

Prevalence of *Haplorchis taichui* and *Haplorchoides* sp. Metacercariae in Freshwater Fish from Water Reservoirs, Chiang Mai, Thailand

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Abstract: A parasitological investigation on trematode metacercariae was made on 62 freshwater fishes of 13 species in northern Thailand; *Cyclocheilichthys apogon*, *Puntioplites proctozyron*, *Labiobarbus siamensis*, *Barbodes gonionotus*, *Barbodes altus*, *Henicorhynchus siamensis*, *Osteochilus hasselti*, *Notopterus notopterus*, *Mystacoleucus marginatus*, *Anabas testudineus*, *Systemus orphoides*, *Morulius chrysophykadian*, and *Hampala macrolepidota*. The fish were caught over the summer period (February-May 2007) from 2 Chiang Mai water reservoirs, i.e., the Mae Ngad (UTM 47Q E 503200, 47Q N 2119300) and the Mae Kuang Udomtara (UTM 47Q E 513000, 47Q N 2092600) Reservoirs in Chiang Mai province, Thailand. The prevalence of heterophyid (*Haplorchis taichui* and *Haplorchoides* sp.) metacercariae in these fish was 83.9% and 74.2% in the Mae Ngad and Mae Kuang Udomtara Reservoirs, respectively. The highest intensity of heterophyid metacercariae in *H. siamensis* in the Mae Ngad was 120.4 and that in *P. proctozyron* in the Mae Kuang Udomtara was 180.0. The fish, *A. testudineus*, *C. apogon*, and *M. chrysophykadian*, were not found to be infected with *H. taichui* metacercariae. The results show that the freshwater fish in Chiang Mai water reservoirs are heavily infected with *H. taichui* and *Haplorchoides* sp. metacercariae.

Key words: *Haplorchis taichui*, *Haplorchoides* sp., metacercaria, freshwater fish, Chiang Mai, Thailand

Thailand is undergoing social and economic changes that accompany rapid development. Positive trends include impressive advances in both the science and technology, as well as rapidly rising education levels among all segments of the society. Along with rapidly increasing literacy rates, higher education is becoming increasingly available, accompanied by advances in public health. Prevention and control programmes dealing with parasitic diseases have been developed and implemented. However, even with these advances, parasitic diseases still remain a serious concern for the public health system in Thailand. Many factors influence the survival and transmission rates of parasites, as in the case of liver fluke infections in northeast Thailand, where people frequently enjoy eating raw fish. Hookworms and roundworms are more frequently found in southern Thailand, where heavy rainfall and temperatures create conditions of high humidity and permit the survival and development of many parasite species.

The Mae Ngad Reservoir is located in Mae Tang district, and the Mae Kuang Udomtara is located in Doi Saket district, Chiang Mai province, Thailand. It serves as an important area for agri-

culture and fisheries in northern Thailand. There are many aquatic animals, in particular cyprinoid fish, which serve as the intermediate hosts for trematode parasites that are causes of fish-borne zoonotic parasitic diseases. Trematodes of the genus *Haplorchis* (Heterophyidae) are found in the small intestines of various definitive hosts, such as birds, cats, dogs, and rats. Humans and other definitive hosts are infected by eating raw freshwater fish containing encysted metacercariae. Thus, the present study was designed to investigate the prevalence of heterophyid metacercariae in freshwater fish in northern Thailand.

