

## RESEARCH NOTE

# SEASONAL VARIATION OF METACERCARIAE IN CYPRINOID FISH FROM KWAE NOI BAMROONGDAN DAM, PHITSANULOK PROVINCE, NORTHERN THAILAND

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**Abstract.** A seasonal investigation of the occurrence of metacercariae in cyprinoid fish was conducted at the Kwaie Noi Bamroongdan Dam, Phitsanulok Province, northern Thailand during December 2008 - August 2009. A total 361 cyprinoid fish from 10 species were examined by artificial digestion method evaluating for metacercariae. The metacercariae determined were *Haplorchis taichui*, *Haplorchis pumilio*, *Haplorchoides* sp and *Centrocestus caninus*. The prevalence of metacercariae ranged from 76.5% to 82.6%, with an intensity of infection of 23.4 to 36.6. *H. taichui*, *Haplorchoides* sp and *C. caninus* had the highest prevalence in the cool season, while *H. pumilio* was more prevalent during the hot season. The highest infection prevalence (100%) was seen in *Rasbora metallicus*, *Barbodes gonionotus* and *R. metallicus*. No significant differences in the type of metacercariae were found between seasons, indicating year-round infestation of cyprinoid fish.

**Keywords:** cyprinoid fish, metacercariae, seasonal variation, Kwaie Noi Bamroongdan Dam, Thailand

### INTRODUCTION

The Kwaie Noi Bamroongdan Dam on the Kwaie Noi River is located in the Wat Bot District, Phitsanulok Province, Thailand. The Kwaie Noi Bamroongdan Dam is important to local habitants to protect from floods and as a source of freshwater fish, some of which serve as the intermediate hosts of medically important trematodes. Foodborne trematode infections are acquired through ingesting raw or uncooked

freshwater fish, shellfish, crabs or unwashed vegetables containing metacercariae (WHO, 1995). About 70 species of intestinal trematodes can infect humans (Yu and Mott, 1994); nearly half are in the families Heterophyidae and Echinostomatidae (Fried *et al*, 2004). More than 50 intestinal fishborne zoonotic trematodes species are reported to infect humans worldwide and at least 13 species are found in Southeast Asia (Chai *et al*, 2005).

Studies of the prevalence and intensity of metacercariae of fishborne trematodes are essential to provide epidemiological data regarding such parasites. This has been performed in many countries.

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The number of human infections with the liver fluke *Opisthorchis viverrini* in Thailand, Lao PDR and Vietnam are underdetermined but are estimated to be in the millions (Sripa *et al*, 2003). The studies of the prevalences of metacercariae among culture fish species in the Mekong Delta, Vietnam were found to include the minute intestinal fluke of the family Heterophyidae, *Haplorchis taichui*, *Haplorchis pumilio*, *Centrocestus formosanus* and *Stellantchasmus falcatus* with prevalences of 1.7% in mono-cultured giant gouramy, 6.6% in carp from the poly-culture and 3.0% in fish raised at a vegetable-aquaculture-animal farm (Thien *et al*, 2007). In Thailand, the helminthic parasites were collected from the Mae Ngad Somboonchon Reservoir, Chiang Mai Province, northern Thailand, included monogenea: *Dactylogyrus* sp, *Gyrodactylus* sp and *Paradiplozoon* sp; 3 species of metacercariae: *Centrocestus caninus*, *H. taichui* and *Haplorchoides* sp and one species of nematode: *Rhabdochona* sp (Boonchot and Wongsawad, 2005). The prevalence of heterophyid (*H. taichui* and *Haplorchoides* sp) metacercariae infecting cyprinoid fish at Mae Ngad and Kuang Udomtara, Chiang Mai Province, were 62.2% and 48.7%, respectively (Nithikathkul and Wongsawad, 2008). The objective of this study was to determine the prevalence and intensity of fishborne trematodes infecting cyprinoid fish collected from Kwaë Noi Bamroongdan Dam, Phitsanulok Province, northern Thailand, to provide baseline data about these trematodes.

