TREMATODES FROM TURTLES OF URUGUAY, VI.

Iagotrema uruguayensis n. gen., n. sp., Monogenea, Monopisthocotylea from the urinary bladder of *Hydromedusa tectifera* (Cope)

by

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Preface to Translation[1]

Translation of this paper was undertaken as part of a long-term research project on the systematics, host-specificity and zoogeography of monogenetic trematodes[2].

A conscious effort has been made to keep this translation as near the original as possible. It is probably inevitable, however, that some of the nuances of meaning in the original have been distorted or lost. For this we apologize to the author and the reader.

Certain passages were difficult to translate. Where a different English phrase seems to fit the author's meaning better or serves to clarify the text, it has been inserted in brackets. Certain obvious errors or misspellings in the original text were changed, less obvious ones are noted with (sic).

For convenience in referring to the Russian text the original pagination is given in the margin of the translation opposite the place where the new page begins. Occasionally figures or tables are somewhat displaced from their original page location; however, since they themselves, are numbered sequentially no confusion should result.

This translation is intended as a service to researchers. Though effort has been made to make it comprehensible, accurate and useful, it is likely that improvements can be made. Should literary improvements or verification appear desirable it is suggested that the researcher make his own translation. Pagination is arranged to facilitate such activity. We will appreciate constructive suggestions for improvements in this and future translations.

Thanks are due to Mrs. Patricia C. Morales of the Virginia Institute of Marine Science who transcribed, typed and assembled the manuscript, and to Miss Evelyn Wells who assisted with final editing.

William J. Hargis, Jr.

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[1]Virginia Institute of Marine Science Translation Series No. 13.

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Some specimens were mounted between a slide and cover slip without p2
exerting pressure, while others were mounted after being anesthetized with 1% cocaine chlorhydrate and fixed in 5% formalin, Bouin's solution or acetic sublimate. The latter were used for in toto drawings and histological sections, which were made in cross and saggital series 5μ in thickness and stained with haematoxylin-eosin. We also observed them in vivo for measurements and study of internal structure details, utilizing vital staining with neutral red.

The specimens mounted in toto were stained with acetic carmine. We used 1% potassium hydroxide for 12 to 24 hours to best expose the chitinous structures followed by staining with acetic carmine and clearing after dehydration with creosote

Iagotrema uruguayensis n. gen., n. sp.

External morphology: Observed in vivo and in situ by transillumination of the isolated bladder where they are found among the folds of the mucosa. In this locality they assume an ovoid shape with the greater axis longitudinally and the extreme ends very close to each other, presenting a convex shape when seen dorsally. Maximum length measurement when making translatory movements /stretched out/ is from 3.33 mm to 4.36 mm and width from 0.41 to 0.04 mm. The anterior end measures 0.41 mm and the posterior end 0.60 mm. Worms move very slowly, first affixing the posterior haptor close to the anterior haptor and then releasing the latter and attaching it further ahead in the plane of support. Their color is a rosy gray contrasting with the bladder mucosa, which is lighter. In ovigerous specimens the single, brown-colored egg stands out clearly.

Specimens mounted with slight pressure or previously anesthetized have an elongated ovoid shape with the anterior end narrower and truncated and measure 2.536 mm to 3.297 mm in length with a maximum width at the level of the ovary of 1.046 mm to 1.173 mm (Plate I).

The posterior haptor (Plate II, fig. 4) is subcircular, narrower than the body measuring 0.380 mm to 0.729 mm in transverse diameter and 0.412 mm to 0.539 mm in longitudinal diameter. It is not very muscular, weak, with a narrow margin provided with 14 larval hooks; there are other larval hooks in the surface of the haptor (Plate II, fig. 3). In the distal end of the posterior haptor are found two pairs of large anchors whose ends extend outward and whose proximal ends are bifurcated into subequal roots; the external or major roots measure 0.189 mm to 0.245 mm in length; the internal or minor p3
roots measure 0.122 mm to 0.155 mm (Plate II, figs. 1, 2 and 4).

The anterior haptor (Plate III, fig. 1) consists of two weak, circular, anterolateral suckers which are not connected to the pharynx, but measure 0.188 mm to 0.322 mm in diameter. Between these and occupying the anterior region of the body is found a group of cephalic glands (Plate IV, fig. 5) located dorsally.

Internal Morphology: Body wall. The cuticle is smooth, with slight undulations of the ventral surface and is of uniform thickness. Immediately inward is found the muscular layer which is very weak and zonally interrupted and is formed of two layers: a circular external one and a longitudinal internal. The cotylophore contains small numbers of radial muscular fibers.

