Boll. Mus. reg. Sci. nat. Torino	Vol. 14 - N. 1	pp. 179-190	28-2-2007

Franco ANDREONE [1] - Jasmin E. RANDRIANIRINA [2]

The amphibians and reptiles of Kalambatritra, a little-known rainforest of south-eastern Madagascar

ABSTRACT

We report data on the presence of amphibians and reptiles from Kalambatritra Special Reserve, SE Madagascar, based upon a survey work. In total, we collected 22 amphibians and 22 reptiles, to which we add a further three amphibian species, and five reptile species that were reported in the literature. Most of our findings are new records for the area, and highlight interesting biogeographic data. Of particular interest we quote the finding of *Boophis periegetes, Mantidactylus aerumnalis, M. delormei, Gephyromantis. spinifer, Uroplatus malahelo,* and *U. malama*. In terms of biogeographic patterns, the Kalambatritra Forest appears to be constituted by different faunal composition, sharing important elements with the Andringitra Massif and others with Andohahela and Anosy Chain.

Key Words: Madagascar, Amphibians, Reptiles, Kalambatritra, Distribution.

INTRODUCTION

Despite the many herpetological survey activities conducted in the last two decades, several areas of Madagascar remain under-studied, and the distribution of most of its highly endemic amphibians and reptiles is still poorly known. This means that important data crucial for conservation analyses have not been obtained: it is our opinion that we need to

[1] Museo Regionale di Scienze Naturali, Torino.
[2] Parc Botanique et Zoologique de Tsimbazaza, Antananarivo.

increase the collecting rate of new data, which would at the same time provide an update of the distribution of the species. To assist with this, it was very helpful to obtain new herpetological information from the Réserve Spéciale (RS) de Kalambatritra, a protected area located in SE Madagascar, at the border of the eastern escarpment (fig. 1). More recently, we had the opportunity to reanalyse a herpetological collection that resulted from fieldwork, which thus provided new data.

