



Advertisement call and male morphology of the Malagasy treefrog *Boophis arcanus* from the Ranomafana region, south-eastern Madagascar

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With over 70 nominal species, treefrogs of the genus *Boophis* (family Mantellidae) represent one of the most species-rich lineages in the amphibian fauna of Madagascar (Cadle 2003). Most *Boophis* are characterized by relatively loud and conspicuous calls, but specimens can be difficult to collect because males are often perched high on trees. Therefore, many species are so far only known from a few specimens, usually males. An exception is the recently described species *Boophis arcanus*, which is only known from two female specimens and for which no further biological data are available (Glaw *et al.* 2010). The two females were found at night sitting on trees and bushes in the rainforest of Mahakajy, a private reserve close to Ranomafana National Park (RNP) in the southern central east of Madagascar. Based on recordings and specimens collected during recent survey work in RNP and nearby forest fragments, we here describe male morphology and the advertisement call of this species.

Specimens were collected during an opportunistic survey at night. Locality information was taken with a Garmin etrex VISTA HCx GPS receiver. Specimens were deposited at the Museum für Naturkunde, Berlin (ZMB) and identified based on DNA sequences of a fragment of the 16S rRNA gene. Vocalization was recorded in the field using a Roland EDIROL R-09 recorder with internal microphone (sampling frequency: 44.1 kHz, recording mode: wav 24 bit). The call was analysed with the software Cool edit Pro 2.0 (values presented as mean \pm standard deviation).

The Ranomafana region comprises mid-altitude (500–1300 m a.s.l.) rainforest with a mean annual rainfall of 1700–4300 mm (Wright & Andriamihaja 2003). Most of the remaining forest habitat is located inside RNP (43,500 ha). The area around the park consists of a fragmented landscape with forest patches that are embedded in a matrix of cultivated fields (rice, bananas) and secondary vegetation; narrow gallery forests often grow along small streams. Five males of *Boophis arcanus* were observed on June 1st 2010, between 19:30–20:30 h along a small stream running through rice fields and degraded land bordered by some riparian forest in Beremby (21°14.426' S, 047°31.558' E, app. 620 m a.s.l.), near RNP. All five males were found on five different neighbouring trees sitting on leaves in 1.5 m height. We collected two voucher specimens of which one individual (ZMB 77315) was observed calling.

The single analysed call of *B. arcanus* (ZMB 77315) contains two different note types (Fig. 1a, and b). The call starts with a series of three pulsed notes of type 1, emitted in irregular intervals (interval between first and second note: 1437 ms, interval between second and third note: 374 ms). After an interval of 1262 ms, a series of 85 pulsed notes of note type 2 follows, separated by only very short intervals of 35–72 ms (41.4 ± 11.1 ms, $n = 10$) at the beginning and only 24–32 ms (26.7 ± 2.3 ms, $n = 10$) at the end of the series. Another single note of note type 1 follows after an interval of 81 ms ending the call. Note type 1 shows the following characters: note duration, 61–86 ms (70 ± 11.9 ms, $n = 4$); number of pulses, 11–23 (15.3 ± 5.3 , $n = 4$); dominant frequency range, ca 4000–6000 Hz; maximum call energy, 4900 Hz. Characters of note type 2: note duration, 37–42 ms ($39.4s \pm 1.8$ ms, $n = 10$) at the beginning and 43–55 ms (49.3 ± 3.1 ms, $n = 10$) at the end; number of pulses, 11–14 (12.2 ± 1.0 , $n = 10$) at the beginning and 18–25 (21.5 ± 1.8) at the end; note repetition rate, 13.7 notes/s; dominant frequency range, 4600–7000 Hz; and four energy maxima, 4800 Hz, 5300 Hz, 5800 Hz, 6500 Hz.

Morphological measurements of two preserved males were taken by MV using a caliper (all in mm; specimen ZMB 77315 (field and tissue number JG_400), with ZMB 77316 (field and tissue number JG_401) in parentheses; GenBank accession numbers JQ413974 – JQ413975): snout-vent length 24.3 (24.8); head width 9.1 (9.2); head length 8.7 (9.1); horizontal tympanum diameter 2.0 (1.8); horizontal eye diameter 3.6 (3.9); eye-nostril distance 1.9 (2.0); nostril-snout tip