

ON *HAPLOTAXIS ORNAMENTUS* SP. NOV.

(OLIGOCHAETA, HAPLOTAXIDAE) FROM TASMANIA

by

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Manuscript received : 1/4/80

Published 1/12/80

ABSTRACT

Haplotaxis ornamentus sp. nov. is described from Tasmania. It is a hologynous species with ornamented setae resembling those of species known from the Cordillera Cantábrica, Spain, the Pyrénées-orientales, and Pyrénées centrales, France, and caves in Bulgaria-Roumania-Yugoslavia.

INTRODUCTION

The family Haplotaxidae is discontinuously distributed around the world, but the species have limited distributional ranges apart from the various forms of *H. gordioides*, which seem to be at least holarctic, possibly cosmopolitan although mature specimens have yet to be described from various localities.

A new species has been found in Great Lake and Arthurs Lake, Tasmania, in large numbers, by the junior author.

Both of these lakes have had their levels raised for hydro-electric purposes but the new species has only been found in the original level of either lake. The depth of this part of Arthurs Lake is from about 8 to 12 m whilst in Great Lake it varies from about 12 to 18 m. Abundance varied considerably between sites and throughout the season with a maximum mean number per Ekman grab sample (232 sq. cm version) at any sample site of 7 in Great Lake and 20 in Arthurs Lake. Biomass estimates for this species varied with season and between sites up to a maximum of 90 g/sq.m at one site in Arthurs Lake.

Sediment analysis at the sites occupied by the new species showed that there was usually in excess of 50% by weight (often more than 75%) of the sediments below 63 μ in size. Organic content of these sediments ranged from about 5 to 20% as determined by weight loss on ignition.

Family HAPLOTAXIDAE

Genus *Haplotaxis* Hoffmeister, 1843

Haplotaxis ornamentus sp. nov.

Figures 1 - 5

Description : Large iridescent worms c. 120 mm long, 2-3 mm broad (preserved) purple-red in life. Prostomium prolobous, bluntly conical. Double annulation from V to about XIV, the anterior, non-setate ring just less than half the width of the larger setate ring, setae about two-thirds back from the front edge of the larger ring, a slight annular groove at the setal line of XIV. Setae closely paired, setal formula (at V) 8:1:5:1:8. Setae of a pair of different lengths, ventral anterior setae longer than the dorsals, reaching a maximum length in IX-X. Setae ornamented, with broad semi-lunar depressions scattered irregularly along the exposed parts, most abundant just below the curved, blunt tips. Genital pores (observable on detached cuticle) present, spermathecal pores in 6/7 and 7/8 ventro-lateral, median in the line b-c. Anterior male pores beside setae b in XI, those in XII behind 11/12 lateral to line b. Female pores in 12/13 and 13/14 in setal line ab.

Vascular systems prominent anteriorly, with long commissural vessels. The commissural vessels visible externally in II arise from the division of the dorsal vessel by the brain, those of III arise from behind that segment such that the dorsal vessel has a long, unbranched anterior portion. These commissurals unite to form a median ventral vessel in about V, beyond which the vessels are less prominent.

Intestine without crop or gizzard, roof of pharynx somewhat thickened. Pharyngeal glands present, ? in IV-VII. Intestine narrows from X to XV or XVI, widening to largely fill posterior segments.

Reproductive system with testes and large male funnels in X and XI, male ducts simple, more or less elongate but difficult to discern. Ovaries and female funnels in XII and XIII. Spermathecae somewhat cylindrical, ducts not much narrower than ampullae, which are filled with balls of sperm, paired in VII and VIII. Sperm sacs extensive, reaching from X to about XIII or more. Eggs sacs to XV.

Cocoons somewhat egg-shaped with elongate processes, single eggs.

Material : Collected from Great Lake, Arthurs Lake, Tasmania (W. Fulton coll.) at various dates.

Type series : fourteen mature specimens, grid reference DP 951 562 (Tasmanian Lands Dept. Tasmapi series), Arthurs Lake, Tasmania, 25.9.77, cocoons Tea-tree Bay, Arthurs Lake, 28.7.77.

Holotype : QVM type 372, 1980/14/1, specimen in fluid.

Paratypes : (i) QVM : QVM types 373-386, 1980/14/2-15, 13 specimens in fluid, 1 specimen, serial sections on 77 slides.

