

ON THREE BLOOD FLUKES (SPIRORCHIIDAE: SPIRORCHI-
INAE) FROM FRESHWATER CHELONIANs AND DISCUSSION
ON THE SYNONYMY OF *PLASMIORCHIS PELLUCIDUS*
MEHRA, 1934

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Plasmiorchis orientalis Mehra, 1934 is redescribed in brief with special reference to the intraspecific variations. On account of the latter, *P. pellucidus* Mehra, 1934 is considered a synonym of *P. orientalis*. *Plasmiorchis stunkardi* Mehrotra, 1973, only the diagnostic features of which have earlier been published in an abstract form, is described in detail and its validity discussed. In having a spatulate body, intestinal caeca with prominent outpocketings both on their outer and inner aspects and twenty-one testes, this form is distinguished from all the known species of the genus. The generic diagnosis of *Plasmiorchis* is emended and a key to its valid species is provided. *Learedius orientalis* Mehra, 1939 is recorded from the eastern coast of India.

Subfamily Spirorchiinae Stunkard, 1921
Tribe Spirhapalini Yamaguti, 1958
Genus *Plasmiorchis* Mehra, 1934
Syn. *Gomtiotrema* Sinha, 1934

PLASMIORCHIS ORIENTALIS Mehra, 1934

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Twenty specimens of *Plasmiorchis orientalis* Mehra, 1934 (= *P. pellucidus* Mehra, 1934, discussion vide infra) were recovered from the heart of freshwater chelonians, *Kachuga sylhetensis* (Jerdon) from Ropar (Punjab), the number of flukes per host being not more than two. Of these specimens, nineteen were with six testes and one with eight. In the light of the writers' observations, this species has been redescribed.

Description

(Ten specimens measured, nine having six testes and one having eight): Body lanceolate, 1.987-3.549 (1) long by 0.477-0.721 broad, maximum width occurring across region of testes or across ventral sucker. Cuticle armed with minute spines which do not project outside it. Oral sucker 0.072-0.136 × 0.049-0.097. Ventral sucker 0.117-0.18 × 0.147-0.221, larger than oral, with a darkly staining central

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area and a lightly staining peripheral area; the latter may be devoid of musculature. Oesophagus sinuous, 0.393-0.65 long, occupying one-sixth to one-fourth of body length, oesophageal vesicle may or may not be prominent. Intestinal caeca, at first running anteriorly parallel to oesophagus and then turning downwards forming anterior loops, reaching up to near hind extremity of body. Excretory vesicle small, pore terminal at posterior end of body.

Testes six to eight, arranged linearly behind ventral sucker, a little apart from, or contacting, one another; oval, rounded, transversely oval or pyriform, may or may not approach the intestinal caeca laterally, $0.065-0.196 \times 0.065-0.273$. Vesicula seminalis externa transversely or obliquely placed behind posteriormost testis, $0.082-0.098 \times 0.114-0.196$. Cirrus sac submedian. Genital pore postovarian, inner and close to left intestinal caecum. Ovary lobed, $0.09-0.224 \times 0.123-0.273$, more or less median, just behind vesicula seminalis externa. Receptaculum seminis slightly dextral. Eggs $0.082-0.122 \times 0.049-0.061$. Vitellaria from level of anterior loops of intestinal caeca to their termination, extending all along their outer and inner sides and also overlapping them.

Remarks

Kachuga sylhetensis is a new host and Ropar a new locality for this species.

Synonymy of Plasmiorchis pellucidus Mehra, 1934 with P. orientalis Mehra, 1934.

Byrd (1939) (?) regarded *Plasmiorchis pellucidus* Mehra, 1934 as synonym of *P. orientalis* Mehra, 1934, whereas Skrjabin (1951) and Yamaguti (1971) considered it a valid species.

Mehra (1934) differentiated *P. pellucidus* from *P. orientalis* (both recovered from *Kachuga dhongoka* at Allahabad, U.P.) on the basis of the absence of the ventral sucker in the mature specimens (though "its position is indicated by a definite clear region devoid of musculature of body parenchyma"), a larger number of the testes (i.e. 8-9) not occupying the entire breadth of the intercaecal space, the vitellaria which do not extend into the intercaecal zone, and the greater length of the oesophagus which extends up to approximately one-fifth of the body length. (According to the original description, in *P. orientalis*, the testes are 5-7 occupying most of the intercaecal area width-wise, the vitellaria surround the intestinal caeca, and the oesophagus extends up to one-sixth of the body length.)

