SOME CESTODA DESCRIBED BY BEDDARD, 1911-1920

BY

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Between the years 1911 and 1920, Professor Beddard published in the *Proceedings of the Zoological Society of London* a series of papers dealing with new and known species of Cestoda collected from the animals dying in the Society's Gardens.

A few years ago, Professor Fuhrmann obtained the loan of some of Professor Beddard's types and co-types with the intention of re-examining and eventually redescribing them. However, more important matters having delayed this work, Professor Fuhrmann asked me to undertake it. I tender my sincerest thanks to Professor Fuhrmann for this material, as well as for his kindly advice.

The Cestoda of which we have been able to examine the types or co-types are the following. The names printed in small italics must fall and be considered as synonyms.

1. *ANOPLOTAENIA DASYURI*, Beddard, 1911.
2. *DASYUROTAENIA ROBUSTUS*, Beddard, 1912.
3. *Hyracotaenia hyracis*, Beddard, 1912.
4. *Hyracotaenia procaviae*, Beddard, 1912.
5. *Inermicapsifer capensis*, Beddard, 1912.
6. *Monoecocestus erethizontis*, Beddard, 1914.
7. *Otidiotaenia eupoditis*, Beddard, 1912.
8. *Thysanotaenia gambianum* (Beddard, 1911).
9. *THYSANOTAENIA LEMURIS*, Beddard, 1911.

We have ourselves already re-examined Nos. 3, 4, 5, and 8, and have published our results in a preliminary report (1924). Our conclusions were as follows: *Hyracotaenia hyracis* = *Inermicapsifer capensis* = *Inermicapsifer hyracis* (Rudolphi, 1810), *Hyracotaenia procaviae* = *Inermicapsifer pagenstecheri* (Setti, 1897), and *Thysanotaenia gambianum* = *Inermicapsifer guineensis* (Graham, 1908). No. 7 has

been re-examined by Skrjabin (1914) who finds *Otidiotaenia eupoditis* to be a synonym of *Schistometra conoides* (Bloch, 1782).

We will now consider the remaining species.

ANOPLOTAENIA DASYURI, Beddard, 1911

Synonym :—

Oochoristica dasyuri (Beddard, 1911), Meggitt, 1924.

Host :—*Sarcophilus satanicus*, Thomas. Locality :—Tasmania (Lond. Zoo.).

Of this worm we were able to examine two entire specimens and a few fragments. The length of the largest specimen is 23 mm., and the greatest width is 1 mm. There are altogether about thirty-one segments ; these are at first broader than long ; they then become square, and finally longer than broad, the last segments measuring 2·7 mm. in length, and 1·4 mm. in width.

The *scolex* is very typical, and measures about 0·86 mm. in diameter ; it is provided with four very large suckers, oval in shape

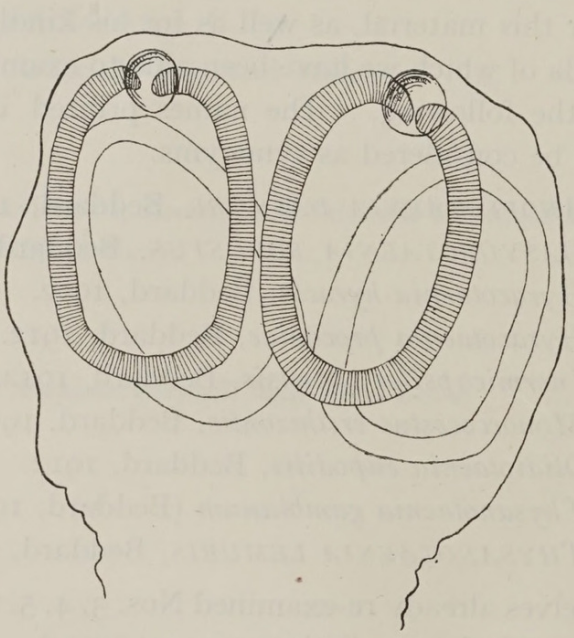

Fig. 1. The scolex of *A. dasyuri*, Beddard.

(fig. 1) measuring 0·48 : 0·29 mm. Neither in whole mounts nor in sections is there any trace of a rostellum. On page 1005, Beddard (1911b) states that ' there is in the same way a kind of hint of a

commencing pseudo-scolex.' What Beddard saw, and interpreted in the above manner, is nothing less than the folds arising from the contraction of the first segments of the strobila.

The cuticle is 3·8μ thick; there are no calcareous corpuscles. The musculature is fairly well-developed. The longitudinal musculature consists of two layers, one outer layer of stout fibres irregularly dispersed throughout the cortical parenchyma, and reaching almost as far as the cuticula (fig. 2), and one inner layer

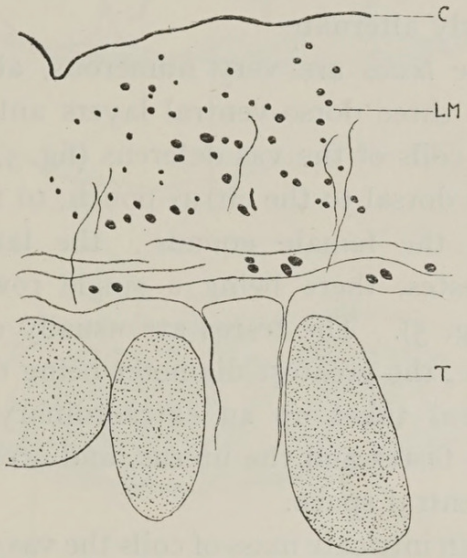

FIG. 2. *A. dasyuri.* A portion of a transverse section. C.—cuticula; L.M.—longitudinal musculature; T.—testes.

of very stout fibres, usually found in pairs, but not forming bundles as described and figured by Beddard (*loc. cit.*, p. 1005, fig. 209). We have, however, occasionally found the latter disposition in the last segments of the strobila. The transverse muscles are but feebly developed; they roughly form two layers separating the inner longitudinal muscle layer from the outer layer on one side, and from the medullary parenchyma on the other. Dorso-ventral fibres are fairly numerous throughout the strobila.

The two longitudinal *nerves* are very much compressed laterally, and measure 15·5μ, the greatest diameter being dorso-ventrally.

The *excretory system* is well developed, and consists of the usual four longitudinal vessels. The ventral vessels are about 0·03 mm. in diameter on transverse sections, and present a very typical aspect in the end segments. At the point where the transverse vessel branches

off, the ventral vessel suddenly swells out, forming a kind of reservoir. This disposition is fairly common among Cestodes, and is also found in *Hemiparonia cacatuae* (Maplestone, 1922), described below. The dorsal excretory vessels are not more than 0·009 mm. in diameter, and are situated dorsally and slightly internal to the ventral vessels. The genital ducts pass between the dorsal and ventral excretory vessels. We have been unable to determine with certainty the position of the longitudinal nerve stem with regard to the genital ducts ; it seems, however, to lie ventral to the latter. The genital pores are irregularly alternate.

