

Papers and Proceedings of the Royal Society of Tasmania, Volume 113, 1979.

(ms. received 23.5.1978)

ANPHILAEMON KINGI gen. et sp. nov., A LAND-LEECH  
ON KING ISLAND, BASS STRAIT (HAEMADIPSOIDEA: DOMANIBDELLIDAE).

by Laurence R. Richardson  
Grafton, New South Wales

(with one text figure)

ABSTRACT

RICHARDSON, L.R., 1979 (20 vii): *Anphilaemon kingi* gen. et sp. nov., a land-leech on King Island, Bass Strait (Haemadipsoidae: Domanibdellidae). *Pap. Proc. R. Soc. Tasm.*, 113: 177-184. ISSN 0080-4703. 4 Bacon Street, Grafton, New South Wales, Australia.

*Anphilaemon*, Philaemoninae, distinctive in having the nephropores on *ix* a<sub>1</sub>, *x* a<sub>1</sub>, anterior, close to *viii/ix*, *ix/x*, in the middle of *xi* a<sub>1</sub>; differs from *Philaemon* s.s. in having the paramedian somital sense organs included in the borders of the median dorsal dark band; a continuous narrow contrast stripe along the medial edge of the paramedian field, the field completed by a dark band extending across the intermediate field, with the intermediate sense organs median and the supramarginals lateral in the band.

INTRODUCTION

This new species is known in three specimens from King Island in the collections of the United States National Museum. This is the first record of land-licees on an island in Bass Strait.

The general morphology of the species is typical of the Philaemoninae, the subfamily containing the 4-annulate land-licees of continental Australia east of the Dividing Range from North Queensland to Victoria, Tasmania, and Lord Howe Island. All known land-licees of Victoria and Tasmania, belong to this subfamily.

There has been major difficulty in systematizing the Philaemoninae at the southern end of its distribution. The type genus for the subfamily is *Philaemon*, a name proposed by Blanchard (1897), but lacking description or definition until 1917, and defined then only as 4-annulate, auriculate, with the type species *Philaemon pungens*. Blanchard and Lambert describe the somital annulation in the manner of Whitman: 26 preanal somites; the annulus containing the somital ganglion, recognized as the anterior annulus of the somite, and the following nephroporic annulus as the posterior annulus of the somite. Their descriptions are converted here to the somital annulation of Moore: 27 preanal somites; the somital ganglion central in the somite, and the nephroporic annulus anterior to this, as belonging to the somite.

There is a discrepancy between Blanchard's description of *P. pungens* as having the genital pores at *xi* b<sub>5</sub>/b<sub>6</sub> and *xii* b<sub>5</sub>/b<sub>6</sub>, and his fig. 7 showing the pores at *xi* b<sub>5</sub>/b<sub>6</sub>, *xii* a<sub>2</sub>/b<sub>5</sub>. The location of the female pore indicates the figure was based on the specimen he lists as from the Richmond River, northern N.S.W., and not on *pungens*. Blanchard (So6s 1967) also placed in *Philaemon* species from Samoa, Java, and Madagascar, in this way assembling an unacceptably heterogeneous genus. The species in Samoa is now in the Leiobdellinae; in Madagascar, in the Malagabdellinae (Richardson 1975; in press).

Lambert (1898) provided a closely detailed description of the external and internal morphology of *Philaemon pungens*, basing this on specimens from southern Victoria

## A land-leech on King Island

and Tasmania.

Lambert described: organs attached to the postcaeca, now the lambertian organs; the compact arrangement of somital ganglia *xxiv* to *xxvii* and the posterior ganglionic mass; the anterior regions of the male paired ducts elaborated on posteriorly directed primary loops within the median splanchnic chamber; the median region of the female reproductive system as formed on a posteriorly directed loop with the posterior face of the elbow of the loop expanded as an oviducal glandular sac; the absence of albumin glands; and other morphology known now as characteristic of the Haemadipsoidea.

