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***Lemniscomys hoogstraali*, an new murid species from Sudan**

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Abstract. *Lemniscomys hoogstraali* n. sp. is described from the eastern Upper Nile Province, Sudan. The new species is related to *L. barbarus* but differs in larger size, some skull characters and the pattern of dorsal stripes.

Key words. Mammalia, Muridae, *Lemniscomys*, new species, Sudan.

Introduction

Several years ago I began to prepare a comprehensive survey of the rodents occurring in the Sudanese Republic (Dieterlen & Rupp 1979, Dieterlen & Nikolaus 1985). In March 1988, while studying the Sudanese holdings of the National Museum of Natural History, Washington (USNM), I came across a large specimen of Striped grass mouse, genus *Lemniscomys*, with strongly contrasting stripes, resembling *Lemniscomys barbarus*. After a detailed comparison with further material at Stuttgart it became evident that the specimen in question belongs to an undescribed species.

The specimen was collected together with other small mammals in 1960/61 by the U.S. Naval Medical Research Unit No. 3 (NAMRU-3), led by Dr. Harry Hoogstraal. Later the collection was distributed to the museums of Washington and Chicago. The task of Hoogstraal's team was to study the epidemiology of Kala-Azar and in particular to collect data on the ecology, distribution and biting behaviour of *Phlebotomus* sandflies in the region of Malakal, Upper Nile Province.

Description

***Lemniscomys hoogstraali* n. sp.**

Holotype: USNM 342078, skin and skull of adult ♂, collected by H. Hoogstraal (NAMRU-3) on 23 January 1961 at Paloich, Niayok, 12 miles N. (approx. 10°26' N, 32°33' E), Upper Nile Prov., Sudan. Collector's no. 13391.

Etymology: The new species is named in memory of Dr. Harry Hoogstraal, an eminent parasitologist and mammalogist who died in 1986. Among his numerous merits, his exploration of the mammals of Egypt may be mentioned as one example.

Diagnosis: Large species of the *Lemniscomys barbarus* group. Tail length small (101 % of head and body length); dorsal coloration rich in contrast and with broad blackish stripes; skull relatively large; incisive foramina ending anterior to M¹; zygomatic plate indented below.

Description: Pelage: The stripe pattern, the main character of the genus *Lemniscomys*, groups *L. hoogstraali* with *L. barbarus*. From the median black dorsal stripe outwards to both sides there are five light primary stripes which alternate with

blackish ones. The longitudinal stripes become broader from dorsal to ventral. The blackish stripes are relatively broad and in their middle a very thin secondary light stripe is visible. These secondary stripes are clearest in the first bilateral pair of blackish stripes and become thinner and indistinct in the more ventral pairs. Five primary and four secondary stripes amount to nine light stripes in total.

L. hoogstraali differs from Sudanese *L. barbarus* by lighter primary stripes and more indistinct secondary stripes, thus increasing the effect of the black stripes and the general contrast (Fig. 1)¹.

The ventral pelage of *L. hoogstraali* is similar to *L. barbarus*: almost pure white but lacking the yellowish border line which is usually present in *L. barbarus*. In the coloration of the forefeet differences are most pronounced: they are whitish in *L. hoogstraali* but rusty to yellowish in *L. barbarus*. The same is true for the hindfeet and the tail basis which is reddish in *L. barbarus*. In both species the short hairs of the ear and the ear basis are rusty coloured.

The blackish colour of the median dorsal stripe continues in the bristles of the upper side of the tail nearly to its tip. In both species the blackish zone is bordered by a narrow stripe of reddish bristles in its proximal half. The ventral side of the tail carries light bristles, as in *L. barbarus*.

External and skull measurements and other characters: Compared to *L. barbarus* from tropical Africa the essential characters of *L. hoogstraali* are larger without overlap (Tab. 1). Important differences exist in the head and body length (127 mm in *hoogstraali* versus 105 in *barbarus*, tail length (101 % versus 120 %), and greatest skull length (31.9 versus 28.7; Fig. 2). The nominate form of *L. b. barbarus*, distributed from Tunisia to Morocco, is an exception, it is an isolated form which has been separated from its tropical relatives presumably for some thousands of years. According to data collected by Schröpfer (1982) and by Van der Straeten (in litt.) this form may be equal to *L. hoogstraali* in size. Average head and body length

Table 1: Measurements (in mm unless otherwise stated) of *Lemniscomys hoogstraali* and *L. barbarus* from Sudan (adults only).

