DIFFERENTIAL DIAGNOSIS OF OPISTHORCHIID AND
HETEROPHYID METACERCARiae (TREMATODA)
INFECTING FLESH OF CYPRINID FISH FROM
NAM NGUM DAM LAKE IN LAOS

T Scholz, O Ditrich and M Giboda

Institute of Parasitology, Czechoslovak Academy of Sciences, Branisovska 31, 370 05
Ceska Budejovice, Czechoslovakia.

Abstract. The examination of flesh of 313 cyprinid fish from the Nam Ngum water reservoir in
Vientiane Province, Laos, revealed the presence of four morphologically similar opisthochiid and
heterophyid metacercariae of medical importance. The following morphological characters, visible
under dissecting microscope with low magnification, were typical of trematodes recorded in fish:
(1) Opisthorchis viverrini, the liver fluke, has oval cysts containing quickly moving C-shaped
metacercarie provided with a rather large excretory bladder; (2) metacercarie of Haplorchis pumilio
and H. taichui are surrounded by a thin-walled, oval cyst; they are actively motile, C- or S-shaped,
and possess a relatively small excretory bladder; (3) cysts of Haplorchoides mehrai are considerably
variable in shape, size, and thickness of cyst wall; larvae are slowly moving, C- or S-shaped, or
often not folded, and provided with a rather small excretory bladder. Some cysts with dead or
degenerated H. mehrai larvae are filled with brownish or yellowish pigment. Morphological
variability of some larvae, however, excluded correct identification of all metacercarie during
routine examination of fish. Therefore, we consider isolation of several larvae from each fish host
as well as all “atypical” metacercarie from fish flesh and their examination under the light
microscope to be necessary. Even though this method of examination is rather time consuming, it
decreases the possibility of false identification of trematode larvae encysted in flesh of cyprinid
fish during field studies on opisthochosis and heterophyiosis.

INTRODUCTION

In Laos, only one species of small fluke, the
liver fluke, Opisthorchis viverrini (Poirier, 1886),
has hitherto been reported to occur in humans
(Segal et al, 1968; Sicard et al, 1977). Commonly
consumed cyprinid fish of the genera Hampala,
Puntius, Cyclocheilichthys, and Barbodes, whose
flesh is infected with O. viverrini metacercarie,
represent a main source of human infection in
some countries of Southeast Asia. The exami-
nation of cyprinids from Nam Ngum Dam Lake
in Laos revealed the presence of three additional
trematode species of the family Heterophyidae
with morphologically closely similar metacercarie
(Ditrich et al, 1990). Considering the
different medical importance of individual para-
sites, their correct identification is important.
This paper presents data about the routine identi-
fication and differential diagnosis of metacercarie
encysted in flesh of cyprinid fish that
might be misdiagnosed as O. viverrini.

MATERIAL AND METHODS

The study was carried out at the Nam Ngum
water reservoir situated north of the Lao capital,
Vientiane (Ditrich et al, 1990). This reservoir
represents the most important source of fish for
inhabitants of the whole Vientiane Province.
Flesh of 313 fish of 18 species were examined
under a dissection microscope (magnification
30 x) using the compression method.

RESULTS

Metacercarie of the following four species
of small flukes were recorded: O. viverrini
(family Opisthochiidae), Haplorchis pumilio
(Looss, 1896), H. taichui (Nishigori, 1924), and
Haplorchoides mehrai Pandel Shukla, 1976
(family Heterophyidae).

Simultaneous infections of one fish with two
species were recorded in 11 cases: O. viverrini
and H. mehrai metacercarie were recorded six
times (twice in *Hampala dispar*, twice in *H. macrolepidota*, once in *Barbodes gonionotus*, and once in *Cyclocheilichthys repasson*); *H. taichui* and *H. mehrai* larvae were found five times (twice in *H. dispar*, twice in *H. macrolepidota*, and once in *B. gonionotus*).

