

# THE GENUS *DIPOROCHAETA* (OLIGOCHAETA MEGASCOLECIDAE) IN QUEENSLAND

by

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(With 16 text-figures and 2 tables)

## ABSTRACT

*Perionychella* is reassigned to *Diporochaeta* as a junior synonym. 9 new species are added to the 8 previously known Queensland species of *Diporochaeta*, all of which are redescribed, bringing the generic total for Australia to 77 named species. Distribution of the genus is disjunct, the Queensland records being restricted to the northeast, between latitudes 15° and 19°S, with the exception of a single morphologically very isolated species in the Bunya Mountains of southeast Queensland. The remainder of the genus occurs in Tasmania, Victoria, the Australian Alps in southern New South Wales and, a few species, in New Zealand. The genus is redefined and a key to Queensland species provided.

## INTRODUCTION

The recorded indigenous earthworms of Queensland are Megascolecidae assignable to 11 genera: *Diplotrema* (s. strict.), *Rhododrilus* (Acanthodrilinae) and *Digaster*, *Notoscolex* (s. lat.), *Spenceriella* (*Austroscolex*), *Diporochaeta*, *Fletcherodrilus*, *Heteroporodrilus*, *Plutellus* (s. strict.), *Megascolex* and *Amyntas* (Megascolecinae). The present study of *Diporochaeta* continues the survey of Queensland oligochaete genera which commenced with a revision of *Digaster* (Jamieson, 1975). *Diporochaeta*, as here emended to include *Perionychella* as a junior synonym, is a larger genus with 67 previously recorded Australian species (all in the Eastern subregion), several species, including the type-species, in New Zealand and doubtful representation in India. It shows close affinities with the large Western Australian genus *Graliophilus* Jamieson, 1971b, which may be its junior synonym. Attention has previously been drawn to a major disjunction in the distribution of *Diporochaeta* in eastern Australia between species in northern Queensland and the remainder of the genus, in south-eastern Australia. This disjunction is investigated in the present study.

Financial support by the Australian Research Grants Committee and Australian Biological Resources Study has enabled this investigation of the distribution of the genus in Queensland, the addition to *Diporochaeta* of nine new species and redescription of all previously known Queensland species.

Terminology employed is explained in Jamieson (1974a). Abbreviations in the specific descriptions are l, length; w, width; s, number of segments; H, holotype; P, paratype; s.l., setal lines. Specimens are lodged in the Rijksmuseum van Natuurlijke Historie, Leiden (LM), the National Museum of Victoria (NMV), the Queensland Museum, (QM), the Zoologisches Museum, Hamburg and the author's collections (BJ).

#### SYSTEMATICS

##### **Diporochaeta** Beddard, 1890

*Diporochaeta* Beddard, 1890: 55, 56; 1895: 439; Michaelsen, 1900: 199; 1907: 161; Stephenson, 1923: 315; 1930: 840; Lee, 1959: 262; Gates, 1959: 257; Jamieson, 1971a: 82. *Perionyx* (part., subgenus *Diporochaeta*); Michaelsen, 1916: 7; 1924: 229. *Perionychella* Michaelsen, 1907: 163; Jamieson, 1974a: 216; 1974b: 219.

Diagnosis. — Setae eight or more per segment. A pair of combined pores of vasa deferentia and tubular or tubuloracemose (rarely racemose?) prostates on XVIII. Last hearts in XII or XIII. Gizzard in V or VI (well developed to vestigial); typhlosole absent or, exceptionally, very rudimentary. Extramural calciferous glands usually absent, rarely with paired glands in X and XI or XI and XII or unpaired annular glands in XV. Nephridia stomate, exonephric holonephridia with or without bladders; their pores in straight or sinuous lines but never with regular alternation; the anterior nephridia sometimes tufted. Spermathecae 1-5, pre-testicular, diverticulate pairs; diverticulum usually single, uniloculate, rarely paired, exceptionally composite, never sessile multiloculate.

Detailed definition. — Terrestrial or sometimes aquatic worms. Form circular in cross section or less commonly depressed; anus terminal; with or without pigmentation. Prostomium- pro-epilobous to tanylobous. Dorsal pores present or sometimes absent; usually commencing in 3/4 or 4/5. Setae eight per segment throughout (lumbricine condition) or becoming more numerous (perichaetine condition) after a varying number of segments, or perichaetine throughout. Nephropores in a single lateral series throughout, in the vicinity of *c* lines (where setae are lumbricine) or their equivalent in perichaetine species, or in an irregularly sinuous series, varying from far dorsally to far ventrally, but not showing a regular alternation. Posterior limit of clitellum shortly anterior to the male pores or including these. A pair of male pores equatorial or postsetal on XVIII, each pore the combined opening

of a prostate gland and the corresponding vasa deferentia. Female pores paired, or exceptionally single midventral, in XIV. Spermathecal pores 1 to 5 pairs in front of or usually including intersegmental furrow 8/9. Accessory genital markings present in the vicinity of the male and sometimes of the spermathecal pores or absent.

TABLE I  
Intersetal indices in *Diporochaeta*

			% of circumference					mm
			aa	ab	bc	zy	zz	u
<i>athertonensis</i>	HMV8481	XII	2.7	1.8	2.5	4.6	8.05	13.04
<i>barronensis</i>	Lectotype	XII	9.4	2.9	3.3	4.2	4.2	11.04
	Paralectotype 2	XII	6.9	3.9	3.9	2.4	3.9	10.21
	mean		8.2	3.4	3.6	3.3	4.1	10.63
	Paralectotype 2	XX	4.2	2.1	2.4	3.9	9.5	14.14
<i>blounti</i>	Holotype	XII	10.3	3.7	5.9	8.8	10.3	5.44
	Paratype	XII	7.3	5.0	6.0	6.7	5.0	4.36
	mean		8.8	4.4	6.0	7.8	7.7	4.90
	Holotype	XX	11.0	3.8	5.2	10.3	8.3	5.80
	Paratype	XX	11.0	4.4	5.5	6.1	4.4	5.44
	mean		11.0	4.1	5.4	8.2	6.4	5.62
<i>bunya</i>	Holotype	XII	13.7	6.1	13.2	11.4	24.8	6.95
		XX	14.9	4.8	12.8	11.2	27.1	6.62
<i>canaliculata</i>	3 specimens (QM,LM)	XII range from	5.8	2.2	2.1	3.7	37.4	24.72
		to	7.9	3.1	2.9	5.0	45.7	30.56
		mean	6.7	2.5	2.4	4.4	40.2	27.82
		XX range from	6.0	1.4	1.7	4.0	22.9	21.28
		to	6.7	3.8	2.6	7.7	23.4	28.72
		mean	6.4	2.4	2.2	5.5	23.2	26.10
<i>crateris</i>	Holotype	XII	8.4	4.8	4.2	5.4	10.2	6.68
	Paratype	XII	7.5	4.9	4.6	6.6	10.4	6.92
	mean		8.0	4.9	4.4	6.0	10.3	6.80
	Holotype	XX	8.5	4.3	4.5	5.7	9.7	7.04
	Paratype	XX	8.8	4.9	3.8	5.8	8.8	7.28
	mean		8.7	4.6	4.2	5.8	9.3	7.16
<i>erici</i>	syntype	XII	8.6	4.3	5.2	5.6	31.5	11.60
		XII range from	5.6	2.6	4.1	4.1	19.0	6.64
		to	8.6	4.3	7.4	9.5	32.6	17.12
	syntype & 11 specimens							
	specimens 1-4, 12, 14-17, 31, 36	mean	7.4	3.5	5.5	5.6	26.9	10.30
	10 specimens	XX range from	6.1	2.1	3.3	3.3	14.3	7.36
		to	8.2	2.9	6.8	4.8	31.5	16.49
		mean	6.7	2.5	4.2	4.2	21.9	10.15
<i>grandis</i>	Lectotype	XII	6.8	2.5	2.9	2.7	10.5	28.39
		XX	4.4	1.6	1.7	4.9	19.4	31.85
<i>kuranda</i>	Holotype	XII	6.5	2.6	1.8	4.8	15.4	19.20
	Paratype	XII	10.0	2.6	2.3	5.4	12.5	18.88
	mean		8.3	2.6	2.1	5.1	14.0	19.04
	Holotype	XX	6.0	2.0	1.7	2.3	18.2	20.64
	Paratype	XX	5.2	1.5	1.4	4.7	13.7	23.28
	mean		5.6	1.8	1.6	3.5	16.0	21.96

TABLE 2  
Intersetal indices in *Diporochoeta* (continued)

			% of circumference				mm		
			aa	ab	bc	zy	zz	u	
<i>millaamillaa</i>	Holotype	XII	4.7	2.4	2.4	3.2	6.5	6.80	
	Paratype 1	XII	3.5	1.4	1.2	2.2	6.8	7.36	
		mean		4.1	1.9	1.8	2.7	6.7	7.08
	Paratype 1	XX	4.3	2.0	3.0	2.5	5.2	6.90	
		mean		6.3	1.9	2.8	2.5	7.5	6.40
			5.3	2.0	2.9	2.5	6.4	6.7	
<i>montislewisii</i>	Holotype H,Pl-4	XII	4.8	3.5	3.0	3.6	6.0	10.08	
		range from	4.8	2.4	2.1	3.3	6.0	10.04	
		to	5.3	3.5	3.0	4.7	9.0	15.24	
	Holotype H,Pl-4	mean		5.1	2.7	2.4	3.8	7.7	11.61
		XX	5.4	2.4	1.9	3.7	6.5	10.22	
		range from	5.3	2.1	1.9	2.5	4.8	10.22	
		to	5.9	2.4	2.4	3.7	13.9	14.64	
		mean	5.5	2.3	2.2	3.0	7.2	14.76	
<i>nashi</i>	Holotype Paratype 1	XII	4.6	2.5	3.5	5.2	44.4	25.24	
		XII	6.1	2.8	2.2	4.4	43.7	21.04	
		mean	5.4	2.7	2.9	4.8	44.1	23.14	
	Holotype Paratype 1	XX	5.1	2.4	2.4	7.4	31.5	26.64	
		XX	7.8	4.3	2.7	5.0	43.1	20.04	
		mean	7.7	3.4	2.6	6.2	37.3	23.34	
<i>oculata</i>	Holotype H,Pl,7	XII	5.7	2.6	3.7	4.5	6.9	9.84	
		range from	5.4	2.6	2.8	4.3	6.9	9.84	
		to	6.5	3.8	3.7	4.5	7.2	12.32	
	Holotype H,Pl,7	mean		5.9	3.2	3.3	4.4	7.5	11.09
		XX	5.2	2.8	2.6	2.7	3.8	11.68	
		XX	7.3	3.2	3.6	4.0	8.4	12.64	
		mean	6.3	3.0	3.0	3.4	6.6	12.24	
<i>phalacrus</i>	Specimen 2	XII	7.1	4.8	2.9	4.0	60.6	19.20	
		XX	9.5	1.3	4.4	2.9	61.9	19.00	
<i>raveni</i>	Holotype H,Pl,4	XII	4.1	0.8	1.0	1.3	2.3	16.52	
		XII range from	4.1	0.8	1.0	1.3	2.3	12.44	
		to	6.1	1.7	2.0	1.8	2.7	16.52	
	Holotype H,Pl,4	mean		5.1	1.3	1.5	1.5	2.4	15.00
		XX	5.0	1.3	1.6	1.5	2.6	12.05	
		XX range from	5.0	0.8	1.1	1.3	2.4	12.05	
		to	5.8	1.4	1.6	2.0	3.0	13.32	
		mean	5.5	1.2	1.4	1.6	2.7	12.62	
<i>terraereginae</i>	Specimen 1	XII	5.8	1.1	1.0	2.3	36.7	71.33	
		XX	4.8	0.8	0.5	2.3	31.0	62.33	

Dorsal vessel single, continuous onto the pharynx; last hearts in XII or rarely, XIII; hearts in X to XII, or to XIII, latero-oesophageal, each receiving a connective from the supra-oesophageal vessel and a lesser connective from the dorsal vessel. Supra-oesophageal vessel restricted to the post-gizzard oesophagus, moderately to well developed though sometimes not differentiated from the oesophageal plexus. Subneural blood vessel absent. Gizzard in V, less commonly in VI. Oesophagus commonly with internal rugae, these often best developed in XIV and XV; sometimes with internal lamellae

which line an annular unpaired axial calciferous gland in XV (*D. glandifera*), or paired sessile glands in X and XI (*D. intermedia*), or 2 pairs of fusiform glands in XI and XII (*D. bunya*). Intestine commencing in XV - XX (usually XVII); typhlosole, muscular thickening and caeca absent, exceptionally a rudimentary typhlosole-like dorsal ridge present. Nephridia simple, exonephric holonephridia throughout, or sometimes these preceded in anterior segments by nephridia with many spiral loops or much coiled with simple (avesiculate or vesiculate) ducts or (*D. davallia*) composite avesiculate ducts. Nephridial bladders usually present, variable in form from subspherical, through pyriform to elongate tubular and with or without a diverticulum, exceptionally (*D. grandis* part) avesiculate in the forebody and vesiculate in the hind body. Holandric (testes in X and XI), with seminal vesicles in IX and XII (rarely in X and/or XI also) or in XI and XII; pseudovesicles sometimes present in XIII; testi-sacs absent or rarely present. Metagynous (ovaries and funnels in XIII); ovisacs present or absent. Prostates tubular, with central lumen, though often flattened, or tubuloracemose, i.e., lobulated or externally racemose but with axial lumen with (or without?) side branches; questionably sometimes racemose (with ramifying internal ducts). Vasa deferentia joining the ectal end of the prostate gland or less commonly the ental region of the prostate duct. Penial setae present or absent. Spermathecae with single clavate to digitiform uniloculate diverticulum (2 diverticula in *D. bunya*) or exceptionally (*D. oculata*) diverticulum composite with four long, parallel conjoined ducts.

Distribution. — New Zealand (type-species) and islands in the vicinity; eastern-subregion of Australia: Victoria; Tasmania; Mt. Kosciusko in New South Wales; Bunya Mountains in S. E. Queensland; North Queensland. India?

Type-species. — *Perichaeta intermedia* Beddard, 1889.

Checklist of Queensland species of *Diporochaeta*:

1. *D. atavia* (Michaelsen, 1916)
2. *D. athertonensis* (Michaelsen, 1916)
3. *D. barronensis* (Fletcher, 1887)
4. *D. blounti* sp. nov.
5. *D. bunya* sp. nov.
6. *D. canaliculata* (Fletcher, 1888)
7. *D. crateris* sp. nov.
8. *D. erici* (Michaelsen, 1916)
9. *D. grandis* (Spencer, 1900)
10. *D. kuranda* sp. nov.
11. *D. millaamillaa* sp. nov.
12. *D. montislewisi* sp. nov.
13. *D. nashi* sp. nov.
14. *D. oculata* sp. nov.

15. *D. phalacrus* (Michaelsen, 1916)
16. *D. raveni* sp. nov.
17. *D. terraereginae* (Fletcher, 1889)

Remarks. — The type-species of *Diporochoeta*, *D. intermedia* (Beddard, 1889), was stated by Lee (1959) to have its posterior hearts in segment XI. Jamieson (1974a) allowed the heart location in *D. intermedia* to warrant retaining this species in a monotypic genus *Diporochoeta* separate from the remaining New Zealand and Australian *Diporochoeta*-like species, which had last hearts in XII or XIII. These other species were placed in the genus *Perionychella* Michaelsen, 1907, which had been suppressed for many years. Examination of the lectotype of *D. intermedia* and of Lee's specimens has shown, however, that the posterior hearts of this species are in XII (Jamieson, 1975). No significant grounds therefore remain for continued generic separation of *Perionychella* from the prior genus *Diporochoeta* and the two genera are here united.

Retention of *Perionychella*, for forms lacking nephridial bladders, as a subgenus of *Diporochoeta* deserves consideration but is not here upheld as the distinction between an avesiculate and a vesiculate group of species is becoming increasingly blurred. Thus the Tasmanian *Diporochoeta mortoni* has avesiculate and, typically, vesiculate individuals (Jamieson, 1974a), *D. grandis* has vesiculate and avesiculate populations, or even segments in the same individual and in *D. terraereginae* (both are Queensland species) nephridial ducts are transitional between the two conditions. Perhaps more significantly, in an unpublished taxonomic (numerical) study it has been found that vesiculate and avesiculate species form mixed groups, especially where all nephridial characters are omitted. It is noteworthy that Michaelsen, who ignored the presence or absence of bladders, considered the avesiculate *D. atavia* to be merely a form of the vesiculate *D. athertonensis*, a decision indicating the closeness of the entities with the antithetic conditions, notwithstanding the view in the present work that they are distinct species. Previously (Jamieson, 1974a) setal ratios gave some support to separation of avesiculate and vesiculate subgenera but the new species *D. bunya* forms a further intermediate between the two groups in respect of these ratios.

The following may be said of the Queensland species of *Diporochoeta*, all of which are described in this account. Seven species were recorded from Queensland by Fletcher (1887, 1889) and Michaelsen (1916) and were referred to *Perionyx* (*Diporochoeta*) by Michaelsen. Their exclusion from *Perionyx* is necessitated by a set of characters of the latter genus, viz. female pore unpaired, midventral; subneural blood vessel present; spermathecal diverticulum absent or sessile multiloculate. The condition of the nephridial

ducts in the seven Queensland species was not described. It is shown in the present study, however, that bladders are present in *D. athertonensis*, *D. barronensis*, *D. grandis* (part), *D. canaliculata* and *D. erici*. Bladders are shown to be absent from *D. phalacrus* and *D. terraereginae*.

Michaelsen's statement that the gizzard is in VII in some Queensland species is not confirmed, the gizzard being in V or VI in all Queensland species. This removes one of the distinctions of the Queensland species from other species of *Diporochaeta* which was mentioned previously (Jamieson, 1974a). The North Queensland species differ from the usual condition in other Australian species in the absence of discrete accessory genital markings and of penial setae, and in the tendency to a large number of setae per segment, but the last two conditions hold for the New Zealand type-species also. *Diporochaeta bunya*, the sole species reported from southern Queensland, possesses discrete accessory genital markings and penial setae and has eight setae per segment but stands apart from the remainder of the genus in Australia in having paired calciferous glands, intestinal origin in XV (both conditions shared with the type-species) and the unique condition of paired spermathecal diverticula. It cannot be considered a close relative of either the North Queensland species or of the remainder of the genus, from Mt. Kosciusko to Tasmania, and perhaps deserves separate generic status. The 17 North Queensland species of *Diporochaeta* are further unified by the strong tendency to translocation of the gizzard from segment V (its primitive location in oligochaetes) to VI and departure in all but *D. atavia*, *D. grandis* and *D. phalacrus*, from the usual condition for the genus of five pairs of spermathecal pores, reduction to 1, 3 or 4 pairs occurring. Reduction to one pair has probably occurred independently in *D. crateris* (in 6/7) and *D. nashi* (in 8/9), as they show no especially close relationships to each other.

Attention was previously drawn (Jamieson, 1974a) to affinities of the North Queensland species with *Perionyx* (*Diporochaeta*) *sigillatus* Michaelsen, 1916, from the same area, which was considered to be related to *Fletcherodrilus*. *F. sigillatus* agrees with the three other species of *Fletcherodrilus* in having unpaired, midventral spermathecal and male pores but introduces the perichaetine conditions into a formerly purely lumbricine genus. Little other than the unpaired genital pores warrants separation of *Fletcherodrilus* from *Diporochaeta*. *Fletcherodrilus* is here retained, at least pending revision, but inclusion in *Diporochaeta* as a subgenus would be sustainable. *Fletcherodrilus* may be regarded as the apomorph sister group of *Diporochaeta*.