With this evidence in a pioneer paper of such a high level of zoological competence, it can be accepted at this time only that the form of the male median region, fig. 2, is as shown: a wide organ in the contiguous annuli of *xi* and *xii*, the width some 6 times the width of nerve cord ganglia; dorsal to the nerve cord; the dorsal aspect bilobed; the anterior ends of the male paired ducts each terminating on the dorsal surface of a lobe. The size, relationship to the nerve cord, etc., is such as I term mesomorphic.

In 4-annulates from North Queensland to Victoria and Tasmania, I have not yet seen a male median region as shown by Lambert. In all I have dissected, the male median region is as in the new species: a simple thin-walled sac, minute, of the size of a nerve cord ganglion to little more than twice this size, ventral to the nerve cord, and with the male paired ducts joining independently to the atrium, low on the anterior face of the atrium. I term this form amyomeric, micromorphic. It was because of this that I was unable (1975) to assess the generic status of the 4-annulate land-leeches in Tasmania.

There are two species currently assigned to *Philaemon* s.s.: *P. pungens* as in Lambert (1898) and *P. grandis* Ingram 1957. Ingram assigned Tasmanian specimens to *pungens*, but the description is inadequate for consideration here. The male median region is micromorphic in *grandis* (v. Ingram, fig. 5).

The dorsal pattern in *pungens* (Lambert, fig. 3) and *grandis* is: a longitudinal dark band restricted to the median field; on each side of this, a light contrast stripe along each line of the paramedian somital sense organs as segments between  $a_2$  and  $a_2$  along the length of the body in *pungens*, coalescing in the mid-body region in *grandis* to form irregular longitudinal stripes; in *pungens*, a wide longitudinal brown band lateral to each stripe, the band occupying the paramedian field, the line of the intermediate somital sense organs, the intermediate field, and the line of the supramarginal sense organs, in *grandis* a wide dark band "uniform in life"; *pungens* lacking a marginal contrast stripe (Lambert refers to "the lateral edge where the dark dorsal area meets the pale ventral surface"), *grandis* with a marginal contrast stripe intact anteriorly and broken posteriorly into segmental patches.

Ingram noted that preserved specimens of *grandis* have the dorsal surface brown, with "four longitudinal darker-brown stripes in the paramedian and paramarginal positions", interpretable from the above as along the medial and lateral edges of each of the paired dark dorsal bands, i.e. the medial edge lateral to the line of the paramedian somital sense organs, as also in *pungens*.

The King Island leeches differ from the above: the median dark band occupies the median field and includes the lines of the paramedian sense organs, the sense organs being in the darker edges of the band; a narrow light contrast stripe along the medial edge of the paramedian field, intact along its length; a wide dark band completes the paramedian field, includes the line of the intermediate sense organs which are central in the width of the band, the band extending across the intermediate field to include the line of the supramarginal sense organs, the band with a medial dark margin and a

Laurence R. Richardson

lateral dark margin in the intermediate field extending into the upper portion of the marginal field; below this, the marginal field pale, continuous with the venter anteriorly; i.e. preserved, a total of 6 dark brown margins on the dorsal bands.

Lambert described the nephropores in *pungens* as opening "on the posterior edge of the annulus"; Ingram, in *grandis* as "visible on the caudal borders of the first annulus in *ix* to *xxiii*".

The King Island specimens show a novelty not known to me before in land-leeches. The nephropores in *ix*, *x*, are anterior on  $a_1$ , close to *viii/ix* and to *ix/x*; in *xi*, central in the length of the surface of  $a_1$ ; and in *xii* to *xxiii*, posterior on  $a_1$ , close to  $a_1/a_2$ .

I have added three genera to the Philaemoninae: *Xenobdella* based on *X. rubra* Richardson 1975 of Lord Howe Island, with *xxiv* 2-annulate, the genital pores at *xi/xii* ( $xi$   $b_6$ ), *xii*  $a_2/b_5$  ( $a_2$ ), and lacking lambertian organs. The other two have the general somital annulation, jaws, lambertian organs etc., as in *Philaemon* s.s.: *Castrabdella* based on *C. nymboidae* Richardson 1975 of north-eastern New South Wales, resembles *Philaemon* s.s. in having a contrast stripe along each line of paramedian sense organs, differs in having a second contrast stripe lateral in each intermediate field, the stripe including the supramarginal sense organs, the genital pores  $xi$   $b_5/b_6$  ( $xi$   $b_6$ ), *xii*  $a_2$ , and distinctly small lambertian organs; *Micobdella*, based on *M. gloriosi* Richardson, 1974 of south-eastern Queensland, has a contrast stripe along the length of the median field, the paramedian sense organs within the medial edge of a dark band extending into the middle of the intermediate field with the intermediate sense organs within the band, and from in *vi* to in *xxvi* a contrast stripe completing the intermediate field with the supramarginal sense organs close to the outer edge of the stripe.

