

**On *Dissotrema papillatum*, n. g., n. sp., an Amphistomoid
Parasite from a Marine Fish.**

By

Seitaro GOTO,

Professor of Zoology in the Science College, Imp. Univ., Tokyo,

and

the Late Mr. **Yasunaga MATSUDAIRA**, *Rigakushi*.*

With one Plate and two Text-figures.

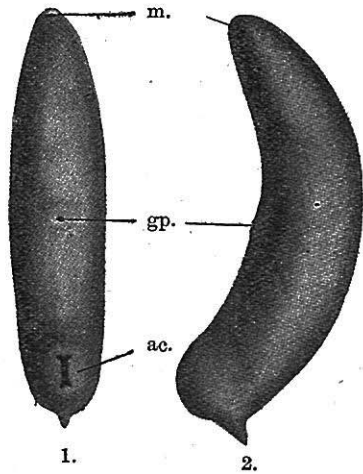
This trematode occurs in the rectum of *Siganus fuscescens* (HOUTTUYN), a marine fish distributed from Tokyo southwards to the Philippines. Of about fifteen fishes examined by us more than half were found to contain the parasites, varying in number from a few to fifty or seventy in a single fish. The form of the body is strikingly like that of a *Paramphistomum*, so that we at first thought that the parasite belonged to that genus; but a cursory examination of the internal organization convinced the senior author at once that it could not possibly be referred to the same genus, and so a detailed study of it was undertaken.

The body may be 3.5 mm. long by about 0.6 mm. at the broadest part; in mounted specimens flattened under the pressure of a cover slip it may be as wide as 1 mm. It is sausage shaped,

* Mr. YASUNAGA MATSUDAIRA was born in Tokyo on the 28th of May, 1889, as the eldest son of Viscount YASUTAMI MATSUDAIRA, formerly Prince of Tsuyama in the Province of Mimasaka. After completing the necessary preliminary education, he entered the Science Section of the First High School and was admitted into the Science College of this University in July, 1910. He finished the course in Zoology with credit in July, 1914, presenting as his graduating thesis a paper on the trematode described here. Shortly afterwards he was taken ill and died on the 19th of October, 1914. He leaves behind him the memory of an earnest and loyal character and his early loss is deeply mourned by all who knew him.

I have examined Mr. MATSUDAIRA's slides and added some observations and drawings of my own. The text has been rewritten. S. G.

longitudinally concave on the ventral side, slightly tapering in front where it ends bluntly, and simply rounded at the hind end.



Text-fig. 1 and 2. *Dissotrema papillatum*.
× 18 diam.

1. Ventral view. 2. Lateral view. m—mouth,
gp—genital pore, ac—acetabulum.

Frequently the worm rounds itself up on the ventral side. The openings of the oral and posterior suckers and the genital aperture near the middle are very conspicuous. Another peculiarity of this worm is the presence of a relatively large papilla near the hind end in the dorsal median line, on the top of which the excretory system opens. The surface of the body is perfectly smooth, except for the minute conical sensory papillæ, which are

more numerous in the anterior parts of the body. The colour is light yellowish brown, owing to the presence of numerous fine pigment granules in the parenchyma. The cuticle or investing membrane is 4μ thick on the dorsal side at the middle of the body and slightly less on the ventral side.

The mouth is subterminal and transversely oval and surrounded by a lip-like prolongation of the body. The oral sucker which immediately follows is usually ellipsoidal; in four specimens mounted in toto it was respectively $298 \times 260\mu$, $268 \times 275\mu$, $275 \times 260\mu$ and $253 \times 253\mu$. Its lumen is flattened dorsoventrally and lined by the direct continuation of the cuticle. The oral sucker is surrounded by a very thin but distinct external limiting membrane, in which run very fine circular muscle fibres, mostly arranged in band-like groups separated from one another by narrow but distinct spaces. Under the microscope these fibres look exactly like the circular fibres of the body wall. Along the lateral margin of the lumen of the oral sucker there project into it in its posterior two-thirds a number of sharp dentiform spines stained

differently from the lining cuticle. The greater part of the oral sucker is formed by the muscular fibres, which are arranged in three groups, two of longitudinal fibres and one of radial. Of these the radial fibres are by far the most numerous, traversing the whole thickness of the wall of the sucker between the lining cuticle and the external limiting membrane and leaving comparatively little interspaces between. The individual fibres of this group are very fine, but they are for the most part united into bundles which lightly diverge towards the external limiting membrane. The inner longitudinal fibres are found between the bundles of the radial fibres immediately outside the lining cuticle, arranged in radiating groups, each of several layers of fibres, which appear in cross sections of the sucker as so many minute dots. The external longitudinal fibres are also found between the bundles of the radial fibres, but next the external limiting membrane, forming groups which are wider and farther separated from one another, owing to the greater intervals between the bundles of the radial fibres in this part. The bundles of the inner longitudinal fibres are separated from those of the outer by connective tissue. In the interspaces left by the three sets of muscle fibres above mentioned there are small, well stained gland cells, which open by long ducts along the anterior margin of the sucker.