The status of the predominantly Western Australian *Graliophilus* Jamieson, 1971b, relative to *Diporochaeta* is rendered even more uncertain by the addition of new species in the present work. *Graliophilus* was retained by

Jamieson (1974a), on the grounds that in Western Australian species the number of spermathecae was less (2 or 3 pairs) than the 5 pairs usual in *Diporochoaeta* and that the avesticulate and totally lumbricine condition was constant whereas the combination of these characters was known in only one

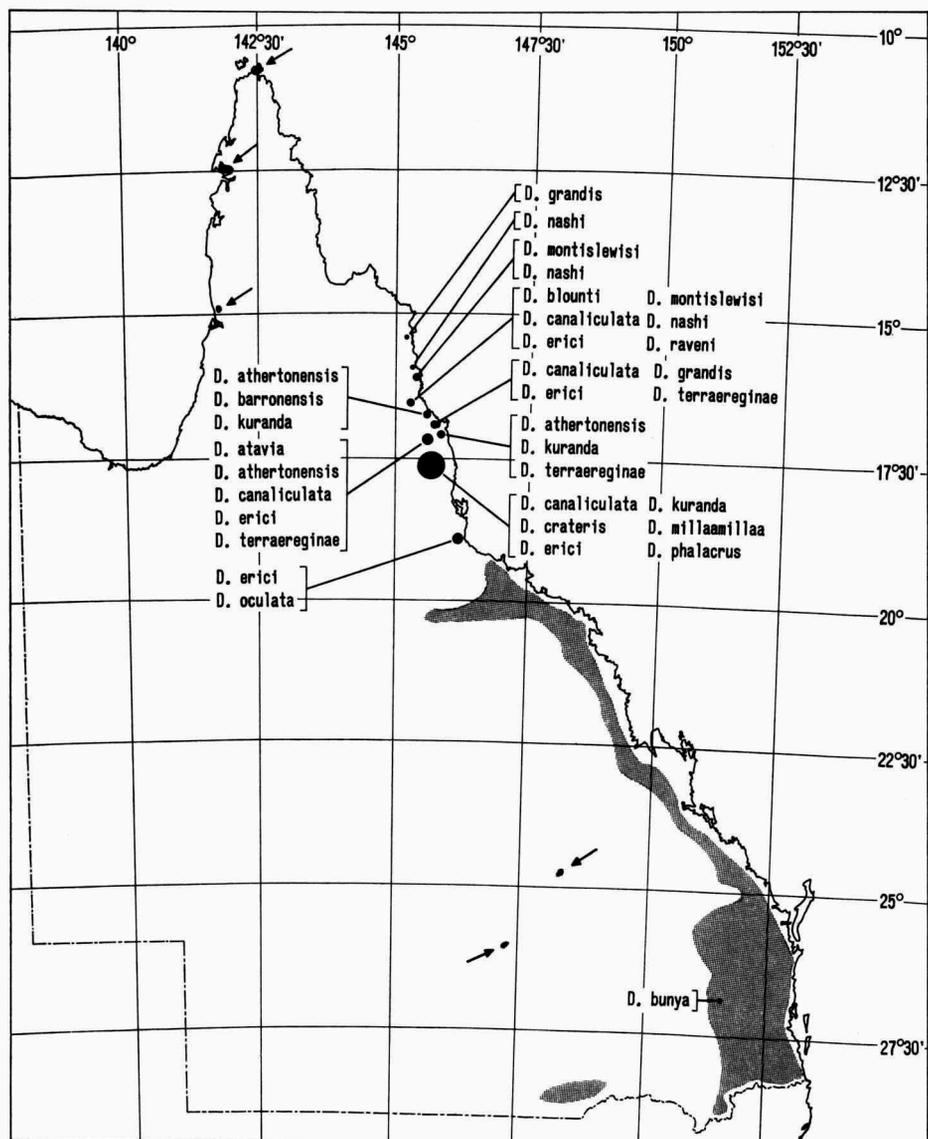


Fig. 1. Records of *Diporochoaeta* in Queensland to April 1975 (black circles). No species of *Diporochoaeta* were recorded from the 158 sites sampled throughout the areas indicated by shading.

species of *Diporochoeta* from eastern Australia (Tasmania). Furthermore, some species of *Graliophilus* (though not the type-species) have a typhlosole which has not been allowed as a character of *Diporochoeta*, though the eastern species *G. woodi* and *G. tripapillatus*, might be regarded as typhlosolate *Diporochoeta*'s. The variation in numbers of spermathecae in the North Queensland species of *Diporochoeta* narrows the gap between the two genera. Nevertheless the low phenetic resemblance between the *Graliophilus* and *Diporochoeta* demonstrated by Wallace (1972) and the very distinct morphology of some *Graliophilus* species, mostly those of the *strelitzi* group, suggest that *Graliophilus* should be retained at least until further Western Australian collections are examined.

The disjunct distribution of *Diporochoeta* in eastern Australia is confirmed (map, fig. 1). With the exception of the morphologically and geographically isolated new species, *D. bunya*, from the Bunya Mountains in south-eastern Queensland, records of the Queensland species are restricted to eastern North Queensland, chiefly in rainforest, between latitudes 15° and 19° S (16 species). Whereas few sites have been sampled north of the fifteenth parallel or on the Capentarian seaboard, 137 sites have been sampled between 19° S and the southern border of Queensland, at approximately 28° S, with no record of *Diporochoeta*, excepting *D. bunya* at its single site.

Collecting in northern New South Wales has been sparse but collections from that state recorded by Fletcher, chiefly in the vicinity of Sydney, did not yield *Diporochoeta*. Although further species will probably be found in the intervening region, the virtually complete disjunction between the very large southern *Diporochoeta* fauna and the smaller, morphologically distinct North Queensland fauna has thus been demonstrated.

#### Key to the Queensland species of *Diporochoeta*

- |      |  |   |
|------|--|---|
| 1    | Spermathecal pores 5 pairs, in intersegmental furrows 4/5-8/9 . . . . .  | 2   |
| —    | Spermathecal pores 1-4 pairs, in some or all of intersegmental furrows 5/6-8/9   | 4   |
| 2(1) | Spermathecal pores in <i>a</i> lines. Spermathecal duct very short. Last hearts in XIII . . . . .  | <i>D. grandis</i> , p. . . . ., fig. 10C      |
| —    | Spermathecal pores median to <i>a</i> lines. Spermathecal duct long and slender though shorter than ampulla. Last hearts in XII . . . . .  | 3   |
| 3(2) | Spermathecal pores of 8/9 approx. 0.02 body circumference apart. Male pores approx. 0.03 body circumference apart. Seminal vesicles in IX and XII. Nephridial bladders present . . . . .           | <i>D. atavia</i> , p. . . . ., fig. 2A        |
| —    | Spermathecal pores of 8/9 approx. 0.06 body circumference apart. Male pores approx. 0.1 body circumference apart. Seminal vesicles in XI and XII (or absent). Nephridial bladders absent . . . . . | <i>D. phalacrus</i> , p. . . . ., fig. 2B     |
| 4(1) | Spermathecal pores 4 pairs, in 5/6 - 8/9 or 4/5 - 7/8 . . . . .  | 5   |
| —    | Spermathecal pores 3 pairs or less . . . . .   | 8   |
| 5(4) | Spermathecal pores in 4/5 - 7/8 . . . . .  | <i>D. terraereginae</i> , p. . . . ., fig. 3A |
| —    | Spermathecal pores in 5/6 - 8/9 . . . . .  | 6   |

- 6(5) Male pores median to *a* lines, their papillae contiguous in the midline. Nephridia lacking bladders . . . . . *D. millaamillaa*, p. . . . . fig. 3B  
 — Male pores between setal lines *a* and *d*, their papillae well separated in the midline. Nephridia with bladders . . . . . 7
- 7(6) Prostomium tanylobous with wide dorsal tongue. Nephropores in a straight series on each side . . . . . *D. erici*, p. . . . . figs. 5 & 6  
 — Prostomium epilobous or proepilobous; with a deep middorsal groove which continues to the hind margin of the peristomium. Nephropores in an irregularly sinuous series, varying from far dorsally to far ventrally, on each side . . . . . *D. kuranda*, p. . . . . fig. 4B
- 8(4) Spermathecal pores 3 pairs, in 4/5 - 6/7 or 6/7 - 8/9; or two pairs in 4/5 and 5/6 . . . . . 9  
 — Spermathecal pores 2 pairs or less, in some of 6/7 - 8/9 . . . . . 14
- 9(8) Spermathecal pores in 4/5 - 6/7 or 4/5 and 5/6 . . . . . 10  
 — Spermathecal pores in 6/7 - 8/9 . . . . . 12
- 10(9) Spermathecal pores in setal lines *d* to *e*. Spermathecal diverticulum very long, tortuous, digitiform almost as long as or longer than the spermatheca. Male porophores not contiguous medianly . . . . . 11  
 — Spermathecal pores in setal lines *a* to *b*. Spermathecal diverticulum clavate, approximately half the length of the spermatheca. Male porophores contiguous medianly . . . . . *D. montislewisi*, p. . . . . fig. 7A
- 11(10) Setae of the order of 26-53 in XII. Spermathecal diverticulum longer than the spermatheca . . . . . *D. barronensis*, p. . . . . fig. 8A  
 — Setae of the order of 77-95 in XII. Spermathecal diverticulum shorter than the spermatheca . . . . . *D. raveni*, p. . . . . fig. 7B
- 12(9) Male pores very close together, almost contiguous midventrally, on a common papilla . . . . . *D. athertonensis*, p. . . . . fig. 9A  
 — Male pores well separated, between setal lines *b* and *f*, on a pair of papillae . . . . . 13
- 13(12) Spermathecal diverticulum simple, shortly clavate . . . . . *D. canaliculata*, p. . . . . fig. 9B, 10A  
 — Spermathecal diverticulum composite, consisting of as many as 4 parallel conjoined tubes with terminal, knoblike seminal chambers; approximately as long as the spermatheca . . . . . *D. oculata*, p. . . . . fig. 10B
- 14(8) Spermathecal pores 2 pairs, in 7/8 and 8/9. (Large fusiform calciferous glands present in XI and XII) . . . . . *D. bunya*, p. . . . . fig. 11A  
 — Spermathecal pores 1 pair, in 6/7 or 7/8 or 8/9. (Calciferous glands absent). . . . . 15
- 15(14) Spermathecal pores 1 pair, in 8/9. (Spermathecal diverticulum long and tortuous) . . . . . *D. nashi*, p. . . . . fig. 11B  
 — Spermathecal pores 1 pair, in 6/7 or 7/8. (Spermathecal diverticulum short, clavate) . . . . . 16
- 16(15) Spermathecal pores 1 pair in 7/8 . . . . . *D. blounti*, p. . . . . fig. 12A  
 — Spermathecal pores 1 pair in 6/7 . . . . . *D. crateris*, p. . . . . fig. 12B

### **Diporochoeta atavia** (Michaelsen, 1916) (fig. I, 2A)

*Perionyx* (*Diporochoeta*) *phalacrus* var. *atavia* Michaelsen, 1916: 16.

Taxonomic note. — Michaelsen appears incorrect in regarding this entity as a form of *D. phalacrus*. Significant differences from *D. phalacrus* which are not reported by Michaelsen are as follows: male pores are median of *a* lines and approximately 0.03 body circumference apart (cf. in or lateral of *a*, 0.1 body circumference apart in *D. phalacrus*); spermathecal pores are

further median of *a* and 0.02 (cf. 0.06) body circumference apart; nephropores, which in *D. phalacrus* are in a straight line on each side, are very irregularly placed in *D. atavia* (viz. dorsolateral in the first few segments, approximately lateral in the remainder of the forebody, and dorsal or dorsolateral in postclitellar segments in which their position often differs widely on the two sides and in successive segments); and, most notable, nephridial

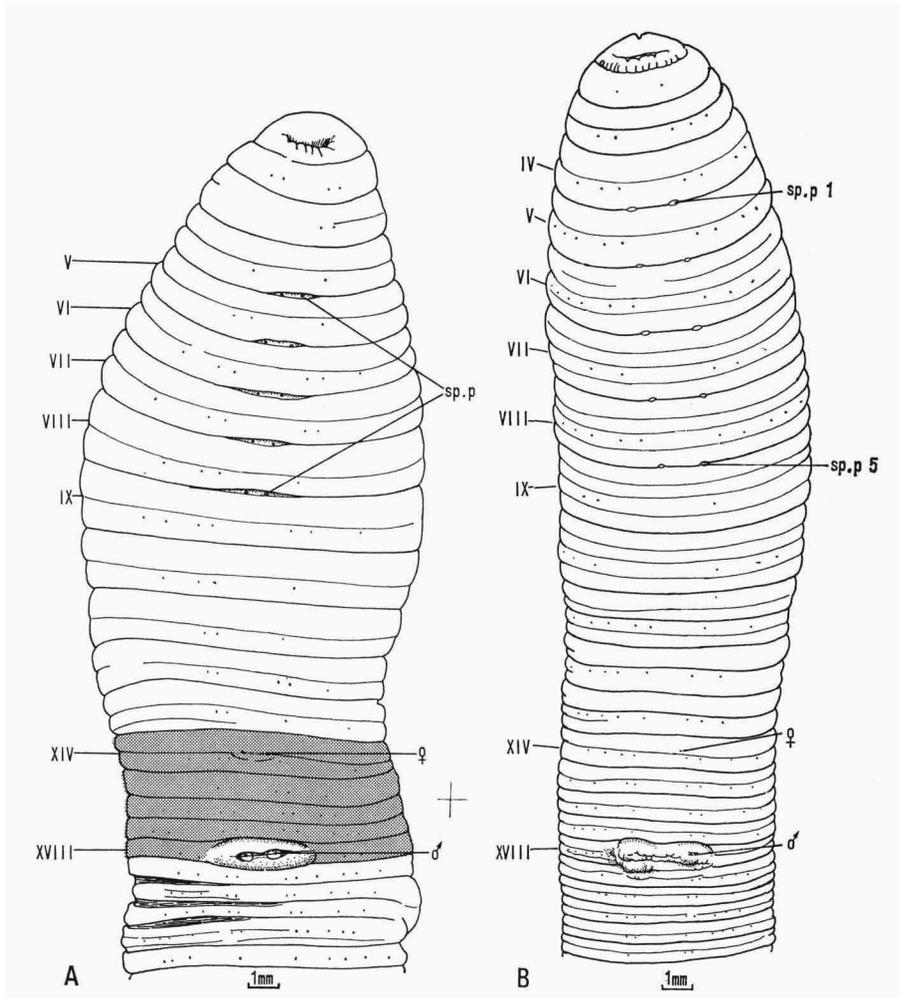


Fig. 2. Genital fields. A, *D. atavia*, syntype, Hamburg Museum, V8477; B, *D. phalacrus*, specimen 2.

Abbreviations used in figures 2-16. ♀, female pore; g.m., accessory genital marking; L, left; ♂, male pore; np, nephropore; ns, nephrostome; R, right; sem. gr., seminal groove; sp. p., spermathecal pore. Roman numerals indicate respective segments. Clitellum shaded. All figures by camera lucida.

bladders, absent in *D. phalacrus*, are present in *D. atavia*. In addition, Michaelsen records seminal vesicles in IX and XII in *D. atavia* but XI and XII in *D. phalacrus*.

Material examined. — Two type-specimens labelled “*Diporochoeta phalacrus atavia* Mich., N. Queensland, Mjöberg, Atherton”, Hamburg Museum V.8477.

***Diporochoeta athertonensis*** (Michaelsen, 1916) (fig. 1, 9A, table 1)

*Perionyx (Diporochoeta) athertonensis* Michaelsen, 1916: 7-9, pl. 1 fig. 6, 7.

*Diporochoeta athertonensis*; Jamieson, 1971a: 83.

*Diporochoeta (Perionychella?) athertonensis*; Jamieson, 1974a: 221.

Taxonomic note. — This species has not been collected in the present survey but the following data, from a re-examination of a type-specimen, augment Michaelsen's description. Nephropores in a straight series on each side. Nephridial bladders (not mentioned by Michaelsen) wide tubes, those in II convoluted and discharging in  $z$  lines, the succeeding bladders progressively more ventral so that by V they are in setal lines 7. Nephropores in 9 on XII, 8 on the clitellum and 12 caudally. By V the vesicles take the form of a tube with an abrupt lateral bend at approximately midlength, the two limbs parallel, the ectal limb wide and often bent near the pore (V-shaped bladders). In the anterior intestinal region the ental limb has become so narrow that it can scarcely be considered part of the bladder and is so closely adherent to the ectal limb that the bend has the spurious appearance of a diverticulum. This form persists to the caudal extremity and although the ental limb widens slightly it remains much narrower than the ectal limb.

Male pores 0.11 mm, 0.11 body circumference apart. Spermathecal pores of 8/9, 0.45 mm, 0.05 body circumference apart.

Material examined. — A syntype labelled “*Diporochoeta athertonensis* Mich. N. Queensland, Mjöberg, Atherton”, Hamburg Museum V.8481 (The Cedar Creek syntypes, V.8482, are now represented by soil debris only).

***Diporochoeta barronensis*** (Fletcher, 1887) (fig. 1, 8A, B, 13D, 15A, 16Q-S, table 1)

*Perichaeta barronensis* Fletcher, 1887: 960-962.

*Diporochoeta barronensis*; Beddard, 1895: 440; Michaelsen, 1900: 205; Jamieson, 1971a: 83.

*Perionychella (Vesiculodrilus) barronensis*; Jamieson, 1974a: 222.

Description. — l = 55-72 mm, w (midclitellar) = 3-3.5 mm (lectotype, paralectotypes 1-3), s = 99-124 (paralectotype 1, lectotype). Prostomium proepilobous 1/3, a median dorsal groove passing posteriorly into the clitellar

region. First dorsal pore 4/5 - 6/7. Setae 33, 26 in XII; 38 (Pl<sub>1</sub>) in XX; 21, 51 caudally (L, Pl<sub>1</sub>); subequally spaced; setae *a* - *d* absent in XVIII; *a* lines straight throughout; *z* lines irregular in the midbody posteriad; *aa*  $\approx$ <sup>1)</sup> 1.8 - 3.3 *ab*, showing no consistent trend but generally wider anteriorly; *zz*  $\approx$  1.0 - 4.3 *zy*, widening posteriorly. Nephropores in a single lateral series on each side, anteriorly in their segments in II posteriorly; on prominent papillae in the lectotype but not in the paralectotypes. Clitellum annular, XIV - XVIII (L). Male pores equatorial in XVIII, in *c* to *d* lines relative to adjacent segments, on very strongly protuberant elliptical porophores; the pores 1.70, 1.55 mm, 0.15, 0.14 body circumference apart (L, Pl<sub>2</sub>). Accessory genital markings absent. Female pores a pair very shortly anteromedian of (L) or in front of (Pl<sub>1</sub>, 2) setae *a* of XIV. Spermathecal pores 3 pairs, in 4/5 - 6/7, on elliptical papillae in *d* lines (L, Pl<sub>1</sub>, 2) the pores in 6/7 1.9, 2.75 mm, 0.17, 0.21 body circumference apart (L, Pl<sub>2</sub>).

Thickest septa 9/10 - 13/14, strongly thickened. Dorsal blood vessel single, apparently ending anteriorly on the gizzard. Dorsoventral commissural vessels in VII - XII; those in VII - IX slender, though those in IX, which arise from the dorsal vessel only, are almost as thick as the hearts. Those in X - XII forming latero-oesophageal hearts, (dorsal connectives demonstrated in XI and XII only).

Oesophagus anterior to the gizzard long, narrow and tortuous but almost as wide as the gizzard in the segment preceding the latter. Gizzard large, globose and strongly muscular, in VI (?). In IX - XIV (Pl<sub>1</sub>), - XV (L) oesophagus moniliform and vascularized, in IX with low internal folds, those in X becoming small radial laminae. The laminae in XI - XIII very extensive, almost meeting at the centre of the oesophageal lumen; less developed in XIV and XV. Oesophagus narrow in XVI - XVII. Intestinal origin XVIII (?) (Pl<sub>1</sub>) or XIX (L). Nephridial bladders elongate sacs, the first discharging anteriorly in II; by XIV (L) or shortly behind this (Pl<sub>1</sub>) the nephridial duct entering the bladder slightly subterminally so that a short lateral diverticulum is formed. The diverticulum becoming progressively longer and, by the intestinal region, well developed (L, Pl<sub>1</sub>).

Iridescent sperm funnels in X and XI, seminal vesicles large, racemose, in XI and XII (L, Pl<sub>1</sub>). Prostates tubular, restricted to the enlarged segment XVIII, much coiled, the folds adpressed and flattened in contact; the external duct tortuous and with muscular sheen (L, Pl<sub>1</sub>). Penial setae absent. Ovaries, elongate laminae with free terminal chains of oocytes, and small funnels in XIII; ovisacs present (L, Pl<sub>1</sub>). Spermathecae 3 pairs, in V - VII;

1)  $\approx$ , approximately equals.

duct poorly demarcated, at first almost as wide as the ovoid ampulla; diverticulum curved to tortuous, longer than the spermatheca, a narrow tube enlarging entally as a knob-like, sperm-filled chamber, and joining the ectal extremity of the spermathecal duct (L, Pl I); length of right spermatheca of VII = 1.1 mm, ratio of total length spermatheca : length duct = 3.0; ratio of length: length diverticulum = 0.5 (L.)

Type locality. — Barron River district, near Cairns.

Material examined. — Four specimens labelled *Perichaeta barronensis* in Fletcher's handwriting and assumed here to be syntypes. Two of the specimens had previously been dissected. One of the dissected specimens is here designated the lectotype, the others being designated paralectotypes 1 to 3.

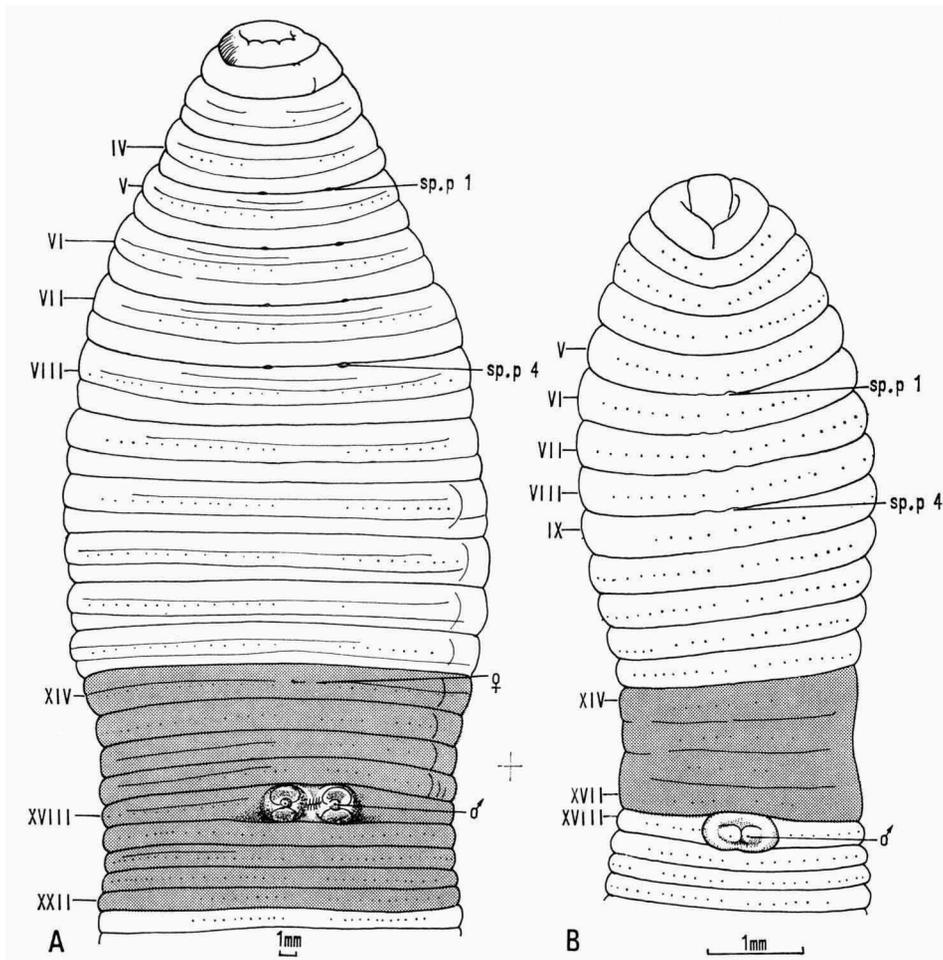


Fig. 3. Genital fields. A, *D. terraereginae*, specimen 1; B, *D. millaamillaa*, holotype.

