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The tadpole of *Ramanella palmata* (Anura: Microhylidae), a frog endemic to Sri Lanka

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Of the 107 species of amphibians known from Sri Lanka (Megaskumbura *et al.* 2009), the family Microhylidae is represented by 10 species (Pethiyagoda *et al.* 2006). The genus *Ramanella* Rao and Ramanna, 1925 is represented by four species in Sri Lanka (Pethiyagoda *et al.* 2006). Except for *R. variegata* (Stoliczka, 1872), which is also found in neighboring India, the other three species are endemic to Sri Lanka. Larval stages and the breeding ethology of *R. obscura* (Guenther, 1864) and *R. nagaui* Manamendraarachchi and Pethiyagoda, 2001 are well known (Morgan-Davis 1953; Meegaskumbura 2001; Manamendraarachchi & Pethiyagoda 2001). Kirtisinghe (1958) briefly outlined the general morphology of the *R. palmata* tadpoles. Here we re-describe tadpoles of *R. palmata* highlighting some important characters that were initially not described by Kirtisinghe (1958), provide standard morphometric measurements of the tadpoles and also a photograph.

Tadpoles described in this account were collected from two small rock pools, adjacent to a stream, flowing close to a tropical montane forest in Seetha Eliya (elevation-1995m asl, Nuwara Eliya District) Sri Lanka on 19th May, 2008. The tadpoles were reared until metamorphosis and the metamorphs were identified using Manamendraarachchi and Pethiyagoda (2001). *R. palmata* adults closely resemble *R. obscura* and the species differs from the latter from the following characters: fourth toe webbing to distal subarticular tubercle on the outside in *R. palmata* vs fourth toe webbing to penultimate subarticular tubercle, antepenultimate subarticular tubercle, or between them on the outside in *R. obscura*. Furthermore, given that the tadpoles were collected at an elevation of 1995m asl verifies that the tadpoles in fact are *R. palmata* since *R. obscura* is never found in elevations above 1220m asl. They were fed with hard-boiled chicken egg yolk and dissolved powdered milk. The tadpoles were staged following Gosner (1960). Seven specimens from different larval stages were preserved in 10% Formalin solution as voucher specimens and were subsequently deposited in the Zoological section in the National Museum of Sri Lanka, Colombo (Gosner stage GS-25[n=3] : NH2007.11.01, GS-33,37,39: NH2007.11.02 and GS 43: NH.2007.11.03). The measurements and morphological characters were taken following Altig and McDiarmid (1999). Measurements were taken using a digital Vernier caliper to the nearest 0.01mm and rounded to the nearest 0.1 mm.

Definitions of the measurements: BL—body length, IOD—interorbital distance, MTH—maximum tail height, TAL—tail length, TL—total length, TMH—tail muscle height, TMW—tail muscle width.

Description of tadpole stages 33-39: Head-body region is wide, dorsally flattened and ventrally rounded. The maximum body-width is just posterior to the eyes. The nares are dorsal, without a raised rim and are closer to the tip of the snout than to the eyes. Eyes are lateral and visible from above but not from below. Interorbital distance is greater than inter-narial distance and IOD is 0.39 times the body length. The vent tube is positioned ventro-medially at the last third of the body length and oriented in posterior direction and entirely attached to the body. Spiracular opening is medial and opens at end of the body (Fig. 1[C]). The intestine is visible in living specimens as well as in the preserved specimens. The gut is arranged in two spirals, one longer thinner one on the left side and a shorter thicker one on the right. The mouth is dorso-terminal and lacks marginal papillae, labial teeth or hard beaks (Fig. 1[D]). The body is oval in shape in dorsal view (Fig. 1[B]). There are few lateral line pores present on the pre and post orbital area and also on sides of the body above the belly region. According to the classification of Altig & Johnston (1989) the tadpole has the body type of a lentic-suspension feeder.

The tail is equally thick as the body and the margins are gradually and convexly tapering in the distal third to a blunt tip. The origin of the dorsal fin is behind the end of the body at a distance roughly equal to one half of the inter-orbital distance. The dorsal fin is as deep as the caudal muscle only in the distal 4th of the tail. The origin of the dorsal fin is at the end of the body and is slightly deeper than the ventral fin. The myotomes of the tail musculature are moderately visible and V-shaped. The tail musculature gradually tapers from its proximal end to its distal end, reaching the tip of the tail. (Fig. 1[A])

