4. On Galactosomum cochleariforme Rudolphi.

By H. S. Pratt, Haverford College, Haverford Pa.

(With 5 figures.)

eingeg. 27. April 1911.

In a collection of trematodes which obtained at Tortugas, Florida, last summer, while working in the Laboratory of the Carnegie Institution of Washington situated on that island, was one species which infests the intestine of the frigate bird (*Fregata aquila*). This worm, as was first pointed out to me by my friend Dr. Teodor Odhner of Upsala, is identical with a trematode first described by Rudolphi in 1819 and named by him *Distoma cochleariforme*, and which had been collected by Natterer in Brazil from the frigate and several similar birds. Rudolphi's two original specimens have since been studied by Braun[1] who has made the species the type of the new genus *Microlistrum*. These specimens were not, however, in a sufficiently good condition of preservation to enable Braun to detect the fact that the worms are not distomids at all but monostomids of the genus *Galactosomum* Looss, and similar in general organization to *G. lacteum* Jägerskiöld[2], and that what he took for the acetabulum is really a penis-like organ in the genital sinus.

G. cochleariforme is an interesting worm on account of the peculiar structure of certain of the genital organs. These are, however, very insufficiently known at the present time, notwithstanding the fact that the worm was first described almost a hundred years ago, and a detailed description of them will be welcome.

The body of the worm is about 8 mm long and is made up of two portions, a broad, flat anterior portion about 2 mm long and 1,5 mm wide, and an elongate posterior portion about 1 mm wide. The forward portion is thin and lamellate and extremely muscular, while the hinder portion is much thicker, having a plain ventral and a high-arched dorsal surface. The entire body is covered with short spines. The oral sucker is rather small, and a short prepharynx, a large pharynx and a very short oesophagus are present. The two intestinal trunks pass at once to the right and left sides of the body and then to its extreme hinder end. Lying between the forward portion of the intestinal trunks and also alongside the pharynx and prepharynx are numerous large gland-cells, similar to those present in *G. lacteum* (fig. 1, 4). They are not, however, so numerous and do not occupy so large a space as in that

[1] M. Braun, Fascioliden der Vögel. Zool. Jahrb. Abt. f. Syst., usw. Bd. 16. S. 56. 1902.

[2] L. A. Jägerskiöld, Über *Monostomum lacteum* n. sp. Festskrift för Lilljeborg. p. 165. 1896.

animal but extend about two-thirds of the distance from the anterior end of the intestinal trunks to the genital pore. They are not near the surface of the body but are scattered irregularly through the parenchyma. I was unable to find the ducts which Jägerskiöld describes in *G. lacteum*.

The median excretory vesicle differs from that in *G. lacteum* in that it does not wind between the testes but extends forward only to a point posterior to them (fig. 1, 14).

The genital pore (fig. 1, 5) lies in the middle of the ventral surface at the posterior border of the broad, anterior portion of the body, and opens into a genital sinus of very complicated structure, which is similar in all essential respects to that in *G. lacteum*.

The most conspicuous organ (fig. 2, 1) in this complex is a large, ellipsoidal muscular structure which Jägerskiöld calls the spheroidal body. The size and shape of this organ vary somewhat with the condition of contraction of the muscles in it, but in the specimen represented in the figure it has a length of 0,13 mm and a thickness of 0,11 mm. It lies in the parenchyma dorsal to the genital pore, extending somewhat posteriorly and a little to the right, and is surrounded by numerous subcuticular cells and muscle-fibres. Its outer wall is made up of two well-defined muscle-layers, the outer of which is composed of fibres which have a general transverse direction (fig. 2, 6), and