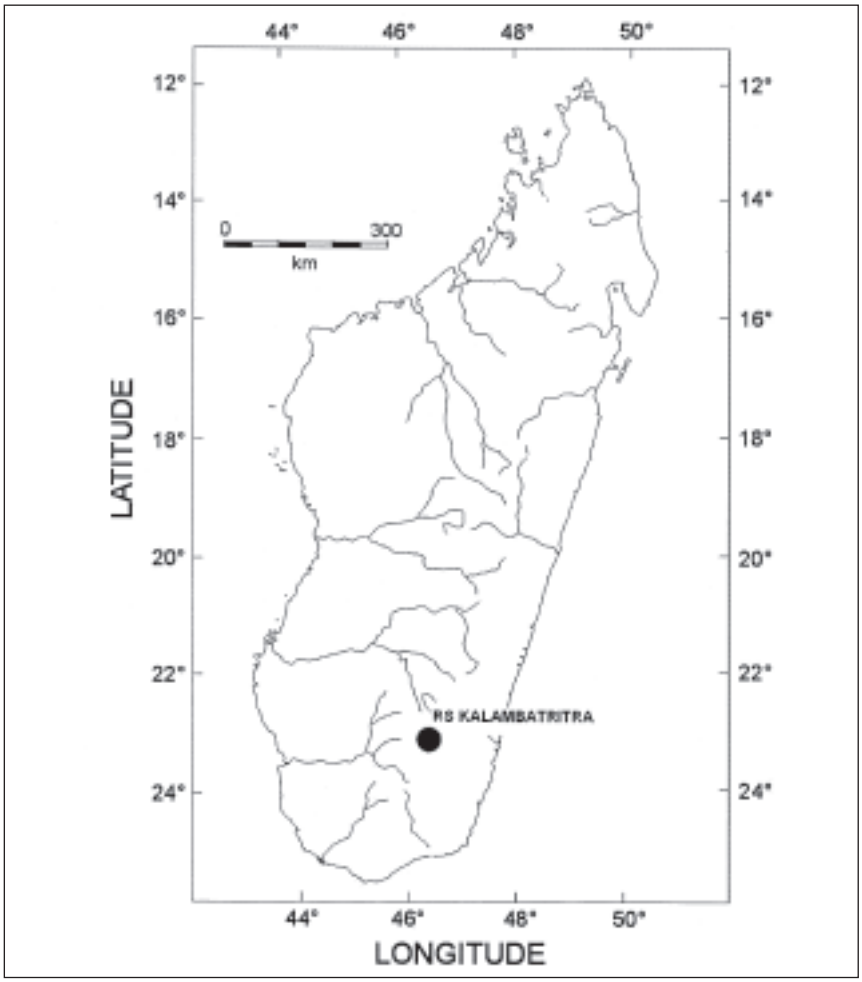

Fig. 1 - Map of Madagascar, with the approximate location of the Réserve Spéciale de Kalambatritra.

The RS de Kalambatritra belongs to the central ecoregion (Projet ZICOMA 1999; ANGAP, 2000), which is quite similar to the central domain. The vegetation type is more similar to the montane humid forest of East Madagascar (White, 1986), and this vegetation type is also peculiar in lying significantly further west than any comparable rainforest in south-eastern Madagascar (Irwin *et al.*, 2001).

As a general rule, the biological components of Kalambatritra are largely unknown, and very little information is available on its amphibians and reptiles. Up until the onset of this study only a few and very scattered data were known, provided by Nicoll & Langrand (1989), Nussbaum *et al.* (1999), and Ramanamanjato *et al.* (2002). A few more data on the amphibians are also available on the Global Amphibian Assessment site (IUCN *et al.*, 2006).

We here provide a list of the observed taxa, and considerations of their occurrence, together with an analysis of their biogeographical affinities.

MATERIAL AND METHODS

The amphibians and reptiles of Kalambatritra were searched for at two sites: Kalambatritra 1 = locally known as "Befarara", Fianarantsoa Faritany, Ihosy Fivondronana, 23°24.85'S, 46°27.49'E, 1450-1700 m a.s.l. (period: 26 April - 9 May 1999); Kalambatritra 2 = locally known as "Befarafara", same administrative data, 23°23'19.6"S, 46°29'24.0"E, 1500-1750 m a.s.l. (period: 11-20 May 1999). These sites are quite similar in terms of vegetation type and degree of disturbance, with a mosaic of mid-altitude rainforest, interspersed with secondary savannahs due to the presence of cattle and increasing deforestation resulting from deliberate burning.

Two researchers were active for about 6 hours a day (both during night and day times). Care was taken to choose survey trails that avoided the researchers coming into contact several times with the same recorded specimens. At each site an alternating pattern of survey work was followed: the first night's research was conducted along rivers and streams within a distance < 50 m from the river, and the second night's research was conducted at a greater distance from the river.

Representative individuals of each species were collected to document their life colouration. As a further aid to taxonomic identification, advertisement calls of frogs were recorded where possible, and compared to an existing vocalisation database.

Voucher specimens were anaesthetised by immersion in chlorobutanol, fixed in 10% buffered formalin or 90° ethanol, and later transferred in 65° (amphibians), or 75° (reptiles) ethanol. The collected material is currently at the Museo Regionale di Scienze Naturali (MRSN), Torino, Italy. Part of the specimens will be subsequently allocated to the Parc

Botanique et Zoologique de Tsimbazaza. We did not take a tissue samples from the individuals that were recorded, but not collected, and for this reason we were not able to perform a barcoding confirmation of the taxonomic determination of some critical species (Vences *et al.*, 2005). For this reason, in some cases the taxonomic determination of some taxa remains uncertain (see later).

The taxonomy used in this study follows Glaw & Vences (1994) and subsequent updates. In particular, we adopted the changes to mantellid systematics and nomenclature given by Glaw & Vences (2006).

RESULTS AND DISCUSSION

Species diversity

In total, we detected 22 species of amphibians and 22 species of reptiles (Tab. 1). This gives a total of 44 species, to which we should add further three amphibian species, and five reptile species for the area, that were reported in the literature and on the web, but not personally found by us.