Genitalia. The *testes* are very numerous, about 300 or more, and lie in two to three dorso-ventral layers anterior to the cirrus pouch and to the coils of the vas deferens (fig. 3, B). There are no testes to be found dorsal to the cirrus pouch, to the coils of the vas deferens, and to the female gonads ; the latter are, however, surrounded by testes, there being a single row posterior to the vitelline gland (fig. 5). The testes are usually close together, and are ovoid in shape, the greatest diameter being dorso-ventrally.

The *vas deferens* takes up an extraordinary amount of room, pushing aside the testes and the uterus, and occupying most of the available dorso-ventral space.

After forming an intricate mass of coils the vas deferens penetrates into the cirrus pouch. The latter has been described at much length by Beddard, who has, however, failed to interpret this organ correctly, and has caused much confusion by trying to distinguish within the cirrus pouch a vas deferens, a cirrus and a penis. The cirrus pouch is almost spherical in shape, usually broader than long. It measures 0·19 mm. in length, and 0·21 mm. in diameter. Its walls are fairly muscular, and are 5μ thick, being chiefly constituted of longitudinal fibres. Within the pouch the vas deferens forms several loose coils, which Beddard (*loc. cit.*, p. 1015) has interpreted as the cirrus. The *cirrus* is 0·21 mm. long and 0·03 mm. in diameter ; it is unarmed and somewhat swollen towards its extremity, and possesses a *terminal* pore. Beddard's drawing and description of a lateral pore are, of course, due to oblique sections. The cirrus is covered with a fairly thick cuticle, the latter being usually thicker towards the base of the cirrus. Within the cirrus pouch are to be found numerous muscle fibres acting, no doubt, as *retractores*

cirri. There are also numerous small cells with large nuclei, which we believe to be the myoblasts of the above muscles. The cirrus pouch opens into a genital atrium, which is extremely characteristic, reminding one in some ways of a similar

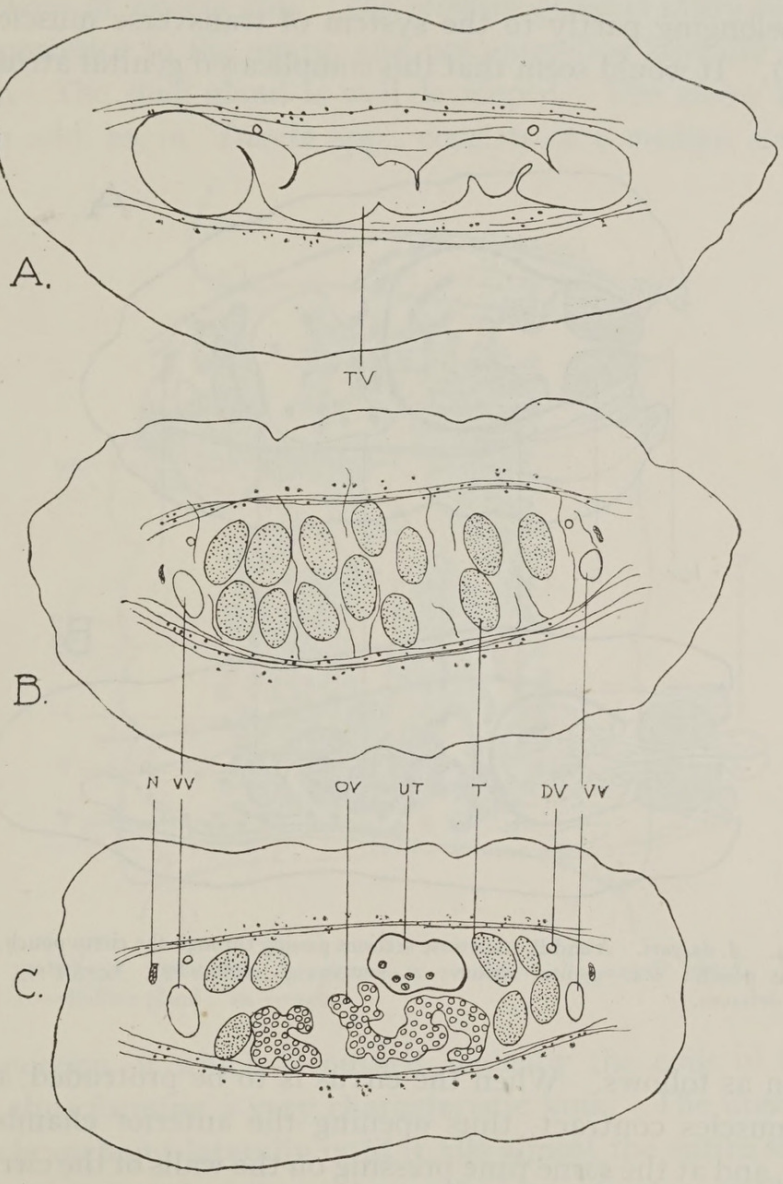

FIG. 3. *A. dasyuri*. Transverse sections: A, between two segments; B, anterior to the cirrus pouch; C, posterior to the cirrus pouch. D.V.—Dorsal excretory vessel; N.—nerve; OV.—ovary; T.—testes; T.V.—transverse vessel; V.V.—ventral excretory vessel; UT.—uterus.

structure found in *Tetrabothrius* spp. The genital atrium may be divided into two regions and not into three or four, as Beddard describes. Immediately next to the cirrus pouch we find a tremendous

sphincter muscle 0·12 mm. in diameter, and 0·1 mm. thick on transverse sections. Curiously enough, this sphincter is pierced laterally to permit the vagina to open into the atrium. Beyond the sphincter we find a second region or atrium proper, the walls of which are provided with numerous radiating muscle fibres, the latter belonging partly to the system of transverse muscles (fig. 4, A and B). It would seem that this complicated genital atrium would