The oral sucker is accompanied by a pair of dermal glands, each consisting of several cells and opening near the mouth. The cells lie in the parenchyma on either side of the sucker (fig. 1).

The acetabulum or posterior sucker is an ellipsoidal organ situated close to the hind end of the body and opening on the ventral surface by an aperture which is usually more or less I-shaped, the axis of the I being parallel to the long axis of the body. In four total mounts its size was respectively $528 \times 510\mu$, $528 \times 458\mu$, $475 \times 422\mu$ and $528 \times 493\mu$. Its wall is very thick, about 126μ , and bounded on the inner side by a cuticle which is the direct continuation of that of the ventral side of the body, and on the outer side by a thin limiting membrane separating it from the surrounding parenchyma. The muscular fibres which form the principal mass of the wall of the acetabulum are arranged in three groups, radial,

circular and irregularly meridional. The radial fibres which are very well developed traverse the whole thickness of the wall and are inserted at their ends to the cuticle and the external limiting membrane respectively and form more or less distinct bundles. The circular fibres form a layer of some thickness, about 8μ , immediately adjoining the lining cuticle, and form bundles, separated from one another by those of the radial fibres. They are especially well developed at the front and hind ends of the acetabulum and are reinforced at the former by some additional bundles lying more outwardly in the same plane with the irregularly meridional fibres directly to be described, and form together a sphincter. The layer of irregularly meridional fibres lies just under the external limiting membrane, the fibres decussating irregularly with one another but running parallel to the limiting membrane and in some places meridionally. In the connective tissue of the acetabulum, between the bundles of the radial fibres and the layers of circular and irregularly meridional fibres, lie numerous, deeply stained unicellular glands, which open by long ducts mostly along the margin of the acetabulum, but in smaller numbers also on its whole inner surface. The ducts that open on the front margin of the acetabulum pass between the bundles of the circular and the irregularly meridional fibres mentioned above. In the parenchyma surrounding the acetabulum there are groups of unicellular glands which open on the body surface around the acetabular orifice.

The oral sucker is followed by the prepharynx, which is remarkable by its length and close windings and the structure of its inner lining. If straightened out it would be nearly as long as 3 mm., therefore about equal to the body length, but is wound upon itself so that in the natural state it occupies only one-fourth as much linear space. Taken as a whole, it may be said to describe two U's open in front, a smaller one inside a larger; the smaller, anterior and ventral, connected with the oral sucker by the front end of its left arm; the larger, posterior and dorsal, connected with the pharynx by the front end of its left arm, and the right arm of the smaller U continued to the right arm of the larger one (figs. 1, 3). The canal measures about 70μ from side to side, and

its inner lining, which may be as thick as 12μ in some places, appears as if composed of clear, small, polygonal prisms hard pressed against one another and separated only by deeply staining membranous partitions. In tangential sections of the prepharynx, the prisms naturally appear as so many clear polygonal spaces with deeply stained peripheries. Examination with high power objectives shows that the clear prisms are nothing else than the openings of the glands that surround the prepharynx along its whole length, and that the deeply stained partitions are the substance of the lining cuticle, which is the direct continuation of that of the oral sucker, but which has undergone a change in its physical condition owing to the pressure to which it must be subjected by the passage of so many glands through it. As a proof of the correctness of this interpretation we see that the cuticle is restored to its ordinary condition in those places where the secretory activities of the gland cells appear to be in a resting stage. In many places the free ends of the membranous partitions above mentioned appear in sections like cilia, and where the secretions are being poured into the prepharyngeal cavity, they may be observed forming a column corresponding to each clear prism and projecting inwards.

