

A double metacercarial infection in an Indian fresh water fish, *Heteropneustis fossilis* (Bloch)

by

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Thirty specimens of *Heteropneustis fossilis* (Bloch), of which twenty-two were obtained from the local fish market and eight collected from a pond located in the environs of Tulsipur — a town in the district of Gonda, have been so far examined for metacercarial infection. Only one of the fishes obtained from the fish market was found infected with both strigeid and clinostome metacercariae: twenty-five specimens of encysted strigeid metacercariae and seven specimens of clinostome metacercariae without cysts were obtained. None of the fishes from Tulsipur was found infected. On a thorough study, the strigeid metacercariae proved to be a new species of *Tetracotyle* Fillipi, 1859, while the clinostome metacercariae turned out to be a described form, *Clinostomum dasi* Bhalerao, 1942. The strigeid metacercaria is described here in detail. All measurements were taken from live specimens.

Tetracotyle muscularis n. sp.

(Fig. 1)

Cysts oval, $0.80-0.92 \times 0.42-0.48$ mm, devoid of pigments and embedded in the subcutaneous tissue of host's body. Cyst-wall thin but double-layered, outer layer thicker than inner. Cyst contained a thick whitish fluid which made the cyst appear rather opaque. The metacercaria apparently showed no movements while within the cyst but contracted and expanded when released either by artificial digestives or by rupturing the cyst-wall.

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Body spinose (Fig. 2), foliaceous and clearly divided into a fore-body and a hind-body. Fore-body large, with a blunt anterior and a broad posterior end, measuring $0.62-0.85 \times 0.58-0.69$ mm; hind-body small, bluntly conical, $0.35-0.44 \times 0.31-0.40$ mm.

Oral sucker terminal, circular, 0.07-0.10 mm in diameter. Ventral sucker postequatorial in position in the fore-body, and circular in outline but appears oval in partly contracted specimens. It is smaller than oral sucker and measures 0.06-0.09 mm in diameter. Pseudosuckers well developed and located anterolaterally. Hold-fast organ subcircular or even oblong, strongly muscular, situated behind the ventral sucker in the hind part of fore-body and measures $0.16-0.22 \times 0.15-0.20$ mm. Hold-fast gland composed of a mass of deep-staining cells, located close behind the hold-fast organ which may, partly or completely, overlap the gland, depending upon the degree of contraction of the body.

Prepharynx absent. Pharynx subglobular and measures $0.03-0.05 \times 0.03-0.04$ mm. Esophagus (Fig. 3) short, bifurcates, at the level of the anterior transverse canal of the reserve excretory system, into intestinal caeca which extend to the end of hind-body. In fixed specimens the intestinal caeca are hardly visible in the fore-body.

Reproductive organs fairly developed. Testes asymmetrical. Anterior testis roughly oval or pyriform in outline, sinistral, and measures $0.06-0.08 \times 0.07-0.09$ mm. Posterior testis large and H-shaped, median in position and measures 0.02-0.04 mm in transverse axis at the cross-connection while each limb is 0.09-0.13 mm long and 0.05-0.07 mm in maximum width. A column of dark-staining cells which extends posteriorly from near the level of the anterior testis to the hind end of body foreshadows the cirrus sac. Ovary rather inconspicuous, appearing as a small oval mass of dark-staining cells placed dextrally in front of the posterior testis and close to the primordium of the cirrus sac. Genital sinus with a rudimentary interior genital cone, terminates in an exterior ventral aperture.

Excretory bladder V-shaped (Fig. 3), located at the posterior end of hind-body, ending in a terminal excretory pore. The canals of the excretory system are considered under two heads: a reserve system and a primary system of excretory canals.

Excretory canals of the reserve system: two main reserve excretory canals, five longitudinal canals and a series of five transverse canals. The main reserve excretory canals arise, one on each side, from the cornua of the excretory bladder and run anteriorly along the lateral fields of the body to the pharyngeal level, where they are joined by a transverse canal—anterior transverse canal—from which arise one median and, on each side, two lateral longitudinal canals. The median longitudinal canal runs posteriorly along the mid-longitudinal line of the body and is connected, roughly midway between the two suckers, with the main reserve excretory canals by the second transverse canal. It insensibly widens as it proceeds posteriorly but greatly widens as it approaches the ventral sucker, wherefrom it runs backward as a dilated tube beneath the hold-fast organ. Just behind the ventral sucker, it is further connected with the main reserve

excretory canals by a transverse canal —median transverse canal— the third in the series. Eventually the median longitudinal canal opens widely into another transverse canal, the fourth, which runs across the line of demarcation between fore-body and hind-body. The main reserve excretory canals of the opposite sides are directly connected in the hind-body by the slender posterior transverse canal. Of the five transverse canals found in the excretory system, three are located in the fore-body, one in the hind-body, and one at the junction of fore-body and hind-body.