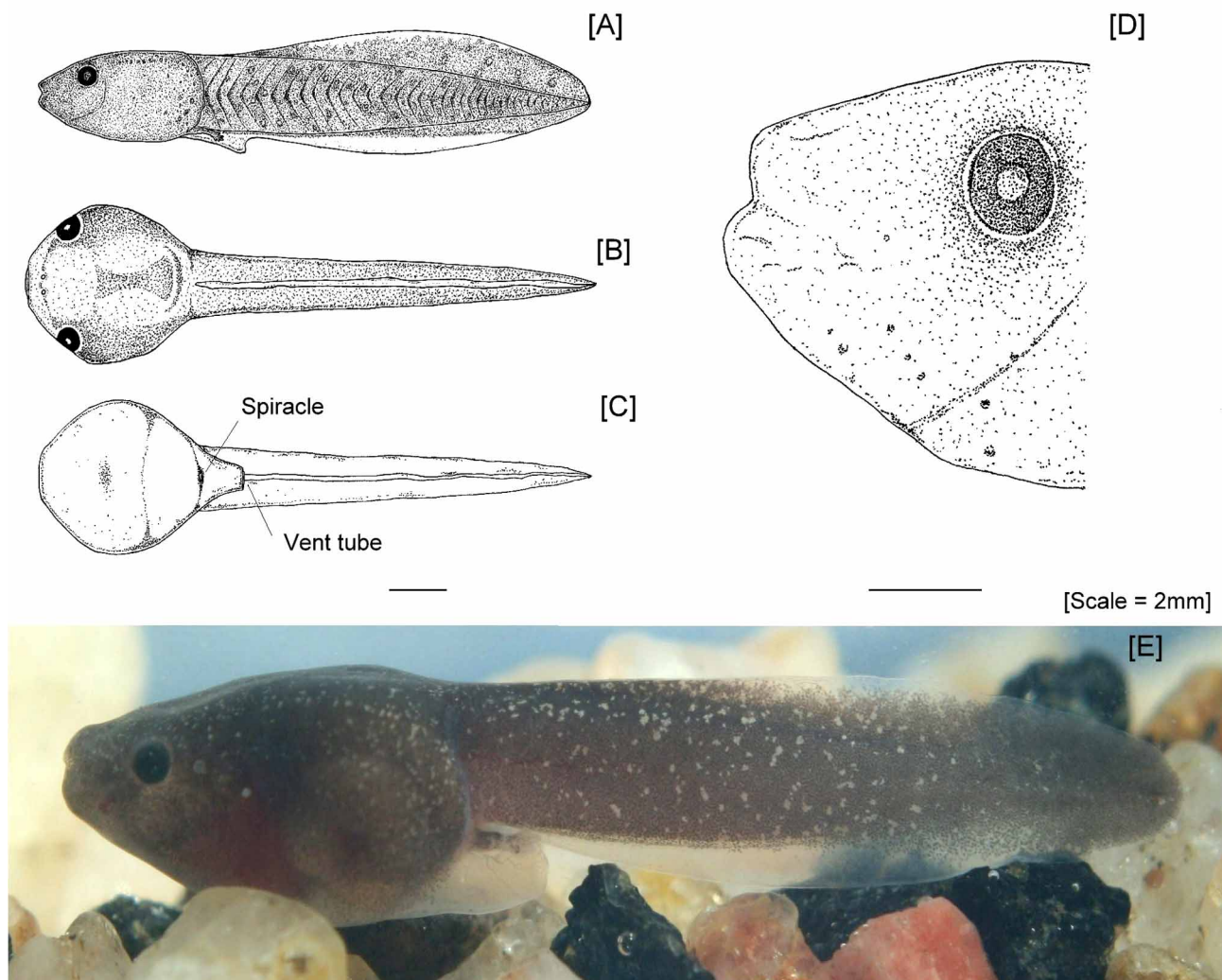


FIGURE 1. *Ramanella palmatatadpole* from Seetha-Eliya, Sri Lanka . [A] Lateral aspect [B] Dorsal aspect [C] Ventral aspect [D] Mouth of NH2007.11.02 (Gosner stage-33) [E] live tadpole.

The colour of the preserved specimens are mainly grayish brown and in live specimens it is purplish gray. There are scattered gold or off white coloured irregular spots on the body and on the tail muscle but other than that it's mainly uni-coloured. Tail fins are lighter than the tail musculature and they are translucent. Majority of the dorsal fin and distal half of the ventral fin has a powdered appearance. The belly is translucent (Fig. 1[E]).