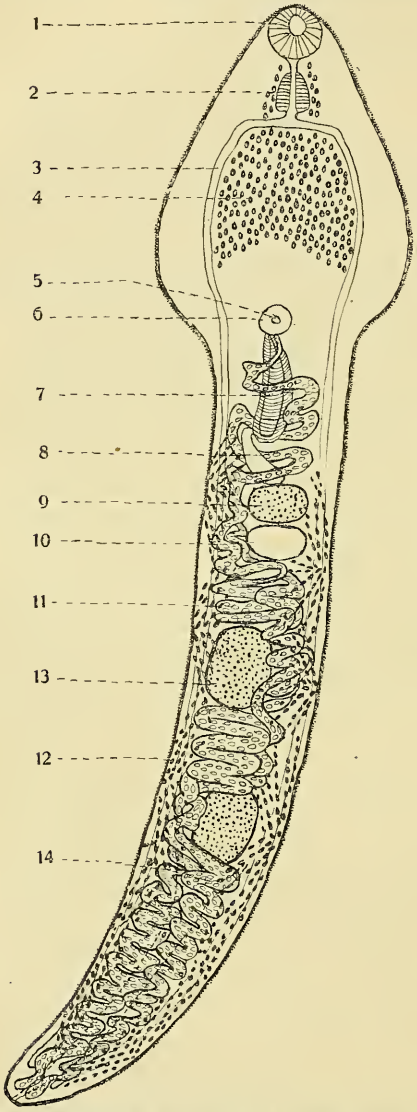

Fig. 1. *Galactosomum cochleariforme*; ventral aspect. 1) Oral sucker; 2) Pharynx; 3) Intestine; 4) Single-celled glands; 5) Genital pore; 6, Spheroidal body; 7) Vesicula seminalis (thick-walled portion); 8) Vesicula seminalis (thin-walled portion); 9 Ovary; 10) Receptaculum seminis; 11) Uterus; 12) Yolk glands; 13) Testis; 14) Excretory vesicle.

the inner of longitudinal fibres (fig. 2, 7). The inner structure is a parenchyma in which are embedded radiating, longitudinal fibres (fig. 2, 8) and numerous deeply-staining gland-cells which are similar in size and appearance to the subcuticular cells. The ventral surface of the spheroidal body, which faces the genital sinus, has no muscular coating and is divided by a deep transverse fissure into an anterior and a posterior half. Projecting from this surface into the genital sinus are large curved spines (fig. 2, 5), the average length of which is 0,01 mm. There are thus two groups of these spines, an anterior and a posterior group, the spines in the former group being directed anteriorly and those in the latter group posteriorly.

Fig. 2.

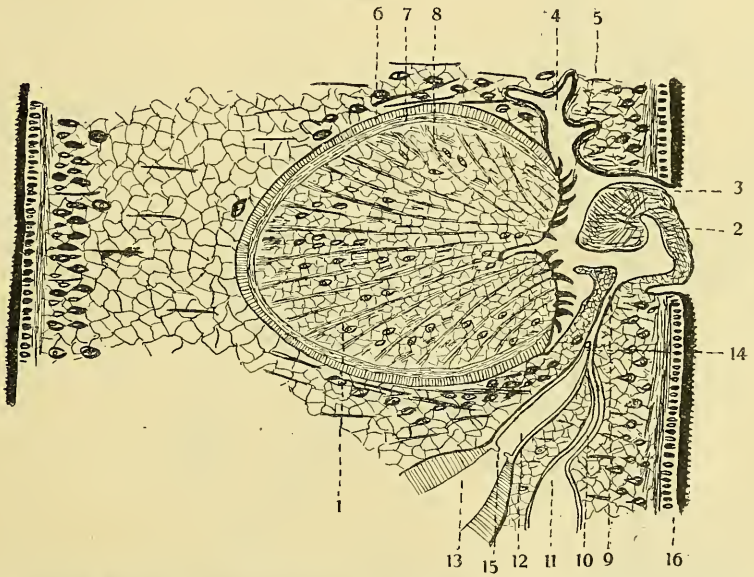

Fig. 2. Genital sinus: longitudinal section. 1) Spheroidal body; 2) Tongue-like body; 3) Genital pore (with the tongue-like body pushed partly through it); 4) Anterior pocket; 5) Spines on spheroidal body; 6) Circular muscles of spheroidal body; 7) Longitudinal muscles of same; 8) Radial muscles of same; 9) Common genital duct; 10) Metraterm; 11) Uterus; 12) Vas deferens; 13) Vesicula seminalis; 14) Genital papilla; 15) Valve-like fold; 16) Ventral body-wall.