The following morphological features were used for identification of most larvae during routine fish examination (Fig. 1): *O. viverrini* has mostly oval cysts containing quickly moving C-shaped metacercariae provided with a large excretory bladder. *Haplorchis pumilio* and *H. taichui* metacercariae are surrounded by a thin-walled, oval cyst; they are actively motile, C- or S-shaped, and their excretory bladder is rather small. Cysts of *H. mehrai* are variable in shape, size, and thickness of cyst wall; metacercariae are slowly or very slowly moving, C-, S- or often I-shaped (not folded). They are also provided with a relatively small excretory bladder. Some *H. mehrai* metacercariae were dead or degenerated; their cysts were filled with brownish or yellowish pigment.

**DISCUSSION**

The results confirmed the possibility of simultaneous infection of cyprinid fish with opisthorchiid and heterophyid flukes. Of four trematode species found, only *H. mehrai* is of no medical importance. This trematode matures exclusively in predatory fish and cannot infect mammals. The liver fluke *O. viverrini* is a common and medically important human parasite in some countries of Southeast Asia, particularly in Thailand (see, eg, Sadun 1955; Harinasuta 1969).

Members of the genus *Haplorchis* Looss, 1899, mainly the two species found in Nam Ngum Dam Lake, occasionally infect humans in the same region (Manning *et al*, 1971; Kliks and Tantachamrun 1974; Radomyos *et al*, 1984). Simultaneous infections of man with *O. viverrini* and heterophyid flukes was confirmed in Laos. Considering their common occurrence and morphological similarity to some *H. mehrai* larvae, the correct identification of *Opisthorchis viverrini* and *Haplorchis* metacercariae is necessary. All the above species can be easily distinguished from one another under the light microscope: *O. viverrini* possesses a relatively large, strongly muscular ventral sucker, while heterophyid flukes are characterized by the presence of a ventro-genital sac, containing a feebly developed ventral sucker, and armed with sclerites and spines of shape, size and arrangement typical for each species (Pearson 1964; Pearson and Ow-Yang 1982). However, the isolation and subsequent examination of all metacercariae under light microscope is practically impossible during field epidemiological studies. Moreover, these features are not recognizable in low magnification. Consequently, morphological features visible under dissecting microscope are necessary for a correct routine identification. We have found such diagnostic criteria. However, morphological variability of some larvae (slightly moving or dead *O. viverrini* larvae, heterophyid metacercariae with a relatively large excretory bladder) made the

![Fig 1](https://example.com/fig1.png)

Fig 1 — Free and encysted opisthorchiid and heterophyid metacercariae from cyprinid fish in Nam Ngum Dam Lake, Laos. A, D, G - *Opisthorchis viverrini* (Poirier, 1886); B, E - *Haplorchis taichui* (Nishigori, 1924); B, H - *H. pumilio* (Looss, 1896) (left intestine (a) in Fig. 1 B is of *H. taichui* larva, right intestine (b) of *H. pumilio* larva); C, F, I - *Haplorchoides mehrai* Pande et Shukla, 1976. A, B, C - free metacercariae, D, E, F, G, H, I - encysted larvae
correct identification of all larvae under the dissecting microscope not possible. We conclude that a small sample of larvae from each fish host and all variable or dead metacercariae should be identified under the light microscope. Apart from being time-consuming, this method of fish examination, seems to be necessary for the correct identification of metacercariae. It will avoid misinterpretation of results during field studies on food-borne trematodes in Southeast Asia.

ACKNOWLEDGEMENTS

The authors are indebted to Mr Boon Thue, Institute of Malaria and Parasitic Diseases, Vientiane, for his excellent technical assistance; and to Mr Buovan, Electricite of Laos, Thinkeo, for valuable help in fish sampling. Thanks are due to Dr Maurice Kottelat, Zoologisch Staatssammlung, Munich, BRD, for identification of some fish specimens.

REFERENCES