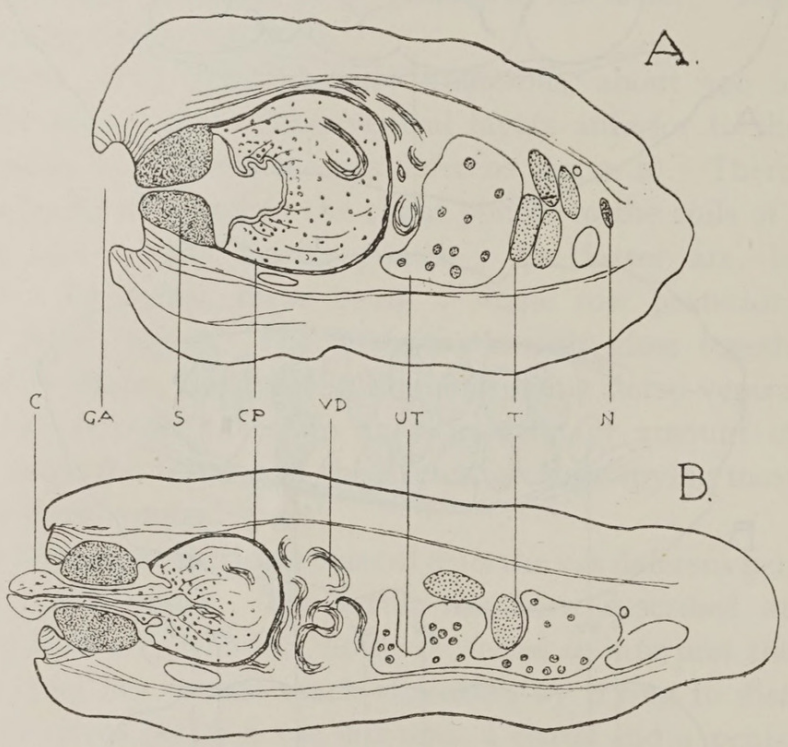

FIG. 4. *A. dasyuri.* A and B, transverse sections passing through the cirrus pouch. C.—cirrus; C.P.—cirrus pouch; G.A.—genital atrium; N.—nerve; S.—sphincter; T.—testes; UT.—uterus; V.D.—Vas deferens.

function as follows. When the cirrus is to be protruded, the transverse muscles contract, thus opening the anterior chamber of the atrium, and at the same time pressing on the walls of the cirrus pouch, causing the cirrus to evaginate; cross-fertilisation is thus made possible. When, however, the sphincter is closed, then self-fertilization is rendered possible, the seminal fluid being expelled through the contractions of the muscular walls of the cirrus pouch. The *vagina*, as we have already mentioned, perforates the sphincter laterally, and passes posterior to the cirrus pouch after forming

a sudden curve, almost at right angles (fig. 5). In its distal portion the vagina forms a distinct and fairly large receptaculum seminis. The *ovary* consists of two wings, of which the poral one is slightly smaller than the aporal one. These wings are made up of fairly numerous and somewhat compressed lobes and remind one strongly of the ovaries of *Taenia* spp. The *vitelline gland* is fairly compact, situated posterior to the ovary, and not extending laterally beyond the latter. The shell gland is well developed. The *uterus* appears very soon and as in *Taenia* spp., consists of a median stem, the

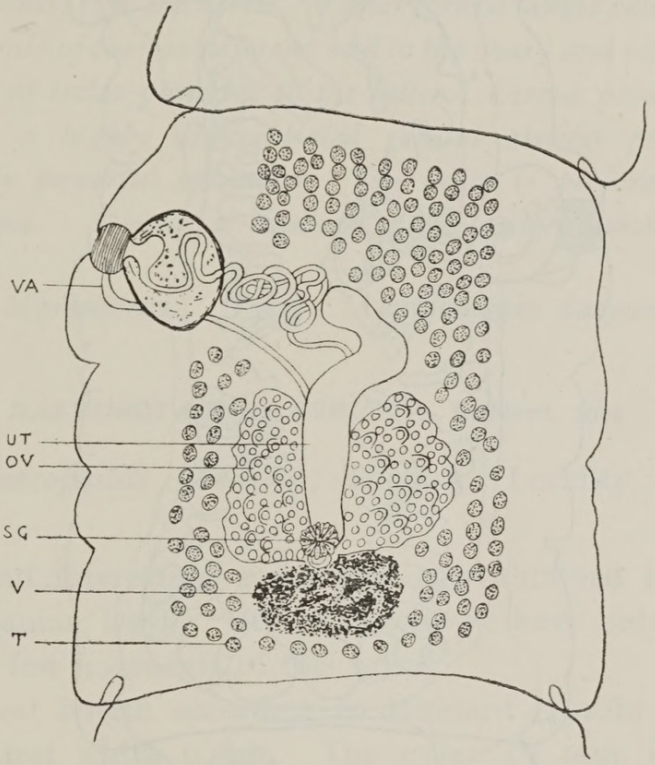

FIG. 5. *A. dasyuri.* A mature proglottid. OV.—ovary; S.G.—shell gland; T.—testes; UT.—uterus; V.—vitelline gland; VA.—vagina.

anterior portion of which is pushed aside by the coils of the vas deferens, thus forming a very characteristic kink. The uterus soon begins to branch out laterally until it fills almost the entire segment. On no occasion was the uterus observed to be reticular, neither were ova found embedded in the parenchyma, both these observations being due to errors of interpretation. The gravid uterus presents a very characteristic aspect, there being always more diverticula on the aporal than on the poral side (fig. 6). The *ova* are thin-shelled and measure 27 : 19μ.

As can be gathered from the above description, the genus *Anoplotaenia*, Beddard, 1911, is entirely justified, although to our mind its systematic position is not correct.

Beddard, after a somewhat lengthy discussion, places his genus in the sub-family ANOPLOCEPHALINAE because the head is unarmed, and because the host is a Marsupial.

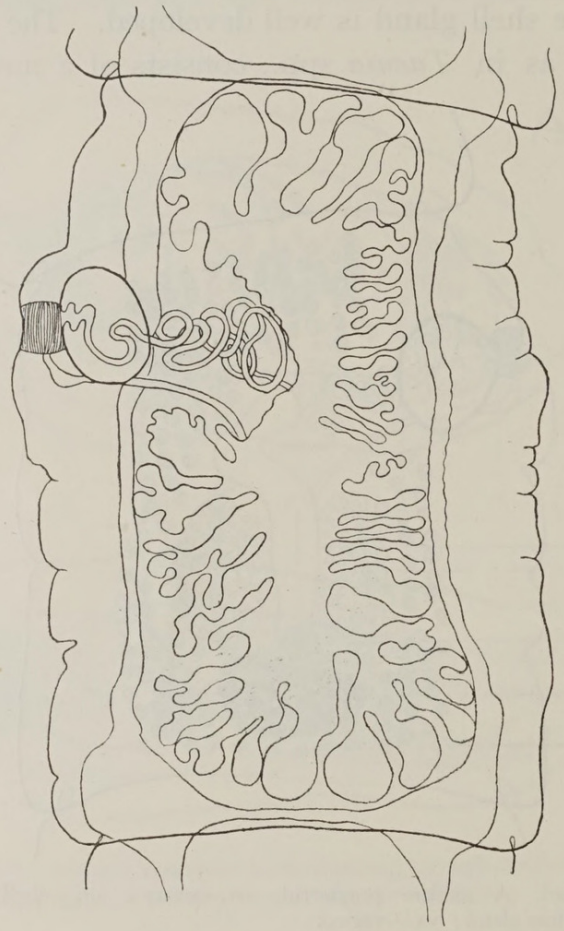

FIG. 6. *A. dasyuri.* A gravid segment showing the structure of the uterus.

