

FRESH WATER FISH TREMATODES OF PAKISTAN

Two New Metacercarial, Forms of *Clinostomum* Leidy, 1856 (Trematoda)

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(Received February 13, 1971; revised July 1, 1971)

Abstract. Two new metacercarial forms of the genus *Clinostomum* Leidy, 1856, namely *Clinostomum mujibi* and *Clinostomum marulius*, are described from the fish *Ophicephalus marulius* (Ham) of Haleji lake, West Pakistan. *Clinostomum mujibi* is characterised by having distinctly lobed testes, anterior five lobed and posterior larger three lobed, large cirrus sac lateral to the anterior testes, submedian genital pore anterior to anterior testes, well differentiated shell gland complex, long coiled oviduct, seminal receptacle posterolateral to ovary, ovary posterior to anterior testes, uterine sac joining the uterine duct at a distance of 0.95 from the acetabulum, well developed metraterm, and a small postcecal V-shaped excretory vesicle and peculiar arrangement of excretory tubules in the outer surface of body parenchyma. It was recovered from the orbit of host.

Clinostomum marulius from the mesentries of the same fish host is peculiar in having much smaller body with relatively large suckers, delicate uterine sac closer to acetabulum, large slightly lobed or irregular testes, large shell gland immediately anterior to posterior testes and delicate excretory tubules prominent at the periphery, small smooth or slightly irregular ovary lateral to anterior testes, and posterior dilatation of the ceca with irregular outline.

Thirteen species of the genus *Clinostomum* Leidy, 1856, are originally known by metacercarial forms namely: *C. attenuatum*² (Syn. *C. marginatum* Wright, 1879,⁹ *C. chrysichthys*,³ *C. dasi*,¹ *C. delagi*,⁷ *C. gideoni*; *C. ophicephali*,⁸ *C. pisidium*⁶ *C. prashadi*,¹ *C. pseudoheterostomum*,⁷ *C. schizothoraxi*,⁵ *C. macrosomum*,⁴ *C. mastacembeli*,⁴ and *C. progonum*.⁴ *Clinostomum attenuatum* is reported from frog and snail and *C. Pseudoheterostomum* and *C. progonum* from frog and all others are from fishes. The usual site of infection of these metacercariae is body cavity, mesentries, and muscles but *C. chrysichthys* is described from swim bladder, *C. ophicephali* from gall bladder, *C. delagi* from eye and pericardium, *C. gideoni* from gills and *C. macrosomum* and *C. mastacembeli* are from the intestine. Out of thirteen, three species *C. ophicephali*, *C. delagi* and *C. macrosomum* are from *Ophicephalus striatus* of the Phillipines and India. The author has also recovered from the related fish host *O. marulius* of West Pakistan, two different *Clinostomum* metacercariae from the orbit and mesentry. These were regarded new species and the name *Clinostomum mujibi* and *Clinostomum marulius* was proposed for them. The species *mujibi* is in honour of Dr. K.A. Mujib and *marulius* refers to the host.

Materials and Methods

Two hundred fishes *Ophicephalus marulius* from Haleji lake were examined for trematode parasites. Each of the twelve fishes infected had one or two

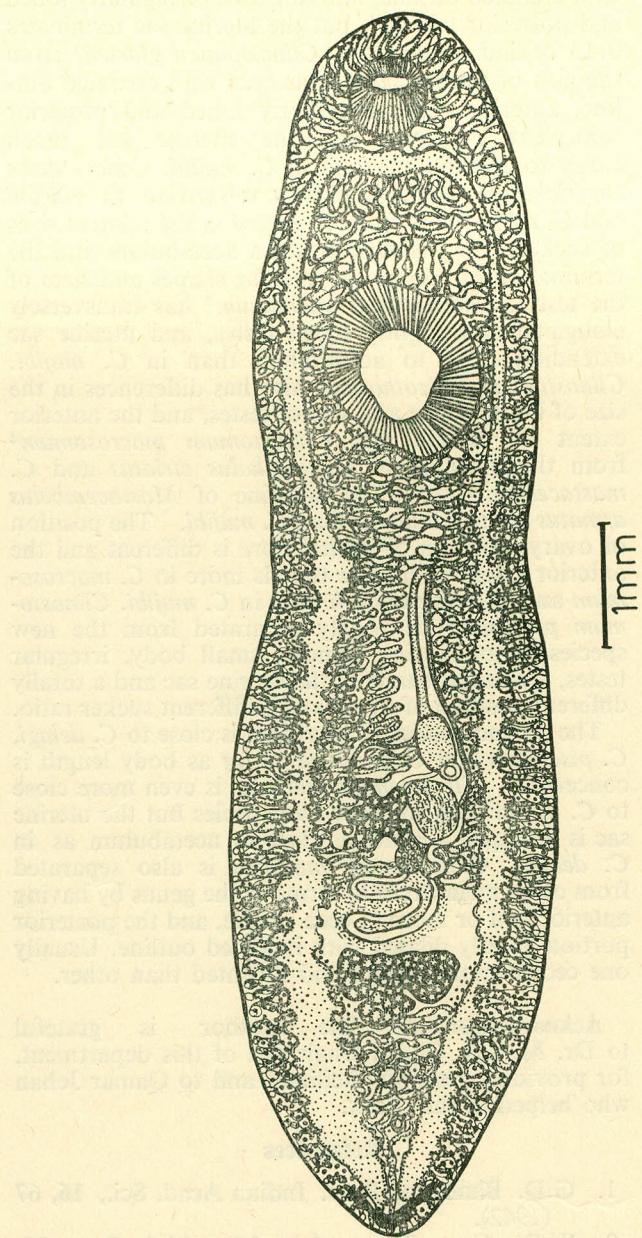
Clinostomum metacercaria encysted in a transparent membrane on the mesentry of the gut or liver. In addition one fish had a single metacercaria in the orbit. Beside this numerous *Euclinostomum* metacercaria were present in all the 14 fishes, although only *Clinostomum* spp. are described here. For detail study cysts were cut open, trematodes were pressed slightly between two glass slides, fixed in 70% formalin with few drops of acetic acid for 24 hr then removed from the slides, stained either with haematoxylin, carmine alum, or borax carmine. Diagrams were made by camera lucida. All the measurements in millimeters. Holotypes and paratypes in the Department of Zoology, University of Karachi, Karachi.