A group of glandular cells (Plate IV, fig. 5) which open separately to the exterior, measuring 25μ to 29μ in length by 13μ to 15μ in width is found at the level of the anterior end, in a dorsal position, between the two anterior suckers. These glandular cells are loaded with secretory corpuscles that stain strongly with eosin. Their cellular membranes contain (individually) ovoid nuclei which are surrounded by little cytoplasm.

Digestive system. The mouth (Plate I), which appears as a transverse slit, is located in the ventral surface of the body at a distance of 0.178 mm to 0.310 mm from the anterior end, the end which, with its two suckers and medial glands, forms a true preoral cephalic lobe. Between the mouth and the pharynx exists a short zone of cuticular folding constituting a prepharynx (Plate IV, fig. 4).

The muscular pharynx (Plate I, fig. 4, far.; Plate III, fig. 1; Plate IV, fig. 3, far) has a cylindrical shape and is clearly visible in unstained specimens. It measures 0.488 mm to 0.590 mm in length by 0.488 mm to 0.550 mm in width and its anterior end is located 0.178 mm to 0.310 mm from the anterior end of the body. Studies of saggital and cross sections indicate that structurally it consists of a loose, peripherally arranged conjunctival covering /plus muscular tissues/. The muscular layers--listed from outside in-are: a fine circular external layer, a longitudinal internal one. Among the muscular layers are found some mesenchymal cells and others of a glandular nature which are loaded with granules. The mucosa is thin and finely undulated.

The pharynx is immediately followed by the intestine without an esophagus. Several ganglionic cells loaded with granules which stain weakly with eosin empty into the region of the pharyngo-intestinal junction.

The intestine (Plate I, fig. 4, int.) an immediate continuation of the pharynx, consists of two lateral ceaca directed posteriorly which join in front of the posterior haptor without extending into it. The intestinal wall is simple, formed by a single layer of cylindrocuboidal cells, with p4
basal nuclei which have loose chromation and a small excentric nucleolus. Their cytoplasm is granulated with numerous secretory vacuoles and their cell boundaries are not clearly defined, particularly in the free margin where they assume an irregular appearance.

Excretory system. We have been able to observe very little of the excretory system. In specimens examined in vivo we have only been able to discern the lateral trunks and the exterior pores, which are located at the level of the anterior end of the pharynx.

Nervous system. The cerebral ganglion (Plate III, fig. 1) is located over /under/ the ventral side of the pharynx, in its anterior third, immediately extending in front of the buccal slit /this is an unusual arrangement--W.J.H.Jr./. It has an ovoid shape along its major axis, formed by few cells with a clear cytoplasm, and a central, circular nucleus and a clearly defined mucleolus. From the periphery of the ganglion arise several nerve trunks which fade into the parenchyma.

Eyes are lacking in mature individuals but in immature forms two pairs, a smaller anterior pair and a larger posterior pair, are located dorsally to and projecting over the antero-lateral margins of the pharynx. They are very clearly seen in specimens examined in vivo (Plate I, fig. 1).

Genital system (Plate IV, fig. 1). The common genital pore (p. gen.) is ventral and medial, located immediately behind the pharynx, at a distance of 0.951 mm to 1.046 mm from the anterior end of the body. It is circular and opens into the genital atrium into which the male and female genital ducts empty.

Male genital system (Plate I, fig. 4; Plate IV, figs. 1,3 and 6). The testis (test.), a single organ of irregular shape, is located in the posterior half of the body occupying the intracaecal space behind the ovary. In some specimens it is ribbon-shaped, turning around upon itself forming several loops; in others, especially in immature specimens, it has a very irregular quadrangular shape leaving orifices or lacunae which are occupied by the mesenchyme (Plate I, fig. 1). In general it measures 0.233 mm to 0.317 mm in width, with a length of from 0.380 mm to 0.455 mm. The vas deferens (def.) which arises from its anterior end extends forward along the left side of the body, leading first to an elongated seminal vesicle (vas. sem.) and then to a strongly muscular, spherical peneal bulb (bul. pen.). The genital armature is formed by the peneal stylet /"estilete peneano"/ which measures 0.152 mm to 0.189 mm and two basal plates /accessory pieces/ which measure 0.051 mm to 0.067 mm (Plate IV, fig. 2). A group of very well developed prostatic glands at the level of the peneal bulb composed of three glandular sets, two lateral and one medial (gl. pr.), open.