Measurement	<i>L. hoogstraali</i> holotype	<i>L. barbarus</i> n = 12
Head and body length	127	105 (94–118)
Tail length	128	126 (114–137)
Tail length in % of HBL	101	120
Hindfoot length (incl. nail)	28	24.5 (23–26)
Ear length	16	15.3 (14–18)
Weight in g	—	40 (32–49)
Greatest length of skull	31.9	28.7 (27.6–29.6)
Interorbital constriction	5.0	4.4 (4.1–4.8)
Length of upper molar row	5.4	5.2 (5.1–5.4)
M ¹ –M ¹	6.5	6.0 (5.6–6.3)
Width of M ¹	1.66	1.63 (1.49–1.81)
Least width of zygomatic plate	3.96	3.90 (3.5–4.1)
Length of bulla	6.3	5.6 (5.1–6.1)
Width of braincase	13.1	12.4 (12.1–12.7)

¹ In the subspecies *L. b. albolineatus* from Kenya that contrast can be likewise strong. As a rare variation it may also occur in populations from other countries such as Ivory Coast or Uganda (USNM 165191 for example).

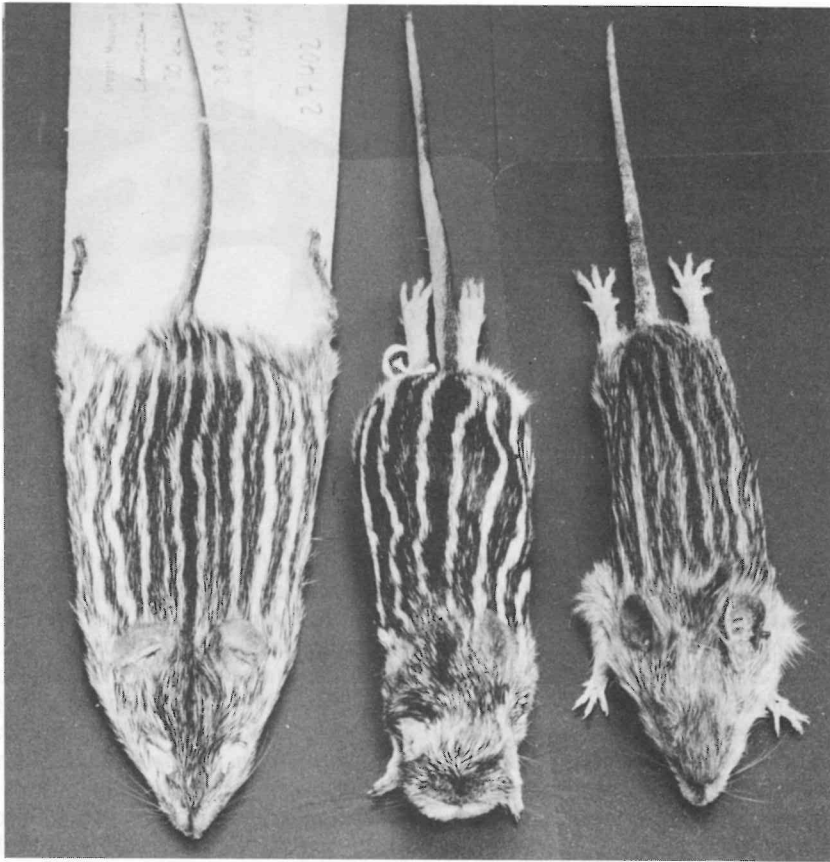


Fig. 1: The holotype skin of *Lemniscomys hoogstraali* (center) compared with two Sudanese *L. barbarus* from the Torit region (left) and from Jebel Marra (right).

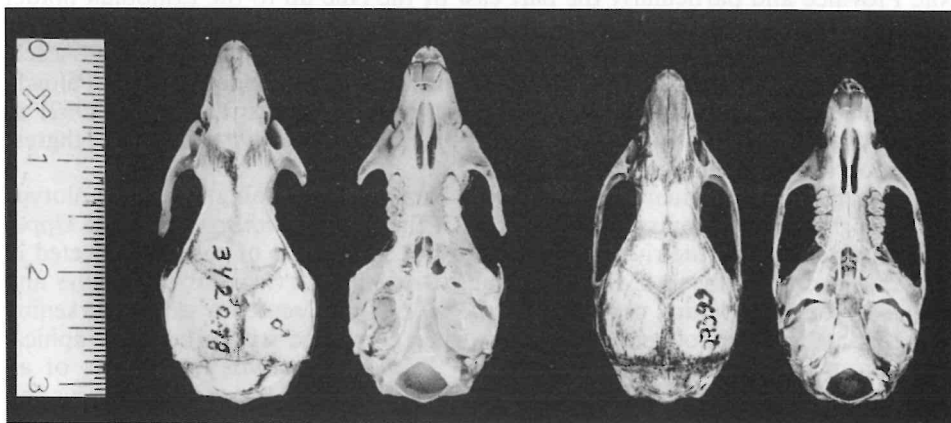


Fig. 2: Dorsal and ventral views of skulls of *Lemniscomys hoogstraali* (holotype, left) and *L. barbarus* (right).

