



Description of the tadpole of *Hylarana darlingi* Boulenger 1902 (Anura: Ranidae) from the Mulanje Area, Malawi

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The generic placement of the African *Hylarana* is still under debate (Frost 2011). We follow the latest taxonomy (Frost 2011) and refer to the genus as *Hylarana*. Of the eleven African species, only *H. darlingi* and *H. galamensis* have been recorded from Malawi (Mercurio 2011). We report the second confirmed record of *H. darlingi* in Malawi. Tadpoles of African *Hylarana* species are poorly known: descriptions are available for *H. lemairei* (Schmidt & Inger 1959; Channing 2001), *H. albolabris* (Channing & Howell 2006) and *H. galamensis* (Rödel 2000; Channing & Howell 2006; Du Preez & Carruthers 2009).

Four tadpoles and one adult male (deposited in SAIAB, no. 185858) were collected from the confluence of the Ruo and Muloza Rivers in southern Malawi (16.09944S; 35.66528E, 597 m a.s.l) by D. Tweddle and T. Mäkinen on 24 May 2011. One tadpole was identified using DNA barcoding: the COI sequences of the tadpole and the adult were identical (joined GenBank no. JQ723518). The adult agrees with previous descriptions (Boulenger 1902; Channing 2001; Du Preez & Carruthers 2009). Developmental stages were determined according to Gosner as reproduced in McDiarmid & Altig (1999). Morphological terminology follows McDiarmid & Altig (1999). Tadpole description is based on a barcoded specimen at Gosner stage 37 (Figure 1). Measurements also taken from remaining tadpoles at Gosner stage 36.

In lateral view. Body ovoid (BW nearly equal to BH), snout oblique. Mouth directed ventrally. Eyes moderately sized (ED 14.0% of BL), bulging, positioned near lateral and directed laterally. Pineal ocellus present at level of anterior border of eye. Nares rounded, very small, rimmed, positioned latero-dorsally, directed slightly more laterally than antero-laterally with opening direction ventral, just closer to snout than to pupils. Spiracle sinistral, tubular, moderately large (2.2 mm in length), positioned laterally and situated closer to end of body than to snout (SS 61.9% of BL), oriented slightly more posteriorly than postero-dorsally, mostly free from body wall except the first third, its opening oval, directed backwards, at the height of middle of lower part of caudal muscle. Tail musculature moderate (TMH 51.8% of BH and 63.5% of MTH), roughly parallel in the first third then gradually tapering, almost reaching tail tip. Tail fins of moderate size, reaching deepest point one third down tail; upper fin not extending onto body, slightly convex anteriorly, concave towards end of tail, lower fin slightly convex at beginning then clearly convex; point of maximum height of tail located just before halfway (MTH 97% of BH), tail tip finely rounded. Vent tube moderately large (3.2 mm in length), bulging, lateral and directed posteriorly, entirely attached to ventral fin; opening large, lateral, bevelled, posteriorly directed.

In dorsal view. Body oval, nearly as high as wide, widest just behind spiracle opening, snout rounded. Nasals narrowly spaced. Inter-orbital distance twice inter-narial distance.

In ventral view. Eyes not visible. Tail muscle moderate (TMW 36.4% of BW). Vent positioned marginal and medial, long, oval opening positioned parallel with ventral fin. Granular glands visible anterior in front of vent. Intestinal coils not visible through skin.

Oral disc. Positioned and directed antero-ventrally, moderately small (ODW 16% of BL and 29% of BW). LTRF: 3(2-3)/3(1). Jaw sheets moderate pigmented, capsulated and rounded. Lateral process of medium length. One to two rows of marginal papillae posterior, two papillae extending past other marginal papillae posterior, single row of marginal papillae anterior, dorsal gap free of papillae (up to 80% free), posterior corners have numerous dark edged sub-marginal papillae.

Colouration pattern. In life pale orange with dark spots, iris golden orange. In preservation beige with darker brown spots, no spots on vent flap, unpigmented gap anterior of mouth, ventral spots smaller and more than on rest of body, larger spots on tail muscle than on tail fins, spots on body darker than on tail muscle and fins.

Measurements (in mm): BH: 12.5 ± 0.7; BL: 23.7 ± 0.8; BW: 12.9 ± 0.4; ED: 3.4 ± 0.2; IND: 3.1 ± 0.2; IOD: 6.2 ± 0.6; MTH: 12.4 ± 0.4; ND: 0.6 ± 0.2; NOD: 4.0 ± 0.4; ODW: 3.7 ± 0.1; TAL: 39.7 ± 2.7; TL: 63.4 ± 3.0; TMH: 6.9 ± 0.6; TMW: 4.8 ± 0.6; SND: 3.3 ± 0.8; SS: 3.4 ± 0.2.