The continuing experience of the jawed leeches in Australia confirms the topographic stability of the dorsal pattern and its systematic values in aquatic and terrestrial sanguivores. In both, the topography of the pattern in the dorsal median and paramedian areas is stable at generic and lower levels in genera separable on general somital annulation and/or other morphological features. In such genera, differences in the topography of the pattern in the dorsal intermediate and marginal areas have been demonstrated to have specific value in some (Richardson 1971, 1974).

On the above basis, it is proper to propose a new genus for the land-leeches on King Island.

#### Sub-family PHILAEMONINAE

##### *ANPHILAEMON* gen. nov.

Derivation: an-, negative prefix in Greek + *Philaemon*, a generic name in zoology.

General somital annulation, lambertian organs, etc., as in *Philaemon* s.s.; jaws with a continuous row of minute teeth; no salivary gland papillae; *xxiv* uniannulate; 6 annuli on the dorsum between *xxiii*  $a_2$  and the anus; auricles small, posterior to *xxv*; nephropores anterior on  $a_1$  in *ix*, *x*, central in *xi*, posterior in *xii* to *xxiii*; a median dark band filling the median field extending to include the paramedian somital sense organs; a narrow continuous light stripe along the medial edge of each paramedian field; the paramedian fields completed by a dark band including the line of the intermediate somital sense organs, central in the band, and extending across each intermediate field to include the line of the supramarginal somital sense organs; genital pores,  $xi$   $b_5/b_6$ ,  $xii$   $b_5/b_6$ ; e jaculatory bulbs present; male median region amyomeric, micromorphic.

