

ON A REPTILIAN AMPHISTOME, *STUNKARDIA DILYMPHOSA* BHALERAO, 1931, WITH A DISCUSSION ON THE SYNONYMY OF AN ALLIED GENUS AND SOME SPECIES.*

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ABSTRACT

Following Nasmark's (1937) method, the description of *Stunkardia dilymphosa* Bhalerao, 1931, an amphistomid fluke of freshwater chelonians, is enlarged. Histological details of its acetabulum, pharynx, oesophageal bulb and genital atrium are given. Some of the original author's observations are elucidated. Contrary to Bhalerao's observations, receptaculum seminis and cirrus are found to be absent, and the yolk reservoir and cirrus sac are present in this species. New hosts and localities are recorded for the parasite.

The genus *Parorientodiscus* Rohde, 1962, is synonymized with *Stunkardia* Bhalerao, 1931, on account of its having a similar structure of the acetabulum. The species *P. magnus* Rohde, 1969, now becomes *S. magnus* (Rohde, 1962) n. comb. *Pseudochiorchis stunkardi* Tandon, 1970, along with its synonyms proposed by Tandon (1970), is also considered a synonym of *S. dilymphosa*. Some of the present authors' observations on the histology of the various organs of this amphistome do not tally with those of Tandon on *P. stunkardi*.

Bhalerao (1931) described an amphistome, *Stunkardia dilymphosa*, as a new species under a new genus, from the rectum of a freshwater chelonian, *Batagur baska*, from Rangoon. The writers also collected one hundred and forty amphistomid flukes from freshwater chelonians, namely *Lissemys punctata punctata* Bonnaterre from Ropar (Punjab) and Rudrapur (U.P.), *Kachuga sylhetensis* (Jerdon) from Ropar, *K. tectum tectum* (Gray) from Pipli (Haryana) and *K.t. tentoria* (Gray) from Lucknow (U.P.). On the basis of the characteristic shape of the acetabulum, i.e. its posterior edges overhanging its aperture and forming two muscular processes (=lips), one on each side, these specimens have been identified as *Stunkardia dilymphosa* (Bhalerao, 1931).

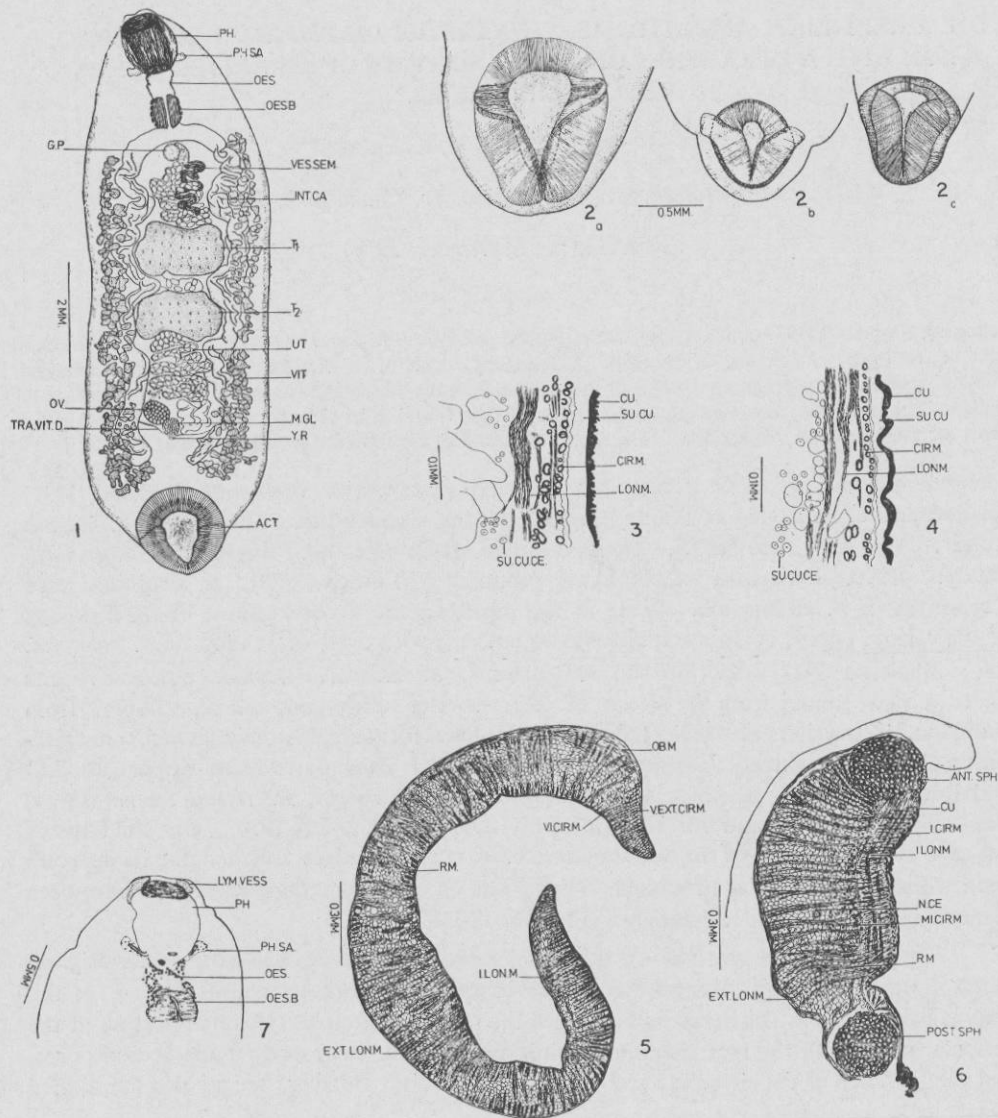
The writers' observations on this species show certain deviations from its original description. Bhalerao's observations were based on two whole mounts only. In the original description, Bhalerao had reported the presence of cirrus (terminal portion of the vesicula seminalis), the receptaculum seminis and separate male and female genital pores, and the absence of the cirrus sac and the yolk reservoir. Further, he had also mentioned