(ii) Brinkhurst Collection : Serial sections of two other specimens totalling 79 slides, and five slides from three other specimens.

DISCUSSION

Many of the species of the family Haplotaxidae are hologynous, as is the present species. Few of them have ornamented setae, however. The oldest known species with this characteristic is *H. bureschi* (Michaelson) from the Balkan states. In the description of this species cited by Brinkhurst (1966) and Brinkhurst and Jamieson (1971) the two-ringed segments are said to have the shorter, non-setate ring behind the larger setate ring, but this is clearly an error as the reverse situation is now suggested in recent accounts by Delay (1972, 1973) who described two species from the Pyrenees of France and Spain which are close to *H. bureschi* (and a third, *H. navarrensis*, which has setae both ornamented, like the above, and keeled like *H. leruthi* from France). Of these two species, *H. corbarensis* is smaller than *H. bureschi*, the setal ornamentation is more variable compared with what must be a new drawing from the type of that species, and there are differences in the setal formula ($U = 13aa$ as in Delay (1972), not $3aa$ as quoted in Delay (1973) for *H. corbarensis*). The second species, *H. cantabronensis*, has simple ornamentation which seems to be as helically arranged on the setae as that of *H. bureschi*. It has the same setal formula as the latter. The sexual setal glands are said to be on IX-XI in the new species but to occupy six segments in the older taxon, but various literature accounts described these glands as either single or paired in from one to six segments.

The separation of all three forms is based on quite slim differences.

The new species is immediately distinguishable by having only two pairs of spermathecae (a character liable to some variation in other species), a very different setal formula, more segments in a similar length, and some differences in setal shape and ornamentation. Its zoogeographic separation suggests the need for this ranking in this discontinuously distributed family, but is not regarded as a taxonomic character of course.

The Haplotaxidae, and also the southern hemisphere Phreodrilidae, are regarded as monogeneric families by the senior author, partly for convenience as there are so few species, partly as an expression of a lack of knowledge of the relative importance of, and intraspecific variation in, morphological characters commonly described. These are practical rather than systematic decisions. Righi *et al.* (1978) have recently described a new haplotaxid genus (*Tiguassu*) from the Brazilian Amazon. The prostomium has a proboscis, the anterior male funnels are non-functional and there is a single pair of ovaries and female funnels in XII, the female pore being in XIII. Spermathecae open laterally (as do the other genital pores) in 8/9 and 9/10. The absence of the anterior pair of testes is unique to this and the doubtful *Pelodrilus falcifer* Omodeo (from Africa), the proboscis is unique, but the absence of posterior ovaries is not. The ovaries of *P. falcifer* are in XIII while the testes are in XI, so the union of this with the genus *Tiguassu* seems unlikely. *P. falcifer* remains a sp. dub. *Haplotaxis brinkhursti* has testes in X-XI but ovaries only in XIII (Cook 1975).

The position of the Haplotaxidae as a stem family for the Haplotaxina, as suggested by Brinkhurst and Jamieson (1971), is clearly at odds with the traditional phylogeny, as illustrated by Knox (1972) after Pickford's account in Encyclopaedia Britannica 1962. In

these traditional versions the small Aeolosomatidae are thought to be primitive annelids that gave rise to the Naididae and Tubificidae, all of these with multiple setae derived from some polychaete-like ancestral form. The radiation of families from the Tubificidae shown by Pickford may not be generally accepted, but the derivation of the more terrestrial earthworms from the Haplotaxidae via some earlier aquatic forms is more soundly based, largely because earlier studies paid far more attention to the better-known larger worms.

