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COMMENTS ON THE TAXONOMY OF THE WEST AFRICAN *TATERILLUS* (RODENTIA: CRICETIDAE) WITH THE DESCRIPTION OF A NEW SPECIES

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The taxonomy of West African rodents of the genus *Taterillus* is confused. Allen (1939) and Ellerman (1941) listed four taxa: *T. gracilis gracilis* (Thomas, 1892), *T. g. angelus* Thomas and Hinton, 1920, *T. nigeriae* Thomas, 1911, and *T. lacustris* (Thomas and Wroughton, 1907). Rosevear (1969) recognized two species, *T. gracilis* and *T. nigeriae*, allocating *T. lacustris* as a subspecies of *T. gracilis*. *Taterillus pygargus* (F. Cuvier, 1838), long considered a species of *Gerbillus* occuring in Egypt and the Sudan, has been shown by Petter (1952) to be a species of *Taterillus*. The holotype of *T. pygargus* is from Senegal. This taxon was overlooked by Rosevear (1969).

Even though Ellerman (1941) and Rosevear (1969) recognized more than one species of *Taterillus*, they suggested that the West African forms could be a single polymorphic species. Cytogenetic data and additional study specimens demonstrate the presence of at least four distinct species. Near topotypes of *T. gracilis* from Senegal have a karyotype of 2N = 36/37, FN = 44 (Matthey and Jotterand, 1972; Petter *et al.*, 1972). Chromosomal information is also known on *Taterillus* from Upper Volta (Matthey and Petter, 1970; Matthey and Jotterand, 1972), Ivory Coast (Petter, pers. comm.), and Ghana (Robbins unpublished data). These specimens have a karyotype of 2N = 36/37, FN = 42, and have been identified as

T. gracilis. Chromosomal information has been reported from near topotypes of *T. pygargus* (2N = 22/23, FN = 37–40) from Senegal (Matthey and Jotterand, 1972; Petter *et al.*, 1972). Specimens from the Cameroon with a karyotype of 2N = 28, FN = 44 have been referred to *T. lacustris* (Tranier *et al.*, 1974). A *Taterillus* with a karyotype of 2N = 30, FN = 36, reported as *T. nigeriae* has been found in Mauritania (Matthey, 1969).

Petter (1972) revised all of the species and subspecies of *Taterillus* utilizing chromosomal information. Based on a greater number of specimens and additional karyotypic information, I have come to different conclusions regarding the taxonomy of West African *Taterillus*. The large number of West African specimens of *Taterillus* now available are a result of the Smithsonian Institutions' African Mammal Project under the direction of Dr. H. W. Setzer. Among these are 115 specimens from Mauritania where *Taterillus* was previously known only by the single specimen reported by Matthey (1969) and Petter (1970). The purpose of this report is to clarify the identities of the West African *Taterillus*.

Materials and Methods

The specimens used in this study, except for a single individual from the Museum National d'Histoire Naturelle, Paris (MNHP), which was reported as a 2N = 30 karotype by Matthey (1969), are housed in the National Museum of Natural History, Division of Mammals (USNM), and were all prepared as conventional museum study skins. Twenty-four measurements as applied to *Taterillus* by Robbins (1973), were made of various dimensions of the skull. Measurements are in millimeters, weights in grams, and capitalized color terms are those of Ridgway (1912).

Computer analyses were performed through the Information Systems Division, Smithsonian Institution. The Smithsonian-developed DSTAT univariate analysis program yielded standard statistics (mean, standard error, standard deviation, variance, coefficient of variation, and range), as well as Student's "t" test, F-test for homogeneity of variance, and one-way analysis of variance. The BMDO7M (Dixon, 1973) multivar-

iate program performed the step-wise discriminant function analysis. Results from multivariate analysis are shown in Table 1. A scattergram of the first two canonical variates and character vectors are presented in Figure 2. Vectors were determined by multiplying the pooled within-groups standard deviation by the coefficients for canonical variates one and two for the most useful characters (Power and Tamsitt, 1973).

An analysis of the West African *Taterillus*, which includes a reexamination of the Mauritanian specimen discussed by Matthey (1969) and Petter (1970), reveals the presence of a heretofore undescribed species that may be known as:

Taterillus arenarius, new species

Holotype: Adult male, skin and skull, USNM 401919, from Tiguent, Trarza Region, Mauritania; obtained 9 April, 1967, by C. B. Robbins, original number 799.

Etymology: The name *arenarius* refers to the sandy substrate characterizing the areas where the species occurs.

Distribution: Mauritania, Niger, and presumably Mali (Fig. 1).

