

Systematics of the Round-eared Sengi (*Macroscelides proboscideus*) in Namibia

Trip Report – 12 August 2007

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To address the systematics of sengis or elephant-shrews in Namibia, we had to collect specimens in the field, as outlined in the attached study plan (Appendix I). Three of us participated in the collecting trip: Galen Rathbun, Research Associate at the California Academy of Sciences, organized the expedition that included Jack Dumbacher, Curator of Birds and Mammals at the Academy, and Tiffany Bozic, a fine artist and Jack's wife, who assisted in specimen collection and preparation. In this report, we summarize our field activities, including trapping and museum examination of specimens. In the next months, we will continue to organize and examine specimens and data and Jack Dumbacher will continue to sequence DNA in the laboratory at the Academy. We eventually will present the details of our findings in papers that will be published in scientific journals.

We used standard-sized Sherman live traps baited with a dry mixture of peanut butter, rolled oats, and Marmite. Traps were set in the late afternoon and checked the next morning. We either set traps haphazardly where we found sengi spore, or in straight-line transects with trap intervals between 10 and 20 metres. Most rodents and many sengis were released alive, but we prepared some sengis as museum specimens, along with all rodents that died as a result of freezing night temperatures. We prepared specimens as study skins with accompanying skulls, and small samples of muscle and liver were preserved in 97% ethyl alcohol for DNA sequencing.

We focused our field effort in the NamibRand Nature Reserve, Maltahöhe District, Namibia, because this is where we had determined that it was most likely that we could trap the different colour morphs of the round-eared sengi (*Macroscelides proboscideus*) in close proximity to each other. We first set traps in the vicinity of the NamibRand headquarters on Keerweder Farm. We then shifted our focus 25 kilometres north x northeast to Omkyk and Zwartmodder farms (the current owners combined both farms under the name Zwartmodder Farm). We returned to the NamibRand and set traps in the vicinity of Gorrasis Farm, 38 kilometres south x southwest of Keerweder.

Because the National Museum of Namibia has an extensive collection of sengis, we also spent several days working with these specimens and accompanying data. For example, we plotted on a map the distribution of the different colour forms of *Macroscelides* in Namibia (Fig. 1), and also examined the different forms of *Elephantulus* that occur in Namibia.

Although *Elephantulus* is easily distinguished from *Macroscelides* (Fig. 2), there are three different species of *Elephantulus* that occur in Namibia that are difficult to

distinguish from each other. Because specimens of *Elephantulus* from the Windpoort Farm area (just south of Etosha National Park in Outjo District) have traits that do not correspond well with the two most likely species that occur in that area (*E. intufi* and *E. rupestris*), we also collected specimens (Table 1) and tissues for a preliminary DNA analyses to assist us in determining the taxonomic status of *Elephantulus* in the Windpoort Farm area.

Although we did not capture any *Macroscelides* on the gravel and sandy plains in the vicinity of Keerweder Farm, we did capture (as expected) *Elephantulus rupestris* on a rock outcrop or kopje near the reserve headquarters (Table 1). In the vicinity of Zwartmodder Farm, we captured *Macroscelides* on relatively bare and rocky gravel plains that were less grassy and bushy than surrounding more sandy substrates. On the latter, which supported more bushes, we captured *Elephantulus intufi* (Table 1). We did not trap on kopjes, but we suspect that *Elephantulus rupestris* would be found in these boulder habitats. Back on the NamibRand, we again captured *Macroscelides* on the flat gravel plains that also had scattered rocks and supported less bunch grass than surrounding areas. In the boulders behind the Gorrasis farm house we also captured *E. rupestris* (Table 1). A little surprisingly, we captured no *E. intufi* on the NamibRand, although it probably does occur there. Once the specimens we collected are catalogued into the Academy collection, more details can be found on the on-line searchable catalogue:

<http://www.calacademy.org/research/bmammals/MamColl/index.asp>

We took biopsy samples from 8 study skins of *Macroscelides* at the museum in Windhoek, and together with the fresh tissues we collected in the field, this material will be used for DNA sequencing. When measuring skulls, we found several incompletely cleaned skulls with dried muscle attached, so we sampled muscle from an additional 5 skulls. We will use the DNA data, morphological features, and geographical distribution of the specimens to assess the taxonomic status of sengis in Namibia.

