

Research Note

**On the Yellow Grubs, Metacercariae of *Clinostomum complanatum* (Rudolphi, 1819), found in the Cultured Loach**

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Metacercariae of digenetic trematodes *Clinostomum* spp. (Clinostomatidae, Trematoda), known as "yellow grub", have been reported from most parts of world as common parasites encysting in the muscle of many kinds of fishes (Baer, 1933; Yamaguti, 1933, 1958, 1972; Hyman, 1951; van Duizn, 1967; Cheng, 1973; Grabda-Kazubaska, 1974; Roberts, 1978; Hoffman, 1979). Hunter and Hunter (1934, 1935) elucidated the life cycle of *Clinostomum* spp. and were followed by Lo *et al.* (1979, 1981 and 1982). They demonstrated *Helisoma* and *Radix* snail as the first intermediate host and fresh-water fishes as the second intermediate host. The adult worms parasitized in the oral cavity and esophagus of birds which ate infected fishes.

Cheng (1973) found the metacercariae of *C. complanatum* in more than 30 species of fishes, including cultured fishes. There were some records on the second intermediate hosts (*Carassius carassius*, *Pseudogobio esocinus*, *Acheilognathus lanceolata*, *Misgurnus anguillicaudatus* and *Pseudorasbora parva*) for the parasite in Japan (Yamaguti, 1933, 1938; Komiya and Tajimi, 1942). As for pathogenicity by the parasite, we could find a few

reports on the damage in fish hosts. Hoshina *et al.* (1965) reported the disorder due to the parasites in gold fishes cultured in ponds in Aichi Prefecture, Japan. Recently, Liu (1979) and Lo *et al.* (1979) mentioned that the yellow grubs caused the serious economic disturbance to some fish culturists in Taiwan. The present study has been carried out to point out the problems as both of fish diseases and human public health, after we met the disorder of fishes in Tanegashima, Kagoshima prefecture.

Observations were done in respective 400 and 800 loaches transferred from Tanegashima in 1981 and 1982. The loaches transferred were cultured in a water tank for about three months so that larvae might develop into yellow grubs on the body surface of the fishes. Visible yellow grubs (arrow at Photo. 1) were found in 8.6% (30/349 in 1981) and 7.3% (58/800 in 1982) of the live fishes. Each infected fish carried 1 to 9 cysts. The yellow grubs were found encysted near the gills and/or in the muscles at the pectoral fin of the hosts.

The loaches were dissected to remove the larval organisms causing yellow grubs. Metacercariae physically excysted (Photo. 2) were fixed in 10% formalin solution under slight pressure of a cover-glass and stained in Mayer's hematoxylin-eosin or Alum-carmin for microscopic observations of the whole worms.

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The whole cysts were fixed together with body wall of the hosts for histological observations of the yellow grubs. All tissue sections mentioned above were stained with hematoxylin-eosin.

All infected lesions showed the formation of typical cysts around the metacercariae. The yellow (sometimes white) cysts were usually round- or oval-shaped and about 2 mm in diameter.

Photo. 4 (the arrows indicate the sectioned worm) showed that there was no obvious cell-infiltration around the cyst.

Most of yellow grubs obtained from the loaches looked like the mature stage, although the size of reproductive organs was small. The cyst wall was very thin and measured about 2  $\mu\text{m}$  in thick, which consisted of two layers. Excysted larvae had a stout-tongue-shaped body (Photos. 2 and 3), 4.64-8.24 mm in length and 1.39-2.09 mm in width. They had an oral sucker (304-684  $\mu\text{m}$  in length and 277-493  $\mu\text{m}$  in width). A large acetabulum (733-1026  $\mu\text{m}$  in length and 889-1154  $\mu\text{m}$  in width) was located in the anterior one-fourth of the body. Typical pharynx was lack and the pharyngeal bulb was well developed. The digestive tract bifurcated into tubular intestine just after the oral cavity. The intestine was voluminous and possessed numerous outpocketings in the posterior region behind the acetabulum. The branches of bifurcated intestine met at the end of body and opened to the excretory vesicle in the posterior extremity. The substance in the intestine was yellow colored. This substance easily gushed from the excretory pore, once the worm was pressed strongly. Primordia of reproductive organs were situated in the mid part of the body. Small ovary was between two testes and genital pore opened at the right side of the anterior testis.

The worms were identified as *C. complanatum* by the body shape, the relative localities of oral and ventral suckers, the position of the genital pore and the extent of the vitellaria expanding.

Lo *et al.* (1982) reported that once a large number of *Clinostomum* metacercariae in-

fecting into fish tissues, many of the parasites may cause irritation to the hosts and make lesions in their tissues, and result in the death of small fishes. They recognized that concerning the damage "yellow grub" of fish hosts by *C. complanatum*, the host became inactive and slowed down their development, resulting in the death during transportation to a city market.