The only amphibian species quoted in literature, but not found by us, were: *Boophis pauliani*, *B. viridis*, and *Spinomantis guibei* (IUCN *et al.*, 1999)

The only reptile species whose presence had already been reported in literature for Kalambatritra are *Oplurus cyclurus, O. quadrimaculatus, Furcifer lateralis, Mabuya gravenhorsti, Zonosaurus laticaudatus, Leioheterodon geayi* (Nicoll & Langrand, 1989), *Uroplatus malama* (Nussbaum *et al.*, 1999) and *Uroplatus malahelo* (Ramanamanjato *et al.*, 2002). Of these species, we were only able to confirm the presence of *Uplorus quadrimaculatus*, *Uroplatus malahelo* and *U. malama*.

Four amphibian species detected during our surveys were not collected, and they do not appear in the list of the voucher specimens given in the appendix. These are *Boophis luteus, B. tephraeomystax, Mantidactylus* sp. and *Blommersia* sp. While the determination is quite certain for *Boophis luteus*, even in absence of the voucher specimens (being based upon its vocalisations), the same degree of certainty cannot be ascertained for *B. tephraeomystax*, since *B. doulioti* from western Madagascar was separated from it quite recently (Vences & Glaw, 2002). *Mantidactylus* sp. belongs to the subgenus *Chonomantis*, and has been preliminarily assigned to *M. opiparis,* although at least two similar species (*M. opiparis* and *M. melanopleura*) are potentially present at Kalambatritra. The fourth species is a *Blommersia* belonging to the subgenus *Pandanusicola,* possibly *B. bicalcaratus.*

Accumulation curves

The species accumulation curves against time for amphibians and reptiles (fig. 2) point to the relevant differences between amphibian and reptile discovery rates already outlined by Andreone & Randrianirina (2000). The curves reveal that sampling did not reached a plateau prior to the end of sampling, implying that not all the species in the area have been recorded. These numbers, therefore, are clearly not exhaustive, due to the quite short amount of time that we were able to survey for. However, they do give useful indications of the relative herpetological diversity in the area: almost all the amphibian and reptile species found during our survey are the first records of them from Kalambatritra, and others represent remarkable geographic extensions of known records.

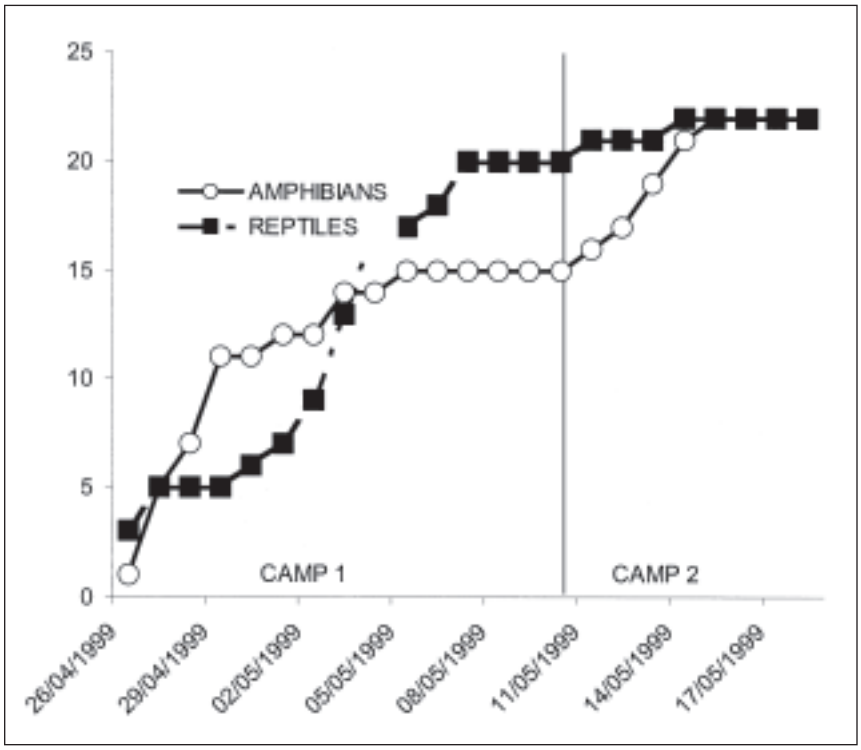

Fig. 2 - Accumulation curves for the amphibian and reptile species discovered at Kalambatritra. The accumulation curves refer to both the sites considered together. A vertical line separates temporally the two campsites.

