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Bassianobdella fusca sp. nov. (Hirudinoidea:
Richardsonianidae), with an Initial Demonstration
of Systematic Values in the Lengths of Annuli in
the Mid-Nephric Somites¹

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Figures 1 and 2.

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ABSTRACT

The new species is distinct in having the annuli subequal in length in the somites of the middle group of the nephric series. The bassianobdellid elongate cylindroid form of the ejaculatory bulbs, and elongate U-shape of the caecate vagina, are shown to be primary morphological forms.

The requirements of an aquatic sanguivorous habit impose a rigid discipline on the morphology of 34 somites in jawed sanguivorous leeches which, accordingly, are animals exhibiting a high measure of monotony in their general morphology. Qualities such as behaviour, muscularity, colour, etc., which readily separate closely similar species in life, vanish or diminish with death and preservation, leaving the systematist the difficult task of finding morphological separation in species which are similar in pattern, in general meristic morphology, jaws, dentition, and the other readily accessible criteria utilized in the classification of leeches for the past 150 years.

With failure in this, the indications of speciation observable in live leeches have been disregarded, and for nearly 100 years the majority of "species" have been defined where separation has been possible on distinctive morphological features present in some leeches. The approach to the assessment of the nature of speciation has been further complicated by the elementary and totally inadequate definition of genera.

The seven-banded bassianobdellid leeches are now known from Tasmania to southern Queensland. Over this range, they are essentially similar in general somital annulation, the location of external landmarks, pattern, the topography of pattern, jaws and dentition, with colour ranging from black through shades of brown, to olive. As such they would have been recognized until recently as a single species, which, lacking salivary gland papillae and copulatory gland pores, and with 16 complete 5-annulate somites, would have been placed in *Limnobdella*.

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Having established systematic values in the morphology of the reproductive systems, pharynx, etc., at familial and generic levels in hirudiniform leeches (Richardson, 1969a), it has been shown (Richardson, 1970) that the bassianobdellids include leeches of two genera: *Bassianobdella*, Bassian; and a Torresian genus. This and other demonstrations of the inadequacy of the earlier classification do not resolve the confusion at the species level, nor can this be resolved in revisions in the use of the earlier criteria. In describing here a third species of *Bassianobdella*, attention can be drawn for the first time to the potential systematic significance in the diversity of annulation in the middle group of nephric somites.

In the pre-Linnean and early post-Linnean periods, species were described in the "classical" manner: colour, pattern, total number of annuli, annular location of landmarks (eyes, genital pores, anus, etc.), teeth, geographic origin; and the hirudiniforms placed in the European genera *Hirudo* and *Haemopsis* (or their equivalents). Before Whitman (1886), a few new genera were established on differences in the position of landmarks (e.g., *Oxyptychus* Grube 1851, 4 annuli between the genital pores); on peculiarities such as: a deep groove on the lower surface of the "lip" of the anterior sucker, a very large posterior sucker (*Limnatis* Moquin-Tandon 1826); a complex of copulatory gland pores (*Macrobdella* Verrill 1872, with many fine teeth, s.g. *Philobdella* Verrill 1874 with 20 teeth); lacking jaws and with many ridges in the pharynx (*Semiscollex* Kinberg 1866).

Whitman demonstrated the presence of 15 "somites" having 5 complete annuli in *Hirudo medicinalis*, as also in a Japanese aquatic jawed sanguivore which he accordingly placed in *Hirudo*; 16 such "somites" in *Macrobdella* and in Japanese leeches which lack copulatory gland pores, and on these terms he provided *Leptostoma* (now *Whitmania*) for the Japanese species. Whitman, following the examples of Grube and Moquin-Tandon, provided *Hirudinaria* as a new genus for *Hirudo javanica*, this having 7 annuli between the genital pores and a very large sucker. In this way there was established the nature of the genus for aquatic hirudiniforms as used for the next 80 years.

