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A New Leech from Papua, Representative of a Third Family of Aquatic Jawed Sanguivores in the Australian Region (Hirudinoidea: Illebdellidae fam. nov.)[1]

By LAURENCE R. RICHARDSON

4 Bacon St, Grafton, N.S.W., Australia

Figure 1

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ABSTRACT

A new family based on *Illebdella papuensis* gen. et sp. nov. is described. Characters include: body strongly depressed and wide; monostichodont, trignathous; pharynx euthylaematous with single secondary ridges in the dorsolateral positions; epididymis, a globular mass at xi/xii; no sperm ducts or ejaculatory bulbs; median regions, bimyomeric; vagina, caecate; no vaginal duct; ix to xxiv, 5-annulate; xxv, 4-annulate; xxvi, 3-annulate. Pattern, topographic, a wide median band of alternating maculae; a lateral catenulate row of large ovals. *Hirudo catenulata* Johansson 1918 is transferred to the new family and provisionally to the g. *Illebdella.*

INTRODUCTION

The leech described here is known from a single preserved specimen collected in 1929 at Mount Lamington in the Northern Division of Papua.

It is strongly depressed, with acute flange-like margins. The pattern consists of a median metamerically checkered band, an inner paired longitudinal row of separated short segmental ovals, and an outer paired row of longer segmental ovals linked at the intersomital levels to be catenulate, chain-like.

Form and pattern indicated that this could not be placed in either of the two established families. This is confirmed in the nature of the pharynx and the form of the anterior region of the male paired duct.

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The species of the eleven genera of aquatic jawed sanguivores now known in the Australian Region are only moderately depressed, the margins obtusely rounded. They are divided among two families, the pharynx in both families being of the type which (1969) I termed hirudoid: trignathous; monostichodont; termininating mostly in ix to ix/x, exceptionally at viii/ix; the entrance narrow, the lumen tubular, tapering; internal muscular ridges arranged as dorsomedian and a pair of ventrolaterals, and lacking dorsolaterals and a ventromedian ending independently on the margin of the entrance to the pharynx.

The two families differ:

Ornithobdellidae Richardson 1969.— As so far known lacking a topographically definable pattern; the female pore, posterior at xii/xiii to xiii b_1/b_2; anterior region of the male paired duct folded on itself in a primary loop, the epididymis on the initial limb, a sperm duct on the terminal limb which may or may not carry an ejaculatory bulb, the relationship parallel; median regions of the reproductive system, amyomeric, i.e. thin-walled atria connecting directly to the bursa, micromorphic, minute extending little higher than the ventral nerve cord. gg. *Ornithobdella* Benham 1909, Snares Is., New Zealand; *Aetheobdella* Moore 1935, eastern Australia, Queensland to Victoria.

Richardsonianidae Richardson 1969.—pattern, topographic, longitudinal dark bands separated by stripes of a light contrast colour; female pore, xii b_5/b_6 or immediately adjacent to this; anterior region of the male paired duct linear, an epididymis posterior to an ejaculatory bulb, the relationship, tandem; median regions of the reproductive systems, myomeric i.e. the organs with a wall of well organized muscular layers, bimyomeric (on both), or hemimyomeric (the male, amyomeric); vagina, caecate. gg. *Richardsonianus* Soos 1968; *Goddardobdella* Richardson 1969, Torresian including Papua; *Quantenobdella* Richardson 1969, Lord Howe Is.; *Euranophila* Richardson 1969, Torresian of the west; *Eunomobdella* Richardson 1969, north-eastern N.S.W.; *Bassianobdella* Richardson 1970, Bassian of the east; *Habeobdella* Richardson 1972, Bassian of the west; *Kaiyabdella* Richardson 1972, Torresian of the east; *Priscabdella* Richardson 1973, Bassian of the east.

The leech described here differs from the above not only in form and pattern, but also in the nature of the pharynx and in the morphology of the anterior region of the male paired duct.

