

A new locality for the endangered microhylid frog *Scaphiophryne boribory* from northern Madagascar and a rapid survey of other amphibians of the Bemanevika region

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Abstract. The endemic and endangered microhylid frog *Scaphiophryne boribory* is known only from unprotected localities, except the Marotandrano Special Reserve in eastern Madagascar. In December 2007, this cryptic frog was discovered in the Bemanevika forest of northern Madagascar during biodiversity surveys. Discovery of this frog in the Bemanevika forest extends its northern distribution and altitudinal range to above 1,000 m. Currently, the Bemanevika site is in the process to be included within Madagascar's Protected Areas System (SAPM-Système des Aires Protégées de Madagascar) and if it becomes a SAPM site it will double the number of protected sites for this species as well as several other endemic and threatened taxa including four other vulnerable frogs: *Boophis blommersae*, *Gephyromantis striatus*, *Mantella pulchra* and *Spinomantis massi*.

Keywords. Bemanevika site, threatened taxa, distribution, altitudinal range, SAPM site

Scaphiophryne is a genus of medium-sized terrestrial and fossorial frogs, which together with the genus *Paradoxyla* constitutes the endemic microhylid subfamily Scaphiophryninae (Glaw and Vences, 1994; Glor, Glaw and Vences, 2005). Seven described species of *Scaphiophryne* are known in Madagascar, two new forms affiliated to *S. calcarata* have been identified, and another specimen collected from Marotandrano Special Reserve is tentatively attributed to this genus too (Glaw, Vences, 2007; pp: 108). *Scaphiophryne boribory* was first recorded within the humid rain forest of the eastern central portion of Madagascar in 1998, and was recently described by Vences et al. (2003). Until specimens of this species were collected by A. Raselimanana within

Marotandrano Special Reserve in 2004 (see photo 3b in Glaw and Vences, 2007; pp: 115) no other localities were known for this species. Nevertheless, this newly described species like many other amphibian taxa (Vallan, 2000, 2002), are seriously affected by increasing pressure from loss and degradation of natural habitats such as forests and marshes. The rarity of this microhylid frog is also exacerbated by the fact that its main distribution is located outside of any of Madagascar's legally protected network areas (Andreone et al., 2005), and this species is being collected for the international pet trade (Andreone et al., 2005; Glaw and Vences, 2007; IUCN, 2008). Classified by IUCN (2008) as an endangered species (EN), its distribution should be considered as one of the key elements for Madagascar's current reserve network extension (Andreone et al., 2005).

This study was conducted from December 2007 to January 2008 at Bemanevika (14°22'S; 48°35'E; see Fig. 1), one of the new proposed sites for Madagascar's protected area network under the SAPM (Système des Aires Protégées de Madagascar) framework. The proposed site overlaps two Communes, Antanagnivo-Haut and Beandrazona, District of Bealanana, Sofia Region, northwestern Madagascar. The humid forest fragments of Bemanevika range from 700 to 1,800 m a.s.l., and includes five important lakes (Andriakanala, Maramantsalegy, Matsaborimena, Matsaborimaitso

