Boll. Mus. reg. Sci. nat. Torino	Vol. 23 - N. 2	pp. 363-381	2006

Franco ANDREONE*, Paulina D. JENKINS**,
Jasmin E. RANDRIANIRINA§, Beatrice PINET*

Small mammals (Order Afrosoricida, Order Eulipotyphla and Order Rodentia) recently collected in Madagascar, and housed in the Museo Regionale di Scienze Naturali, Torino

ABSTRACT

We present the catalogue of the tenrecs, shrews and rodents collected in Madagascar from 1994 to 2005. The collection consists of 213 voucher specimens, and 24 species (18 species of tenrecs, two shrews and four rodents). The specimens are conserved in alcohol, and part of them is prepared with separate skulls. Most of these specimens represent new geographical findings. Conspicuous series of *Microgale parvula* and *M. cowani,* and of *Eliurus tanala* are of particular interest. Especially notable is one specimen of *Nesomys lambertoni*, a species that until recently was known only from a handful of specimens.

Key words: Afrosoricida, Soricomorpha, Rodentia, Madagascar, Catalogue.

INTRODUCTION

During the last fifteen years two of us (F. Andreone and J. E. Randrianirina) carried out more than twenty zoological field surveys in Madagascar. This activity was mainly aimed at monitoring the diversity and conservation status of the amphibians and reptiles in several rainforest and dry forest areas, which led to the discovery of many new taxa and the compilation of an updated herpetological collection from the this island.

Such fieldwork also allowed collecting many small insectivorous mammals and some rodents, which fell into the pit-fall traps utilised for the

* Museo Regionale di Scienze Naturali, Torino.
** The Natural History Museum, London.
§ Parc Botanique et Zoologique de Tsimbazaza, Antananarivo.

capture of secretive and fossorial amphibians and reptiles. This led to combine the presence of these small mammals with that of the herpetofauna, and allowed to get more comprehensive conservation assessments (e.g., Andreone *et al.*, 2000). More recently other mammal specimens were collected specifically for a biomolecular and karyological study, thus it was possible to assemble an exceptional diversity of insectivores and rodents.

The present work is a catalogue of the preserved small mammal specimens from Madagascar currently housed in the Museo Regionale di Scienze Naturali, with notes on their distribution and natural history.

MATERIAL AND METHODS

Collecting methods

The specimens were collected in the field mainly using pitfall traps, consisting of standard plastic buckets (about 280 mm deep, 290 mm top internal diameter, 220 mm bottom internal diameter), with the handles removed, sunk in the ground at intervals along a drift fence. Small holes were punched in the bottom to allow water to drain. The fence (0.5 m high and 100 m long) was made from plastic sheeting stapled to thin wooden stakes. The fence bottom was buried 50 mm deep into the ground and positioned to run across or along each pitfall trap. Pitfall traps were positioned at 10 m intervals along the drift fence and at both ends. The pitfalls were checked each morning and evening for captured animals.

After capture, the individuals were prepared for preservation. They were fixed in 4% formalin (by means of several injections), and then preserved in 70% ethanol. In a few cases the specimens were fixed in 90-100% ethanol for future molecular studies. The majority of museum specimens also have associated skulls, which were prepared later and conserved as dry skulls.

Catalogue structure

Within the catalogue each record represents a single specimen. The museum acronym MRSN (Museo Regionale di Scienze Naturali) is followed by an alphanumeric catalogue number (T), for mammal (theriological) collection, and a progressive number. Then the geographic reference (in alphabetical order), the collector(s)' initials and the collection date. To distinguish between age categories and means of preservation we used the following abbreviations: A = (apparently) adult specimen; Sa = subadult specimen; E = specimen fixed in ethanol; Ca = whole body; Cr = specimen with cranium prepared separately. The abbreviations of collectors quoted though the text are as follows: FA = Franco Andreone; JER = Jasmin E. Randrianirina; GA = Gennaro Aprea; MV = Miguel Vences, EJE = Euan J. Edwards.

Locality information

The collection localities are reported below. They include nine major sites, where survey work was conducted regularly for a certain number of days, and a tenth "miscellaneous" category, which includes some sites where occasional captures occurred.

1. *Masoala*. The large Masoala Peninsula hosts the major low altitude rainforests of Madagascar. The mammals were collected at seven campsites (just outside the boundaries of the Parc National de Masoala) in 1998, 1999 and 2002. At these sites the rainforest consists of variegated intact and disturbed patches. The campsites 1-5 (all within Antsiranana Faritany and Antalaha Fivondronana) are abbreviated as follows: Masoala 1 = Campsite 1, locally named Ambatoledama, 15°17.00'S, 50°01.25'E, 450 m; Masoala 2 = Campsite 2, Beanjada, 15°15.83'S, 49°95.50'E, 600-700 m; Masoala 3 = Campsite 3, Andasin'i Governera, 15°18.55'S, 50°01.40'E, 600-700 m; Masoala 4 = Campsite 4, Antsarahan'Ambararato, 15°23.52'S, 50°02.82'E, 500-530 m; Masoala 5 = Campsite 5, Menamalona, 15°22.87'S, 49°59.27'E, 770-800 m. Campsites 6-7 (all within Toamasina Faritany and Mahalevona Fivondronana): Masoala 6 = Campsite 6, Ambohitsitondroina, 15°26.00'S, 49° 57.34' E, 1100-1200 m; Masoala 7 = Campsite 7, Amparihy, 15°25.06'S, 49°56.42'E, 800-900 m. Further information on most of these sites is available in Andreone & Greer (2002).