Definition: Interauricular, interorbital, and rostral areas same color as dorsum and varying from Sayal Brown to Snuff Brown; circumorbital region, postauricular patches, mystacial and pectoral areas, fore and hind limbs, and entire underparts white; cheeks and sides Cinnamon-Buff; dorsal hairs plumbeous basally, the brown pigmented portion only 2 to 3 mm in length, and some hairs finely tipped with dark brown; fore and hind limbs have five digits with claws, plantar surfaces naked except for a narrow band of white hairs; pinna of ear long and almost naked, color almost the same as the dorsum, and anterior margin with short buff colored hairs; vibrissae long and composed of both white and dark brown hairs; tail long and uniformly Cinnamon-Buff basally with the dorsal hairs interspersed with darker brown hairs grading to a terminal Mummy Brown pencil; ventrally, the Cinnamon-Buff color grades to white in the region of the pencil.

Skull relatively large for the genus and moderately robust; zygomata heavy; lachrymals large; molariform teeth medium-sized; auditory bullae large and inflated; parapterygoid fossae large and deep but not markedly flared; rostrum relatively long and slightly expanded anterior to the infraorbital shield; nasals relatively broad and long; braincase flattened.

Measurements: Measurements of the holotype (age class 5; see Robbins, 1973) followed by averages and extremes of eight adults (age class 4) from the type-locality are, respectively: total length 289, 279 (269–300); head and body length 128, 117 (111–124); length of tail 161, 163 (158–176); length of hind foot 33, 33 (32–34); length of ear from

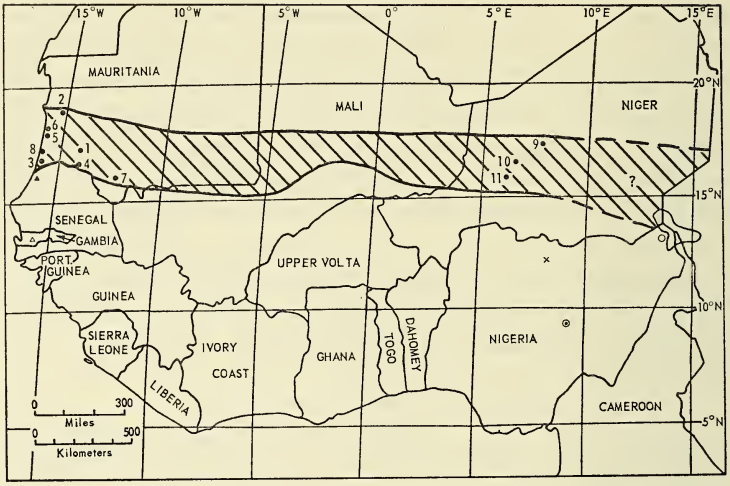

FIG. 1. Distribution of *T. arenarius* with known localities shown by closed circles. Type-localities for the other species and subspecies of West African *Taterillus* are: *T. pygargus*, closed triangle; *T. g. gracilis*, open triangle; *T. g. angelus*, ×; *T. g. nigeriae*, open circle with dot enclosed; *T. lacustris*, open circle.

notch 22, 21 (19–22); weight 59, 46 (42–52); greatest length of skull (GLS) 36.9, 35.6 (34.9–36.3); occipitonasal length 35.7, 34.3 (33.4–35.3); basilar length 26.9, 25.7 (25.2–26.5); zygomatic breadth 18.2, 17.6 (17.4–17.8); condylobasilar length 28.8, 27.5 (27.1–28.2); cranial breadth 14.6, 14.4 (13.6–14.7); least interorbital constriction 6.0, 6.1 (5.8–6.6); breadth of rostrum 4.5, 4.6 (4.4–4.8); greatest breadth across bullae (GBAB) 13.9, 13.4 (12.8–13.8); greatest width across upper molars 7.3, 7.1 (6.7–7.3); length of diastema 9.0, 8.9 (8.6–9.6); palatilar length 15.3, 15.0 (14.6–15.3); postpalatal length (PPAL) 11.3, 10.6 (10.0–11.0); length of anterior palatine foramina 6.2, 5.9 (5.5–6.5); length of palatal bridge 7.4, 7.3 (7.0–7.7); length of auditory bulla (LAB) 10.1, 9.4 (9.0–9.7); breadth of auditory bulla (BAB) 6.2, 5.8 (5.6–6.1); length of nasals 15.0, 14.8 (14.1–15.3); length of rostrum 13.4, 12.9 (12.7–13.6); frontonasal length 28.2, 27.2 (26.4–28.3); depth of cranium 13.7, 13.6 (13.0–13.8); length of posterior palatine foramina (LPPF) 3.8, 3.7 (3.2–4.2); alveolar length of first molar (ALM1) 2.8, 2.7 (2.4–3.1); alveolar length of maxillary toothrow 5.1, 5.1 (5.0–5.4).