The pharynx is of the type I termed macrobdelloid: similar to the hirudoid, but additional to the dorsomedian and ventrolateral primary internal ridges, there are secondary muscular ridges in the dorsolateral (and ?ventromedian) positions, ridges which terminate independently on the margin of the entrance to the pharynx between the bases of the jaws. The anterior region of the male paired duct is linear, with an epididymis complexly folded on itself into a small compact globular mass; no sperm duct; no ejaculatory bulb.

General form, pattern, the nature of the pharynx and of the anterior region of the male paired duct, in combination exclude the Mount Lamington leech from both the Ornithobdellidae and the Richardsonianidae. There is no established family suitable for it.

Hirudo catenulata Johansson 1918 of the New Hebrides, known only in Johansson's incomplete description, can be transferred to the new family and placed at least provisionally in the new genus given below.

SYSTEMATICS

Illebdellidae fam. nov.

Arhynchobdellae; Euthylaemata; pharynx and associated structures, macrobdelloid; fully divided nephric somites 5-annulate; nephropores, ventral; female pore, xii b_5/b_6; anterior region of male paired duct linear, epididymis formed as a compact globular mass; no sperm duct or ejaculatory bulb; median regions of the reproductive systems, myomeric, formed on a posteriorly directed primary loop; vagina, caecate.

Pattern, metameric maculations and catenulations.

Aquatic. Sanguivorous. Australian Region: Papua; New Hebrides.

Type genus: Illebdella gen. nov. as below.

The division of the internal longitudinal muscles of the body wall into two distinct equally well developed layers has not come to my notice in other aquatic jawed sanguivores. The systematic value of this feature cannot be assessed at this time.

This is the first occasion on which the form of the anterior region of the male paired duct in a euthylaematous leech of the Australian Region has some resemblance to a form known in a leech of another Region.

In his account of *Hirudinaria viridis* Moore 1927, a leech of India, Moore (1927, fig. 57) shows the vas deferens forming a globular "epididymal" mass. The vas deferens enters the mass somewhat posteriorly, and the general appearance of the mass suggests that the epididymis has formed on the initial limb of a primary loop, with a sperm duct completing the terminal limb of the loop. I can see no basis for any relationship for *H. viridis* and the leech below.

Illebdella gen. nov.

Derivation: ille = that + bdella = a leech. m.

Description: Illebdellidae; ix to xxiv complete 5-annulate (total, 16); xxv, 4-annulate; somital sense organs, obscure; jaws, small, compressed, tall; no salivary gland papillae on jaws; teeth, small, about 50; dorsal salivary glands, sparse, no obvious columns of aggregated ducts; extrinsic radial muscles of pharynx, an obvious system in vii to in ix; pharynx and associated structures, macrobdelloid; wall of pharynx, thin; internal muscular ridges, thin, primaries not secondarily subdivided, secondaries in the dorsolateral positions, well-formed, single, ending independently on the margin of the entrance to the pharynx; pharynx terminating in ix; crop with a short simple compartment in ix; compartments in x to xviii, each with a pair of caeca in the anterior position and a pair in the posterior position, both entering the paramedian chamber from xiii to xviii, both distally lobed; the compartment in xix with an anterior pair of caeca, and postcaeca originating in the posterior position extending in the paramedian chamber to terminate in xxvi; intestine tubular, acaecate, compartmented, connecting terminally to the rectum; genital pores, posterior in xi b_5 and at xii b_5/b_6; testes, 10 pairs, saccular, the anterior pair at xiii/xiv; anterior region of male paired duct, linear, an epididymis formed as a compact globular mass in the contiguous halves of xi and xii; no ejaculatory bulbs; median regions of the reproductive systems, bimyomeric, mesomorphic, both formed on a posteriorly directed primary loop; penis sheath reflecting in xii; vagina, caecate; no vaginal duct.

Pattern: Metameric maculations and catenulations.

Distribution: Aquatic. Sanguivorous. Australian Region: Papuan.