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the presence of only 5-6 eggs in the uterus and the vitellaria in the form of very small follicles diffused in the paranchyma. Chatterji (1936), while redescribing this species



FIGURES 1—7, *Stunkardia dilymphosa* Bhalerao, 1931. 1, a whole mount (ventral view); 2, a, b and c, a cetabulum with muscular projections in the unflattened specimens; 3, a portion of the dorsal body wall in sagittal section, depicting its histology; 4, a portion of sagittal section, showing the histology of the ventral body wall; 5, acetabulum in sagittal section, showing its musculature; 6, one-half of the pharynx in the sagittal section showing its histological details; 7, a portion of longitudinal-horizontal section, showing the primary pharyngeal sacs.

from another freshwater chelonian, *Morenia ocellata*, from the same locality, i.e. Rangoon, pointed out the presence of distinct vitelline follicles and the uterus full of eggs. However, he did not mention the cirrus sac, the yolk reservoir and the receptaculum seminis. The writers who have had the opportunity of studying these flukes, both in whole mounts and in serially cut sections, could locate the cirrus sac and ductus hermaphroditicus. (No separate male and female genital pores were observed on the surface of the body.) The receptaculum seminis was found to be absent and the yolk reservoir was conspicuous in fully mature specimens only.

Tandon (1970) described a new amphistomid species, *Pseudochiorchis stunkardi*, from freshwater chelonians from Lucknow (U.P.). In the writers' opinion, this form is nothing but *S. dilymphosa* (discussion on the synonymy *vide infra*). Tandon had also given some histological details of the acetabulum, pharynx and genital atrium of this form on the lines of Nasmak's (1937) work. In the case of the acetabulum, he had only referred to the number of units of the dorsal exterior and the ventral interior circular muscles, whereas in the text figure given by him, the dorsal interior and the ventral exterior circular muscle units have also been shown. Further, Tandon had reported the presence of well-developed basally circular muscles in the pharynx, but they have not been shown in the text figure.

With a view to supplementing its account, *S. dilymphosa* has been redescribed in brief.

Description (based on twenty specimens, three series of sections; ten specimens measured) : Body subcylindrical 4.435—13.728 mm long by 1.584—3.444 mm wide. Cuticle unarmed, wavier on dorsal surface than on the ventral (Figs. 3, 4), tubercles (observable only under high magnification) present on lateral body margins from the anterior end of the body up to the level of the pharynx. Acetabulum 0.968—1.76 x 0.836—2.042 mm, with a ventral funnel-shaped opening, not consisting of two portions separated by a septum, as seen in unflattened specimens and also described, as such, by Bhalerao (1931); in fact, the posterior edges of the acetabulum guarding its aperture are elevated and overhang it, forming two muscular processes (or a lip), one on each side, the shape of which varies in accordance with the degree of contraction or expansion of the fluke (Figs. 2 a, b and c); circular muscle units not well developed, dorsal exterior and dorsal interior circular units in diffused form (dorsal exterior circular units 60-65 according to Tandon, 1970), ventral exterior circular units 25-28, ventral interior circular units 35-40, radial muscle fibres well developed (Fig. 5).