Comparisons: *Taterillus arenarius* can be distinguished from *T. pygargus*, where the two occur together, by its markedly longer and more robust skull; flatter, less rounded braincase; broader rostrum and slightly larger incisors; more bulbous bullae; slightly smaller cheek

teeth; parapterygoid fossae larger (deeper) but not so widely flaring; and paler dorsal coloration. At Garak, Mauritania, where *T. arenarius* is sympatric with *T. pygargus*, the latter are darker dorsally and laterally—Snuff Brown and Tawny-Olive, respectively.

Taterillus arenarius differs from *T. gracilis* by its broader, more robust skull although the skulls are similar in length. The bullae of *T. arenarius* are more inflated anteriorly, antero-laterally, and ventrally. The pelage color of *T. arenarius* is conspicuously paler.

Taterillus arenarius closely resembles *T. lacustris*, from which it can be distinguished by its somewhat narrower nasals, flatter braincase, and more inflated bullae. The pelage color is similar.

Remarks: A specimen of *Taterillus* from Bou Rjeimat, Mauritania, has a reported karyotype of 2N = 30, FN = 36 (Matthey, 1969) and was identified by Matthey (1969), Petter (1970), and Petter (1972) as *T. nigeriae*. Inasmuch as the karyotype of *T. nigeriae* was not known, and since its geographic range is closer to Mauritania than any other known species of *Taterillus*, this allocation was made. However, an examination of available specimens of *T. nigeriae*, including the holotype, demonstrates that *T. arenarius* is distinct. *Taterillus nigeriae* is darker in dorsal coloration and occupies a different habitat.

Taterillus arenarius is restricted in distribution to the vegetated sandy habitats of the northern Sahel Savanna and Sub-Desert of West Africa. It is replaced southward by either *T. pygargus* or *T. gracilis*. Where sympatric with *T. pygargus*, this species occupies the sandier habitats while *T. pygargus* is found in areas with a harder substrate vegetated with tall grasses. Eastward, *T. arenarius* is replaced by *T. lacustris*.

Other rodents occurring with *T. arenarius* are: *Gerbillus* (*Gerbillus*) *gerbillus*, *G.* (*G.*) *pyramidum*, *G.* (*G.*) *nigeriae*, *G.* (*Hendecapleura*) *mauritaniae*, *G.* (*H.*) *amoenus*, *Tatera guineae*, *T. kempi*, *T. gambiana*, *T. wellmani*, *Desmodilliscus braueri*, *Jaculus jaculus*, *J. deserti*, *Arvicanthis niloticus*, and *Euxerus erythropus*.

Specimens examined: Mauritania (97). Inchiri Region: Bou Rjeimat, 1 (MNHP 247); Trarza Region: 11 km N Nouakchott, 5 (USNM 411120–411124); 6 km E Nouakchott, 3 (USNM 401117–401119); Tiguent, 48 (USNM 401893–401939); Garak, 10 (USNM 401940; 401941; 401950–401956; 401958); Brakna Region: 3 km S Aleg, 14 (USNM 401960–401973); Gorgol Region: Kaedi, 10 (USNM 401974–401983); Guidimaka Region: Passe de Soufa, 6 (USNM 401989; 401994–401996; 401998; 401999). Niger (15). Agadez Region: 5 km NE Agadez, 7 (USNM 482626–482632); 30 km S In-Gall, 3 (USNM 482633–482635); Tahoua Region: 120 km S In-Gall, 5 (USNM 482636–482640).

Gazetteer: (Localities plotted in Figure 1)

1.	Aleg, 3 km S	17°02'N., 13°55'W.
2.	Bou Rjeimat	19°04'N., 15°08'W.
3.	Garak	16°33'N., 15°46'W.

TABLE 1. Discriminant coefficients for characters most useful in separating three West African species of *Taterillus*. For explanation of abbreviations see text and Fig. 2

Character	A vs. P	A vs. G	P vs. G
BAB	9.287	11.552	2.265
GBAB	– 6.197	– 0.334	5.863
PPAL	–11.921	–20.116	– 8.195
GLS	4.758	– 7.975	–12.715
ALM1	14.857	22.794	8.237
LAB	– 6.624	– 2.408	4.216
LPPF	–14.407	–13.813	0.594

4. Kaedi 16°09′N., 13°30′W.
5. Nouakchott, 6 km E 18°09′N., 15°58′W.
6. Nouakchott, 11 km N 18°13′N., 16°01′W.
7. Passe de Soufa 15°56′N., 12°00′W.
8. Tiguent 17°16′N., 16°01′W.
9. Agadez, 5 km NE 17°02′N., 08°02′E.
10. In-Gall, 30 km S 16°33′N., 06°52′E.
11. In-Gall, 120 km S 15°45′N., 06°36′E.