A land-leech on King Island

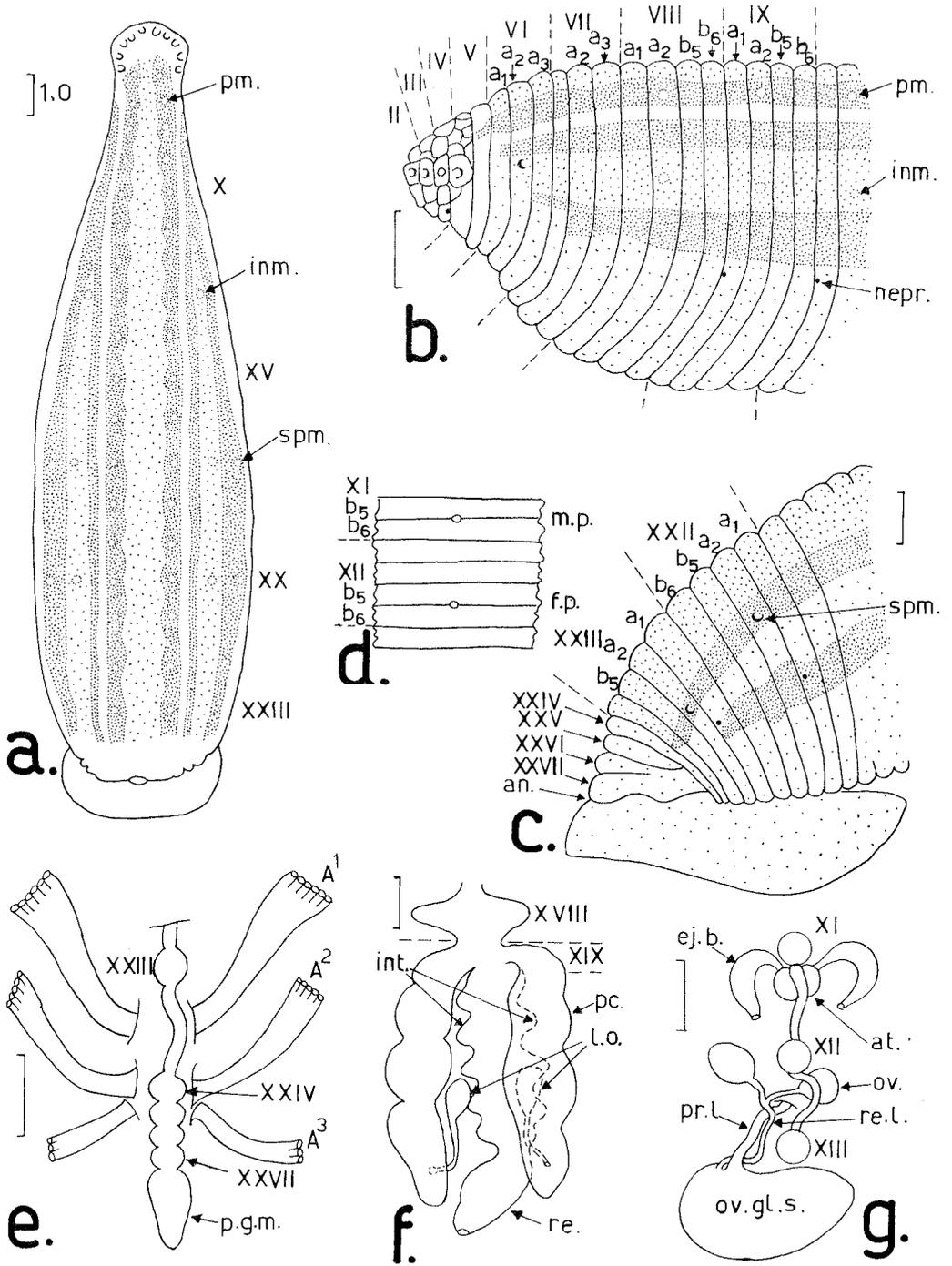


FIGURE 1

Laurence R. Richardson

Type Species: *Anphilaemon kingi* sp. nov., King Island, Bass Strait.

*ANPHILAEMON KINGI* sp. nov.

Figure 1

Material: "U.S.N.M. Haemadipsidae. 3 spec. King Island, Bass Strait, Tasmania. A.R. Cheese, coll. Moore, donor. Acc. 259718." No date given. All three specimens are strongly contracted, curved ventrally: (a) 14.5 mm long; (b) ca. 25.0 mm; (c) 27.0 mm; paratype (b) deposited in the Tasmanian Museum.

The following description is based on (a) Nat. Mus. Nat. Hist., No. 55608, which I select as the type specimen. Colour, pattern, and the location of the nephropores on *ix*, *x*, *xi*, in (b), (c), as in the type.

#### Description

##### General Form

Contracted to be broad-bodied; the dorsum low convex, the margins obtusely rounded, and the venter shallowly concave. Widest posteriorly at about 10.0 mm from the anterior border of the sucker, the width 5.0 mm, the depth 2.0 mm; narrowing gradually anteriorly to be 4.0 mm at 5.0 mm, and 2.0 mm at *vi/vii*; the width reducing more rapidly posteriorly, the depth 3.0 mm, to form the base for the posterior sucker which is narrower than the width of the body, nearly 3.0 mm wide and long, with a small obtuse clamp.

##### Colour

Preserved. Dark brown across the dorsum, divided longitudinally by six narrow darker bands; the margins and venter, paler, uniform greyish brown; the dorsum and venter of the posterior sucker, dark cream.

##### Pattern (fig. 1. a, b, c)

Preserved. A dark band with narrow darker borders occupies the dorsal median field, with the lines of the paramedian somital sense organs in the dark borders from in *vi* to in *xxiii*. In the median field, the band takes its colour from dark areolae and contrasting paler areolae, the general distribution of the paler areolae producing the appearance of a pale median "stripe" which is very irregular along its length.

#### FIGURE 1

*Anphilaemon kingi* gen. et sp. nov.