ABBREVIATIONS

ACT.—acetabulum; ANT.SPH.—anterior sphincter; BA.CIR.M.—basal circular muscles; CI.SA.—cirrus sac; CIR.M.—circular muscles; CU.—cuticle; D.EJ.—ductus ejaculatorius; D.H.—ductus hermaphroditicus; EX.P.—excretory pore; EX.VE.—excretory vesicle; EX.VESS.—excretory vessel; EXT.CIR.M.—exterior circular muscles; EXT.LON.M.—exterior longitudinal muscles; G.AT.—genital atrium; G.AT.R.M.—genital atrial radial muscles; G.P.—genital pore; GL.CE.—gland cells; I.CIR.M.—interior circular muscles; I.LON.M.—interior longitudinal muscles; INT.CA.—intestinal caecum; L.C.P.—Laurer's canal pore; LON.M.—longitudinal muscles; LYM. VESS.—lymph vessel; M.GL.—Mehlis' gland; MI.CIR.M.—middle circular muscles; MT.—metraterm; N.CE.—nerve cells; O.DIV.—oral diverticulum; OB.V.—oblique muscles; OES.—oesophagus; OES.B.—oesophageal bulb; OV.—ovary; PH.—pharynx, PH.SA.—primary pharyngeal sac; POST.SPH.—posterior sphincter; R.M.—radial muscles; SU.CU.—subcuticle; SU.CU.CE.—subcuticular cells; T₁—anterior testis; T₂—posterior testis; TRA.VIT.D.—transverse vitelline duct; UT.—uterus V.EXT.CIR.M.—ventral exterior circular muscles; V.I.CIR.M.—ventral interior circular muscles; VES.SEM.—vesicula seminalis; VIT.—vitellaria; Y. R.—yolk reservoir.

Pharynx (Fig. 6) 0.572—1.32 x 0.572—1.32 mm, following Nasmark's (1937) method, the general arrangement of muscle layers comes near Group IA, *Scleroporum* type, but basally circular muscles absent, radial musculature resembling *Pseudocladorchis* type, ramifying profusely in peripheral parts; primary pharyngeal sacs (Figs. 7, 8) better developed than those in *Scleroporum* type, nearer to *Microrchis* type. Oesophagus 0.66—1.232 mm in length (including that of the oesophageal bulb), surrounded by circular muscle fibres, arranged in concentric rows. Intestinal caeca forming four undulations on each side, reaching up to the anterior edge of acetabulum.

Excretory vesicle just in front of acetabulum, two excretory vessels running up to posterior border of the pharynx, each in its course forming several loops from the outer side to the inner side of the intestinal caeca (Fig. 10). Excretory canal postvesicular, opening dorsally in level with the anterior edge of acetabulum (Fig. 13).

Lymph vessels in two pairs, running along the intestinal caeca, giving off branches surrounding the latter (caeca), gonads, pharynx and acetabulum (Fig. 11).

Testes tandem, in the middle third of the body; anterior testis 0.352—0.968 x 0.44—1.804 mm, posterior testis 0.352—0.968 x 0.396—1.584 mm. Vesicula seminalis long, coiled. Cirrus sac present (Figs. 12, 19), enclosing vesicula seminalis interna, pars prostatica and ductus ejaculatorius. Ductus ejaculatorius joining terminal part of metraterm and forming a short ductus hermaphroditicus. Genital pore ventral to or immediately behind the intestinal bifurcation. Genital atrium (Fig. 12) resembling Group IIB of Nasmark's genital atrium types, between *Ichikawai* and *Gracile* types; genital atrial radial musculature, as reported by Tandon (1970), lacking, sphincter papillae in the form of scattered circular muscle units present.

Ovary 0.088—0.466 x 0.132—0.446 mm, slightly dextral, almost midway between the posterior testis and the acetabulum. The Mehlis' gland 0.088—0.352 x 0.176—0.308 mm, posterolateral to the ovary. Receptaculum seminis said to be present by Bhalerao (1931a), absent. Laurer's canal not crossing the excretory vesicle or its canal (Fig. 13), opening approximately 0.7 mm in front of the excretory pore (in sagittal section). Uterus convoluted, full of eggs. Eggs 0.131—0.188 x 0.0656—0.0984 mm. Vitellaria in lateral fields, from the level of caecal bifurcation to a little in front of the acetabulum, overlapping intestinal caeca at places. Yolk reservoir posteroventral to the Mehlis' gland.