On the basis of their observations on the specimens of *P. orientalis*, the writers feel that all these characters which Mehra took into consideration to distinguish the two species are mere intraspecific variations. Hence, in conformity with the views of Byrd (1939), they also regard *P. pellucidus* as synonymous with *P. orientalis*.

PLASMIORCHIS STUNKARDI Mehrotra, 1973

Eight specimens of *Plasmiorchis stunkardi* Mehrotra, 1973 were recovered from the heart of *Kachuga sylhetensis* (Jerdon) collected from Ropar (Punjab). Not more than one fluke was ever found in one host specimen. The live flukes were fixed in Bouin, stained in borax carmine and Mayer's carmalum for whole mount preparations. Ehrlich's haematoxylin and eosin were used for staining the

(¹) All the measurements are in millimeters.

(²) Though Byrd (1939) considered the genus *Plasmiorchis* Mehra, 1934 identical with *Spirorchis* McCallum, 1918, the writers in agreement with Skrjabin (1951) and Yamaguti (1971) regard it as a valid genus. The genus *Spirorchis* is characterized by the absence of the ventral sucker and anterior loops of the intestinal caeca.

sections cut $6\ \mu$ thick. The measurements are taken from four, almost equal-sized specimens (flattened) of which, one was completely mature.

Description

Live flukes opaque white with black intestinal caeca; body spatulate, 6.541-7.02 in length and 0.887-1.111 in maximum breadth that occurs either in spatula-like anterior region or in middle of testicular zone. Cuticle smooth. Suckers feebly developed; oral 0.107-0.156 long by 0.117-0.175 broad, (may or may not be longer than broad); ventral 0.078-0.122 \times 0.058-0.102, 1.891-3.003 behind anterior extremity, i.e. a little in front of equatorial line of body; smaller than the oral. Oesophagus sinuous, 0.663-1.014 long, surrounded by gland cells, forming a small oesophageal vesicle at its distal end. Intestinal caeca, at first running forward and then taking a backward turn forming anterior loops, proceeding posteriorly parallel to lateral body margins, reaching up to hind extremity, provided with prominent pocket-like diverticula on their outer and inner faces. Excretory vesicle small, giving off two excretory vessels from its base; pore terminal at hind extremity of body.

Testes twenty-one, arranged linearly behind ventral sucker, lobed or entire in contour, transversely elongated or irregular in shape, 0.097-0.234 \times 0.117-0.409 in size. Vesicula seminalis externa sinistral and dorsal to ovary. Cirrus sac small, muscular, enclosing vesicula seminalis interna, pars prostatica and cirrus. Male genital pore just in front of female pore on ventral surface, a little behind ovary, close and inner to left intestinal caecum. Ovary post-testicular, lobate, 0.526 in front of hind extremity, 0.156-0.37 \times 0.041-0.234. Receptaculum seminis present. Uterus small, with a single non-filamented egg that measures 0.117 \times 0.076. Vitellaria profusely developed, from level of anterior loops of intestinal caeca up to the ends of the latter and extending all along their inner and outer aspects, follicles of the two sides coalescing mesially between anteriormost testis and ventral sucker. Transverse vitelline ducts meeting in postovarian region to form an irregularly shaped and well developed yolk reservoir.

Host: *Kachuga sylhetensis* (Jerdon)

Location: Heart

Locality: Ropar (Punjab)

Type specimen: Deposited in the senior author's helminthological collection.

Discussion

Oesophagus long and sinuous having an oesophageal vesicle, intestinal caeca forming anterior loops along the oesophagus, testes arranged linearly in the region between the ovary and the ventral sucker, and vitellaria extending from the level of the anterior loops of the intestinal caeca to the termination of the latter and all along their outer and inner aspects are the characters which allocate the present species to the genus *Plasmiorchis* Mehra, 1934.

The present form differs from all the other known species of the genus in the shape of the body, the feeble development of the ventral sucker, the nature of the intestinal caeca, i.e. with prominent outpocketings both on their outer and inner aspects, and a larger number of testes. In the known forms, namely: *Plasmiorchis orientalis* Mehra, 1934 (syn. *P. pellucidus* Mehra, 1934) from *Kachuga dhongoka* in Allahabad (U.P.) and also from *K. sylhetensis* in Ropar (Punjab); *P. obscurum* Mehra, 1934⁽¹⁾ from *K. dhongoka* in Allahabad; and *P. sanguineus* (Sinha, 1934) Mehra, 1939 (syn. *Gomtiotrema sanguineus* Sinha, 1934) from *Hardella thurgi* in Lucknow (U.P.), the body is somewhat lanceolate or slender, the suckers are relatively well developed, and the intestinal caeca are simple or with very small outgrowths given off mainly from their inner sides as in *P. obscurum*. Further, in *P.*

⁽¹⁾ Listed as a synonym of *Hemiorchis hardelli* (Mehra, 1934) Mehra, 1939 by Yamaguti (1971). The writers agree with Skrjabin (1951) in considering it a valid species of the genus *Plasmiorchis*.

