

## Redescription of the type-species of the earthworm genus *Notoscolex* (Megascolecidae: Oligochaeta)

B. G. M. JAMIESON

Zoology Department, University of Queensland

### Introduction

The genus *Notoscolex* Fletcher, 1887, as defined by Stephenson (1930) and Gates (1960), has species in Australia, New Zealand, South India and Ceylon and is one of the largest oligochaete genera. Relegation of these species to a single genus depends solely on the possession of a combination of four characters which, individually, occur in many other genera. These characters are: eight setae per segment, racemose prostates, meronephridia and a single gizzard. Jamieson (1971 b) showed, from a consideration of the literature, that 38 Australian species appeared to conform with this superficial definition. Attention was drawn to the fact that some Australian species have megameronephridia median to micromeronephridia in posterior segments and reasons were given for placing such species in a separate tribe from those lacking megameronephridia or median stomate nephridia. It was pointed out, however, that such division of *Notoscolex* could not be undertaken as the condition of the posterior nephridia in the type-species of the genus, *Notoscolex camdenensis*, was unknown.

During revisionary studies of the Baldwin Spencer collection in the National Museum of Victoria the author has since examined unregistered specimens bearing the label "*Megascolides camdenensis*" which conform precisely with Fletcher's type-description of *Notoscolex camdenensis*. These specimens are described below.

### TAXONOMIC DESCRIPTION

*Notoscolex camdenensis* Fletcher, 1887.

(Fig. 1)

*Notoscolex camdenensis* Fletcher, 1887: 546-551, Pl. VIII, figs. 1-5.

Length = 115 mm and 135 mm, width (midclitellar) = 6 mm; segments = 127 and 192 (specimens 1 and 2 respectively). Pigmentless buff in alcohol. Circular in transverse section throughout; not canaliculate; some anterior segments weakly triannulate. Prostomium epilobous 1/3, closed, crossed by a transverse groove at 0/1 (specimens 2 and 3); with a median and two lateral dorsal longitudinal grooves in specimen 2; damaged in specimen 1. First dorsal pore 8/9 (specimen 1); 11/12 or 23/24 (specimens 2 and 3). Setae commencing in II, in 8 regular longitudinal rows throughout. Setae *a* and *b* absent from XVIII, replaced by penial setae.

Nephropores not certainly recognizable, possibly indicated by numerous white flecks sporadically visible on some segments. Clitellum well developed, unusually long for a megascolecid, extending from XIV-XXII, 1/2 XXIII, XXIII, annular but behind the male pores weak ventrally between setae *b*; setae visible, intersegmental furrows clearly discernible but fainter than

Table 1  
Intersetal distances in segment XII in *Notoscolex camdenensis*

	aa		ab		be		cd		dd		dd : u
	mm	st*	mm	st	mm	st	mm	st	mm	st	
Specimen 1	2.21	9.55	0.71	3.07	2.14	9.25	1.93	8.34	11.36	49.11	0.49
Specimen 2	2.14	8.69	0.79	3.21	2.21	8.97	1.64	6.66	13.21	53.63	0.54
mean		9.12		3.14		9.11		7.50		51.37	0.52
mean/ab		2.90		1.00		2.90		2.39		16.36	

\* standardized to  $u=100$  mm.

elsewhere ; nephropores and dorsal pores not visible. Combined male and prostatic porophores a pair of elliptical papillae in XVIII, each extending from median of *a* to lateral of *b* lines, the pore in *ab*. Unpaired midventral glandular areas forming equatorial transverse bands between the ventral setal couples of XIX-XXIII ; three similar but more prominent genital markings present on XI-XIII, filling the anterior two annuli and extending laterally beyond *b* lines (3 specimens). Female pores inconspicuous, anteromedian to setae *a* of XIV. Spermathecal pores 2 pairs, on minute papillae in 7/8 and 8/9, in *a* lines.

#### *Internal anatomy* (Specimen 1):

Septa 6/7-11/12 progressively thickened, the first strongly, the last very strongly thickened and a little stronger than 12/13, the remainder very thin. Septal glands restricted to the pharynx, the last anterior in IV. Brain at junction of II and III. Dorsal blood vessel single, continuous onto the pharynx. Dorsoventral commissural vessels in V-XIII ; in X-XIII, forming 4 pairs of large hearts each of which receives a connective from the dorsal and supra-oesophageal vessels. Commissurals in IX slender, each giving off a lateral branch near its junction with the ventral vessel ; such branches absent from the hearts. All commissurals valvular. Supra-oesophageal vessel in X-XIII, weakly developed. Dorsal vessel receiving a pair of vessels from the calciferous glands in each of segments XIV-XVI ; no supra-oesophageal vessel detectable on the glands.