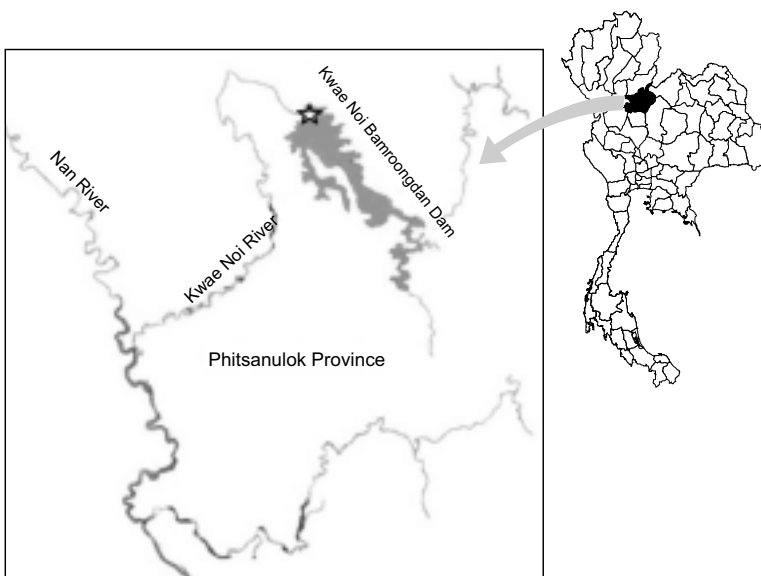


Fig 1—The location of Kwaë Noi Bamroongdan Dam, Wat Bot District, Phitsanulok Province, Thailand.

## MATERIALS AND METHODS

A total of 361 cyprinoid fish from 10 species were collected from Kwaë Noi Bamroongdan Dam, Phitsanulok Province (Fig 1). The cyprinoid fish were collected during 3 seasons (cool, hot and rainy) during December 2008 - August 2009. All fish samples were transferred to the laboratory at Department of Biology, Faculty of Science, Chiang Mai University and identified to species. The fish meat was ground with a pestle. It was then mixed with artificial gastric juice and incubated at 37°C for 1-2 hours. The digested material was filtrated with graded sieves to remove large particles and rinsed twice with 0.85% normal saline solution. The metacercariae were collected and identified to species based on morphology under a light microscope. The prevalence and the intensity of metacercariae infection were analyzed using one-way ANOVA.

## RESULTS

The metacercariae were found in all 10 species of cyprinoid fish: *Barbodes gonionotus*, *B. schwanenfeldi*, *Cyclocheilichthys repasson*, *Esomus metallicus*, *Hampala macrolepidota*, *Henicorhynchus siamensis*, *Labiobarbus siamensis*, *Osteochilus hasselti*, *Puntioplites proctozyson*, and *Puntius brevis*. Four species of metacercariae (*H. taichui*, *H. pumilio*, *Haplorchoides* sp and *C. caninus*) were collected from the 361 cyprinoid fish specimens collected during the 3 seasons. The prevalence of metacercariae during the cool season was 82.6%, the rainy season was 81.3% and the hot season was 76.5%. The intensity of infection found during the hot season was 36.6, the cool season was 25.2 and the rainy season was 23.4 (Fig 2). The prevalence of *H. taichui* metacercariae was highest during the cool season (50.3%), decreased during the hot season (20.6%) and then increased during the rainy season (45.3%). The prevalence of *Haplorchoides* sp metacercariae was highest during the cool season (39.8%) decreased during the hot season (36.8%) and decreased further during the rainy season (29.7%). The prevalence of *C. caninus* metacercariae was highest during the cool season (18.6%) decreased during the hot season (9.6%) and not found during the rainy season. The prevalence of *H. pumilio* metacercariae was moderately during the cool season (7.5%), increased during the hot season (14.0%) and decreased during the rainy season (6.3%) (Fig 3). The prevalence of *H. taichui* metacercariae was highest during the rainy

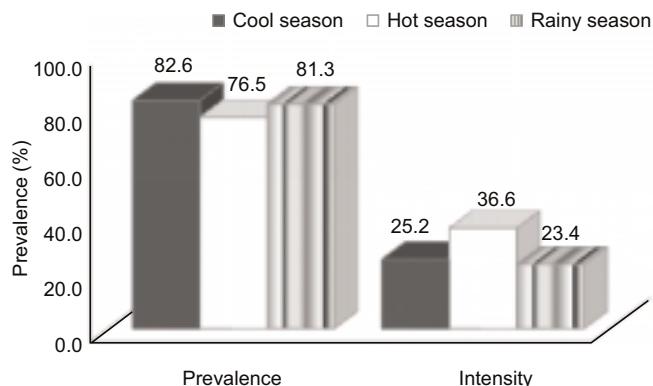


Fig 2—Total prevalence and intensity of metacercariae during 3 seasons (cool, hot and rainy season).

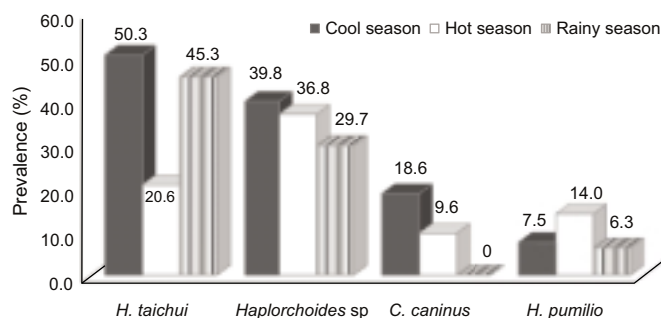


Fig 3—Prevalence of *H. taichui*, *Haplorchoides* sp, *C. caninus* and *H. pumilio* metacercariae during 3 seasons.

