

REDESCRIPTION OF *CLINOSTOMUM COMPLANATUM* (RUDOLPHI, 1809) (TREMATODA: CLINOSTOMIDAE LUHE, 1901) REPORTED FROM *CHANNA STRIATUS* IN MORO, SINDH, PAKISTAN

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ABSTRACT

During the investigation on helminth parasites of freshwater fish host *Channa striatus* (snakehead fish), seventeen specimens of trematode belonging to the genus *Clinostomum complanatum* (Rudolphi, 1809) were recovered from the gills of six infected hosts caught from Moro, Sindh, Pakistan. Recovered *Clinostomum complanatum* possess smaller size body, width is maximum at the level of ovary. Sub-terminal oral sucker. Pre-pharynx is absent, while pharynx is not prominent. Esophagus short, acetabulum larger, Caecal bifurcation anterior to acetabulum, and ends at the posterior extremity. The testes are intercaecal, postacetabular and asymmetrical in shape. Anterior testis larger than posterior testis. Ovary intercaecal, small and situated between the testes. Vitelline follicles are rounded. Eggs are not clearly visible. Excretory vesicles opens terminally at body's posterior end. On the basis of above mentioned characters these trematodes were identified as *Clinostomum complanatum* (Rudolphi, 1809), however the locality Moro, Sindh, Pakistan, is new to this species.

Key words: *Clinostomum complanatum*, yellow grubs, zoonotic, *Channa striatus*, Moro, Sindh Pakistan.

INTRODUCTION

The Genus *Clinostomum* was erected by Leidy, 1856. Genus *Clinostomum* belongs to Family Clinostomidae Luhe, 1901, and Sub family Clinostominae Pratt, 1902. Flukes of the genus *Clinostomum* are endoparasites and requires two secondary hosts and one primary host to completes life cycle (Wang *et al.*, 2017). First secondary host is gastropods while fishes, amphibians are second intermediate host. Definitive host is piscivorous birds. Commonly *Clinostomum complanatum* (Rudolphi, 1809) is called as “yellow grub”. This Parasite can also cause zoonotic effects in humans as reported by Chung *et al.* (1995). In human beings or birds the infection of *C. complanatum* occurs by intake of undercooked or infected raw fish *Clinostomum* spp. infections have been recorded from the continent Africa. (Britz *et al.*, 1985), Shellfish and fish can be reservoir of metacercariae infection in domestic animals and humans. (Deardorff and Overstreet, 1991). Kagei *et al.* (1988) review summarized that the infections with *C. complanatum* are considered to a significant zoonotic of community health importance. That's why the parasites are the world health issue that affects several people, especially endangered people in developing nations. “Yellow grubs” causes huge losses to aquaculture industry and natural fish resources around the world in recent years (Dowsett and Lubinsky, 1966; Dias *et al.*, 2003; Gustinelli *et al.*, 2010.)

In Pakistan Bilqees (1972) reported new species *C. marulius* and *C. mujibi* (Bilqees, 1972 from the host *Channa marulius*. Saeed and Bilqees (1972) redescribed *C. mastacembeli* Jaiswal, 1957 recovered from the host *Notopterus notopterus*, *C. sindensis* Khan and Bilqees 1986 recovered from *Mastacembelus armatus*. Khan and Bilqees (1990) redescribed *C. complanatum* (Rudolphi, 1814). Braun (1899) recovered it from *Channa striatus*.

MATERIAL AND METHOD

The *Channa striatus* (fishes) were caught from Moro, Sindh, Pakistan. Fishes taken to Parasitological laboratory, Department of Zoology, University of Sindh, Jamshoro. In order to examine helminth parasites, fishes were cut from cloacal region to mouth cavity. During examination seventeen permanent mature flukes were founded from the gills of *Channa striatus*. Then recovered flukes were fixed 70% alcohol, placed between two lightly pressed glass slides and for staining Mayer's carmalum-stain was used, dehydrated in the alcohol series. After that clove oil is used for clearing, washed with xylene and permanently mounted in canada balsam. Camera lucida is used for Lime diagrams. All measurements are length/width in millimeters. The slides are placed in the Parasitological Laboratory, University of Sindh, Jamshoro.

