

HELMINTHIC PARASITES INFECTING FOUR SPECIES OF FRESHWATER FISH FROM TASIK MERAH, PERAK, PENINSULAR MALAYSIA

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ABSTRACT. A total of 79 fish from Tasik Merah, Perak, Peninsular Malaysia were examined for their parasitic fauna. The fish species were *Puntius schwanefeldii* (20), *Puntius gonionotus* (20), *Hampala macrolepidota* (19) and *Notopterus notopterus* (20). Ten species of parasites were found from the two major groups of nematode and trematode. The nematodes were *Capillaria* sp., *Spinictus inermis*, *Echinocephalus* sp., *Microtetrameres* sp., and *Cucullanus* sp. The trematodes were *Paradiplozoon malayense*, *Paradiplozoon barbi*, and *Dactylogyrus* sp. Factors that may determine parasite distribution were discussed.

Keywords: helminthic parasites, freshwater fish, Tasik Merah

INTRODUCTION

According to the Food and Agriculture Organization of the United Nation (2000), the world inland water capture, including fish, crustaceans and molluscs production in 2000 was 7,014,428 metric tonnes. The total production for Malaysia in 1999 was 1,251,765 metric tonnes. From this, 3,366 metric tonnes were from freshwater fish

and this value increased to 1,289,245 metric tonnes in 2000 with 3,549 metric tonnes from freshwater fish (Department of Fisheries Malaysia Annual Fisheries Statistics, 1995). The total landings of freshwater fish from public water bodies or inland fisheries in 1995 by month was 3,938.94 metric tonnes. June showed the highest yield which was 469.23 metric tons and the lowest landing was in September which is 254.09 metric tonnes. Sabah showed the highest landing with 1,700 metric tonnes and the lowest was in Negeri Sembilan with 1.86 metric tonnes. The above data showed the economic importance of freshwater fish as one of the trading goods in addition to protein source for Malaysians and world population.

Some observations on parasites of Malaysian freshwater fish had been reported in the literature but they are mainly limited to the genus *Clarias* sp., the catfish (Lim, 1991; Rahman and Ali, 1991; Rahman *et al.*, 1992; Leong and Mokhtar, 1981; Furtado and Tan, 1973; Fernando and Furtado, 1963; Shaharom *et al.*, 1992), or *Channa striatus*, the snakehead (Fernando and Furtado, 1963; Leong and Mokhtar, 1981; Rahman and Ali, 1991)

and *Anabas testudineus*, the climbing perch and *Trichogaster pectoralis*, the snakeskin Gouramy (Rahman and Ali, 1991; Fernando and Furtado, 1963; Leong and Mokhtar, 1981; Betterton, 1979).

The present paper describes the parasitic fauna of four infrequently reported freshwater fish from Tasik Merah, Perak, Peninsular Malaysia: *Puntius schwanefeldii*, *Puntius gonionotus*, *Hampala macrolepidoata* and *Notopterus notopterus*.

MATERIALS AND METHODS

This study was carried out at Tasik Merah, Perak (long. 100° 32'E, lat. 5° 10'N), Peninsular Malaysia. Only four major species, *Puntius schwanefeldii* (*lampam sungai*, *tin foil barb*) *Puntius gonionotus* (*lampam jawa*, *java barb*), *Hampala macrolepidot* (*sebarau*, *jungle perch*) and *Notopterus notopterus* (*belida*, *grey leatherback*) were included in this research. A total of 79 fish which were caught by fishermen from the lake were used in this experiment. Twenty fish from each of the species were randomly chosen and brought back to the laboratory in an ice box.

The external features were visually examined for ectoparasites. The gills were removed and examined for helminths under a dissecting microscope. The fish were slit open and the contents collected in Petri dishes, and examined under a dissecting microscope. All parasites found were picked individually and kept in small bottles. Trematodes and acanthocephalans

were preserved in formaline-alcohol-acetic acid, while nematodes were preserved in 5% glycerine in 70% alcohol. Trematodes were stained with semichon's acetic carmine stain and mounted permanently in Canada balsam. Nematodes and acanthocephalans were cleared in lactophenol and examined in temporary mounts.