Figures based on the type. a. Topography of the dorsal pattern (semidiagrammatic). General somital annulation and topography of pattern: b. left lateral view, somites *ii* to *ix*; c. right lateral view, somites *xxii* to *xxvii*, and posterior sucker. d. Location of genital pores (not to scale). e. Posterior somital ganglia, posterior ganglionic mass, mm. habenaes of the A group; dorsal aspect. f. Crop compartments *xxiii*, *xxix*, postcaeca, lambertian organs, intestine, rectum, left postcaecum displaced laterally; dorsal aspect. g. Anterior ends of male paired ducts, male median region, female reproductive systems, oviducal glandular sac displaced posteriorly; dorsal aspect.

Somites and somital ganglia indicated by roman numerals; annuli, "a<sub>2</sub>" etc.; somites, broken lines; somital ganglia shown at relative size; scales in mm, 0.5 mm or as indicated.

Abbreviations: A<sup>1</sup>, A<sup>2</sup>, A<sup>3</sup>, mm. habenaes; an., anus; at., atrium; ej.b., ejaculatory bulb; f.p., female pore; inm., intermediate somital sense organ; int., intestine; l.o., lambertian organ; m.p., male pore; nepr., nephropore; ov., ovary; ov. gl.s., oviducal glandular sac; pc., postcaecum; p.g.m., posterior ganglionic mass; pm., paramedian somital sense organ; re., rectum; re.l., recurrent, and pr.l., procurrent limbs of the female median region; spm., supramarginal somital sense organ.

## A land-leech on King Island

A narrow contrast stripe along the median third of the paramedian field in *vi* to in *xxiii*.

A wide dark band with a narrow darker medial border completes the paramedian field, includes the line of the intermediate somital sense organs which are central in the band, the band extending across the intermediate field has a wide lateral dark border which includes the supramarginal sense organs (recognizable in *xv* to *xxi*), the two dark borders of the band fusing anteriorly.

The marginal fields are occupied above by the dark border of the paired band, and below this, maculated rather irregularly giving the impression of a faded pale stripe in the upper portion of the marginal field, this including the nephropores anteriorly, with the posterior nephropores in a pale band darker than the venter.

The fading after preservation of rather uniform dark bands into a paler median portion with dark edges, is seen in many land-leeches (Richardson 1974).

Allowing for this, the dorsal pattern in life for this species would be: a wide dark median band including the lines of the paramedian somital sense organs, the band separated by a narrow contrast stripe close to the median edge of the paramedian field, from a wide dark band extending across the paramedian field, the line of the intermediate somital sense organs, the intermediate field, the line of the supramarginal sense organs, and briefly into the marginal field; a narrow contrast stripe with a straight dorsal margin completing the marginal field, and possibly continuous with the venter.

Annulation (fig. 1. b,c)

Contracted; the intersomital and interannular furrows, deep, equivalent; the annuli compressed; areolation reduced along much of the body; somital sense organs commonly recognizable; nephropores, generally readily recognizable on *xii* to *xxiii*, but requiring careful examination on *ix* to *xi*.

The 1st nephropores are ventral to the ocular areolae of *iv*, *v*; the 2nd nephropores, anterior on *ix*  $a_1$  and close to *viii/ix*; the 3rd, anterior on *x*  $a_1$ , close to *ix/x*; the 4th, in the middle of the length of *xi*  $a_1$ ; the 5th to 16th, on *xii* to *xxiii*, posterior on  $a_1$  close to  $a_1/a_2$ ; the 17th nephropores, each at the bottom of a wide-mouthed nephroporic pit beneath the auricle.