The spiny surface of the spheroidal body forms thus the inner or dorsal wall of the genital sinus. The outer or ventral wall is formed partly by a muscular body which Jägerskiöld calls the tongue-like body. This structure (fig. 2, 2) is a sac the walls of which are very thick and made up of muscle fibres which run rather irregularly in several different directions. Like the spheroidal body its shape varies considerably in different individuals according to the condition of contraction

of the muscles, but it is usually more or less heart-shaped or globose, with a diameter of about 0,06 mm. Its position varies also. It may lie at the surface of the body, partly projecting through the genital pore

Fig. 3.

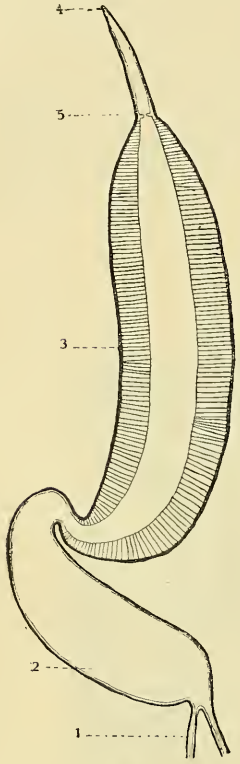

Fig. 4.

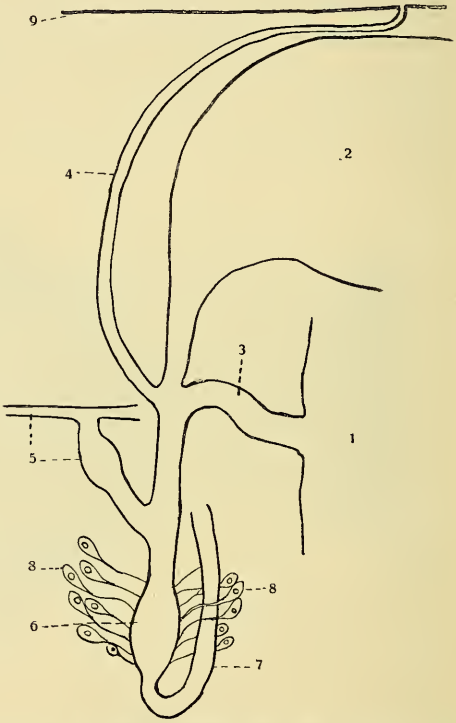

Fig. 5. Diagram showing the origin of the ducts of the female genital organs. 1) Ovary; 2) Receptaculum seminis; 3) Oviduct; 4) Laurer's canal; 5) Yolk ducts; 6) Ootype; 7) Uterus; 8) Shell-glands; 9) Dorsal body-wall.

Fig. 3. Vas deferens: diagram. 1) Vasa efferentia; 2) Posterior or thin-walled vesicula seminalis; 3) Anterior or thick-walled vesicula seminalis; 4) Papilla-like anterior end; 5) Valve-like fold.

Fig. 4. Cross section of anterior vesicula seminalis.

(fig. 2, 2), or it may lie dorsal to the genital pore and entirely enclosed in the genital sinus, in which case the genital pore is seen to be a small

opening of the size usual in trematodes (fig. 1, 5). The cavity of this body forms a part of the genital sinus and its function is to receive the common genital duct (fig. 2, 9), which approaches it from behind and a little to the right. On the opposite or anterior side of the genital sinus and somewhat to the left is a large branched pocket (fig. 2, 4) of varying form with thin, non-muscular walls, the actual size and form of which is very different in different individuals.

The exact method by which this complicated apparatus operates during copulation it is impossible to state. It is probable, however, that the spinose end of the spheroidal body is thrust out of the genital pore pushing the tongue-like body before it. The large anterior branched pocket is probably simply a fold of the wall of the genital sinus which is straightened out when the spheroidal body is thrust forward. The tongue-like body is a muscular sac which is probably pushed entirely out of the genital pore during copulation and evaginated: it seems to me probable that in this condition it may receive the end of the spheroidal body of the other copulating individual.