Trematodes are parasites of various animals; they are dorsoventrally flat and hermaphroditic, and require one or more intermediate hosts. To complete their life cycle, specific species of intermediate hosts must be available for trematode development. Infections are food-borne and are now emerging as a major public health problem, with more than 50 million people infected globally [1]. A series of developmental stages occur within the snail hosts (sporocysts and rediae), eventually producing cercariae, which are released into the water. These cercariae then encyst in the tissues of freshwater fish (cyprinoid fish) and become metacercariae. When infected freshwater fish are ingested raw, the metacercariae infect the human host. In Southeast Asia, especially Thailand, eating raw fish is a tradition. Fluke diseases, caused

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by fish-borne trematodes, are therefore common in this region. Several species of metacercariae of medically important flukes have been reported [2-4]. In northern Thailand, fluke diseases remain a common public health problem. Therefore, this project was designed to determine the prevalence of metacercariae in cyprinoid fish in water reservoirs (the Mae Ngad and the Mae Kuang Udomtara in Chiang Mai province). The epidemiological information collected will help to develop a prevention strategy for public health.

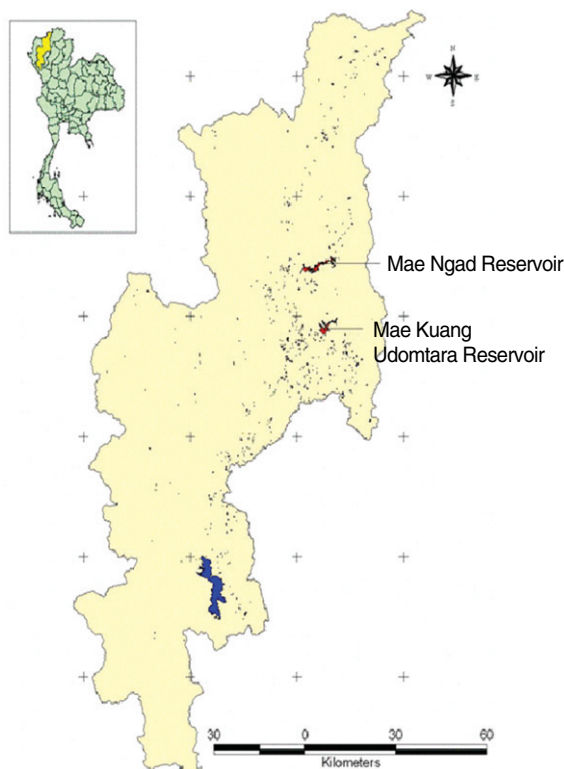


Fig. 1. A map showing the geographic position system (GPS) of the surveyed water reservoirs in Chiang Mai province, Thailand.

A survey of metacercariae from freshwater fish was carried out at 2 reservoirs, the Mae Ngad (UTM 47Q E 503200, 47Q N 2119300) and the Mae Kwong (UTM 47Q E 513000, 47Q N 2092600) reservoirs of Chiang Mai province (Fig. 1). The fin muscles of the fish were removed for collection of metacercariae using 1% pepsin digestive solution in normal saline (1 ml conc. hydrochloric acid, 1 g pepsin, 99 ml 0.85% sodium chloride solution for 1.3 hr at 37°C). The digested material was then rinsed with 0.85% sodium chloride solution and examine for metacercariae.

The prevalence of *Haplorchis taichui* and *Haplorchoides* sp. metacercariae in fish of the Mae Ngad and the Mae Kuang Udomtara Reservoirs was 83.9% (26 of 31 fish) and 74.2% (23 of 31 fish), respectively (Tables 1, 2). In the Mae Ngad, the highest density of heterophyid metacercariae per fish was 120.4 in *H. siamensis* (Table 1), and in Mae Kuang Udomtara the highest density was 180.0 in *P. proctozyron* (Table 2). All species of fish, with the exception of *C. apogon*, *A. testudineus*, and *M. chrysophykadian*, were found to be infected with *H. taichui* metacercariae in the 2 reservoirs (Tables 1, 2). All fish species, with the exception of *M. chrysophykadian* and *B. altus* in the Mae Ngad, and *H. siamensis* and *N. notoptyrus* in the Mae Kuang Udomtara Reservoirs, were found infected with *Haplorchoides* sp. metacercariae (Tables 1, 2).