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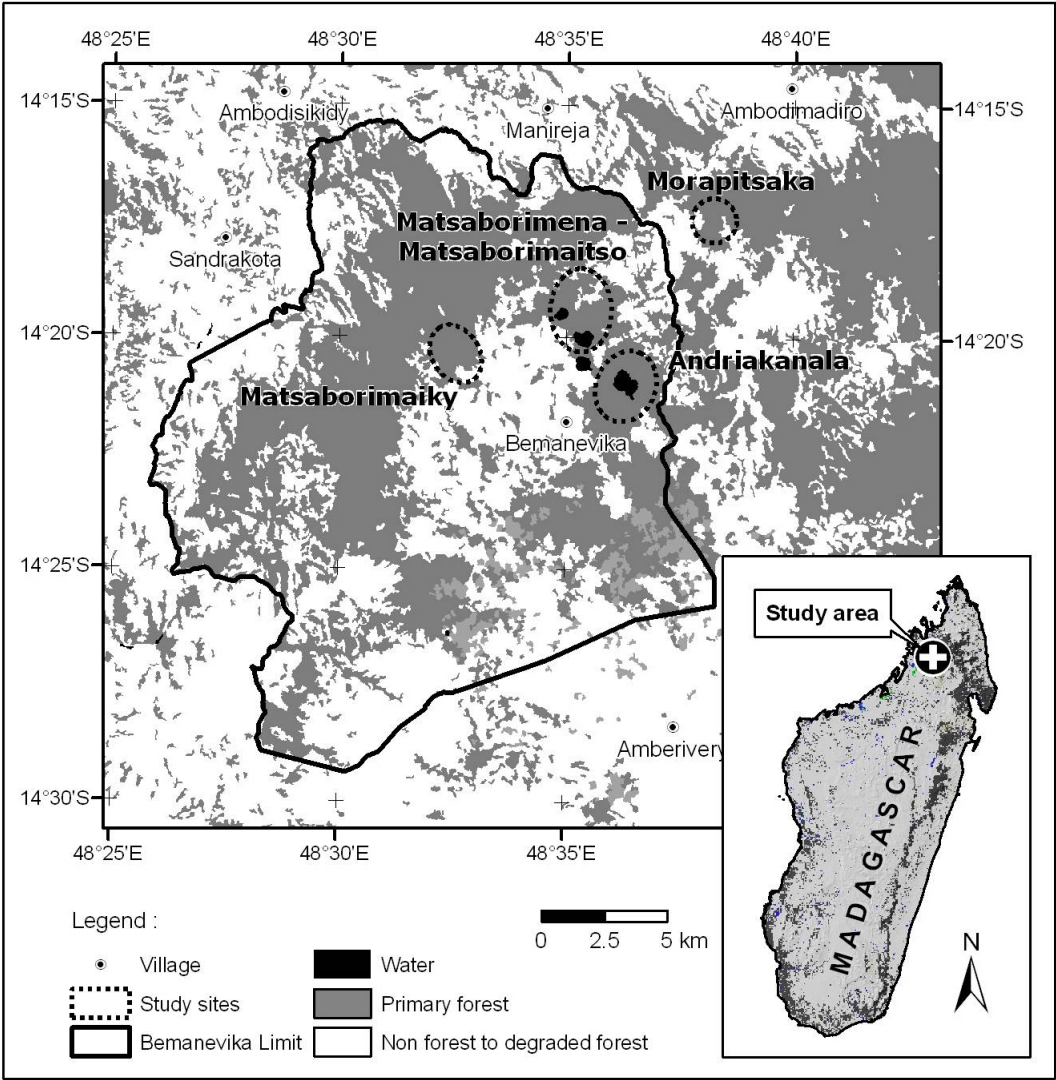


Figure 1. Map of sites surveyed for amphibians during December 2007 and January 2008 in northern Madagascar.

and Matsaborimisivoay), marshes and savannas covering an area of 37,041 hectares. The dry season is from May to October and the rainy season from November to April. This study occurred at a time when the herpetofauna is most active throughout the year (Raxworthy, 1988). Four sites were surveyed: Matsaborimena-Matsaborimaitso (14°19'S; 48°35'E and altitude 1600-1750 m) Andriakanala (14°21'S; 48°36'E and altitude 1590-1730 m), Morapitsaka (14°17'S; 48°38'E and altitude 800-1780 m) and Matsaborimaiky (14°20'S; 48°32'E and altitude 1400-1750 m) (Fig. 1) and each site was intensively investigated for six days. Three complementary sampling methods as described in

Raxworthy and Nussbaum (1994) for a rapid biological inventory of herpetofauna were used: including opportunistic searches, refuge examination, and pit fall traps with drift fences. The first technique consists of diurnal and nocturnal observations along pathways or trails across the forest to search for amphibian and reptiles. Nocturnal searches were carried out using headlamps to locate animals by reflection of the light shine from their eyes. The second method is a careful exploration of microhabitats suspected to be used as a refuge for amphibians and reptiles. These microhabitats include tree hole filled-water cavities, behind flaking bark on trees, crevasses on rock walls, under leaf litter,

Table 1. Amphibian species recorded during the rapid biological inventory in Bemanevika forest during December 2007 and January 2008 (IUCN status: EN=endangered, VU=vulnerable, NT=near threatened, LC=least concern, DD=data deficient; Endemic=E; Site 1-Matsaborimena-Matsaborimaitso, Site 2-Andriakanala, Site 3-Morapitsaka, Site 4-Matsaborimaiky, +=present).