Clinostomum mujibi, sp. n. (Fig. 1)

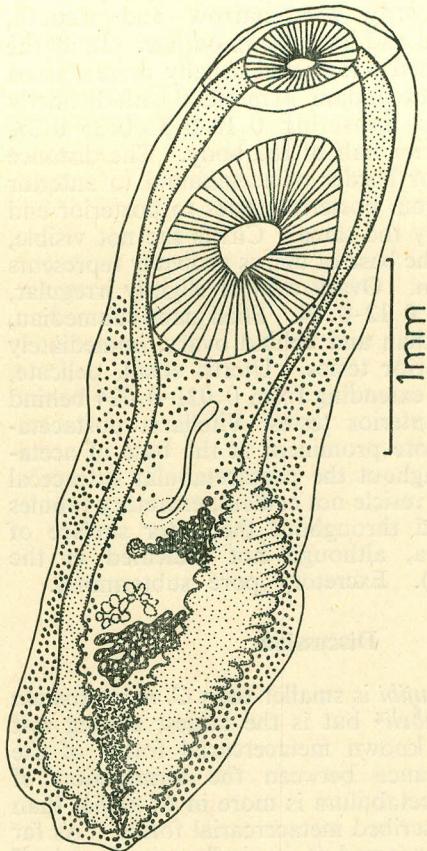
Host. *Ophicephalus marulius* (Ham.); locality, Haleji lake, West Pakistan; location, Orbit; number, A single specimen, 200 host examined.

Medium sized, stout, linguiform trematode, yellowish when alive. Anterior end rounded, posterior bluntly pointed. Immediate preuterine region slightly attenuated, maximum width at the ovotesticular region. Body length 8.6, width approximately 3.0. Oral sucker subterminal, well developed 0.48×0.6 , pharynx small 0.05×0.1 , esophagus indistinct. Ceca long sinuous without lateral branches but with irregular outline, reaching to posterior extremity and almost fused with excretory vesicle. Acetabulum in anterior $\frac{1}{3}$ of body, much larger than oral sucker 1.28×1.46 in size. Testes almost in the middle of posterior half of the body, anterior five lobed small 0.83 long, 0.80 wide, posterior transversely elongated, three lobed and large 0.56×1.2 in size. Cirrus sac large 0.55 in

* Supported by research grants from the University of Karachi, Karachi and Pakistan Agricultural Research Council.

Fig. 1. *Clinostomum mujibi* sp. n. Holotype.

length, lateral to anterior testes. Genital pore circular, anterolateral to cirrus sac. Ovary spherical, slightly submedian, small 0.133×0.133 , situated immediately posterior to anterior testes. Oviduct long and coiled passing upwards to the left of cirrus sac through the well differentiated shell gland as a delicate uterine duct, joining the uterus proper 0.95 behind the acetabulum. The posterior portion of uterus is differentiated into metraterm and distinctly marked off from the former. Vitelline follicles small extending from the posterior extremity to the postacetabular region and more prominent in the extracecal zone. Excretory vesicle rudimentary, postcecal joining the posterior extremity of the ceca, V-shaped from which arises an

Fig. 2. *Clinostomum marulus*, sp. n. Holotype.

excretory stem passing between the ceca and breaking down into excretory plexus. The excretory tubules form an irregular network throughout the other body parenchyma but not prominent at the interesticular zone at the shell gland complex and at the uterus. Excretory pore subterminal.

Clinostomum marulus, sp. n. (Fig. 2)

Host. *Ophicephalus marulus* (Ham); locality, Haleji lake, West Pakistan; location, Mesentries; number, 20 specimen in 12 host, 200 host examined.