In this study, careful culture of the fishes was introduced and it prevented their dying during the experiments. Therefore, we failed to manifest the harmful influence against the fish hosts at the end of 3-month culture. However, we also noticed that the infected loaches were seriously deformed and were already of limited economical value.

Cheng (1973) indicated that the adults of *Clinostomum* were not so harmful to the humans. However, human infections in India (Cameron, 1945) and Japan (Yamashita, 1938; Kamo *et al.*, 1962; Sano *et al.*, 1980; Kumada *et al.*, 1983) produced pharyngeal pain, cough, blood sputum, itchiness and discomfortable sensation in the throat, etc. Therefore, this parasitic infection is an important problem in regard to a parasitic zoonoses.

This is a new locality of this species from loaches.

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## 養殖ドジョウにおける *Clinostomum complanatum* のメタセルカリア寄生について

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鹿児島県種子ヶ島産養殖ドジョウを採集し研究室内で3ヶ月間飼育している間にその8.6% (1981年), 7.3% (1982年)に「黄色の瘤」が形成されているのを見出し、寄生虫学的検索を行った所 *Clinostomum complanatum* のメタセルカリアによることがわかつ

た。このメタセルカリアは魚病として問題がある以外にその寄生部位の突出によって外見上奇観を呈し商品価値の低下に連がる。また人体寄生の報告もみられるという点でも本虫寄生は問題である。種子ヶ島産ドジョウからの本虫の報告は始めてである。

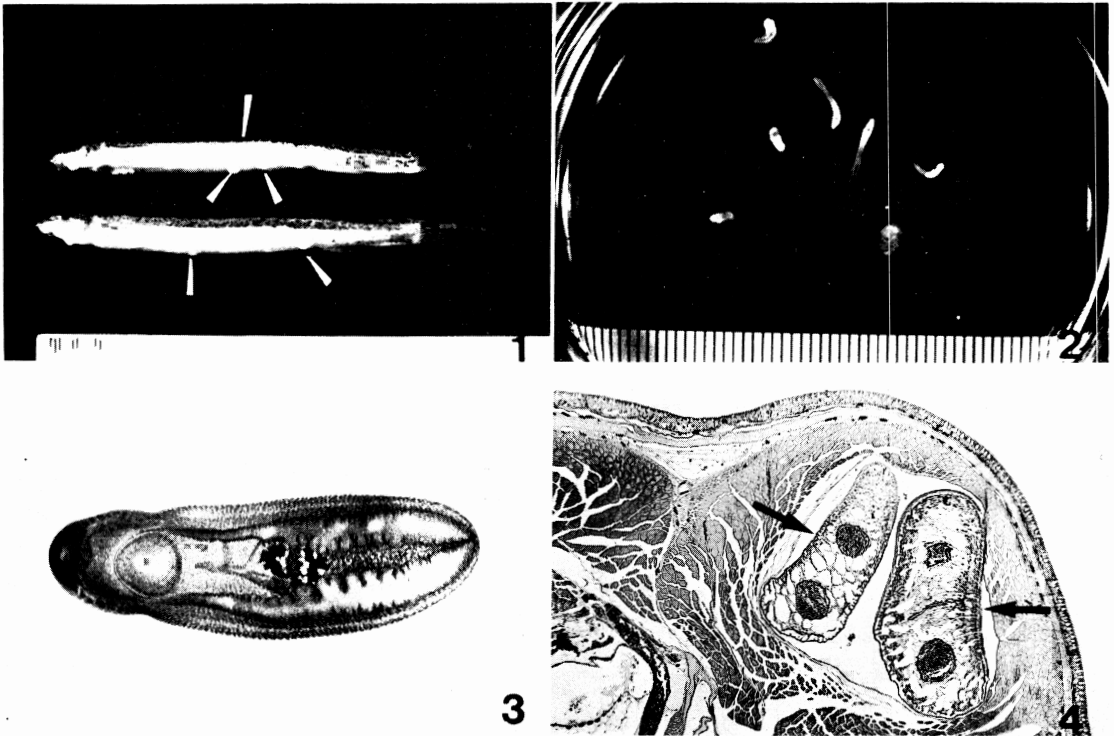


Photo. 1. The yellow grubs (arrows) on the body wall of loach infected by the metacercariae of *Clinostomum complanatum*.

Photo. 2. Alive metacercariae of *C. complanatum* removed from the cysts.

Photo. 3. Metacercaria of *C. complanatum* stained with hematoxylin-eosin.

Photo. 4. A histological section of loach infected by the metacercariae of *C. complanatum* (arrows).