

ON THE MORPHOLOGY OF A NEW GENUS OF TREMATODE PARASITE OF THE KINGFISHER FROM LUCKNOW.

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LÜHE (1909) created a subfamily, Psilostominae, for the reception of the two genera—*Psilostomum* and *Psilochasmus*. Odhner (1913) described several new genera and added considerably to our knowledge of the group. He further considered the advisability of raising the group to the status of a family, Psilostomidae. Travassos (1921) gave an account of a species of a new genus *Lyperorchis* under the family Psilostomidae. Linton (1928) in his account of the Trematodes from North American birds recorded several new species of the genus *Psilostomum*, some of which do not appear to us to conform to the generic diagnosis. Bhalerao (1931) added yet another genus, *Testifroncosa*, from the intestine of pigs from India to the family under review. In the course of our investigations on the Trematode parasites of birds, we have recovered a few specimens from the intestine of a kingfisher, shot at Lucknow and these appear to be new to science. They are described as a new genus of the family. While reserving our criticisms to a later stage, we must say here that the discovery of this new genus under the family Psilostomidae has revealed certain points of systematic value that necessitate the revision of our knowledge of this interesting group of Trematodes.

Psilorchis indicus N.G., N. Sp.

The body of this Trematode is long flattened, leaf-like and gradually tapers towards either end. It is 8.57 mm. in length and has a maximum breadth of 1.17 mm., which is at about the middle of the body near the ovary. The body is covered over with smooth cuticle and is devoid of any spines or scales.

The mouth is subterminally situated at the anterior end and is surrounded by a small oral sucker, which is not powerful. It is .17 mm. by .1 mm. in size. The ventral sucker is strong and powerful and is much larger than the oral sucker. It measures .75 mm. by .65 mm. and is situated at 2/9th

portion of the body from the anterior end. The genital pore opens in front of the ventral sucker, between it and the intestinal bifurcation.

The mouth leads into a short prepharynx, measuring .18 mm. in length. The pharynx is globular, thick-walled and muscular and is .18 mm. by .16 mm. in size. This is followed by a small cesophagus, .09 mm. long, and this latter bifurcates into two intestinal diverticula, running laterally to the posterior end of the body, ending blindly a little in front of it.

The excretory pore is situated at the posterior end of the body and leads into a short Y-shaped excretory bladder. The two horns of the Y lead into long excretory ducts which ramify in the body of the animal.

The ovary is oval and is situated slightly behind the middle of the body. It measures .41 mm. by .25 mm. From its posterior end arises a short narrow oviduct, which after a short course is met by the common yolk duct. Here it forms the öotype, which receives the Laurer's canal and the uterus also arises from it. There is no receptaculum seminis in these forms and the öotype is surrounded by a large number of unicellular shell glands.

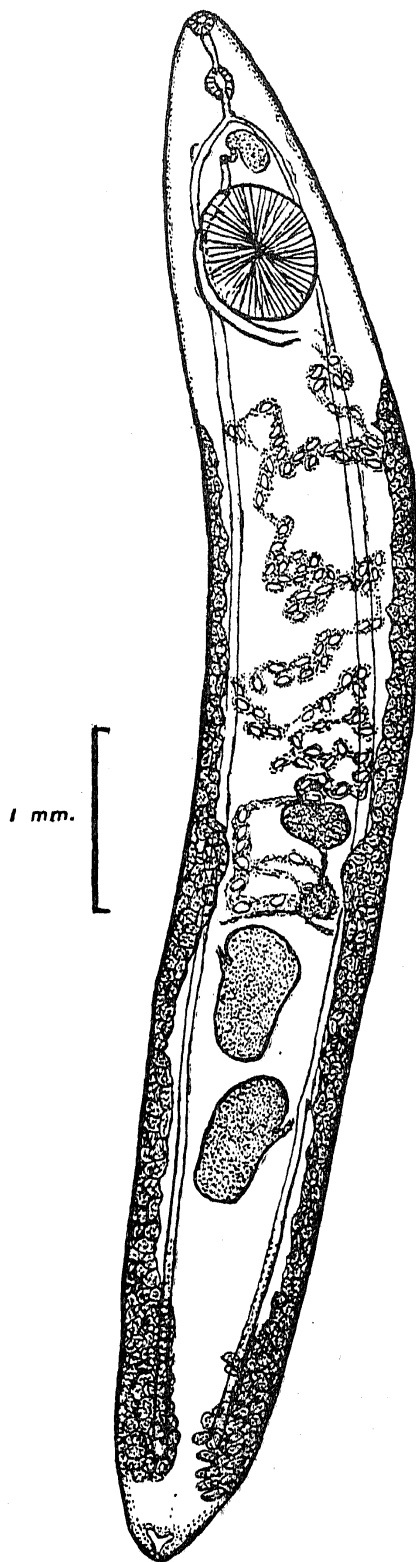


FIG. 1.