Moquin-Tandon (1846) described 21 varieties of colour and pattern in *Hirudo medicinalis*, 11 in *Haemopsis sanguisuga*. Converting this interpretation of wide variation in colour and pattern in the species into a principle that these were generally without systematic value, and adding to Whitman's generic criteria the presence or absence of a median groove on the ventral aspect of the "lip" of the anterior sucker and also of salivary gland papillae on the jaws, R. Blanchard, from 1891 on, reduced hirudiniform and haemadipsine species described in the classical manner in various Regions to synonymy under the earliest named species in the Region; e.g., 15 such in the Oriental Region became synonyms of *Hirudo granulosa* Savigny 1822. This, having salivary gland papillae on the jaws, Blanchard (1897) transferred to the Circum-Mediterranean *Limnatis*, placing it in a s.g. *Poecilobdella* since *granulosa* has more than 100 teeth on the jaw and metameric maculations.

Established on limited criteria which are now proven neither specific nor generic in value, Blanchard's "megasppecies" in the aquatic and terrestrial jawed sanguivorous leeches have created confusion for nearly all workers since 1900. This can be seen in Johansson (1911), who figures some 10 differing patterns in *Hirudo australis* Bosisto 1859, including here leeches of three Australian genera, one recognizably bassianobdellid; and in Moore (1927), who was partially successful in subdividing Blanchard's megasppecies *L. granulosa* in terms of the morphology of the median regions of the reproductive systems, but as this was used at both the subgeneric and specific levels, Moore gave no clear indications for others to follow. Because of a separation of their leeches into genera on morphological criteria other than those of Whitman and Blanchard, Caballero and Ringuelet have had a considerable measure

of success in the determination of species in the Neotropical jawed leeches. Caballero utilizes systematic values in colour and pattern; Ringuet, variation in the position of external landmarks and in the morphology of the reproductive systems, both differing in a measure not seen in other faunas.

With the Australian leeches, it has been possible to validate *Hirudo elegans* Grube 1867, a species described in the classical manner (Richardson, 1969b); to show, as also with leeches of other Regions, the inadequacy of genera formulated on the principles of Whitman, Blanchard, and their followers (Richardson, 1969a and c, 1971b and c); to demonstrate the nature of generic differentiation among leeches which are highly monotonous in general somital annulation, pattern, etc. (1969a and c, 1970, 1971b and c); and now, among such leeches, to show systematic values in the variety of annulation in the middle group of nephric somites.

Since Whitman (1886), it has been accepted that a complete 5-annulate condition is found only in the somites of the nephric region, viii to xxiv. It is found on all (total 17) in a few genera (*Aetheobdella*, Australian Region; *Whitmania*, Oriental; one species of *Oxyptychus*, Neotropical); generally (25 of the 28 currently known genera) the genera have either ix to xxiv (total 16), or ix to xxiii (total 15); 14 such, only in *Myxobdella*, Oriental. Whitman's practice directs attention to the anterior and posterior nephric somites, viii and xxiv.

Moore was meticulous in recording the detailed annulation of all somites in many species from various Regions for over 30 years from 1901. He recognized (1927) three groups of somites in the nephric series: an anterior group, viii to x, xii or xv, somites in which the relative lengths of the annuli change from somite to somite in a progression which expresses the ontogeny of somital annulation that Moore (1900) had described; a middle group in which the relative lengths of annuli are the same in all somites; and a posterior group, xix or xx to xxiv, again with progressional change in the relative lengths of annuli. Following Whitman and Blanchard, Moore gave systematic value only to the annulation of the initial somites in the anterior group and terminal somites in the posterior group. The extensive data on annulation of the middle group remained embodied in specific descriptions. It was not given systematic value. Later, Moore abandoned description of the annulation of the middle group of somites.

Those very few (Ringuet, Meyer, Richardson) who have followed Moore in the intimate description of the complete somital annulation in aquatic jawed sanguivores, have also followed him in directing attention to the initial and terminal somites in the nephric series. With an anticipation that the distribution of somites among the three groups might possibly have value, I attempted to determine the precise limits of the groups. This fails because the change from one group to the other is commonly gradual, not abrupt. I find that even with excellent material I often have no confidence in the determination of the limiting somites of the anterior and posterior groups.

With expanding experience of the Australian leeches, it has become obvious that the somites of the middle group in the nephric series may have:

- A. Annuli all of the same length, $b_1 = b_2 = a_2 = b_5 = b_6$;
- B. Annuli all of differing length, $b_1 < b_2 < a_2 > b_5 > b_6$, when the sequence by length is $a_2 > b_5 > b_6 > b_2 > b_1$;
- C. Some annuli equal and differing in length from others, in combinations of $b_1 < \text{or} = b_2 < \text{or} = a_2 = \text{or} > b_5 = \text{or} > b_6$.