Type Species: Illebdella papuensis sp. nov.

Other species: (Provisionally) *Hirudo catenulata* Johansson 1918, New Hebrides (see below).

Illebdella papuensis sp. nov. (Fig. 1)

Holotype: A specimen 50.0 mm long, dissected. Mt Lamington District, Northern Divison, Papua, May 1929. Collector, C. T. McNamara. Australian Museum, Sydney, reg. no. W.2692.

General Form (Fig. 1A)

Preserved, contracted; strongly depressed, the dorsum very low convex; margins narrowly flange-like, acute; venter very slightly concave. The margins are parallel, straight along the greater length of the body (between 10.0 and 40.0 mm from the tip of the velum) and the width uniform; reducing abruptly in width anterior and posterior to these levels, anteriorly to form a transversely oblong preclitellar region, posteriorly gradually and then abruptly to form the basis for the large posterior sucker.

Total length, 50.0 mm; width at the anterior end, 5.0 mm back to 3.0 mm, then increasing to be 15.0 mm wide at 10.0 mm and of this width back to 40.0 mm, reducing to form the base, 5.0 mm wide, of the posterior sucker which is 9.0 mm wide. The depth almost uniformly 4.0 mm along the mid-line of the body, decreasing gradually laterally to the thin marginal flanges.

Colour

Preserved, faded. Dorsum weakly dusky yellow with faded blackish maculae and linear markings; venter, of the same colour, immaculate.

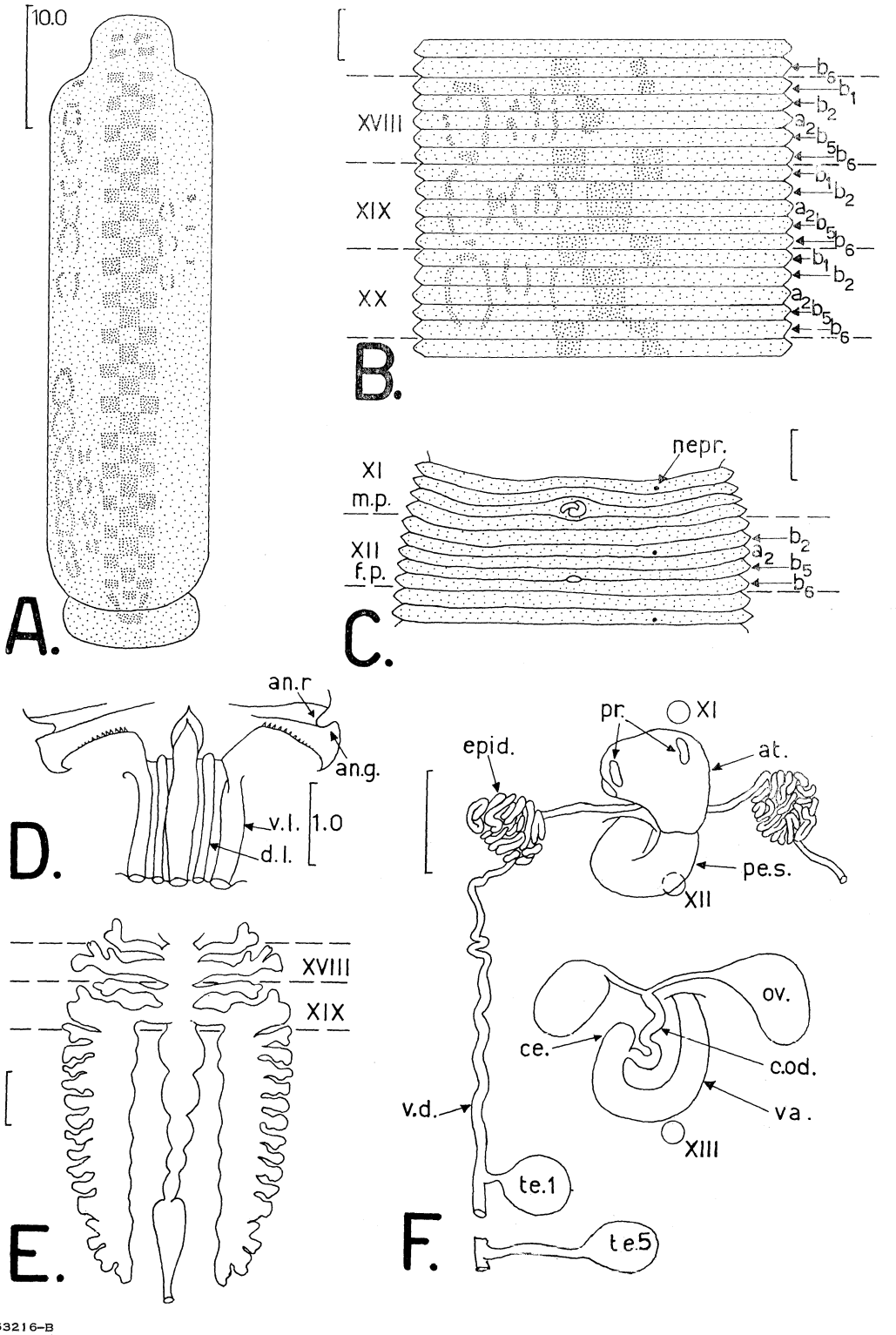
Pattern (Fig. 1, A, B)