Previous studies on trematode metacercariae were carried out on freshwater fish in Khon Kaen province, Thailand [5]. *H. taichui* was the dominant species and was found in all kinds of fish, in particular including *Hampala dispar* [5]. The metacercariae of *H. taichui* were found in various fish collected from Chom Thong and Mae Taeng districts [6-8], in *M. marginatus* from Mae Sa Stream [9], in *Thynnichthys thynnoides* [10], *P. proctozyron* (90.0%), *H. dispar* (87.9%), and *H. siamensis* (82.5%) from Chiang Mai province [11]. High prevalences of *H. taichui* metacercariae

Table 1. Prevalence of heterophyid metacercariae in freshwater fish from the Mae Ngad Reservoir

Species of fish	No. fish examined	No. fish infected (%)	<i>Haplorchis taichui</i> ^a	<i>Haplorchoides</i> sp. ^a	Total No. of heterophyid metacercariae (av. No./fish)
<i>Barbodes altus</i>	1	1 (100.0)	0	0	0 (0.0)
<i>Barbodes gonionotus</i>	4	4 (100.0)	54	6	60 (15.0)
<i>Hampala macrolepidota</i>	5	2 (40.0)	133	24	157 (78.5)
<i>Henicorhynchus siamensis</i>	5	5 (100.0)	542	60	602 (120.4)
<i>Labiobarbus siamensis</i>	5	5 (100.0)	164	3	167 (33.4)
<i>Morulus chrysophykadian</i>	3	1 (33.3)	0	1	1 (1.0)
<i>Mystacoleucus marginatus</i>	1	1 (100.0)	11	0	11 (11.0)
<i>Puntioplites proctozyron</i>	6	6 (100.0)	23	3	26 (4.3)
<i>Systomus orphoides</i>	1	1 (100.0)	20	1	21 (21.0)
Total	31	26 (83.9)	947	98	1,045 (40.2)

^aNo. of metacercariae detected.

Table 2. Prevalence of heterophyid metacercariae in freshwater fish of the Mae Kuang Udomtara Reservoir

Species of fish	No. fish examined	No. fish infected (%)	<i>Haplorchis taichui</i> ^a	<i>Haplorchoides</i> sp. ^a	Total No. of heterophyid metacercariae (av. No./fish)
<i>Anabas testudineus</i>	1	1 (100.0)	0	2	2 (2.0)
<i>Barbodes altus</i>	3	3 (100.0)	48	3	51 (17.0)
<i>Barbodes gonionotus</i>	1	1 (100.0)	91	4	95 (95.0)
<i>Cyclocheilichthys apagon</i>	1	1 (100.0)	0	59	59 (59.0)
<i>Henicorhynchus siamensis</i>	1	1 (100.0)	4	0	4 (4.0)
<i>Labiobarbus siamensis</i>	7	5 (71.4)	1	5	6 (1.2)
<i>Mystacoleucus marginatus</i>	9	4 (44.4)	45	40	85 (21.3)
<i>Notopterus notopterus</i>	2	1 (50.0)	1	0	1 (1.0)
<i>Osteochilus hasselti</i>	5	5 (100.0)	19	47	66 (13.2)
<i>Puntioplites proctozysron</i>	1	1 (100.0)	2	178	180 (180.0)
Total	31	23 (74.2)	211	338	549 (23.9)

^aNo. of metacercariae detected.

were found in *H. siamensis* and *M. marginatus* [8]. In Chiang Mai province, metacercariae of *Stellantchasmus falcatus* were also found in *Dermogenus pusillus* [12-15] and in *Xenentodon cancila* of Mae Sa Stream, Chiang Mai [9].

This is the first report of the geographic position system (GPS) of fish-borne parasitic zoonosis in water reservoirs, Chiang Mai province. As in previous studies, the present study found that most cyprinoid fishes were infected with *Haplorchis* metacercariae, implying that the degree of infection of the definitive host would be high in these areas. Further studies are required to examine the locations of water bodies in the area in order to design public health prevention and control strategies.

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