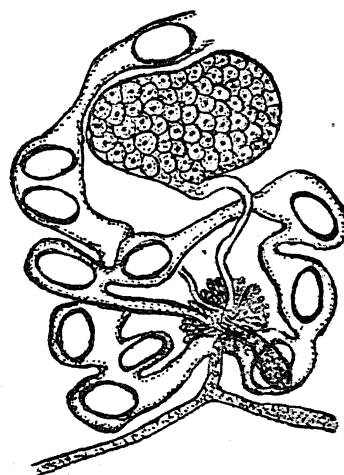


FIG. 2.

The vitelline glands are distributed behind the ventral sucker, as large number of diffused follicles laterally on either side of the body to the posterior end. These glands are chiefly extra-cæcal in position, but at places they project inwards interior to and covering the intestinal diverticula. At the posterior end of the body they predominantly become intra-cæcal but unlike other genera of Psilostomidæ and the Echinostomidæ they do not meet in the middle line. They all lead by their minute ducts into the lateral vitelline ducts on either side, and at the level of the öotype these lateral vitelline ducts join the transverse vitelline duct of its side and the two transverse ducts unite behind the öotype to form a median vitelline duct. This duct before entering the öotype collects its yolk into a small pear-shaped yolk reservoir.

The uterus arises from the right side of the öotype and forms an anterior loop round the latter. It then turns round behind it and in front of the anterior testis it turns forwards along the right side of the ovary. Then it follows a zig-zag course forwards to open at the genital pore in front of the ventral sucker as an elongated metraterm. The eggs are large oval structures measuring from $\cdot 125$ — $\cdot 130$ mm. by $\cdot 08$ — $\cdot 1$ mm.

There are two testes, more or less bean-shaped, situated behind the ovary and are tandem in position. Each testis is provided with an external lateral funiculus that leads forwards into a narrow vas deferens. The anterior testis

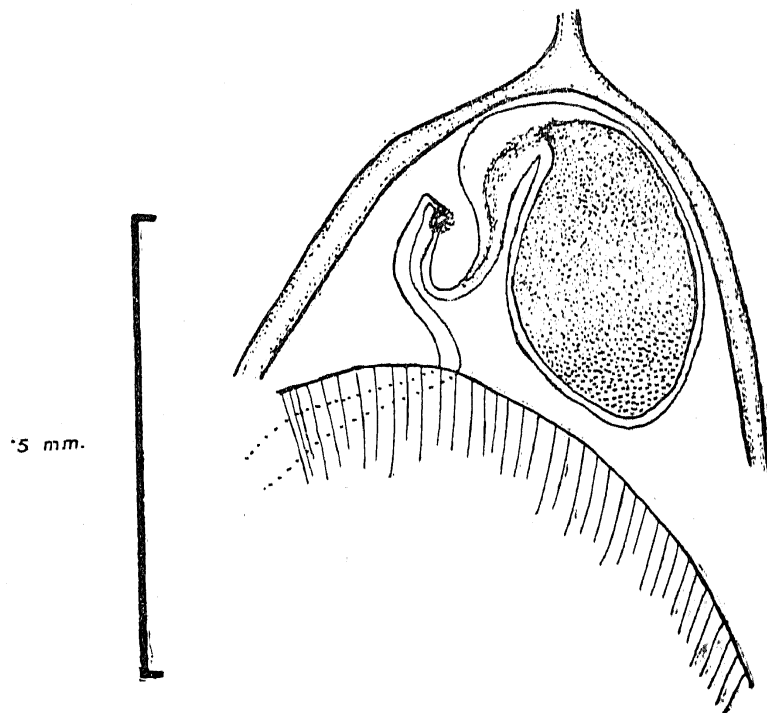


FIG. 3.

is situated behind the ovary at a distance of .5 mm. and measures .75 mm. long by .42 mm. broad. The posterior testis measures .75 mm. by .36 mm. in size.

The vesicula seminalis, formed by the union of two vasa deferentia in front of the ventral sucker, is retort-shaped and anteriorly leads into a short ductus ejaculatorius and the cirrus. It opens at the genital pore close to the opening of the metraterm, the opening being slightly dextral, situated between the intestinal bifurcation and the acetabulum.

The characters of the genus *Psilorchis* may, therefore, be summed up thus:—

1. Leaf-like body, devoid of spines.
2. Ventral sucker much larger than the oral sucker.
3. Short Y-shaped excretory bladder.
4. Dextral position of the genital pore in front of the ventral sucker.
5. Ovary in front of the two testes, in the posterior half of the body.
6. Receptaculum seminis absent.
7. Uterine coils in front of the testes.
8. Vitellaria behind the ventral sucker and do not meet those of the other side posteriorly behind the testes.
9. Short cirrus and retort-shaped vesicula seminalis completely in front of the ventral sucker.