Preserved, faded, poorly indicated on the right, sufficiently on the left for description. Somital sense organs are not detectable and, although topographically defined, the pattern cannot be described in full topographic detail.

Dorsum with a median longitudinal row of regularly spaced oblong maculae. On either side of this, a contiguous row of slightly shorter squarish maculae, the squarish maculae alternating with the maculae of the median row, and the three together forming a checkered band along the length of the body.

Opposite

Figure 1. *Illebdella papuensis* gen. et sp. nov. A, dorsal view showing general form and pattern. B, detail of indications of pattern on somites xviii to xx. C, ventral view, somites xi and xii, showing genital pores and nephropores. D, pharynx opened by a median ventral longitudinal incision to show the annular ridge and groove, jaws, internal muscular ridges of the pharynx. E, caecation of crop, somites xviii and xix; intestine; rectum. F, anterior region of male paired ducts, male median region; female reproductive system. All figures from the holotype. Somites and somital ganglia indicated by roman numerals; somital limits, by interrupted lines; annuli, "a_2", etc.; somital ganglia represented at relative size. Scales in mm, 2.0 mm or as indicated. Abbreviations: an.g., annular groove; an.r., annular ridge; at., atrium; c.od., common oviduct; ce., caecum; d.l., dorsolateral muscular ridge; epid., epididymis; f.p., female pore; m.p., male pore; nepr., nephropore; ov., ovary; pc.s., penis sheath; pr., prostate; te., testis; va., vagina; v.d., vas deferens; v.l., ventrolateral muscular ridge.


10.0
A.
XVIII
XIX
XX
B.
XI
m.p.
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XIII
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Just lateral to this band, narrow interrupted longitudinal lines appearing as pairs closely approximated anteriorly and posteriorly, divergent along their length, so that they partially, with some few completely enclose individual longitudinal patches at the level of the maculae of the median row of the checkered band. This forms an inner paired row of oval patches.

An outer paired row of similar oval patches is situated between the inner row of such patches and the margin.

The oval patches of the outer paired row are slightly longer than those of the inner paired row, and join at each end into a black patch, linking these oval patches together in a catenulate, chain-like manner.

The above is a metamerically repeated pattern.

In fully annulated somites, the oblong patches of the median row of the checkered band are continuous over b_2, a_2, b_5; the most anterior, transversely oblong on vi and on vii; longitudinally oblong on viii to xxiii; and vaguely indicated in xxiv to xxvii.