Analysis of Variation and Diagnostic characteristics of the Species: Table 1 and Figure 2 show the results of the discriminant analysis on three species of *Taterillus*. The specimens of *T. gracilis* and *T. pygargus* were age class 4 animals (see Robbins, 1973) of known karyotype representing several localities in Senegal. The specimens of *T. arenarius* were also age class 4 from several Mauritania localities, but most were from the type-locality.

The mean and standard error for seven cranial characters in their order of inclusion in the discriminant analysis are shown in Table 2. These seven cranial characters were selected as the minimum necessary for discriminating the three species because of sample size. In addition, by step seven, the F-matrix in the discriminant analysis showed significant differences between the three groups at the 95 per cent level.

It should be noted that three of the cranial characters in the discriminant analysis reflect auditory bulla dimensions. *Taterillus arenarius* and *T. pygargus* have bullar shapes which are more similar to each other than either are to *T. gracilis*. In areas where *T. arenarius* and *T. gracilis* are sympatric (as well as areas where *T. pygargus* and *T. gracilis* occur together), comparisons of bullar shape and size are the most reliable method of distinguishing between the species. The length and direction of the cranial character vectors (Fig. 2) show the relative importance of each variable in discriminating between the three species. When a clean, intact skull is available, specimens of unknown identity can be correctly allocated.

TABLE 2. Means and standard error for seven cranial characters in their order of inclusion in the discriminant analysis. For explanation of abbreviations see text.

Character	*T. arenarius* (n = 15)		*T. pygargus* (n = 9)		*T. gracilis* (n = 7)	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
1. BAB	5.70	0.084	5.50	0.087	5.30	0.117
2. GBAB	13.40	0.109	13.80	0.137	13.30	0.157
3. PPAL	10.50	0.149	10.50	0.070	10.90	0.146
4. GLS	35.40	0.190	35.00	0.102	35.30	0.261
5. ALM1	2.66	0.081	2.83	0.041	2.77	0.047
6. LAB	9.40	0.082	9.30	0.087	9.40	0.084
7. LPPF	3.60	0.121	3.60	0.095	3.50	0.094

The chromosomes of *T. arenarius* are only known from the female reported under the name *T. nigeriae* by Matthey (1969). Its karyotype (as reported by Matthey, 1969) consists of one pair of large subtelocentrics, three pairs of medium-sized to small metacentrics, and ten pairs of medium-sized acrocentric autosomes. The X-chromosomes are large submetacentrics. The Y-chromosome is unknown.

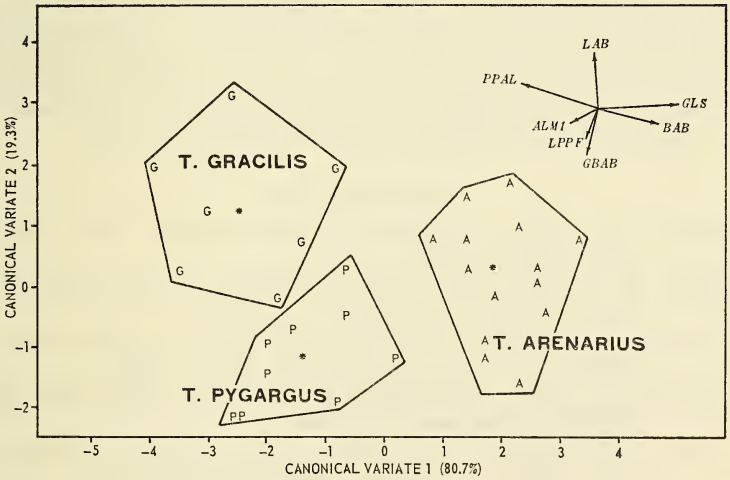

FIG. 2. Projection of the first two canonical variates for three species of West African *Taterillus*. Vectors show relative contributions of the characters in the discriminant analysis. For explanation of abbreviations see text.

On gross morphology, the four West African species of *Taterillus* appear to be closely related. However, their different karyotypes do not affirm a common derivation. The 2N = 28, FN = 44 karyotype of *T. lacustris* could have been easily derived from the 2N = 36, FN = 44 karyotype of *T. gracilis* through four fusions. However, serum protein analysis (Tranier *et al.*, 1974) shows that *T. lacustris* is more closely related to *T. pygargus* than to *T. gracilis*. The 2N = 30, FN = 36 karyotype of *T. arenarius* and the 2N = 22, FN = 40 karyotype of *T. pygargus* could also have been derived from the *T. gracilis* karyotype, but would have required a complex series of translocations and inversions. The 2N = 22, FN = 40 karyotype of *T. pygargus* could have been derived from the 2N = 30, FN = 36 karyotype of *T. arenarius* through two inversions and four fusions. Speculation on the relationships of these four species based on their karyotypes is premature at this time, and should await additional information from banding pattern analysis.

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