**Diporochaeta blounti** sp. nov. (fig. 1, 12A, 14A, 15F, table 1)

Description. —  $l = 35+$ , 43 mm,  $w = 2.2$ , 1.9 mm,  $s = 83+$ , 114 (H, posterior amputee; P respectively). Traces of purplish pigmentation in the dorsal midline. Prostomium epilobous  $\frac{1}{2}$  (H),  $\frac{1}{3}$  (P), broad, narrowing posteriorly; a deep, wide dorsal canalicula bisecting it and the peristomium; peristomium not shortened, it and segment II with midventral groove; first dorsal pore  $\frac{4}{5}$  (H, P). Setae, 15, 16 in XII; 14, 17 in XX (H, P); 19 caudally (H); irregularly spaced but *ab* significantly narrower than other intervals of the same side; the intervals with a tendency to progressively widen dorsad; absent from the last three segments (P); setae *a* and *b* absent in XVIII; *a* line straight throughout; *z* lines becoming irregular shortly behind the clitellum (H); or irregular throughout (P); *aa*  $\approx 2-4$  *ab* (widest caudally); *zz* smaller than adjacent intersetal intervals. Nephropores visible in a straight series on the clitellum, lateral, in setal lines 5, anteriorly in their segments (H, P). Clitellum annular, XIII-XVII. Male pores a pair of gaping transverse slits in XVIII, in setal lines *b* forking at each extremity, each bordered by a strong elliptical tumescence which fills the segment longitudinally; the pores 1.04, 1.00 mm, 0.19, 0.18 body circumference apart (H, P). Accessory genital markings absent. Female pores a pair very slightly median of *a* lines and slightly nearer the anterior margin than the equator of XIV, on a common transverse tumescence (H, P). Spermathecal pores one pair, in  $\frac{7}{8}$ , between setal lines 3 and 4, inconspicuous slits, 2.00, 1.68 mm, 0.35, 0.34 body circumference apart (H, P).

Thickest septa  $\frac{8}{9}$  -  $\frac{12}{13}$ , moderately thickened. Last hearts in XII; those in X - XII latero-oesophageal, each receiving a broad, short connective from the supra-oesophageal vessel and a more slender, long one from the dorsal vessel. Supra-oesophageal vessel very discrete, in VIII to anterior XIII, ramifying on the gut in VIII and becoming continuous with the highly developed oesophageal plexus in XIII; this plexus conspicuous in XIII - XV in each of which it gives one or occasionally two large vessels on each side to the dorsal vessel. Gizzard moderately firm and large, in V (?); septum  $\frac{5}{6}$  extremely delicate but at least anteriorly ensheathing the gizzard. Oesophagus vascular in VIII - XV but especially so in XIII - XV; long and narrow in XVI. Intestinal origin XVII. Nephridia stomate (avesiculate), exonephric holonephridia commencing in II; simple, though those in II - VI are large and coiled; preseptal funnel demonstrated for those of III (and II?) posteriorly. Sperm funnels large, iridescent, in X and XI; seminal vesicles slightly lobulated sacs in IX and XII; no pseudo-vesicles in XIII. Diffuse flattened ovaries, and funnels, in XIII; ovisacs absent. Prostates long, flattened and irregularly tubular (tubuloracemose), meandering with adpressed

coils in XVIII - XXIV (H), XVII - XXII (P); the long coiled muscular duct at first narrow, ectal to the gland, then strongly dilated, then narrow to the pore; bursa copulatrix absent; vas deferens joining the gland near the ectal extremity of the latter; penial setae absent. Spermathecae one pair; ampulla irregularly ovoid; duct long, slender and twisted; diverticulum (inseminated) single, clavate with slender stalk joining the duct at its ectal fourth (H, P); length left spermatheca = 0.90 mm; ratio total length: length duct = 1.7; ratio length: length diverticulum = 2.3 (H).

Material examined. — 145/16(4), 145°17'E 16°34'S, Mt. Lewis, near summit dry soil in tropical rainforest, W. Nash and L. Blount, 17 August 1974 - H (QM G8335); P(LM 15229).

**Diporochoeta bunya** sp. nov. (fig. 1, 11A, 13E, 15E, table 1)

Description. — l = 3.4 mm, w (midclitellar) = 3.4 mm, s = 103 (H). Pigmented purplish grey in alcohol. Circular in cross section generally but dorsoventrally depressed in the vicinity of the male field. Prostomium probolous; peristomium not shortened, nor grooved midventrally; canaliculi absent. First dorsal pore 6/7 (?clearly visible only caudally). Setae 8 per segment, in regular longitudinal rows throughout; *a* and *b* absent in XVIII; all setae absent from the last two segments. Nephropores sporadically and faintly visible in *c* lines, anterior in their segments. Clitellum annular, strongly protuberant, XIV-½XVII. Male pores on small firm, conical papillae in XVIII in *ab*, nearer *b*, relative to adjacent segments; the pores 1.68 mm, 0.13 body circumference apart. Accessory genital markings: a midventral transverse glandular pad occupies the region in front of the male pores, extending longitudinally from ½XVII - ½XVIII and laterally to include setae *b* of XVII, bearing on each side, a circular whitish genital marking in *b* posteriorly in XVII, and a further one median to setal lines *a* at the site of the obliterated intersegment 17/18; a further similar pair of circular genital markings present at the anterior border of XIX behind the latter pair, median of *a* lines, each of this pair on an elliptical tumescence extending longitudinally from ½XVIII to include setae *ab* of XIX, furrow 18/19 persistent and separating off its anterior region; each ellipse conjoined with that of the other side to form a transverse pad narrowed in the midline. A transversely elliptical tumid pad present midventrally in each of XI and XII filling the segment and including setae *a*, each pad with a pair of circular genital markings median to *a*, the marking on the right in XII transversely duplicated. Female pores an inconspicuous pair shortly anteriomedian of setae *a* of XIV. Spermathecal pores two pairs, at the anterior margins of VIII and IX, in *b* lines; each on a small transversely elliptical papilla; the pores

of IX 1.82 mm, 0.28 body circumference apart; the left posterior spermathecal pore is abnormal in being transversely duplicated well lateral of *b* line.

Thickest septa 8/9 and 9/10, moderately strongly thickened. Last hearts in XII; those in X - XII latero-oesophageal each with a well developed connective from the dorsal vessel and a further connective from a paired circum-oesophageal vessel, adherent to the gut, well ventral of the connection of this vessel with its fellow middorsally on the gut; presence of a supra-oesophageal vessel not ascertained. Gizzard large, barrel-shaped but wider

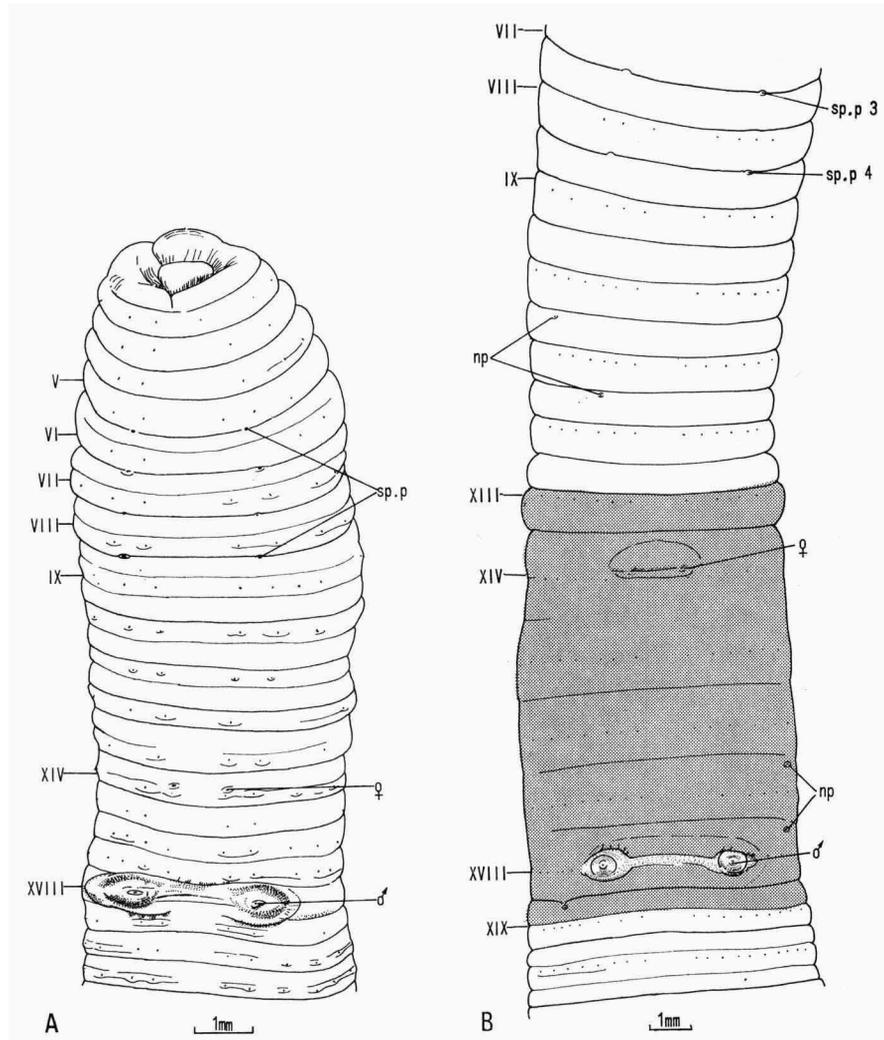


Fig. 4. Genital fields, A, *D. erici*, syntype, Hamburg Museum, V8484; B, *D. kuranda*, holotype.

than long; appearing to be in VI but the exceedingly delicate (and incomplete?) septum 5/6 adherent to and probably containing it; preceded by an almost equally large region of the oesophagus. True extramural calciferous glands two pairs, in XI and XII; each gland pyriform or bluntly fusiform, arising from the dorsolateral face of the oesophagus by its narrow tapering end but lacking a distinct duct; the gland curving ventralwards around the oesophagus and seen in hand sections to have in the order of 10 thick radial septa which meet axially and almost occlude the lumen but are not axially united. Intestine commencing in XV but pushing septum 14/15 forward so as to appear spuriously to commence in XIV. Nephridia simple stomate, avesiculate holonephridia; slender ducts discharging in *c* lines or, in the preclitellar region, occasionally in *cd*; postseptal ducts visible in II posteriorly but small preseptal funnels only sporadically demonstrated though presumably present. Iridescent sperm funnels in X and XI; testis-sacs absent; seminal vesicles in IX (large, racemose) in XII (small sacciform). Ovaries, large bunches of oocytes, and funnels in XIII; ovisacs and pseudovesicles absent. Prostates fairly thickly and irregularly tubular (tubuloracemose?), much-coiled in XVIII and XIX; the muscular duct once-bent. Penial setae present; ectally gently curved and finely tapering, slender but not filiform; ornamentation? (damaged). Spermathecae two pairs, opening anteriorly in VIII and IX; ampulla large, sacciform; duct stout but tapering; two clavate inseminated diverticula joining the junction of ampulla and duct, one on each side; size uniform; length of right spermatheca of IX = 1.1 mm; ratio total length: length duct = 2.2; ratio length: length diverticulum = 3. 1.

Material examined. — 151/26(2), 151°35'E 26°57'S, Bunya Mts. National Park, near Festoon Falls, E. Bradbury, 19 February 1971 - H(QM G8336).

**Diporochaeta canaliculata** (Fletcher, 1888) (fig. 1, 9B, 10A, 14B, 15J, table 1)

*Perichaeta canaliculata* Fletcher, 1888: 391-395.

*Megascolex canaliculatus*; Beddard, 1895: 375.

*Diporochaeta canaliculata*; Michaelsen, 1900: 206; Jamieson, 1971a: 83.

*Perionychella canaliculata*; Michaelsen, 1907: 163.

*Perionychella* (*Perionychella*?) *canaliculata*; Jamieson, 1974a: 221.

*Perionyx canaliculatus*; Michaelsen, 1910: 60.

*Perionyx* (*Diporochaeta*) *canaliculatus*; Michaelsen, 1916: 9-11.

Description. — 1 = 190, 184 mm, w (midclitellar) = 10.7, 9.7 mm, s = 173, 180 (specimens 1 and 2 respectively; 1 = 90-260 mm, w = 8-11 mm, s = 120-182, Fletcher; Michaelsen). Pigmented purplish-grey or brown, pale ventrally in alcohol. Prostomium tanylobous but the dorsal tongue so narrow as to appear as a groove from a proepilobous prostomium (proepilobous,

Fletcher; epilobous, Michaelsen). A fine middorsal groove present throughout, though commonly interrupted in the forebody and absent from the clitellum. Peristomium not bifid ventrally. First dorsal pore 5/6. Setae 21 (specimen 1), 17 (2), 29 (Michaelsen) in XII; 14-38, generally 24, in the forebody (Fletcher); 28 (specimen 1 and Michaelsen), 32 (specimen 2) in XX; caudally 42 (1), 49 (2), 50 (Fletcher), 38-40 (Michaelsen); subequally spaced except dorsally, where a few are more widely spaced; absent from the posterior 8 or 9 segments, otherwise *a* lines straight, *z* lines irregular; *aa*  $\approx$  2-3 *ab*. *zz* very wide in the fore and mid body (owing to suppression of posteriorly visible setal lines), narrowing to 2-3 *zy* caudally. Nephropores not generally visible but recognisable in the vicinity of the clitellum where they are paired anteriorly in their segments forming a very irregular series on each side and may be asymmetrically disposed in a segment; locations observed in the same specimen: dorsal and asymmetrical in XV; XVI and XVIII, progressively nearer the dorsal midline in the three successive segments until they are only 3.9 mm, 0.13 body circumference, apart dorsally in XVII; dorsolateral but still above the setal rows (*zz* very wide) in XVIII; ventrolateral, in setal lines 7-8 (right only seen) in XIX. Clitellum annular, recognisable by its colour and concealment of setae, in XIV-XVIII ( $\frac{I}{n}$ XII -  $\frac{I}{n}$ XIX, Fletcher;  $\frac{1}{2}$ XIII -  $\frac{1}{2}$ XIX, Michaelsen). Male pores on XVIII, in setal lines 4-5(1) or 5-6 (2, and Fletcher), 6-7 (Michaelsen) each on a more or less distinct papilla situated on a slight elliptical tumescence; the papilla and tumescence poorly demarcated medially; pores 7.50, 8.00 mm, 0.25 (as Michaelsen), 0.27 body circumference apart. Accessory genital markings absent. Female pores a pair of small slits anteromedian of setae *a* of XIV. Spermathecal pores 3 pairs, in 6/7, 7/8 and 8/9, in straight longitudinal lines but varying in location from setal lines 3 to between 4 and 5 owing to irregularity of distribution of the setae (in approx. s. 1.5, Fletcher) each concealed in the intersegmental furrow but apparent as a crescentic anterior bowing of the furrow, the pores (IX) 6.67, 6.00 mm, 0.25 (as Michaelsen), 0.23 body circumference apart.

Thickest septa 10/11 - 13/14 (11/12 and 12/13, Michaelsen) strongly thickened. Last hearts in XII, those in X - XII latero-oesophageal, each receiving a broad short connective from the supra-oesophageal vessel and a more slender long one from the dorsal vessel. Supra-oesophageal vessel discrete and well developed in VIII -  $\frac{1}{2}$ XIII ending in the latter in a pair of conspicuous circumoesophageal vessels which are closely adherent to the gut; these paired circumoesophageal vessels present in each of IX-XIII, decreasing in size anteriorly. Gizzard very large and firmly muscular, with anterior

rim, in VI (as Fletcher, in VII or VI and VII, Michaelsen); septum 6/7 exceedingly attenuated and closely enveloping it. Oesophagus suppressed by backward extension of the gizzard in VII, short in VIII, segmentally dilated and vascularized in IX-XV (considered calciferous glands by Fletcher); more slender and posteriorly chloragogenous in XVI; internally with numerous conspicuous lamellae in X-XV (XI-XV, Michaelsen); the lamellae in XII the

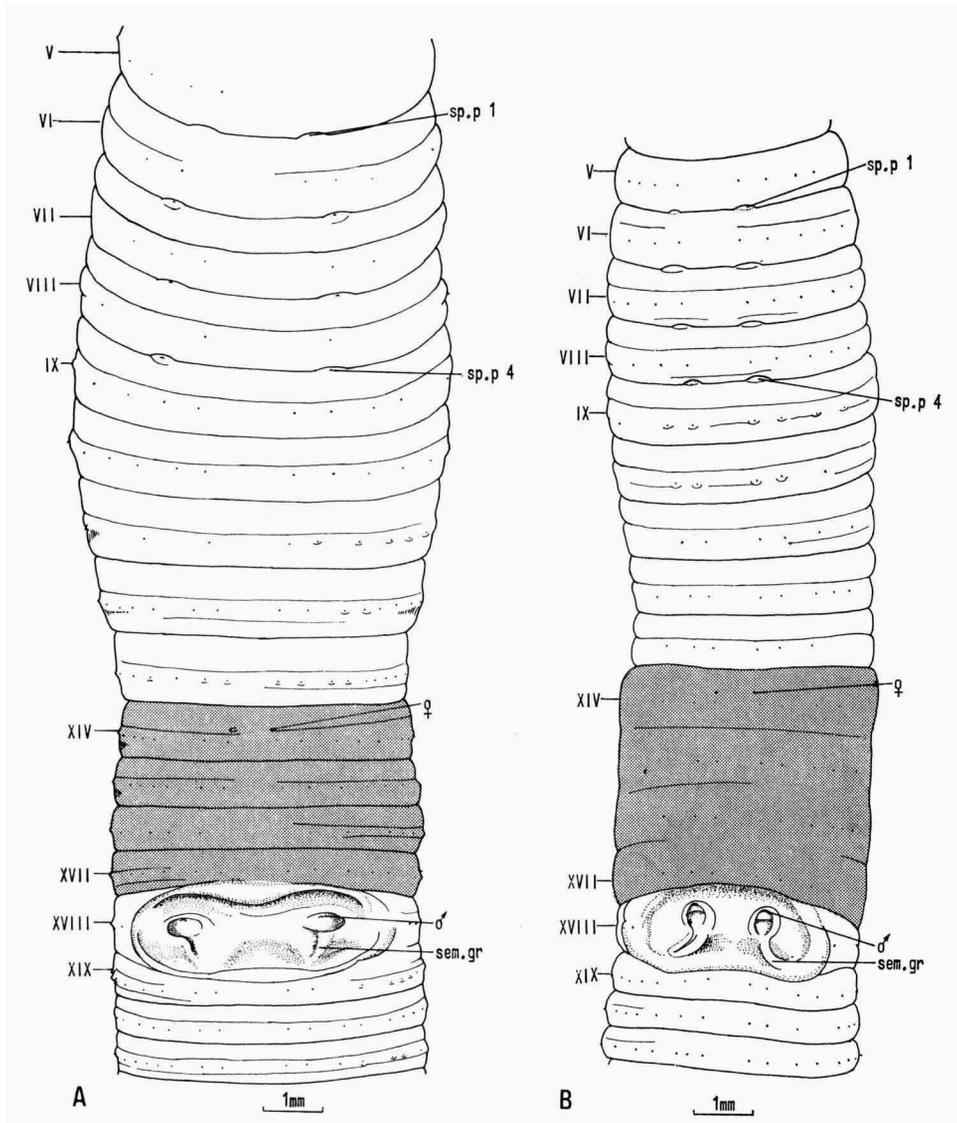


Fig. 5. Genital fields in *D. erici*. A, specimen 1; B, specimen 13.

highest but not meeting across the lumen transversely or longitudinally; extramural calciferous glands nevertheless absent. Intestine commencing in XVII. Nephridia stomate, vesiculate, exonephric holonephridia commencing in II, simple (not tufted) throughout; preseptal funnel demonstrated for those of II and posteriorly; bladders very large, elongate - ellipsoid with a slender ectal duct (leading to the pore) which is usually at least twice the length of the bladder; the length greatest where the nephropore is more dorsally situated.