Ranges of total lengths (mm) 25.17–27.89 (Gosner stage 33–39), 23.18–25.55 (Gosner stage 25). Average measurements (mm) (\pm SD) of tadpoles in GS 33–39 are (n=3): TL—26.3 \pm 1.41; BL—9.2 \pm 0.12; TMW—2.3 \pm 0.02, IOD—3.6 \pm 0.12; TMH—3.4 \pm 0.10; MTH—4.5 \pm 0.31; TAL—17.1 \pm 1.36; Average measurements (\pm SD) as a ratio to TL of tadpoles in GS 33–39 (n=3): BL/TL—0.35 \pm 0.02; TMW/TL—0.09 \pm 0.00; IOD/TL—0.14 \pm 0.01; TMH/TL—0.13 \pm 0.01; MTH/TL—0.17 \pm 0.01; TAL/TL—0.65 \pm 0.02.

According to the available descriptions there is hardly any difference between the tadpole of *R. palmata* and *R. nagaoui* except the differences in the structure of the mouth. The mouth of *R. nagaoui* is funnel shaped (Manamendraarachchi & Pethiyagoda 2001) vs not funnel shaped in *R. palmata*. Although there are good accounts of the breeding ecology and the natural history of *R. obscura* (Morgan-Davis 1953; Meegaskumbura 2001) the description of the tadpole morphology is incomplete. Thus, the morphology of the *R. obscura* tadpole could not be compared with the morphology of the *R. palmata* tadpole. But the colouration and the general body shape are more or less identical in the tadpoles of these two species. The tadpole of *R. palmata* can be distinguished from the tadpole of *R. variegata* which is brown or gray in colouration with minute black spots and occasional blue spot on each side of the body (Daniels 2005). The tadpoles of *R. palmata* used in this description were collected from two rock pools close to a stream in Seetha Eliya, Sri Lanka. There is only one report on the breeding habitat of *R. palmata* (de Sliva 1999). Studies conducted by de Sliva (1999), reported that this species breeds in phytothelms and tadpoles were found in these phytothelms in Hortain Plains National Park (Nuwara Eliya District, Sri Lanka). This is the second report of the breeding microhabitat of tadpoles of *R.*

palmata. Interestingly our observations suggest that *R. palmata* is not an exclusive tree hole breeder. At the time of collection, the tadpoles belonged to the Gosner stage 27. It took between 65–75 days for the metamorphosis. The larval period up to metamorphosis could be less than this in the natural environment. Unlike *R. obscura* and *R. variegata*, the diet, ecology, and microhabitat preference of the *R. palmata* tadpole is poorly known. Therefore it is important to study these aspects further of this rare, endangered and endemic species of frog to ensure its future survival.

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Literature cited

- Altig, R. & Johnston, G.F. (1989) Guilds of Anuran larvae: Relationships among developmental modes morphologies and habitats. *Herpetological Monographs*, 3, 81–109.
- Altig, R. & McDiarmid, R.W. (1999) *Tadpoles: The Biology of Anuran larvae*. The University of Chicago Press, Chicago, 444 pp.
- Daniels, R.J.R. (2005) *India – a Lifescape. Amphibians of Peninsular India*. Indian Academy of Sciences, Universities Press, Hyderabad, 322 pp.
- de Silva, A. (1999) *The habitat preferences and the status of amphibians and reptiles at Horton Plains National Park. Report to the Zoological Survey of Sri Lanka*. National Science Foundation, Colombo, 67 pp.
- Gosner, K.L. (1960) A simplified table for staging anuran embryos and larvae, with notes on identification. *Herpetologica*, 16, 183–190.
- Kirhtisinghe, P. (1958) Some hitherto undescribed anuran tadpoles. *Ceylon Journal of Science*, 1, 171–176.
- Manamendra-Arachchi, K. & Pethiyagoda, R. (2001) *Ramanella nagaoi*, a new tree hole frog (Microhylidae) from Southern Sri Lanka. *Journal of South Asian Natural History*, 5, 121–133.
- Meegaskumbura, M. (2001) Ecology of *Ramanella obscura* (Anura: Microhylidae) in a home-garden habitat and a mid-country forest (Gannoruwa). *Lyricephalus*, 4, 36–39.
- Meegaskumbura, M., Manamendra-Arachchi, K. & Pethiyagoda, R. (2009) Two new species of shrub frogs (Rhacophoridae: *Philautus*) from the lowlands of Sri Lanka. *Zootaxa*, 2122, 51–68.
- Morgan-Davies, A.M. (1958) Notes on the eggs, tadpoles, metamorphosis and ecology of a Ceylonese narrow-mouthed frog *Ramanella obscura* (Gunther). *Journal of Bombay Natural History Society*. 55, 307–312.
- Pethiyagoda, R., Manamendra-Arachchi, K., Bahir, M.M. & Meegaskumbura, M. (2006) Sri Lankan Amphibians: Diversity, Uniqueness and Conservation. In: Bambaradeniya, C.N.B. (eds), *The Fauna of Sri Lanka*. World Conservation Union, Sri Lanka, pp. 65–69.