2. *Ambolokopatrika.* A mid-altitude rainforest area between the Anjanaharibe-Sud and Marojejy massifs. The forest around Sites 1 and 2 is transitional between lowland and mid-altitude moist rainforest, while at Site 3 it is a mid-altitude rainforest; at all sites there are patchworks of pristine and disturbed rainforest. Two were campsites from where we collected small mammals (both within Antsiranana Faritany and Andapa Fivondronana): Ambolokopatrika 1 = Campsite 1, Andemakatsara, 14°31.80'S, 49°26.50'E, 800-810 m; Ambolokopatrika 3 = Campsite 3, Antsinjorano, 14°32.60'S, 49°25.80'E, 950-1250 m. Information on these sites is available in Andreone *et al.* (2000).

3. *Tsaratanana Massif.* This is a mid altitude rainforest, crossed by several streams and deep valleys. While the forest nucleus is considered to be quite pristine, logging occurred at many outer sites. At one campsite (Antsiranana Faritany, Ambanja Fivondronana) we obtained samples of small mammals: Tsaratanana 1 = Campsite 1, Antsahamanara, 14°02.70'S, 48°47.07'E, 1100 m. Information on these sites is available in Vences *et al.* (2003)

4. *Besariaka.* A forest about 60 km south of Andapa, between the Réserve Spéciale d'Anjanaharibe-Sud and the Tsararano Chain. It is currently degraded, especially the patches farther from streams. This disturbance is due to several reasons, among which the use of forest areas for cattle, cutting trees by villagers, use of well established path systems to search for "bilahy" bark (used for preparation of the local alcoholic bev-

erage "betsa-betsa"), and for hunting. Small mammals were collected at two campsites (both within Antsiranana Faritany, Andapa Fivondronana): Besariaka 1 = Campsite 1, Ambinaninimiakamidina, 14°49.30'S, 49°3.25'E, 1000-1100 m; Besariaka 2 = Campsite 2, Ambinanin'antasahamaloto, 14°49.70'S, 49°35.75'E, 800 m.

5. *Tsararano.* This chain lies between the Anjanaharibe-Sud Massif and the Masoala Peninsula. Despite paths being cut for collecting local products and for hunting the forest still appears to be quite intact, most likely due to the distance from large sized villages. Two sites were visited (both Antisiranana Faritany, Andapa Fivondronana): Tsararano 1 = Campsite 1, Antsarahan'ny Tsararano, 14°54.40'S, 49°41.20'E, 700-850 m; and Tsararano 2 = Campsite 2, Andatony Anivo, 14°54.80'S, 49°42.60'E, 600-750 m. Information on these sites is available in Andreone et al. (2001).

6. *Kalambatritra.* The forest at Kalambatritra Special Reserve includes a mix of amphibians and reptiles from the eastern rainforests and the high plateau. Up to the onset of this project no information has been obtained regarding the fauna of this forest. Small mammals were captured at one of the two visited campsites (Fianarantsoa Faritany, Ihosy Fivondronana): Kalambatritra 1 = Campsite 1, Befarara, 23°24.85'S, 46°27.49'E, 1450-1700 m.

7. *Berara*. The area, within the Sahamalaza Peninsula, NW Madagascar, includes an intermediate forest: although it is included in the biogeographic domain of the West, its vegetational aspects (dominated by a dry forest of the *Dalbergia*, *Commiphora* and *Hildegardia* series; Humbert, 1955) and climate are transitional between those of the Sambirano Domain and those of the dry Western Domain. A single campsite was made (Mahajanga Province, Analalava Fivondronana, Ambolobozo Firaisana and the western part of the Befotaka Firaisana): Berara = Berara, within the larger Anabohazo Forest, 14°18.55'S, 47°54.92'E, 170 m. More information on these sites is available in Andreone et al. (2001).

8. *Bemaraha.* This is a very wide complex of deciduous forest and tsingy karstic formation in the west of Madagascar. It is currently a national park and an UNESCO site. This site (Mahajanga Faritany, Antsalova Fivondronana, Bekopaka Firaisana) was visited in May-June 2003 by JER: Bemaraha = Andamozavaky, 19°01.86'S, 44°46.80'E, 120-130 m.

9. *Antoetra.* 18-23 January 2003. This site is about 4 km from the village of Antoetra, so was intensively visited by the local people. The habitat consists of a degraded savana, with extended grass meadows and scattered *Eucalyptus* trees. The area is crossed by several small streams. A single campsite (Antoetra Firaisana, Ambositra Fivondronana, Fianarantsoa Faritany) provided small mammal samples: Antoetra 1 = Soamazaka, 20°45.38'S and 47°17.64'E, 1600-1650 m. Additional information on these sites is available in Andreone et al. (in press). Some further specimens obtained in Antananarivo by local collectors and international pet-traders

likely come from the same locality, although we cannot be fully certain of this. In that case the site is generically marked as "Antoetra".

10. *Miscellaneous localities.* A. *Andohahela,* a humid rainforest area, 200-700 m, between Isaka-Ivondro and Eminiminy villages, Tolagnaro Fivondronana, Toliara Faritany (24°45.83'S, 46°51.25'E) (Andreone & Randriamahazo, 1997; Nussbaum *et al.*, 1999); B. *Namazaha Valley*, Isalo Massif, a subdesertic area, about 800 m, between Ranohira and Ilakaka, Ranohira Fivondronana, Fianarantsoa Faritany (22°32.20'S, 45°22.39'E); C. *Marofandilia,* a dry-deciduous forest, close to the town of Morondava, about 30-40 m, Morondava Fivondronana, Toliara Faritany (20° 7.60'S, 44° 32.60'E); D. *Toliara*, surrounding of Toliara, 20 m, Toliara Fivondronana, Toliara Faritany (23°21.0'S, 43°40.0'E); E, *Ambohimandrozo,* an isolated and degraded mid-altitude rainforest within intensive ricefields, around 600 m, Tolongoina Fivondronana, Fianarantsoa Faritany (21°28.43'S, 47°33.37'E) (Rabemanjara et al., 2005)*;* F, *Ranomafana*, a rather intact rainforest, close to the homonymous national park, around 930 m, Ifanadiana Fivondronana, Fianarantsoa Faritany, (21°15.0'S, 47°27.0'E); Anosibe An'ala, a midaltitude rainforest, 798 m, Fivondronana, Faritanin' i Toamasina (19° 25.60'S, 48°13.0'E).