Species Recorded	IUCN 2008	Endemic	Site 1	Site 2	Site 3	Site 4
Family: Hyperoliidae						
<i>Heterixalus andrakata</i>	LC	E	+	+	+	+
<i>Heterixalus carbonei</i>	NT	E			+	
Family: Mantellidae						
Laliostominae						
<i>Aglyptodactylus madagascariensis</i>		E	+	+	+	+
Mantellinae						
<i>Boophis axelmeyeri</i>		E				+
<i>Boophis blommersae</i>	VU	E			+	
<i>Boophis</i> cf. <i>brachychir</i>		E	+			
<i>Boophis madagascariensis</i>	LC	E	+			
<i>Boophis</i> cf. <i>madagascariensis</i>		E	+	+		
<i>Boophis marojejensis</i>	LC	E		+	+	
<i>Boophis</i> cf. <i>marojejensis</i>		E	+			
<i>Boophis</i> cf. <i>rufioculis</i>		E	+			
<i>Boophis tephraeomystax</i>	LC	E	+	+		
<i>Boophis vittatus</i>	LC	E		+		
<i>Boophis</i> cf. <i>vittatus</i>		E		+		
<i>Boophis</i> sp. 1		E	+			
<i>Boophis</i> sp. 2		E		+		
<i>Boophis</i> sp. 3		E			+	
<i>Blommersia blommersae</i>	LC	E				+
<i>Blommersia</i> sp.		E	+			
<i>Gephyromantis ambohitra</i>		E			+	+
<i>Gephyromantis</i> cf. <i>ambohitra</i>		E		+		
<i>Gephyromantis cornutus</i>	DD	E				
<i>Gephyromantis luteus</i>	LC	E	+			
<i>Gephyromantis</i> cf. <i>luteus</i>		E		+		
<i>Gephyromantis moseri</i>	LC	E	+			
<i>Gephyromantis pseudoasper</i>	LC	E		+		
<i>Gephyromantis redimitus</i>	LC		+		+	
<i>Gephyromantis striatus</i>	VU	E				+
<i>Gephyromantis zavona</i>		E	+			
<i>Guibemantis liber</i>	LC	E	+			
<i>Mantella pulchra</i>	VU	E		+		
<i>Mantidactylus betsileanus</i>	LC	E	+			
<i>Mantidactylus</i> cf. <i>biporus</i>		E	+			
<i>Mantidactylus charlotteae</i>	LC	E	+			
<i>Mantidactylus femoralis</i>		E	+	+	+	+
<i>Mantidactylus guttulatus</i>	LC	E	+	+	+	+
<i>Mantidactylus mocquardi</i>	LC	E	+	+	+	+
<i>Mantidactylus opiparis</i>	LC	E				+
<i>Mantidactylus</i> sp.		E	+			
<i>Spinomantis massi</i>	VU					+
<i>Spinomantis peraccae</i>	LC	E	+		+	+

Table 1. *continued*

Family: Microhylidae					
Cophylinae					
<i>Plethodontohyla</i> sp. 1		E			+
<i>Plethodontohyla</i> sp. 2		E			+
<i>Plethodontohyla</i> sp. 3		E			+
<i>Rhombophryne alluaudi</i>	LC		+		
<i>Rhombophryne</i> cf. <i>laevipes</i>		E	+		+
Scaphiophryninae					
<i>Scaphiophryne boribory</i>	EN	E		+	
Family: Ptychadenidae					
<i>Ptychadena mascareniensis</i>			+	+	+
TOTAL			25	17	13
					17