The contiguous squarish patches are continuous over b_6 and b_1, the contiguous annuli of fully annulated somites. Each is of the width of the adjacent median patch, and shorter by the length of an annulus; the most anterior, on vii a_2 and a_3, then regularly on b_6 and b_1 from viii and ix, to xxiv and xxv; the most posterior, a pair of elongate patches posterior on xxv, crossing xxvi into xxvii.

The patches of the mid-line are accordingly across the neuromeric and contiguous annuli, central in the somite; the patches of the paired rows, across the contiguous annuli of the intersomital levels.

A narrow longitudinal dark line connects the outer corners of the paired patches across b_2, a_2, b_5 in the somite, i.e. enclosing a patch bordered anteriorly and posteriorly by the paired squared patches, medially by the elongate median patch, and laterally by a line having the same relationship to the annuli in the somite as does the median patch.

Lateral to the median checkered band, there is a row of paired short narrow lines, the anterior ends closely approximated at b_1/b_2, appearing as though possibly joining at this level or posterior on b_1; divergent on b_2, a_2, and covergent on b_5. Under the low power, these appear to be a series of short somital oval areas defined by narrow black borders, and having essentially the same relationship to the annuli in the somite as does the median patch.

Between this paired row of oval patches and the margin, there is an outer row of oval patches, each oval defined by a narrow black border extending across b_2, a_2 b_5 and having the same relationship to the annuli of the somite as does the median patch, and the ovals of adjacent somites linked by a black patch continuous across b_6 and b_1, i.e. the linking patches have the same relationship to the annulation of the somites as do the paired patches of the median checkered band. The ovals of this chain are recognizable from ix back to xxv.

Accordingly the outer paired catenulate row consists of patches having the relationship to the annuli of the somites similar to that of the paired patches of the median checkered band, and ovals defined by narrow borders having the relationship to the annuli of the somite similar to that of the median patches of the checkered band.

The venter is immaculate. The dorsum of the posterior sucker has a black postanal patch.

Annulation

Preserved. Contracted. The annuli on the dorsum strongly compressed, and the relative lengths of the annuli cannot be assessed; interannular and intersomital furrows, equivalent; somital limits not directly recognizable. Somital sense organs not detectable. Nephropores, fully ventral, minute apertures close to the posterior edge of a_1 and b_2, situated nearly midway between the median line and the margin.

Velum turned ventrally to cover the entrance to the sucker. Eyes, obscure. The 1st furrow, iii/iv, is short and does not reach the edge of the velum; iv, 2-annulate, a_1a_2/a_3 does not reach the edge of the velum; iv/v incises the edge of the velum, and v incomplete 2-annulate, a_1a_2 forming the dorsolateral lobe on the margin of the sucker, and uniannulate v forms the lateral and ventral margins, the furrow a_1a_2/a_3 terminates in the dorsolateral lobe; vi, 3-annulate above, 2-annulate below; vii, complete 3-annulate; viii, 4-annulate; ix to xxiv, 5-annulate (total 16); xxv, 4-annulate, $b_1 = b_2 = a_2 < a_3$; xxvi, 3-annulate, $a_1 > a_2 = a_3$; xxvii, uniannulate or possibly a_1, $(a_2 + a_3)$; anus at the posterior edge of xxvii.

Dorsum of the posterior sucker with 7 or 8 concentric rows of areolae; the venter, with a central papillate area about $\frac{1}{2}$ of the diameter of the sucker and radiating muscular bands subdividing to terminate as about 90 at the margin of the sucker.

Body wall and muscular systems

The body wall is unusually firm and thick. The layers of oblique muscle are recognizable as outer and inner layers, and together do not equal the thickness of the internal longitudinal muscles which consist of two layers each of wide (0.35 mm) flat strands anteriorly, both layers here adherent and continuous with the body wall. Posteriorly, the strands increase in width (0.80 mm), the inner layer becomes separated from the outer, and the fibres of the inner lay can be lifted individually as though fully separated from one another. There is a pair of equally wide strands along the mid-dorsal line for the length of the body. This pair is fully adherent to the body wall.