***Clinostomum complanatum* (Rudolphi, 1809) Braun, 1899**
(Figs. 1-2)

Host: *Channa striatus*
Locality: Gills
Location: Naushahro Feroze
No. of specimens: 17
Host examined/ infected: 09/06

DESCRIPTION

DESCRIPTION IS BASED UPON MATURE SEVENTEEN, PERMANENTLY MOUNTED SPECIMENS.

Elongated and rounded body at both ends measures 5.69-5.88 by 1.86-2.27. At the ovary level the maximum width is measured. Cuticle, thin without spines. Position of oral sucker is subterminal and smaller in size measuring 0.31-0.32 by 0.37-0.38. Prepharynx is absent while pharynx is not prominent. Short oesophagus measures 0.11-0.11 in length. Acetabulum is larger in size than oral sucker measuring 1.26-1.32 by 1.27-1.28. Caecal bifurcation anterior to acetabulum, and ends at the posterior extremity. Testes are intercaecal and present at posterior body region. Testes are, postacetabular, asymmetrical. Distance between acetabulum and testes measures 2.04-2.21. The anterior testis is larger than posterior testes. The size of anterior testes measures 0.52-0.54 by 0.5-0.85 while the size of posterior testes measures 0.34-0.49 by 0.72-0.77. Ovary is intercaecal small and present between the testis measuring 0.24-0.28 by 0.27-0.27. Vitelline follicles are rounded and its distribution starts from acetabulum to the posterior body region. Eggs are not clearly visible. Excretory vesicles opens terminally at the posterior end of the body.

DISCUSSION

Digenetic Flukes of genus *Clinostomum* Leidy, 1856 are **cosmopolitan** parasites of molluscs, amphibians, fishes, fish-eating birds. (Kanev *et al.*, 2002).

Available literature reveals several species of Genus *Clinostomum* reported from Pakistan, these includes *C. mastacembeli* (Jaiswal, 1957) Saeed and Bilqees (1972); *C. sindensis* Khan and Bilqees 1986, *C. marulius* and *C. mujibi* Bilqees Bilqees (1972) the host for first metacercaria is *Notopterus notpterus* while the latter two are reported from *Channa (O.) marulius*.

