*Zootaxa* 3395: 59–64 (2012)
www.mapress.com/zootaxa/


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ISSN 1175-5326 (print edition)
**ZOOTAXA**
ISSN 1175-5334 (online edition)

# Larval morphology of two species of the genus *Theloderma* (Tschudi, 1838) from Vietnam (Anura: Rhacophoridae: Rhacophorinae)

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The genus *Theloderma* (Rhacophoridae: Rhacophorinae) was first described by Tschudi (1838) based on the type species *T. leporosa* from Sumatra. This genus is diagnosed by having, *e.g.*, numerous calcified warts on the dorsum and Y-shaped terminal phalanges (Liem 1970; Manthey & Grossmann 1997). According to Frost (2011), Rowley *et al*. (2011) and Orlov *et al*. (2012) the genus *Theloderma* currently contains 23 species.

It has a wide distribution range from north-eastern India and Sri Lanka through Myanmar, Thailand, Laos, and Cambodia to southern China and Indochina to Malaya and Sumatra (Frost 2011). In Vietnam, 16 species of *Theloderma* are currently recorded, namely *T. asperum* (Boulenger, 1886), *T. bambusicolum* Orlov, Poyarkov, Vassillieva, Ananjeva, Nguyen, Nguyen & Geissler, 2012, *T. bicolor* (Bourret, 1937), *T. chuyangsinense* Orlov, Poyarkov, Vassillieva, Ananjeva, Nguyen, Nguyen & Geissler, 2012, *T. corticale* (Boulenger, 1903), *T. gordoni* Taylor, 1962, *T. kwangsiense* Liu & Hu, 1962, *T. laeve* (Smith, 1924), *T. lateriticum* Bain, Nguyen & Doan, 2009, *T. licin* McLeod & Ahmad, 2007, *T. nebulosum* Rowley, Le, Hoang, Dau & Cao, 2011, *T. palliatum* Rowley, Le, Hoang, Dau & Cao, 2011, *T. rhododiscus* (Liu & Hu, 1962), *T. ryabovi* Orlov, Dutta, Ghate & Kent, 2006, *T. stellatum* Taylor, 1962, and *T. truongsonense* (Orlov & Ho, 2005), (Nguyen *et al.* 2009; Frost 2011; Rowley *et al*. 2011; Orlov *et al*. 2012). However, first records of *T. kwangsiense* and *T. licin* for Vietnam were recently published by Orlov *et al*. (2012) without collection and locality information, and thus still need reconfirmation. Nevertheless, of these 16 species *T. bicolor* is listed as endangered, and *T. stellatum* as well as *T. rhododiscus* are listed as near threatened. *Theloderma asperum*, *T. gordoni* and *T. licin* are listed as least concern species. The remaining aforementioned *Theloderma* species are known as data deficient species (IUCN 2011). In general, ecological and morphological data for species of the genus *Theloderma* (both for adults and tadpoles) are incomplete.

The Amphibian Breeding Station of the Institute of Ecology and Biological Resources (IEBR) in Hanoi (Vietnam) is focused in particular in the captive keeping and breeding of anurans of the family Rhacophoridae (Ziegler & Nguyen 2008; Nguyen *et al*. 2009; Ziegler *et al.* 2011). In the following, we provide detailed descriptions of external larval morphology of *Theloderma bicolor* and *T. corticale* which were successfully bred at the station recently, and for which larval descriptions are still lacking to date.

Terminology for morphometric data and abbreviations followed McDiarmid & Altig (1999) and Grosjean (2005). Tadpoles were staged according to Gosner (1960). The labial tooth row formula (LTRF) was determined according to McDiarmid & Altig (1999) and for general larval types see Orton (1953).

Tadpoles were photographed alive in a cuvette, subsequently euthanized with ethyl acetate and preserved in 70 % ethanol. Prior to preservation, a piece of the lower tail fin and tail musculature was taken from each tadpole and preserved in a 98 % ethanol solution for further genetic analysis.

The measurements were taken with a dial calliper to the nearest 0.1 mm. Abbreviations are as follow: BH = maximum body height; BL = body length; BW = maximum body width; ED = maximum diameter of eye (horizontal); IND = internarial distance (measured between centers of narial apertures); IP = interpupilar distance (measured between centers of pupils); LF = maximum height of lower tail fin; LTRF = Labial Tooth Row Formula with A (number of rows on anterior labium) and P (number of rows on posterior labium); MTH = maximum tail height; NK = number of keratodonts (per 0.5 mm of the A3 keratodont row); NP = number of papillae around mouth; NPD = naro-pupilar distance (measured between the center of the nostril and the center of the pupilla); ODW = oral disc width; RND =

*Accepted by M. Vences: 24 May 2012; published: 23 Jul. 2012*