

## SPRING-BREEDING AND REPRODUCTIVE MODE IN *Leptotalax khasiorum* (ANURA, MEGOPHRYIDAE) IN NORTH-EASTERN INDIA

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We examined the breeding habitat, oviposition site and timing of breeding in *Leptotalax khasiorum* at its type locality at Mawphlang, Meghalaya State, north-eastern India. Surveys were conducted along a stream within a fragmented patch of forest for adults, tadpoles, eggs and nesting sites, with data collected monthly between January 2009 and December 2011. The species starts emerging from wintering microhabitats with the onset of the premonsoonal showers in February. Breeding activity (specifically, deposited eggs) was observed for a few weeks after emergence and lasted a few weeks between early March and April. Adults were found under rocks along the stream banks. Eggs are deposited on the underside of rocks that are flatly embedded on the gravel and over leafy bottom of the dry stream bed. The eggs of *Leptotalax khasiorum* are cream-colored, lacking an animal pole, and covered with a transparent jelly, showing adaptations for terrestrial development in sheltered microhabitats via avoidance of moisture loss and damage of eggs from solar radiation. In producing eggs out of water, showing free-swimming tadpoles, the reproductive mode can be classified as Mode 18, a first for a member of the genus *Leptotalax*. It is arguably the first report of terrestrial reproduction and parental care for a member of the family Megophryidae. Placement of eggs outside of water may coincide with low water levels of early spring, advantages of choice of timing being reduced competition for egg-laying sites and food for the larval and postlarval stages.

**Keywords:** *Leptotalax khasiorum*; North-eastern India; Mawphlang; oviposition; reproductive mode.

Sympatric anuran amphibian species may differ in habitat use for breeding, calling site, annual reproductive period, daily period of calling activity and acoustic features of advertisement call, which are interpreted as important isolating mechanisms (Wells, 1977; Haddad et al., 1990). Anuran amphibians are vulnerable to desiccation, at least in one phase of three- egg, tadpole, or postmetamorphic stages and are therefore dependent on water and/or atmospheric humidity for their activities especially for reproduction. The selection of oviposition sites by frogs can directly influence larval development (Resetarits and Wilbur, 1989), largely influences the distribution of tadpoles (Alford, 1999; Evans et al., 1996), and can be of critical importance for the reproductive success of organisms lacking parental care (Murphy, 2003). Selection of breeding sites in response to abiotic factors, such as pond depth, water temperature, water transparency, pH, density and surrounding vegetation

cover, permanency and vegetation cover and biotic factors, such as the presence of predators and competitors, has been frequently documented (Crump, 1991; Evans et al., 1996; Blaustein, 1999; Skelly, 2001; Hazell et al., 2003; Goldberg et al., 2006). Many workers have identified rainfall as the primary extrinsic factor affecting the time of the breeding activity for most tropical and subtropical anuran species (Haddad and Sazima, 1992; Duellman and Trueb, 1994). Many hylid species have been documented to depend on rain to reproduce (Wiest, 1982; Aichinger, 1987). Most Neotropical species show association between the wet season and prolonged reproduction during the year (Pombal, 1997) while many can reproduce more than once during the breeding season (Wells, 1977; Telford and Dyson, 1990). Species exhibiting breeding seasonality have been described to display two basic patterns: (1) tropical species capable of breeding throughout the year; where rainfall is the major extrinsic factor controlling reproduction; and (2) temperate species with seasonal breeding activity that is dependent on a combination of temperature and rainfall (Duellman and Trueb, 1986; Bertoluci and Rodrigues, 2002).

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