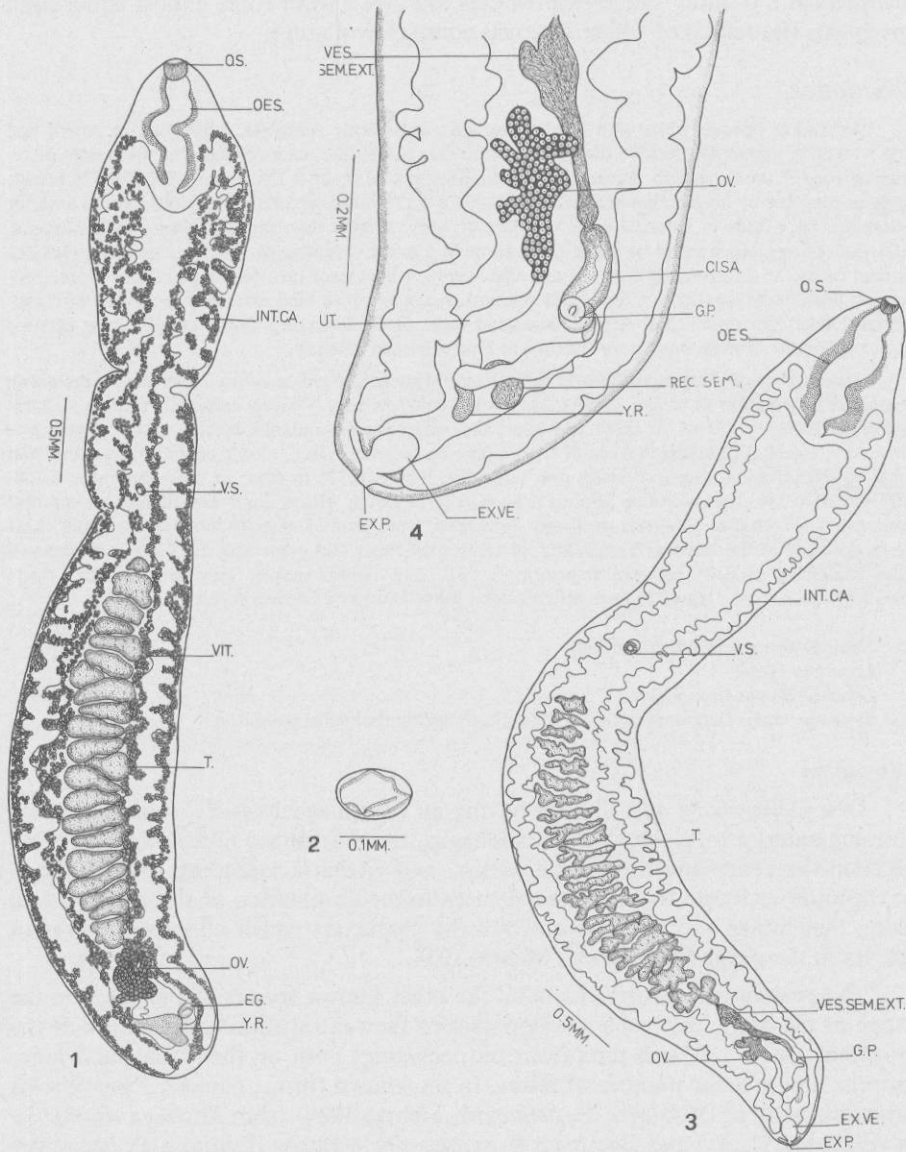


Fig. 1 - *Plasmorchis stunkardi* Mehrotra, 1973: 1, a whole mount (ventral view); 2, egg; 3, another whole mount showing the gut and lobed testes (ventral view); 4, a magnified posterior portion of the same showing the terminal genital ducts and excretory vesicle.

(CI.SA., cirrus sac; EG., egg; EX.P., excretory pore; EX.VE., excretory vesicle; G.P., genital pore; INT.CA., intestinal caeca; O.S., oral sucker; OES., oesophagus; OV., ovary; REC.SEM., receptaculum seminis; T., testes; UT., uterus; V.S., ventral sucker; VES.SEM.EXT., vesicula seminalis externa; VIT., vitellaria; Y.R., yolk reservoir).

orientalis, *P. sanguineus* and *P. obscurum*, the number of testes is 5-9, 12 and 19 respectively.