Gizzard very large, fusiform, firm and strongly muscular, in VI. Oesophagus straight and narrow in VII-XIII ; in each of segments XIV-XVI bearing dorsolaterally a pair of very large kidney-shaped calciferous glands which completely obscure the gut in dorsal view and abut on the dorsal vessel ; the duct short and narrow. Each gland deeply incised into an anterior and a posterior half by a circumferential furrow from the dorsal end of which the calciferous vessel runs to the dorsal vessel. The interior of the gland appears, through the walls, to be fully occupied by laminae orientated radially relative to the axis of the oesophagus. Intestine commencing in XVIII ; typhlosole and caeca absent. Wholly meronephric, nephridia in III-V (in terms of external segmentation) forming large tufts composed of innumerable loops, the numerous ductules of which form webs running anteromedianly to open into the buccal cavity and anterior pharynx, the ductules of III and IV becoming bound

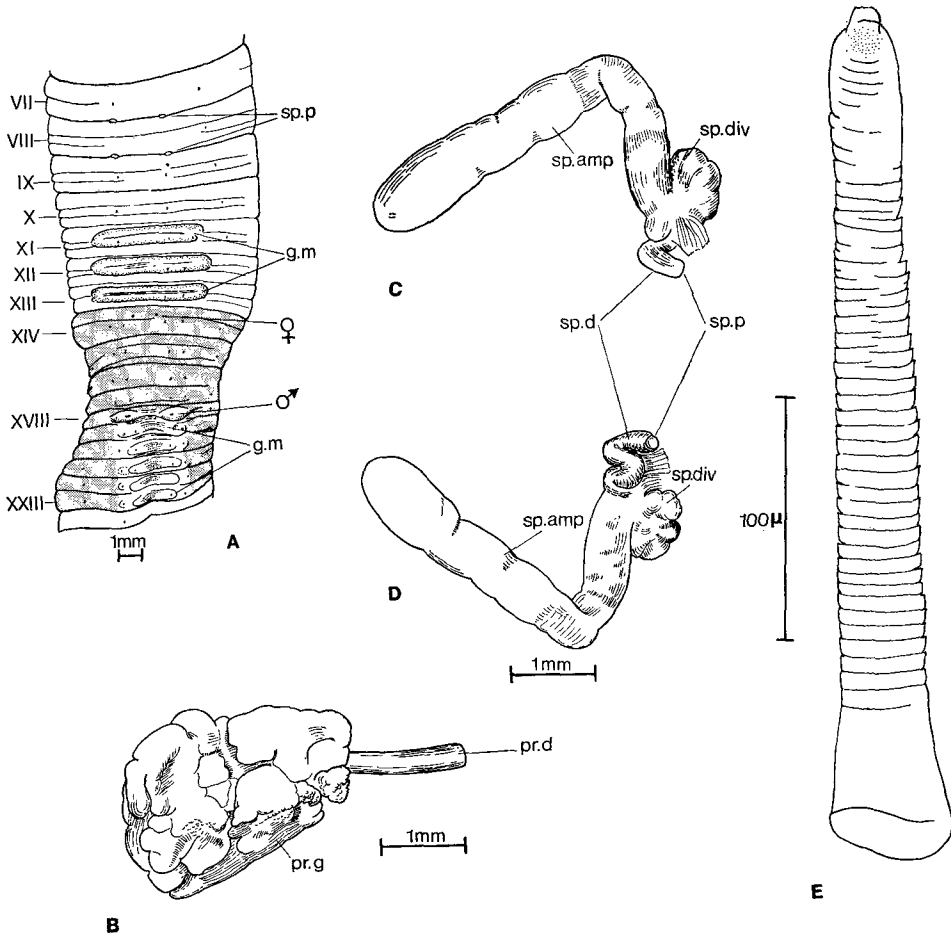


FIG. 1. *Notoscolex camdenensis* Fletcher, 1887 (specimen 1). A, clitellum and genital fields; B, left prostate dorsal view; C, D, dorsal and ventral views respectively of left spermatheca of IX; E, a reserve penial seta. All by camera lucida. Clitellum shaded. ♀, female pore; g.m., accessory genital marking; ♂, male pore; pr.d., prostate duct; pr.g., glandular portion of prostate; sp. amp., spermathecal ampulla; sp.d., spermathecal duct; sp. div., spermathecal diverticulum; sp.p., spermathecal pore.