Sperm funnels large, iridescent, in X and XI; seminal vesicles in XI and XII relatively very small, simple ellipsoidal sacs; a further pair of similar but large sacs (pseudovesicles) depend from septum 12/13 into XIII (as Fletcher) median to the ovaries. (Seminal vesicles in XI, XII and XIII, Michaelsen). Ovaries each an irregular lamina with many fused chains of oocytes, and small funnels, in XIII; ovisacs absent (a small sac to each side of the gut in XIV is repeated in XV and presumably is not an ovisac). Prostates elongate tubular with irregular cross section and minutely lobulated surface; passing laterally in XVIII before becoming tortuous with 3 or 4 bends, restricted to XVIII (left) or entering XVII (right); external duct muscular and convoluted, the paired vas deferens joining the duct at approximately its ental third; internal lumen of gland slitlike, very narrow relative to the thickness of the gland (and Michaelsen, with numerous lateral canals), i.e. tubuloracemose. Penial setae absent. Spermathecae three pairs opening at the anterior margin of VII, VIII and IX (as Fletcher and Michaelsen) though the ampulla may be reflexed into the anterior segment; ampulla ovoid to subspherical; duct slender and tubular; diverticulum (inseminated) single, shortly clavate, uniloculate, dorsomedian, joining the ectal end of the duct; size of spermathecae decreasing to about half anteriorly; length of left spermatheca of IX = 5.8 mm, ratio of total length: length duct = 3.6; ratio of length: length diverticulum = 8.9 (specimen 1).

Type-locality. — Mossman River, Cairns district.

Material examined. — 145/17(12), 145°34'E 17°47'S, Tully Falls National Park, in red soil in rainforest, T. Walker, 25 May 1972 — specimen 1 (LM 15230), specimen 2 (QM G8337), specimen 4 (BJ); 145/16(4), 145°17'E 16°34'S, Mt. Lewis near old gold camp, under logs in rainforest, T. Walker, 27 May 1972 — specimen 5 (QM G8338); 145/17(12), Tully Falls, in rainforest, D. Liem, 10 December 1971 — specimen 6 (BJ); 145/17(15), 145°45'E 17°01'S, White Rock Mountain, half way up, rainforest soil, W. Nash, 8 January 1975 — specimen 3 (BJ). Also: Elgner, Queensland, Hamburg Museum V.3627 — one dorsally opened specimen (fig. 9B); Atherton, Mjöberg, Hamburg Museum, V.8479 — two specimens.

**Diporochaeta crateris** sp. nov. (fig. 1, 12B, 14C, 15B, 16A, table 1)

Description. —  $l = 60, 28+$  mm,  $w$  (midclitellar) = 2.4, 2.2 mm,  $s = 127, 57+$  (H;P, posterior amputee). Pigmentless (H) or with traces of bluish brown pigmentation dorsally (P) in alcohol. Prostomium tanylobous, dorsal tongue broad, parallel sided with indistinct margins; it, but not the body, dorsally canaliculate. Peristomium short, bifid ventrally. First dorsal pore  $3/4$  (H),  $4/5$  (P). Setae 19, 21 in XII; 22, 21 in XX; caudally 23 (H, P, respectively); subequally spaced except dorsally where a few are more widely spaced; absent from the last four segments; at least setae  $a - c$  absent in XVIII; otherwise  $a$  lines straight throughout;  $z$  lines becoming slightly irregular posteriorly;  $aa \approx 1.3-2.0 ab$ ;  $zz$  moderately wide throughout  $\approx 1.3 - 1.9 zy$ ; both median intervals widest in the hindbody. Nephropores not externally recognisable. Clitellum annular, XIV - XVIII. Male pores a pair of large, gaping transverse slits with puckered margins in XVIII, in setal lines  $c$ , each bordered by a strong tumescence which fills the segment longitudinally and is conjoined with that of the other side by a narrow band of similar, glandular appearance; the pores 2.04, 2.40 mm, 0.29, 0.33 body circumference, apart (H, P, respectively). Accessory genital markings absent. Female pores a pair of small points, significantly median of setae  $a$  but slightly nearer the equator than the anterior margin of XIV. Spermathecal pores one pair, in  $6/7$ , in setal lines 5; each conspicuous with crescentic anterior border; far lateral, 3.2, 3.04 mm, 0.48, 0.44 body circumference apart (H, P, respectively).

Thickest septa  $10/11 - 13/14$  moderately strongly thickened. Last hearts in XII, those in X-XII latero-oesophageal; each receiving a broad, short connective from the supra-oesophageal vessel and a more slender, long one from the dorsal vessel. Supra-oesophageal vessel discrete, in VIII -  $1/2$ XII. Gizzard large, cylindrical and muscular but readily compressible, in VI, preceded by a narrower, though still broad proventriculus in V. Oesophagus short in VII, moniliform and with circumferential vascular striae in IX-XV; narrower and not evidently vascularized in XVI. Intestinal origin XVII. Nephridia stomate, vesiculate, exonephric holonephridia, commencing in II, simple (not tufted) throughout; preseptal funnel demonstrated in III posteriorly; bladders in II, irregular broad ellipsoidal tubes, each with a slender ectal duct from one third to half as long as the bladder, the duct discharging in setal line 7 in II and 6 in XV. Sperm funnels large, iridescent, in X and XI, embedded in compacted sperm masses which meet dorsally above the gut; seminal vesicles transversely fusiform sacs, in XII, with an identical pair of (functional?) pseudo-vesicles in XIII; vasa efferentia and deferentia inflated and conspicuous on the internal parietes. Ovaries, folded laminae with many fine egg strings,

and funnels, in XIII, ovisacs absent. Prostates tubuloracemose, in XVIII - XXIII, each flattened, linear, irregularly and deeply incised and coiled, with the duct visible throughout its length as an exposed 'midrib' on the parietal face; the ectal muscular duct long and coiled; vas deferens joining the duct considerably ectal of the gland; the duct passing into a large hemispheroidal bursa copulatrix. Penial setae absent. Spermathecae one pair, in VII, ampulla subspherical with a small subsidiary discrete apical knob; duct short, well demarcated, diverticulum (inseminated) elongate curved, digitiform joining the ectal end of the duct (H, P); total length right spermatheca = 1.50 mm; ratio length: length duct = 3.8; ratio length: length diverticulum = 0.6.

Material examined. — 145/17(4), 145°30'E 17°27'S, The Crater National Park, in rainforest in brown sandy soil, T. Walker, 24 May 1972 - H(QM G8339), P(LM 15231).

**Diporochaeta erici** (Michaelsen, 1916) (fig. 1, 4A, 5A, B, 6A-C, 14D-G, 15G-I, 16T-X, table)

*Perionyx* (*Diporochaeta*) *erici* Michaelsen, 1916: 12-13, pl. 1 fig. 8.

*Diporochaeta erici*; Jamieson, 1971a: 83.

*Perionychella* (*Perionychella*?) *erici*; Jamieson, 1974a: 221.

Description. — l = 40-110 mm, w, (midclitellar) = 2.5-5.1 mm, s = 116-c.193. Dark grey-brown, pigmentless in alcohol. Prostomium tanylobous, dorsal tongue very wide, at least one third the width of the short peristomium and as wide as the prostomial lobe. A middorsal groove present from the forebody posteriad. Peristomium bifid ventrally or not. First dorsal pore 4/5 or 5/6. Setae 14-29 in XII, 18-28 in XX, 14-22 caudally, subequally spaced but only *a* lines completely regular; *ab* consistently narrower than *bc*; *aa* ≈ 2-4 *ab*; *zz* moderately wide throughout, though narrowing posteriorly ≈ 3-5 *zy*, always significantly wider than *aa*. Nephropores in a straight lateral series on each side with the exception that those in II are located far dorsally. Clitellum annular XIII, XIV-XVII, (XVIII?) (= 4 or 5 segments); dorsal pores and intersegmental furrows fainter than elsewhere. Male pores on XVIII slightly lateral of setal lines *b* (typical form) or in setal lines *a* (common alternative form); each pore at the centre of a small paired papilla, and therefore equatorial, or eccentric, near the anterior border of the papilla, and markedly presetal. The two papillae in a glandular depression with raised margins which narrows midventrally where it usually obscures intersegmental furrows 17/18 and 18/19 and may form an anterior and a posterior tumescence impinging on XVII and XIX respectively; a seminal groove running posterolaterally or rarely posteromedially from each male papilla to the posterior border of the glandular depression or absent. The male pores

0.7-2.3 mm, 0.08-0.17 body circumference apart. Female pore minute, shortly anterior to or immediately anteromedian to setae *a* of XIV. Spermathecal pores 4 pairs, in intersegmental furrows 5/6-8/9 in *ab* (typically) or in *a* or very slightly lateral of *b*, their papillae inconspicuous or concealed in the intersegmental furrows; the pores 0.48 - 2.8 mm, 0.07 - 0.14 body circumference apart.

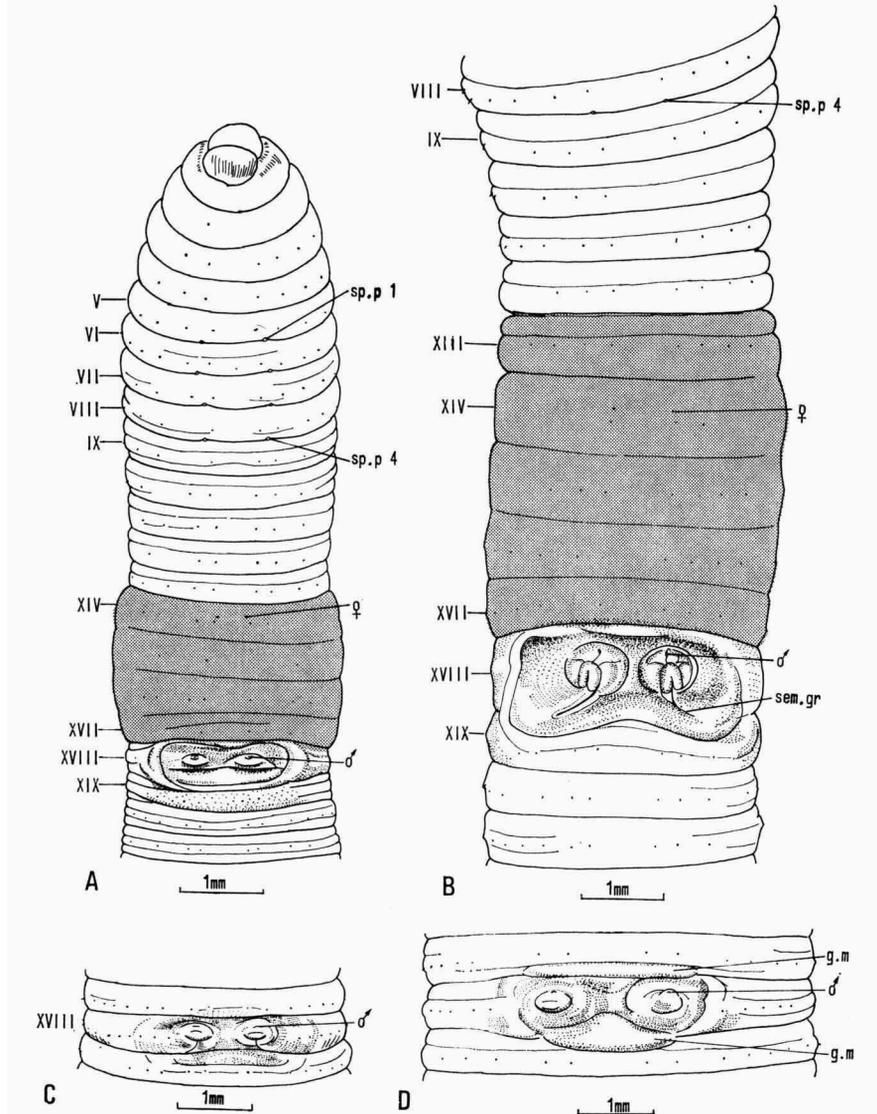


Fig. 6. Genital fields in *D. erici*. A, specimen 31; B, specimen 36; C, specimen 12; D, specimen 28.

Thickest septa 9/10 - 10/11 or 11/12, moderately strongly thickened. Last hearts in XII (typically) or XIII (Commoner alternative); latero-oesophageal hearts in X - XII, XIII. Supra-oesophageal vessel well developed in  $\frac{1}{2}$ VIII,  $\frac{1}{2}$ IX -  $\frac{1}{2}$ XIII, XIII. Gizzard very large, with anterior rim and large but less muscular anterior expansion, in V; septa 5/6 and 6/7 very delicate, and attenuated by their extension posteriad (location given as VI by Michaelsen). Oesophagus vascular and dilated in VIII, IX-XVI, in XIV-XVI (-XVII, Michaelsen) with internal villi or lamellae but extramural calciferous glands absent. Intestinal origin  $\frac{1}{2}$ XVIII. Nephridia vesiculate (preseptal funnels demonstrated in the anterior intestinal region) those in II, and less markedly III, with many loops (pseudo-tufted), still coiled though less completely in a few succeeding segments of the forebody; bladders in II and III and a varying number of succeeding segments of the forebody elongate, dilated tubular to elongate pyriform, progressively losing the narrow ectal region while the slender nephridial duct enters increasingly ectal of the free, internal end of the bladder so that by the anterior intestinal region the free portion projects as a small to elongate lateral diverticulum. Caudally the bladders are smaller and the coelomic portion is not appreciably longer than wide and may be diverticulate or adiverticulate. Sperm funnels in X and XI; testis-sacs absent; seminal vesicles in IX and XII. Ovaries with several strings of large oocytes, and funnels, in XIII; small sacs in XIV may be ovisacs (no female organs recognisable in large Ravenshoe Road specimen). Prostates tongue-shaped to auricular the narrow axial lumen with side branches which like it are lined by a regular epithelium (tubuloracemose); muscular external duct much shorter and thinner than the glandular portion but nevertheless stout and sometimes ectally widening. Vas deferens joining the gland at its junction with the duct. Penial setae absent. Spermathecae four pairs, in VI to IX but sometimes reflexed into the next anterior segment. Ampulla broadly ovoid to pyriform; duct well demarcated, slightly longer or shorter than the ampulla, joined at the body wall or at midlength by a small clavate, uniloculate diverticulum; total length of a spermatheca 1.3 - 2.4 mm; ratio of length: length duct = 1.8 - 2.1; ratio of length: length diverticulum = 2.6 - 5.9 (measurements for right spermatheca of VIII or IX in the Mt. Spec Lookout and large Ravenshoe Road specimen, respectively).

Type locality. — Atherton and Cedar Creek in Cairns district.

Material examined. — 145/17(7), 145°36'E 17°34'S, approx. 13 km south west of Millaamillaa on Ravenshoe Road, red clayey volcanic soil in steep gully in rainforest, D. Lambert and G. Dyne, 9 February 1975 — specimen 1, 37-43 (BJ); 145/16(4), 145°17'E 16°34'S, Mt. Lewis, north of Mt. Molloy, near old gold camp, T. Walker, 26 May 1972 — specimen 2 (QM

G8341); 145/17(4), 145°30'E 17°27'S, The Crater National Park, in rainforest in brown sandy soil, T. Walker, 24 May 1972 — specimen 3-5 (QM G8342 - 8344); 145/17(5), 145°37'E 17°30'S, Millaamillaa Falls, rainforest with secondary growth, T. Walker, 25 May 1972 — specimens 6-11, 37 (QM G8345 - 8351); 145/17(8), 145°41'E 17°34'S, 13 km east of Millaamillaa on Palmerston Highway, dry red soil in rainforest, W. Nash and L. Blount, 15 August 1974 — specimen 12 (BJ); 145/17(10), 145°50'E 17°37'S, Wallacha Falls, Palmerston National Park, in rainforest, T. Walker, 26 May 1972 — specimen 13 (BJ); 145/17(11), 145°32'E 17°42'S, Charmillan Creek, 9.3 km from Tully Falls towards Ravenshoe, in brown sandy soil in rainforest, T. Walker, 28 May 1972 — specimen 14 (BJ); 145/17(12), 145°34'E 17°47'S, Tully Falls National Park, in red soil in rainforest, T. Walker, 25 May 1972 — specimens 15-21 (BJ); 145/17(13), 145°38'E 17°47'S, Koombooloomba Dam, in eucalypt forest, T. Walker, 25 May 1972 — specimens 22-27 (BJ); 146/18(1), 146°05'E 18°56'S, Birthday Creek Falls, 16 km from Mt. Spec Lookout, in rainforest, T. Walker, 20 May 1972 — specimens 28-30 (LM 15232-15234) specimen 31 (QM G8352); 146/18(2), 146°13'E 18°56'S, Mt. Spec, leaf debris under rocks along creek bed in rainforest, I. R. Salanitra, 23 June 1966 — specimen 32 (LM 15235); Mt. Spec, in rainforest, T. G. Wood, 25 April 1970 — specimens 33-35 (LM 15236-15238); Mt. Spec Lookout, in rainforest, T. Walker, 20 May 1972 — specimen 36 (QM G8340).

Remarks. — The above account is drawn from the material examined but also summarises descriptions by previous workers. The species shows a greater variability than is usual at the infraspecific level, thus male pores may be eccentric or central on their porophores, seminal grooves present or absent, last hearts in XII or XIII and prostates restricted to XVIII or extending through several segments. All combinations of the conditions occur with the exception that seminal grooves were never observed where male pores were central on their porophores. No clear grounds for subdivision into further species can at present be demonstrated.

### **Diporochaeta grandis** Spencer, 1900

*Diporochaeta grandis* Spencer, 1900: 63-64, pl. 2 fig. 94-96; Jenz & Smith, 1969: 95; Jamieson, 1971a: 83.

*Perionychella (Vesiculodrilus) grandis*; Jamieson, 1974a: 222.

Description. — l = 200 mm, w (midclitellar) = 11.6 mm, s = 198. Pigmentless in alcohol excepting the deep brown clitellum (Purple with iridescent clitellum when seen by Spencer). Prostomium proepilobous 1/3; peristomium short, lacking mid-ventral groove; a mid-dorsal groove on the

peristomium and first 3 segments. First dorsal pore 4/5 (origin in 1/2, Spencer, not confirmed). Setae 57 in XII; 32 in XX (40-42 in front of the clitellum; 42-52 behind it, Spencer); caudally approximately 46; progres-

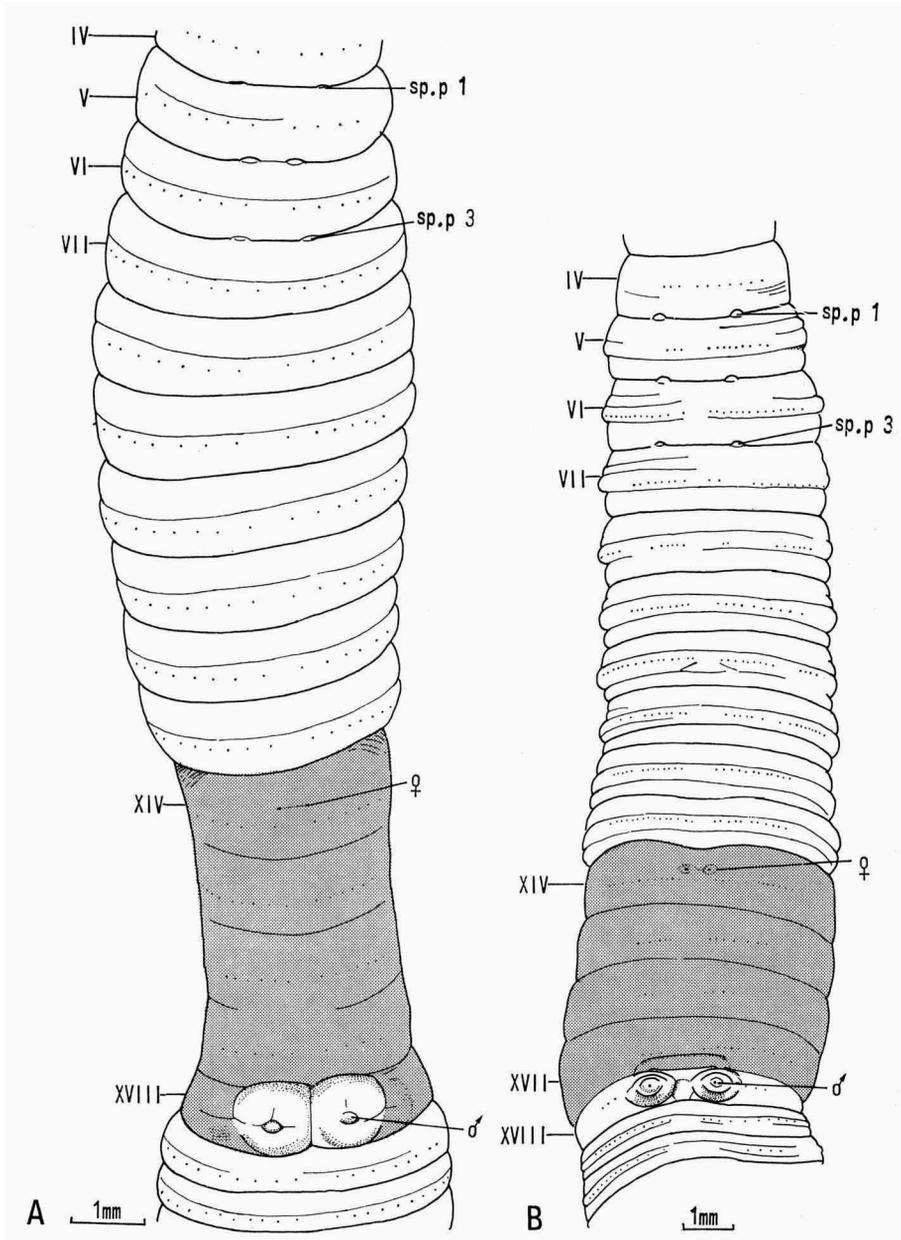


Fig. 7. Genital fields. A, *D. montislewisi*, holotype; B, *D. raveni*, holotype.

sively more widely spaced dorsalwards; setae absent from a few posterior segments; *a* lines becoming irregular posteriorly; *z* lines irregular on and behind the clitellum; *aa*  $\approx$  2-4 *ab*, widening posteriorly; *zz* very wide throughout. Nephropores visible only on the clitellum; paired anteriorly in their segments and varying from far dorsally to far ventrally; usually asymmetrically disposed in a segment. Clitellum annular, XIV-XVIII (and posterior XIII, Spencer), very strongly protuberant. Male pores on XVIII in *ab* nearer *a*, each on a minute papilla borne on a paired circular domed porophore which fills the segment longitudinally; the two porophores distinct or connected by a transverse band or (lectotype) united as a strongly protuberant midventral pad; the anterior and posterior faces of the porophore in the illustrated paralectotype each developed as an indistinct pad; no separate accessory genital markings developed; the two porophores in a common whitish field which interrupts the clitellum; the pores 1.3 mm, 0.04 body circumference apart. Female pores not visible, represented by a common transverse groove anteromedian to setae *a* of XIV. Spermathecal pores 5 pairs, at the anterior margins of V-IX, in *a* lines, each on a small hemispheroidal papilla; the pores of IX 1.1 mm, 0.04 body circumference apart (paralectotype).