The paramedian palisade of dorsoventral muscles is represented by wide-spaced small clusters at the intersomital levels; the intermediate palisade, by a continuous row of narrowly spaced strands, unusually short as they are at the base of the thin marginal flanges of the body.

Alimentary Tract (Fig. 1, D, E)

The lower surface of the velum is smooth, carries a weak median and several transverse furrows, and ends posteriorly in an annular ridge which is low, poorly formed anterior to the dorsomedian jaw, and increases in height and width on the inner surface of the lateral walls of the sucker. The ridge defines an annular groove which appears incomplete dorsally, is well-formed laterally, and is obliterated by a frenulum in the mid-ventral line. The dorsomedian jaw is housed in a poorly formed pocket; the ventrolaterals, in the annular groove, separated by the ventral frenulum.

The jaws are very small, about 1.8 mm long, strongly compressed to be taller (0.5 mm) than wide (0.25) at the medial end. The dental margin is almost straight, armed with a single row of minute teeth(assessed as about 50 or less), the medial teeth the tallest, the height diminishing more rapidly along the medial end of the row than along the distal portion, so that the greater length of the row has teeth very gradually diminishing in height.

The entrance to the pharynx is distinctly wider than the base of the dorsomedian jaw. The wall of the pharynx is thinly muscular. The internal muscular ridges include the three primaries, a dorsoventral and a pair of ventrolaterals which are not subdivided and enter the base of the appropriate jaw, and a pair of weaker but well-formed dorsolateral ridges which terminate independently on the margin of the entrance to the pharynx on either side of the base of the dorsomedian jaw. A ventromedian was not recognizable.

The lumen of the pharynx is tapering tubular; the pharynx, short, small, 1.3 mm long and wide; terminating in the middle of ix. The extrinsic radial muscles of the pharynx are sparse, present in vii, viii and ix. Salivary glands are spaced in vii to ix, the dorsals without obvious aggregated columns of ducts.

The crop commences with a short acaecate compartment in ix; compartments in x to xviii, each with a pair of caeca at the anterior and posterior levels, both pairs lobed distally, both pairs extending into the paramedian chambers; the caeca of the posterior pair increasing in length from xiii to xviii and distally digitate. The compartment in xix with a pair of distally lobed anterior caeca, and a pair of laterally lobed postcaeca commencing at the posterior level and continuing in the paramedian chamber to terminate in xxvi.

The crop connects terminally to the wide, compartmented intestine which connects to the end of the short tapering tubular rectum at xxiii/xxiv.

Reproductive Systems (Fig. 1, C, F)

Assessed as mature, male gravid.

Genital pores, the male posterior in xi b_5; the female at xii b_5/b_6.

Testes, saccular, intersomital, the most anterior at xiii/xiv, the most posterior at xxii/xxiii; total, 10 pairs. The posterior testes connecting laterally by a long vas efferens to the vas deferens which is lateral in the paramedian chamber, white, slightly tortuous, and extends anteriorly to xii/xiii. At this level, it narrows to continue as a thin-walled transparent tube which becomes highly convoluted to form a compact solid globular mass at xi/xii, the epididymis. The male duct continues again as a narrow transparent non-muscular duct which turns medially to enter the ventral aspect of the male atrium.

The male median region is formed on a posteriorly directed primary loop reflected at ganglion xii; the strongly muscular atrium in the posterior half of xi; the penis sheath occupying both limbs of the primary loop; the penis, very narrowly cylindrical.

The ovaries, saccular, situated at xii/xiii, continue as short narrow thin-walled oviducts which join to form the median region. There is no distinct atrial chamber.

The female median region formed on a posteriorly directed primary loop reflecting in the middle of xiii; the common oviduct, thick-walled, of greater diameter than the oviduct, slightly tortuous, occupies the greater part if not the whole of the initial recurrent limb of the loop, connects subterminally to the vagina which is caecate, essentially tubular, strongly muscular, and occupies the terminal procurrent limb of the loop. There is no vaginal duct.