We are grateful for the support of many friends and colleagues in Namibia, especially Mike Griffin and Toivo Uahengo of the Ministry of Environment and Tourism; Seth Eiseb of the National Museum of Namibia, J. Bruekner, Danica Shaw, Nils Odendaal, and Andreas Keding of the NamibRand Nature Reserve, Tim and Laural Osborne of Windpoort Farm, and Susan and Anton Horn of Zwartmodder Farm. Our research in Namibia was authorized by Ministry of Environment and Tourism permit #1131/2007, NamibRand Nature Reserve permit # NRNR/P/003/07, and a research visa issued by the Ministry of Home Affairs.

Figure 1. Study skins of *Macroscelides proboscideus* positioned on a map of Namibia so that the tip of each nose indicates the collection location. Note the dark forms in the south-eastern area compared to more northern and coastal forms, which are lighter.

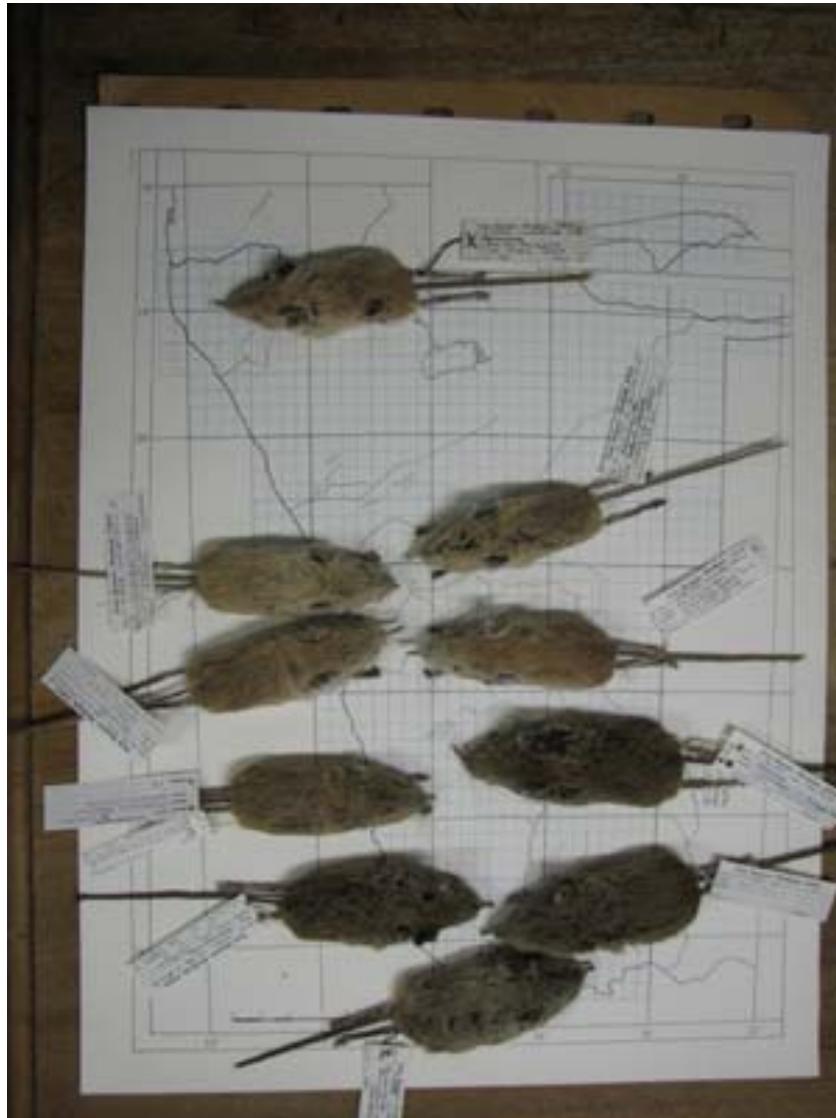


Figure 2. Portraits of the three species of sengi or elephant-shrew captured in Namibia. Top = Round-eared Sengi (*Macroscelides proboscideus*), Left = Western Rock Sengi (*Elephantulus rupestris*), and Right = Bushveld Sengi (*Elephantulus intufi*).



Table 1. Capture data during trapping in Namibia during June 2007.

Trap Line Location	Date Traps Collected	Trap Nights	Number Rodents	Number Sengis (by Species ¹)	Overall Trap Success, %
Keerweder East	5 June 07	50	26	0	52
Keerweder South 1	5 June 07	50	17	0	34
Keerweder South 2	5 June 07	50	6	0	12
Keerweder South 2	6 June 07	50	9	0	18
Keerweder West	5 June 07	35	9	0	36
Keerweder West	6 June 07	35	7	0	29
Keerweder (Dino) Kopje	6 June 07	25	8	5 (R)	52
Keerweder Toekoms	6 June 07	20	25	0	25
Omkyk 1	9 June 07	20	1	1 (I)	10
Omkyk 2	9 June 07	10	1	5 (I)	60
Omkyk 3	9 June 07	5	0	0	0
Omkyk 4	9 June 07	12	3	2 (I)	42
Omkyk 5	9 June 07	10	3	0	30
Omkyk 6	9 June 07	15	9	1 (I)	67
Zwartmodder 7	10 June 07	50	14	0	28
Zwartmodder 8	10 June 07	50	10	3 (I) + 4 (P)	34
Gorrasis 1	12 June 07	45	1	1 (P)	4