Meggitt (1924a) basing his argument on Beddard's error of interpretation, considers the genus *Anoplotaenia* as a synonym of *Oochoristica*, because the uterus dissolves and the ova are scattered in the parenchyma, and he lists it accordingly. To our mind the presence of an unarmed scolex is not necessarily a reason for including this genus in the ANOPLOCEPHALIDAE. Several families of *Cyclophyllidea* contain genera with unarmed scolices, the same genera being also found to possess species with armed scolices; for instance,

Hymenolepis and *Taenia s. str.*, not to mention *Anonchotaenia*, *Rhabdometra*, *Octopetalum*, etc. On the other hand, the uterus of *Anoplotaenia*, as Beddard himself states, is very similar to that of *Taenia s. str.*

If we now take the above characters into consideration, keeping in mind the general anatomy, we can but place the genus *Anoplotaenia* in the family TAENIIDAE, Perrier e. p., and re-define it as follows :—

TAENIIDAE *of small size. Head unarmed, suckers large. Genital pores irregularly alternating. Genital ducts pass between the excretory vessels and dorsal* (?) *to the nerve. Testes form a single field interrupted dorsal to the coils of the vas deferens and to the ovary and vitelline gland. A single row of testes posterior to the latter. Cirrus pouch spherical, opening into a highly differentiated genital atrium provided with an exceedingly powerful sphincter. The latter is perforated laterally by the vagina. Uterus a median stem with numerous lateral diverticula.*

Adult in *Marsupials*. Type : *Anoplotaenia dasyuri*, Beddard, 1911.

DASYUROTAENIA ROBUSTA, Beddard, 1912

Host :—*Sarcophilus satanicus*, Thomas. Locality :—Tasmania (Lond. Zoo).

This second interesting genus was also obtained by Beddard from a Tasmanian Devil. Unfortunately we have only been able to examine a few fragments of this worm.

The greatest length according to Beddard (1912b) is 31 mm. and the greatest width 9 mm. The *scolex* 3·5 mm. in diameter bears four suckers, each of which measures 0·35 mm. in diameter. The fragments to hand, and also the material examined by Beddard, judging from his drawings, are extraordinarily contracted. This will serve to explain certain of the errors committed by Beddard.

The *cuticle* is exceedingly thick, and measures as much as 11·4μ. There are no calcareous corpuscles to be found.

The *musculature* is extremely well developed (fig. 7). Immediately beneath the cuticula we find a layer of irregularly disposed muscle fibres ; these are very stout and show a tendency to form bundles of about four fibres each. Beneath this layer of longitudinal muscles are to be found several fibres of transverse muscles. Beneath

these again we find a second layer of longitudinal muscles now definitely grouped in bundles containing about fifteen fibres. We next find a second layer of transverse muscles, beneath which lies a third layer of longitudinal muscles forming bundles containing about fifty fibres each. This layer is separated from the next by a third layer of transverse fibres. The fourth layer of longitudinal muscles consists of bundles containing about thirty fibres each. We then find a fourth layer of transverse fibres, beneath which lies a fifth layer of longitudinal muscle bundles containing about twenty fibres each. Finally we have a fifth layer of transverse fibres.

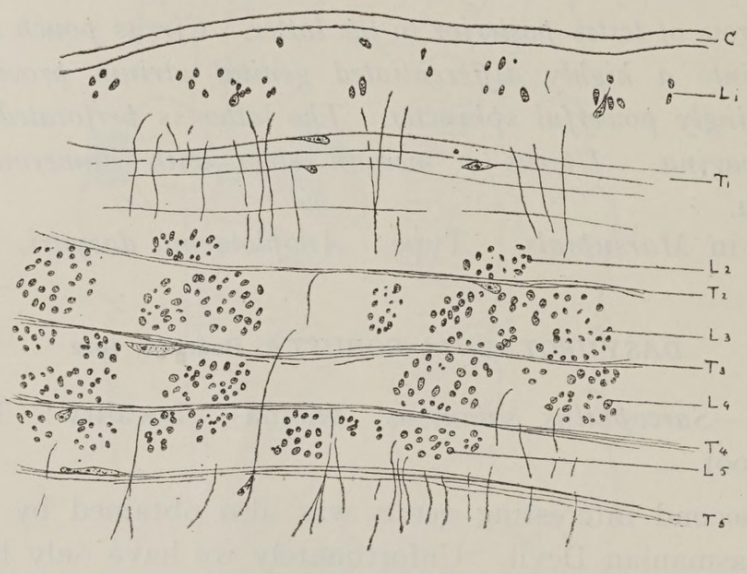

FIG. 7. *D. robusta.* A portion of a transverse section. c.—cuticula; L1-L5.—Longitudinal musculature; T1-T5.—transverse musculature.

Dorso-ventral fibres are very numerous. It is interesting to note the very numerous and exceedingly distinct myoblasts, the latter being found in all three of the muscular systems. This exceedingly powerful musculature reminds one of that of *Cotungia* spp. and also to a certain extent of that of the ACOLEIDAE.

The *excretory* system also presents a very interesting disposition, and seems to have given Beddard much trouble. The most striking character of this system is the truly extraordinary development of the two ventral excretory vessels. The latter are about 0·69 mm. in diameter, and form two exceedingly large coils in the lateral fields of the proglottides. Owing to extreme contraction of the worm, we find these coils touching one another, with the result that on

sections we find what Beddard describes as membranes and valvules, and which are caused by the sections passing somewhat obliquely through two consecutive coils. In the same way the genital ducts do not *pierce* the ventral vessel, but pass between two coils. We have endeavoured to figure this diagrammatically in fig. 8. The latter