Moore has described these conditions in leeches from other Regions.

Some of the conditions now known for somites in the middle group of the nephric series in Australian leeches are:

- A. All equal, somites xii to xxi. *Goddardobdella elegans*, Torresian; 2 species of a Torresian genus of bassianobdellid-like leeches; 2 species of *Richardsonianus*, central eastern N.S.W.
- B. All of different lengths. Not recognized here as yet, excepting on the posterior somites of the anterior group in C₄ below.
- C. Some equal, differing in length from others.
 1. $b_1 = b_2 < a_2 = b_5 = b_6$. *Bassianobdella* sp. nov. as below, central eastern N.S.W., exhibiting two series: xv to xvii, a_2 very closely similar in length to all of the "b" category; xviii to xxi, with a_2 slightly but recognizably longer than b_1 and b_2 .
 2. $b_1 = b_2 < a_2 > b_5 = b_6$. *Bassianobdella victoriae*, Victoria. (Preserved material, somital range uncertain.)
 3. $b_1 = b_2 < a_2 = b_5 > b_6$. Somites ix to xviii. Gen. et sp. nov., southern Western Australia. A genus of the "australis"-complex with xxv 5/5- or 4/5-annulate (Richardson, 1971d).
 4. $b_1 < b_2 < a_2 = b_5 > b_6$. Somites x to xviii. *Bassianobdella* sp. nov., Tasmania (Richardson, 1971a).
 5. $b_1 < b_2 = a_2 = b_5 > b_6$. Somites xiv to xxiii. *Richardsonianus* sp., southern eastern N.S.W.

In C. 2. to 5. above, the greater length of a_2 and its equivalent is quite distinct in live material, well extended preserved specimens, and with some experience recognizable in poorer preserved material. In the latter, it is difficult to assess differences in relative length of annuli of the "b" category.

Genus *Bassianobdella* Richardson 1970

Richardsonianidae; 16 complete 5-annulate somites; xxv, 4-annulate; teeth minute, about 45 to 50; no salivary gland papillae on the jaws; pharynx terminating at viii/ix; primary caeca median on crop compartments; ejaculatory bulbs elongate, cylindroid, folding in contraction; median regions, bimyomeric, mesomorphic, both formed on a primary loop, the caecate vagina formed on the elbow and extending along the posterior portions of the procurrent and recurrent limbs to be elongate, U-shape with subequal limbs, the procurrent limb tapering into a moderately muscular vaginal duct distinctly shorter ($\frac{3}{4}$ or less) than the recurrent limb of the vagina; common oviduct not associated intimately with the vaginal duct or the body of the vagina.

Size, medium. Pattern, continuous longitudinal dark bands, a median dorsal and three pairs of dorsal bands.

Type species: *Bassianobdella victoriae* Richardson 1970, by monotypy; Bassian (Victoria).

In the original separation of *Bassianobdella* from the Torresian genus (Richardson, 1970), the relative lengths of the common oviduct and of the vagina were proposed as a primary generic feature. This has been found incorrect (Richardson, 1971a). Comparison of the female median regions in a 21.0 mm specimen and an 81.0 mm specimen in the new species below shows that growth during general growth and functional differentiation is greater in the muscularized portion of the primary

loop than in the non-muscularized common oviduct, agreeing with the principle which was earlier proposed (Richardson, 1969a) that the effects of differentiation are greater on the bursal portion of the primary loop than on the atrial portion. Since the vaginal duct and vagina are equally influenced in growth and differentiation, the relative lengths of the two structures provide a primary morphological characteristic of generic value.

Bassianobdella fusca sp. nov.

(Figs 1, A to F; 2, G and H)

Holotype: Deposited Australian Museum, Sydney, reg. no. W 4297. Length, 81.0 mm. Dissected, right ventrolateral jaw removed, mounted separately. Evans Plain Creek, from a side-pool just above the Mitchell Highway, 6 miles east of Bathurst, altitude 1,800 feet, tributary to the Macquarie River. Dec. 4, 1969. Coll. L. R. Richardson.