Somite *i* forming the anterior margin of the sucker; the eyes each in an ocular areola; *ii*, *iii*, *iv*, uniannulate, the oculars of *ii* contiguous, of *iii* separated by 4 areolae, of *iv* separated by 6 areolae, and *iv* forming the dorsolateral portions of the margin of the sucker; *v* erratically areolate between the oculars as though 3-annulate, but essentially 2-annulate,  $a_1a_2 > a_3$ ,  $a_1a_2/a_3$  continues posterior to the oculars, lacking in the median ventral field, so that  $a_1a_2$  forms the ventrolateral portions of the margin of the sucker, and uniannulate *v* forms the ventral margin; *vi* almost complete 3-annulate,  $a_1 = a_2$  with the 5th eyes  $> a_3$ ,  $a_1/a_2$  lacking in the mid-ventral field; *vii* 3-annulate,  $a_1, a_2 < a_3$ ; *vii*  $a_3 = \text{viii } a_1$ ; *viii* to *xxiii* 4-annulate (total 16); *viii*  $a_1 < a_2 = b_5 = b_6$ ; *ix* to *xxiii*, the relative lengths of the annuli are not generally assessable with confidence, in the middle of the series some somites show as  $a_1$  slightly  $< a_2 > b_5 = b_6$ , as also in *xxiii*, and *xxiii*  $b_6$  complete across the venter; *xxiv* to *xxvii* uniannulate; *xxiv* reduced to a thin ridge across the venter; *xxv* short, excluded from the auricle by the fusion of *xxvi* and *xxvii* forming the simple flange-like auricle with a small obtuse notch.

The dorsum of the posterior sucker with 6 concentric rows of areolae; the venter with a small areolate central area about a quarter of the diameter, the areolae fusing into rows forming muscular ridges subdividing to terminate as some 80 ridges on the margin.

Laurence R. Richardson

Muscular System (fig. 1. e)

The contracted state prevents description of the body wall muscular envelope and the dorsoventral palisades.

The intersomital dorsoventral musculature in the posterior body somites, the mm. habenae (Richardson 1977) is represented by three pairs of muscular strap-like bands ascending in the paramedian splanchnic chambers medial to the postcaeca, and inserted onto the dorsal body wall in this chamber. These are identifiable as of the A group. The bands are without attachment along their course, and cut at the insertions can be drawn down to the floor of the median splanchnic chamber. The dorsal insertions can only be approximated:

A<sup>1</sup>, origin in the posterior half of *xxiii*, the insertion anterior to *xxiii*; A<sup>2</sup>, origin at the level of ganglion *xxiv*, insertion in *xxiii*; A<sup>3</sup>, origin at the level of ganglion *xxv*, insertion in *xxiv*, *xxv*.

Habenaes of the B group were not recognized.

Central Nervous System (fig. 1. e)

The details of the anterior ganglionic mass and ganglia *vii* and *viii* could not be determined; ganglion *xxiii*, spaced from *xxiv*; *xxiv*, *xxv*, *xxvi*, *xxvii*, in intimate contact, ganglion *xxiv* distinctly the larger, and *xxvii* in intimate contact with the posterior ganglionic mass.

Alimentary Tract (fig. 1. f)

The anterior sucker is contracted. The margin is a single fold on all aspects, divided by deep furrows into a transverse anterior portion, longer dorsolateral portions, and a transverse ventral portion, the furrows continuing onto the surface of the chamber of the sucker which is thrown into two tall folds at the inner ends of the dorsolateral portions, and papillate, but the papillae are low, irregular, and do not appear to be permanent.

There is a transverse aperture at the posterior end of the chamber, the aperture leading into a deep annular groove housing the horizontal ventrolateral jaws and a dorsomedian pad, between these a short chamber leading to the restricted entrance to the pharynx.

The jaws are low, compressed, the dental margin nearly straight and about 0.25 mm long, armed with a row of many crowded minute teeth forming a continuous cutting edge.

Posterior to the dorsoventral connectives of the anterior ganglionic masses, the pharynx is thin-walled, narrow, and about 0.25 mm in diameter.

The crop compartments anterior to *xviii* are strongly compressed, the form and caecation not definable; the compartment in *xviii*, distorted, but expanded laterally with caeca median on and wide-based on the compartment; in *xix*, the postcaeca extend from the full length of the side walls of the compartment, both inflated, extended medially so that the intestine is entirely concealed beneath them, thin-walled, and terminating bluntly at about *xxiv*.

The Lambertian organs are posterior, in *xxi* and *xxii*, each elongate ovoid, about 0.5 mm long, and connecting subterminally by a duct about 0.75 mm long, to the post-caecum; the duct distinctly longer than the organ.