Tab. 1 - Presence of the amphibians and reptiles found at Kalambatritra, in three other rainforest blocks in the central southern part of the eastern coast of Madagascar.

	SPECIES	1999 SURVEY	BIBLIOGRAPHY	ANDOHAHELA	ANDRINGITRA	RANOMAFANA IVOHIBE
1	*Aglyptodactylus madagascariensis*	+		+	+	+
2	*Boophis albipunctatus*	+		+	-	-
3	*Boophis boehmei*	+		-	-	+
4	*Boophis goudoti*	+	4	-	-	+
5	*Boophis guibei*	+		-	+	+
6	*Boophis luteus*	+	4	-	+	-
7	*Boophis occidentalis*	+		+	+	+
8	*Boophis pauliani*	-	4	-	-	-
9	*Boophis periegetes*	+	4	-	-	-
10	*Boophis tephraeomystax*	+		-	-	+
11	*Boophis viridis*	-	4	-	-	-
12	*Gephyromantis leucocephalus*	+		+	-	-
13	*Gephyromantis spinifer*	+	4	+	-	-
14	*Laliostoma labrosum*	+		-	-	-
15	*Mantidactylus aerumnalis*	+		-	-	+
16	*Mantidactylus betsileanus*	+		+	?	+
17	*Mantidactylus* sp.	+		?	?	?
18	*Blommersia* sp.	+		?	?	?
19	*Mantidactylus delormei*	+		-	+	-
20	*Mantidactylus femoralis*	+		+	+	+
21	*Mantidactylus lugubris*	+		+	+	+
22	*Spinomantis guibei*	-	4	+	-	-
23	*Platypelis* sp.	+		-	-	-
24	*Plethodontohyla inguinalis*	+	4	+	+	+
25	*Scaphiophryne madagascariensis*	+		-	+	-
26	*Ptychadena mascareniensis*	+		+	+	+
27	*Brookesia nasus*	+		+	+	+
28	*Calumma brevicorne*	+		+	+	+
29	*Calumma andringitraense*	+		?	+	-
30	*Calumma nasutum*	+		+	+	+
31	*Calumma oshaughnessyi*	+		+	+	+
32	*Calumma* n. sp.	-	5	-	+	-
33	*Furcifer lateralis*	+	1	-	-	-
34	*Hemidactylus frenatus*	+		?	-	+
35	*Phelsuma quadriocellata*	+		+	+	+
36	*Uroplatus malahelo*	+	2, 3	+	-	-
37	*Uroplatus malama*	+		+	+	-

	SPECIES	1999 SURVEY	BIBLIOGRAPHY	ANDOHAHELA	ANDRINGITRA	RANOMAFANA IVOHIBE
38	*Zonosaurus ornatus*	+		-	-	+
39	*Zonosaurus laticaudatus*	-	1	-	-	-
40	*Oplurus cyclurus*	-	1	-	-	-
41	*Oplurus quadrimaculatus*	+	1	+	-	-
42	*Madagascincus frontoparietalis*	+		+	+	-
43	*Madagascincus melanopleura*	+		+	+	+
44	*Mabuya boettgeri*	+		-	-	-
45	*Mabuya gravenhorsti*	-	1	+	+	+
46	*Dromicodryas bernieri*	+		-	-	-
47	*Geodipsas infralineata*	+		+	?	-
48	*Leioheterodon geayi*	-	1	-	-	-
49	*Leioheterodon modestus*	+		-	-	-
50	*Liopholidophis infrasignatus*	+		+	-	+
51	*Liopholidophis epistibes*	+		+	+	+
52	*Liopholidophis sexlineatus*	+		-	-	+
53	*Mimophis mahfalensis*	+		-	-	-
		44	16	29	26	26

Bibliography: 1 = Nicoll & Langrand, 1989; 2 = Nussbaum *et al.*, 1999; 3 = McIntyre *et al.*, 2002; 4 = Global Amphibian Assessment (IUCN *et al.*, 1999); 5 = Raselimanana, 1999. Question marks (?) indicate doubtful or not yet confirmed occurrence of a certain taxon at the considered site.