Paratype: Deposited National Museum of Victoria, Melbourne, Coll. No. G. 1909. Length, 81.0 mm. Dissected, left ventrolateral jaw removed, mounted separately. Same locality, date, collector, as holotype.

Type locality: A lower transitional section of a small sandy-bottom stream averaging about 6 feet wide by 1 foot deep, with secure well-grassed banks about 4 feet high. Taken from a small, deep, side pool divided from the main stream by a sand bank nearly closing off the head of the pool. Associated: 6 specimens of *Richardsonianus* sp. No other *B. fusca* found during 1½ hours search over a length of 300 yards of stream.

The following description is taken from the holotype.

General form

In life: elongate, moderately depressed, the margins sharp ridged; swimming, elongate, depressed to be strongly flattened, the margins sharply keeled along the greater length of the postclitellar region. The leech is strongly muscular and readily escapes from the tightly closed hand.

Preserved: Depressed, elongate, widening progressively from the velum to the clitellum, which is well formed and the widest region of the body; narrowed slightly behind this with the margins parallel to the postnephric region where, it narrows abruptly to form the base, two-thirds of the width of the sucker which is slightly narrower than the general width of the body. The depth increasing to the clitellum, and essentially uniform along the postclitellar region.

Total length, 81.0 mm; width at iv/v, 2.0 mm; at vii/viii, 3.5 mm wide and 2.0 mm deep; at x/xi, 6.0 mm wide, 3.5 mm deep; at xiv/xv, 5.0 mm wide, 3.5 mm deep and of these dimensions back to xxiv/xxv, 75.0 mm from the tip of the velum; the base of the sucker, 3.0 mm wide; the sucker, 4.0 mm in diameter.

Colour

In life: generally dark greenish-brown above, the venter paler; the median band, black; paired dark bands, brownish-black; the light stripes, dark greenish-brown; margins, pale.

Preserved in alcohol: the general colour diminishes to a pale light-grey, the venter much paler light-grey; median band, black; paired dark bands, pale grey, uniform; supramarginal field, dark grey; the stripes, pale light-grey, almost off-white; dorsum of the sucker, immaculate dark-grey. Venter, immaculate.