together as a single composite duct on each side before entering the buccal cavity; the ductules of V entering the pharynx independently of the preceding nephridia but again associating on each side before joining the pharyngeal wall. Nephridia in VI consisting of numerous closely crowded tubules but apparently separate exonephric micromeronephridia. The succeeding nephridia, to and including those of XII, sparse (exonephric?) micromeronephridia at the junction of the posterior septa with the body wall; nephridia further posteriorly, as far as the caudal third, exonephric micromeronephridia equatorial on the body wall in each segment; nephridia of the posterior third consisting on each side in each segment of a median stomate exonephric megameronephridium, with preseptal funnel, lateral to which are 9 or 10 astomate micro-meronephridia lying equatorially on the parietes, approximately equally spaced and separated

by a considerable interval from their neighbours. Despite the large size of the stomate nephridium, its duct is thin and avesciculate, entering the body wall in *b* line. Small tongue-like testes and very large, iridescent sperm funnels free, in X and XI; small racemose, much divided seminal vesicles in XI and XII. Prostates one pair limited to XVIII, the gland compact and deeply lobulated, the straight, moderately muscular duct running medianly to reach the parietes and about half as long as the gland. Penial setae present. A reserve seta mounted for microscopic examination is short, straight and baton-shaped, widening at the base and rounded at the ectal end; from the rounded end, eccentrically, projects a short protuberance which appears cylindrical viewed from above or below but is apparently somewhat wedge-shaped, widening ectally, in profile. Ornamentation of the seta is very distinctive consisting of closely spaced annuli, with minutely serrated ectal borders, throughout the length of the seta with the exception of short basal and ectal regions; length of the seta  $353\mu$  (presumably greater when a seta has become functional); width shaft  $35\mu$ ; width base  $50\mu$ ; greatest width of ectal protuberance  $14\mu$ .

Ovaries and funnels not recognizable. Spermathecae 2 pairs, the ampullae exceptionally elongate and bent under the gut; the duct muscular, short, narrow and sinuous; a single multilocular inseminated diverticulum attached to the anterodorsal aspect at the junction of duct and ampulla. Length of the left spermatheca of IX = 5.7 mm; ratio of total length : length of duct = 5.8; ratio of total length : length of diverticulum = 11.6.

#### *Material examined*

3 clitellate specimens one of which is a posterior amputee (here designated lectotype and paralectotypes); 2 posterior ends; 1 intercalary portion; 1 prostomial portion: labelled only "*Megascolides camdenensis* Fletcher jar 3". New National Museum Registration Number G. 170. Fletcher gives the type-locality as Burrawang in the County of Camden.

#### **Discussion**

The above account largely confirms and considerably augments that of Fletcher. Location of the testes in XI and XII in Fletcher's account is not confirmed, the testes in the newly examined specimen occupying the normal location in megadriles, X and XI.

Very few species assignable to *Notoscolex*, as it was defined by Stephenson (1930), show sufficient general similarity with the type-species to suggest that they are congeneric with it. These species, all from New South Wales and Queensland, are *N. attenuatus* Boardman, 1931, *Cryptodrilus queenslandica* Spencer, 1900; *C. rusticus* Fletcher, 1887 (the type-species of *Cryptodrilus*) and *Notoscolex ulladullae* Boardman, 1931. Boardman's species are known to have megameronephridia median to micromeronephridia in posterior segments, as is revealed in the present study for *N. camdenensis*, but the condition in the two *Cryptodrilus* species is unknown. Formal restriction of the genus must be deferred until these species and others formerly referred to the genus are revised.

Demonstration of posterior stomate megameronephridia in *Notoscolex* indicates that its affinities lie with a *Dichogaster-Megascolides* group of genera (see Jamieson, 1971) and not with a group typified by *Megascolex* as proposed in the classifications of Gates (1959) and Sims (1966, 1967).

### Summary

Specimens of *Notoscolex camdenensis*, the type-species of *Notoscolex* are described for the first time since erection of the genus. The type-species is shown to have stomate megameronephridia median to micromeronephridia in posterior segments, a condition indicating that its affinities lie with a *Dichogaster-Megascolides* group of genera and not, as has previously been held, with a *Megascolex* group. Only four other species appear to be congeneric with *N. camdenensis*. These are endemic in New South Wales, like the type-species, or in Queensland.

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