The intestine is grossly inflated, to such measure that it appears to have short simple lateral caeca, and connects subterminally to the inflated rectum.

Reproductive Systems (fig. 1. d,g)

Genital pores, *xi* b<sub>5</sub>/b<sub>6</sub>, *xii* b<sub>5</sub>/b<sub>6</sub>.

Due to contraction, the primary loops of the paired male ducts within the median splanchnic chamber, are compacted, covering the male median region, the ovaries and

## A land-leech on King Island

ducts of the female system; and the oviducal glandular sac is not longitudinal but transverse in the contiguous halves of *xii*, *xiii*.

The primary loops of the paired male ducts appear to be occupied with sperm ducts. Removal of this compacted mass was necessary to display the terminal end of each duct expanded as a small ejaculatory bulb reducing in diameter to connect independently low on the anterior face of the minute thin-walled male atrium which is entirely ventral to the nerve cord, and amyomeric, micromorphic.

Displacement of the oviducal glandular sac exposed the paired saccular ovaries in the posterior half of *xiv*, each continuing as a thin-walled oviduct, the oviducts joining, without the formation of an atrium, to the female median region.

The female median region is formed on a posteriorly directed primary loop, the recurrent limb of the loop narrower than the procurrent limb, the two limbs subequal in length, closely associated along their length and at their junction to the large oviducal glandular sac.

The condition of the specimen obscured the prostate glands. There are no massed albumin glands.

## ACKNOWLEDGEMENTS

I express my thanks to Dr. Marian H. Pettibone, the Smithsonian Institute, for the privilege of studying the specimens described above; also to Dr. A. Soós, the Hungarian Museum of Natural History, for his scholarly reviews of the genera and species in the Hirudinea which have been of major value to me in this and other studies.

The Librarians, C.S.I.R.O., the Australian Museum, the Linnean Society of New South Wales, and other institutions, have assisted me with literature.

The study of this leech was conducted with support from the Australian Research Grants Committee for researches on the zoology of the freshwater-dependent leeches of Australia.

## REFERENCES

- Blanchard, R., 1897: Hirudinées. In Perrier. *TRAITÉ DE ZOOLOGIE*, Paris, part 4: 1727-1760.
- \_\_\_\_\_, 1917: Monographie des Hémadipsines (Sangsues terrestres). *Bull. Soc. Pathol. Exot.*, 10: 640-675.
- Ingram, D.M., 1957: Some Tasmanian Hirudinea. *Pap. Proc. R. Soc. Tasm.*, 91: 191-232.
- Lambert, A.M., 1898: The structure of an Australian land-leech. *Proc. R. Soc. Vict.*, 10: 211-235.
- Richardson, L.R., 1971: *Bassianobdella ingrami* sp. nov. from Tasmania (Hirudinoidea: Richardsonianidae). *Pap. Proc. R. Soc. Tasm.*, 105: 113-118.
- \_\_\_\_\_, 1974: *Amicobdella* and *Micobdella* gen. nov. of eastern Australia (Hirudinoidea: Haemadipsidae). *Mem. Qd Mus.*, 17(1): 125-149.
- \_\_\_\_\_, 1975: A contribution to the general zoology of the land-leeches (Hirudinea: Haemadipsoidea Superfam. nov.). *Acta Zool. Hung.*, 21(1-2): 119-152.
- \_\_\_\_\_, 1977: A system of intersomital dorsoventral muscles in the posterior body somites of land-leeches (Hirudinea: Haemadipsoidea). *Aust. Zool.*, 19(2): 233-238.
- \_\_\_\_\_, (in press): On the zoological nature of land-leeches in the Séchelle Islands, and a consequential revision of the status of land-leeches in Madagascar (Hirudinea: Haemadipsoidea). *Rev. Zool. Africaine*.
- Soós, Á., 1967: Identification key to the leech (Hirudinoidea) genera of the world, with a catalogue of the species. iv. Family: Haemadipsidae. *Acta Zool. Hung.*, 13(3-4): 417-432.