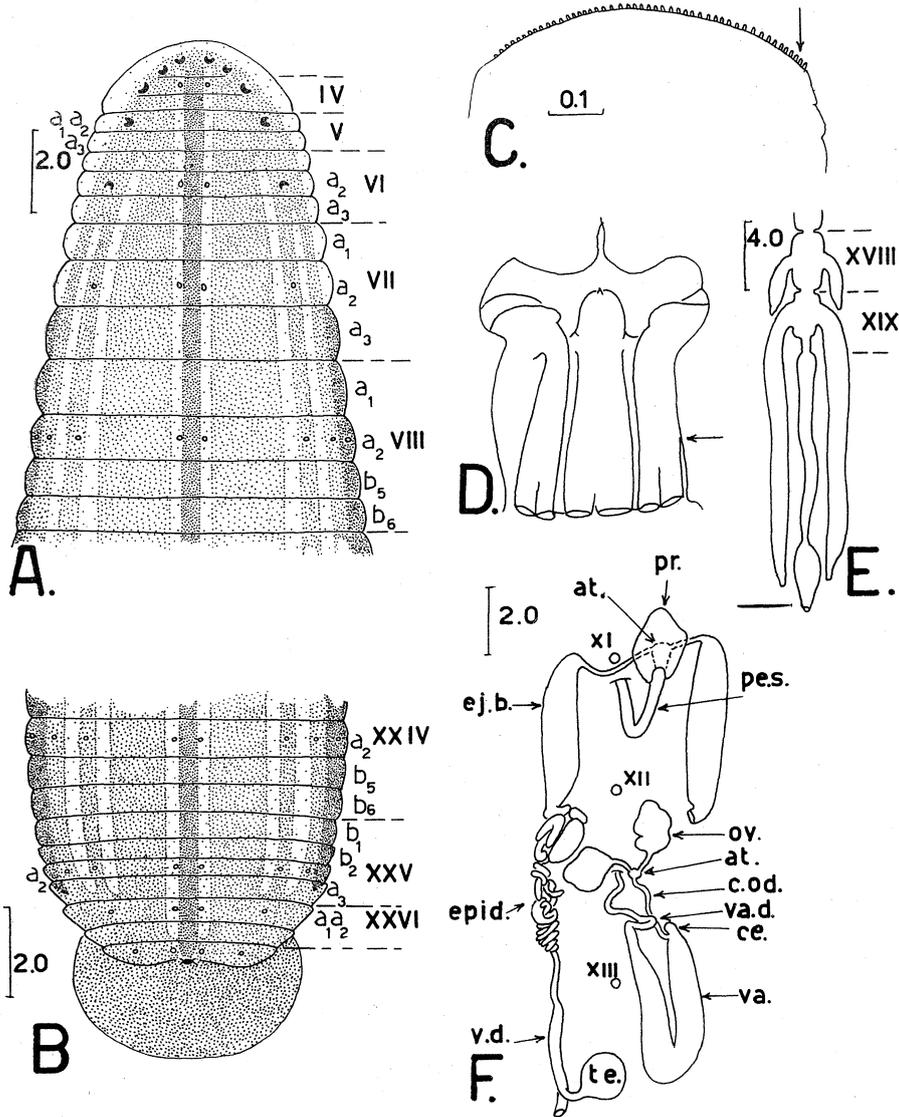


Figure 1, A to F.—*Bassianobdella fusca* sp. nov. Dorsal annulation, A somites i to viii, and B somites xxiv to xxvii. C, left ventrolateral jaw of paratype (arrow indicates medial end). D, pharynx opened along mid-ventral line to show jaws and internal muscular ridges (arrow marks mid-point in length of pharynx). E, crop, caecation, somites xviii and xix; intestine; rectum. F, anterior region, male paired ducts; male median region; female reproductive system. Illustrations from the type, excepting C from the paratype. Somites and somital ganglia indicated by Roman numerals; annuli, "a₂", etc. Somital ganglia represented at relative size. All scales in mm. Abbreviations: at, atrium; ce., caecum; c.od., common oviduct; ej.b., ejaculatory bulb; ej.d., ejaculatory duct; epid., epididymis; ov., ovary; ovd., oviduct; pes., penis sheath; pr., prostate; te., testis; va., vagina; va.d., vaginal duct; v.d., vas deferens.

Pattern (Fig. 1, A, B)

The ocular arch enclosed in a dark ocular area. Three pairs of light stripes, inner, middle and outer pairs, separate the narrow median, inner, middle and outer paired dark bands, the outer continuous with the distinctly darker supramarginal band. (See paratype and other material.)

The inner paired stripes commence at iii/iv, include the paramedian sense organs closer to the medial edge of the stripe, extend briefly into the paramedian field, and terminate in xxvi a_3 , defining between them the median black band which continues to the posterior border of xxvii and is slightly wider than the adjacent stripes for most of its length. The middle paired stripes are narrow, of uniform width, wider than the inner pair, commence at v/vi, terminate at xxv/xxvi and are lateral in the paramedian field. Between the inner and middle stripe, the paramedian field is occupied by the inner paired bands which increase in width as this field widens posteriorly. The outer paired stripe is of the width of the inner stripe, uniform in width along its length, commences in vi a_3 , extends along the intermediate field and terminates at xxv/xxvi. The middle and outer stripes define the middle paired dark bands which extend along the line of the intermediate sense organs, briefly into the adjacent fields, and are uniform in width. The outer paired band is of the width of the middle paired band, uniform, extends along the line of the supramarginal sense organs from in vi to xxv/xxvi. The dark margin occupies the supramarginal field, includes the marginal sense organs, and is sharply set off from the pale submarginal field which is continuous with the venter.

The dark paired bands join into the dark patch across xxvi and xxvii which is continuous with the uniform dark dorsum of the sucker.

Annulation (Fig. 1, A, B)

Preserved: Interannular and intersominal furrows equivalent, strongly defined; somital limits not directly recognizable; annuli not showing as distinct couplets or triplets; somital sense organs small, obscure, detectable as in small white patches on the dorsum, but only with great difficulty on the venter; sensillae, not obvious, but in the clitellar and postclitellar regions, a very fine white line divides the annuli at the level usual for the sensillae and shows white points similar in size to sensillae; nephropores obvious in small white spots on a_1 or b_2 just medial to the intermediate line of sense organs.