The prepharynx is accompanied in its whole length by numerous unicellular glands which invest it all around in cross sections and which we think it appropriate to call the *prepharyngeal glands* (fig. 3). They are arranged in more or less distinct groups of some ten or more cells each, separated from one another by the intervening parenchyma or pressed against one another in different degrees according to the different phases of their secretory activity. The cells are very deeply stained with haematoxylin when they are small, i.e. in the intervals of their secretory activity and more pale when they are large and contain much secretion in the cytoplasm. In the latter state the nucleus is usually spherical and vesicular and contains a single, well defined chromatin spherule in the centre. The duct which leads from each of these cells to the prepharyngeal lumen can be observed better when they are deeply stained, since the filling of these ducts by

the secretion makes them stain paler and distinguishable from the surrounding parenchyma with difficulty. One of the larger groups of prepharyngeal glands taken at random in a sagittal section of the worm measured 40μ in diameter. Next the lining cuticle of the prepharynx lies a layer of circular muscle fibres, followed by one of longitudinal fibres. The prepharyngeal glands lie at a short distance outside these muscle layers.

The prepharynx is continued posteriorly into an exceedingly muscular pharynx, an ellipsoidal or almost spherical organ measuring in three specimens mounted in toto $372 \times 312\mu$, 342×275 and $298 \times 298\mu$ respectively. Its lumen is flattened dorsoventrally and lined by a comparatively thick cuticle like that of the oral sucker, the direct continuation of that of the prepharynx. Its wall is almost entirely made up of muscle fibres which form numerous concentric bundles with the pharyngeal lumen as the axis. In the thickest part of the pharyngeal wall there are about twenty bundles lying one outside another, and in the median sagittal section of the pharynx, up to some sixty bundles are seen arranged one behind another, the bundles being polygonal owing to mutual pressure and separated from one another by an exceedingly thin layer of connective tissue. At the two ends of the pharynx there are some especially well developed bundles staining differently from the others, and serving as the sphincters. In the anterior sphincter which is much the stronger one, the bundles are arranged in some six or seven obliquely transverse layers separated from one another by distinct slit-like spaces. The posterior sphincter consists of only three or four similar layers of bundles.

The muscle fibres of the pharynx appear to be produced for the most part by two pairs of gigantic myoblasts closely applied, two on either side, to the lateral surface of its front half, and surrounding the whole organ with a coat of its sarcoplasm. Each one of these gigantic cells is accompanied by two or three smaller cells, probably of the same nature as the principal ones, and a number of very much smaller cells with deeply stained nuclei, which may possibly be nervous in nature.

The correctness of the contention of Looss, that the "pharynx" of authors in the *Paramphistomatidæ* is in reality the oral sucker is especially evident in this genus.

Next the pharynx comes the œsophagus, a very short section of the alimentary canal lined by the direct continuation of the cuticle of the former, which terminates abruptly behind and gives place to the epithelium of the intestine. Into the œsophagus open a number of unicellular glands, the *œsophageal* or *salivary*, the cells of which lie at some distance from the lumen, with which they are connected by long ducts. As a general rule these salivary glands stain lighter than the prepharyngeal.

The intestinal cæca are short and diverge at an angle of about 40° and are broader anteriorly and narrower posteriorly. In four specimens mounted in toto a cæcum measured respectively $616 \times 264\mu$, $616 \times 300\mu$, $598 \times 300\mu$ and $510 \times 229\mu$, as seen dorsoventrally. The hind ends of the cæca lie slightly behind the middle of the whole length of the body. The cæca are surrounded by double layers of muscle fibres, an inner of circular and an outer of longitudinal ones. The latter may be looked upon as the continuation of the corresponding layer of the prepharynx, because several of its fibres are seen to be directly continued into those of the other along the outside of the pharynx. The intestinal epithelium, which rests on a thin basement membrane, is of various thickness, but usually the cells are $12-32\mu$ in height, and their free ends show the pseudopodia-like processes frequently seen in digenetic trematodes.

The excretory pore lies at the top of the papilla already mentioned near the posterior end of the body; hence the papilla may be fitly called the excretory papilla (fig. 2). The pore leads into an elongated bottle-shaped cavity, the excretory vesicle, lying on the dorsal side of the acetabulum and extending forwards to about its middle, where it divides right and left into the two main excretory vessels. These diverge towards the lateral side of the body and proceed forwards with light windings just on the outside of the genital organs and the gut to about the level of the hind end of the brain. Here it turns upon itself and forms the recurrent vessel, which proceeds backwards, closely following its former course, and divides into several small branches

in the region of the acetabulum. From the recurrent vessel are given off a number of branches which are distributed to the different parts of the body. The finer ramifications of the excretory vessels have not been traced to our satisfaction, owing to the opaqueness of the worm in the living state, and we have not been able thus far to observe very young ones alive. The wall of the excretory vesicle is formed by a thin epithelium of finely granular appearance containing nuclei at wide intervals and resting on a basement membrane. Outside this lies a single layer of fine circular muscle fibres, which is continued at the apex of the excretory papilla into the circular muscle layer of the body wall. Short inconspicuous muscle fibres running in a longitudinal direction may sometimes be found around the excretory pore.