Female genital system. The comma- or pear-shaped ovary (Plate I, fig. 4, ov.; Plate III, fig. 2) is located at the level of the middle of the body on the right side, intracaecal and caecal. The major axis is obliquely inward from the distal, posterior end. It measures 0.144 mm to 0.174 mm in length by 0.158 mm to 0.222 mm in width at its wider distal end. The oocytes in the distal end are small and numerous, increasing in size the closer they are to the oviducts. Mature oocytes are spherical, measuring 38 to 40 /microns?/ in diameter, with a central nucleus which measures 12 to 14 and a voluminous nucleolus, spherical and also central, which measures 8. The oviduct is short receiving the common vitelline canal (c. vit.) and then the seminal receptacle (recept. sem.) which is

large and clearly visible. Its energetic and regular contractions can be seen in vivo. The ootype is a short canal extending from the oviduct into which opens a very well developed Mehlis gland (gl. Mh.). which is transaversely situated. The short uterus (ut.) is medial and occupied by a single egg. The latter, observed in vivo, measures 0.370 mm long by 0.297 mm wide. The vitelline glands are very well developed occupying the lateral extracaecal and caecal fields and extending anteriad to the middle of the pharynx and posteriad to variable distances from the posterior haptor, generally to the level of the junction of the intestinal caeca. No vagina exists.

Discussion: Of the three superfamilies[1] that comprise the

Footnote 1

[1]The systematics of monogenetic trematodes is still in an initial stage, thus making it impossible to adopt criteria the solidity of which would remain unquestionable. Only better knowledge of these trematodes will, in time, provide a base for a correct interpretation of their phylogeny and rational systematics. We adopt the subdivision of the suborder Monopisthocotylea Odhner, 1912 into three superfamilies (Price, 1937; Sproston 1946; Brinkmann, 1952). We have not adopted Bychowsky's (1957) new classification because the arguments serving as a basis for his classification, in many aspects totally new and invested with great interest, have not been translated from the Russian. Hargis, 1955, also settles for the temporary retention of the three superfamilies of Monopisthocotylea for the same reasons.

Monopisthocotylea, we first eliminate the Acanthocotyloidea Sproston, 1946, because it is readily separated by its very special characteristics: the posterior haptor in the adult is a new structure, modified in variable ways which develops immediately in front of the larval haptor which is, nevertheless, retained, and which may be provided with spiny structures but never with anchors (Sproston, 1946). This new form is separated /from/the two remaining superfamilies, Gyrodactyloidea Johnston and Tiegs, 1922 and Capsaloidea Price, 1936, by important elements making it impossible to include it in either.

For example, the anterior haptor of the Gyrodactyloidea consists of anterolateral cephalic organs connected to more posterior cephalic glands. In the Capsaloidea, a structure similar to the one mentioned /for Gyrodactyloidea/ is either present or completely absent. When present it is in the form of an oral sucker or pseudosucker or of two lateral suckers or of glandular furrows. Because of the nature of the anterior haptor, Iagotrema approaches more closely the descriptions given for this second superfamily. p6

The posterior haptor of the Gyrodactyloidea is very characteristic, with one or two large anchors supported by one or two, rarely three, chitinous /cuticular/ bars. In the Capsaloidea the posterior haptor is discoid, large, muscular, with the ventral surface frequently divided by septae delineating depressions in the form of small suckers, with or without large anchors. If anchors are present they never have supporbing bars. In our species the posterior haptor resembles that of Capsaloidea in the absence of supporting bars, even t hough it is not septate. It has a weak and poorly muscular constitution very similar to that in Udonella Johnston, 1835.

The genital pore can be medial or lateral in both superfamilies. The cirrus, generally cuticular, does not have accessory structures in the Capsaloidea, while in the Gyrodactyloidea it is provided with a more or less complex chitinous /cuticular/ accessory apparatus. The chitinous /cuticular/ cirrus of Iagotrema has a complex apparatus, also chitinous /cuticular/ at its base thus resembling the cirrus of the Gyrodactyloidea closely.

We therefore propose to include this new form of Monopisthocotylea, in the newly created family and superfamily, Iagotrematoidea, with the following diagnosis.

Anterior haptor present, consisting of two lateral suckers. Anterior cephalic glands present. Posterior haptor discoidal, with smooth ventral surface, 14 marginal larval hooks, two pairs of large anchors, and nó supporting bar. Intestine saccular, without diverticulae. Common genital pore medial. Cirrus simple, chitinous with a complex chitinous basal apparatus. Vagina absent. Oviparous. Parasites of fresh-water turtles of South America.

This superfamily would be located as an intermediate group between the superfamilies Gyrodactyloidea and Capsaloidea, since it possesses characteristics clearly equidistant /from the two/.

Turtles are the only reptiles parasitized by monogenetic trematodes, all of them belonging to the suborder Polyopisthocotylea and the family Polystomatidae Gamble, 1896. A small number of genera, Polystomoides Ward, 1917, Neopolystoma Price, 1939, Polystomoidella Price, 1939, have been described from the urinary bladders, nasal fosae or the pharynx /esophagus/ of turtles. The other genera of the family parasitize the eyes of the rhinoceros /hippopotamus/ (Oculotrema Stunkard, 1924, monotypic species) or the urinary bladder of batrachians in the adult stage and the gills of tadpoles in their neotenic form (Polystoma, Zeder, 1800; Diplorchis Ozaki, 1931; Parapolystoma Ozaki, 1935), (Price, 1939).