The thin margin of the velum incised in the paramedian and intermediate lines, carries the 1st and 2nd pairs of eyes and a weak furrow ii/iii between the intermediate lines; iii/iv, distinct between the same limits; iv, 2-annulate with the 3rd pair of eyes and 1st obvious paramedians in $a_1 a_2 > a_3$; iv/v extending onto the margin so that the dorsolateral lobe of the margin of the sucker is well defined; v, 2-annulate above, the 4th pair of eyes in $a_1 a_2$ slightly $< a_3$, $a_1 a_2 / a_3$ terminating at the marginal line with uniannulate v essentially forming the lateral and ventral margin of the sucker; vi, 3-annulate above, a_1 slightly $< a_2 < a_3$, the 5th pair of eyes in a_2 , a_1 / a_2 weak, reaching to the supramarginal line and vi 2-annulate on the margin and below where $a_1 a_2 > a_3$; vii 3-annulate above and below, $a_1 < a_2 < a_3$; vii a_3 and viii a_1 almost subequal (refer to paratype and other material); viii 4-annulate, $a_1 > a_2$ slightly $> b_5 > b_6$, the 1st nephropores on a_1 ; ix to xxiv complete 5-annulate (total 16); ix, $b_1 = b_2 < a_2 = b_5 > b_6$; x, $b_1 = b_2 < a_2 = b_5 < b_6$, x a_2 the 1st annulus of the clitellum; xi, $b_1 = b_2 < a_2 < b_5 = b_6$; xii, $b_1 = b_2 = a_2 = b_5 > b_6$; xiii, $b_1 = b_2 = a_2 > b_5 > b_6$, xiii b_5 the last annulus of the clitellum; xiv, $b_1 = b_2 < a_2 > b_5 = b_6$; from xv to xxi, a_2 detectably longer than annuli b_1 and b_2 but not significantly longer and all are closely similar in length so that a_2 is not recognizable

by length alone, $b_1 = b_2$ slightly $< a_2 = b_5 = b_6$; xxii, $b_1 = b_2 < a_2 > b_5 = b_6$ with a_2 recognizably longer than b_2 , as also in xxiii, $b_1 = b_2 < a_2 = b_5 > b_6$; xxiv, $b_1 = b_2 > a_2 > b_5 > b_6$, with the last nephropores on b_2 ; xxv, 4-annulate, $b_1 > b_2 = a_2$ slightly $< a_3$, with a_3 the last annulus complete across the venter; xxv a_3 very slightly $>$ xxvi $a_1 a_2$; xxvi, 2-annulate, $a_1 a_2 > a_3$, the somital sense organs all median in the length of $a_1 a_2$; xxvi/xxvii complete across the dorsum; xxvii, uniannulate; the anus at the posterior border of xxvii. The dorsum of the sucker with 6 concentric furrows; omital sense organs obscure.

Alimentary tract (Fig. 1, C, D, E)

Jaws small, compressed in profile at the medial end and obtusely rounded, slightly taller than the width at the base; housed in deep grooves, almost pocket-like but with poorly formed margins; a distinct deep median fissure extending on the lower surface of the velum, anteriorly from the groove housing the dorsomedian jaw but not incising the margin of the velum; the dental ridge, long, low convex, 0.7 mm in length; the teeth about 45 (but the ridge distorted and the number not accurately countable), 0.020 mm long at the medial end and diminishing very gradually; no salivary gland papillae on the jaws.

The mouth little wider than the base of the dorsomedian jaw; the lumen of the pharynx, narrow, tubular, tapering; six internal muscular ridges joining rather far back in the pharynx as pairs forming ventrolateral and dorsomedian ridges, each entering the base of the appropriate jaw; no ridges ending independently between the bases of the jaws.

The pharynx commences vii/viii, terminates at viii/ix; extrinsic radial muscles, an obvious system extending into ix; dorsal salivary glands, numerous as cords of gland cells forming poorly defined right and left masses each with thick cords of aggregated ducts; the crop constricted into compartments, narrowly tubular in ix and x; tubular with indications of one pair of small simple caeca at the median level in xi, as also in xii (the compartments in x, xi, and xii restricted by the thick layer of clitellar gland cells associated with the well-formed clitellum); in xiii, a pair of distinct caeca at the median level, the caeca elongate, tubular and extending into the paramedian chambers, as also in xiv; xv, similar but with the caeca extending into the anterior annuli of the following somite, as also xvi, xvii and xviii; in xix, the postcaeca originate along the lateral aspects of the anterior half of the compartment, and behind this the compartment is reduced, tubular, and joins the intestine terminally at xix/xx; the intestine, inflated, tubular, tapering terminally to join at xxiii/xxiv to the end of the rectum which terminates at the anus. The postcaeca are inflated, simple, and terminate in xxvi.