On the nervous system we have made only a few observations. The brain is situated directly behind the oral sucker, on the dorsal side of the prepharynx (fig. 2). It is transversely elongated and presents thickenings at the two ends, where nerve cells are especially numerous and from which large nerves are given out forwards, one on each side, on the dorsal side of the oral sucker and another large pair backwards. The latter are the main nerves that supply the greater part of the body and can be followed for a considerable distance, lying directly on the inside of the muscular layers of the body wall. A few additional nerves are shown in the figure.

The common genital pore lies in the median line of the body slightly backwards than the middle of the whole length and is relatively large. It leads into a spacious genital atrium lined by the direct continuation of the cuticle of the body surface and indistinctly divided into a dorsal and a ventral portion, into the former of which the male duct opens and into the latter the metraterm. Around the genital atrium are found groups of unicellular dermal glands opening by tolerably long ducts on the external cuticle.

The testes, of which there are two forming an oblique pair, lie just in front of the acetabulum, with which the posterior or right one may be partly overlapping (fig. 1). They are subglobular and measure $175-250\mu$ in diameter. From the front end of the right testis a slender vas efferens proceeds forwards obliquely to-

wards the right side of the body; and from the right side of the left testis a similar duct proceeds towards the right and obliquely forwards, and uniting with its fellow opens into the vas deferens (fig. 4). This is a large duct beginning with a sudden expansion where it joins the vasa efferentia and proceeding transversely across the body with a light posteriorly convex curvature, opens directly in front of the left testis into the next portion, which may be called the seminal vesicle. The wall of the vas deferens is formed by a thin membrane and is destitute of muscle fibres. The left vas efferens runs parallel to the vas deferens, the former on the dorsal side of the latter.

The seminal vesicle is a large spindle-shaped organ communicating with the vas deferens on the left side of the body by a constricted opening and lying transversely across the body directly in front of the vas deferens and parallel to it. At its right end it undergoes a narrow constriction forming a circular valve projecting into the next portion, the ejaculatory duct. The wall of the seminal vesicle is formed by a thin membrane exactly like that of the vas deferens, but in addition there is a layer of well developed circular muscle fibres. The seminal vesicle lies ventrally to the other genital organs found at the same level, and is like the vas deferens almost always filled with sperm. The ejaculatory duct is a canal of some length, whose calibre varies a great deal in different examples according to its sperm contents; in one of the examples that came under observation it was a slender canal and entirely empty. Usually however it is more or less enlarged and runs from where it joins the seminal vesicle forwards and slightly towards the left, and entering the penis sac opens near the centre of the latter into the penis. Its wall consists of a flattened or cubical epithelium resting on a basement membrane and containing well stained nuclei, followed by a layer of circular muscle fibres, on the outside of which there is a layer of strong longitudinal ones. The muscular coat is relatively thick, being about 8μ , and consequently the wall of the ejaculatory duct stands out quite distinctly even in total mounts. That part of the ejaculatory duct which lies outside the penis sac is surrounded on all sides by the *prostate glands*, conspicuously well

stained cells opening by long ducts in groups into the lumen of the ejaculatory duct. Corresponding to each group of these openings there is a group of vesicles containing a granular substance projecting into the cavity of the duct; these are nothing else than the secretions of the prostate glands, and since there are nearly as many vesicles in the duct as there are gland cells outside it, the former form an almost exact reflected picture of the latter. From the fact that these vesicles are found in nearly all examples we may infer that the secretion of the prostate glands dissolves away only very slowly in the ejaculatory duct.

The penis is a dorsoventrally flattened, wide duct with a thick wall, describing, when completely retracted, a round **U** opening by its left end into the genital atrium and terminating blindly at the other end. Where it overlaps with the ejaculatory duct it lies on the ventral side of the latter, which opens into it from the median side at a short distance from its blind termination (fig. 4). The lining cuticle, which is the direct continuation of that of the genital atrium, is quite thick, and its free surface is covered with very fine granules, which assume in some places the form of stiff-looking hairs. Outside the cuticle is a layer of circular muscle fibres followed by one of longitudinal. The thickness of the wall of the penis including the muscular coat is about 12μ . The penis is surrounded by numerous unicellular glands similar to the prostate but staining less deeply and opening in groups into the cavity of the penis. Their secretion does not form vesicles like that of the prostate glands and is probably of a sticky nature, covering the surface of the penis when it is everted for copulation. The fine granules and stiff-looking hair-like structures mentioned above as occurring on the surface of the penis cuticle are probably due to the presence of the secretion of these glands, which may be called the *penis glands*.