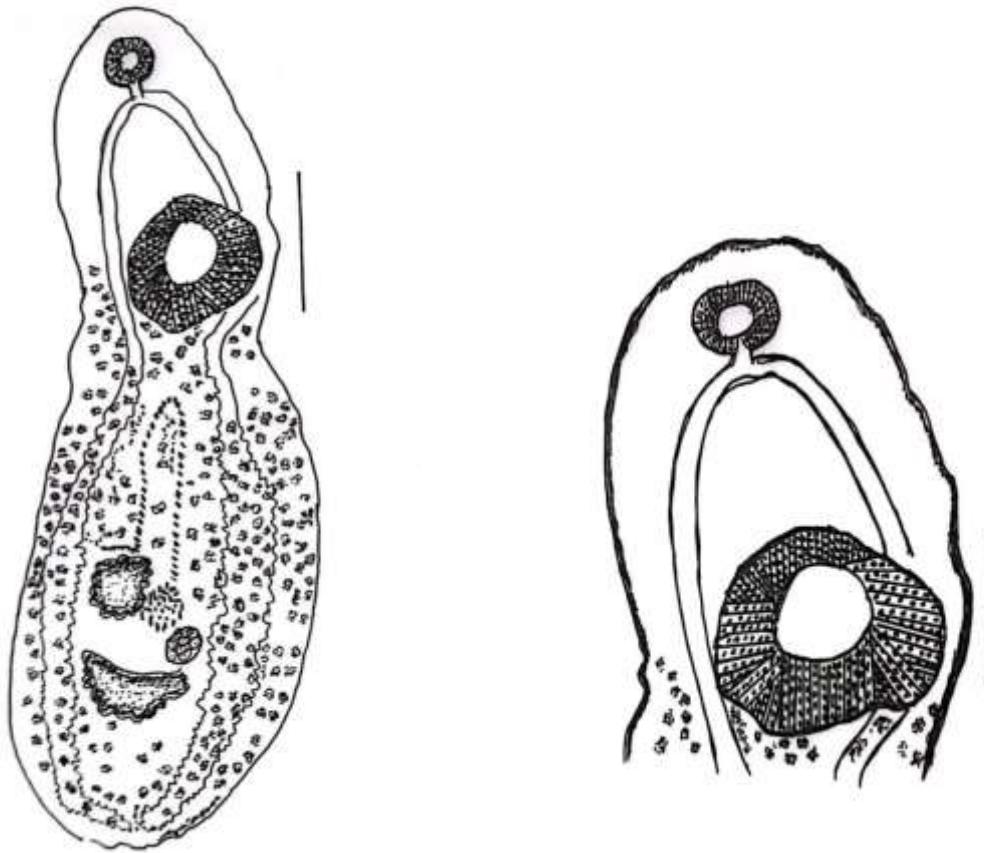
Present specimens is recovered from the gills of *Channa striatus*. Specimens resemble *Clinostomum complanatum* (Rudolphi, 1809) Braun, 1899 in having following differentiated characters.

1. General body shape
2. Sub terminal oral sucker
3. Prepharynx absent
4. Pharynx not prominent
5. Short Oesophagus
6. Larger size of ventral sucker near to double than oral suckers
7. Shape and position of gonads
8. Testes are asymmetrical
9. Smaller ovary is situated between the testes
10. Distribution of the Vitelline follicles

Present forms are however slightly smaller in body size, size of the oral and ventral suckers, size of the gonads, and eggs are not clearly visible.

Originally the specimen was reported in America recovered from the intestine of pike (*Esox lucius*) in the Delaware River.

However, this species being reported for the first time from the new locality Moro, Sindh, Pakistan. Therefore these are regarded as same.



Clinostomum complanatum (Rudolphi, 1809)

Fig.1 Entire lateral view.

Fig. 2 Enlarged view shows the subterminal oral sucker, part of short oesophagus, intestinal bifurcation and enlarged ventral. Sucker. Scale bars; 0.5mm; 0.1 um.

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REFERENCES

- Bilqees, F.M. (1972). Freshwater fish trematodes of West Pakistan. Two new metacercarial forms of *Clinostomum* Leidy, 1928 from *Ophiocephalus* spp. *Pakistan J. Sci. Ind. Res.*, 15: 72-74.
- Braun, M. G. C. C. (1899). Über *Clinostomum* Leidy. *Zoologischer Anzeiger*, 22: 489-493.
- Britz, J., Van As, J. G. and J. E. Saayman (1985). Occurrence and distribution of *Clinostomum tilapiae* Ukoli, 1966 and *Euclinostomum heterostomum* (Rudolphi, 1809) metacercarial infections of freshwater fish in Venda and Lebowa, Southern Africa. *Journal of Fish Biology*, 26(1): 21-28.
- Chung, D. I., H. H. Kong and C. H. Moon (1995). Demonstration of the second intermediate hosts of *Clinostomum complanatum* in Korea. *The Korean journal of parasitology*, 33(4): 305-312.
- Deardorff, T. L. and R. M. Overstreet (1991). Seafood-transmitted zoonoses in the United States: the fishes, the dishes, and the worms. In: *Microbiology of marine food products* (pp. 211-265). Boston, MA: Springer US.
- Dias, M. L. G. G., J. C. Eiras, M. H. Machado, G. T. R. Souza and G. C. Pavanelli (2003). The life cycle of *Clinostomum complanatum* Rudolphi, 1814 (Digenea, Clinostomidae) on the floodplain of the high Paraná river, Brazil. *Parasitology Research*, 89: 506-508.