ANNOTATED CATALOGUE

Order AFROSORICIDA

Family TENRECIDAE Gray, 1821

Subfamily Oryzorictinae Dobson, 1882

Genus *Microgale* Thomas, 1882

Microgale brevicaudata Grandidier, 1899

MRSN T247	Bemaraha, JER 17.V.-2.VI.2003	Sa, Cr, E
MRSN T248	Bemaraha, JER 17.V.-2.VI.2003	A, Cr, E
MRSN T249	Bemaraha, JER 17.V.-2.VI.2003	A, Cr, E

Microgale cowani Thomas, 1882

MRSN T40	Ambolokopatrika 2, FA, GA, and JER, 7.XII.1997	A, Ca, E
MRSN T39	Ambolokopatrika 3, FA GA, and JER, 11.XII.1997	A, Ca, E
MRSN T41	Ambolokopatrika 3, FA GA, and JER, 13.XII.1997	A, Ca, E
MRSN T42	Ambolokopatrika 3, FA GA, and JER, 13.XII.1997	A, Ca, E
MRSN T43	Ambolokopatrika 3, FA GA, and JER, 16.XII.1997	A, Ca, E
MRSN T44	Ambolokopatrika 3, FA GA, and JER, 16.XII.1997	A, Ca, E
MRSN T45	Ambolokopatrika 3, FA GA, and JER, 19.XII.1997	A, Ca, E

MRSN T38	Ambolokopatrika 3, FA, GA, and JER, 11.XII.1997	A, Ca, E
MRSN T37	Ambolokopatrika 3, FA, GA, and JER, 10.XII.1997	A, Ca, E
MRSN T206	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E
MRSN T207	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E
MRSN T132	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T135	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T136	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T137	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T138	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T139	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T143	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T144	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T145	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T147	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T148	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T149	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T150	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T151	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T152	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T153	Masoala 6, JER, 26.I.-5.II.2002	A

Microgale dobsoni Thomas, 1884

MRSN T202	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E
MRSN T203	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E

Microgale dryas Jenkins, 1992

MRSN T79	Besariaka 1, FA and JER, 6.VI.1996	Sa, Cr
MRSN T80	Besariaka 1, FA and JER, 8.VI.1996	Sa, Cr
MRSN T83	Besariaka 1, FA and JER, 13.VI.1996	A, Ca, E
MRSN T71	Tsararano 1, FA and JER, 2.XII.1996	

Microgale fotsifotsy Jenkins, Raxworthy & Nussbaum, 1997

MRSN T36	Ambolokopatrika 2, FA, GA, and JER, 4.XII.1997	A, Ca, Cr, E
MRSN T117	Masoala 2, FA and JER, 26.XI.1998	A
MRSN T140	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T229	Masoala 7, JER, 8-17.II.2002	Sa, Cr, E

Microgale longicaudata Thomas, 1882

MRSN T29	Ambolokopatrika 3, FA, GA and JER, 11.XII.1997	A, Ca, E
MRSN T215	Masoala 6, JER, 26.I.-5.II.2002	A, Cr, E

Microgale parvula G. Grandidier, 1934

MRSN T28	Andohahela, XI.1994	A
MRSN T2	Ambolokopatrika 2, FA and JER, 8.VI.1997	A, Ca
MRSN T3	Ambolokopatrika 2, FA and JER, 9.VI.1997	A, Ca
MRSN T50	Ambolokopatrika 2, FA, GA and JER, 4.XII.1997	A, Ca
MRSN T48	Ambolokopatrika 2, FA, GA and JER, 5.XII.1997	A, Ca
MRSN T87	Ambolokopatrika 2, FA, GA, and JER, 6.XII.1997	A, Ca
MRSN T85	Ambolokopatrika 2, FA, GA, and JER, 8.XII.1997	A, E
MRSN T49	Ambolokopatrika 3, FA and JER, 10.XII.1997	A
MRSN T52	Ambolokopatrika 3, FA, GA and JER, 1.XII.1997	A, Ca, E
MRSN T46	Ambolokopatrika 3, FA, GA and JER, 10.XII.1997	A
MRSN T47	Ambolokopatrika 3, FA, GA and JER, 11.XII.1997	A, Ca, E
MRSN T53	Ambolokopatrika 3, FA, GA and JER, 11.XII.1997	A
MRSN T86	Ambolokopatrika 3, FA, GA and JER, 11.XII.1997	A
MRSN T88	Ambolokopatrika 3, FA, GA and JER, 12.XII.1997	A
MRSN T51	Ambolokopatrika 3, FA, GA and JER, 14.XII.1997	A
MRSN T89	Ambolokopatrika 3, FA, GA and JER, 18.XII.1997	A
MRSN T72	Besariaka 1, FA and JER, 9.VI.1996	A, Ca
MRSN T73	Besariaka 1, FA and JER, 9.VI.1996	A, Ca
MRSN T200	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Ca, E
MRSN T201	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Ca, E
MRSN T245	Masoala 2, FA and JER, 25.XI.1998	A
MRSN T121	Masoala 3, FA and JER, 4.XII.1998	A
MRSN T118	Masoala 3, FA and JER, 6.XII.1998	A
MRSN T119	Masoala 3, FA and JER, 6.XII.1998	A
MRSN T120	Masoala 3, FA and JER, 7.XII.1998	A
MRSN T213	Masoala 6, JER, 26.I.-5.II.2002	A, Ca, E
MRSN T214	Masoala 6, JER, 26.I.-5.II.2002	A, Ca, E
MRSN T227	Masoala 7, JER, 8-17.II.2002	A, Ca, E
MRSN T228	Masoala 7, JER, 8-17.II.2002	A, Ca, E
MRSN T146	Masoala 6, JER, 26.I.- 5.II.2002	A
MRSN T75	Tsararano 1, FA and JER, 1.XII.1996	A
MRSN T74	Tsararano 1, FA and JER, 13.VI.1996	A, Ca
MRSN T76	Tsararano 1, FA and JER, 4.XII.1996	A
MRSN T77	Tsararano 2, FA and JER, 17.XII.1996	A
MRSN T78	Tsararano 2, FA and JER, 17.XII.1996	A