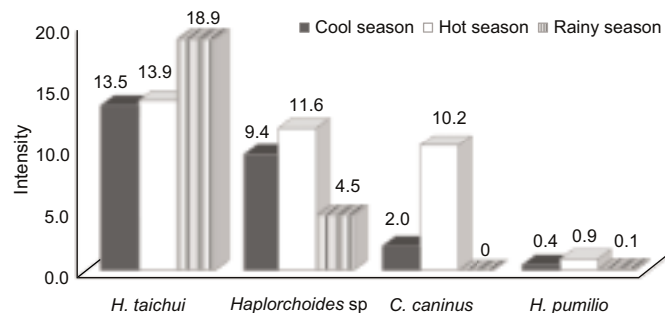


Fig 4—Intensity of *H. taichui*, *Haplorchoides* sp, *C. caninus* and *H. pumilio* metacercariae during 3 seasons.

Table 1

Prevalence of metacercariae in cyprinoid fish collected from Kwa Noi Bamroongdan Dam.

Cyprinoid fish	Cool season (%)	Hot season (%)	Rainy season (%)
<i>Esomus metallicus</i>	100.0	72.2	0.0
<i>Cyclocheilichthys repasson</i>	76.9	81.0	70.8
<i>Barbodes gonionotus</i>	80.0	75.0	100.0
<i>Henichorhynchus siamensis</i>	100.0	77.4	100.0
<i>Osteochilus hasselti</i>	85.7	0.0	75.0
<i>Puntius brevis</i>	57.9	0.0	0.0
<i>Labiobarbus siamensis</i>	88.5	82.4	0.0
<i>Barbodes schwanenfeldi</i>	100.0	68.8	0.0
<i>Hampala macrolepidota</i>	70.0	81.8	0.0
<i>Puntioplites proctozysron</i>	0.0	66.7	55.6

season (18.9%), decreased during the hot season (13.9%) and stayed about the same during the cool season (13.5%). The prevalence of *Haplorchoides* sp metacercariae was highest during the hot season (11.6%), lower during the cool season (9.4%) and lowest during the rainy season (4.5%). The prevalence of *C. caninus* metacercariae was highest during the hot season (10.2%), lower during the cool season (2.0%), and not found during the rainy season. The prevalence of *H. pumilio* metacercariae was highest during the hot season (0.9%), lower during the cool season (0.4%) and lowest during the rainy season (0.1%) (Fig 4). Statistical analysis revealed no significant differences in prevalence or intensity of metacercariae between the seasons ( $p>0.05$ ). *C. caninus* metacercariae was found in *Rasbora metallicus* (100%); *H. pumilio* was found in *Barbodes gonionotus* (31.4%); *H. taichui* was found in *R. metallicus* (100%); and *Haplorchoides* sp was found in *Henichorhynchus siamensis* (57.14%) (Table 1).

## DISCUSSION

Four species of minute intestinal flukes (*C. caninus*, *H. taichui*, *H. pumilio* and

*Haplorchoides* sp) were found in most of the 361 cyprinoid fish collected during all 3 seasons in Thailand. Three species (*C. caninus*, *H. taichui* and *Haplorchoides* sp) were detected mostly on fish scales and in their muscles (Namue *et al*, 1998). *H. pumilio* is commonly found in freshwater fish and humans in Thailand, Lao PDR and China (Chai *et al*, 2005). They were found throughout the year. This is in contrast to a study by Sukontason *et al* (1999) who found the metacercariae of *H. taichui* in Ban Pao District, Chiang Mai Province, were highest in the cool and lowest in the rainy seasons. The intensity of infection depends on the availability of the intermediate hosts, their predation by fish and elimination of parasites from the gut (Santos and Eiras, 1995). The stage in the fish has an effect on the prevalence and intensity of the metacercariae (Esch *et al*, 1986). The prevalences of each species showed *C. caninus* metacercariae had the highest prevalence in *Rasbora metallicus*, *H. pumilio* in *Barbodes gonionotus*, *H. taichui* in *R. metallicus* and *Haplorchoides* sp in *Henichorhynchus siamensis*. A previous report revealed *H. taichui* was found in *H. siamensis* and *Mystacoleucus marginatus* (Kumchoo *et al*, 2005).

In conclusion, *H. taichui*, *Haplorchoides* sp and *C. caninus* metacercariae were found in cyprinoid fish collected from the Kwae Noi Bamroongdan Dam during the cool season in a greater prevalence than during the hot and rainy seasons, but *H. pumilio* was found in greater prevalence during the hot season than during the cool and rainy seasons. This indicates these helminths can be found throughout the year.

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