- Dowsett, J. A., & Lubinsky, G. A. (1966). Maturation of *Clinostomum complanatum* (Trematoda) in laboratory mice. *Canadian Journal of Zoology*, 44(3).
- Gustinelli, A., M. Caffara, D. Florio, E. O. Otachi, E. M. Wathuta and M. L. Fioravanti (2010). First description of the adult stage of *Clinostomum cutaneum* Paperna, 1964 (Digenea: Clinostomidae) from grey herons *Ardea cinerea* L. and a redescription of the metacercaria from the Nile tilapia *Oreochromis niloticus niloticus* (L.) in Kenya. *Systematic Parasitology*, 76: 39-51.
- Hiral, H., T. Ooiso, Y. Kifune, Y. Kiyato and Y. Sakaguchi (1987). *Clinostomum complanatum* infection in posterior wall of pharynx of human Jpn. *J. Parasitol.*, 36 (3): 142-14.
- Jaiswal, G. P. (1957). Studies on the trematode parasites of fishes and birds found in Hyderabad State. Part I-IV. *Zoologische Jahrbucher. Abteilung für Systematic, Ökologie und Geographic de Tiere.*, 85(1/2): 1-72.
- Kagei, N., Y. Yanshara, R. Uchikawa and A. Sato (1988) Natural infection with *Clinostomum complanatum* (Rud. in the birds of southern Japan. *Jpn. J. Parasitol.*, 37 (4): 254-257.
- Kanev, I., V. Radev and B. Fried (2002). Family Clinostomidae Lühe, 1901. In: *Keys to the Trematoda: Volume 1* (pp. 113-120). Wallingford UK: CABI Publishing.
- Khan, A.; Bilqees, F.M. (1986). *Clinostomum sindensis*, new species (Trematoda: Clinostomidae) metacercaria from a fresh water fish. *Proceedings of Pakistan Congress of Zoology*. 5: 292.
- Khan, A., & Bilqees, F. M. (1990). Four trematodes including a new species from fresh-water fishes of Sind, Pakistan. *Proceedings of Parasitology*, (9): 1-44.
- Leidy, J. (1856). A synopsis of entozoa and some of their ectocongeners observed by the auther. *Pro. Acad. Nat. Sc. Phila.*, 8: 42-58.
- Lühe, M. (1901). Ueber Hemiuriden. (Ein Beitrag zur Systematik der digenetischen Trematoden). *Zoologischer Anzeiger*. 24: 394-403, 473-488.
- Maejima, J., S. Fukumoto, T. Tanihata, H. R. Wang and K. Hirai (1996). The fourth case of human infection with *Clinostomum* sp. (Trematoda: Clinostomidae) in Shimane prefecture. *Jpn J Parasitol.*, 45(4): 333-337.
- Rudolphi, C. A. (1809). *Entozoorum sive vermium intestinalium historia naturalis*, Vol. 2. Symptibus Tabernae Librariae et Artium, *Amstelaedami*. 1-457.
- Saeed, R. and F. M. Bilqees (1972). Trematodes of some fishes of Kalri Lake, Sind, West Pakistan. In: Bilqees, F.M. et al. (Eds). *Helminth parasites of some vertebrates chiefly from fishes of West Pakistan*. Agricultural Research Council, Government of Pakistan, Karachi, pp. 66-81
- Wang, M. L., H. Y. Chen and H. H. Shih (2017). Occurrence and distribution of yellow grub trematodes (*Clinostomum complanatum*) infection in Taiwan. *Parasitology research*, 116: 1761-1771.

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