The penis sac is an oval muscular organ lightly flattened dorsoventrally and enclosing the distal part of the ejaculatory duct and the whole of the penis together with its numerous glands. Its wall is formed by two well developed layers of muscles, an inner of transverse and an outer of longitudinal fibres. The inter-

spaces left by the enclosed organs above mentioned are filled by a loose parenchyma, in which a few gigantic cells, probably myoblasts, with well stained cytoplasm and large processes directed towards the inner muscular coat of the penis are present. The outer muscular coat of the penis sac appears to be the product of about five myoblasts much smaller than the principal ones of the pharynx, which are closely applied to the outer surface of the sac and send out a sarcoplasmic mantle surrounding it. They are inconstant in position but are mostly situated on the dorsal side of the sac.

The ovary is a rather small, subglobular organ situated on the right side of the median line, roughly between the middle and the last third of the body length, near the dorsal side (figs. 1, 3, 4). It is surrounded by a thin membrane with an opening at the anteromedian corner of the ovary, where the oviduct takes its rise. The membrane is surrounded by a layer of very fine circular muscle fibres, and near its opening there are two nuclei embedded in it, probably the nuclei of the matrix cells. The contents of the ovary consist entirely of ova in different stages of development, the smaller and immature ones lying close together at the blind end of the ovary, and the larger and maturer ones near the oviduct. The latter begins at the opening of the ovarial membrane above mentioned and is immediately expanded into a small chamber, in which spermatozoa are usually present, and which may therefore be called the *insemination chamber*.* From this the oviduct continues its course transversely across the median line towards the left side, and after receiving the openings of the seminal receptacle, the LAURER'S canal and the median yolk duct on its way, expands into the ootype, which is an ellipsoidal organ situated in the left half of the body close to the median line and surrounded by the numerous glands of MEHLIS, or shell glands (fig. 4). The ootype is continued into the uterus which makes a few windings in the left half of the body, between the penis sac and the seminal vesicle. At

* Looss calls it "Befruchtungsraum" in several of the distomes described by him in his publication of 1894.

its last loop it is usually more or less notably expanded and passes into the metraterm, which proceeds thence almost straight forwards on the left side of the penis sac, and at the level of the common genital pore makes a sudden turn towards it and opens into the ventral portion of the genital atrium. The uterus contains but few eggs at a time, about 5–10 all told. The egg is asymmetrical and is provided at one pole with a very short stalk-like process, the operculum being found at the other pole. The dimensions of the egg as measured in the three different aspects shown in fig. 5 are (a) $78 \times 39 \mu$, (b) $78 \times 41 \mu$, (c) $47 \times 37 \mu$. The shell is dark brown in older eggs.

The oviduct receives at a short distance from the insemination chamber the opening of the seminal receptacle. This is a comparatively large, flask-shaped vesicle lying just in front of the right testis, on the dorsal side of the vas deferens and the seminal vesicle and is nearly always filled with sperm. The neck is nearly as long as the body, and communicates just before opening into the oviduct with the LAURER'S canal. This is a tolerably long canal with a thick cuticular wall and a narrow lumen and proceeds from the point of its origin dorsalwards, and after making a few light windings on the way, opens on the dorsal surface of the body at some distance to the left of the median line.

The vitellarium lies between the oral sucker and the penis sac, in the superficial part of the parenchyma, all around the body as seen in a cross section, therefore enveloping the alimentary system on nearly all sides (fig. 1). The lobes are relatively small and on the dorsal side they extend from a little behind the oral sucker to about the hind end of the penis sac and do not show any regular arrangement; but in some examples the paired condition is suggested by the presence of a median portion free of the lobes. On the ventral side the lobes are arranged roughly in the shape of an **X**, with the point of intersection on the ventral side of the oesophagus and with an irregular connection between the two arms at the front end; the anteroposterior extension nearly coinciding with that of the dorsal portion but stopping a little shorter behind at about the level of the genital pore. In the