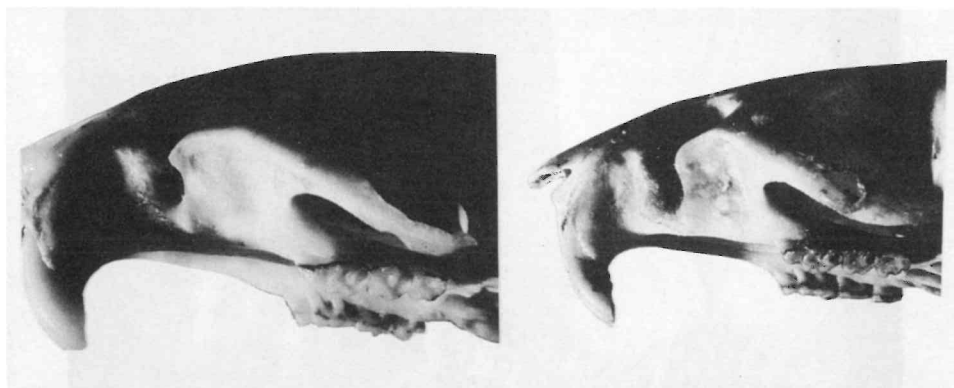


Fig. 3: Comparison of the zygomatic plate of *Lemniscomys hoogstraali* (holotype, left) and *L. barbarus* (right).

is 107 ($n = 5$), tail length 134, relative tail length 125 %, and greatest skull length 30.6. On the grounds of the large geographical distance and of evident morphological differences I do not think that both forms are closely related. Besides their length, the most important difference of the skulls is the extension of the incisive foramina (Fig. 2). In *L. hoogstraali* they end anteriorly to the anterior root of the first upper molar, while in *L. barbarus* they extend backwards to the first third of M^1 . Another character is the form of the zygomatic plate in side view (Fig. 3): In *L. hoogstraali* its margin is markedly indented in its lower part while in *L. barbarus* it is straight or merely slightly indented. The position of the incisors is slightly ophistodont in *L. hoogstraali* and orthodont in *L. barbarus*. According to molar abrasion the holotype specimen of *L. hoogstraali* is adult to old adult. The cusp pattern is largely effaced so that no comparison can be made.

Locality information and ecology: The small mammal fauna of the Upper Nile Province and particularly the part east of the Nile up to the Ethiopian border is nearly unexplored. Larger collections, all made by members of NAMRU-3 in 1960/61, come from the areas of Malakal and Paloich which belong to the "Acacia Tall Grass Forest" vegetational division (Tothill 1948). The habitat north of Paloich, where the holotype was collected, was described by Hoogstraal et al. (1962) as "forested grassland" with *Acacia mellifera* and *Balanites aegyptiaca* and highgrass vegetation as the dominant elements.

Together with a specimen of *Lemniscomys barbarus* from Boing Doro the holotype of *L. hoogstraali* represents the only record of the genus *Lemniscomys* in the Upper Nile Province east of the river. Some two to three hundreds of rodents collected in the same region by the NAMRU-3 belong to *Acomys*, *Arvicanthis*, *Mastomys* and *Tatera*. In this sample and especially in the murids represented a strong darkening of the pelage can be noticed, particularly when compared with other geographical forms from the Sudan, e.g. in a series of *Acomys cineraceus*, the darkest of all Sudanese Spiny mice, and likewise in the form *luctuosus* of *Arvicanthis niloticus* and in a form of *Mastomys* resembling the Black rat *Rattus rattus*. It is interesting that *L. hoogstraali* is also the darkest form of the genus *Lemniscomys*. For the present I have no explanation for this phenomenon of pelage darkening in that region.

Discussion

On grounds of its striping pattern the new species can be integrated into the *Lemniscomys barbarus* group, which is different from other species groups (*striatus* and *griselda*) already studied in detail by Van der Straeten & Verheyen (1980). *L. hoogstraali* can clearly be separated from the tropical forms of *L. barbarus* by its considerable size. Its description as a new species seems therefore justified although only one specimen is available at present. Four species of *Lemniscomys* are now known from the territory of Sudan: *L. striatus*, *L. macculus*, *L. barbarus* and *L. hoogstraali*. The systematics, distribution and ecology of these species will be treated in detail in a forthcoming publication (Dieterlen & Nikolaus, in prep.).

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Zusammenfassung

Lemniscomys hoogstraali aus der östlichen Upper Nile Province im Sudan wird als neue Art beschrieben. Sie unterscheidet sich von der verwandten Streifenmaus *L. barbarus* vor allem durch beträchtliche Größe, einige Schädelmerkmale und durch ein anderes Streifungsmuster.

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