeled excepting close to the sucker which is thin, of the width of the body and aligned with the body. An elegant but not rapid swimmer.

Relaxed, extended, preserved: elongate, low convex above and below, margins acute, sub-parallel along the nephric region, the width reducing in the post-nephric region to form the narrow base for the posterior sucker which is about equal to the maximum width.

In life: moderate contraction, 22.0 mm long; maximum extension, 52.0 mm long by 4.0 mm wide; extended at rest, 32.0 mm. Relaxed, extended preserved: total length, 51.0 mm; width at iv/v, 2.0 mm; at vii/viii, 2.3 mm and the depth 2.0 mm; at x/xi, 7.0 mm from the tip of the velum, width 3.0 and depth 2.2 mm; at the female genital pore, 14.0 mm from the tip of the velum, width 4.0 and depth 2.2 mm, and of these dimensions back to the end of the nephric region, narrowing in xxv on to form the base, 2.0 mm wide, for the posterior sucker which is 4.0 mm in diameter. Colour and pattern. Fig. 1, a, b, f.

In life: drab, blackish, a faint narrow longitudinal median black band, strongly black marginal bands, and brownish black between these bands; the marginal bands of the colour and continuous with the immaculate dull black venter; somital sense organs on both surfaces, enclosed in distinct and very obvious white circular patches, as also the nephropores and genital pores. Under the lens, the dorsum between the marginal and median bands, dull slate-grey suffused with reddish tonings which are lacking on the venter; the reddish tonings more dominant and almost coppery along the line of the paramedian sense organs as faint pale narrow stripes on either side of the median band; similar narrow stripes on either side of the intermediate lines of sense organs which then appear included in faintly indicated blackish narrow bands, much weaker than the median band; the paramedian field occupied by a faintly indicated wide dark reddish brown band excepting for the narrow pale stripe along the lateral margin of the field.

The pattern consists of: a narrow black band filling the median field from immediately behind the first pair of eyes to the posterior border of xxvi; an inner pair of very narrow light stripes along the paramedian lines including the sense organs between these limits; a middle pair of narrow light stripes along the lateral margin of the paramedian fields detectable between the middle of vii into xxvi; between the inner and middle paired stripes, a broad band completing the paramedian field from v/vi to xxvi a_1a_2/a_3 and increasing in width along the body as the body widens; a narrow outer pair of light stripes along the medial half of the intermediate fields detectable from in vii to xxvi a_1a_2; between the middle and outer paired narrow light stripes, a faint narrow dark paired band along each of the intermediate lines which include these sense organs; lateral to the outer paired light stripe, the marginal dark band completes the intermediate field, extends across the supramarginal and submarginal fields, is continuous with the venter, and includes the lines of supramarginal and marginal sense organs. The dorsum of the sucker is blackish grey, darker than the ventral face.

Preserved in formalin: the indications of the above pattern are slightly intensified but only the median and marginal bands are strongly defined; the paired narrow dark bands diminish to the same colour and intensity as the broad band of the paramedian fields; the narrow paired light stripes intensify and contrast more strongly with the general background colour than in life, the venter remains black.

Annulation. Fig. 1, a, b.

Very clearly defined in both the live and preserved leech; interannular and intersomital furrows, equivalent; somites not defined as such, but recognizable by the transverse rows of white patches enclosing all somital sense organs on both dorsal and ventral aspects and plainly identifying the neuromeric annuli; in extension, annuli such as vii a_3, viii a_1, $a_2 = b_5$ along the nephric region, are all distinctly elongate and the latter show as couplets separated by triplets of shorter annuli; sensillae, not detectable; nephropores, small, distinct, each in a white patch posterior on a_1 and b_2 just median to the line of ventral intermediate sense organs; genital pores, obvious in white patches. Relaxed, extended, preserved: as in life, but the somital sense organs contracted somewhat and relatively smaller; no sensillae detectable.

The rounded margin of the velum proper of the anterior sucker continuous with the dorsolateral, lateral and ventral regions of the margin of the sucker. In the preserved specimen, as also in life, a distinct furrow median on the dorsum of the velum extends from the

margin to iv/v. The first transverse furrow, iii/iv, extending across the median field, does not reach the margin and incompletely divides the velum into an anterior portion, i to iii carrying the 1st and 2nd pairs of eyes, and iv, 2-annulate with the 3rd pair of eyes and 1st obvious paramedians in $a_1a_2 > a_3$; iv/v, a distinct furrow across the dorsum, weakening laterally and not sharply defining the posterior margin of the dorsolateral lobe; v, 2-annulate above, the 4th pair of eyes and 1st obvious supramarginal sense organs in $a_1a_2 > a_2$, the furrow a_1a_2/a_3 ending in the submarginal field, and uniannulate v forming the lateral and ventral margin of the sucker; vi, 3-annulate above, $a_1 < a_2 > a_3$, the 5th pair of eyes in a_2, and 2-annulate below, $a_1a_2 > a_3$, vii, complete 2-annulate, $a_1 < a_2 < a_3$; viiia_3 distinctly longer than viii a_1 in the live leech and in the preserved specimen; viii, 3-annulate, $a_1 > a_2 > b_5 > b_6$, the 1st nephropores on a_1; x to xxiv, complete 5-annulate, nephropores on b_2 (total 16); ix, $b_1 < b_2 < a_2 > b_5 > b_6$; x to xviii, $b_1 < b_2 < a_2 = b_5 > b_6$ (i.e. $a_2 = b_5 > b_6 > b_2 > b_1$); xix to xxiii, $b_1 = b_2 < a_2 = b_5 > b_6$; xxiv, $b_1 = b_2 = a_2 > b_5 > b_6$, the last nephropores on b_2; xxv, incomplete 4-annulate, $b_1 = b_2 < a_2 < a_3$ above, with the somital sense organs central in the length of a_2, and a_2 the last annulus across the venter; xxvi, 2-annulate above, $a_1a_2 > a_3$, the paramedian sense organs central in the length of a_1a_2, but the intermediates and supramarginals posterior in the annulus in the usual position—the positions are the same in the live and the preserved leech; xxvii, uniannulate; anus at the posterior border of xxvii.