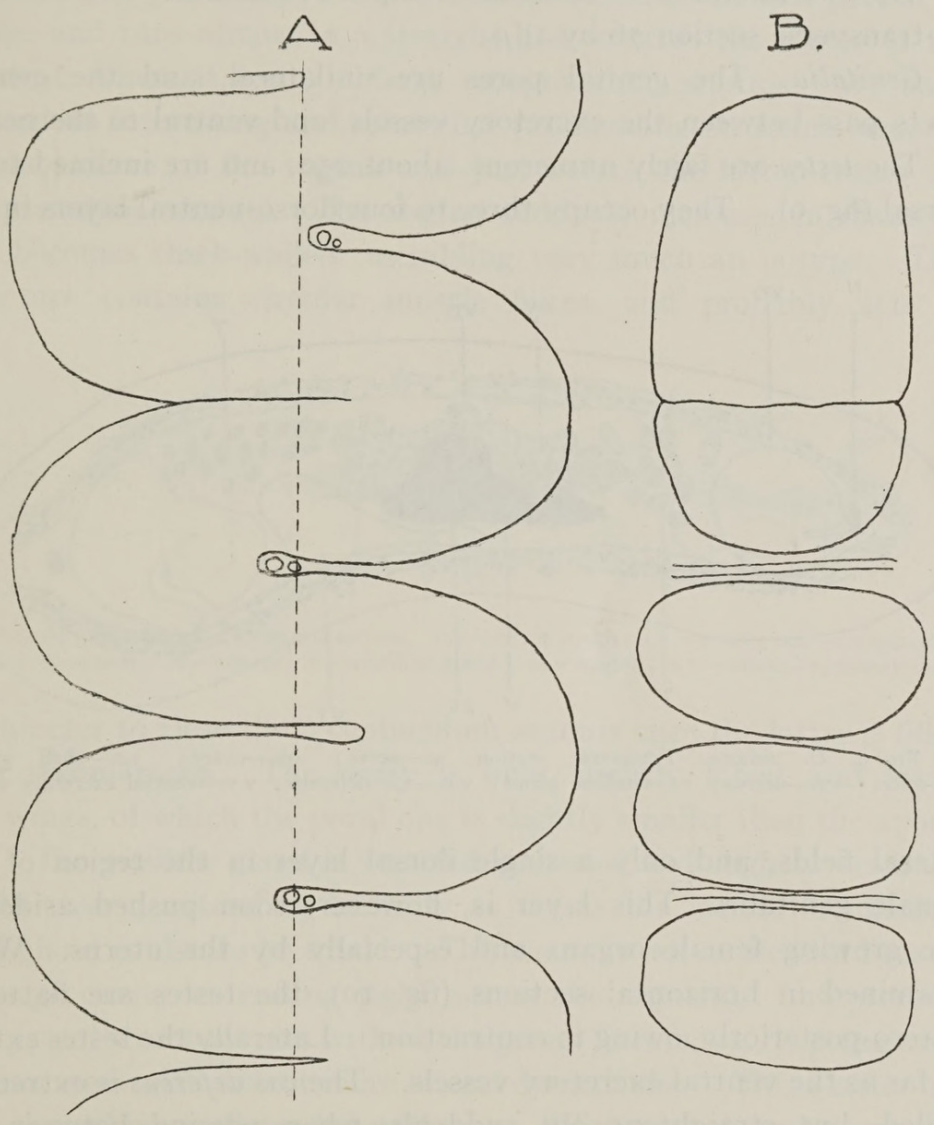

FIG. 8. *D. robusta.* Diagram of the ventral excretory vessel: A, sagittal view; B, section along the dotted line viewed horizontally.

represents a ventral vessel coiled dorso-ventrally; in reality the coils are spiral, and next to it is a section passing along the dotted line. As Beddard rightly remarks, there are no transverse vessels to be seen, although perhaps in less contracted specimens such

a structure might be seen, and might have been obliterated owing to the extraordinary contraction of the worm. The dorsal vessels are about 0·007 mm. in diameter, i.e., about a hundred times smaller than the ventral vessels. They are also very much coiled and are exceedingly difficult to make out.

The two lateral *nerve stems* are compressed laterally and measure on transverse section 76 by 19μ.

Genitalia. The genital pores are unilateral, and the genital ducts pass between the excretory vessels, and ventral to the nerve.

The *testes* are fairly numerous, about 250, and are inclined to be dorsal (fig. 9). They occupy three to four dorso-ventral layers in the

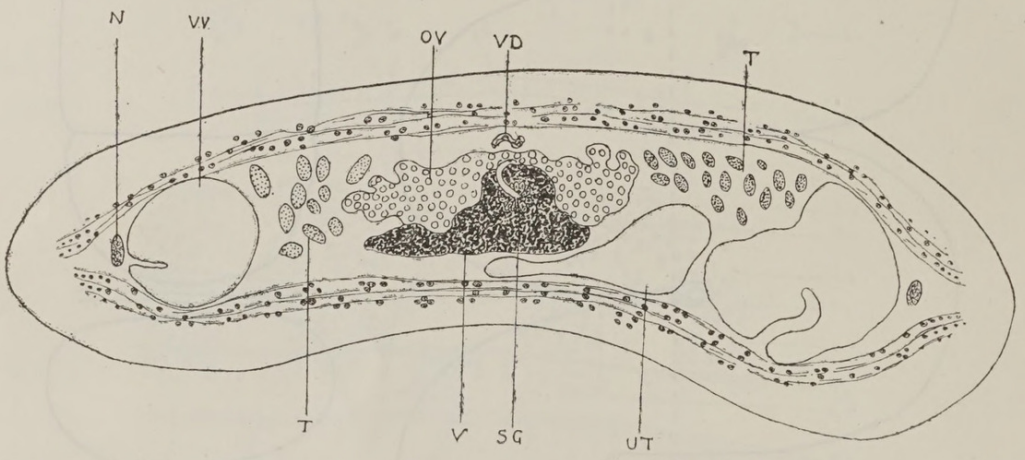

FIG. 9. *D. robusta.* Transverse section. N.—nerve; OV.—ovary; S.G.—shell gland; T.—testes; UT.—uterus; V.—vitelline gland; V.D.—vas deferens; V.V.—ventral excretory vessel.

lateral fields, and only a single dorsal layer in the region of the female genitalia. This layer is, however, soon pushed aside by the growing female organs and especially by the uterus. When examined in horizontal sections (fig. 10), the testes are flattened antero-posteriorly, owing to contraction. Laterally the testes extend as far as the ventral excretory vessels. The *vas deferens* is extremely coiled, but straightens out suddenly when passing between the excretory vessels. We have not noticed the glands surrounding the male duct and described by Beddard as 'interstitial prostatic cells.' The cirrus pouch is an elongate pear-shaped organ 0·34 mm. long and 0·25 mm. at its greatest diameter. The walls are fairly muscular and measure 8μ in thickness. Immediately on entering the cirrus pouch the vas deferens forms several coils much distended with

spermatozoa, and probably replacing functionally an internal vesicula seminis. The *cirrus* is 0·19 mm. long and 0·015 mm. in diameter. Although none of the cirri were evaginated, we have been unable to observe on them any small spines such as Beddard describes on page 693. The *vagina* opens into a small genital atrium posterior to the cirrus pouch ; it is thick-walled in the first part of its course and runs almost in a straight line towards the centre of the segment, where it forms a large receptaculum seminis. We have noticed an interesting and somewhat problematic structure situated on the course of the vagina and just before the latter enters the receptaculum seminis. The vagina suddenly increases in diameter and becomes thick-walled resembling very much an ootype. This structure contains circular muscle fibres, and probably acts as