Taxonomy and species distribution

Boophis periegetes. The series obtained from *Kalambatritra* is of particular relevance, since up until now this species was found only around the Ranomafana area (Cadle, 1995). The specimens agree with the original description, although they lack the typical dermal spiculae and warts as originally described.

Mantidactylus aerumnalis. The finding of this species at Kalambatritra moves the southern distribution border: up until now it had so far been found at An'Ala (Vallan *et al.*, 2004; Vences & Glaw, 2004), Moramanga, Ranomafana, Ivohibe, Vondrozo (Vences & Glaw, 2004), Mangevo near to Ranomafana, and Tolongoina (Vences & Glaw, 2004).

Mantidactylus delormei. The populations from Andringitra formerly attributed to *M. brevipalmatus* belong in reality to a separate species, for which the name *M. delormei* is available (Glaw & Vences, 2006; Vences *et al.*, 2006).

Gephyromantis spinifer. This species was until now known only from Andohahela, Chaines Anosyennes, Andringitra, Marovitsika, and Ambana (Blommers-Schlösser & Blanc, 1991; Nussbaum *et al.*, 1999). The Kalambatritra findings marks so far a considerable geographic extension.

Scaphiophryne sp. A single juvenile individual fits for morphology with the individuals from the Andringitra Massif ascribed to *S. madagascariensis* by Glos *et al.* (2005), a species until now known from this massif only.

Calumma andringitraense. This chameleon species was formerly known at Andringitra (Raxworthy & Nussbaum, 1996). The presence of this chameleon at Kalambatritra is an important extension of the distribution; data of *Calumma gastrotaenia* generically provided by Nussbaum *et al.,* (1999) for Andohahela could in reality be referred to *C. andringitraense.*

Uroplatus malahelo. A rare species until now known from the type locality, Malahelo Forest (Nussbaum & Raxworthy, 1994), although its occurrence at Kalambatritra was already reported by Ramanamanjato *et al.* (2002).

Uroplatus malama. This species known only from Ampamakiesiny, Andohahela (Nussbaum & Raxworthy, 1995; Nussbaum *et al.,* 1999), and Ivohibe-Andringitra (Raselimanana, 1999).

Biogeographic remarks

We compared the Kalambatritra faunal composition with that from three other central-southern rainforest sites, which are Andohahela (according to Nussbaum *et al.,* 1999), Andringitra (Raxworthy *et al.,* 1996), and Ranomafana (Glaw & Vences, 1994, and personal observations). The numbers of taxa that Kalambatritra shares with these rainforests are respectively 29, 26, and 26. The taxa present at all the sites are: *Aglyptodactylus madagascariensis, Boophis albipunctatus, B. boehmei, Mantidactylus femoralis, M. lugubris, Plethodontohyla inguinalis, Ptychadena mascareniensis, Brookesia nasus, Calumma brevicorne, C. oshaughnessyi, Phelsuma quadriocellata,* and *Madascincus melanopleura.*

The herpetofauna observed at Kalambatritra appears therefore to be a mixture of three major biogeographic elements: (1) taxa typical of the eastern rainforest (e.g., *Mantidactylus femoralis, Mantidactylus lugubris, Plethodontohyla inguinalis, Calumma nasutum, Liopholidophis infrasignatus*); (2) taxa typical of south-eastern Madagascar (e.g., *Mantidactylus spinifer, M. leucocephalus, Boophis periegetes, Brookesia nasus, Calumma andringitraense, Scaphiophryne madagascariensis*, *Uroplatus malahelo,* and *U. malama*); (3) taxa more typical of the high plateau (e.g., *Boophis*

goudoti, Mantidactylus delormei, Furcifer lateralis, Liopholidophis sexlineatus, Zonosaurus ornatus, and *Mabuya boettgeri*).

Of course, it is necessary to confirm many of the current taxonomic determinations (which are currently based only on the analysis of preserved specimens) with other methods, such as bioacoustics and molecular analyses, before full conclusions can be drawn. The herpetofauna of Kalambatritra should be more carefully studied, especially to understand how local microclimatic data have influenced the species distribution.