Dorsum of the posterior sucker with 5 concentric furrows and rows of paramedian, intermediate and supramarginal sense organs, each in a white patch.

There are some abnormal furrows: ix b_5, subdivided on the left; x a_2, on the right, as also xii a_2 and xiii b_6; but these are erratic and unrelated to the typical somital annulation.

Alimentary tract. Fig. 1, c, d, e.

Jaws, of moderate size, compressed; the dorsomedian jaw in profile at the medial end, about as tall, 0.5 mm, as wide at the base, housed in a broadly open groove, the ventrolaterals in shallow pits, all with such poorly defined margins as to be nonmorphological; (paratype: the dental margin of the ventrolateral jaw, low convex and appearing nearly straight along most of the length, and about 0.6 mm long; the teeth, about 45, spaced, minute, the teeth at the median end about 0.02 mm high, the row diminishing very gradually in height so that those in the middle of the row are still 0.018 mm; no salivary gland papillae on the jaws).

The entrance to the pharynx at vii/viii, narrow, barely wider than the base of the dorsomedian jaw; the lumen, narrow, tapering; internal muscular ridges arranged as a dorsomedian and ventrolateral pairs, each pair joining to enter the base of the appropriate jaw; none ending independently on the entrance to the pharynx between the bases of the jaws; extrinsic radial musculature, sparse; dorsal salivary glands, compact right and left masses, each mass with a large column of aggregated ducts.

Pharynx terminates at viii/ix, followed by a simple compartment in ix; x and xi with subequal small anterior and median pairs of simple caeca within the median chamber; xii, posteriorly, the anterior pair remaining relatively small and retained in the median chamber, the median pair, increasingly tubular, extending into and reflected posteriorly in the paramedian chamber so that from xv to xviii the ends lie lateral to the anterior caeca of the following somite; in xix, there are no anterior caeca, the postcaeca originate in the anterior quarter of the compartment, which behind this is narrowly tubular, ending at xix/xx connecting terminally to the wider tubular intestine which tapers to connect terminally at xxiv/xxv to the rectum. The postcaeca extend into xxvi.

Reproductive system. Fig. 1, f, g.

The specimen is gravid male.

The genital pores at xi b_5/b_6 and xii b_5/b_6; the median regions, bimyomeric, mesomorphic.

The testes, simple saccular, the 1st pair at xiii/xiv, last pair at xxii/xxiii, total of 10 pairs located in the median chamber, connecting laterally each by a short vas efferens to the vas deferens in the paramedian chamber extending anteriorly to the mid-level in xiii where it enlarges into the tubular, tortuous epididymis much folded on itself and ending at the mid-level in xii, connecting to the dorsal end of a short vertical limb of the elongate cylindrical muscular ejaculatory bulb which at the level of ganglion xi reduces to a delicate ejaculatory duct, passing through the paramedian palisade to connect to the anteroventral aspect of the atrium in the median chamber; the atrium continuous with the recurrent limb of the folded muscular penis sheath, reflecting at ganglion xii and continued as the procurrent limb ending at the male pore.

The ovaries somewhat elongate subovoid in the posterior half of xii, joining by short oviducts to the distinct small atrium; the common oviduct, elongate, relatively long, much folded on itself initially, then less so and extending posteriorly to connect subterminally to the elongate cylindrical caecate vagina; the vagina formed on the posterior portion of the primary loop, extends into the anterior annuli of xiv, consisting of subequal recurrent and procurrent limbs; the procurrent limb, reducing in diameter to continue as the short slightly tortuous vaginal duct, much shorter than and only about ½ the length of the procurrent limb of the vagina; wall of the vaginal duct somewhat translucent, not obviously opalescent or strongly muscular, appearing to have a relatively large lumen.

The common oviduct, enclosed on all sides by the albumin gland, is not intimately associated with the vaginal duct, and can be lifted freely away from it without dissection. The common oviduct is distinctly longer than the vaginal duct.

Prostate glands, a thick investment covering the atrium and extending briefly along the penis sheath. The albumin glands a heavy investment of the anterior half of the common oviduct, extending partly onto the atrium.

Paratype.

General form and colour, as the type, excepting after preservation the marginal band on the dorsum is divided into a slightly paler median portion in the lateral half of the intermediate field and the medial half of the supramarginal field, and including the line of the supra-

marginal sense organs, but this band is nowhere defined laterally by a distinct stripe in the supramarginal field, and is definitely paler than the venter.

Annulation, essentially as in the type, excepting xxvi/xxvii is only weakly defined in the median field. Alimentary canal, as in the type, with the anterior secondary caeca not as clearly defined. Reproductive system, as in the type.

The vaginal duct cut across showed a well developed circular layer with what appears to be a longitudinally rugose lining epithelium.

General notes.

Mr P. Sabine describes the pond as about 20 feet in diameter, down to 3 feet deep; the bottom, sandy with some mud and rotting vegetation; swampy margins continuing back into ti-tree excepting on the south side; part of a coastal swamp complex defined by sand dunes on the seaward side.

Taken in September, both or one or the other would be seen moving in the jar, or concealed for a period of a week or more, through to January. From February to early August, both were commonly concealed for periods of several weeks, with one occasionally and rarely seen at a time. In early August, both became fully active at the one time.

A blood meal was taken from a tadpole.

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