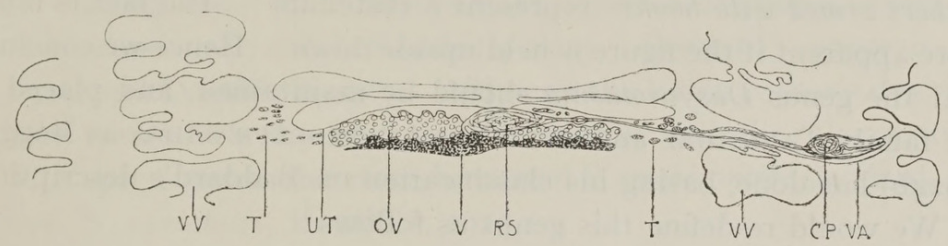

FIG. 10. *D. robusta.* Horizontal section. C.P.—cirrus pouch ; OV.—ovary ; R.S.—receptaculum seminis ; T.—testes ; UT.—uterus ; V.—vitelline gland ; VA.—vagina ; V.V.—ventral excretory vessel.

a sphincter to close the receptaculum seminis once the latter is filled with spermatozoa. The *ovary* is only slightly lobed and forms two wings, of which the poral one is slightly smaller than the aporal one. The *vitelline gland* is situated posterior and slightly ventrally to the ovary, extending laterally as far as the latter. A distinct shell-gland is also to be found. The *uterus* is not as Beddard states ' a large cavity extending right across the segment,' but presents the typical structure met with in the genus *Taenia*, i.e., it possesses a median stem with two or more lateral diverticula. These latter are club-shaped when distended with ova. With regard to the ' uterine pore ' described in a later paper (1915), we cannot but interpret this as an artefact due to the sections not being in an horizontal plane.

The ova measure 19 by 15μ, and are provided with a thin shell.

It is obvious that the above description is far from being complete as no young segments, and especially no scolex, have been examined, the description being entirely based on gravid or mature segments.

We have attempted to clear up certain obscure anatomical details, but remain totally in the dark with regard to the scolex.

Beddard's description of a globular scolex with two external and two internal suckers depicts an entirely new arrangement, and suggests that the author has misinterpreted his sections. We cannot, of course, say that the arrangement described by Beddard is impossible without having examined the material ; we may, however, formulate an hypothesis based on the general structure of the worm, and on Beddard's drawings of the head. The hooks figured on page 682, text-fig. 96, are typical hollow hooks as found on the rostellum of many species of Cestodes, and especially in the family TAENIIDAE. The anatomy, also, is that of a member of this family ; we are, therefore, led to conclude that the *'two inner suckers armed with hooks'* represent a rostellum ! The fact is much more apparent if the figure is held upside down. Hence we conclude that the genus *Dasyurotaenia* should be maintained, and placed in the family TAENIIDAE and not in the ANOPLOCEPHALIDAE as Meggitt (1924b) has done, basing his classification on Beddard's description.

We would re-define this genus as follows :

TAENIIDAE *of small size, with an exceedingly well-developed muscular system. Ventral excretory vessels hypertrophied, a transverse vessel being absent* (?) *Scolex provided with four small suckers and a rostellum armed with a double* (?) *crown of hooks. Genital pores unilateral ; genital ducts passing between the excretory vessels and ventral to nerve. Large receptaculum seminis present. Uterus with a short median stem and very long, club-shaped, lateral diverticula.*

Adult in Marsupials. Type : *Dasyurotaenia robusta*, Beddard, 1912.

MONOECOCESTUS ERETHIZONTIS, Beddard, 1914

Host : *Erethizon dorsatum* L. Locality : N. America (Lond. Zoo).

We have been able to examine two entire specimens of this worm ; all our observations being made on total mounts, the latter being remarkably clear, as the material is rather macerated.

A careful examination of our preparations has shown us that the excretory vessels show distinct anastomoses such as are always found in the genus *Schizotaenia*. Beddard describes at much

length (p. 1048) the presence in certain segments of a rudimentary vagina, and based on this character, he places his genus in the ACOLEIDAE! One of the characteristics, however, of the ANOPLOCEPHALINAE, with the exception of *Aporina*, is the possession of a vagina which soon atrophies and disappears as the segments grow older. Beddard has himself described this particularity, but he does not seem to have realised its importance.

The rudimentary vagina of the ACOLEIDAE is of a totally different type, the vaginal *pore* being absent.

We have found the cirri to be covered with small spines, and what is more, we have found that the material examined contains *two* different species! Our observations lead us to conclude that what Beddard has described as *Monoecocestus erethizontis*, gen. et sp.n. is nothing else than *Schizotaenia americana* (Stiles, 1895), and *Schizotaenia variabilis*, Douthitt, 1915. Beddard's paper is dated 1914, and Douthitt's 1915. Although the latter author's description of *S. variabilis* is excellent, we must comply with the rules of priority. This species must, therefore, be named *S. erethizontis* (Beddard, 1914), syn. *S. variabilis*, Douthitt, 1915.

In the following table we have endeavoured to place all the species of the genus *Schizotaenia*, Janicki, 1904, giving the differential characters of each species. It will be noticed that we retain the specific name *americana* for the species described by Stiles (1896). Douthitt (1915) has definitely shown the existence of two species of Tapeworms in the American Porcupine, neither of which can be identified with *T. laticephala*, Leidy, 1855. As the types of the latter have been lost (*vide* Stiles, *loc.cit.*, p. 165), it seems undesirable to maintain this name. We, therefore, propose to consider *T. laticephala*, Leidy, as a *nomen nudum*. We have removed from the genus *Schizotaenia* the species *S. cacatuae*, Maplestone, 1922, as this species is the type of a new genus to be described below. In a previous paper (1923), we removed to the genus *Anoplocephala* the species *S. latissima* (Deiner, 1912) and *S. gigantea* (Peters, 1856). We are almost inclined to include in the genus *Schizotaenia* the species actually known as *Oochoristica didelphydis* (Rudolphi, 1810) from *Marmosa murina*, L. It will be remembered (*vide* Janicki, 1906) that only fragments of this species exist, egg-capsules have not been found, and the scolex is unknown. On the other hand, the

vagina lies anterior to the cirrus pouch, and the ovary and the uterus are just at the stage where it is almost impossible to distinguish the one from the other, especially in macerated material. These last two factors seem to show a distinct relationship to the genus *Schizotaenia*. We prefer, however, to leave this species where it is for the present, and await a further supply of material in order to be able to study it further.

TABLE I.