ACKNOWLEDGEMENTS

This research was conducted in cooperation between the Museo Regionale di Scienze Naturali and the Parc Botanique et Zoologique de Tsimbazaza, Antananarivo, and was supported by Gondwana Conservation and Research, and the Nando Peretti Foundation. We are grateful to the Malagasy authorities for collection and export permits. E. Ortoffi helped in setting up the specimens. G. Garcia, F. Glaw, V. Mercurio, A. Raselimanana, and D. Vallan. F. Glaw provided useful information and made criticisms on a first draft of this paper. J.-B. Ramanamanjato gave some unpublished data about the herpetofauna of Kalambatritra. R. Berridge was so kind to help in the correction of the very bad English of a first draft of this paper.

RIASSUNTO

L'erpetofauna della foresta di Kalambatritra, Madagascar sud-orientale

Si riportano i dati di presenza relative agli anfibi e ai rettili della Riserva Speciale di Kalambatritra, Madagascar sud-orientale, basati essenzialmente su uno studio condotto nel 1999. Sono stati trovati 22 anfibi e 22 rettili, alle quali dobbiamo aggiungere altre tre specie di anfibi e cinque di rettili, riportate sul web e su pubblicazioni scientifiche, ma non rinvenute direttamente da noi. Gran parte dei ritrovamenti sono nuovi per l'area, e sottolineano interessanti osservazioni biogeografiche. Di interesse particolare il ritrovamento di *Boophis periegetes, Mantidactylus aerumnalis, M. delormei, Gephyromantis. spinifer, Uroplatus malahelo* e *U. malama*. Per molte di queste specie, i ritrovamenti precedenti erano limitati a una singola o a poche località e i dati biologici correlate erano particolarmente scarsi.

Parole chiave: Madagascar, Anfibi, Rettili, Kalambatritra, Distribuzione.

Franco ANDREONE
Museo Regionale di Scienze Naturali
Via G. Giolitti, 36
I-10123 Torino - Italy
e-mail f.andreone@libero.it

Jasmin Emile RANDRIANIRINA
Parc Botanique et Zoologique de Tsimbazaza
Rue Fernand Kasanga, BP 4096
Antananarivo 101 - Madagascar

LITERATURE CITED

ANDREONE F. & RANDRIAMAHAZO H., 1997. Ecological and taxonomic observations on the amphibians and reptiles of Andohahela low altitude rainforest, S. Madagascar. - Revue fr. d'Aquariol. - Hérpetologie 3/4, 95-128.

ANDREONE F. & RANDRIANIRINA J.E., 2000. Biodiversity, rainforests and herpetological communities in Madagascar: what about differences between amphibians and reptiles? *In*: W.R. Lourenço & S.M. Goodman (eds), Diversity and endemism in Madagascar. - Mémoires de la Société de Biogéographie, pp. 217-228.

ANDREONE F., J.E. RANDRIANIRINA, P.D. JENKINS & G. APREA, 2000. Diversity of Amphibia, Reptilia and Lipotyphla (Mammalia) at Ambolokopatrika, a rainforest corridor between Anjanaharibe-Sud and Marojejy Massifs. - Biodiv. and Conserv., 9: 1587-1622.

ANDREONE F., VENCES M. & RANDRIANIRINA J.E., 2001. Patterns of amphibian and reptile diversity at Berara Forest (Sahamalaza Peninsula), NW Madagascar. - Ital. J. of Zool., 68: 235-241.

ANGAP, 2000. Plan de Gestion du Réseau National des Aires Protégées de Madagascar. - Ministère de Environnement and ANGAP, Antananarivo.

BLOMMERS-SCHLÖSSER R.M.A. & BLANC CH.P., 1991. Amphibiens (première partie). - Faune de Madagascar, Paris, 75 (1): 1-379.

CADLE J.E., 1995. A new species of *Boophis* (Anura: Rhacophoridae) with unusual skin glands from Madagascar, and a discussion of variation and sexual dimorphism in *Boophis albilabris* (Boulenger). - Zool. J. Linn. Soc., London, 115: 313-345.

GLAW F. & VENCES M., 1994. A fieldguide to the amphibians and reptiles of Madagascar. Second edition. - Vences and Glaw Verlag, Cologne.