Thickest septa 9/10 - 14/15 very strongly thickened. Last hearts in XII (not XIV as erroneously noted by Spencer), those in X - XIII latero-oesophageal, each receiving a broad, short connective from the supra-oesophageal vessel and a more slender long one from the dorsal vessel. Supra-oesophageal vessel discrete, well developed, limits not determinable receiving a pair of conspicuous circum-oesophageal vessels in X-XIII in which the oesophagus is laterally dilated and has high internal lamellae. Gizzard large and firmly muscular in V, widening anteriorly to a rim; oesophageal dilatations in X-XIII probably true calciferous glands but forming part of the general lumen of the oesophagus; lamellae persisting in XIV and XV; oesophagus narrow in XVI and anterior XVII; the intestine commencing with abrupt expansion in posterior XVII, though appearing spuriously to commence, as noted by Spencer, in XVIII. Nephridia stomate, avesculate, exonephric holonephridia, commencing in II, simple (not tufted) throughout, preseptal funnels demonstrated in the anterior and intestinal segments; ectal ducts in pre-intestinal segments fairly wide tubes but bladders totally absent; the ducts very narrow in intestinal segments. Sperm funnels in X and XI; testis-sacs absent. Seminal vesicles small in IX and moderately large in XII. Ovaries and funnels no longer recognisable. Prostates very elongate though restricted to XVIII; slenderly tubular and much coiled, with irregular cross section owing to conformation of adpressed coils, smooth surfaced, passing laterally

from the pore; the muscular duct moderately long, abruptly bent once or twice, widening rapidly near its ectal extremity; the double vas deferens joining the glandular portion well ental of the muscular duct; the gland with no distinct lumen where previously severed (tubuloracemose?). Penial setae absent. Spermathecae 5 pairs, opening anteriorly in V-IX increasing significantly in size posteriorly; ampulla ovoid almost subspherical with some surface corrugations but generally smooth; duct short; joined at midlength by a small strongly clavate inseminated diverticulum; length left spermatheca of IX = 2 mm, ratio total length: length duct = 5.0, ratio length: diverticulum = 4.0 (lectotype).

Material examined. — 5 surface hardened, sexual specimens (with 2 juveniles) labelled "Megascolex Sp. 1<sup>x</sup>Q. Upper Endeavour River", NMV G 114, are recognisable as *D. grandis* from the type-description and are here considered to be the syntypes which were mentioned as lost by Jenz & Smith (1969). The previously dissected specimen is here designated the lectotype and the other four specimens the paralectotypes.

A further specimen labelled "*Diporochoeta grandis* Spencer, 1900, Cairns, Queensland, presented by C. French, 24.4.09", NMV G 184 provided fig. 13A of a prostate gland and fig. 15D of a spermatheca.

Remarks. — *D. grandis* is very similar to *D. terraereginae* (Fletcher, 1889), its chief distinction being the additional pair of spermathecae in IX.

The Cairns specimen is only tentatively identified with *D. grandis* and is not included in the above description. It agrees very closely in external and internal morphology with the lectotypic series but differs in the papillate surface of the spermathecal ampulla, in having bodies like seminal vesicles on the posterior wall of VIII, in addition to the vesicles in IX and XII, and in having vesiculate in addition to avesiculate nephridial ducts. A description of the excretory system of the Cairns specimen follows: Nephridia vesiculate and avesiculate holonephridia in the same individual; those in II each with a small but distinct pyriform bladder joined immediately subterminally by the nephridial duct and with funnels in I; in III nephridial duct wide, entering the bladder terminally, the latter only a slight dilatation of the duct; behind III the nephridia are concealed beneath the gut and the attenuated duct passes far laterally to enter the parietes without the intervention of a bladder. Caudally with small conical to pyriform bladders, sometimes concealed in the body wall, mostly in a straight line in approximately setal line 21 but occasionally more median in s. 1.18.

***Diporochoeta kuranda***, sp. nov. (fig. 1, 4B, 13G, 15C, 16B, C, table 1)

Description. — l = 120, 170 mm, w (midclitellar) = 7.1, 10.7 mm, s = 141, 131 (H, P1). Dorsally purplish (H) or pigmentless (P1) in alcohol;

clitellum pale brown. Prostomium pro-epilobous (H) or epilobous 1/3 (P1) or possibly (pro) epi-tanylobous as the peristomium in both specimens has several longitudinal grooves. Peristomium not shortened; it and the prostomium with a wide deep dorsal groove. Peristomium not bifid ventrally. Body with a fine dorsal groove. First dorsal pore 5/6. Setae 23, 24 in XII, 31, c.49 in XX, 47, 64 caudally; subequally spaced but *ab* usually slightly wider than *bc* throughout; absent from the last 8 or 9 segments; setae *a - d* (H) or *a - c* (P1) absent in XVIII; *a* lines regular throughout; *z* lines irregular in the forebody and posteriorly; *aa* = 1.6 - 1.9 *ab*; *zz* = 2 - 4.8 *zy*; both median intervals narrowing posteriorly. Nephropores first visible at the anterior margin of II, symmetrically paired very near the dorsal midline; progressively more ventral in succeeding segments until by IV they are lateral, in setal lines 5; thereafter irregularly sinuous; and often asymmetrical in a segment, from far dorsally to far ventrally; in XII in setal line 10 or 6 (left) and 3 or 9 (right); in XX in s.l. 10 or 4 (left) above *z* or in 18 (right) (H, P1 respectively). Clitellum annular, 1/2 XIII - 1/2 XIX (H) XIV - XVIII (P1). Male pores on very small, firm papillae in XVIII, in or lateral of setal lines *c* of most neighbouring segments, but between *b* and *d* relative to XVII and XIX owing to irregularities of setal spacing; the pores 3.23, 3.16 mm, 0.15, 0.13 body circumference apart (H, P1 respectively). Accessory genital markings absent. Female pores a pair well median of *a* and only slightly pre-equatorial in XIV, on a common elliptical tumescence. Spermathecal pores 4 pairs, in 5/6-8/9, in straight lines, in or lateral of *b* lines (H) or in *ab* but nearer *a* in 5/6 and 6/7 and nearer *b* in 7/8 and 8/9 (P1), each on a small elliptical papilla; the pores of 8/9, 3.45, 2.72 mm, 0.16, 0.11 body circumference, apart (H, P1 respectively).

Thickest septa 9/10 - 12/13, very strongly thickened. Last hearts in XII; those in X - XII latero-oesophageal, each with a slender connective from the dorsal vessel and a broad short one from the supra-oesophageal vessel. Supra-oesophageal vessel well developed but slender, in IX-XIII. A discrete sub-neural trunk absent but a slender segmentally branching vessel is visible in some segments on the body wall below the nerve cord. Gizzard large, fusiform, firmly muscular, in VI. Oesophagus short in VII and VIII owing to backward extension of the gizzard. In IX - XIII moniliform, with circumferential vascular striae imparting a dark appearance, sending paired vessels to the supra-oesophageal vessel. In XIV - XVI whitish, through still moniliform and vascular, and sending paired vessels to the dorsal vessel; narrower in XVII in which vessels to the dorsal vessel are less conspicuous. Intestinal origin 1/2 XVII. Nephridia stomate, vesiculate holonephridia, simple though enlarged and conspicuous in the first segments; first bladders in II, very

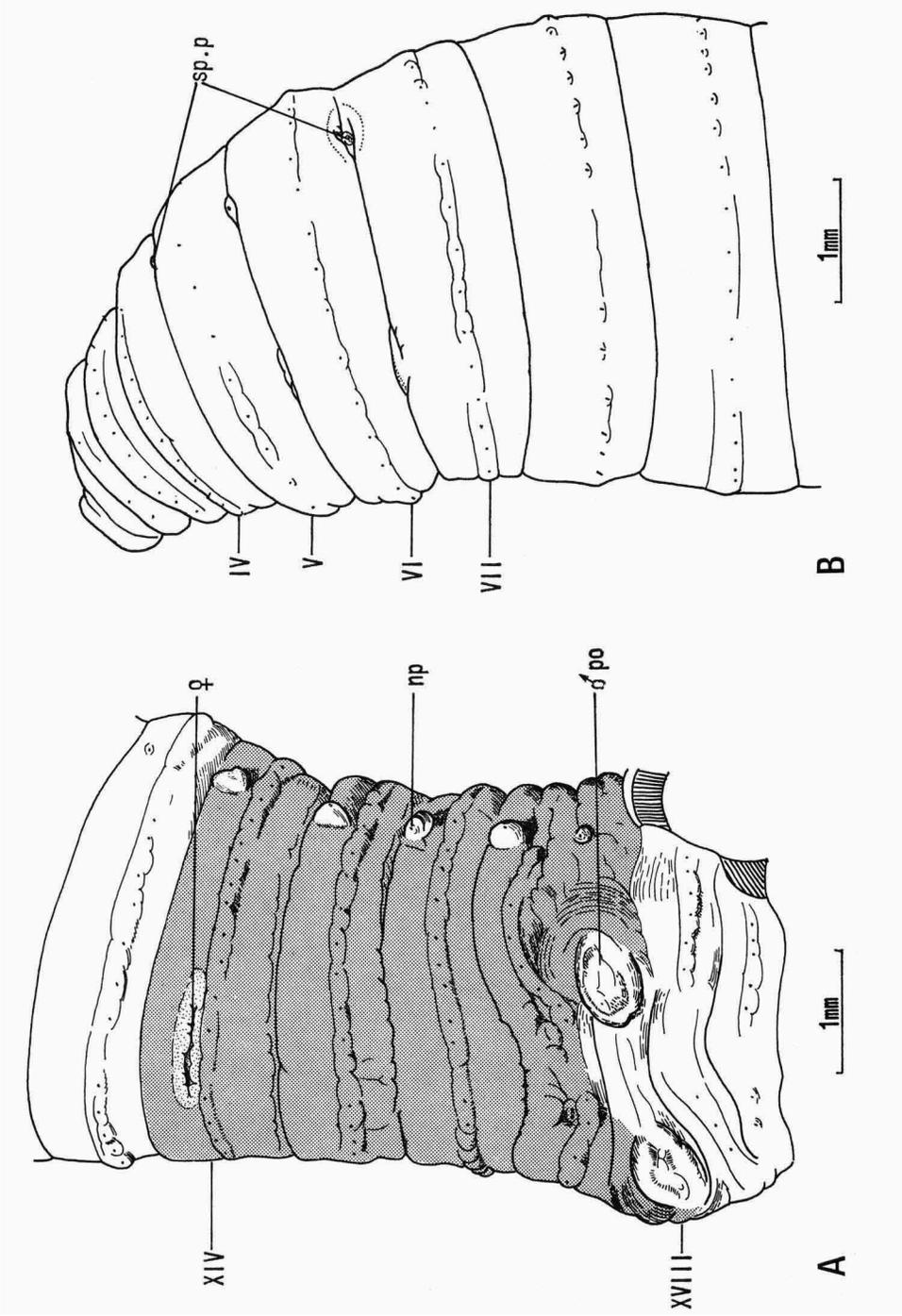


Fig. 8. Genital fields in *D. barronensis*. A, male field of lectotype; B, spermathecal field of paralectotype 1.

slender with long thin ectal duct and only ectally swollen; soon in the forebody becoming elongate - ellipsoidal with afferent duct very slightly subterminal and long slender ectal duct, the bladder with its long axis transverse to the body; this form persisting to the caudal extremity; preseptal funnels demonstrated for anterior intestinal segments but postseptal necks visible in the forebody, indicating the stomate condition. Iridescent sperm funnels in X and XI; testis-sacs absent; seminal vesicles in XI (small slightly lobulated) and XII (larger, racemose); pseudovesicles in XIII. Fan-shaped ovaries with many chains of oocytes in XIII; ovisacs absent. Prostates thickly tubular, much coiled, in XVIII-XXI; the long sinuous muscular ectal duct with four bends, evenly widening to three or four times its ental width, and receiving the vas deferens well over halfway towards its ectal end. Penial setae absent. Spermatheca four pairs, opening anteriorly in segments VI - IX; ampulla elongate-ovoid with pleated surface; duct slender and slightly tortuous, though not abruptly demarcated, joined near its ectal end by a relatively very small clavate inseminated diverticulum (H, P1); size of spermatheca increasing posteriorly; length of right spermatheca of IX = 7.2 mm; ratio total length: length duct = 3.3; ratio length: length diverticulum = 14.0 (H).

Material examined. — 145/16 (5), 145°38'E 16°50'S, Kuranda, in red-brown soil in rainforest, T. Walker, 23 May 1972 - H(QM G8353); 145/17 (10), 145°50'E 17°37'S, Wallacha Falls, under rock in rainforest, T. Walker 26 May 1972 - P1(LM 15239). 145/17(23), 145°42'E 17°10'S, Bellenden-Ker Range, on Gillies Highway, 16-24 km past quarry near Bruce Highway, under log in moist rainforest, R. Raven, 22 January 1975 - P2 (BJ).

**Diporochaeta millaamillaa** sp. nov. (fig. 1, 3B, 14H, 15K, table 2)

Description. — l = 28, 24 mm, w (midclitellar) = 2.4 mm, s = 102, 80 (H, P1). With traces of dark dorsal pigmentation in alcohol. Body strongly depressed dorsoventrally; short relative to its width. Prostomium proepilobous 1/3; a deep, wide dorsal groove in II and III impinging slightly on its posterior extremity. Peristomium not shortened; with a midventral longitudinal groove (H, P1). First dorsal pore 4/5 (H, P1). Setae 54, 50 on XII; 44, 54 on XX; caudally 44, 42 (H, P1, respectively); slightly more widely spaced dorsally than ventrally and laterally; setae *a* and *b* absent in XVIII; all setae absent from the posterior three or four segments; *a* lines regular; *z* lines regular throughout excepting a few omissions in the forebody; *aa* = 2 - 3.5 *ab*; *zz* = 2 - 3.2 *zy*; both median intervals narrowing posteriorly (H, P1), and also constricted in the vicinity of XX (H), but only *zz* becoming an inappreciable interruption. Nephropores inconspicuous white points visible on the clitellum in a straight series on each side, in setal lines 13 to 14. Clitellum

annular, XIV - XVII. Male pores median to *a* lines of XVIII, on small papilla which extend laterally as far as *c* lines, fill the segment longitudinally and are contiguous medianly throughout their lengths; each papilla with a central approximately oval region occupying its middle third which is separated by a slight transverse groove from the anterior and posterior thirds of the papilla; pores 0.28, 0.30 mm, 0.04, 0.05 body circumference apart (H, P<sub>I</sub>, respectively). Accessory genital markings absent. Female pores inconspicuous, each on a small circular elevation, shortly median of *a* lines and slightly nearer the setal arc than the anterior margin of XIV (H, P<sub>I</sub>). Spermathecal pores four pairs, in 5/6-8/9, in (H) or median to (P<sub>I</sub>) *a* lines, visible as slight crescentic forward embayments of the intersegmental furrows; 0.34, 0.24 mm, 0.05, 0.03 circumference apart (H, P<sub>I</sub>).

Thickest septa 10/11 - 13/14 (P<sub>I</sub>), 14/15 (H), moderately strongly thickened. Last hearts in XII; those in X - XII latero-oesophageal, each with a broad, short connective from the supra-oesophageal and a long slender one from the dorsal vessel. Supra-oesophageal vessel discrete, in at least IX -

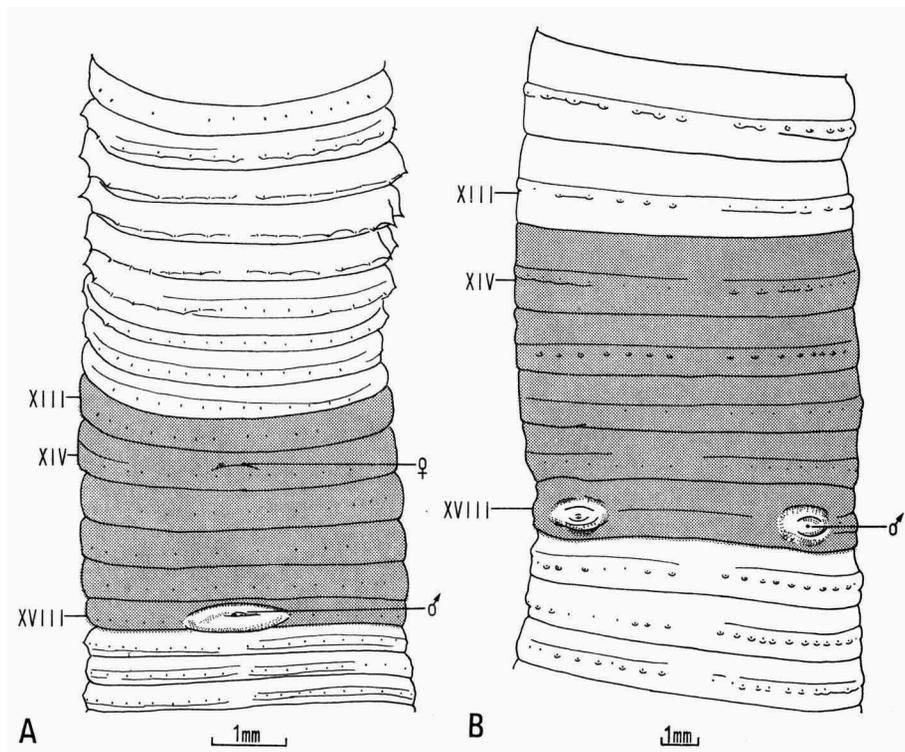


Fig. 9. Genital fields. A, *D. athertonensis*, syntype, Hamburg Museum V8481; B, *D. canaliculata*, Elgner specimen, Hamburg Museum V 3627.

$\frac{1}{2}$ XIII. Gizzard large, globose with anterior rim, firmly muscular in VI; septum 6/7 forming an exceedingly delicate sheath around it. Oesophagus in XV and XVI very strongly dilated and vascularized but with only low internal lamellae; slender and chloragogenous looking in XVII and  $\frac{1}{2}$ XVIII. Intestinal origin  $\frac{1}{2}$ XVIII. Nephridia simple, avesciculate, stomate holonephridia commencing in II, slender ducts entering the body wall laterally throughout; in setal lines 13-14 on the clitellum and in the midbody; preseptal funnel readily demonstrable in the intestinal region. Iridescent sperm funnels in X and XI; testis-sacs absent (H, P<sub>1</sub>); small racemose seminal vesicles in XI and XII and pseudovesicles in XIII (P<sub>1</sub>; this region macerated in holotype). Prostates thickly tubular, passing laterally in XVIII, bent near the ental end; vas deferens joining the slender duct near the gland. Penial setae not demonstrable. Small ovaries and funnels in XIV. Spermathecae four pairs, opening anteriorly in VI-IX, ampulla slender, elongate sacciform, poorly demarcated from the duct; a large clavate, inseminated lateral diverticulum joining the junction of ampulla and duct by a very short stalk; increasing slightly in size posteriorly but those in VIII and IX virtually uniform (H, P<sub>1</sub>); length of right spermatheca of VIII = 1.2 mm, ratio total length: length duct = 3.9; ratio length: length diverticulum = 3.7 (H).

Material examined. — 145/17(8), 145°41'E 17°34'S, 13 km east of Millaamillaa on Palmerston Highway, dry red soil in rainforest, W. Nash and L. Blount, 15 August 1974 - H (QM G8354), P (LM 15240).