rocks and decaying logs, in *Pandanus* leaf axils and screw palms, and in termite mounds. The third method consisted of pit fall traps consisting of 11 buried plastic buckets (about 15 liters), with handles removed, set up in 10 m intervals along a drift fenced line of 100 m length. The buckets had many small holes in the bottom to allow water to drain (see also Raxworthy, 1988; D’Cruze et al., 2007, 2008) and were placed at 100 m elevation intervals. Three pit fall lines were set at each site: one was placed in a valley, one in a slope and one on a ridge. At each site, traps were checked twice a day at 06:00h and 16:00h during six consecutive trap days. Two voucher specimens of *Scaphiophryne boribory*, were taken for identification confirmation and deposited in the Université d’Antananarivo, Département de Biologie Animale, Madagascar (UADBA): UADBA 42610 and UADBA 42611 (Appendix 1), (research permit N° 0295/07/MINENV.EF/SG/DGEF/DPSAP/SSE). Collected specimens were euthanized by immersion in chlorobutanol solution, fixed in 4% formalin, and stored in 70% ethanol solution before housing them in the Department of Animal Biology (DBA) Laboratory at the University of Antananarivo.

A total of 48 species of amphibians were recorded in Bemanevika area. Excluding the indigenous Mascarene grass frog *Ptychadena mascareniensis*, all other taxa recorded were endemic species in Madagascar. Five of these species are among those threatened species found on the IUCN red list: *Scaphiophryne boribory* “Endangered”, found in the Andriakanala locality, and the following four species classified as ‘Vulnerable’ were encountered in different sites of Bemanevika: *Boophis blommersae*, *Gephyromantis striatus*, *Mantella pulchra* and *Spinomantis massi* (Table 1). Two specimens of *Scaphiophryne boribory* were found in the forested, sandy and flooded habitat between the

Analamahavelona River and Andriakanala Lake. The first specimen was trapped during the night by the pit fall line located in the mid-elevation interval and the second one was encountered on the forest floor during a nocturnal search.

Recently, *Scaphiophryne boribory* was considered as one of the amphibians at risk of extinction and its distribution to be restricted; found only in few unprotected areas (Andreone et al., 2005; Glaw and Vences, 2007). It has also been collected for the pet trade and the impact from the international market is unknown (Glaw and Vences, 2007). Most of the area in Bemanevika is above 1,000 m a.s.l. and its occurrence in this area may extend its altitudinal range as it is known only from elevations ≤ 1000 m (Andreone et al., 2005). Like many threatened amphibians the ongoing habitat destruction and the exploitation for the international pet trade are the main threats to *S. boribory* (Rabemananjara et al., 2005; Andreone et al., 2005, 2006). The inclusion of the Bemanevika site into the new network of Madagascar’s protected areas under SAPM will, undoubtedly, have a positive conservation impact for this endangered species, as well as to many other endemic threatened and/or traded taxa, including the vulnerable species *Boophis blommersae*, *Gephyromantis striatus*, *Mantella pulchra* and *Spinomantis massi*.

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Appendix 1. Voucher specimens from Bemanevika. *Heterixalus andrakata* (UADBA 42601 and 42602), *Aglyptodactylus madagascariensis* (UADBA 42613, 42614, 42615, 42616 and 42617), *Boophis axelmeyeri* (UADBA 42646), *Boophis* cf. *brachychir* (UADBA 42653 and 42654), *Boophis* cf. *madagascariensis* (UADBA 42643 and 42644), *Boophis marojezensis* (UADBA 42655, 42656, 42657 and 42658), *Boophis vittatus* (UADBA 42659 and 42660), *Boophis* cf. *vittatus* (UADBA 42662), *Blommersia blommersae* (UADBA 42619 and 42620), *Blommersia* sp. (UADBA 42621 and 42622), *Gephyromantis ambohitra* (UADBA 42633, 42634, 42635, 42636, 42637, 42638, 42639 and 42640), *Gephyromantis* cf. *ambohitra* (UADBA 42632), *Mantella pulchra* (UADBA 42618), *Mantidactylus femoralis* (UADBA 42626), *Mantidactylus guttulatus* (UADBA 42628 and 42629), *Mantidactylus mocquardi* (UADBA 42627), *Mantidactylus opiparis* (UADBA 42630), *Spinomantis peraccae* (UADBA 42642), *Plethodontohyla* sp. (UADBA 42605, 42606, 42607, 42608, 42609 and 42645), *Rhombophryne alluaudi* (UADBA 42603 and 42604), *Scaphiophryne boribory* (UADBA 42610 and 42611), and *Ptychadena mascareniensis* (UADBA 42612).

