

ON THE PARASITES OF TROPICAL LOACHES FROM THE SOUTH-WEST COAST OF INDIA

SOME information is available on the parasites and associates of cultivable species of fishes¹⁻⁴, but not much on the associates of wild populations living in torrential streams and water bodies in the plants. During a study on the ecology of tropical loaches, the authors had the opportunity to determine the identity, incidence and intensity of metazoan parasites associated with these fascinating group of fishes. *Noemacheilus triangularis* Day and *Lepidocephalus thermalis* (Cuv. & Val.) were examined for both external and internal parasites chiefly metacercariae of *Clinostomum* sp., rhabdochonid nematodes and leeches, but quantitative data could be collected only on nematodes.

Encysted metacercariae of *Clinostomum* sp. were collected from *L. thermalis* from the ventral region of the head as oval or rounded nodules or cysts within the skin of the fish. Each cyst measured 1.5-2 mm on an average and contained a worm with its head end folded. The incidence of these cysts was low, the maximum being eight in one fish collected from a stream near Trivandrum city. The infection does not appear to seriously harm the fish. Incidence of cysts at the gular area is probably on account of the peculiar burying habit of this fish in sand and the

constant vibration of the lower part of the operculum facilitating the setting up of water currents which carried the parasites to the gular area. The present observation thus tends to corroborate those of Miller and McCoy⁵ that parts which are usually in constant motion are prone to heavy infestation.

The rhabdochonid nematode was found to infest *N. triangularis* collected from hill streams of Kallar, the site of infection being the stomach and in one instance the liver. Of the 597 fish examined, only 48 were found to be infected (Table 1), the incidence of infection being only 8.04%. The intensity of infestation was not heavy, the average per fish being 2.6 and the range 1 to 4. Considerable fluctuation in the incidence and intensity of infestation during different months of the year could be noticed (Table 1). Both the sexes were equally prone to infestation which occurred in all length groups examined (20-74 mm) but smaller individuals (20-34 mm) were less infected. The trend indicates an increased infestation with the growth of the fish, reaching a peak in 55-59 mm length group. A sharp fall is however discernible in older specimens and the reason for greater incidence in medium size groups is difficult to comprehend.

Leeches (as yet unidentified) were seen attached to the caudal peduncle and fins of *N. triangularis* and their incidence was erratic.

TABLE I

Incidence and intensity of infection in N. triangularis with rhabdochonids during October 1972-September 1973

Months	No. of fish examined	Total No. of inf. fish	No. of inf. female fish	No. of inf. male fish	% inf. fish	Total No. of nematodes	Mean No. of nematodes inf. fish	Mean No. of nematodes per fish
Oct. 1972	51	1	..	1	1.9	1	1	0.019
Nov.	49	8	3	5	16.3	14	1.75	0.170
Dec.	16	1	..	1	6.2	2	2.0	0.062
Jan. 1973	34	5	2	3	14.7	18	3.6	0.147
Feb.	36	7	5	2	19.4	27	3.8	0.194
March	50	9	7	2	18.0	33	3.6	0.180
April	90	5	3	2	5.5	5	1.0	0.055
May	72	2	..	2	2.7	8	4.0	0.027
June	64	5	2	3	7.8	8	1.6	0.078
July	65	2	1	1	3.1	3	1.5	0.031
Aug.	38	1	1	..	2.8	1	1.0	0.026
Sept.	32	2	1	1	6.4	5	2.5	0.062
Total	.. 597	48	25	23	..	125	27.35	1.051
Mean	8.04	..	2.6	0.0804

The digenetic trematodes infest loaches in less turbulent waters whereas nematodes occur in loaches inhabiting hill streams and torrential waters, indicating thus some sort of host specificity related to the permanent habitat of the fish and its dietary requirements. In numerical terms, mortality of loaches caused by parasitism in natural habitats is perhaps only a minute fraction.

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A PRELIMINARY STUDY ON BAIT SHYNESS IN *BANDICOTA BENGALENSIS*, TOWARDS ZINC PHOSPHIDE

UNTIL recently, poison baiting with 2-5% zinc phosphide for the control of rodents was recommended for 2-3 consecutive days^{1,2}. But many Indian rodent pests rapidly develop bait shyness on such a poisoning regime³⁻⁵. Although *B. bengalensis* is one of the most common agricultural and commercial pests in India⁶, there is little information on responses of this species towards poisons or on the effects of sub-lethal poisoning on subsequent behaviour. Lesser bandicoot rats were therefore tested for their response to repeated sub-lethal feedings of zinc phosphide and for the possible development of bait shyness.

Ten adult *B. bengalensis*, five of each sex, were kept in individual cages, 60 × 30 × 30 cm, and were provided daily with fresh weighed amounts of polished rice (*Oryza sativa*) and maize (*Zea mays*) in two circular metal dishes fixed at the front of the cages. Drinking water was always available. Total daily food intake was recorded to 0.1 g for eight days. The positions of the foods were alternated daily to prevent the development of position preferences. On each of the next five days, 0.05% zinc phosphide (a sub-lethal dose) and 1% groundnut oil were added to the rice, which was the preferred food. Thereafter rats were fed for six day periods on a pellet diet (Hindustan-Hindlever animal feed); on each seventh day rats were tested for bait shyness by offering them a choice of rice + 1% groundnut oil or maize. Bait shyness was measured by comparing the average

preference for rice on the last three days before poisoning (calculated as weight of rice eaten divided by the weight of maize eaten + 0.5, since some rats ate no maize) with preference for rice on the weekly tests after poisoning.

Poisoning the rice with sub-lethal amounts of zinc phosphide resulted in a rapid reversal of preference; preference for rice decreased from a median value of 14.6 on days 5-8 to 0.5 on day 13, the last poisoning day ($p > 0.01$). The decreased preference for rice was immediate, median preference falling to only 4.5 after the first day of poisoning. Such rapid avoidance of poisoned food has previously been noted¹. On their first test for bait shyness, 9/10 rats still had lower preferences for rice than before poisoning (Table I: $p > 0.02$), but by the third test, the median preference for rice was little different from that of pre-poisoning (Table I). But importantly, some rats still showed continued reduced preference for rice on the third test, an indication of longlasting bait shyness similar to that observed in other Indian rodents³⁻⁵.

TABLE I

Pre- and Post-poisoning preferences for rice of
B. bengalensis

Rats	Mean pre-poison preference	Post-poison 1	Post-poison 2	Post-poison 3
1	1.5	1.1	5.4	18.0
2	26.6	52.8	44.0	28.1
3	11.3	0.8	1.0	5.4
4	1.1	0.8	1.5	1.3
5	13.1	3.6	4.8	2.8
6	17.4	12.2	4.6	18.1
7	9.0	4.6	10.5	9.4
8	16.0	0.8	1.2	1.4
9	21.8	2.1	2.0	11.4
10	18.0	4.4	19.6	21.3
Median	14.6	2.9	4.7	10.4

(Values are g consumed/100 g body weight).

There was much individual variation in response to repeated sub-lethal feedings on zinc phosphide. Such variation in behaviour is probably the main source of problems in rodent control using acute rodenticides^{3,4} both because some animals never ingest lethal amounts of poison and because a proportion of the