Microgale principula Thomas, 1926

MRSN T67	Besariaka 1, FA and JER, 6.VI.1996	A, Cr
MRSN T133	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T141	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T142	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T69	Tsararano 1, FA and JER, 3.XII.1996	A, Cr
MRSN T68	Tsararano 1, FA and JER, 30.XI.1996	Sa, Cr

Microgale taiva Major, 1896

MRSN T32	Ambolokopatrika 3, FA and JER, 15.XII.1997	Sa, Cr, E
MRSN T204	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E
MRSN T115	Masoala 2, FA and JER, 26.XI.1998	A
MRSN T219	Masoala 6 JER, 26.I.-5.II.2002	Sa, Cr, E
MRSN T216	Masoala 6, JER, 26.I.-5.II.2002	Cr, E
MRSN T217	Masoala 6, JER, 26.I.-5.II.2002	Sa, Cr, E
MRSN T218	Masoala 6, JER, 26.I.-5.II.2002	Sa, Cr, E
MRSN T220	Masoala 6, JER, 26.I.-5.II.2002	A, Cr, E
MRSN T221	Masoala 6, JER, 26.I.-5.II.2002	A, Cr, E
MRSN T222	Masoala 6, JER, 26.I.-5.II.2002	Sa, Cr, E
MRSN T223	Masoala 6, JER, 26.I.-5.II.2002	Sa, Cr, E
MRSN T224	Masoala 6, JER, 26.I.-5.II.2002	Sa, Cr, E

Microgale soricoides Jenkins, 1993

MRSN T30	Ambolokopatrika 3, FA and JER, 11.XII.1997	A, Ca, Cr, E
MRSN T31	Ambolokopatrika 3, FA and JER, 14.XII.1997	Cr, E
MRSN T33	Ambolokopatrika 3, FA and JER, 16.XII.1997	Cr, E
MRSN T34	Ambolokopatrika 3, FA and JER, 17.XII.1997	Sa, Cr, E
MRSN T205	Kalambatritra 1, JER, 26.IV.-9.V.1999	S, Cr, E
MRSN T212	Masoala 6, JER, 26.I.-5.II.2002	S, Cr, E

Microgale talazaci Major, 1896

MRSN T9	Ambolokopatrika 1, FA and JER, 27.V.1997	A
MRSN T10	Ambolokopatrika 1, FA and JER, 28.V.1997	A
MRSN T11	Ambolokopatrika 1, FA and JER, 31.V.1997	A
MRSN T12	Ambolokopatrika 2, FA and JER, 6.VI.1997	A, Cr
MRSN T13	Ambolokopatrika 2, FA and JER, 6.VI.1997	A, Ca
MRSN T14	Ambolokopatrika 2, FA and JER, 6.VI.1997	A, Ca
MRSN T17	Ambolokopatrika 2, FA and JER, 10.VI.1997	A, Ca

MRSN T18	Ambolokopatrika 2, FA and JER, 11.VI.1997	A, Cr
MRSN T15	Ambolokopatrika 2, FA and JER, 6.VI.1997	A, Cr
MRSN T16	Ambolokopatrika 2, FA and JER, 8.VI.1997	A, Ca
MRSN T27	Ambolokopatrika 2, FA, GA, and JER, 3.XII.1997	A, Ca
MRSN T62	Besariaka 1, FA and JER, 8.VI.1996	A, Ca
MRSN T63	Besariaka 2, FA and JER, 23.VI.1996	A, Cr
MRSN T116	Masoala 3, FA and JER, 8.XII.1998	A
MRSN T65	Tsararano 2, FA and JER, 12.XII.1996	A, Cr
MRSN T66	Tsararano 2, FA and JER, 12.XII.1996	A, Cr
MRSN T64	Tsararano 2, FA and JER, 13.XII.1996	A, Cr

Microgale sp.