GLAW F. & VENCES M., 2006. Phylogeny and genus-level classification of mantellid frogs (Amphibia, Anura). - Organisms, Diversity and Evolution, 6: 236-253.

GLOS J., GLAW F. & VENCES M., 2005. A new species of *Scaphiophryne* from western Madagascar. - Copeia, 2005 (2): 252-261.

IRWIN M.T., SAMONDS K.E. & RAHARISON J.-L., 2001. A biological inventory of the lemur community of Réserve Spéciale de Kalambatritra, south-central Madagascar. - Lemur News, 6: 24-28.

IUCN, Conservation International, and NatureServe, 2006. Global Amphibian Assessment. <www.globalamphibians.org>. - Downloaded on 4 May 2006.

NICOLL M.E. & LANGRAND O., 1989. Madagascar: revue de la conservation et des aires protegées. WWF Fonds Mondial pour la Nature, Gland. 374 pp.

NUSSBAUM R. A. & RAXWORTHY C.J., 1994. A new species of *Uroplatus* Duméril (Reptilia: Squamata: Gekkonidae) from southern Madagascar. - Herpetologica, 50 (3): 319-324.

NUSSBAUM R.A. & RAXWORTHY C.J., 1995. New *Uroplatus* Duméril (Reptilia: Squamata: Gekkonidae) of the *ebenaui*-Group from the Anosy Mountains of Southern Madagascar. - Copeia, 1995: 118-124.

NUSSBAUM R.A., RAXWORTHY C.J., RASELIMANANA A.P. & RAMANAMANJATO J.-P., 1999. Amphibians and reptiles of the Réserve Naturelle Intégrale d'Andohahela, Madagascar. In Goodman S.M. (Editor), A floral and faunal inventory of the Réserve Naturelle Integrale d'Andohahela, Madagascar: with reference to elevational variation. - Fieldiana, Zool. (N.S.), 94: 155-173.

Projet ZICOMA, 1999. Les zones d'importance pour la conservation des oiseaux à Madagascar. Projet ZICOMA Antananarivo. 266 pp.

RAMANAMANJATO J-B.; MCINTYRE P.B. & NUSSBAUM R.A., 2002. Reptile, amphibian, and lemur diversity of the Malahelo Forest, a biogeographical transition zone in southeastern Madagascar. - Biodiv. Conserv., 11 (10): 1791-1807.

RASELIMANANA A.P., 1999. Chapitre 4. Le herpétofaune. In Goodman, S.M. & Rasolonandrasana B.P.N. (eds.), Inventaire biologique de la réserve spéciale du pic d'Ivohibe et du couloir forestier qui la relie ai Parc national d'Andringitra. - Récherches pour le developpement. Série Sciences Biologiques, Antananarivo, 15: 81-87.

RAXWORTHY C.J., ANDREONE F., NUSSBAUM R.A., RABIBISOA N. & RANDRIAMAHAZO H., 1998. Amphibians and reptiles of the Anjanaharibe Massif: elevational distributions and regional endemicity. In Goodman S. M. (ed.), A floral and faunal inventory of the Réserve Spéciale d'Anjanaharibe-Sud, Madagascar: with reference to elevational variation - Fieldiana Zool., Chicago, (n. s.) 90: 79-92.

RAXWORTHY C. J. & NUSSBAUM R.A., 1996. Amphibians and reptiles of the Réserve Naturelle Intégrale d'Andringitra, Madagascar: a study of elevational distribution and local endemicity. - In Goodman S.M. (Editor), A floral and faunal inventory of the eastern slopes of the Réserve Naturelle Intégrale d'Andringitra, Madagascar: with reference to elevational variation. - Fieldiana Zool., Chicago, (n. s.) 85: 158-170.

VALLAN D., ANDREONE F., RAHERISOA V.H. & DOLCH R., 2004. Effects of low, selective wood exploitation on Amphibians in a tropical rain forest in East Madagascar. - Oryx, 38: 410-417.

VENCES M. & GLAW F., 2002. Molecular phylogeography of *Boophis tephraeomystax*: a test case for east-west vicariance in Malagasy anurans (Amphibia, Anura, Mantellidae). - Spixiana, 25 (1): 79-84.