The lateral longitudinal canals, two on each side, are more slender than the median longitudinal canal and run backward. They join the second transverse canal and thereafter continue their course and terminate in the median transverse canal. The lateral longitudinal canals are connected with each other and also with the median longitudinal canal by fine cross-connections which number seven. The meshes thus formed are, however, not all alike; they are mostly rectangular or oblong, but some are trapezoidal. Of the seven cross-connections, three are found in front of the second transverse canal and four behind. Small, round excretory corpuscles of various sizes are found suspended in a fluid in these canals. The fluid, along with the corpuscles, is ejected through the excretory pore.

Details of the primary system could not be made out due to the extensive development of the reserve system.

DISCUSSION

Only four species of the larval genus *Tetracotyle* Fillipi, 1859, are known to date from India, viz., *T. ranae* Kaw, 1950; *T. indicus* Singh, 1956; *T. sophoriensis* Singh, 1956 and *T. lucknowensis* Pandey, 1968. Of these Indian species, the present form shows some resemblance to *T. sophoriensis* but differs markedly from the others. The demarcation of the body into fore-body and hind-body readily distinguishes the present form from *T. sophoriensis*. Further, in the writer's form, the genital rudiments are far advanced in development while the vitellaria are not yet developed, whereas in *T. sophoriensis*, the vitellaria are fairly developed but genital rudiments aren't. Besides, the relative size of the suckers in these two forms differs: in the present form the oral sucker is larger than the ventral sucker, whereas in *T. sophoriensis* the oral sucker is smaller. Evidently the writer's form is quite distinct from *T. sophoriensis*.

Among the foreign species, the present form resembles *Tetracotyle* of *Apatemon fuligulae* Yamaguti, 1933 and *Tetracotyle* of *Apatemon pellucidus* Yamaguti, 1933, but chiefly differs from them in the character of the hold-fast organ which is not of lobate type. It also differs from both in the relative size of the sucker: in the present form the oral sucker is larger than the ventral sucker, while in the other two forms the oral sucker is smaller, and further, it can be distinguished from both in that its genital anlagen are fairly well developed.

Clinostomum dasi Bhalerao, 1942

BHALERAO (1) first described this form from a single specimen collected from *Heteropneustis fossilis* (Syn., *Sacobranchus fossilis*) at Hyderabad, Andhra Pradesh. PANDEY (3) has recently restudied the species and has given a critical account based on fresh specimens collected from *Heteropneustis fossilis* at Lucknow. As the writer's specimens do not show any feature worth mentioning, an account is deemed unnecessary.