If we accept the concepts outlined by Clark (1964) in his penetrating analysis of the origins and functions of the coelom and septa, we may envisage a very different sequence of events. The Aeolosomatidae have been shown by Brinkhurst (in Brinkhurst and Jamieson, 1971) to bear no anatomical similarities to Oligochaeta beyond their shared annelidan characteristics. Their reproductive system cannot be derived from the simple hologynous array of the Haplotaxida, and they must be regarded as a separate higher taxon containing from one to three families depending on the classification adopted. The Haplotaxidae fulfill the requirements for an ancestral form for the Oligochaeta, but most living species have already established the characteristic four setal pairs of their terrestrial descendants. Only *H. gordioides*, the one widely distributed species, has odd setae which may echo an ancestral form with few setae derived from some earlier non-segmented coelomate that may well have been ancestral to the few surviving taxa with such a structure. In *H. smithii* the male and female genital ducts are more or less the same, again a trace of a condition that would likely have been present in a primitive oligochaete. While most of the modern species may be thought to be most closely associated with the Lumbricina of Brinkhurst and Jamieson (1971) the senior author cannot agree with the most recent rearrangement of the classification by Jamieson (1978). In his most interesting study following Hennig's principals, Jamieson confirms an earlier change in position of the Moniligastrida from an Order to a Suborder of the Lumbricina, and this has been supported by the senior author elsewhere. The other change is to elevate the Tubificina from a Suborder to a full Order, shifting them outside the Haplotaxida. My objections to this are based on the fact that no representative of either the Order Lumbriculida or the Suborder Tubificina were involved in the computerised study, and Haplotaxina were represented by a single "characteristic" species, *H. violaceus*. The latter is closely allied to the terrestrial forms and other more advanced Lumbricina in that the male pores both lie on XII, anticipating the general rearward tendency in male pore position, the only species in the Suborder where this is reported. This, together with the non-representation of the aquatic groups, would inevitably skew the analysis towards the conclusion reached. The complaint, then is not with the consistency or logic of the result obtained, but its relevance to any consideration of the position of the Tubificina viz a vis the Haplotaxina. It is unfortunate that the state of so many species descriptions and the labour involved in entering all of them into the programme prohibits a complete analysis, but the clues available from a study of the fragmentary living remnants of a truly ancient family are such that they may readily be lost in computer systems no matter how carefully set up.

One significant feature of the Tubificina which causes many biologists to balk at this concept of their position is their multiple setae. It seems to be dogma that these setae are held-over from some previous polychaetine ancestor, largely because Polychaetes are marine and are therefore thought to be ancestral to terrestrial and freshwater oligochaetes. Again, I rely on Clark (1964) for the basis for rejecting this.

It so happens that more and more marine oligochaetes are now being discovered, some with quite elaborate adaptations, but most with very simple bifid setae. These do not seem to be primitive tubificids, (although the variation in prostate glands is becoming interesting). Many are members of the distinct subfamily Phallodrilinae. No relict oligochaete with polychaetine setae has been found. The complex hair and pectinate setae of many Tubificidae and Naididae are restricted to dorsal bundles but are not especially like those of polychaetes, and seem to the senior author to be an analogous development, like the simple eyes of the Naididae, a development for a swimming existence, since, abandoned by the tubificids. The Enchytraeidae have an enlarged setal number (though not often very many per bundle) and seem to have had bifid setae in their aquatic phase of evolution, now largely abandoned for a terrestrial existence (note *Propappus* the aquatic genus with bifid setae, said to be primitive). The Tubificidae may be showing a strong tendency to lose their elaborate setae, which seem hard to visualise as an adaptation to burrowing. Experiments with setal number are found in perichaetine earthworms, of course, and there seems no need to believe that multiplication of the setae has arisen only once in annelid evolution. In this sense the tubificine oligochaetes can be seen as an evolutionary line penetrating aquatic habitats after developing sexual reproduction and hermaphroditism at the earliest phase of oligochaete evolution. The functional basis of the former is generally held to be the needs for reproduction in a terrestrial environment, perhaps even an osmotically threatening freshwater environment that seems to be the ancestral home of most oligochaetes.

The functional basis of hermaphroditism seems to this author to require a breakthrough in understanding as significant as that brought to bear on the functions of the coelom by Clark (1964), as much of the received truth seems inadequate to explain its significance for the often astronomically abundant tubificids and its general widespread occurrence in "lower" phyla.

ACKNOWLEDGEMENTS

We are indebted to the Laboratory of Analytical Systematics of the Royal Ontario Museum, Toronto for provision of the sections. The Inland Fisheries Commission, Tasmania, supported the study during which the specimens were collected.

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FIGURE LEGENDS

- Figure 1. Disposition of male pores (M) and female pores (F) on ventral side of segments XI - XIII (diagramatic).
- Figure 2. Anterior blood vascular system A — ventral view, B dorsal view.
- Figure 3. Scanning electron micrograph of seta to show ornamentation (x 4800).
- Figure 4. Setae (scale = 0.05 mm).
- Figure 5. Spermatheca with sperm balls (scale = 0.1 mm).