RESULTS

Eight species of ecto and endoparasites were found to infect the four fish species (Table 1). The two most abundant parasites were the nematodes *Cucullanus* sp. and *Spinitectus inermis*. *Cucullanus* sp. was recovered only from *Puntius schwanefeldii* while *S. inermis* was found in all four species of fish. The other two nematode species infecting the fish were *Microtetrameres* sp. and *Capillaria* sp. Four species of trematodes infecting the fish were *Paradiplozoon barbi*, *P. malayense*, *Echinocephalus* sp. and *Dactylogyrus* sp. *Paradiplozoon barbi* found infecting *H. macrolepidota* were present in large numbers in one fish host while only a single *P. malayense* was found in *P. schwanefeldii*. *Hampala macrolepidota* seemed to be a favourite host for many parasites as compared to the other three species of fish.

Even though there were only three species of parasites found in *P. schwanefeldii*, most of them occurred in a large numbers especially *Cucullanus* sp. This was followed by *S. inermis* which infected 30% of the fish (Table 1). 90% of all examined *P. schwanefeldii* were

TABLE 1: Total number of parasites infecting the four fish species in Tasik Merah, Perak

	<i>P. schwanenfeldii</i>	<i>P. gonionotus</i>	<i>H. macrolepidota</i>	<i>N. notopterus</i>	No. of host
<i>Cucullanus sp</i>	79	-	-	-	1
<i>Spinitectus inermis</i>	23	20	1	10	4
<i>Microtetrameres sp</i>	-	-	6	-	1
<i>Capillaria sp</i>	-	-	3	-	1
<i>Paradiplozoon barbi</i>	-	-	10	-	1
<i>P. malayense</i>	1	-	-	-	1
<i>Echinocephalus</i>	-	-	-	1	1
<i>Dactylogyrus sp</i>	-	-	2	-	1
Total no. of parasites	103	20	22	11	
Parasite species	3	1	5	2	

TABLE 2: Various parasite populations infecting *P. schwanenfeldii* in Tasik Merah, Perak

Parasite	No. Infected fish	Percentage	Total no. of parasite
Nematode			
<i>Cucullanus sp</i>	14	70.0	79
<i>Spinitectus inermis</i>	6	30.0	23
Trematode			
<i>Paradiplozoon malayense</i>	1	5.0	1
No. of fish examined		20	
% of fish infected		90.0	
No. of parasite species		3	
Total no. of parasite		106	

TABLE 3: Various parasite populations infecting *Puntius goniotus*

Parasite	No. of infected fish	Percentage	Total no. of parasite
Nematode			
<i>Spinitectus inermis</i>	5	25.0	20
Trematode			
No. of fish examined		20	
% of fish infected		30.0	
No. of parasite species		2	
Total no. of parasite		21	

TABLE 4: Various parasite populations infecting *Hampala macrolepidota*

Sebarau / jungle perch – <i>Hampala macrolepidota</i>			
Parasite	No. Infected fish	Percentage	Total no. of parasite
Nematode			
<i>Microtetrameres</i> sp.	4	21.05	6
<i>Capillaria</i> sp.	1	5.26	3
<i>Spinitectus inermis</i>	1	5.26	1
Trematode			
<i>Paradiplozoon barbi</i>	1	5.26	10
<i>Dactylogyrus</i> sp.	1	5.26	2
No. of fish examined	19		
% of fish infected	36.84		
No. of parasite species	6		
Total no. of parasites	24		

TABLE 5: Various parasite populations infecting *Notopterus notopterus*

Belida / grey featherback - <i>Notopterus notopterus</i> (Pallas)			
Parasite	No. Infected fish	Percentage	Total no. of parasite
Nematode			
<i>Spinitectus inermis</i>	2	10.0	10
<i>Echinocephalus</i> sp.	1	5.0	1
No. of fish examined	20		
% of fish infected	15.0		
No. of parasite species	2		
Total no. of parasites	11		

infected with one or more species of parasites and the total number of parasites were 106 (Table 2).

Only 30% of *P. gonionotus* were infected with parasites (Table 3). The total number of parasite found to infect *P. gonionotus* was only 21. However, 20 of them were *S. inermis*. This showed that *S. inermis* was heavily infecting both the *Puntius* species.

Only 36.84% of *H. macrolepidota* were infected with parasites, with a total number of 24 parasites (Table 4). Even though the number of parasite species found to infect *H. macrolepidota* was more than other fish species, the total number of parasite was only 24. Of all the four species of fish studied, *N. notopterus* showed the least number of infected fish (15%) with only two species of parasites recovered (Table 5).