region of the prepharyngeal windings the dorsal and ventral portions pass into each other without any break. There are two principal yolk ducts running longitudinally on each side of the body, one for the dorsal vitellarium, the other for the ventral. They are very distinct near the hind end of the vitellarium, whence they proceed backwards and unite at about the level of the ovary and form the paired yolk ducts. These turn towards the median line of the body, passing on its way between the LAURER'S canal and the seminal receptacle on the dorsal side and the seminal vesicle on the ventral, and unite to form the yolk reservoir, from which a short unpaired yolk duct leads forwards to the oviduct, into which it opens directly before the ootype. As to the structure of the walls of the female ducts, the following may be added: the oviduct has a syncytial wall with very few scattered nuclei, surrounded by a layer of fine circular muscle fibres, which form a sphincter at either end of the insemination chamber; the seminal receptacle has also a similar wall surrounded by an inner layer of circular and an outer of longitudinal fibres; the ootype is provided with an epithelial wall whose cell boundaries are not apparent, followed by an inner circular muscle and an outer longitudinal of exceedingly fine fibres; the uterus has an epithelial wall, whose cells are closely in contact with one another at their bases and project free into the lumen, the muscular coat consisting of inner circular and outer longitudinal fibres, the latter few in number; the wall of the metraterm is cuticular like that of the genital atrium and has the same muscle layers as the uterus. The LAURER'S canal and the yolk ducts appear to be entirely destitute of a muscular coat.

About the parenchyma we want to note the presence of subcuticular cell groups and of lymph spaces. The former are arranged in some parts at nearly regular intervals a short distance away from the cuticle, and each group consists of a few to some dozen relatively small cells with a compact nucleus and an apparently homogeneous or finely granular cytoplasm, both staining well with hæmatoxylin. They are probably of glandular nature

and appear to open on the cuticle. The dermal glands before noted as lying on either side of the oral sucker are probably special developments of these subcuticular cell groups. As to the lymph spaces they are especially well developed in this species, and although we have not been able to make out their mutual connections thoroughly, there is no doubt that they consist in the main of longitudinal vessels extending nearly the entire length of the body. At the level of the intestinal cæca one can count as many as fifteen spaces in a cross section, most of them immediately surrounding the cæca but some lying at some distance away from them. At the level of the genital pore they are situated around the intestinal cæca and on the dorsal and lateral sides of the penis sac; and at the two ends of the body, where the spaces are less in number, they are situated on the dorsal side of the respective suckers. In some sections it appeared to us that some of these spaces fused and communicated with the neighbouring ones.

There is no doubt that this new genus is most nearly allied to the *Paramphistomatidæ*. Aside from the general form of the body with the two suckers at either end, the character of the prepharynx, the development of a muscular pharynx in its course, and above all the presence of a lymph system are characters which can be noted in varying degrees in the members of that family. Thus FISCHOEDER [p. 491] mentions a certain degree of the winding of the prepharynx ('oesophagus' according to his terminology) as a distinguishing character of the *Paramphistomatidæ*, but it is carried to an extreme in our new genus, as above described. Again the presence of gland cells around the prepharynx appears to be a characteristic of that family, so far as its members have been studied with reference to this point. A muscular pharynx, more or less well developed, somewhere in the course of the prepharynx, is found in such forms as *Watsonius watsoni*, *Pseudodiscus hawkesii*, *Opisthodiscus diplodiscoides*, *Schizamphistomum spinulosum* and *Schizamph. scleroporum*. As to the lymph system its significance has been so ably pointed out not long ago by ODHNER that I deem it sufficient merely to refer

to him. Notwithstanding these points of resemblance affiliating our new genus with the *Paramphistomatidæ*, there are others as sharply differentiating it from any of the members of that family. In the first place, the pretesticular position of the ovary is a character which appears to occur in none of the *Paramphistomatidæ*, and only in *Opisthodiscus diplodiscoides*, so far as I know, do the testes lie not in front of the ovary but on the same level and extend further backwards than the latter. Again, the peculiar arrangement of the vitelline lobes appears to be a characteristic of the new genus, as also the short and relatively wide intestinal cæca extending but little into the posterior half of the body. In view of these points of resemblance and difference it appears to us that the question as to whether to refer the new genus to a distinct family from the *Paramphistomatidæ* is more a matter of convenience than of principle; but it is in our opinion sufficiently different to justify the erection of a new family, which is then to be called *Dissotrematidæ* and may be diagnosed as follows:

Fam. *Dissotrematidæ*. Digenea with more or less cylindrical body; with oral sucker close to the front end, and acetabulum close to the hind end, of the body; with long convoluted prepharynx and well developed pharynx; ovary pretesticular; common genital aperture ventral and median; no buccal pouches, no ventral pouch.