MRSN T130	Masoala 6, JER, 26.I.-5.II.2002	A
MRSN T131	Masoala 6, JER, 26.I.-5.II.2002	A

Genus *Oryzorictes* A. Grandidier, 1870

Oryzorictes hova A. Grandidier, 1870

MRSN T4	Ambolokopatrika 1, FA and JER, 29.V.1997	A
MRSN T5	Ambolokopatrika 1, FA and JER, 30.V.1997	A
MRSN T6	Ambolokopatrika 1, FA and JER, 1.VI.1997	A
MRSN T19	Ambolokopatrika 2, FA, GA, and JER, 2.XII.1997	A, Ca, E
MRSN T20	Ambolokopatrika 2, FA, GA, and JER, 4.XII.1997	A, Ca, E
MRSN T21	Ambolokopatrika 2, FA, GA, and JER, 4.XII.1997	A, Ca, E
MRSN T22	Ambolokopatrika 2, FA, GA FA, 5.XII.1997	A
MRSN T23	Ambolokopatrika 3, FA and JER, 7.XII.1997	A, Ca, E
MRSN T24	Ambolokopatrika 3, FA and JER, 7.XII.1997	A, Ca, E
MRSN T25	Ambolokopatrika 3, FA, GA, and JER, 8.XII.1997	A
MRSN T26	Ambolokopatrika 3, FA and JER, 16.XII.1997	A, Ca
MRSN T54	Ambolokopatrika 3, FA, GA, and JER, 17.XII.1996	A
MRSN T55	Besariaka 1, FA and JER, 12.VI.1996	A, Ca
MRSN T56	Besariaka 1, FA and JER, 15.VI.1996	A, Cr
MRSN T57	Besariaka 2, FA and JER, 18.VI.1996	A, Ca
MRSN T58	Besariaka 2, FA and JER, 18.VI.1996	A, Ca
MRSN T59	Besariaka 2, FA and JER, 18.VI.1996	A, Ca
MRSN T60	Besariaka 2, FA and JER, 22.VI.1996	A, Ca
MRSN T61	Besariaka 2, FA and JER, 24.VI.1996	A, Cr
MRSN T114	Masoala 1, FA and JER, 19.XI.1998	
MRSN T226	Masoala 7, JER, 8-17.II.2002	

Subfamily Tenrecinae Gray, 1821

Genus *Echinops* Martin, 1838

Echinops telfairi Martin, 1838

MRSN T251	Toliara, EJE, I.2004	A
MRSN T252	Toliara, EJE, I.2004	A
MRSN T253	Namazaha Valley, GA. 21.I.2004	A
MRSN T254	Namazaha Valley, GA. 21.I.2004	A
MRSN T255	Namazaha Valley, GA. 21.I.2004	A

Genus *Hemicentetes* Mivart, 1871

Hemicentetes nigriceps Gunther, 1875

MRSN T126	Antoetra 1, FA, GA, JER, and MV, 19.I.2003	A
MRSN T127	Antoetra 1, FA, GA, JER, and MV, 19.I.2003	A
MRSN T155	Antoetra 1, FA, GA, JER, and MV, 19.I.2003	A
MRSN T260	Antoetra, EJE, I.2004	A
MRSN T261	Antoetra, EJE, I.2004	A

Hemicentetes semispinosus (G. Cuvier, 1798)

MRSN T239	Masoala 1, FA and JER, 14.XI.1998	A
MRSN T84	Masoala 1, FA and JER, 14.XI.1998	A, E
MRSN T82	Masoala 1, FA and JER, 16.XI.1998	A, E
MRSN T235	Masoala 1, FA and JER, 18.XI.1998	A
MRSN T236	Masoala 1, FA and JER, 19.XI.1998	A
MRSN T237	Masoala 1, FA and JER, 20.XI.1998	A
MRSN T238	Masoala 3, FA and JER, 10.XII.1998	A
MRSN T92	Masoala 4, FA and JER, 5.XII.1999	A
MRSN T93	Masoala 4, FA and JER, 9.XII.1999	A
MRSN T91	Masoala 5, FA and JER, 13.XII.1999	A
MRSN T90	Masoala 5, FA and JER, 18.XII.1999	A
MRSN T81	Tsararano 1, FA and JER, 5.XII.1996	A
MRSN T122	Tsaratanana 1, FA, 7.II.2001	A
MRSN T123	Tsaratanana 1, FA, 8.II.2001	A
MRSN T257	Ranomafana, GA, 12.II.2004	A
MRSN T258	Ranomafana, GA, 12.II.2004	A
MRSN T259	Ambohimandrozo, FA, GA and VM, 15.II.2004	A

Genus *Setifer* Froriep, 1806

Setifer setosus (Schreber, 1778)

MRSN T230	Antoetra 1, FA, GA, JER, and MV, 19.I.2003	A
MRSN T128	Antoetra 1, FA, GA, and JER, 19.I.2003	A
MRSN T129	Antoetra 1, FA, GA, and JER, 19.I.2003	A
MRSN T102	Berara, FA, JER and MV, 22.II.2000	A
MRSN T244	Masoala 1, FA and JER, 17.XI.1998	A
MRSN T241	Masoala 2, FA and JER, 30.XI.1998	A
MRSN T243	Masoala 2, FA and JER, 30.XI.1998	A
MRSN T240	Masoala 3, FA and JER, 2.XII.1998	A
MRSN T242	Masoala 3, FA and JER, 2.XII.1998	A
MRSN T101	Masoala 5, FA and JER, 14.XII.1999	A
MRSN T225	Masoala 7, JER, 8-17.II.2002	A
MRSN T266	Marofandilia, GA, 28.I.2004	A
MRSN T264	Anosibe Anala, EJE, I.2004	A
MRSN T265	Ambohimandrozo, FA, GA and VM, 16.II.2004	A

Genus *Tenrec* Lacépède, 1799

Tenrec ecaudatus (Schreber, 1778)

MRSN T154	Antoetra 1, FA, GA, and JER, 19.I.2003	A
MRSN T96	Berara, FA, JER and MV, 19.II.2000	Sa
MRSN T97	Berara, FA, JER and MV, 19.II.2000	Sa
MRSN T98	Berara, FA, JER and MV, 19.II.2000	Sa
MRSN T263	Berara, FA, JER and MV, 17.II.2000	Sa
MRSN T256	Ranomafana, GA, 11.II.2004	A
MRSN T262	Marofandilia, GA, 29.I.2004	A