Species	Author	Year	Length	Width	Diameter of scolex	Dimensions of cirrus pouch	Number of testes	Size of ova	Host	Distri
			mm.	mm.	mm.	mm.		μ		
S. decrescens ...	(Diesing)	1856	296	5	?	0·67 : 0·23	?	?	*Tayassus tajacu, T. albirostris*	Brazil
S. hagmanni ...	Janicki	1904	145	5·8	1·9	0·63 : 0·2	120–140	57	*Hydrochoerus capybara*	Brazil
S. americana ...	(Stiles)	1895	33	6	0·6	0·5–0·63 : 0·19–0·21	70	55–61	*Erethizon dorsatum, E. epixanthum*	U.S.A Can
S. sigmodontis ...	Chandler and Suttles	1922	30–50	2·5–3·5	0·36–0·45	0·6 : 0·19	70	47–53	*Sigmodon hispidus*	Texas
S. anoplocephaloides	Douthitt	1915	30–33	1·7–2	0·39	0·14 : 0·085	70–110	30–40	*Geomys breviceps*	U.S.A
S. erethizontis ...	(Beddard)	1914	20	8·5	0·88	0·49–0·5 : 0·14–0·19	70–110	12–14	*Erethizon dorsatum*	U.S.A

It is interesting to note that the genus *Schizotaenia* is entirely confined for the present, to the New World, where it is found in *Rodentia* and *Suidae*. A point which may be of some importance and which appears very interesting is raised by Scharff (1911). Speaking of the Canadian Tree Porcupine, the author says :

> 'Yet the species had already come into existence when the sabre-tooth tiger and peculiar kinds of peccaries haunted the forests of Arkansas, for its remains have been found together with these extinct creatures in the Conrad fissure.'

Actually the peccaries have retreated into South America, and the Canadian Tree Porcupine has retreated further north ; both groups, however, harbour the same genus of Cestode parasites. May we

take this as an indication that the genus *Schizotaenia* came into existence during the late Tertiary times, about the Pliocene Period, and has existed ever since ? The collection of further data will show if such an hypothesis is liable to lead to interesting results, or is to be abandoned.

THYSANOTAENIA LEMURIS, Beddard, 1911

Host :—*Lemur macaco*, L. Locality :—Madagascar (Lond. Zoo).

We have only been able to examine a few gravid and much macerated fragments of this worm, and are totally unable to add anything to Beddard's description except that a distinct dorsal excretory vessel is present in all our sections. This genus is, however, not a synonym of *Inermicapsifer*, Janicki, 1910. From the description of the genital organs, and from the aspect of the egg-capsules, we are almost inclined to refer this genus to *Raillietina*, Fuhrmann, 1920, and to the sub-genus *Ransomia*. We would do this in spite of the fact that Beddard states that the scolex is unarmed. All workers who have had to deal with this group know how difficult it is at times to perceive the tiny hooks on the rostellum, especially when the latter is retracted. For the present, however, and until more material has been examined, we retain the genus *Thysanotaenia*, Beddard, 1911, with the type species *T. lemuris*, Beddard, 1911, and place it in the sub-family LINSTOWINAE.

HEMIPARONIA CACATUAE (Maplestone, 1922), n.gen.

Synonym :—

Schizotaenia cacatuae, Maplestone, 1922.

Host :—*Cacatua galerita*, Lath. Locality : North Queensland.

As we have already mentioned above, this species was placed by Maplestone in the genus *Schizotaenia*. Its curiously aberrant anatomy, however, led us to suppose that this might be the type of a new genus. Thanks to the kindness of Professor Warrington Yorke, we have been able to examine the type and also the type material deposited in the collection of the School, and have been able to confirm our first opinion. We also express our sincerest thanks to Dr. Southwell for the loan of this valuable material.

Certain points in Maplestone's description are not very clear; we will therefore briefly redescribe the anatomy.

The *cuticula* is 4μ thick, and beneath this lies the internal longitudinal *musculature*. The latter consists of three layers of stout bundles. As the material is considerably macerated, it is very difficult at times to make out the three layers; these exist, however, throughout the entire strobila. Transverse muscles are hardly developed, whereas the dorso-ventral muscles are very numerous. The cortical parenchyma contains numerous small calcareous corpuscles measuring 7·6 : 5μ.

The two longitudinal nerve stems lie lateral to the dorsal excretory vessels.

Genitalia. Maplestone estimates the number of *testes* at 100; we believe, however, that this number is too small. The testes lie in two and sometimes three dorso-ventral layers (fig. 11). We should

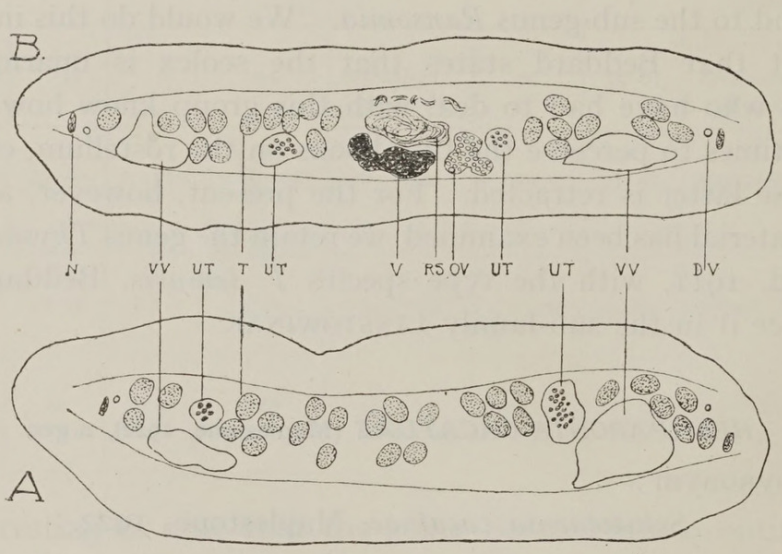

FIG. 11. *H. cacatuae.* Transverse sections: A, through the anterior region of the segment; B, through the posterior region of the segment. D.V.—Dorsal excretory vessel; N.—nerve; OV.—ovary; R.S.—receptaculum seminis; T.—testes; UT.—uterus; V.—vitelline gland; V.V.—ventral excretory vessel.

say that there appear to be about 200 testes. The latter are spherical in the lateral fields, and measure 0·042 mm. in diameter. Towards the centre of the segment they are generally so crowded together that they become egg-shaped, the greatest diameter being dorso-ventral. Laterally the testes pass beyond the ventral

excretory vessels. The vasa efferentia form a distinct and very complicated network, a portion of which is drawn in fig. 12. The

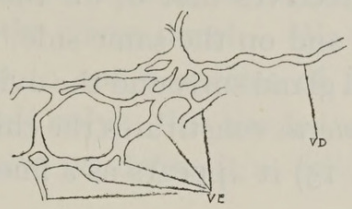

Fig. 12. *H. cacatuae.* Portion of the network formed by the vasa efferentia.