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SUMMARY

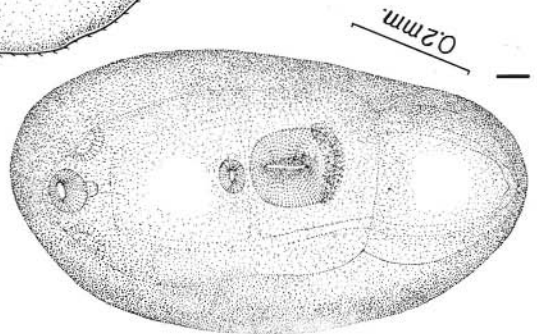
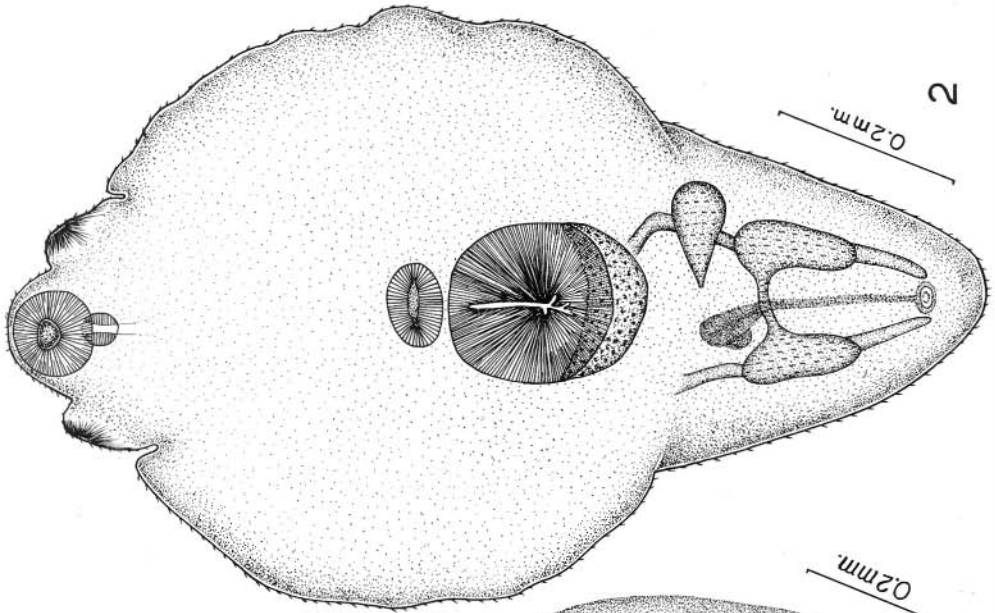
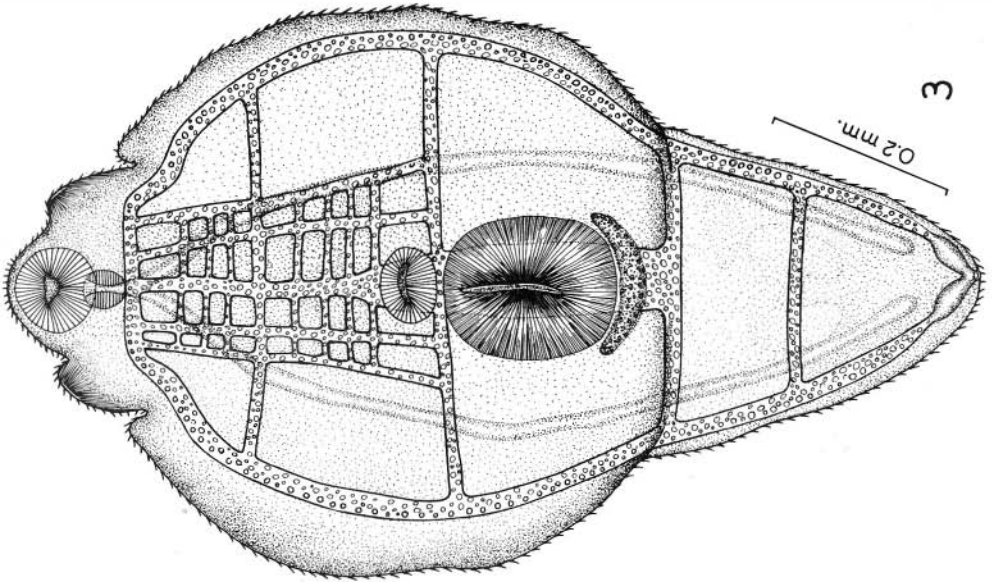
A new species of strigeid metacercaria, *Tetracotyle muscularis* was found in an Indian fresh water fish, *Heteropneustis fossilis* (Bloch). The metacercarial cysts were embedded in the subcutaneous tissue of the host. Metacercaria is chiefly characterized by having its spinose body divided into a fore-body and a hind-body, oral sucker larger than ventral sucker, and H-shaped posterior testis.

RESUMEN

Se encontró una especie nueva de metacercaria estrigeida, *Tetracotyle muscularis* en un pez de agua dulce de la India, *Heteropneustis fossilis* (Bloch). Los quistes metacercariales estaban metidos en el tejido subcutáneo del huésped. La metacercaria se caracteriza principalmente por tener su cuerpo espinoso dividido en dos partes, anterior y posterior; por tener la ventosa oral mayor que la ventral; y por tener el testículo posterior en forma de H.

EXPLANATION OF FIGURES

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- Fig. 1. *Tetracotyle muscularis* n. sp. Encysted metacercaria (Drawn from a live specimen).
- Fig. 2. *Tetracotyle muscularis* n. sp. Ventral view (Drawn from a mounted specimen).
- Fig. 3. *Tetracotyle muscularis* n. sp. Ventral view. Alimentary canal and reserve excretory system. (Drawn from a live specimen).



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