**Diporochoeta montislewisi** sp. nov. (fig. 1, 7A, 14I, 15L, 16F-J, table 2)

Description. — l = 96.147 mm, w (midclitellar) = 2.6, 5.1 mm, s = 115, 204 (H, posterior regenerate?; P<sub>1</sub>). Pigmentless in alcohol excepting the pale brown clitellum. Prostomium tanylobous, with the form of a wedge dividing the very short peristomium and continuous to intersegment 1/2 as a wide groove here considered the dorsal tongue; if the groove were considered separate from the prostomium the latter would be termed epilobous  $\frac{1}{2}$ ; a faint midventral and middorsal groove present throughout the hindbody; peristomium with mid-ventral groove but almost suppressed in the midline. First dorsal pore 4/5. Setae 32-46 in XII; 32-42 in XX; caudally 38-52 (H, P<sub>1</sub>-4) closely and subequally spaced; setae 1-4 absent in XVIII; a lines becoming slightly irregular posteriorly; z lines irregular in the forebody but too close together in the hind body for irregularity to be appreciable; aa  $\approx$  1.4-2.7 ab in XII and XX, widest in the postspermathecal and extreme caudal regions; zz  $\approx$  1.7-3.7 zy in XII and XX, widest in the forebody, an inappreciable interruption caudally. Nephropores in a single, straight lateral series on each side, visible anteriorly in their segments in III posteriorly; in

setal lines 10 in III, 13 in XII, 14 in XX, and 15 caudally (H); inconspicuous in the forebody and on the clitellum; very conspicuous and linked by a longitudinal furrow throughout the hindbody. Clitellum annular XIV-XVIII in XIV-XVII narrower than adjacent segments. Male pores in *b* lines of XVIII on very small domed papillae which in turn lie on the summit of a pair of strongly protuberant medianly adpressed hemispheroidal porophores which slightly expand the segment longitudinally; each porophore crossed by a transverse groove; the pores 0.84-1.84 mm (mean of 5 = 1.23 mm); 0.08-0.13 (mean of 5 = 0.10) body circumference apart (H, P1-4). Accessory genital markings absent. Female pores a pair very slightly median of *a* lines and slightly nearer the setal arc than the anterior margin of XIV. Spermathecal pores 3 pairs, in 4/5-6/7 on small transversely elongate papillae, those in 4/5 in *b*; in 5/6 in *a* and in 6/7 in *ab*; (pores in 4/5 and 5/6 only in specimens 5 and 6) the posterior pores 0.78-1.84 mm (mean of 5 = 1.17 mm), 0.07-0.13 (mean of 5 = 0.10) body circumference apart (H, P1-4).

Thickest septa 8/9 (P1), 9/10 (H) - 11/12 moderately thickened. Last hearts in XII; those in X-XII latero-oesophageal, each receiving a broad short connective from the supra-oesophageal vessel and a longer slender one from the dorsal vessel. Supra-oesophageal vessel well developed and discrete, in VIII(?), IX - 1/2XIII. Subneural vessel absent as a discrete vessel though in some postprostatic segments a longitudinal vessel receiving lateral vessels from the body wall is visible under the nerve cord. Gizzard large and firmly muscular, barrel-shaped with anterior rim, in VI, but ensheathed by an exceedingly delicate membrane which may be a continuation of the very thin septum 5/6. Oesophagus suppressed in VII, short in VIII; dilated and with circumferential vascular striae in XII-XVI; with a pair of large vessels to the supra-oesophageal vessel in XII and XIII and one or two pairs to the dorsal vessel in each of XIV-XVI; narrow and chloragogenous in XVII. Intestinal origin XVII, 1/2XVII. Nephridia stomate, vesiculate holonephridia; the bladders very elongate wide tubes with rounded ental ends in II and succeeding anterior segments, the nephridial duct joining each bladder very slightly subterminally; the bladders which discharge anteriorly in II, III and IV extend into IV where the nephridial body of each forms a large tuft on the side of the oesophagus, one behind the other in sequence, where they are concealed by the pharyngeal glands; the bladders which discharge in III and IV very elongate and more slender but still conspicuous. Nephridial bladder and body of nephridia of V and succeeding segments confined to the segment in which they discharge but body still enlarged and more than usually coiled to VII; preseptal funnels demonstrated for nephridial bodies of V but probably present further anteriorly. By XIII the bladder is elliptical to slenderly

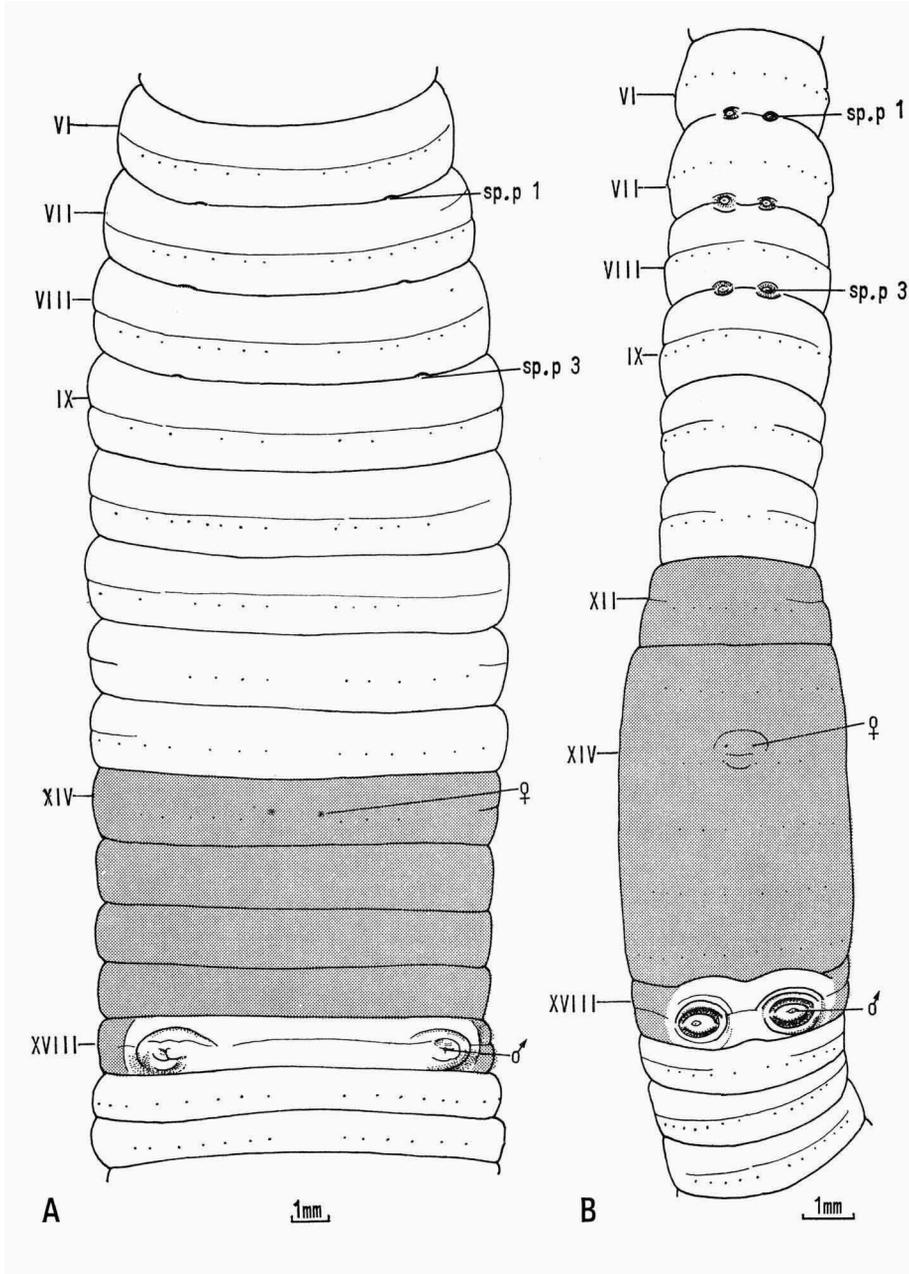
pyriform and not greatly elongated, the afferent duct still entering it shortly subterminally. In XIV posteriorly the bladder changes rapidly from stoutly pyriform to subspherical and the afferent duct attaches medianly shortly ental of the equator of the bladder; in the anterior intestinal segments the bladder becomes bilobed with small median lobe joined by the afferent duct and large, globular lateral lobe which now constitutes a diverticulum. Sperm funnels very large and iridescent, in X and XI; testis-sacs absent; seminal vesicles in IX and XII racemose, those in XII the larger and more elongate; sacciform white paired bodies on the anterior septa of X and XI are presumably testes; pseudovesicles absent from XIII. Ovaries, delicate webs with many strings of small oocytes, and funnels, in XIII; small sacs in XIV may be ovisacs. Prostates tubular, in XVIII and XIX, much coiled but compacted (that on the left into a circular outline); the adpressed coils of irregular cross section conforming to the shape of contiguous regions and depressed; with very narrow central lumen (tubuloracemose?); muscular duct moderately long, slightly sinuous, gradually but not conspicuously widening ectalwards; joined ectal of the gland by the vas deferens; the region of the duct between this junction and the gland with less muscular sheen than the remaining more ectal, longer portion. Penial setae absent. Spermathecae 3 pairs, opening anteriorly in V-VII; ampulla ovoid to fusiform, duct slender; diverticulum (inseminated) single, clavate, uniloculate, uniting with the spermathecal duct at the body wall; size approximately uniform (H, P1); length of right spermatheca of VII = 1.6 mm, ratio of total length: length duct = 1.6; ratio length: length diverticulum = 1.9 (H).

Material examined. — 145/16 (4), 145°17'E 16°34'S, Mt. Lewis, near summit, dry soil in tropical rainforest, W. Nash and L. Blount, 17 August 1974 - H, P2 (QM G8355, G8356); Mt. Lewis, north of Mt. Molloy, near old gold camp, T. Walker, 26 May 1972 - P1 (LM 15241), specimen 4 (BJ); Mt. Lewis, near old gold camp, under logs in rainforest, T. Walker, 27 May 1972 - P3, specimens 1-3 (BJ); Mt. Lewis, half way up, dry soil in rainforest, W. Nash and L. Blount, 17 August 1974 - P4 (BJ). 145/16(15), 145°26'E 16°10'S, Cape Tribulation road, 16 km north of Daintree River, rainforest soil, W. Nash and M. Shand, 10 January 1975 - specimens 5 and 6 (BJ).

Remarks. — Specimens 1-3 conform closely to *D. montislewisi* but are distinguished by wider separation of the ventral setae ( $aa = 6.6\%$  circumference in XII,  $8.4\%$  in XX, in one measured specimen). They also differ in the wide separation of the male pores (0.18 circumference) and spermathecal pores (0.28 circumference). The setal ratios, apart from  $aa$ , nevertheless fall within the range for the species shown in Table 2, and differ

significantly from those of *D. raveni* and *D. barronensis*, the other species with spermathecal pores in 4/5-6/7.

Specimen four compares well in general morphology and in the appearance of the male porophores with *D. montislewisi* but has a greater number of



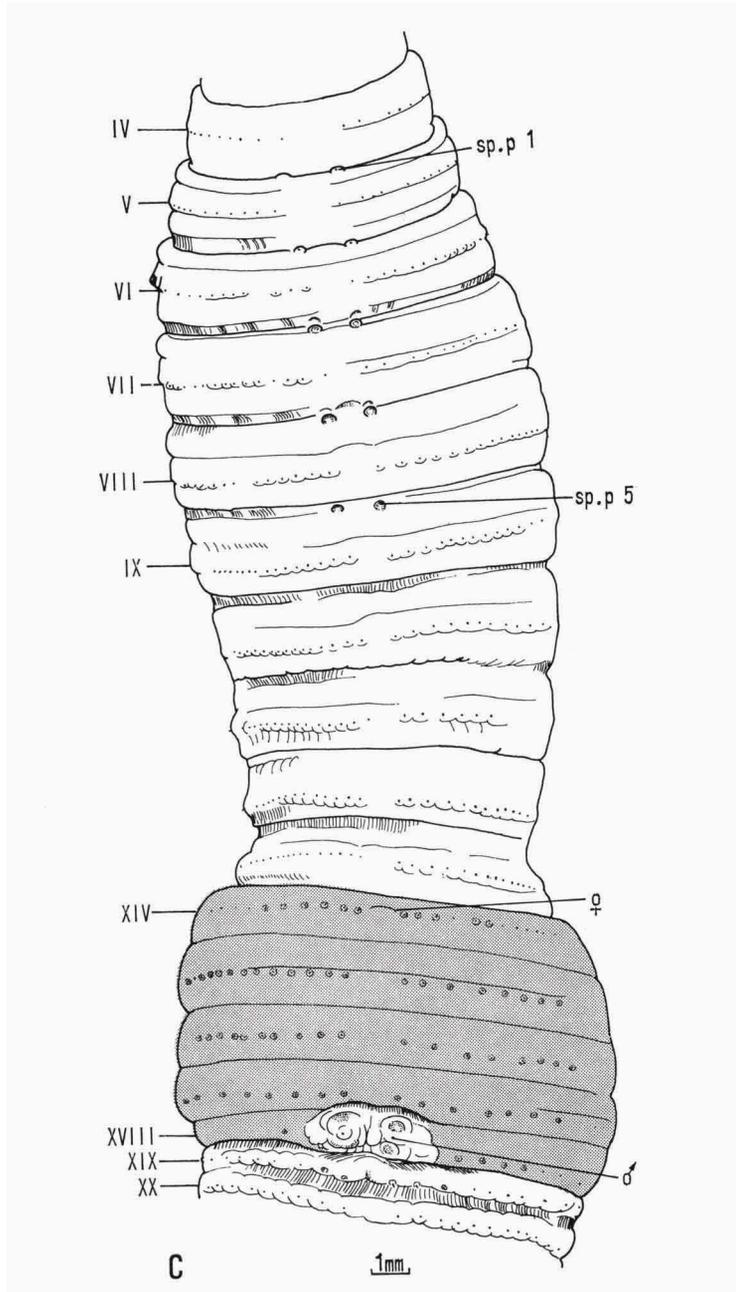


Fig. 10. Genital fields. A, *D. canaliculata*, specimen 1; B, *D. oculata*, holotype; C, *D. grandis*, lectotype.

setae (74 in XII, 54 in XX) and some of its setal intervals fall slightly outside those given in Table 2. These differences should probably be regarded as lying within the normal range for the species.

**Diporochaeta nashi** sp. nov. (fig. 1, 11B, 14J, 15M, 16N-P, table 2)

Description. —  $l = 120+$ , 191, 199 mm,  $w$  (midclitellar) = 9.1, 7.8, 6.0 mm,  $s = 106+$ , 152, 127 (H; P1, posterior amputee; P3). Pigmented deep purple, pale intersegmentally. Prostomium epilobous  $\frac{1}{2}$ , broad almost parallel-sided; it and the peristomium, which is not shortened, with a wide, deep dorsal groove. Peristomium not bifid ventrally. Body with a fine dorsal groove. First dorsal pore  $\frac{5}{6}$ . Setae 17, 20 in XII; 22, 18 in XX; 24, 31 caudally; ventrolaterally subequally spaced, dorsally progressively more widely (H, P1); absent from the last five segments (P1); setae  $a - c$  absent in XVIII;  $a$  lines straight,  $z$  lines irregular, throughout;  $aa \approx 2 ab$ ;  $zz = 4-11zy$  (H, P1). Nephropores lateral, in a straight series on each side (recognisable externally from VI posteriorly), in setal lines  $\frac{6}{7}$  anteriorly, or 8, preclitellar; and 11 in the midbody (H, P1). Clitellum (H; not developed in P1) annular, XIII (P3),  $\frac{1}{2}$ XIII-XVIII. Male pores minute, each in a short transverse groove on a transversely elliptical moderately prominent papilla, in  $c$  or  $cd$  of XVIII, the area between and behind the papillae pale and tumid but differing from the reddish brown clitellum; the male pores 4.0, 3.84 mm, 0.16, 0.19 body circumference apart (H, P1). Accessory genital markings absent. Female pores minute, almost inappreciably median of  $a$  lines, slightly nearer the setal arc than the anterior border of XIV. Spermathecal pores one pair, in  $\frac{8}{9}$ , each in a transverse groove on a small elliptical papilla, in setal lines 3-4, the pores 4.64, 4.56 mm, 0.19, 0.18 body circumference apart (H, P1).

Thickest septa 10/11 and 11/12, strongly thickened. Last hearts in XII; those in X - XII latero-oesophageal, each receiving a broad short connective from the supra-oesophageal vessel and a slender long one from the dorsal vessel. Supra-oesophageal almost as large as the dorsal vessel, in IX - anterior XIII, receiving a pair of large vessels from the oesophagus in each segment. Gizzard apparently in VI as septum  $\frac{5}{6}$ , which is exceedingly delicate, can be traced only to its anterior border, but relationships of this septum obscure; the gizzard large, cylindrical, firmly muscular, demarcated only by increased musculature from the preceding oesophagus. Oesophagus short in VII; segmentally dilated and vascularized in IX - XIII; in XIV - XVI tubular and less obviously vascular though in each segment giving two pairs of large vessels to the dorsal vessel; extramural calciferous glands absent but numerous longitudinal internal plications present in IX-XVI which

in XIII constitute low lamellae. Intestinal origin XVII. Nephridia simple stomate, vesiculate holonephridia, (preseptal funnel demonstrated in III and posteriorly), commencing in II where the bladder is a simple pyriform enlargement which enters the parietes by a narrowly tapering duct near the middorsal line, dorsal to setae *z*; by X the slender nephridial duct enters the bladder appreciably subterminally and this trend is most developed in the posterior oesophageal and anterior intestinal region in which the duct enters the bladder at midlength; the slender ectal duct of the anteriormost nephridia widens in succeeding segments, being broad by XI. The bladders are oriented longitudinally, discharging at the anterior margins of their segments. The portion of the bladder ental to the point of junction with the incoming duct is not here considered a true diverticulum. Bladders largest in XV in which they enter the parietes between setal lines 7 and 8. Sperm funnels very large and iridescent, embedded in compacted sperm masses, in X and XI; seminal vesicles a pair of simple sacs in each of IX (small) and XII (moderately large), with a pair of large probably functional "pseudovesicles" in XIII. Ovaries, folded laminae with many fine egg strings, and funnels, in XIII; several small sacs (H; absent in P<sub>1</sub>) in XIV (right only) may comprise an ovisac. Prostates tubular, tortuous with adpressed coils of irregular cross section in XVIII; the muscular duct moderately long, widening ectally and receiving the vas deferens at approximately one third its length from the gland. Spermathecae one pair, in IX, ampulla very large, ovoid; duct much narrower and well demarcated; diverticulum long and coiled tubular, with spermatozoal iridescence throughout at least is ental half (H, not inseminated in P<sub>1</sub>); length spermatheca = 5.2 mm, ratio total length: length duct = 3.2; ratio length: length diverticulum = 0.8.

Material examined. — 145/16(4), 145°17'E 16°34'S, Mt. Lewis, near summit, wet sandy soil near running stream in rainforest, W. Nash and L. Blount, 17 August 1974 - H, P<sub>2</sub>, +6 specimens (QM G8357-G8364); near old gold camp, under logs in rain forest, T. Walker, 27 May 1972 - P<sub>1</sub>, + 9 specimens (LM 15242-15251). 145/16 (17), 145°28'E 16°05'S, Cape Tribulation, rainforest soil, W. Nash and M. Shand, 10 January 1975 - P 3 (LM 15252) P<sub>4</sub> (QM G8373), P<sub>5</sub> (BJ). 145/15(3), 145°21'E 15°55'S, Bloomfield River Mission, south of Cooktown, G. Ingram, 2 October 1974 - P<sub>6</sub> (BJ).