The discovery of a Monopisthocotylea in turtles constitutes, p7
therefore, a completely new fact, no other member of this suborder is known to parasitize vertebrates other than fish, where almost all occur with the exception of a small number of forms which parasitize crustaceans (Udonella caligorum Johnston, 1835; Capsala biparasitica Goto, 1894) and one species in the gills of cephalopods (Isancistrum loliginis de Beauchamp, 1912).

Of the Monopisthocotylea known to South America none parasitizes fresh-water hosts, Fredericianella ovicola Brandes, 1894, found among the eggs of Trachysurus barbus Lacep. (= Arius commersoni Gthr.), is really marine even though this fish invades brackish waters of the rivers and streams in southern Brazil and Uruguay.[1]

Footnote 1

[1]Berg, C. Enumeración sistemática y sinonímica de los peces de las costas argentina y uruguaya. An. Mus. Nac. Buenos Aires, 2ª ser., 4:22, 1895; Ringuelet, R. A. y R. H. Aramburu. Peces marinos de la República Argentina. Clave para el reconocimiento de familias y géneros. Catálogo crítico abreviado. Agro, 2:53, 1960.

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PLATE I

Iagotrema uruguayensis n. gen. n. sp.

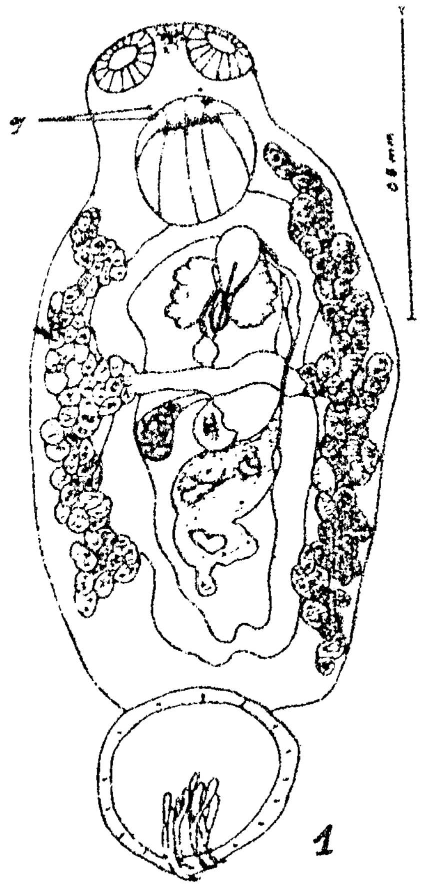
1. Whole mount, ventral view, of a juvenile individual with two pairs of juxtapharyngeal eyes.

2. Whole mount, dorsal view, of a mature non-ovigerous individual.

3. and 4. Whole mounts, dorsal view, of mature ovigerous individuals.

Abbreviations employed in the plates:

arm. gen.,	genital armature
bul. pen.,	penis bulb
c. vit.,	vitelline canal
def.,	vas deferens
far.,	pharynx
gl. cef.,	Cephalic glands
gl. Mh.,	Mehlis' glands
gl. pr.,	prostatic glands
gl. vit.,	vitelline glands
int.,	intestine
ov.,	ovary
p. gen.,	genital pore
recept. sem.	seminal receptacle
test.,	testis
st. pen.,	penis stylet
ut.,	uterus
vit.,	vitellarium
v. ant.,	ventral sucker
ves. sem.,	seminal vesicle



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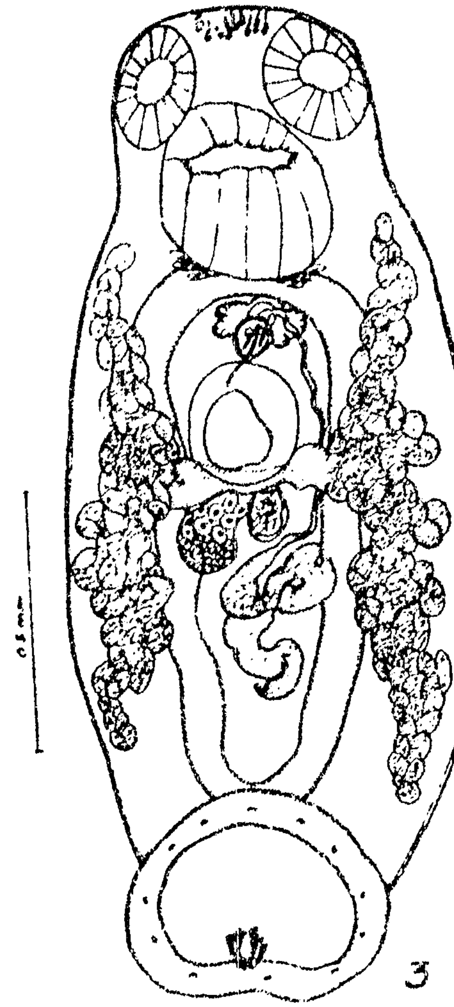