Genus *Dissotrema*. Body sausage shaped, longitudinally concave on the ventral side, convex on the dorsal, only slightly attenuated at the front end, hind end well rounded; oral sucker surrounded by lip-like prolongation of body; acetabulum subterminal, opening on the ventral surface by a longitudinal slit-like aperture. Genital atrium present, opening in the ventral median line in the middle third of body; testes two, subglobular, in oblique pair, in front of acetabulum; ovary subglobular, pretesticular; vitellaria continuous across the median line; the whole genital organs with the exception of the vitellaria in posterior half of body; penis sac present. Prepharynx long, convoluted; pharynx very well developed; intestinal cæca short; digestive system almost entirely in front of genital pore. Excretory vesicle elongated bottle-shaped, opening by its slender end close to

the hind end of body, dorsal to acetabulum; paired excretory vessels proceeding from anterolateral corners of the vesicle.

D. papillatum. Body smooth except for the sensory papillæ, about 3.5 mm. long, 0.6 mm. wide, cylindrical, with a conspicuous excretory papilla on the dorsal median line close to the hind end of body. Oral sucker usually ellipsoidal, length 0.25–0.3 mm., width 0.25–0.28 mm.; acetabulum comparatively small, ellipsoidal, length 0.48–0.53 mm., width 0.42–0.51 mm., opening ventral, I-shaped. Prepharynx describing a double U, one within the other, the inner U continued to the oral sucker, the outer to the pharynx; pharynx subglobular or ellipsoidal, 0.28–0.37 mm. in diameter, very muscular, at hind end of prepharynx, between the anterior and middle third of body; intestinal cæca immediately following the pharynx, elongated ovate when viewed dorsoventrally, with the attenuated end directed backwards, the two communicating with each other by a wide passage immediately behind the pharynx, only about one-half of the cæca extending into the posterior half of body. Genital pore only slightly behind the middle of body, fairly large, transversely oval; penis sac dorsal and mostly posterior to genital pore, oval, occupying about one-third of the breadth of body. Right testis posterior, closely in front of acetabulum or partly overlapping it, may be submedian; left testis obliquely in front of the right; prostate glands and penis glands well developed. Vasa efferentia uniting in right half of body and opening into the vas deferens between ovary and testis; vas deferens transverse, at same level with seminal receptacle; seminal vesicle spindle-shaped, transverse, immediately in front of vas deferens, communicating with the latter in left half of body; ejaculatory duct nearly straight, antero-posterior, joining the seminal vesicle at its right end, penetrating the penis sac; penis when completely retracted U-shaped, flattened dorsoventrally, receiving the ejaculatory duct near its right end, opening at the other into the genital atrium. Ovary small, subglobular, in right half of body between penis sac and right testis; uterine windings few and simple, in left half of body between penis sac and paired yolk duct; metraterm on left side of penis sac, curving towards the median line and opening into the genital atrium.

Seminal receptacle large, flask-shaped, between ovary and right testis; LAURER'S canal present, opening on the dorsal side in left half of body. Vitellarium extending from level of genital pore forwards to between the oral sucker and prepharyngeal convolutions, situated around the digestive tract; two yolk ducts proceeding backwards on either side from hind end of vitellarium, they soon unite to form the paired yolk ducts; yolk reservoir submedian, midway between testes and penis sac. Eggs asymmetrical, with a short, blunt stalk-like projection at one end. Excretory vesicle opening on top of the papilla above mentioned, extending forwards a little farther than middle of acetabulum; main excretory vessel reaching forwards to about the level of the brain, where it turns backwards to form the recurrent vessel.

Host. *Siganus fuscescens* (HOULTUYN).

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S. Goto and Y. Matsudaira :
ON DISSOTREMA PAPILLATUM.

PLATE I.