Gorrasis 2	12 June 07	50	3	5 (P)	6
Gorrasis 3	12 June 07	25	3	0	12
Gorrasis House	13 June 07	25	12	2 (R)	56
Windpoort Type Locus	19 June 07	15	2	1 (?I)	20
Windpoort Type Locus	20 June 07	15	0	0	0
Windpoort 1	19 June 07	10	0	1 (?I)	10
Windpoort 1	20 June 07	15	1	0	7
Windpoort 2	19 June 07	15	0	0	0
Windpoort 2	20 June 07	15	0	0	0
Bakenkop	20 June 07	45	1	6 (?I)	16
Windpoort West 1	20 June 07	30	0	0	0
Windpoort West 2	20 June 07	20	1	0	5
Windpoort West 1	21 June 07	30	2	0	7
Windpoort West 2	21 June 07	20	2	0	10
Windpoort Corner	22 June 07	50	2	0	4
Windpoort Plum Corner	22 June 07	50	1	0	2
Vierling Farm	23 June 07	50	3	9 (?I)	24
Windpoort Campground	24 June 07	5	3	0	60
Total		1017	165	47	21

¹ *Macroscelides proboscideus* = P, *Elephantulus intufi* = I, *Elephantulus rupestris* = R

Appendix I

Research Proposal

Date: 12 January 2007

Title: Systematics of the Round-eared Sengi (*Macroscelides proboscideus*) in Namibia

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Background: The Round-eared Sengi (*Macroscelides proboscideus*) is distributed from central Kaokoveld in north-western Namibia to the south-eastern Cape of South Africa – a linear distance of over 2000 km. Within this range, the species shows variation in pelage colour and this has stimulated taxonomists over the past 200 years to describe three separate species and numerous subspecies. For example, Austin Roberts (1951), an avid “splitter”, recognized two species and nine subspecies. Corbet and Hanks (1968), which are the current authorities on sengi taxonomy, recognizes only one species that varies from dark individuals in South Africa to light individuals in Namibia (essentially, a gradual cline). However, Corbet and Hanks (1968) also suggested that the subspecies *M. p. flavicaudatus* (Lundholm, 1955) from the Namib Desert and Skeleton Coast of Namibia, with its light buff or pinkish pelage, might be a full species.