Hosts : *Lissemys punctata punctata* Bonnaterre,
Kachuga sylhetensis (Jerdon),
K. tectum tectum (Gray),
K. t. tentoria (Gray)

Location : Rectum

Localities : Ropar (Punjab), Pipli (Haryana), Rudrapur and Lucknow (U.P.)

Remarks : The above-mentioned last three hosts and the first three localities have been found new records for *S. dilymphosa*.

FIGURES 8—13, *S. dilymphosa* 8, a sagittal section passing through the primary pharyngeal sac; 9, oesophagus and oesophageal bulb in sagittal section; 10, an entire specimen, showing its excretory system; 11, a longitudinal horizontal section, showing the portions of the lymph vessels in relation to various organs of the body; 12, enlarged genital atrium and cirrus sac in median sagittal section; 13, semidiagrammatic representation of the relationship of the Laurer's canal and excretory canal.

Discussion on the synonymy of the genus *Parorientodiscus* Rohde, 1962 with *Stunkardia* Bhalerao, 1931, and also of some other amphistome species with *Stunkardia dilymphosa* Bhalerao, 1931.

Rohde (1962) described *Parorientodiscus magnus* n.g., n.sp. (Fig. 15) from the intestine of a tortoise, *Cyclemys amboiensis*, from Malaya and placed it under the subfamily Nematophilinae Skrjabin, 1949. He distinguished the new genus from *Orientodiscus* Srivastava, 1938, on the basis of its having a strongly developed subterminal acetabulum consisting of two parts separated by a radial septum, the excretory vesicle between the Mehlis' gland and the anterior margin of the acetabulum and the lymphatic system comprising two pairs of longitudinal vessels, whereas the genus *Orientodiscus* is characterized by having a simple subterminal acetabulum, the excretory vesicle being dorsal to the acetabulum and the lymphatic system consisting of three pairs of lymph vessels.

It seems that Rohde (1962) had not consulted Bhalerao's work on *Stunkardia dilymphosa*. The illustrations of the acetabulum of *P. magnus*, as given by Rohde (Figs. 16 a, b), show the prolongation of the posterior edges of the acetabulum covering its aperture—a feature similar to that of the acetabulum of *S. dilymphosa*. Since other characters of Rohde's form, viz. the presence of primary pharyngeal sacs, oesophageal bulb and topography of the reproductive organs, also confirm to those of the genus *Stunkardia*, the writers consider the genus *Parorientodiscus* congeneric with the latter. However, they regard the species, *Parorientodiscus magnus*, as a valid form which now becomes the second species of the genus *Stunkardia*, i.e. *S. magnus* (Rohde, 1962) n.comb., on account of the position of the ovary which is very close to the posterior testis.