Reproductive system (Fig. 1, F)

The indications are that the specimen is nearing female maturity.

The genital pores are at xi and xii b_5/b_6 ; the ejaculatory bulbs, elongate cylindroid; the median regions, bimyomeric, mesomorphic, the vagina U-shaped with a vaginal duct.

Testes, simple saccular, 10 pairs, the first pair at xiii/xiv, the last at xxii/xxiii (the vas deferens continues briefly beyond the 10th vas efferens, turns medially into the median chamber, suggesting the possibility for 11 pairs); vasa deferentia extend along the floor of the paramedian chamber, reduce in diameter in the middle of xiii, and the male duct continues as the tubular, folded and convoluted epididymis in the contiguous halves of xiii and xii, becoming more broadly tubular before opening into

the ejaculatory bulb in the middle of xii; ejaculatory bulbs, elongate, cylindroid, muscular, extend to the level of ganglion xi, connecting medially by short, narrowly tubular ejaculatory ducts to the male atrium; the atrium, muscular, continuous with the muscular cylindrical penis sheath formed on a posteriorly directed loop, reflecting at xi/xii to end at the genital pore.

The saccular thin-walled ovaries are in the posterior half of xii, connecting by short oviducts to the well-formed thin-walled atrium at the level of the female pore; female median region formed on a posteriorly directed loop extending from the atrium to the genital pore and reflected at xiii/xiv; the common oviduct occupies the first one-third of the recurrent limb, connecting subterminally to the vagina, which has a small caecum, completes the recurrent limb and continues more than half-way along the procurrent limb, where it tapers to become a narrow muscular vaginal duct loosely folded on itself before terminating at the genital pore. The vagina is U-shaped with subequal limbs; the vaginal duct shorter than the limbs.

The anterior portion of the female median region is in the median chamber, but from ganglion xiii posteriorly, the body of the vagina extends into the paramedian chamber.

The prostate glands are a heavy thick cap investing the atrium and extending briefly along the penis sheath. The semitranslucent albumin glands invest the common oviduct, but not the atrium.

Paratype (Fig. 1, C)

Colour and pattern as in the type, excepting that the supramarginal field is pale, continuous from the velum back to xxvii, and continuous with the venter.

Annulation, as in the type: excepting vii a_3 slightly longer than viii a_1 ; xxv, b_1 slightly $> b_2 < a_2 < a_3$; but xxv a_3 distinctly $>$ xxvi $a_1 a_2$.

Alimentary tract, as in type. Teeth poorly defined, minute, about 48, the longest at the medial end 0.017 mm tall, about 0.010 mm in the middle of the row, the final 10 or 12 granular.

Reproductive system, as in type: excepting the ejaculatory bulbs are partly folded; the limbs of the vagina, subequal; the length of the vaginal duct: the length of the procurrent limb as 2: 3.

The vaginal duct, opened, showed an organized muscular wall lined with an epithelium thrown into longitudinal rugae, and a relatively large lumen.

Other Material (Fig. 2, G, H)

Two specimens, 42.0 mm and 21.0 mm long from a creek between Bathurst and Orange, N.S.W. Coll. W. H. Dawbin, 1st March, 1967.

a. 42.0 mm. Colour and pattern as in type, excepting margin pale in both supramarginal and submarginal fields, continuous from the velum to xxvii, and continuous with the venter.

Annulation exhibiting a tendency to couplets on 5-annulate somites, b_1 and b_2 , b_5 and b_6 ; vii a_3 distinctly $>$ viii a_1 ; xxv, $b_1 = b_2 < a_2 < a_3$; xxv a_3 very slightly $<$ xxvi $a_1 a_2$.

Alimentary tract, as in type.