**Diporochaeta oculata** sp. nov. (fig. 1, 10B, 13F, 15N, 16D, E, table 2)

Description. — l = 118.68 mm, w (midclitellar) = 4.6, 4.2, s = 138, 104 (H, P<sub>1</sub>). Purplish brown with pale ventral surface (P<sub>1</sub>) fading to pigmentless (H), in alcohol. Prostomium tanylobous, it and the entire body with

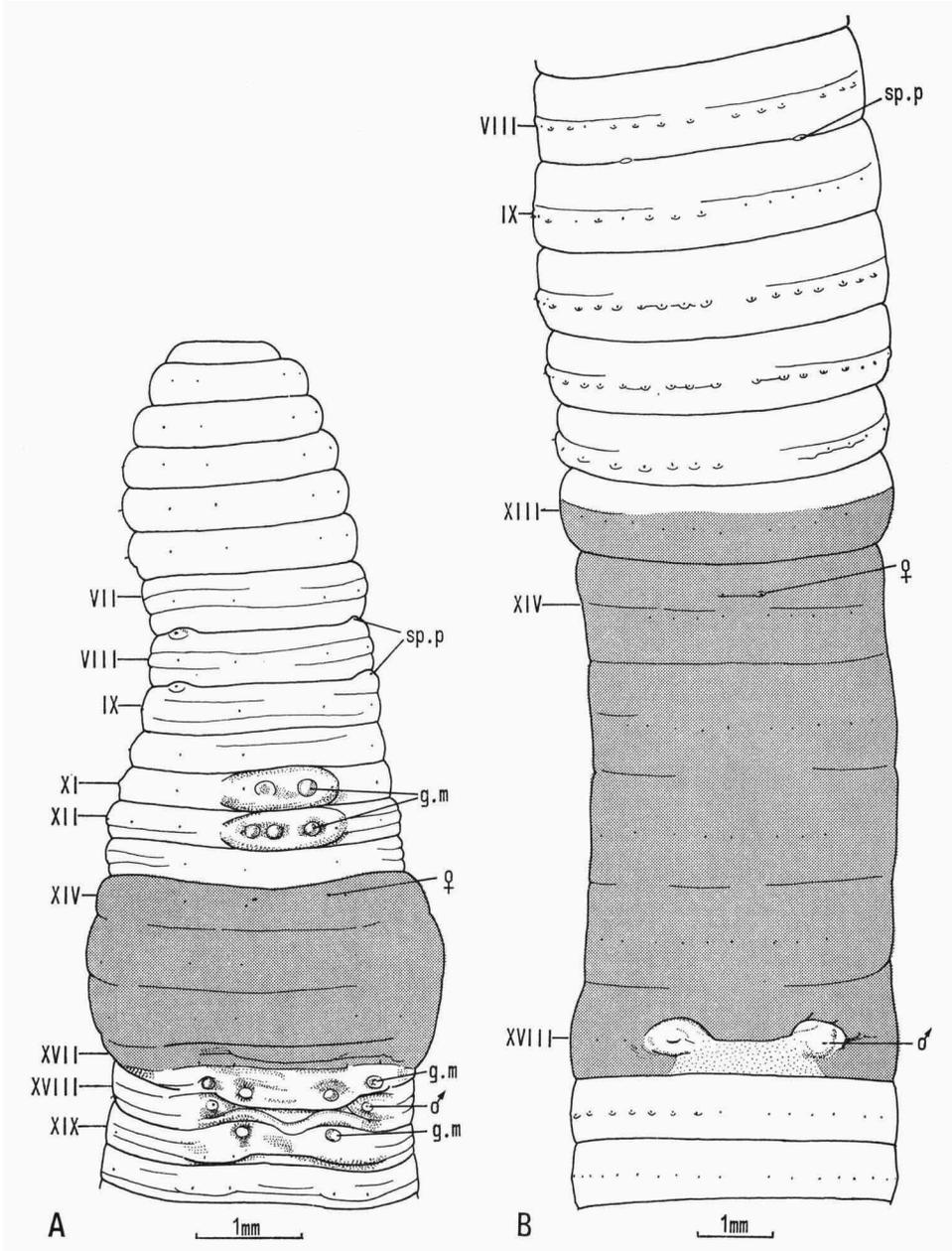


Fig. 11. Genital fields. A, *D. bunya*, holotype; B, *D. nashi*, holotype.

middorsal groove; a ventral groove also present throughout the hindbody; peristomium not shortened, not bifid ventrally. First dorsal pore 4/5 (imperforate, P1), 5/6 (H). Setae 24, 25 in XII; 28, 25 in XX; 34, 42 caudally (H,

P<sub>1</sub> respectively); subequally spaced; absent from the last four segments; setae *a - c* absent in XVIII; *a* (H, P<sub>1</sub>) and *z* lines straight throughout (H), *z* lines slightly irregular in midbody (P<sub>1</sub>);  $aa \approx 0.9 - 2.5 ab$ ;  $zz = 1.1 - 2.0 zy$ . Nephropores in a straight lateral series anteriorly in their segments from III posteriorly, in setal lines 8, 7 in XII, s. l. 10, 8 in XX, s. l. 9, 10 caudally; readily visible slits longitudinally conjoined by a dark line; location of those in II not certainly determinable but a pair of pits further dorsally, near the prostomial tongue, may be nephropores. Clitellum annular well developed in XIII-XVII but XII and XVIII at least dorsally with clitellar modification so that it appears fusiform. Male pores in minute ellipses on XVIII, immediately median of setal lines 3 relative to adjacent segments; each ellipse on a sharply defined, flat topped equatorial transversely elliptical papilla which in turn is surrounded by a wall-like oval rim of equal height separated from it by a narrow moat-like encircling channel; this rim reaching the posterior border of XVIII but not extending into its anterior fourth; the pores 2.00, 1.80 mm, 0.16, 0.14 body circumference apart (H, P<sub>1</sub>). Accessory genital markings absent. Female pores very shortly median of *a* lines and slightly nearer the setal arc than the anterior margin of XIV. Spermathecal pores three pairs, in 6/7, 7/8 and 8/9, in *a* lines, each a gaping transverse slit with thickened lips; the pores 0.88, 1.08 mm, 0.10, 0.09 body circumference apart.

Thickest septa 10/11 - 13/14, moderately strongly thickened. Last hearts in XII; those in X - XII latero-oesophageal, only connectives from the supra-oesophageal demonstrated in the holotype but specimen macerated. Supra-oesophageal a discrete vessel in at least IX - XII. Gizzard in VI (?) elongate, cylindrical, muscular but easily compressed; its posterior limit at 1/2 IX but the delicate septa 6/7 and 7/8 deflected posteriad by it; 6/7 diverging from it at mid-length but ensheathing it further posteriorly; septum 5/6, also diaphanous, meets the oesophagus at the anterior margin of the gizzard and appears no longer to envelop the latter (H). Oesophagus suppressed in VII, short in VIII; in IX-XVI with circumferential vascular striae but only notably dilated in XII and XIII; the vascularized region with conspicuous rounded internal villi. Oesophagus in the anterior half of XVII narrow and chloragogenous. Intestinal origin 1/2 XVII. Nephridia stomate, vesiculate holonephridia, bladders commencing in II; nephridial bodies of those of II forming very large much-coiled (stomate?) masses on each side of the pharynx in IV, the bladder a wide very elongate, tortuous tube, with one major sharp bend, discharging laterodorsally. Nephridia of III and IV with smaller, though still enlarged, coiled bodies and similar though less tortuous bladders. By VI the bladder has taken on the form of a sharp V with the

ectal limb much thicker than the ental limb and bent again laterally as it approaches the pore; the bladder restricted to the segment containing the nephridial body (H, P1). A large preseptal nephrostome on a long slender postseptal neck demonstrated for this and subsequent nephridia but anterior nephridia probably also stomate. By approximately XIII the ental limb of the original bladder is so thin that only the ectal limb can be regarded as the bladder, the ental limb having become a duct. Even in caudal segments this duct still attaches to the ental extremity of the bladder, no diverticulum being developed. Large iridescent sperm funnels in X and XI; testis-sacs absent; seminal vesicles finely lobulated sacs in IX and XII. Fanshaped ovaries with many partly conjoined strings of large oocytes, and funnels, in XIII. Ovisacs not demonstrable. Prostates very widely tubular, restricted to and enlarging XVIII in which each passes laterally before coiling terminally; ectal duct very short, concealed under the gland; gland with very narrow central lumen (tubuloracemose); vas deferens joining the junction of gland and duct. Penial setae absent. Spermathecae three pairs, in VII, VIII and IX, ampulla ovoid to conical; duct narrow, well demarcated; diverticulum uniting with the spermathecal duct far ectally in the body wall; the diverticulum long, tubular, terminating in an at least trifid iridescent (inseminated) seminal chamber, the entire length of the stalk of the diverticulum consisting of two conjoined tubes each of which in turn has two discrete lumina; size approximately uniform; length left spermatheca of IX = 2.1 mm; ratio total length: length duct = 2.2; ratio length: length diverticulum = 1.1 (H).

Material examined. — 146/18(2), 146°13'E 18°56'S, Mt. Spec, leaf debris, under rocks along creek bed in rainforest, I. R. Salanitri, 23 June 1966 - H, P4 (QM G8365, 8366); 146/18(1), 146°05'E 18°56'S, Birthday Creek Falls, 16 km from Mt. Spec Lookout, in rainforest, T. Walker, 20 May 1972 - P5, 6 (LM 15253-15254). 146/18(2), 146°13'E 18°56'S, Mt. Spec, under logs in rainforest, T. Walker, 28 July 1974. - P1-3 (QM G8367-8369); 146/19(3), 146°08'E 19°00'S, Paluma Range, via Townsville, leaf litter, forest floor, A. Taylor, 8 September 1964 - P7 (BJ).

**Diporochaeta phalacrus** (Michaelsen, 1916) (fig. 1, 2B, 13B, 15O, table 2)

*Perionyx (Diporochaeta) phalacrus* f. *typica* Michaelsen, 1916: 14-16, pl. 1 fig. 5.

*Diporochaeta phalacrus*; Jamieson, 1971a: 83.

*Perionychella (Perionychella) phalacrus*; Jamieson 1974a: 221.

Description. — l = 136 mm, w (XV) = 6.3 mm, s = 219 (230 mm, 8-10 mm, 238 segments, Michaelsen). Pigmentless in alcohol. Prostomium probolous unless the medianmost of several longitudinal grooves on the peri-

stomium are considered to make it protanylobous (proepilobous, Michael- sen); deeply bisected by a dorsal groove which continues as a canalicula throughout the body. Peristomium short; not bifid ventrally. First dorsal pore 5/6. Setae 13 in XII, 14 in XX; c. 6-11 caudally (11-12 in IV-XII; 16-20 in XX -CL, 25-28 in CC-CCX, Michael- sen); *ab* in the vicinity of the

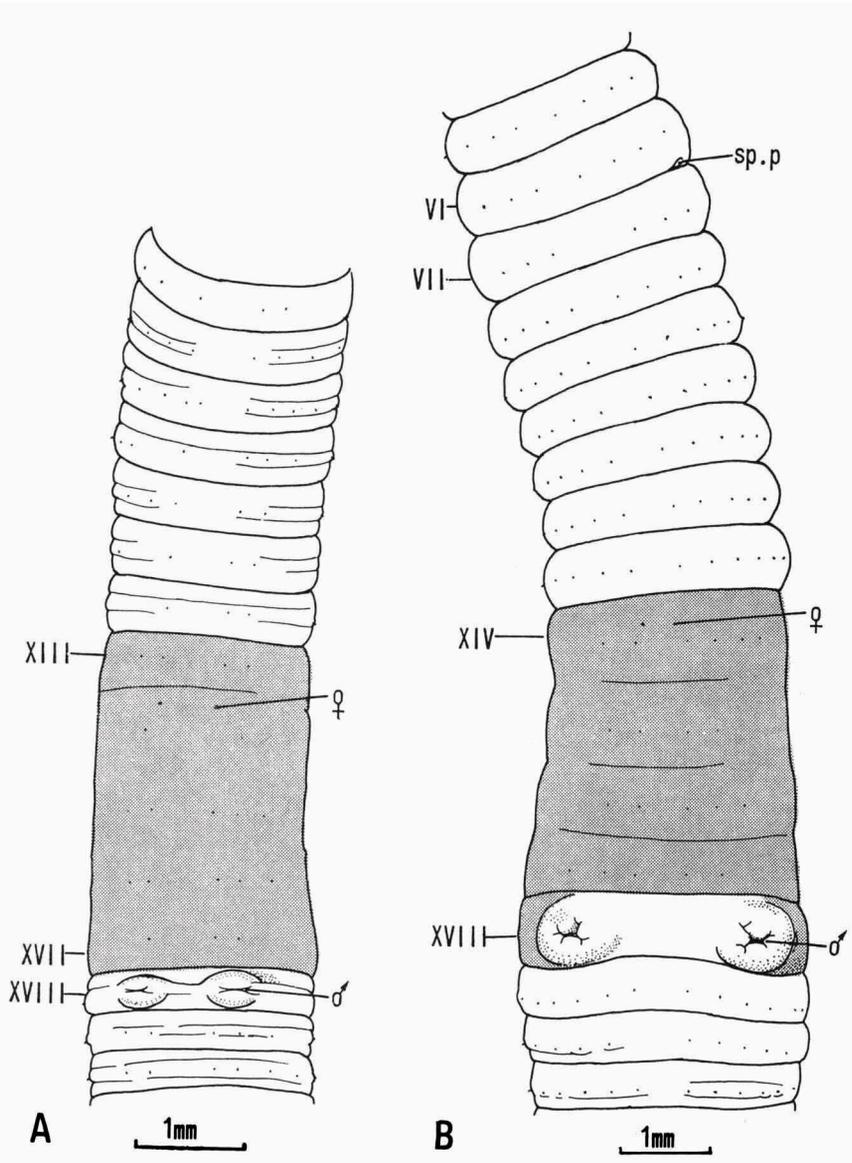


Fig. 12. Genital fields. A, *D. blounti*, holotype; B, *D. crateris*, holotype.

clitellum forming a narrow pair separate from the other setae, *bc* being wider than the distance between other adjacent setae; *a* lines fairly regular in all but the last few caudal segments; *zz* irregular throughout; *aa*  $\approx$  1.5 - 7.5 *ab* widest in the midbody; *zz* very wide throughout, 15-21 *zy* in XII and XX, though narrower posteriorly (*zz* minimally, in the hindbody = 0.4-0.25 body circumference, Michaelsen). Nephropores not externally visible. Clitellum not developed (annular, XIV -  $\frac{3}{4}$ XVIII, Michaelsen). Male pores on XVIII in setal lines *a* (in *ab* nearer *a*, Michaelsen); each on an indistinct small papilla on a paired tumescence which causes segment XVIII to impinge in its vicinity slightly onto XVII and XIX and displaces the presetal annulus of XIX a little posteriorly; male pores 2.16 mm, 0.11 body circumference apart. Female pores minute, indistinct, shortly median to *a*, and only slightly anterior to the setal annulus, of XIV. Spermathecal pores 5 pairs, in 4/5-8/9, visible as small elliptical papillae well median (shortly median, Michaelsen) to *a* lines; the pores 1.32 mm, 0.06 (c. o.i, Michaelsen) body circumference apart.

Thickest septa 9/10 - 11/12, very strongly thickened (8/9 - 12/13 strong, Michaelsen). Last hearts in XII; those in X - XII latero-oesophageal, with slender dorsal and broad supra-oesophageal connectives. Supra-oesophageal a discrete vessel visible in IX -  $\frac{1}{2}$ XIV. Gizzard in VI (VII, Michaelsen); but septa 5/6 and 6/7 so delicate that their relationships to the gizzard are uncertain. Oesophagus suppressed in VII by backward extension of the gizzard; short in VIII; vascularized and increasingly dilated segmentally in IX to XVI, in each of XV and XVI (XIV and XV, Michaelsen) forming a conspicuous unpaired broad structure with the appearance of a calciferous gland which is not, however, cut off from the general oesophageal lumen, though its internal walls bear numerous longitudinal low lamellae, and is apparently not a true extramural calciferous gland. Oesophagus in XVII and XVIII narrow, less vascular and greatly elongated to form a wide coil. Intestinal origin XIX (XVI, Michaelsen). Nephridia simple (not-tufted) stomate avesiculate holonephridia (preseptal funnels demonstrated in anterior intestinal region) discharging anteriorly in their segments with ducts terminating in a straight series on each side dorsolaterally and above the setal lines, with the exception that those with pores in 1/2 and 2/3 discharge near the middorsal line. Sperm funnels iridescent in X and XI; testis-sacs absent. Sperm mass present (in X and XI); seminal vesicles absent (specimens 1 and 2) (in XI and XII, Michaelsen). Ovaries with many conjoined strings of oocytes, and funnels, in XIII; ovisacs absent. Prostates long coiled and flattened tubular (with narrow central lumen, Michaelsen), restricted to XVIII; short straight external duct running medially, not strongly muscular;

with very narrow central lumen (tubuloracemose); vasa deferentia not traceable (joining the duct almost proximally, Michaelsen). Penial setae absent. Spermathecae five pairs, opening at the anterior margins of segments V-IX though the ampulla may be reflexed into the next anterior segment; ampulla ovoid to sub-spherical, duct narrowly tapering and joined at midlength (or at its ectal end, Michaelsen) by a single (inseminated) diverticulum with short duct; the diverticulum internally subdivided into several sperm chambers and often showing partial external subdivision into a larger and a smaller lobe; size of spermathecae approximately uniform; length of left spermatheca of VIII = 2.8 mm; ratio length: length duct = 2.24; ratio length: length diverticulum = 2.8.

Type locality. — Malanda, Cairns District.

Material examined. — 145/17(8), 145°42'E 17°34'S, Palmerston National Park, dry rainforest under logs and rock near road about 8 km west of picnic grounds, R. Raven, 22 January 1975 - specimen 1 (LM 15255) 145/17(10), 145°50'E 17°37'S, Wallacha Falls, Palmerston National Park, in rainforest, T. Walker, 26 May 1972 - specimen 2 (QM G8370). Also a single specimen labelled "Typ. N. Queensland, Mjöberg, Malanda", Hamburg Museum, V.8476.

Remarks. — The type-material in Hamburg consists only of the anterior alimentary canal, and adjacent structures, and a separate portion of the body wall. It was not utilized for the above new account.

Only *D. phalacrus*, *D. atavia* (q.v. here excluded from *D. phalacrus*) and *D. grandis*, of the Queensland species of the genus, have five pairs of spermathecal pores. Agreement of this new Wallacha Falls material with *D. phalacrus* (Michaelsen, 1916), is generally good, the chief differences being the (abnormal?) absence of seminal vesicles and more posterior intestinal origin in the new material. The difference in location of the gizzard is perhaps ascribable to the difficulty in ascertaining this.

***Diporochaeta raveni* sp. nov.** (fig. 1, 7B, 13C, 15P, 16K-M, table 2)

Description. — l = 65+, 104 mm, w (midclitellar) = 4.7, 3.6 mm, s = 90+, 213 (H, posterior amputee; P1). Unpigmented in alcohol. Prostomium very slightly proepilobous; it and the peristomium, which is not shortened, bisected dorsally by a wide deep groove. Peristomium bifid ventrally. Body with faint dorsal groove. First dorsal pore 4/5. Setae 95,77 in XII, 64,60 in XX; 90,58 caudally (H, P1); sub-equally spaced, absent in the last seven segments (P1); setae *a - d* absent in XVIII; *a* lines straight throughout; *z* lines at first straight but becoming very irregular caudally; some caudal segments with greatly reduced (> 26) numbers of setae; *aa* = 3-7 *ab*; *zz* =

1.3-3.0  $\mu$ y; both median intervals widening caudally. Nephropores in a straight lateral series throughout, commencing anteriorly in III (or II?), in setal lines 3<sub>1</sub>, 2<sub>3</sub> in XII (H, P<sub>1</sub>). Clitellum annular, XIV-XVII, very sharply demarcated from, and narrower than, segment XIII. Male pores minute in XVIII in setal lines 3-4 relative to adjacent segments on hemi-

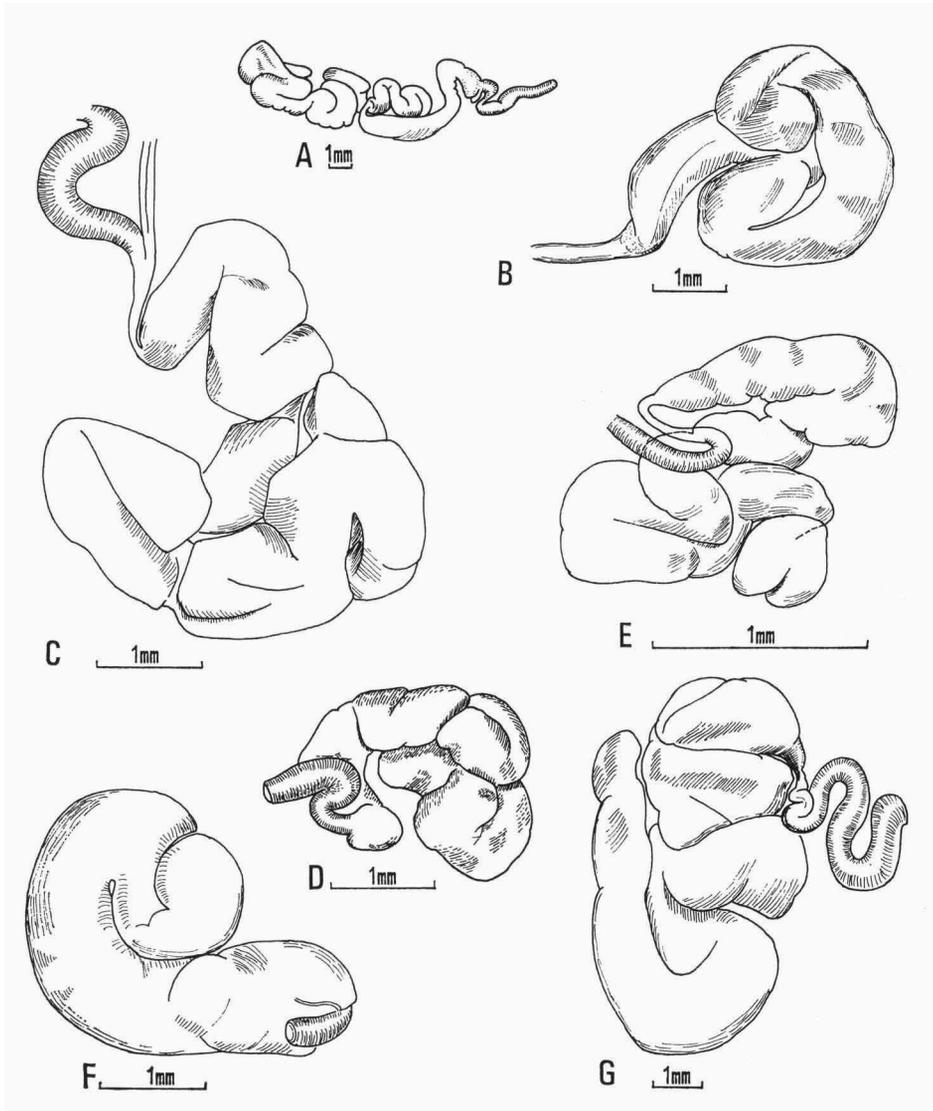


Fig. 13. Prostate glands. A, *D. grandis*, NMV G184 L; B, *D. phalacrus*, specimen 2, R; C, *D. raveni*, holotype, R; D, *D. barronensis*, lectotype, R; E, *D. bunya*, holotype, R; F, *D. oculata*, holotype, R; G, *D. kuranda*, holotype, L.

spheroidal equatorial papillae about one third the length of the segments; each papilla on an elliptical tumescence which fills the segment longitudinally; a similar tumescence developed at the anteriomedian and posteriomedian limits of each elliptical area so that an approximately diamond shaped area of unmodified epidermis intervenes midventrally between the tumid fields; the male pores 1.44, 1.68 mm, 0.12, 0.14 body circumference apart (H, P1). Accessory genital markings absent. Female pores shortly median of *a* lines, about one fourth the distance from the setal arc to the anterior border of XIV. Spermathecal pores three pairs, in 4/5 - 6/7, in setal lines 4-5, each a small pore on a distinctly visible elliptical papilla; the pores 1.48, 1.16 mm, 0.14, 0.10 body circumference apart (H, P1).