Figure 1

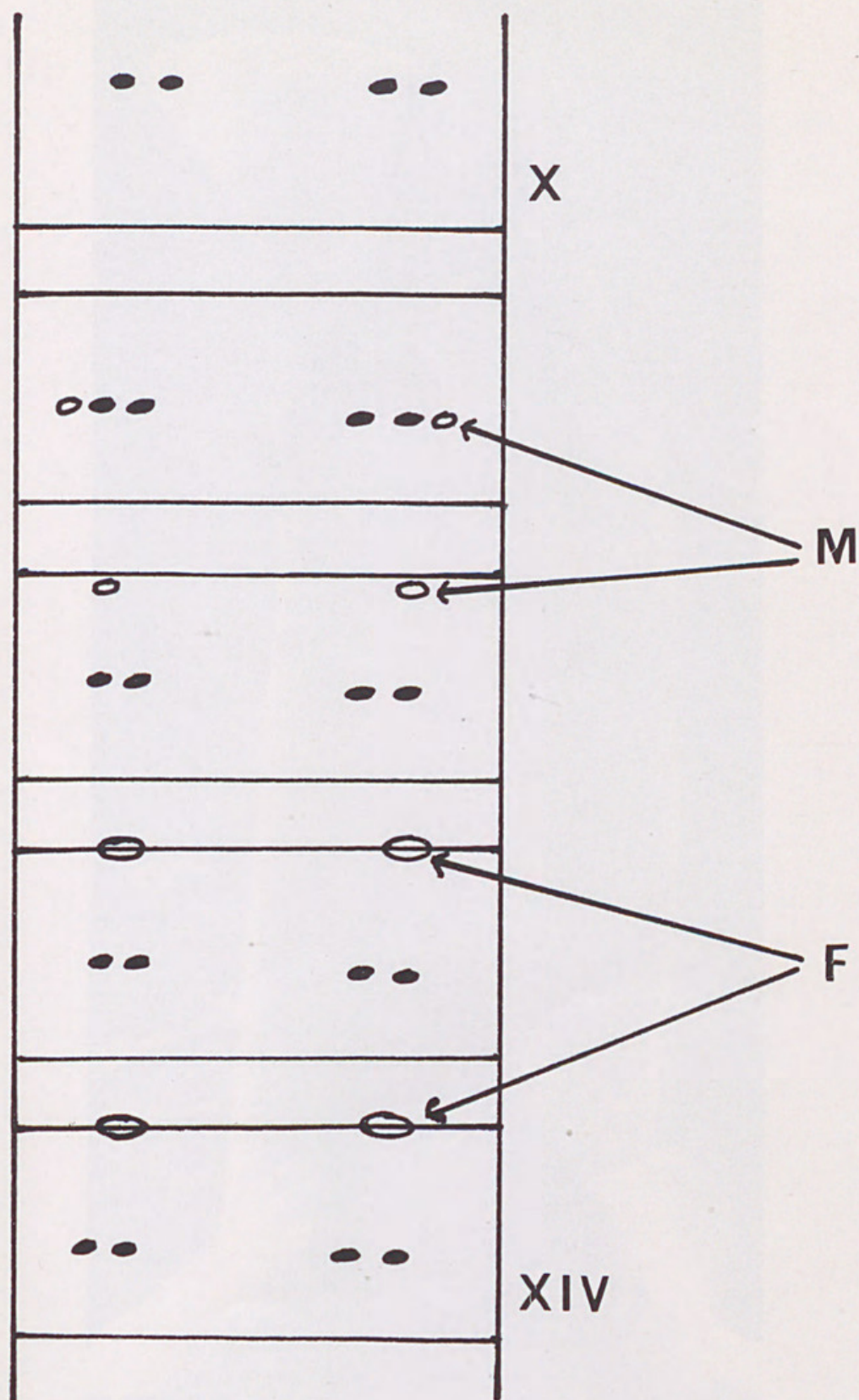


Figure 2A and 2B



Figure 3

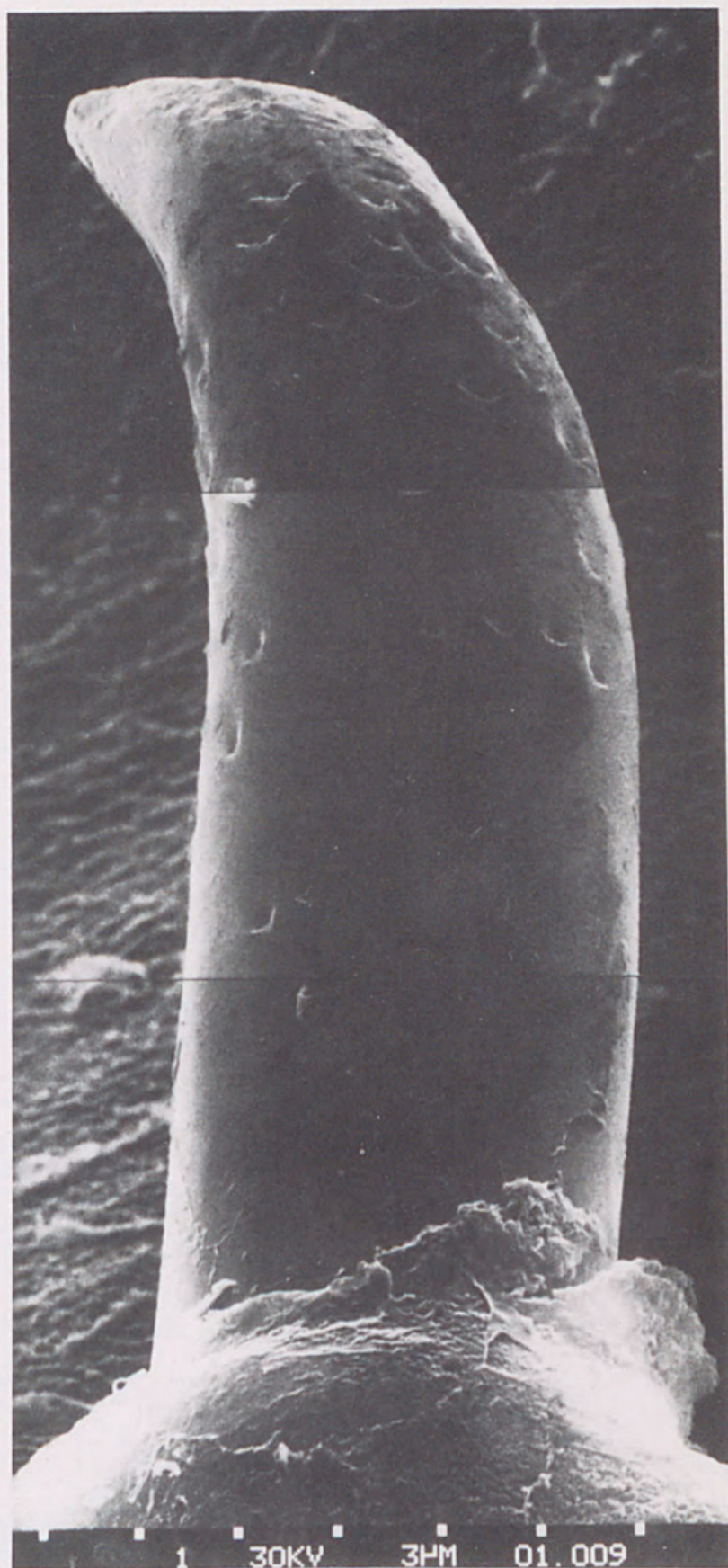


Figure 4