Order EULIPOTYPHLA

Suborder SORICOMORPHA

Family SORICIDAE Fischer von Waldheim, 1817

Genus *Suncus* Ehrenberg, 1832

Suncus madagascariensis (Coquerel, 1848)

MRSN T103	Berara, FA, JER and MV, 14.II.2000	A
MRSN T104	Berara, FA, JER and MV, 16.II.2000	A, E

MRSN T105	Berara, FA, JER and MV, 17.II.2000	A, E
MRSN T106	Berara, FA, JER and MV, 17.II.2000	A, E
MRSN T107	Berara, FA, JER and MV, 18.II.2000	A
MRSN T108	Berara, FA, JER and MV, 18.II.2000	A
MRSN T109	Berara, FA, JER and MV, 23.II.2000	A

Suncus murinus (Linnaeus, 1766)

MRSN T7	Ambolokopatrika 2, FA and JER, 12.VI.1997	A, Ca
MRSN T8	Ambolokopatrika 2, FA and JER, 12.VI.1997	A, Ca
MRSN T94	Berara, FA, JER and MV, 17.II.2000	A
MRSN T95	Berara, FA, JER and MV, 17.II.2000	A

Order RODENTIA

Family MURIDAE Illiger, 1815

Subfamily Nesomyinae Major, 1897

Genus *Eliurus* Milne-Edwards, 1885

Eliurus minor Major, 1896

MRSN T211	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E
MRSN T99	Masoala 5, FA and JER, 12.XII.1999	A
MRSN T70	Tsararano 2, FA and JER, 17.XII.1996	A, Cr

Eliurus myoxinus Milne-Edwards, 1855

MRSN T110	Berara, FA, JER and MV, 20.II.2000	
MRSN T246	Bemaraha, 17.V.-2.VI.2003	Sa, Cr, E

Eliurus tanala Major, 1896

MRSN T1	Ambolokopatrika 2, FA and JER, 12.VI.1997	
MRSN T208	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E
MRSN T209	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E
MRSN T210	Kalambatritra 1, JER, 26.IV.-9.V.1999	A, Cr, E

Eliurus sp.

MRSN T35	Ambolokopatrika 3, FA and JER, 30.XI.19967	A, Ca, Cr, E

MRSN T100	Masoala 5, FA and JER, 17.XII.1999	A
MRSN T111	Masoala 5, FA and JER, 16.XII.1999	A
MRSN T112	Masoala 5, FA and JER, 16.XII.1999	A

Genus *Nesomys* Peters, 1870

Nesomys lambertoni Grandidier, 1928

MRSN T250	Bemaraha, JER 17.V.-2.VI.2003	A, Cr

Considerations on the constitution of the collection

The Madagascan specimens housed in the MRSN collection total 213 (at 31st March 2005), including six genera and 18 species of tenrecs, one genus and two species of shrews, and two genera and four species of rodents (Table 1). One species of *Eliurus* was not identified, due to some problems regarding the conservation of the specimens. Anyhow, seen the provenance of these specimens (Masoala and Kalambatritra) we belive they belong either to *E. tanala* or *E. minor.*

Within the tenrec group the most abundant species was *Microgale parvula* (with 34 specimens), followed by *M. cowani* (27 individuals), and with *M. dobsoni* and *M. longicaudata* as the least represented species each represented by two specimens. Far fewer rodents were present, with four species each represented by one to four specimens (Table 1).

To show species representation based on specimens housed in the MRSN, for each species we reported the collection localities from which the specimens originated: Ambolokopatrika, Antoetra, Besariaka, Kalambatritra, Tsararano, Tsaratanana, Masoala, Sahamalaza. We excluded the miscellaneous localities, due to their unbiased results. For simplicity, the campsites from a single locality were grouped together (Table 2).

The most representative shrew tenrec species at the collection sites was *M. parvula* (five localities), followed by *M. talazaci* from 4 sites and *M. cowani, M. taiva, M. principula* and *Oryzorictes hova* each from 3 localities, with the spiny tenrecs *Hemicentetes semispinosus* and *Setifer setosus* also collected from 3 localities. The rodents are not as well represented as tenrecs, probably due to the capture methods (pitfalls), which do not readily catch animals that are mostly arboreal or that are able to escape by jumping.

Of special interest is the presence within the collection of a specimen *of Nesomys lambertoni*, a rodent that was until now known from a handful of specimens (Ryan, 2003), and recently recorded for the same area by Goodman & Schütz (2004). The specimen was found dead at the Bemaraha site and collected by one of us (JER).

Table 1 - Summary of taxa and representative preserved specimens of the Afrosoricida, Soricomorpha and Rodentia housed in the MRSN collection.

SPECIES	NUMBER OF SPECIMENS
AFROSORICIDA	
Microgale parvula	34
Microgale cowani	27
Oryzorictes hova	21
Microgale talazaci	17
Hemicentetes semispinosus	17
Setifer setosus	14
Microgale taiva	12
Tenrec ecaudatus	7
Microgale principula	6
Microgale soricoides	6
Hemicentetes nigriceps	5
Echinops telfairi	5
Microgale dryas	4
Microgale fotsifotsy	4
Microgale brevicaudata	3
Microgale dobsoni	2
Microgale longicaudata	2
Microgale sp.	2
EULIPOTYPHLA	
Suncus madagascariensis	7
Suncus murinus	4
RODENTIA	
Eliurus tanala	4
Eliurus sp.	4
Eliurus minor	3
Eliurus myoxinus	2
Nesomys lambertoni	1
TOTAL OF SPECIMENS	**213**

Geographic provenance: the case of north Madagascar

As witnessed by recent studies (Raxworthy & Nussbaum, 1995; Andreone, 1996; Goodman & Jenkins, 1998; Nussbaum *et al.*, 1999), North-Madagascar shows a very rich biodiversity, especially of tenrecs. This is most likely due to the heterogeneous geographic situation, with the presence of several refuge massifs (e.g., Montagne d'Ambre, Tsaratanana, Marojejy, and Anjanaharibe-Sud) that act as biogeographic endemicity centres, and the presence of very diverse habitats (Andreone, 2004).