vas deferens soon becomes swollen with spermatozoa. Within the cirrus pouch it forms a few coils also very much distended with spermatozoa; it then enters the cirrus. The latter is covered with minute spines. The *vagina* opens slightly anterior and ventral to the cirrus pouch. Passing ventrally to the vas deferens it forms a large receptaculum seminis situated dorsally (fig. 13). The vagina

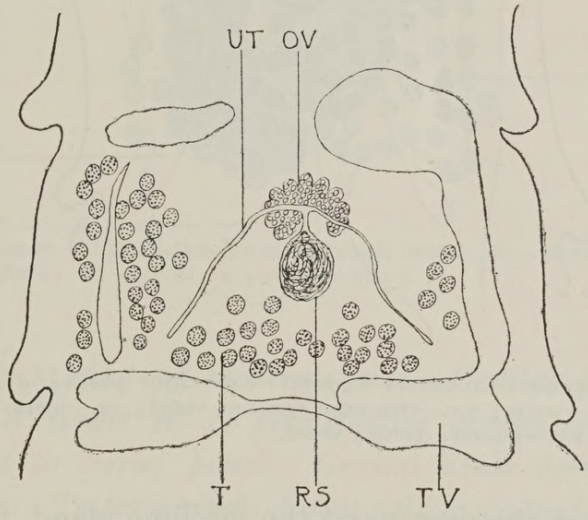

Fig. 13. *H. cacatuae.* A horizontal section through a young proglottid. ov.—ovary; R.S.—receptaculum seminis; T.—testes; T.V.—transverse excretory vessel; UT.—uterus.

very soon becomes so distended with spermatozoa that it is impossible to distinguish it from the receptaculum seminis (fig. 14). The *ovary* and *vitelline gland* are situated one behind the other; the former, fan-shaped, is made up of several lobes, and is situated ventrally to the latter, which is only slightly lobed. This can be

seen in transverse sections passing through this region (fig. 11). We find a slightly different arrangement of the female ducts from that described by Maplestone. The oviduct which is surrounded by numerous glands, receives first of all the duct from the receptaculum seminis, then and on the same side, the vitelline duct, and only then does the shell gland surround the oviduct, the latter passing into the uterus. The *uterus* constitutes the chief character of our new genus. In *anlage* (fig. 15) it appears as a fine horseshoe-shaped tube

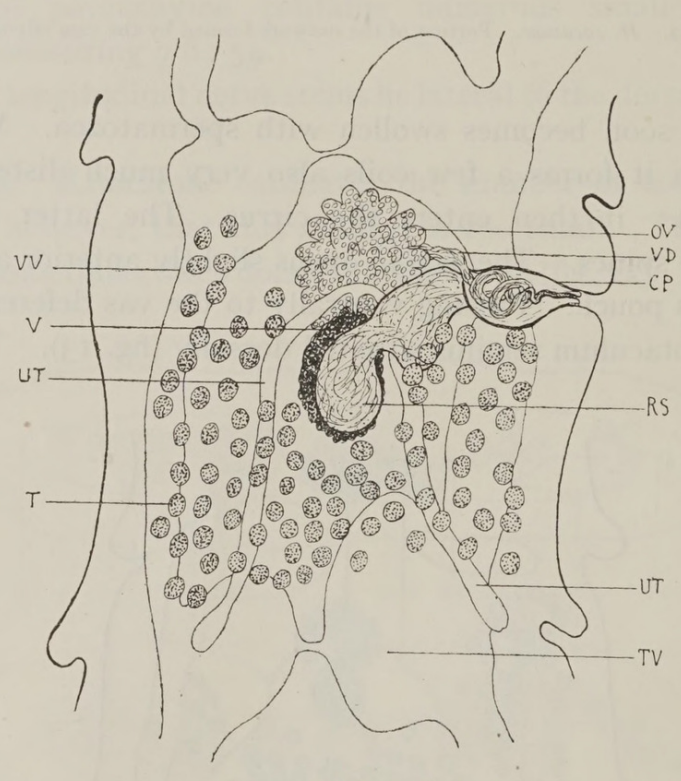

FIG. 14. *H. cacatuae.* A mature segment. C.P.—cirrus pouch; OV.—ovary; R.S.—receptaculum seminis; T.—testes; T.V.—transverse excretory vessel; UT.—uterus; V.—vitelline gland; V.D.—vas deferens; V.V.—ventral excretory vessel.

passing between the ovary and the vitelline gland, and lying in the centre of the segment. Very soon, however, the uterus increases in diameter, and forms several diverticula. In the gravid uterus the two extremities of the horseshoe never fuse together.

This extremely interesting genus from an Australian parrot bears an extraordinary resemblance to the genera *Paronia* Diamare, and *Moniezioides* Fuhrmann (*vide* Fuhrmann, 1918), both of which are also found in Australian parrots. The only difference is that these

two genera possess double genital pores, and a double genital apparatus.

Our new genus possesses unilateral, dextral genital pores, and the vagina lies ventral to the cirrus pouch. We would obtain the same disposition if we were to cut a species of *Paronia* into half, and considered the right half only ; this has led us to propose the name *Hemiparonia*, n.gen., and we define it as follows :—

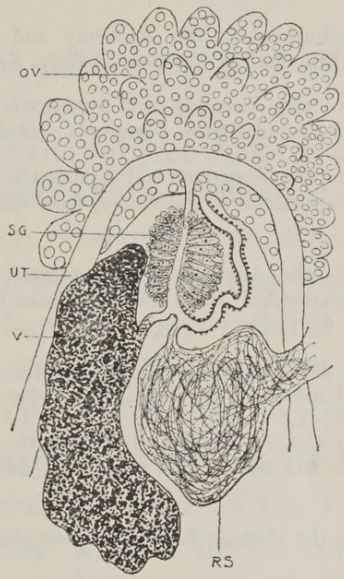

FIG. 15. *H. cacatuae*. The relationship of the female ducts. OV.—ovary ; R.S.—receptaculum seminis ; S.G.—shell gland ; UT.—uterus ; V.—vitelline gland.

ANOPLOCEPHALINAE *of moderate size. Genital pores unilateral and dextral. A single set of reproductive organs in each segment. Vagina ventral to cirrus pouch. Genital ducts dorsal to excretory ducts and nerve. Testes a single dorsal field extending laterally beyond the ventral excretory vessel. Large receptaculum seminis present. Ovary and vitelline gland in centre of segment, former anterior to latter. Uterus horseshoe-shaped, later forming diverticula ; the two extremities never fuse together. Ova without* (?) *piriform apparatus.*

Adult in Birds. Type : *Hemiparonia cacatuae* (Maplestone, 1922).

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