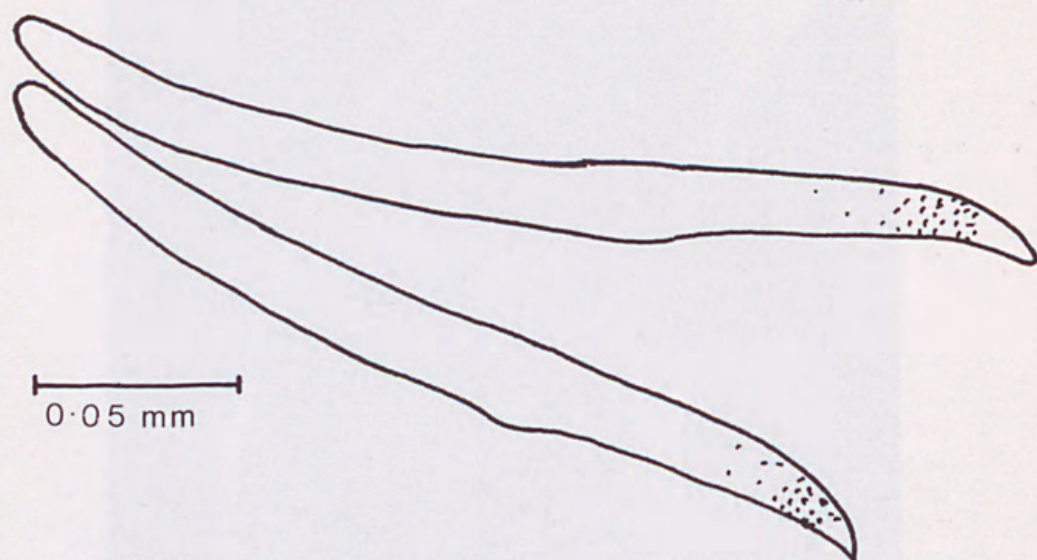
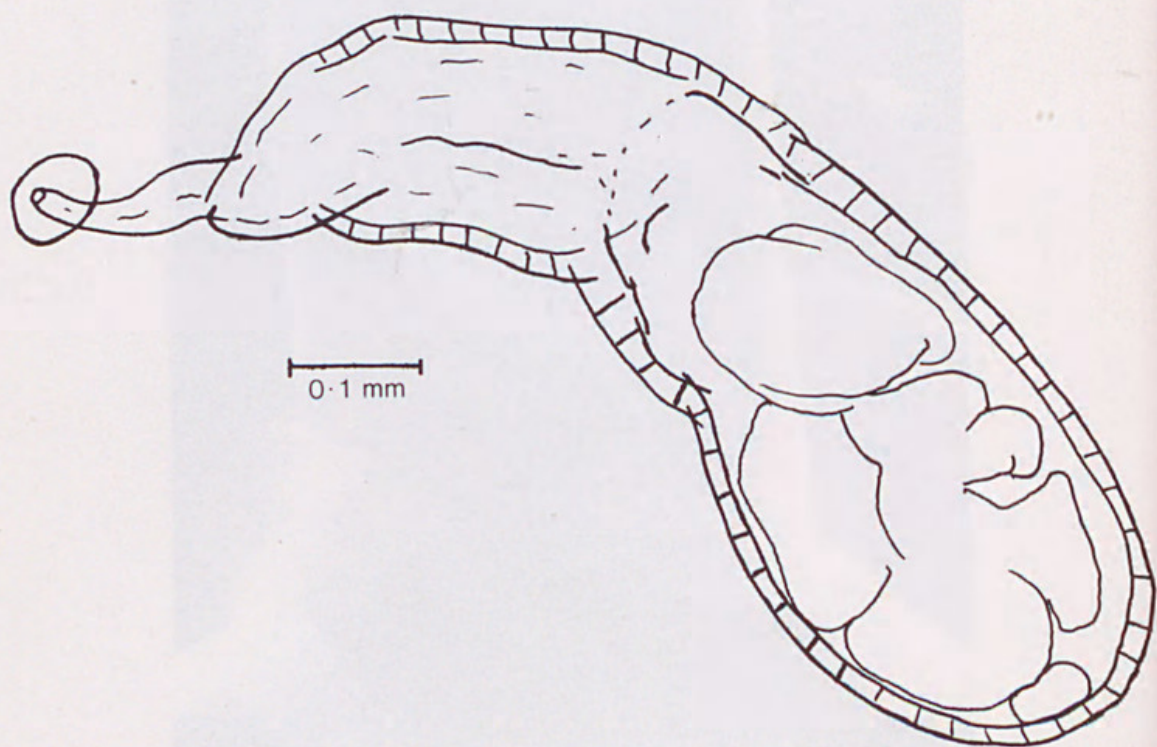


Figure 5





Brinkhurst, Ralph O. and Fulton, W. 1980. "On Haplotaxis ornamentus sp. nov. (Oligochaeta, Haplotaxidae) from Tasmania." *Records of the Queen Victoria Museum Launceston* 72, 1–8.

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