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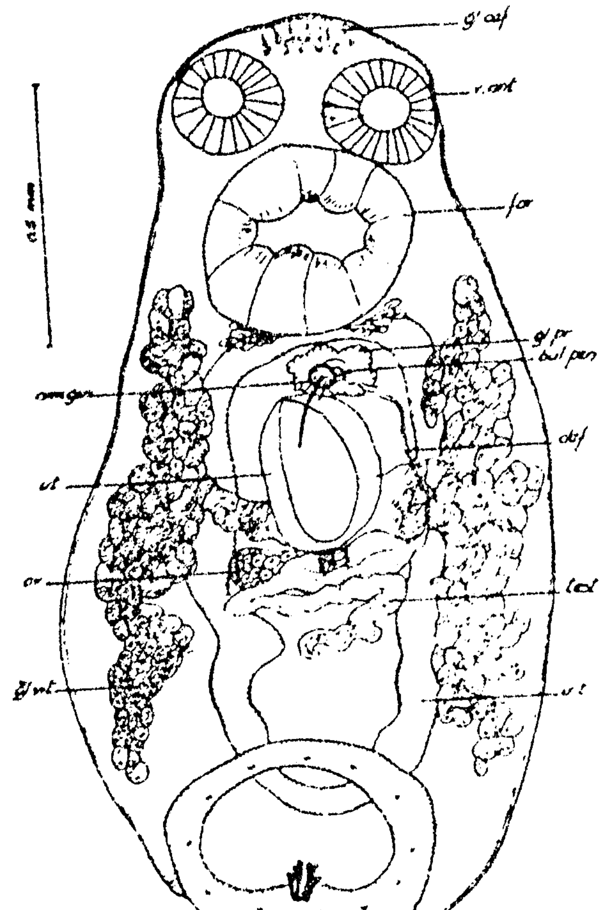