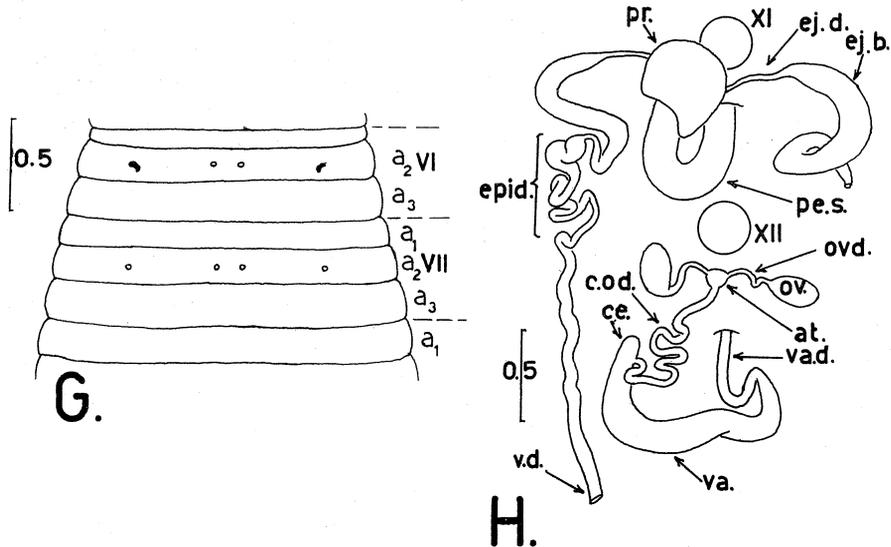


Figure 2, G, H.—*Bassianobdella fusca*, 21.0 mm long. G, dorsal annulation, somites vi, vii, and viii a_1 . H, anterior region male paired ducts; male median region; female reproductive system. For abbreviations see figure 1.

Reproductive system. Fully mature male. Anterior portion of epididymis grossly swollen, forming a large convoluted compact globoid mass in and of the length of xii and nearly as wide as long; behind this a small, short, narrowly tubular folded portion. Female median region, as in type, excepting the procurrent limb tapering very gradually, becoming progressively muscular as a short and well-characterized vaginal duct.

b. 21.0 mm. Colour, preserved in alcohol, as in the type, excepting: median dorsal band, greyish-brown. Pattern, as in type, excepting: supramarginal field pale, continuous with the submarginal field and the venter; paramedian band slightly darker laterally than medially.

Annulation, as in type, excepting: interannular furrows not equivalent posterior to ix, with commonly b_1/b_2 and b_5/b_6 much shallower than b_2/a_2 , a_2/b_5 , and intersomitals, so that somital limits are recognizable and in the middle group there are obvious couplets on either side of a_2 on both the dorsum and the venter, with a_2 distinctly recognizable as longer than b_1 and b_2 in the anterior somites of the middle group; vii a_3 distinctly $>$ viii a_1 ; xxv, $b_1 < b_2$ slightly $< a_2 < a_3$; xxv $a_3 >$ xxvi $a_1 a_2$.

Alimentary tract, as in type. A pair of well-formed small caeca in the anterior position on all crop compartments, in addition to the primary paired caeca in the median position, is misleading. The thin wall of the crop enables the internal rugae to be followed, and the manner in which the rugae continue into the anterior "caeca" indicates that these are temporary.

Reproductive system. Immature. Exhibiting only early indications of functional differentiation on the anterior region of the paired male duct where the epididymis is little folded and clearly divided into a posterior narrowly tubular portion leading into a more widely tubular anterior portion.

The specimen demonstrates that the elongate cylindroid form of the ejaculatory bulbs and of the U-shaped vagina are established before functional differentiation, and are primary morphological forms. It illustrates quite clearly that the body of the vagina is formed on the elbow and posterior portions of the primary loop, with the common oviduct and vaginal duct completing the recurrent and procurrent limbs of the loop. Comparison of the relative lengths of common oviduct and vagina in this immature specimen, with the condition in the adult, shows that growth in functional differentiation is at a higher level on the muscular portions of the primary loop than on the non-muscular common oviduct, as was anticipated earlier from a study of the comparative morphology of the male and female median regions (Richardson, 1969a). In this specimen, the common oviduct approximates to three-quarters of the full length of the vagina. In the adult, the common oviduct is less than half the length of the procurrent limb. The caecate condition is shown as an early morphological achievement.

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