The only indication of prostate glands are a few wide-spaced small patches on the surface of the atrium, which otherwise is almost entirely exposed. The albumin glands are a heavy investment of the entire length of the common oviduct.

Status of Hirudo catenulata Johansson 1918

This species of aquatic jawed sanguivore is known only in the original account which describes the external meristic morphology, the pattern, and the jaws. It is based on 6 specimens from the New Hebrides.

Progressively in studies on the Richardsonianidae, I have been able to demonstrate (1973) that topographically definable pattern has not only specific value, but also generic and familial values in genera characterized by the combination of external meristic morphology, the nature of the pharynx and associated structures, the organs and relationship of the organs on the anterior region of the male paired duct, and the nature of the median regions of the reproductive systems.

Although Johansson's account is incomplete, I have long been confident that the pattern he described excluded *catenulata* from the Richardsonianidae and the Ornithobdellidae, and was indicative of a third family in this Region.

Johansson does not describe the general form of *catenulata*. In pl. xii fig. 6, he shows relatively short, very wide 5-annulate somites. He gives the length (22.0 mm) and the maximum width (6.3 mm) for the largest specimen, but not the depth. The ratio of width to length is 1 : 3.5. The ratio for *I. papuensis* is 1 :3.3. In leeches of the usual form, elongate cylindrical to moderately depressed, the ratio is in the order of 1 : 9 or 10, or contracted as 1 : 5 or 6.

The pattern on 5-annulate somites is given as: a median row of regularly interrupted narrow elongate patches, each patch continuous across b_2, a_2, b_5, i.e. each patch having the same relationship to the annuli of the somite as the median elongate oblong patches in *papuensis*.

On either side of this median row, a continous narrow band, closer to the midline at the intersomital levels, curving laterally along the somite, and in this way incompletely enclosing the median patch. This is equivalent to the paired square patches and the lines connecting the outer corners of the patches in the somite in *papuensis*. Johansson's figure is indicative of small square patches on b_6 and b_1 together forming an elongate oblong.

The median row and the continuous paired bands correspond to and have the same relative total width as the median checkered band in *papuensis*.

Lateral to this, on each side: an inner interrupted band of elongate maculae; an outer interrupted band of longer maculae close to the margin; and between these, a longitudinal row of connected elongate large ovals.

The maculae of the inner band extend over b_2, a_2, b_5, and are separated over b_6 and b_1. The maculae of the outer band appear to be centred on b_6 and b_1, with some extending onto b_5 and b_2. The maculations of the inner band have the same relationship to the annuli in the somite as the inner row of elongate ovals in *papuensis*. *I. papuensis* does not show an equivalent to the outer paired band.

Between the paired bands of patches, there is a row of large elongate connected ovals, of the same size, location, and relationship to the annuli of the somite as the outer row of ovals in *papuensis*. Each oval extends over b_2, a_2, b_5, connecting to patches on b_1 and b_6, these patches fusing to similar patches on the contiguous annuli of the adjacent somites, and so having a catenulate appearance. The venter, maculate.

Johansson states that the could not detect somital sense organs. He describes the somital annulation as being similar to that of *Hirudo medicinalis* excepting xxiv, complete 5-annulate (i.e. ix to xxiv, 5-annulate, total 16); xxv, 4-annulate; xxvi, 3-annulate; xxvii, uniannulate; genital pores, xi and xii b_5/b_6. (The enumeration of the somites given here is revised on the basis of 27 preanal somites).

Jaws, lacking salivary gland papillae; 44 teeth in the dental row, the tallest at the median end.

The above indicates that *catenulata* has the general form, general somital annulation, and the essential features of the pattern in *papuensis;* that *catenulata* is recognizably a member of the Illebdellidae; and can be placed provisionally in the g. *Illebdella.*

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