Table 2 - Occurrence of the species at the visited study sites.

	SPECIES	T	S	AB	B	TF	M	BM	A	K	TOT
1.	*Microgale brevicaudata*	-	-	-	-	-	-	+	-	-	**1**
2.	*Microgale cowani*	-	-	+	-	-	+	-	-	+	**3**
3.	*Microgale dobsoni*	-	-	-	-	-	-	-	-	+	**1**
4.	*Microgale dryas*	-	-	-	+	-	-	-	-	-	**1**
5.	*Microgale fotsifotsy*	-	-	+	-	-	-	-	-	+	**2**
6.	*Microgale gymnorhyncha*	-	-	-	-	+	-	-	-	-	**1**
7.	*Microgale longicaudata*	-	-	+	-	-	+	-	-	-	**2**
8.	*Microgale parvula*	-	-	+	+	+	+	-	-	+	**5**
9.	*Microgale principula*	-	-	-	+	+	+	-	-	-	**3**
10.	*Microgale taiva*	-	-	+	-	-	+	-	-	+	**3**
11.	*Microgale talazaci*	-	-	+	+	+	+	-	-	-	**4**
12.	*Microgale soricoides*	-	-	+	-	-	-	-	-	-	**1**
13.	*Oryzorictes hova*	-	-	+	+	-	+	-	-	-	**3**
14.	*Hemicentetes nigriceps*	-	-	-	-	-	-	-	+	-	**1**
15.	*Hemicentetes semispinosus*	+	-	-	-	+	+	-	-	-	**3**
16.	*Setifer setosus*	-	+	-	-	-	+	-	+	-	**3**
17.	*Tenrec ecaudatus*	-	+	-	-	-	-	-	+	-	**2**
18.	*Suncus murinus*	-	+	+	-	-	-	-	-	-	**2**
19.	*Suncus madagascariensis*	-	+	-	-	-	-	-	-	-	**1**
29.	*Eliurus minor*	-	-	-	-	+	+	-	-	-	**2**
21.	*Eliurus myoxinus*	-	+	-	-	-	-	+	-	-	**2**
22.	*Eliurus tanala*	-	-	+	-	-	-	-	-	-	**1**
23.	*Nesomys lambertoni*	-	-	-	-	-	-	+	-	-	**1**
	TOTAL	**1**	**5**	**10**	**5**	**6**	**10**	**3**	**3**	**5**	

Abbreviations: AB = Ambolokopatrika Forest, A = Antoetra, B = Besariaka Forest, BM = Bemaraha, K = Kalambatritra Forest, T = Tsaratanana Massif, M = Masoala Peninsula, S = Sahamalaza Peninsula, TF = Tsararano Forest. TOT = number of localities. TOTAL = number of species collected from the site.

In Table 3 we have compared the distribution of tenrecs from northern localities recorded in the literature to the specimens currently housed in MRSN captured in north Madagascar (Table 3). The tenrecs derived from species lists provided between 1995 and 2005, and collected in areas of N and NE Madagascar (Anandrivola, Ambolokopatrika, Tsararano, Montagne d'Ambre, Marojejy), include twenty species: 16 *Microgale*, *Hemicentetes semispinosus*, *Oryzorictes hova, Setifer setosus* and *Tenrec ecaudatus* (Goodman & Jenkins, 1998; Andreone *et al.*, 2000; Goodman & Jenkins, 2000). Within the MRSN collection 83% of the specimens come from the north, (9 species of *Microgale*, *Hemicentetes semispinosus, Oryzorictes hova* and *Setifer setosus*). Two species of *Microgale* (*M. dryas* and *M. taiva*) and the shrew *Suncus madagascariensis* are newly reported from this area.

Table 3 - Species of afrosoricidans recorded from N. Madagascar, and present in the MRSN collection.

	Species	**Bibliographic records**	**MRSN collection**
1.	*Microgale brevicaudata*	+	
2.	*Microgale cowani*	+	+
3.	*Microgale dryas*	-	+
4.	*Microgale dobsoni*	+	+
5.	*Microgale longicaudata*	+	+
6.	*Microgale fotsifotsy*	+	+
7.	*Microgale gracilis*	+	-
8.	*Microgale gymnorhyncha*	+	+
9.	*Microgale drouhardi*	+	-
10.	*Microgale monticola*	+	-
11.	*Microgale parvula*	+	+
12.	*Microgale principula*	+	+
13.	*Microgale pusilla*	+	-
14.	*Microgale soricoides*	+	+
15.	*Microgale taiva*	-	+
16.	*Microgale talazaci*	+	+
17.	*Oryzorictes hova*	+	+
18.	*Hemicentetes semispinosus*	+	+
19.	*Setifer setosus*	+	+
20.	*Tenrec ecaudatus*	+	+
	TOTAL	**18**	**15**

ACKNOWLEDGEMENTS

This work was carried out within a project supported by the World Wide Fund for Nature and Ecological Training Program, the Gondwana Conservation and Research, the Nando Peretti Foundation, Declining Amphibian Population Task Force, the Wildlife Conservation Society, the National Amphibian Conservation Center, Association Européenne pour l'Etude et la Conservation des Lémuriens. For companionship we thank G. Aprea, M. Vences, F. Mattioli, V. Mercurio, H. Randriamahazo, D. Vallan, and J.-E. Rafidison. We are also especially indebted to the late director of Parc Botanique et Zoologique de Tsimbazaza, A. Randrianjafy, who was of aid during our residence in Madagascar. E. Gazzaniga assisted during preliminary preparation of the specimens. The collection of small mammals was possible due to the agreement of the Ministére des Eaux et Forêts and the Association Nationale pour la Géstion des Aires Protégées. Two anonymous referees kindly improved the quality of the paper.

