SHORT COMMUNICATION

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IN-VITRO DEVELOPMENT OF *DAPHNIA LUMHOLTZI* SARS (CLADOCERA : DAPHNIIDAE)

The present communication deal with the embryonic development of the parthenogenetic eggs of the cladoceran, *Daphnia lumholtzi* Sars. This species is widely distributed in tropical and subtropical regions of Asia, Australia and Africa. From India, it has been so far reported from West Bengal, Bihar, Rajasthan, Tamil Nadu, Orissa and Andhra Pradesh.

The material for this study was collected from Ward's Lake, Shillong (Lat. 25°5 N ; Long. 91°9 E) with a plankton net of bolting silk (No. 25 ; mesh size 64 μm). Several parthenogenetic females were sorted out from the field samples and were kept in glass troughs in the labaoratory. Subsequently, two sets of 20 primiparous females each were reared individually, in the filtered lake water, at each of the mentioned temperatures. The eggs in one set were allowed to develop normally within the brood pouch of the mother and observed at frequent time intervals to record conspicous morphological changes ; those developing in the second set were dissected out simultaneously and fixed in 4% formalin to study the different embryonic stages.

In the mature females, the parthenogenetic eggs were released about 30-35 minutes after ecdysis of the mother. As reported in *Daphnia magna* (Green, 1965) and *Daphnia carinata* (Murugan and Venkataraman, 1977 ; Venkataraman and Job, 1980), the embryonic development in *D. lumholtzi* could also be conveniently divided into eight stages. The details of the various stages were almost similar with that of *D. carinata* (Murugan and Venkataraman, *loc. cit.*)

The embryonic development, in *D. lumholtzi*, took 72 hours (range 64-78 hours) at 16°C and 60 hours (range 56-64 hours) at 20°C. With further increase in temperature to 28°C, the embryonic duration was reduced to 40 hours (range 38-42 hours). Thus the rise in the temperature exhibited an inverse co-relation with the duration of embryonic development. In this context, the durations of embryogenesis of various other species of *Daphnia* (as evident from the scattered literature) are compared in TABLE I.

TABLE 1. Embryonic durations in different species of *Daphnia*.

Species	Temp. (°C)	Embryonic duration (hrs.)	Remarks
D. carinata	15	131-133	Tropical
	28-33	28-30	
	35	23-25	
D. magna	15	117	Temperate
	22	70	
D. hyalina	5	394	Temperate
	10	195	
	15	102	
	20	70	
D. galeata mendota	5	432	Temperate
	20	62	
D. schodleri	18	57	Temperate
D. lumholtzi	16	72	Present study
	20	60	
	28	40	

The presence of two embryonic membranes in the parthenogenetic eggs has been demonstrated in some members of Daphniidae (Obreshkove and Fraser, 1940 ; Murugan, 1977 ; Murugan and Sivaramakrishnan, 1973, 77 ; Murugan and Venkataraman, 1977). In *D. lumholtzi* also, the two membranes i.e., the outer thick egg membrane and the inner thin

naupliar membrane were noticed in the present study. Further, the egg membrane was cast off at the 4th stage and the naupliar membrane at the 6th stage.

Till the release of the embyos to the exterior, the caudal spine usually remained reflexed on the ventral side. It is believed that especially when the brood pouch was full, the embryos themselves exerted some pressure which, combined with the movement of the abdominal processes, enabled them to be released. However, when the embryos were few in numbers, probably due to low internal pressure, they straightened their caudal spines even while within the brood pouch which is likely to facilitate their release.

It was of interest to note the process of development of the characteristic, pointed anterior spine (helmet) in this daphnid. The head of the embryos remained more or less rounded till the 7th stage, elongated slightly in the early part of the 8th stage and the helmet was fully formed only when the embryos were ready for their release from the brood pouch of the mother.

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