

organ systems of the host. It is also possible that nutrients may be withdrawn from uninfected tissues (like muscle) which has nutrient reserves next to liver. While tapping muscle for nutrients, the total content is uniformly decreased in all the three types of muscular tissues. The sarcoplasmic fraction is tapped to a greater extent from thigh and cardiac muscles. In flight muscles, the small decrease in the sarcoplasmic fraction may not interrupt the regular supply of energy for high frequency movements during the flight. In spite of infection, the contractile fraction is less decreased in the cardiac muscle of the host which is presumably an adaptive measure in host-parasite relationship.

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ASSOCIATION OF TEMPERATURE WITH ESTABLISHMENT AND SURVIVAL OF PSEUDOPHYLLIDEAN CESTODES IN HILL-STREAM FISH

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PARASITOLOGICAL data on 3083 hill-stream fish of 6 genera and 12 species were collected during May 1979 through April 1981 in the two rain-fed rivers, Khoh (325–450 mASL) and Nayar (600–650 mASL) in the Garhwal Himalayan ecosystem. The water temperature at 7th day interval, and monthwise pH of river water were recorded during the period of study. Egg production and maturation of cestodes in hill-stream fish appeared to be a water-temperature associated phenomenon. *Polyonchobothrium armatii*¹ was the most prominent cestode (1979–80, 76.7%; 1980–81, 71.2%), while *Senga nayari*¹ showed the highest index of infection (1979–80, 6.7%; 1980–81, 44.8%). The parasite's optimum for egg production and maturation of cestodes was 26–27°C for *Bothriocephalus teleostei*¹ in *Labeo dero* (Ham.) and *Schizothorax plagiostomus* (Heck.), 16–20°C in *S. richardsonii* (Gray), 15–20°C and 23–27°C in *Barilius bola* (Ham.), the fish spawning twice a year during February–March and October–November; 20–26°C for *P. armatii* in *Mastacembelus armatus*; 24–26°C for *S. nayari* in *Mastacembelus armatus* (Lac.) and *M. pancalus* (Ham.); 15–18°C for *Ptychobothrium nayarensis*¹ in *B. bola* and *S. richardsonii*; and 17°C for *Mackiewiczia satpuliensis*¹ and *Guptaia garhwalensis*¹ in *S. richardsonii*. Range of pH of river water (in parentheses) during the infection period for different cestodes viz. *P. nayarensis* (7.8–8.6), *P. armatii* (5.4–9.4), *S. nayari* (5.4–9.4), *B. teleostei* (7.4–9.4), *M. satpuliensis* (8.5–8.6), and *G. garhwalensis* (8.5–8.6).

The suitable water temperature was between 16 and 27°C for egg production by the cestodes in fish of tropical streams in India while the optimum water temperature, 4.4–15.5°C for egg production by *Caryophyllaeus laticeps* in *Leuciscus leuciscus* L. and 4–18°C for the same cestode in *L. idus* were described from varying temperate regions^{2,3}. Crane and Mizelle⁴ reported population peaks of *Urocleidus ferox* (Mueller) in *Lepomis macrochirus* (Rafinesque) in California pond at 8°C; Rawson and Rogers⁵ recorded temperature optimum as 9°C and 28°C for *U. furcatus*, *U. principalis* and *Actinocleidus fusiformis*, and 9°C for *Clavunculus bursatus* on largemouth bass

Table 1 Significance of water temperature difference

Source of variation	Sum of squares	df	Mean square	F	F 2.5%	F 5%
Between	251.001	1	251.001	7.037	7.57	5.32
Within	285.368	8	35.671			
Total	536.369					Significant at 5%

in Walter F. George reservoir. Thus the difference, based on statistical analysis, in optimum water temperature for parasitic infection between fish of tropical and temperate regions was significant at 5% level (table 1). On the other hand a critical temperature around 27°C was observed in the present investigation beyond which only temporary survival of parasites was possible. This observation is reasonably close to the study of Paperna⁶ who found the critical temperature for *Dactylogyrus* on carp to be between 24°C and 28°C and is well supported by the statement of Dendy⁷ that the high level of parasite abundance in fish may be a result of the tendency of fish to associate themselves with the temperatures (27°C) close to parasite's optimum.

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PRESENCE OF SECRETORY CYST IN THE PITUITARY OF THE INDIAN WALL LIZARD *HEMIDACTYLUS FLAVIVIRIDIS* (RUPPELL)

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IN the human pituitary ciliated and non-ciliated cysts have been reported by several investigators¹⁻⁵. Human

pituitary cysts are considered as a normal feature by Romeis⁶, who termed all vesicles larger than pseudo-follicles as cysts. Ciliated cysts are also reported in the pituitary of Indian palm Squirrel, *Funambulus pennanti*⁷. However, such reports are less in the reptilian species. In this communication the structure of the Rathke's cyst occurring in the pars distalis of the Indian wall lizard *Hemidactylus flaviviridis* is described.

Over 100 specimens were sacrificed by decapitation and their brain along with the pituitary was trimmed and fixed in Bouin's fluid containing aqueous mercuric chloride (5 g/100 ml) for a week to study the pituitary cytology. Paraffin sections were cut at 5 µm and stained in periodic acid Schiff's (PAS), lead hematoxylin (Pb.H.) and orange G. Out of 100 specimens examined only one had a large follicular cyst. A few sections were destained and restained in PAS and Heidenhain's iron-alum-hematoxylin.

The pituitary of *H. flaviviridis* comprises of neurohypophysis and adenohypophysis. The neurohypophysis includes the median eminence, the infundibular stalk and the pars nervosa (PN). The adenohypophysis can be differentiated into pars distalis (PD) and pars intermedia (PI) (figure 1). The PD can clearly be divided into rostral and caudal lobe.

A round follicular cyst having a large cavity was noticed in the caudal lobe of pituitary pars distalis. It has a cyst wall made up of a single, at some places double or even triple layers of flattened, cuboidal or columnar cells superimposed with a connective tissue layer (figures 2 and 4). The nuclei of these cells are nearly rounded and fairly large. It was difficult to visualise cilia in these cells. The cavity of the cyst was packed up with PAS positive material (figures 1 and 2) having a colloid-like or granular or foaming appearance (figure 3). The PAS positive globules and droplets were very often seen among the epithelial cell lining of the cyst wall (figures 1 and 4). These globules are seen connected with the accumulated PAS positive material in the cavity of the cyst (figure 3).

The presence of cysts in the pituitaries was reported in mammals including man and carefully described by