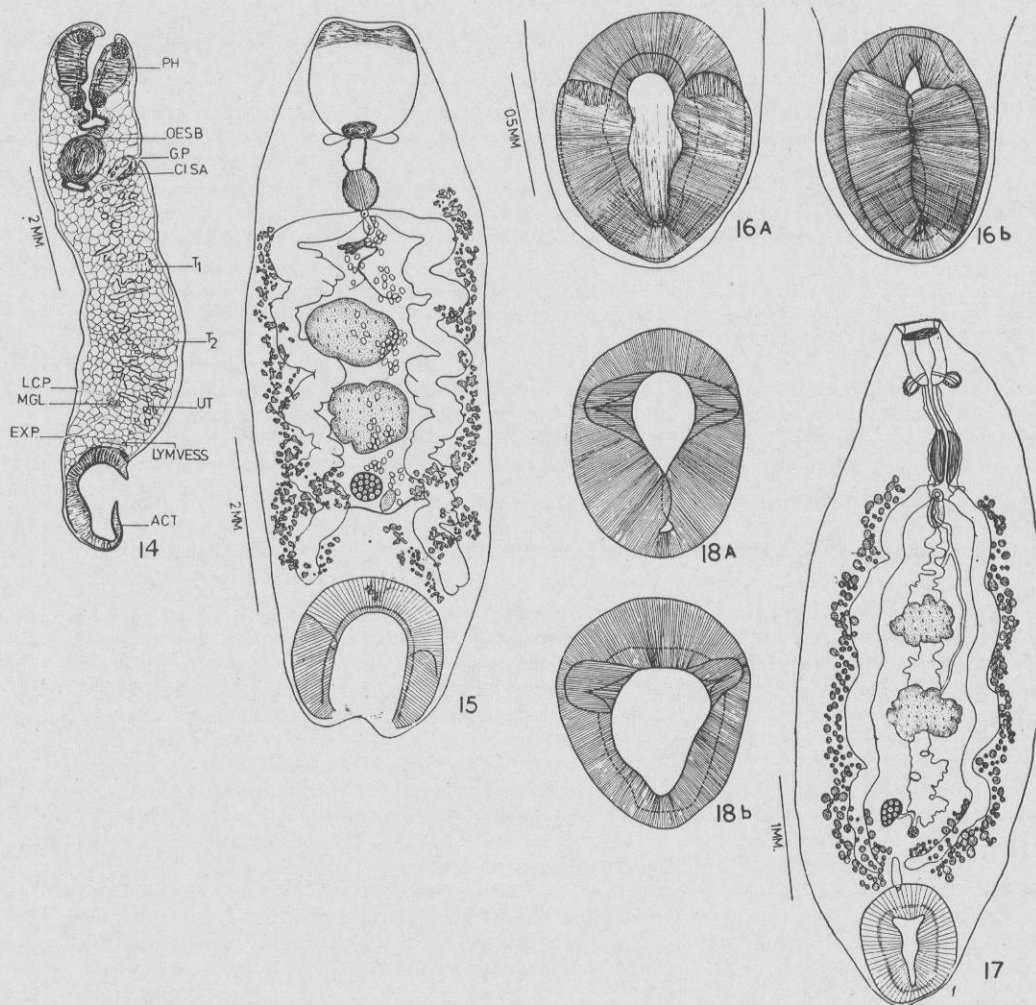
Tandon (1970) described a new amphistomid species, *Pseudochiorchis stunkardi* (Fig. 17), from *Hardella thurgi*, *Lissemys punctata*, *Kachuga kachuga* and *Trionyx gangeticus* from Lucknow. He differentiated this species from the other species of the genus mainly on the basis of the presence of the aperture of its acetabulum and different size of the body and its organs. In fact, the adhesive papillae on the acetabulum of *Pseudochiorchis stunkardi*, as described by Tandon (Figs. 18a, b), correspond to the muscular processes present in the acetabulum of *S. dilymphosa*. An examination of the specimens from Tandon's collection also revealed that in all other characters, too, his form resembles the latter. Hence it is proposed to consider *Pseudochiorchis stunkardi* Tandon, 1970, synonymous with *S. dilymphosa*.

Kachugotrema amboinensis Dwivedi, 1967, and *Schizamphistomoides prescotti* Agarwal, 1967, earlier considered synonyms of *Pseudochiorchis stunkardi* by Tandon (1970), now fall into synonymy with *S. dilymphosa*; the genus *Kachugotrema* Dwivedi, 1967, also becomes a synonym of *Stunkardia* and not of *Pseudochiorchis* Yamaguti, 1958, as suggested by Tandon.

In view of the preceding account, the diagnostic features of the genus *Stunkardia* have been emended and enlarged.

Generic diagnosis (emended and enlarged)—Paramphistomidae, Zygoctylinae: Body elongate. Primary pharyngeal sacs small. Oesophageal bulb present. Intestinal caeca sinuous, terminating just in front of acetabulum. Acetabulum large, subventral with its posterior edges elevated and overhanging its aperture forming two muscular processes (= lip), one on each side. Excretory vesicle in between acetabulum and ovary, excretory vessels on each side forming several loops from the outer side to the inner side of the intestinal caeca. Lymphatic system consisting of two pairs of longitudinal trunks. Testes

lobed, situated in a median field one behind the other at the middle third of the body. Cirrus sac present. Genital pore at intestinal bifurcation or post bifurcal. Ovary submedian, either just behind the posterior testis or about halfway between it and the acetabulum. Uterus convoluted, occupying the entire preovarian intercaecal field, when gravid. Vitellaria forming groups of follicles, extending mainly in the extracaecal fields from the level of oesophageal bulb to caecal ends, also overlapping intestinal caeca at places. Parasites of freshwater chelonians.



FIGURES 14—18. *S. dilymphosa*. 14, a reconstructed median sagittal section, showing the relative position of the various organs. 15—16. *Stunkardia magnus* (= *Parorientodiscus magnus* Rohde, 1962).—resketched for comparison, from the literature; after Rohde (1962); 15, entire specimen; 16 a, b, acetabulum. FIGURES 17—18. *S. dilymphosa* (= *Pseudochiorchis stunkardi* Tandon, 1970)—resketched after Tandon (1970); 17, entire specimens; 18 a, b, acetabulum.