VENCES M. & GLAW F., 2004. Revision of the subgenus *Chonomantis* (Anura: Mantellidae:*Mantidactylus*) from Madagascar, with description of two new species. - J. Nat. History, London, 38, 77–118.

VENCES M., GLAW F. & MARQUEZ R., 2006. The calls of the frogs of Madagascar. - Alosa, Sons de la Natura,Valencia.

VENCES, M., THOMAS M., BONETT R. M. & VIEITES D. R., 2005. Deciphering amphibian diversity through DNA barcoding: chances and challenges. - Philosophical Transactions of the Royal Society London, Ser. B, 360: 1859-1868.

APPENDIX

List of voucher specimens found at Kalambatritra. The occurrence of each single taxon at each site is given within brackets: C1 = Site 1 (Befarara); C2 = Site 2 (Befarafara). The specimens are currently housed at the Museo Regionale di Scienze Naturali, but will be partly housed at the Parc Botanique et Zoologique de Tsimbazaza.

AMPHIBIA

PTYCHADENIDAE - *Ptychadena mascareniensis,* A2521 [C1].

MANTELLIDAE - *Aglyptodactylus madagascariensis,* A2573 [C2]; *Boophis goudoti,* A2536-2539, A2545 [C1]; *Boophis boehmei,* A2546-2547, A2549, A2467-2468 [C1], A2548, A2550-2551 [C2]; *Boophis guibei*, A2452 [C1]; *Boophis periegetes,* A2454, A2456-2457 [C1], A2453, A2455, 2458 [C2]; *Boophis albipunctatus,* A2479 [C2]; *Gephyromantis leucocephalus,* A2530-2535 [C1], A2480 [C2]; *Gephyromantis spinifer,* A2526 [C1], A2473-2475 [C2]; *Laliostoma labrosum,* A2477 [C2]; *Mantidactylus aerumnalis,* A2519, A2459 [C1], A2730, A2460-2461 [C2]; *Mantidactylus betsileanus,* A2464 [C1]; *Mantidactylus delormei,* A2822 [C1], A2517, A2520 [C1]; *Mantidactylus femoralis,* A2469-2472 [C2]; *Mantidactylus lugubris,* A2465-2466 [C2].

MICROHYLIDAE - *Platypelis* sp., A2481 [C2]; *Plethodontohyla inguinalis,* A2528-2529, A2564 [C1], A2476 [C2]; *Scaphiophryne madagascariensis,* A2543 [C1].

REPTILIA

CHAMAELEONIDAE - *Brookesia nasus.* R2177-2178, R2280 [C1], R2176, R2278-R2279 [C2]; *Calumma andringitraense,* R2238-R2240, R2173-2174 [C1], R2236-2237, R2241 [C2]; *Calumma brevicorne,* R2287 [C1], R2288 [C2]; *Calumma nasutum,* R2167-2169, R2320 [C1], R2170, R2321 [C2]; *Calumma oshaughnessyi*, R2179, R2297 [C1], R2171 [C2]*; Furcifer lateralis,* R2172 [C1].

GEKKONIDAE - *Hemidactylus frenatus,* R2140 [C2]; *Phelsuma quadriocellata*, R2175 [C2]; *Uroplatus malahelo,* R2142 [C1]; *Uroplatus malama*, R2145, R2390 [C1].

GERRHOSAURIDAE - *Zonosaurus ornatus*, R2158 [C2].

OPLURIDAE - *Oplurus quadrimaculatus,* R2252-2256 [C2].

SCINCIDAE - *Madagascincus frontoparietalis,* R2391 [C1], R2392 [C2]; *Madagascincus melanopleura,* R2587-2588 [C1]; *Mabuya boettgeri*, R2502 [C2].

COLUBRIDAE - *Dromicodryas bernieri,* R2219 [C1]; *Geodipsas infralineata,* R2233 [C1]; *Liopholidophis infrasignatus,* R2213 [C2]; *Liopholidophis epistibes,* R2214 [C1]; *Liopholidophis sexlineatus,* R2234 [C1]; *Mimophis mahfalensis*, R2242 [C1].