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PLATE II

1. Anchors of the posterior haptor, seen in their natural relationship.

2. Anchors of the posterior haptor, from left to right; two major or internal anchors and one minor or external anchor.

3. Larval hook.

4. Posterior haptor with the crown of larval hooks and the posterior anchors.

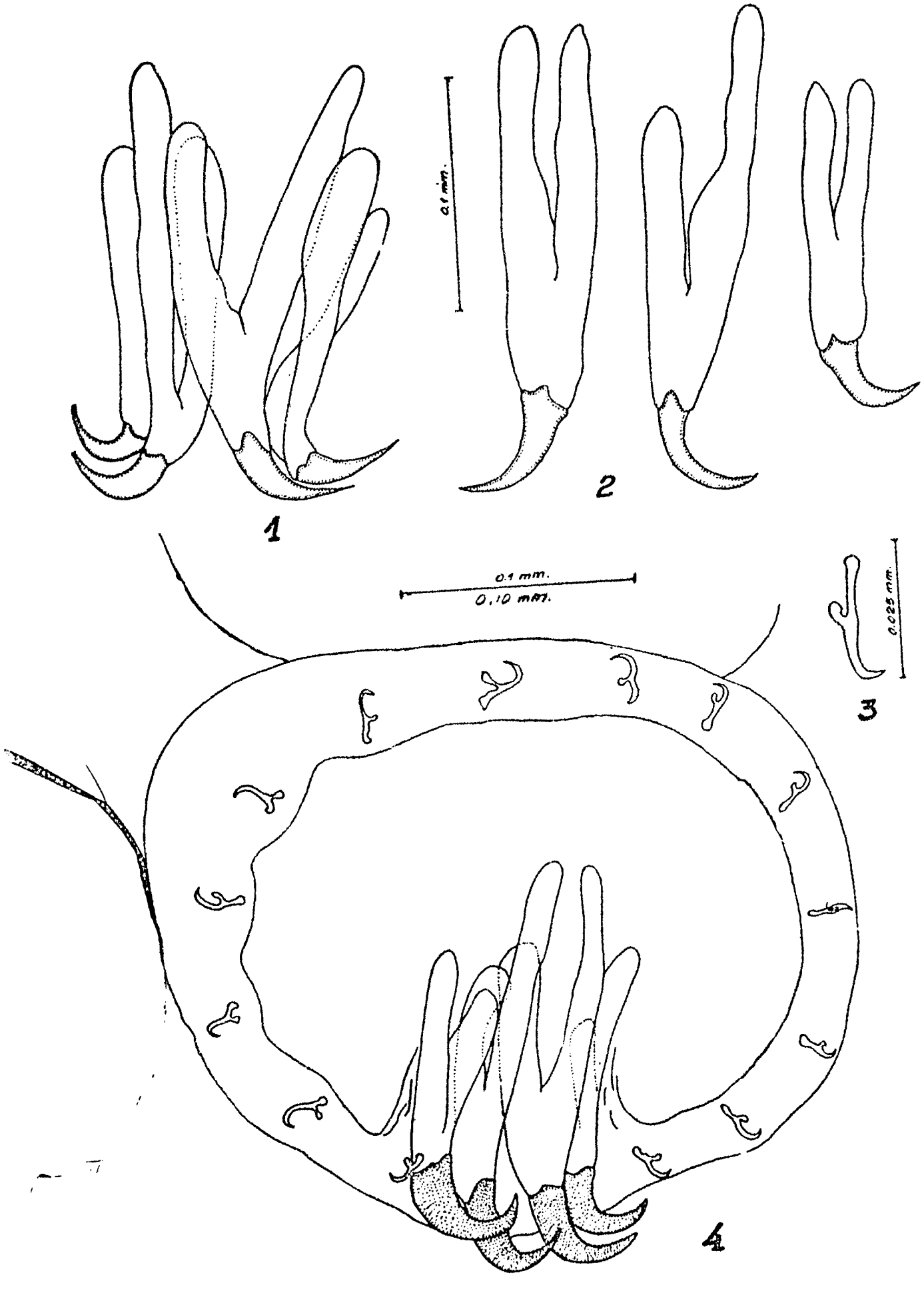
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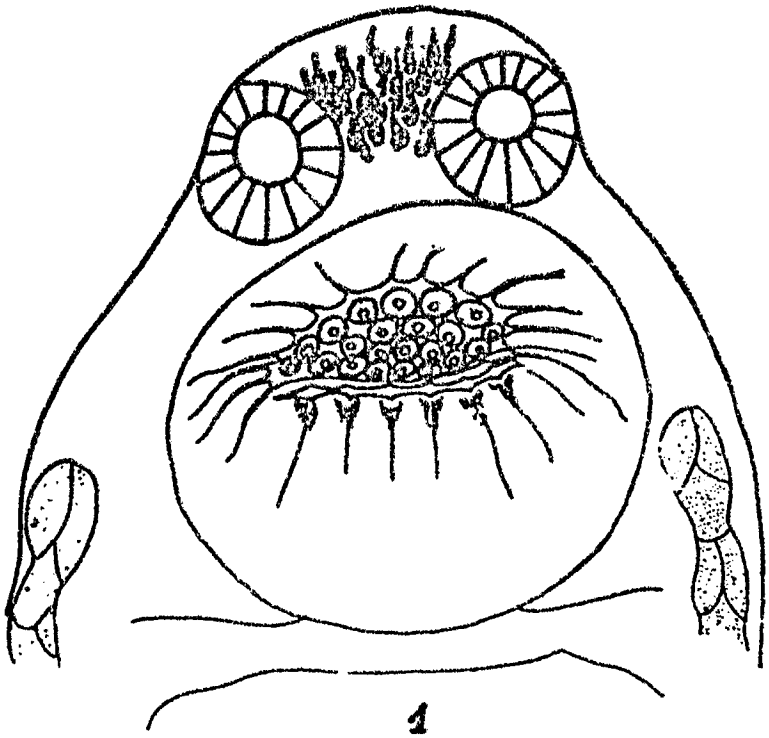
PLATE III

1. Anterior end of the body. The cerebral ganglion can be seen projecting from the anterior part of the buccal slit.

2. Ovary, cross-section following the major axis.

3. Cross-section of the intestine at the level of the middle third of the body.



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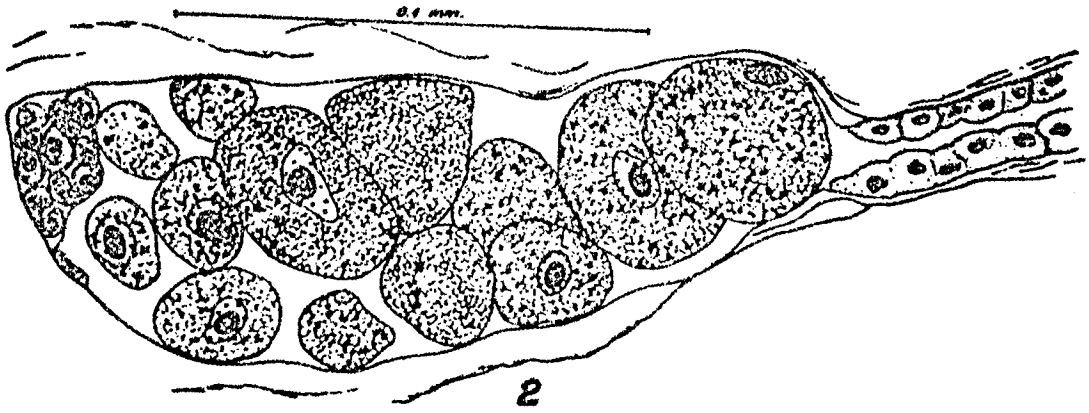