The genus described above belongs to the family Psilostomidæ, which also includes the genera *Psilostomum*, *Psilochasmus*, *Psilotrema*, *Apopharynx*, *Sphæridiotrema*, *Lyperorchis* and *Testifrondosa*. The present form differs from *Psilostomum* in the dextral position of the genital pore, in the position of the vesicula seminalis, in the short cirrus and in the absence of the posterior coalescence of the vitellaria. From *Psilochasmus* it can be distinguished in the shape of the posterior end of the body, the shape of the excretory bladder and the position of the vesicula seminalis. It can be differentiated from *Psilotrema* in the absence of the body spines, in the position of the ventral sucker, in the shape of the excretory bladder, in the length of the uterus with numerous eggs, in the position of the ovary and in the position of the genital pore. It can readily be distinguished from *Sphæridiotrema* and *Apopharynx* by the shape and position of the ventral sucker, the position of the ovary and the uterus and the genital pore. It differs from *Testifrondosa* in the absence of the receptaculum seminis, shape of the testes, the position of the vesicula seminalis, the shape of the ventral sucker and the presence of the prepharynx. The genus *Testifrondosa*, it may be mentioned, is unique amongst the members of the family Psilostomidæ in having a receptaculum seminis and it appears to

us that it should be removed from this family on this account. We will urge for its inclusion under the family Allocreadiidæ with which it shows several other features in common.

The only other genus of the family is *Lyperorchis* and this is characterised by the absence of the uterine coils behind the ovary, the peculiarly drawn out and sinuous testes, the presence of two processes round the oral sucker, the absence of prepharynx and the presence of an armed cirrus.

Thus, the present form stands out clearly from all the known genera of the family.

The family Psilostomidæ appears to show variations in structures of some of the important organs in the body. The chief modifications concern the cirrus, the position of the genital pore and the length of the uterus. The presence or absence of the body spines is also a feature in which the genera show variations.

The cirrus is long and powerful in *Psilostomum* and *Sphæridiotrema*, and is also armed in *Lyperorchis*. In *Psilorchis* n.g. it is the shortest. The reduction in size of the cirrus can be traced through the series *Psilochasmus* → *Psilotrema* → *Apopharynx*, where there is gradual reduction in size and ultimately we arrive at the condition found in the present genus *Psilorchis*. The cirrus pouch likewise shows corresponding reduction in size in the series.

The genital pore is situated in between the ventral sucker and the intestinal bifurcation in *Psilostomum*. In *Psilotrema* and *Apopharynx* it lies at the level of the pharynx, while in *Sphæridiotrema* it comes to lie at the hinder end of the mouth sucker, an extreme stage in the family. Thus, the gradual shifting forward of the genital pore can be traced through the genera of the family. This seems to have its effect on the length of the uterus, which is shortest in *Psilotrema* and contains only a few (4-5) eggs. In *Apopharynx* it is a little longer and contains more eggs. In other genera it is very long and contains many eggs. The elongation of the uterus may also be due to the gradual shifting backward of the ovary. In *Apopharynx* it is situated at the level of the ventral sucker, while in *Psilotrema* it is behind the ventral sucker. In *Psilorchis* it has finally shifted much behind in the posterior half of the body.

The presence or absence of receptaculum seminis also seems to be an important feature for consideration. It is entirely absent in the family under review, but is present in the allied family Allocreadiidæ. Lühe (1909) mentions that the receptaculum seminis is present as a small structure in the subfamily Psilostominæ. Odhner (1913) who revised the work of Lühe mentions its absence in the entire family, Psilostomidæ,—at least he could

not see it in any of the forms described by him. Later, Fuhrmann (1928) confirms Odhner's view in mentioning the absence of receptaculum seminis in the family under review. We have failed to find it in *Psilorchis* and some other genera in our possession. Bhalerao (1931) mentions its presence in his genus *Testifrondosa*, which he has placed under the family Psilostomidæ. It is surprising to note that he has not shown it in any of his figures. He has, however, mentioned that owing to the development of the shell glands this structure is obscured in whole mounts. If this statement of Bhalerao is accepted as correct, we fail to understand how, on the presence of the receptaculum seminis, this genus could be included under the family Psilostomidæ. We venture to suggest its removal to the family Allocreadiidæ, with which it (*Testifrondosa*) shows several other resemblances besides, e.g., the position of the ovary in front of the two testes, the presence of the uterus between the ovary and the ventral sucker.

Similar variations in the structure of the cirrus, genital pore and uterus have been traced for the members of the family Allocreadiidæ, with which the present family appears to show relationships. The two families show parallel lines of evolution along divergent lines. It appears that the primitive form amongst the family Psilostomidæ shows greater resemblance to a form not much removed from *Allocreadium* and the condition in Psilostomidæ may possibly have arisen from Allocreadiidæ by the loss of the receptaculum seminis, probably through the genus *Testifrondosa*.

EXPLANATION OF FIGURES.

- FIG. 1.—*Psilorchis indicus* n.g., n.sp., ventral view.
 FIG. 2.—*Psilorchis indicus*, showing ovary and öotype complex.
 FIG. 3.—*Psilorchis indicus*, showing genital pore and the cirrus.

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