A dark specimen recently collected from the Gai-as area of Damaraland (northwestern Namibia) raises the question as to whether *Macroscelides* is indeed monospecific. Round-eared Sengis from this area were thought to be of the light buffy type (*M. p. flavicaudatus*). Dark animals were believed to occur only from the Mariental area in south-western Namibia and south into South Africa, with one possible exception. In the early 1800's the explorer Alexander collected a dark *Macroscelides* in 'Damaraland' (i.e., northwestern Namibia), which was later described by Ogilby (1838) as a new species: *M. melanotis*. Because dark specimens from this region were never subsequently collected, the locality for this single specimen was considered incorrect by Corbet and Hanks (1968); they assumed that it was actually a specimen from South Africa and thus assignable to *M. proboscideus*. Based on several specimens recently collected by Mike Griffin from the Gai-as area, it appears that Alexander's collection locality was indeed correct, so are these specimens *M. melanotis*, *M. proboscideus* or *M. p. flavicaudatus*?

The recent dark specimen from Damaraland prompted us to examine specimens in the collection of the National Museum in Windhoek, and we found that dark and light forms also occur in close proximity to each other in the vicinity of the NamibRand Nature Reserve in south-western Namibia. Light forms are known from Gorrasis Farm, while dark specimens have been collected on Zwartmodder Farm, about 60 km to the northeast.

The current information on *Macroscelides* can be interpreted in several ways. One intriguing possibility is that the dark specimens in northwestern Namibia indeed are *M. melanotis*, which may extend as far south as the NamibRand, while dark animals in South Africa (south of the Orange River) are *M. proboscideus* and all the light specimens actually are a full species, *M. flavicaudatus*. In other words, perhaps there are indeed three different species of *Macroscelides*.

Objective: Our objective is to examine the taxonomic relationship of the different forms of *Macroscelides*. The relationship between the dark and light forms in Namibia and the dark forms from South Africa and Namibia will be explored using DNA sequencing methods. If these genetic analyses suggest that the taxonomy of *Macroscelides* needs revision, then we will also consider the morphological features of these forms to develop a revised taxonomy for the genus.

Methods: We need fresh tissues from the various forms of *Macroscelides*. For comparison of the two morphs in Namibia, we ideally need specimens that occur in close proximity to each other. Currently, there are two such areas: the NamibRand Nature Reserve and the Gai-as area in Damaraland. We already have material from dark animals at Gai-as and from South Africa. We propose to work on the NamibRand Nature Reserve to collect both light and dark forms in close proximity to each other. For example, it is possible that both forms may be found on Keerweder Farm, which is about mid-way between Gorrasis and Zwartmodder, and would appear to have suitable habitat for both forms. We propose to trap on Keerweder and if we are successful in obtaining both forms we will terminate trapping. However, if we are unable to capture one or the other on Keerweder, then we will move trapping efforts towards Gorassis and Zwartmodder, until we successfully capture both forms. Fieldwork is planned for the month of June 2007.

We will use Sherman live traps and snap traps to capture sengis; un-wanted specimens (e.g. rodents) will be released or prepared as specimens for deposition in museums. Tissues needed for the DNA analyses will be preserved in 95% ethyl alcohol, while voucher specimens will be either prepared as study skins or preserved in formalin.

Laboratory analyses will be done at the state-of-the-art facilities of the California Academy Sciences in San Francisco.

Products: A trip report will be prepared after the fieldwork is completed. Once the laboratory analyses are finished, the results will be prepared for publication in an appropriate peer-reviewed scientific journal.

Literature Cited:

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