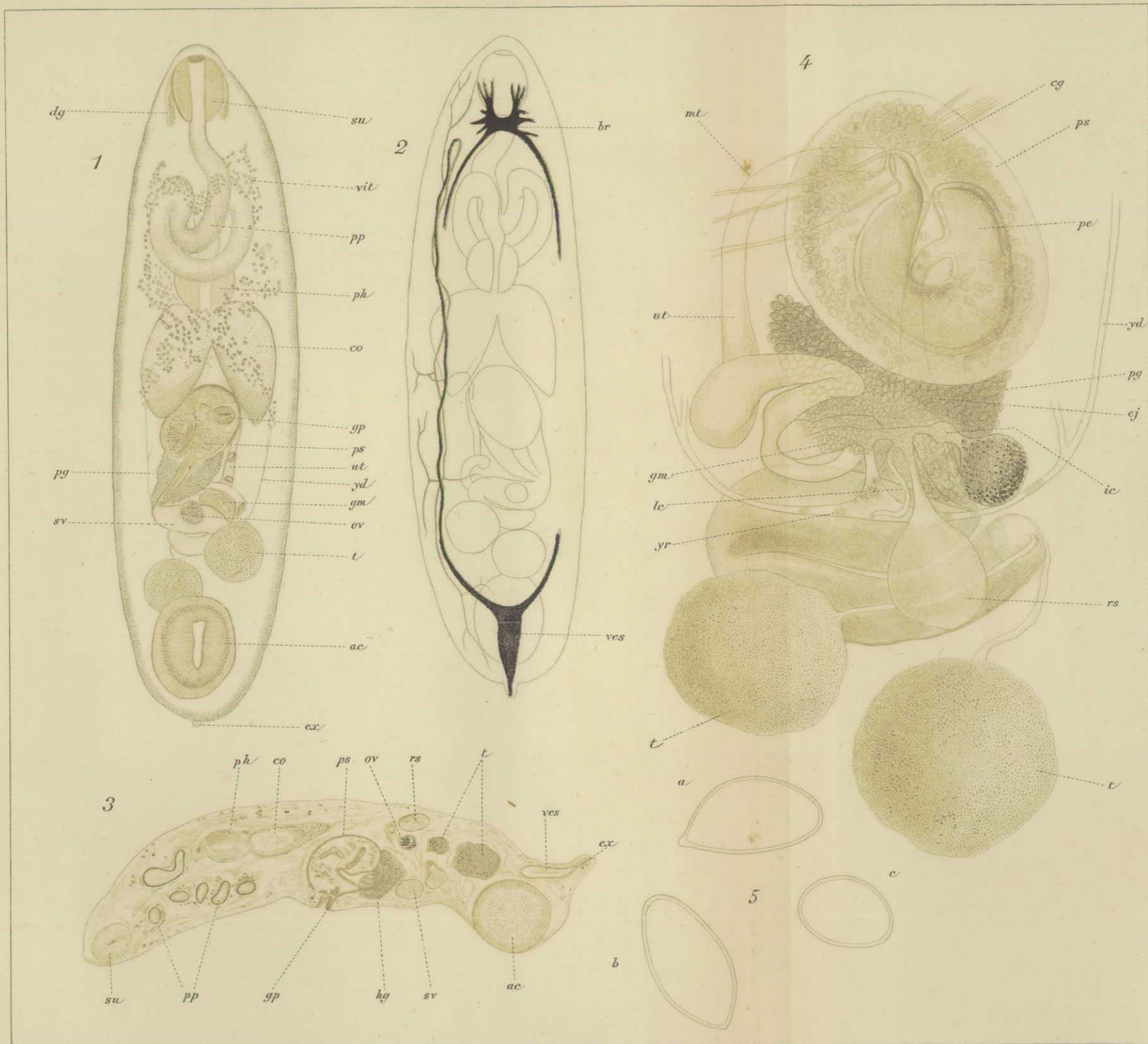
Explanation of Plate I.

Dissotrema papillatum.

- Fig. 1.** An entire worm viewed from the ventral side, to show the principal organs. From a total mount. $\times 45$ diam.
- Fig. 2.** An entire worm viewed from the dorsal side, to show the nervous and excretory systems. $\times 45$ diam.
- Fig. 3.** A sagittal section of the worm. $\times 33$ diam.
- Fig. 4.** The genital organs with the exclusion of the vitellarium; dorsal view. $\times 125$ diam.
- Fig. 5.** An egg shell in three different aspects respectively at right angles to one another. $\times 388$ diam.

Abbreviations.

ac	acetabulum.	pe	penis.
br	brain.	pg	prostate gland.
cg	penis gland.	ph	pharynx.
co	intestinal cæcum.	pp	prepharynx.
dg	dermal gland.	ps	penis sac.
ej	ejaculatory duct.	rs	seminal receptacle.
ex	excretory pore.	su	oral sucker.
gm	shell gland.	sv	seminal vesicle.
gp	genital pore.	t	testis.
ic	insemination chamber.	ut	uterus.
le	LAURER'S canal.	ves.....	excretory vesicle.
m	mouth.	vit.....	vitellarium.
mt	metraterm.	yd	yolk duct.
ov	ovary.	yr	yolk reservoir.



GOTO et MATSUDAIRA del.

On *Dissotrema papillatum*, n. g., n. sp.