

Mating and nesting behaviour, and early development in the tree frog *Polypedates maculatus*

S. Girish and S. K. Saidapur

Department of Zoology, Karnatak University, Dharwad 580 003, India

While the male of the tree frog, *Polypedates maculatus*, in axillary amplexus with female (i.e. with its vent closer to that of the female) constructs terrestrial foam nest by whipping up the released seminal fluid with its hind limbs, the female releases eggs (210–448) that are unpigmented. The duration of this process is about 2.5 h. The eggs complete their embryonic development in the foam nest within nine days, and the larvae complete their metamorphosis in 60 ± 10 days.

THE tree frog, *Polypedates maculatus*, is a common rhacophorid breeding between June to August in South India and is known to deposit eggs in the foam nest^{1,2}. Here we report our observations on its mating behaviour, foam nest construction, fecundity, duration of embryonic development, size and stage at hatching and larval duration.

The process of foam nest construction by an amplexed pair of *P. maculatus* was witnessed (July 1997) in the early morning hours at 0615 h in a cement pond (30' × 30') having a depth of 2'. During the study period the rain water in the pond reached a level of about 1' and the bottom was found to be completely covered with debris material, leaves and plenty of algae. The pond was inhabited by other sympatric anurans, such as *Rana cyanophlyctis* (adults and tadpoles) and the toad *Bufo melanostictus*. Insect fauna was also abundant in the pond. The amplexed pair of *P. maculatus* was about 10 inches above the water level (Figure 1). The female frog was larger than the male, greyish, and was found hanging at the inner aspect of the pond with its forelimbs placed on the upper surface of the pond. The male frog was dull yellowish on its dorsal side. During amplexus, the male frog grasped the female by her axilla. The amplexus was therefore axillary. During oviposition the male moved a little lower down so as to bring its vent closer to that of the female. Coinciding with emergence of the eggs the male began secreting large amounts of seminal fluid. This was followed by its beating the hindlegs upwards and downwards in a cyclic manner that whipped up the seminal fluid resulting in construction of a foam nest. The duration of this activity lasted for 2.5 h, from 0615–0845 h. The terrestrial foam nest thus constructed was above the water surface and remained attached to the wall of the pond for several hours (Figure 2). Later, it fell off into the water and continued to float till it once again came in contact

with the edges of the pond. It then readhered to the wall of the pond that was in close association with the water surface. The foam nests provide protection to the eggs against desiccation and predation by aquatic insects^{3,4}.

Between July–August 1997, several already formed foam nests of *P. maculatus* were sighted in temporary ponds, puddles and man-made ponds. The foam nests were 4–5' away from water body in case of natural ponds and puddles, while in cement cisterns they were found adhering to the wall some distance away from the water surface. Eight foam nests found in temporary ponds were brought to the laboratory. Until hatching of the eggs, the foam nests were kept in separate aquaria with water and substratum collected from the same pond. Eggs were pigmentless. The embryonic development was complete within 9 days. There was no mortality of the embryos. Hatching was nonsynchronous; it took 2 to 3 days for all the embryos to hatch and the number of hatchlings per nest ranged between 210 and 448 (mean = 339.7; SE = 24.3; $n = 8$). The hatchlings measured about 10 mm in total length, and were at stage 23 (ref. 5). The tadpoles continued to associate with



Figure 1. Amplexed pair of *P. maculatus* during nest construction.



Figure 2. A foam nest attached to the wall of the pond above water surface.

the foam nest till stage 25, i.e. about 4–6 days after hatching. The tadpoles, maintained at a density of 50/25 l water/aquarium and fed on boiled spinach, completed metamorphosis in 60 ± 10 days (day of oviposition being day 0).

-
1. Mishra, P. K. and Dash, M. C., *Trop. Ecol.*, 1984, 25, 203–207.
 2. Kanamadi, R. D. and Jirankali, C. S., *Zool. Anz.*, 1991, 266, 149–162.

3. Crump, M. L., *Misc. Publ. Nat. Hist. Univ. Kansas.*, 1974, 61, 1–68.
4. Duellman, W. E. and Trueb, L., *Biology of Amphibians*, Hopkins Univ. Press, Baltimore, 1986.
5. Gosner, K. L., *Herpetologica*, 1960, 16, 183–190.

ACKNOWLEDGEMENTS. The study was supported by a grant (No. SP/SO/C-022/95) from the Department of Science and Technology, New Delhi. S.G. is grateful to the DST for the Junior Research Fellowship.

Received 12 August 1998; revised accepted 7 November 1998