RIASSUNTO

Piccoli Mammiferi (Ordine Afrosoricida, Sottordine Soricomorpha e Ordine Rodentia) raccolti recentemente in Madagascar e conservati al Museo Regionale di Scienze Naturali, Torino

È presentato il catalogo ragionato dei tenrec, topiragno e roditori catturati in Madagascar dal 1994 al 2005. La collezione consiste di 213 esemplari, per un totale di 24 specie (18 specie di tenrec, due di topiragno e quattro di roditori). Gli esemplari sono conservati in etanolo e sono parzialmente preparati con cranio conservato a parte. Molti di questi esemplari rappresentano nuove segnalazioni geografiche. Di particolare interesse citiamo una cospicua serie di esemplari di *Microgale parvula* e di *M. cowani,* nonché di *Eliurus tanala*. Una particolare nota merita il ritrovamento di un esemplare del raro *Nesomys lambertoni*, specie conosciuta per pochissimi individui.

Parole chiave: Afrosoricida, Soricomorpha, Rodentia, Madagascar, Catalogo.

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

Paulina D. JENKINS
Department of Zoology, The Natural History Museum
Cromwell Road, London SW7 5BD, UK
e-mail: p.jenkins@nhm.ac.uk

Jasmin E. RANDRIANIRINA
Parc Botanique et Zoologique de Tsimbazaza
BP 4096, Antananarivo (101), Madagascar
e-mail: randrianirina_herpeto@yahoo.fr

REFERENCES

ANDREONE F., 1996. Another green treefrog, *Boophis anjanaharibeensis* n.sp. (Ranidae: Rhacophorinae), from northeastern Madagascar. - Aqua, 2 (2): 25-32.

ANDREONE F., 2004. Crossroads of herpetological diversity: survey work for an integrated conservation of amphibians and reptiles in northern Madagascar. - Ital. J. Zool., Suppl 2: 229-235.

ANDREONE F. & GREER A.G., 2002. Malagasy scincid lizards: descriptions of nine new species, with notes on the morphology, reproduction and taxonomy of some previously described species (Reptilia, Squamata, Scincidae). – J. Zool., London, 258: 139-181.

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

ANDREONE F., RANDRIANIRINA J.E., JENKINS P.D. & APREA G., 2000. Species diversity of Amphibia, Reptilia and Lipotyphla at Ambolokopatrika, a rainforest between Anjanaharibe-Sud and Marojejy massifs, NE Madagascar. – Biodiv. 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. - Italian J. Zool., 68: 235-241.

ANDREONE F., VENCES M., GLAW F. & RANDRIANIRINA J. E. (in press). Remarkable records of amphibians and reptiles on Madagascar's central high plateau. Trop. Zool.

GOODMAN, S. M. & JENKINS, P. D., 1998. The insectivores of the Réserve Spéciale d'Anjanaharibe-Sud. In Goodman S. M. (ed.), A floral and faunal inventory of the Réserve Spéciale d'Anjanaharibe-Sud, Madagascar: with reference to elevational variation, pp. 139-161. - Fieldiana: Zool., n.s., 90: 1-245.

GOODMAN, S. M. & JENKINS, P. D., 2000. Tenrecs (Lipotyphla: Tenrecidae) of Parc National de Marojejy, Madagascar. In Goodman S. M. (ed.), A floral and faunal inventory of the Parc National de Marojejy, Madagascar: with reference to elevational variation, pp. 201-229 - Fieldiana: Zool., n.s., 92: 1-286.

GOODMAN S. M. & SCHÜTZ H., 2004. Specimen evidence of the continued existence of the Malagasy rodent *Nesomys lambertoni* (Muridae: Nesomyinae). – Mammalia, 67: 445-449.

HUMBERT H., 1955. Les territoires phytogéographiques de Madagascar. Leur cartographie. - Ann. Biol., troisième série, 31, 195-204.

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

Rabemananjara F., Bora P., Cadle J. E., Andreone F., Rajeriarison E., Talata P., Glaw F., Vences M. & Vieites D. R., 2005. New records, distribution and conservation of *Mantella bernhardi,* an endangered frog species from south-eastern Madagascar. - Oryx, 39(3), 339–342.

Raxworthy C. J. & Nussbaum R. A., 1995. Systematics, speciation and biogeography of the dwarf chameleons (*Brookesia*; Reptilia, Squamata, Chamaeleontidae) of northern Madagascar. – J. Zool., London. 235, 525-558.

Ryan J. M., 2003. *Nesomys,* red forest rat, Voalavo, Mena. In Goodman S. M. & Benstead J. P. (eds.), The Natural History of Madagascar, pp. 1388-1389. – Chicago University Press.

Vences M., Andreone F., Glaw F. & J. E. Randrianirina J. E., 2003. Molecular and bioacoustic divergence in *Mantidactylus granulatus* and *M. zavona* sp. n. (Anura: Mantellidae): bearings for the biogeography of northern Madagascar. - Afr. J. Zool., 38: 67-78.