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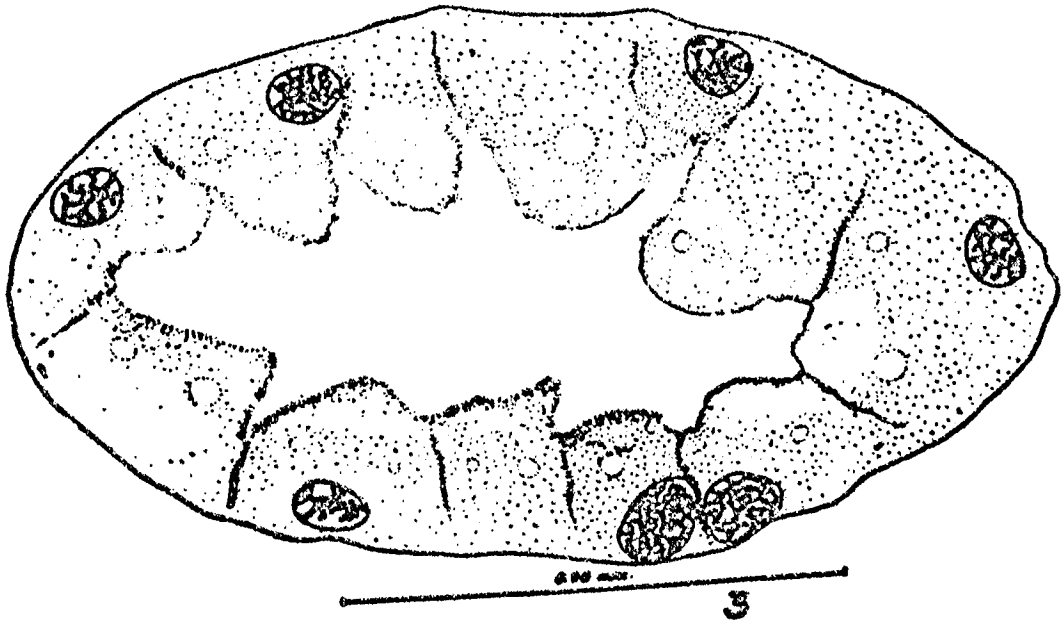

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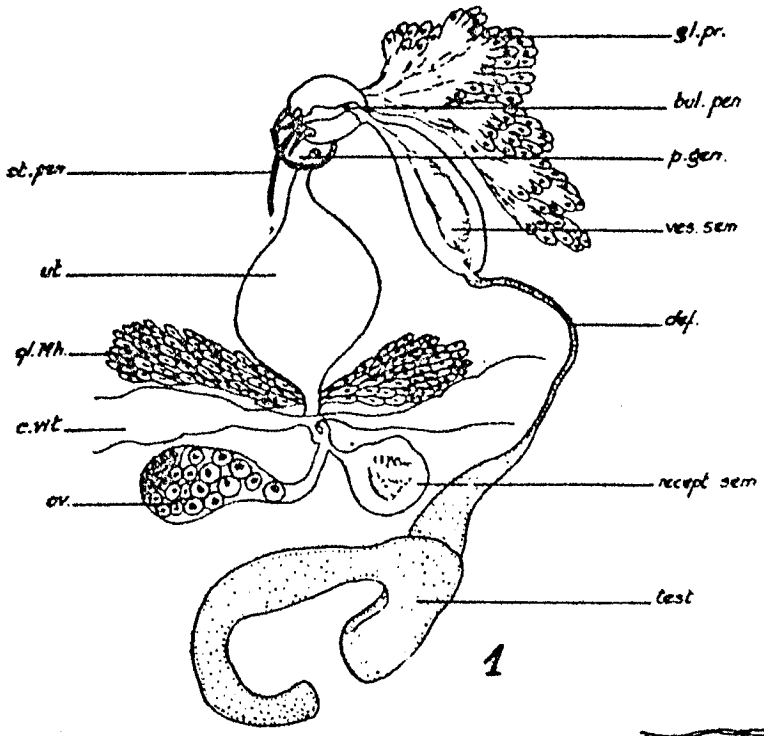
PLATE IV