In view of its strong differential characters, the present species has been considered new and named *Plasmiorchis stunkardi* after the eminent helminthologist Professor H. W. Stunkard, of the American Natural History Museum, New York (U.S.A.).

In order to accommodate the species described above and in accordance with the descriptions of the other known species of the genus, the writers propose to emend the generic diagnosis of *Plasmiorchis*. While doing so, the diagnostic features, as given by Yamaguti (1958, 1971) for this genus, have been taken into consideration.

GENERIC DIAGNOSIS (emended): Spirorchiidae, Spirorchiinae, Spirhpalini: Body spatulate or lanceolate, spinose or smooth. Oral sucker longer than broad or *vice versa*. Ventral sucker present, though may be rudimentary, larger or smaller than oral sucker, about one-third of body length from anterior extremity or between it and equatorial line of body. Oesophagus long, sinuous oesophageal vesicle present. Intestinal caeca recurrent for a short distance on each side of oesophagus, terminating close to posterior extremity. Excretory system V-shaped. Testes lobed or not, arranged in a linear series between ventral sucker and ovary. Vesicula seminalis externa sinistral or dorsal to ovary. Cirrus sac small, may or may not be muscular, post-testicular, opposite to ovary; prostate complex differentiable or not. Genital pore(s) sinistral, ventral, postovarian. Ovary on right side of median line or practically median, at or near middle of posterior third of body. Receptaculum seminis present. Uterus short, containing a single large, oval egg. Vitellaria extending from intestinal bifurcation or a little in front of it to caecal ends, outside or around intestinal caeca and extending into intercaecal zone. Parasitic in heart or arteries of freshwater chelonians.

KEY TO THE VALID SPECIES OF THE GENUS *PLASMIOARCHIS* MEHRA, 1934

1. Intestinal caeca simple, without any outpocketings 2
 Intestinal caeca with faint or welldeveloped outpocketings 3
2. Body lanceolate. Testes 5-9. Oral sucker smaller than ventral sucker. *P. orientalis* Mehra, 1934.
 Body slender. Testes 12. Oral sucker larger than ventral sucker.
 *P. sanguineus* (Sinha, 1934) Mehra, 1939
3. Body somewhat lanceolate. Intestinal caeca with faint outgrowths mainly on their inner sides.
 Testes 19. *P. obscurum* Mehra, 1934.
 Body spatulate. Intestinal caeca with prominent outpocketings, both on their outer and inner sides.
 Testes 21. *P. stunkardi* Mehrotra, 1973.

Genus *Learedius* Price, 1934

LEAREDIUS ORIENTALIS Mehra, 1939

Host: *Chelone mydas* (Linn.)

Location: Heart

Locality: Gulf of Mannar (Pamban, Tamil Nadu)

Remarks

The writers report the occurrence of *Learedius orientalis* Mehra, 1939 from *Chelone mydas* from the eastern coast of India. Fifty-eight specimens were recovered from one host. Earlier, this species was described by Mehra, (1939b) from the same host from the Arabian sea near Karachi (Now in Pakistan).

SU TRE TREMATODI SANGUICOLI (SPIRORCHIIDAE: SPIRORCHIINAE) DI CHELONI
D'ACQUA DOLCE E DISCUSSIONE SULLA SINONIMIA DI *PLASMIORCHIS PELLUCIDUS*
MEHRA, 1934

Plasmiorchis orientalis Mehra, 1934, repertata nel nuovo ospite *Kachuga sylhetensis*, viene brevemente ridescritta con particolare riguardo alle sue variazioni intraspecifiche. In considerazione di queste ultime, *P. pellucidus* Mehra, 1934 viene considerata un sinonimo di *P. orientalis*. *P. stunkardi* Mehrotra, 1973, di cui era stato pubblicato solo un riassunto delle caratteristiche diagnostiche, viene dettagliatamente descritta e se ne discute la validità specifica: essa si distingue da tutte le altre specie note del genere per avere corpo spatulato, ciechi intestinali con prominenti tasche sporgenti sia all'esterno che all'interno e ventuno testicoli. La diagnosi del gen. *Plasmiorchis* viene emendata ed è fornita una chiave delle specie valide. *Laeredius orientalis* Mehra, 1939 repertata nel cuore di *Chelone mydas* viene citata per la costa orientale dell'India.

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