Body longated, broader anteriorly than posteriorly, 4.2–4.7 in length, 1.2–1.4 in width. Oral sucker

subterminal to ventroterminal, $0.17-0.19 \times 0.37-0.49$ in size and partially retracted in such a way that the anterior body wall is raised around it like a collar. Acetabulum near to oral sucker and much larger than this $0.85-0.99$ long, $0.82-0.84$ wide. Pharynx absent, esophagus indistinct. Ceca long, reaching to posterior extremity. Anteriorly ceca narrow and smooth, posteriorly dilated and irregular in outline. In all the specimens examined one cecum usually more dilated than other. Testes tandem, pyramidal with distinctly irregular surfaces measuring $0.18-0.3 \times 0.35-0.38$, situated in posterior half of the body. The distance from the posterior border of acetabulum to anterior testes and that from posterior testes to posterior end of body is usually the same. Cirrus sac not visible, a lighter area at the base of uterus probably represents the genital atrium. Ovary oval or slightly irregular, small $0.11-0.13 \times 0.12-0.14$. Shell gland submedian, irregular, larger than and behind ovary, immediately anterior to posterior testes. Uterus small, delicate, slightly S-shaped extending from $0.021-0.024$ behind acetabulum to anterior testes. Vitellaria postacetabular, follicles more prominent at the base of acetabulum and throughout the postacetabular extracecal field. Excretory vesicle not evident, excretory tubules well differentiated throughout the outer surface of body parenchyma, although not indicated in the diagram (Fig. 2). Excretory pore subterminal.

Discussion

Clinostomum mujibi is smaller than *C. macrosomum* and *C. mastacembeli*⁴ but is the largest among rest of the currently known metacercarial forms of the genus. The distance between the termination of uterine sac and acetabulum is more in *C. mujibi* than the previously described metacercarial forms. As far as location is concerned it is similar to *C. delagi*⁷ although not recovered from the pericardium of host. But in *C. delagi* the extent of uterine sac is more and the testes have smooth surfaces while in *C. mujibi* the uterine sac is 0.95 behind the acetabulum and both the testes are distinctly lobed. In *C. pseudoherostomum*⁷ the anterior testes is U-shaped and posterior V-shaped and the ratio of the oral sucker to acetabulum is also different from *C. mujibi*. In *C. opicephali*⁸ testes are smooth transverse lines and the uterine sac extends from genital pore to about $1\frac{1}{2}$ the distance between anterior testes and acetabulum, while in *C. mujibi* uterine sac extends from genital pore to about $\frac{2}{3}$ the distance between anterior testes and acetabulum. *Clinostomum piscidium*⁶ has no pharynx, uterine sac close to acetabulum, and testes pyriform with margins slightly indented. *Clinostomum prashadi*¹ of which host and location is not known has prepharynx, simple ceca, and the anterior testes irregularly lobed while the posterior Y-shaped. *Clinostomum dasi*¹ from the fish *Saccobranchus fossilis*, the location of which is also not known, has the ceca

with crenated outline, anterior testes irregularly lobed and posterior trilobed, but the uterine sac terminates 0.13 behind acetabulum. *Clinostomum gideoni*¹ from the gills of *Barbus sephre* has ceca with crenated outline, anterior testes irregularly lobed and posterior somewhat Y-shaped, and the uterine sac much closer to acetabulum than in *C. mujibi*. *Clinostomum chrysichthys*³ which is closely related to *C. gideoni* and *C. dasi*, differs from *C. mujibi* in the relative sizes of suckers, the distance between acetabulum and the termination of uterine sac and the shapes and sizes of the testes. *Clinostomum attenuatum*² has transversely elongated and slightly lobed testes, and uterine sac extending close to acetabulum than in *C. mujibi*. *Clinostomum schizothoraxi*⁵ also has differences in the size of body, shape and size of testes, and the anterior extent of uterine sac. *Clinostomum macrosomum*⁴ from the intestine of *Ophicephalus striatus* and *C. mastacembeli*⁴ from the intestine of *Mastacembelus armatus* are much larger than *C. mujibi*. The position of ovary, position of genital pore is different and the anterior extent of uterine tube is more in *C. macrosomum* and *C. mastacembeli* than in *C. mujibi*. *Clinostomum progonum*⁴ is widely separated from the new species by possessing spinose, small body, irregular testes, a peculiar shape of the uterine sac and a totally different position of ovary and a different sucker ratio.

The second species *C. marulius*, is close to *C. delagi*, *C. piscidium* and *C. prashadi* as far as body length is concerned. *Clinostomum marulius* is even more close to *C. delagi* than to other two species but the uterine sac is S-shaped and not as close to acetabulum as in *C. delagi*. *Clinostomum marulius* is also separated from other metacercarial forms of the genus by having anterior half or more of ceca simple, and the posterior portion greatly dilated with indented outline. Usually one cecum more dilated and indented than other.

Acknowledgements. The author is grateful to Dr. M.A.H. Qadri, Chairman of this department, for providing research facilities, and to Qamar Jehan who helped in this work.

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