1. Semi-schematic drawing of the genital apparatus.
2. Peneal bulb and genital armature.
3. Sagittal section through the middle of the body.
4. Sagittal section at the level of the pharynx and the buccal vestibule.
5. Localization and distribution of the cephalic glands.
6. Cross-section at the level of the genital pore.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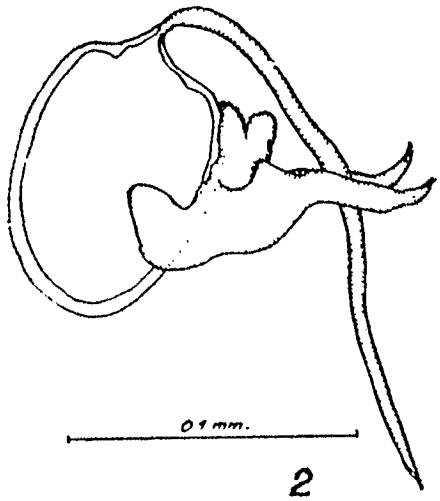
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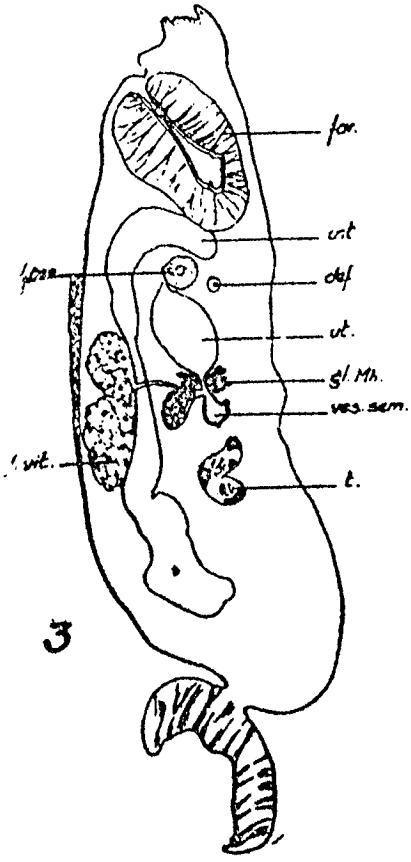
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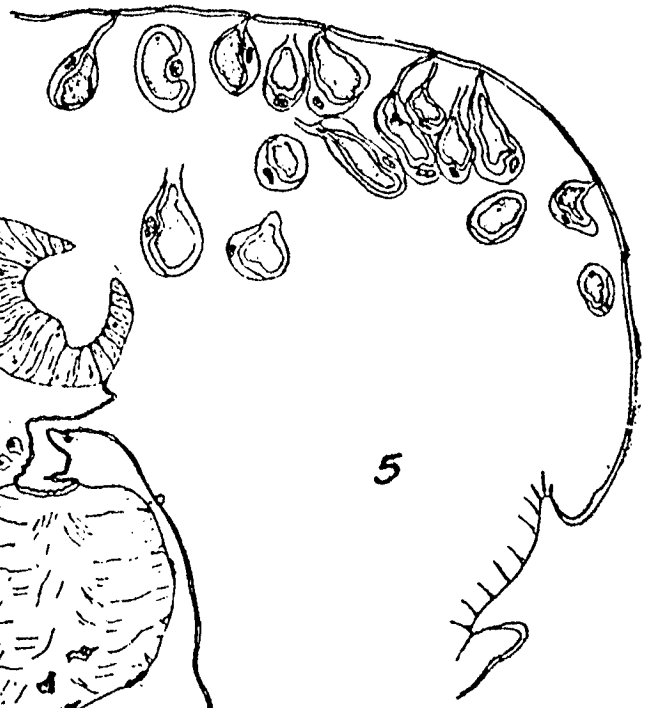

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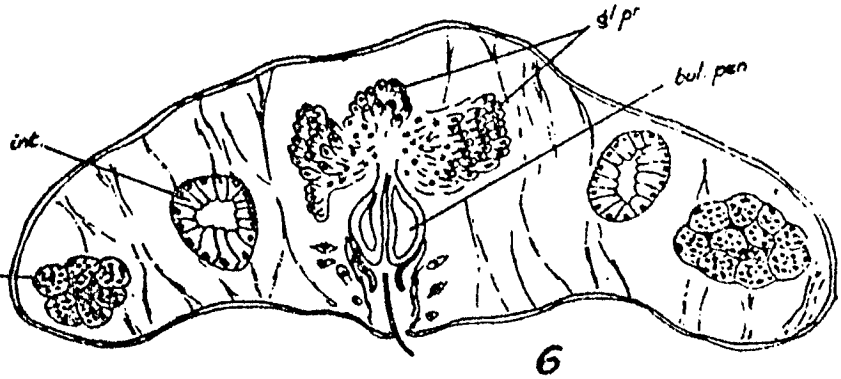
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