DISCUSSION

It is interesting to note that most of the parasites found in this study showed specificity toward certain fish hosts. However, as pointed out by Paul and John (2002) it is not uncommon to find a fish harbouring several parasite infections rather than only one single parasite species. In the present study, only a single parasite showed a wide range of host infection; *S. inermis* was found to infect all four fish species.

The study showed that no two species of fish in the same genera shared similar parasite species. *Puntius schwanenfeldii* and *P. gonionotus* showed different infections; most of *P. schwanenfeldii* were infected by one or more parasites, while only 30% of *P. gonionotus* were infected by parasites with only one species each. This may be due to a difference in the immune system of the fish, whereby *P. schwanenfeldii* may not only be susceptible to wide range of parasites but also in abundant numbers, possibly due to a weak or even absence of immune response toward the parasitic invaders.

Large numbers of *Cucullanus* sp. was found to infect only *P. schwanenfeldii*. This may be due to the specificity to its definitive host. Once they are able to get into the fish, they will reproduce excessively to form colonies in the fish. The infection may be through the feeding behavior of the fish since they are from the family Camallinidae. Copepods and small fish possess as intermediate and carrier

hosts for Camallinidae (Fernando and Furtado, 1962, 1963).

According to Mokhtar (1979), mayfly nymphs were known to serve as intermediate hosts for *Spinitectus* sp. This may explain its absence in *H. macrolepidota*. The other three fish species examined in this study feed on insects; *H. macrolepidota* feeds on small fish.

Two types of *Paradiplozoon* sp. were found at Tasik Merah: *P. malayense* and *P. barbi*. Lim (1989) found *Paradiplozoon* sp. in 15 species of cyprinid fish, including *H. macrolepidota* and *P. schwanenfeldii* obtained from Tasik Bera, Pahang. Hila Bu and Leong (1999) found two *Paradiplozoon* sp. infecting *H. macrolepidota* from Cenderuh Reservoir, Perak. *Paradiplozoon barbi* is important because it appears as small grey pustules on the gills and could ultimately kill the fish (Duijn, 1973).

It is interesting to note that not a single cestode or acanthocephalan were found in this study. This may be due to the lack of intermediate hosts (eg. snails and crustaceans) suitable for those parasites as similarly reported by Mokhtar (1979) and Leong *et al.* (1987) for other lakes located elsewhere in Malaysia.

The number of parasite species was significantly higher ($p < 0.05$) in *H. macrolepidota* when compared to other fish species. However, the total number of parasites did not exceed that of *P. schwanenfeldii*. Six species of parasites were found to infect *H. macrolepidota* while others were infected with only two or three types of parasites. This may be due

to the feeding habits of the fish. According to Poulin and Rohde (1997) and Dogiel *et al.* (1970), the diet of a fish can be the factor that determines the type of parasite that may infect it.

Hampala macrolepidota is a carnivorous fish which feeds mainly on fry and small fish. The finding of only one specimen of *S. inermis* (which has insect larvae as intermediate hosts) is not surprising because *H. macrolepidota* does not feed on insect larvae. Other parasite species that infect *H. macrolepidota* such as *Capillaria* sp. and *Microtetrameres* sp. may occur when intermediate hosts like copepods, small crustaceans, and small fish are consumed (Furtado and Tan, 1973). Both *P.* and *N. notopterus* were infected by two parasite species, with *Spinitectus inermis* as the main parasite, implying that both these fish feed mainly on mayfly larvae.

Both *P. schwanefeldii* and *P. gonionotus* have large sized abdomen and long intestines, thus providing ample space for large amounts of food to be taken in, and can simultaneously harbour a large number of parasites. In addition, *P. schwanefeldii* is a greedy eater; it will attempt to fill its mouth with as much food as possible during feeding and will eat almost anything available. This could be the reason for it having the higher parasite infection when compared to *P. gonionotus*.

CONCLUSIONS

In this study, eight species of parasites were found to infect freshwater fish at Tasik Merah. *Spinitectus inermis* infected all four species of fish examined in the study. Other parasites specialised in infecting one fish species only. *Capillaria* sp., *P. barbi*, *Microtetrameres* sp., and *Dactylogyrus* sp., were found to infect *H. macrolepidota*. *Cucullanus* sp. and *P. malayense* were limited to *P. schwanefeldii*. *Echinocephalus* sp. was found to infect only *Notopterus notopterus* and *P. gonionotus*. It was also noted that the feeding behaviour of the fish influenced the species of parasite infecting the fish. Carnivorous fish tend to harbour more species of parasites as compared to omnivorous fish.

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