Thickest septa 6/7 - 10/11, very strong. Last hearts in XII; those in X-XII wide and latero-oesophageal, each receiving short connectives from the dorsal and supra-oesophageal vessels. Supra-oesophageal vessel a discrete vessel, in 1/2IX - 1/2XIII, ending in each by bifurcation around the oesophagus and receiving in each of the intervening segments a pair of similar oesophageal vessels. Gizzard moderately large, globose, firmly muscular, in V; the exceedingly delicate septum 5/6 ensheathing it. Oesophagus short in VII; not markedly vascularized in VIII; in IX-XV segmentally dilated and conspicuously vascularized, especially and increasingly in XIII - XV; the vascularized region internally with numerous moderately high longitudinal lamellae; oesophagus simple and not evidently vascular in XVI. Intestinal origin XVII. Nephridia stomate, vesiculate holonephridia; preseptal funnel demonstrated for intestinal segments; the bladders of anterior nephridia extraordinarily large, pyriform, narrowing entally (H, P1); those of II - V grouped together on each side of the oesophagus in association with paired much coiled and enlarged nephridial bodies which lie in an embayment formed by the posterior face of the pharynx, the wall of the oesophagus and the anterior face of septum 5/6; the oesophagus here much vascularized, the nephridial mass, adpressed to the oesophagus, also reddish, suggesting increased vascularization. The third of the bladders was seen to receive a duct from the largest, anteriormost, nephridial mass at its apex and the long slender duct of the bladder was traced to the anterior margin of II; the ducts of the three other anterior bladders disappear in the glandular investment of the pharynx but presumably are exonephric as externally nephropores (presumably perforate) are visible anteriorly in (II?), III, IV and V (H). In segment VI and succeeding segments the nephridia are not appreciably enlarged and their pyriform bladders are seen to discharge by ventro-laterally directed ducts at the anterior margins of their respective segments. By IX the nephridial duct joins the bladder at midlength and then runs up the

bladder to enter it apically. In succeeding segments there is an increasing tendency for the portion of the nephridial duct in contact with the bladder to adhere more closely to the bladder and to be reduced so that, by XIV, the adherent portion of the duct has been lost and the duct enters the bladder at

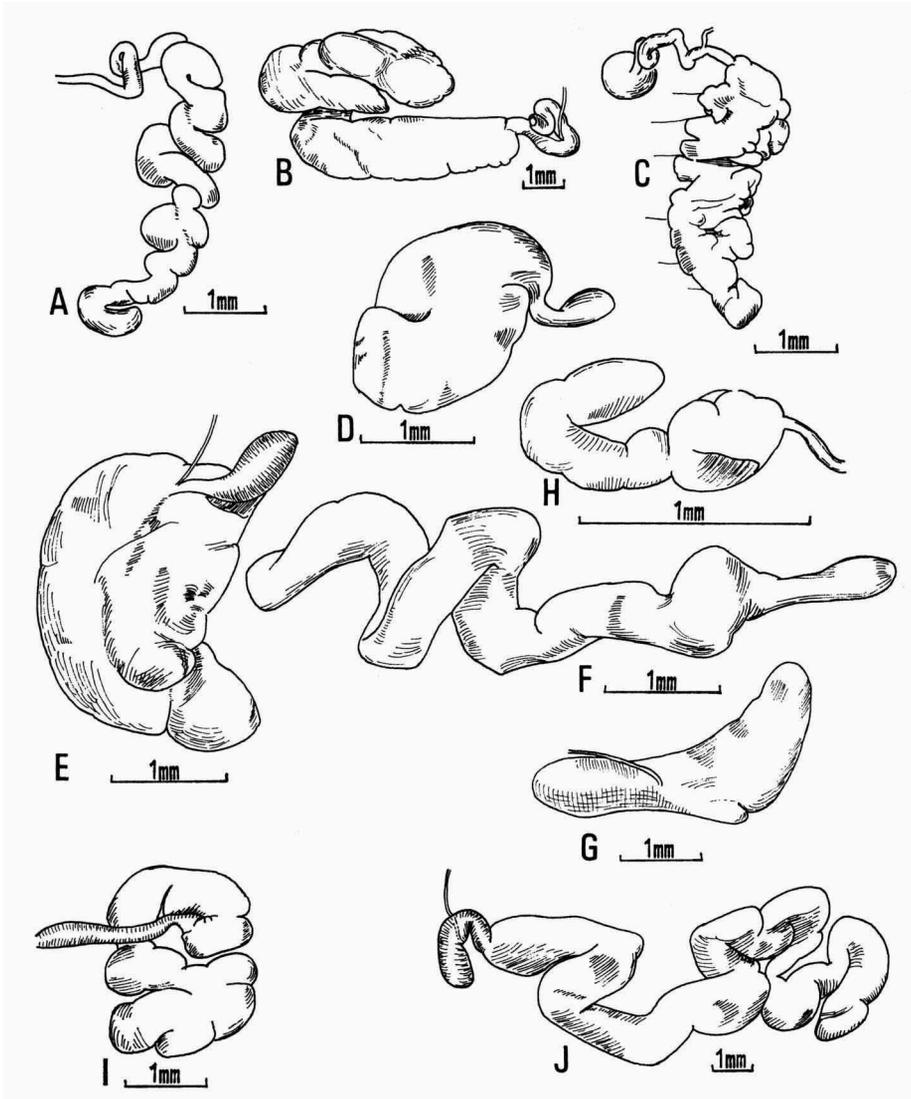


Fig. 14. Prostate glands (continued). A, *D. blounti*, holotype, R; B, *D. canaliculata*, specimen 1, L; C, *D. crateris*, holotype, R; D-G, *D. erici*: D, specimen 12 L, E, specimen 36 R, F, specimen 28 L, G, specimen 1; H, *D. millaamillaa*, holotype, L; I, *D. montislewisi*, holotype, L; J, *D. nashi*, holotype, R.

midlength, the bladder in turn having become almost sessile on the body wall. In the anterior intestinal region the free ental portion of the bladder has extended laterally as a true diverticulum. The bladders which in XIV, except for the reduction of the duct, are at least as large as the anterior bladders, are significantly less voluminous in the intestinal region. Sperm funnels very large and iridescent in X and XI; testis-sacs absent; seminal vesicles four pairs; small and racemose in IX, large simple sacs in X, vestigial sacs in XI, large and racemose in XII. Small ovaries with several egg strings, and funnels, in XIII (H, P<sub>1</sub>); small sacs in XIV may be ovisacs (H). Prostates tubular, in XVIII and XIX, much coiled but compacted into a circular outline, the adpressed coils of irregular cross section conforming to the shape of contiguous regions and depressed; muscular duct moderately long, sinuous, narrow entally but otherwise not notably widening; joined ectal of the gland by the double vas deferens. Penial setae absent. Spermathecae three pairs, in V - VII, clavate with the ampulla poorly demarcated from the duct; diverticulum (inseminated) a blind more or less coiled tube joining the ectal end of the duct; the ampulla and duct sometimes reflexed into the segment preceding the diverticulum and pore; length right posterior spermatheca = 3.38 mm; ratio total length: length duct = 1.7; ratio length: length diverticulum = 1.3.

Material examined. — 145/16(4), 145°17'E 16°34'S, Mt. Lewis, near summit, dry soil in tropical rainforest, W. Nash and L. Blount, 17 August 1974 - H (QM G8371), P<sub>1</sub> (LM 15256), P<sub>2</sub>, + 5 specimens (BJ); Mt. Lewis, near summit, wet sandy soil near running stream in rainforest, W. Nash and L. Blount, 17 August 1974 - P<sub>4</sub> (QM G8372); 145/16 (3), 145°16'E 16°32'S, Mt. Lewis, near creek, 3 km from forestry sheds, in rainforest, T. Walker, 27 May 1972 - P<sub>3</sub> (LM 15257).

**Diporochoeta terraereginae** (Fletcher, 1889) (fig. 1, 3A, 15Q, table 2)

*Perichaeta?* *terraereginae* Flechter, 1889: 1002-1003.

*Diporochoeta terraereginae*; Beddard, 1895: 441; Michaelsen, 1900: 204-205; Ude, 1905: 429-431; Michaelsen, 1907: 161; Jamieson, 1971a: 83.

*Perionyx* (*Diporochoeta*) *terraereginae*; Michaelsen, 1916: 19-20.

*Perionychella* (*Perionychella*) *terraereginae*; Jamieson, 1974a: 221.

Description. — l = 317 mm, w (midclitellar) = 20 mm, s = 208 (190-300 mm, 15-20 mm, 144-170 segments, Fletcher, Ude). Pigmentless in alcohol, excepting the dorsal purplish brown of the clitellum, but in life the entire body an intense prussian blue though paler ventrally (Dorsally reddish brown, ventrally colourless, Ude). Prostomium prolobous, a deep dorsal groove connecting it with intersegment 1/2 (epilobous 1/3, Fletcher). A fine middorsal groove from XI posteriorly; obscured on the clitellum. Peristo-

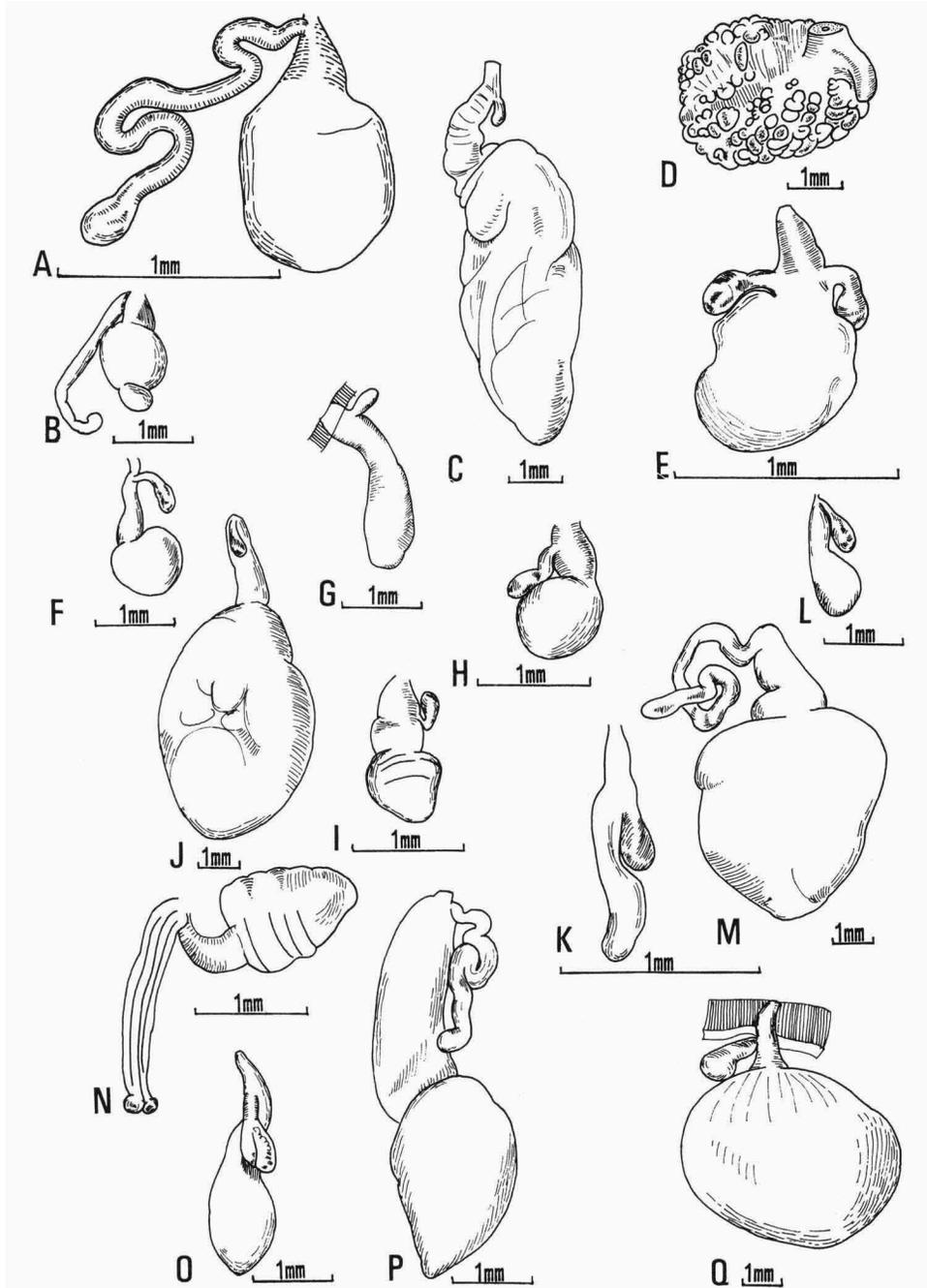


Fig. 15. Spermathecae. L = left, R = right spermatheca. A, *D. barronensis*, lectotype, R IX; B, *D. crateris*, holotype, R VII; C, *D. kuranda*, holotype, R IX; D, *D. grandis*, NMV G184 L IX; E, *D. bunya*, holotype, R IX; F, *D. blounti*, holotype, L VIII; G-I, *D. erici*; G, specimen 1 R IX; H, specimen 28, R VII; I, specimen 36, R VII; J, *D. canaliculata*, specimen 1, L IX; K, *D. millaamillaa*, holotype, R IX; L, *D. montis-lewisi*, holotype, R VII; M, *D. nashi*, holotype, R IX; N, *D. oculata*, holotype, L IX; O, *D. phalacrus*, specimen 2, L VIII; P, *D. raveni*, holotype, R VII; Q, *D. terraereginae*, specimen 1, L VIII.

mium not bifid ventrally. First dorsal pore 4/5 (5/6, Fletcher, Ude). Setae 39 in XII; 45 in XX; caudally 50 (generally, 40-60, Fletcher, Ude); progressively more widely spaced dorsalwards; setae absent from the posterior 9 segments, otherwise *a* lines straight, *z* lines irregular; *aa*  $\approx$  5-5.5 *ab*; *zz* very wide throughout. Nephropores only sporadically visible (on and behind the clitellum) but large; paired anteriorly in their segments; an irregularly sinuous series on each side; locations varying even in a single segment from ventral, in setal lines 5, to near the dorsal midline, well above the setal arc (in setal lines 4-10, seldom 16 and 20, or far dorsal, Fletcher, Ude). Clitellum annular (?); recognisable only by dorsal and dorsolateral purplish brown pigmentation in XIV - XXII (XIII, XIV-XXI, XXII, Fletcher; XIV-XX, annular in XIV-XVII, saddle shaped in XVIII-XX, Ude). Male pores on XVIII, in setal lines *a* or *ab* (in *b*, Ude); each indistinctly visible on a minute papilla borne on a paired circular domed porophore which fills and expands the segment longitudinally, the anterior and posterior faces of the porophore each developed as a subcircular scarcely apparent pad; no separate accessory genital markings developed; the pores 3.08 mm, 0.05 mm body circumference apart. Female pores minute, in transverse grooves, at the anterior border of the slight setal annulus about  $\frac{1}{2}$  *aa* apart (shortly anteromedian of *a* Fletcher). Spermathecal pores 4 pairs, concealed in intersegmental furrows 4/5 - 7/8, in *ab* very slightly lateral of *a* (in or a little ventral of *b*, Fletcher; in *b*, Ude); the pores (VIII) 4.25 mm, 0.07 mm body circumference apart.

Thickest septa 10/11 - 13/14; very strongly thickened (9/10 - 15/16 strongly thickened, Ude). Last hearts in XIII (as Ude), those in X-XIII latero-oesophageal, each receiving a broad, short connective from the supra-oesophageal vessel and a more slender long one from the dorsal vessel. Supra-oesophageal vessel discrete and well developed in  $\frac{1}{2}$ VIII-XIII, ending in XIII in a pair of conspicuous circum-oesophageal vessels which are closely adherent to the gut; these paired circum-oesophageal vessels present in each of IX-XVI but joining the dorsal vessel in XIV-XVI. Gizzard extremely large and strongly muscular in V (as Ude), displacing septa 5/6 - 7/8 to the posterior of VIII. Oesophagus suppressed by backward extension of the gizzard in VI, short in VII; segmentally dilated and vascularized in VIII-XVI and discus-shaped with the circum-oesophageal vessels on its "rim" in IX-XVI in which the internal walls have low but considerable lamellae; narrow and chloragogenous in XVII; intestinal origin XVIII (as Ude). Nephridia stomate, avesculate exonephric holonephridia, commencing in II, simple (not tufted) throughout, preseptal funnel demonstrated for those of II and posteriorly; ectal ducts fairly wide tubes but bladders totally absent;

length of duct very variable, greatest where the pore is more dorsally situated. (Re-examination of a specimen recorded by Michaelsen, 1916, reveals a slight dilation at the ectal extremity of the nephridial duct which is minute relative to the length of the duct and is not here considered a bladder). Sperm funnels moderately large, iridescent, in X and XI; testis sacs absent. Seminal vesicles in VIII, IX and XII (as Ude); very large and racemose those in VIII being the largest. Ovaries relatively small, amorphous, with very numerous peripheral loculi, and funnels, in XIII; ovisacs apparently absent, a pair of small simple subspherical sacs on the anterior septum of XIV does not have the usual structure of ovisacs. Prostates very elongate though restricted to XVIII; slenderly tubular and much coiled, with irregular cross section, and

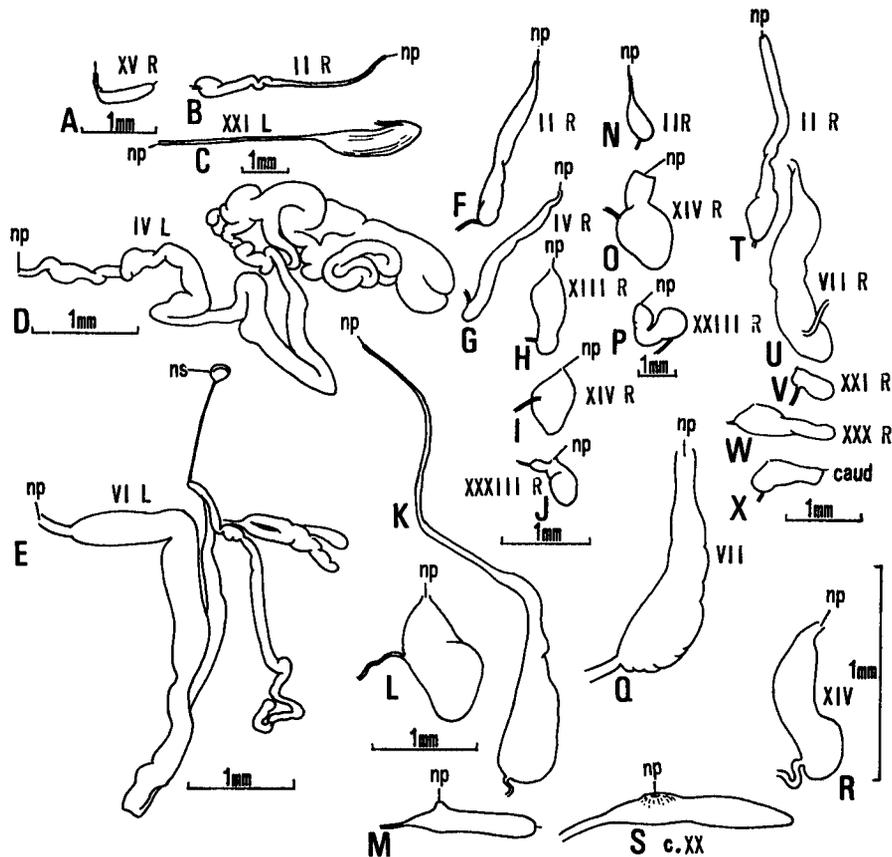


Fig. 16. Nephridial bladders (segments and right or left, as indicated). A, *D. crateris*, holotype; B, C, *D. kuranda*, holotype; D, E, *D. oculata*, holotype; F-J, *D. montislewisi*, holotype; K-M, *D. raveni*, holotype; N-P, *D. nashi*, holotype; Q-S, *D. barronensis*, lectotype; T-X, *D. erici*, specimen 1.

smooth-surfaced passing laterally from the pore; the muscular duct long and tortuous with 3 or 4 bends; the duct joined by the double vas deferens at approximately its ental third; the internal lumen of the gland slit-like, a very small fraction of the total thickness of the gland (0.08-0.10 the width of the gland with a regular cylindrical epithelium with no distinct lateral canals but with slit-like insinkings, Michaelsen), a condition indicative of the tubuloracemose condition. Penial setae absent. Spermathecae 4 pairs, opening anteriorly in V-VIII though the ampulla may be reflexed into the next anterior segment; ampulla subspherical, almost sessile on the body wall but an ectally narrowing slender duct concealed in the latter; diverticulum (inseminated) single, clavate, uniloculate, lateral, joining the duct where this enters the body wall; size of spermathecae approximately uniform; length of left spermatheca of VIII = 6.3 mm; ratio of length: length duct = 3.7; ratio of length: length diverticulum = 3.9.

Type locality. — Mt. Bellender-Ker.

Material examined. — 145/17(1), 145°33'E 17°08'S, Tinaroo Dam, on road, altitude about 1100 mm, G. Monteith, - specimen 1 (LM 15258). Vicinity of Cairns, collector Elgner, Hamburg Museum V.3628 - a single specimen examined for nephridia only (prostates described by Michaelsen, 1916).

Other localities. — Queensland (Ude, 1905).

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