Hardly less remarkable than the structure of the genital sinus is that of the vas deferens (fig. 3). The two vasa efferentia come together immediately in front of the ovary to form this organ, which is made up largely of two enormous vesiculae seminales. The hindermost of these (fig. 3, 2) is the smaller of the two and is a thin-walled sac about 0,41 mm long and 0,154 mm in diameter. Its walls are muscular and have a thickness of 0,0045 mm. The forward end of this structure turns towards the right side of the body (fig. 1, 8) and then bends on itself and passes into the anterior vesicula seminalis (fig. 1, 7; fig. 3, 3). This structure is about 0,72 mm long and 0,21 mm in diameter and has walls of enormous thickness (0,04 mm) which are composed entirely of circular muscle-fibres (fig. 4): it undoubtedly acts as an ejaculatory apparatus.

The anterior end of the vas deferens is a narrow tube (fig. 3) 0,1 mm long and 0,03 mm in diameter, the walls of which are composed of outer longitudinal and inner circular fibres. It is separated from the vesicula seminalis by a circular fold of its inner surface (fig. 2, 15; fig. 3, 5) which leaves a very small communication between the two structures and probably acts as a valve between them. The anterior end forms a papilla-like prolongation (fig. 2, 14; fig. 3, 4) which has a minute lumen and projects into the common genital duct. No cirrus or cirrus-sac are present.

The terminal portion of the uterus forms a muscular metraterm with a length of about 0,1 mm (fig. 2, 10). The common genital duct has a length of about 0,15 mm and opens into the cavity of the tongue-like body (fig. 2, 9).

The testes (fig. 1, 13) are ovoid bodies with a length of 0,5 mm and a diameter of 0,35 mm which lie one behind the other in the hinder half of the body. The ovary and receptaculum seminis are ovoid bodies of about the same size, the former of which lies directly in front of the latter (fig. 1, 9 and 10) and the dimensions of which are about 0,35 mm by 0,3 mm: they lie towards the left side of the body and near its middle. The oviduct (fig. 5, 3) proceeds from the right side of the ovary (fig. 5, 1) and, running a short distance to the right, meets the receptaculum seminis (fig. 5, 2) and the Laurer's canal (fig. 5, 4) at the same place. The latter canal is rather long, extending dorsally and posteriorly, and finally opens to the outside in the dorsal body-wall above the receptaculum seminis. The oviduct, after receiving these two ducts, bends directly ventrally and after being joined by the median yolk-duct (fig. 5, 5) expands to form the ootype (fig. 5, 6). The uterus (fig. 5, 7) proceeds from the ventral portion of the ootype and bends at once on itself and runs dorsally: it is very long extending to the hinder end of the body. The average size of the egg is 0,024 mm by 0,014 mm. Surrounding the ootype are the elongated so-called shell-glands (fig. 5, 8). The yolk-glands (fig. 1, 12) extend from the region of the ovary to the hinder end of the body. They are grouped in a series of indistinct follicles, each follicle consisting of strings of small glands arranged in radiating lines from a common point.

In conclusion I wish to thank Hofrat Professor Dr. L. von Graff most heartly for the privilege of working in his laboratory during the Winter and him and all of my colleagues in the Zoological Institute in Graz for their many kindnesses to me.

Graz, April, 1911.

5. Über den Ursprung der Microsclere der Desmacidoniden.

Von Dr. Ernst Hentschel, Hamburg.

eingeg. 28. April 1911.

Die merkwürdigen, meist sehr kleinen Skeletkörper der Kieselschwämme, welche man als Microsclere bezeichnet, haben um ihrer auffallenden, oft überaus komplizierten Gestalt willen mehrfach zu Versuchen angeregt, diese Gestalt zu erklären. Es ist bemerkenswert, wie wenig dabei die organische Zweckmäßigkeit, die sonst so häufig herangezogen wird, als Faktor der Gestaltung angenommen worden ist. Die meist mehr oder weniger regellose Lage der Microsclere im Schwammkörper ließ nur selten eine Beziehung zu den Lebensfunktionen annehmbar erscheinen, und vor allem keine Beziehung, welche so kompliziert gestaltete Gebilde notwendig machen würde. Vorwiegend sind physi-