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**GEOLOGY AND PALAEOBIOLOGY OF THE
NORTHERN SPERRGEBIET, NAMIBIA**

by

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Tubulidentata from the Northern Sperrgebiet, Namibia

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Remains of Tubulidentata are extremely rare in the Northern Sperrgebiet Early Miocene deposits. After 15 years of surveys, the Namibia Palaeontology Expedition found the first fossil of this order, the distal end of a first phalanx at Grillental Borrow Pit site, similar in dimensions to those of *Orycteropus africanus* and *O. chemeldoi*.

Introduction

Aardvark fossils are not common in African Miocene deposits, yet a variety of specimens has been recovered from localities in Uganda (Pickford, 1994), Kenya (Patterson, 1975, 1978; Pickford, 1975), South Africa (Pickford, 2005) and Namibia (Pickford, 2003). In the latter country small aardvark fossils were recovered from Arrisdrift (Pickford, 1996, 2003) and Rooilepel (Pickford, 1996) but until recently they were unknown in the Early Miocene deposits of the northern Sperrgebiet. In 2007, however, the distal half of a first phalanx was found at Grillental, proving the presence of Tubulidentata in the region about 20 million years ago.

Systematic description

Order Tubulidentata Huxley, 1872
Family Orycteropodidae Bonaparte, 1852
Genus *Orycteropus* Geoffroy, 1795
Species *Orycteropus africanus* MacInnes, 1956
or *Orycteropus chemeldoi* Pickford, 1975

Material : GT 76'07, distal end of first phalanx (Fig. 1).

Locality : Grillental Borrow Pit site.

Description : The distal end of the first phalanx from Grillental, here attributed to *Orycteropus*, possesses a hemicylindrical distal articulation which is slightly concave on the plantar/volar side, becoming flat dorsally (Fig. 1). The medial and lateral sides of the distal epiphysis possess deep fossae for tendinal insertions. The little of the diaphysis that is preserved reveals a slight dorso-volar compression of the shaft as is usual in aardvark first phalanges. The dorsal part of the distal articulation is not raised above the axis of the diaphysis, indicating that the specimen is not a second phalanx. It is not possible to determine with certainty whether the specimen is from the manus or the pes, although its robustness suggests that it is possibly from the foot.

Discussion : Aardvarks are medium sized mammals that exploit underground social insects, in particular termites, as their main source of nutrition. As such they have well developed burrowing adaptations which are clearly expressed in the post-cranial skeleton, including the phalanges, which have almost cylindrical distal articular surfaces and deep medial and lateral fosses for insertions of tendons. Such pha-



Figure 1. GT 76'07, distal end of a 1st phalanx of *Orycteropus africanus/chemeldoi* from Grillental Borrow Pit site, northern Sperrgebiet, Namibia (scale : 10 mm).

Table 1 : Dimensions (in mm) of distal ends of median first phalanges (digits II, III, and IV) of *Orycteropus* species.

Specimen N° and locality	Specimen	Species	Distal breadth	Distal height
KNM ER 876 East Turkana	1st phalanx digit II manus	<i>O. afer</i>	11.1	8.3
KNM ER 876 East Turkana	1st phalanx digit III manus	<i>O. afer</i>	11.0	9.1
KNM ER 876 East Turkana	1st phalanx digit IV manus	<i>O. afer</i>	11.0	9.1
GT 76'07 Grillental	1st phalanx distal end	<i>O. africanus/chemeldoi</i>	8.3	6.9
M 21536 1264'50 Rusinga	1st phalanx digit II manus	<i>O. africanus</i>	7.9	5.0
M 21536 1264'50 Rusinga	1st phalanx digit IV manus	<i>O. africanus</i>	8.9	7.0
M 21508 1264'50 Rusinga	1st phalanx digit II manus	<i>O. africanus</i>	7.1	5.4
KNM RU 3059 Rusinga	1st phalanx unknown position	<i>O. africanus</i>	5.4	4.5
KNM FT 3327 Fort Ternan	1st phalanx digit III manus	<i>O. chemeldoi</i>	7.6	5.7
KNM BN 269 Ngorora	1st phalanx digit IV manus	<i>O. chemeldoi</i>	7.4	6.3
KNM SO 1236 Songhor	1st phalanx digit III manus	<i>O. minutus</i>	4.9	4.2
KNM MW 88 Mfwangano	1st phalanx unknown position	<i>O. minutus</i>	5.6	4.9
KNM RU 3055 Rusinga	1st phalanx unknown position	<i>O. minutus</i>	5.1	3.7
KNM RU 3056 Rusinga	1st phalanx unknown position	<i>O. minutus</i>	4.5	4.3

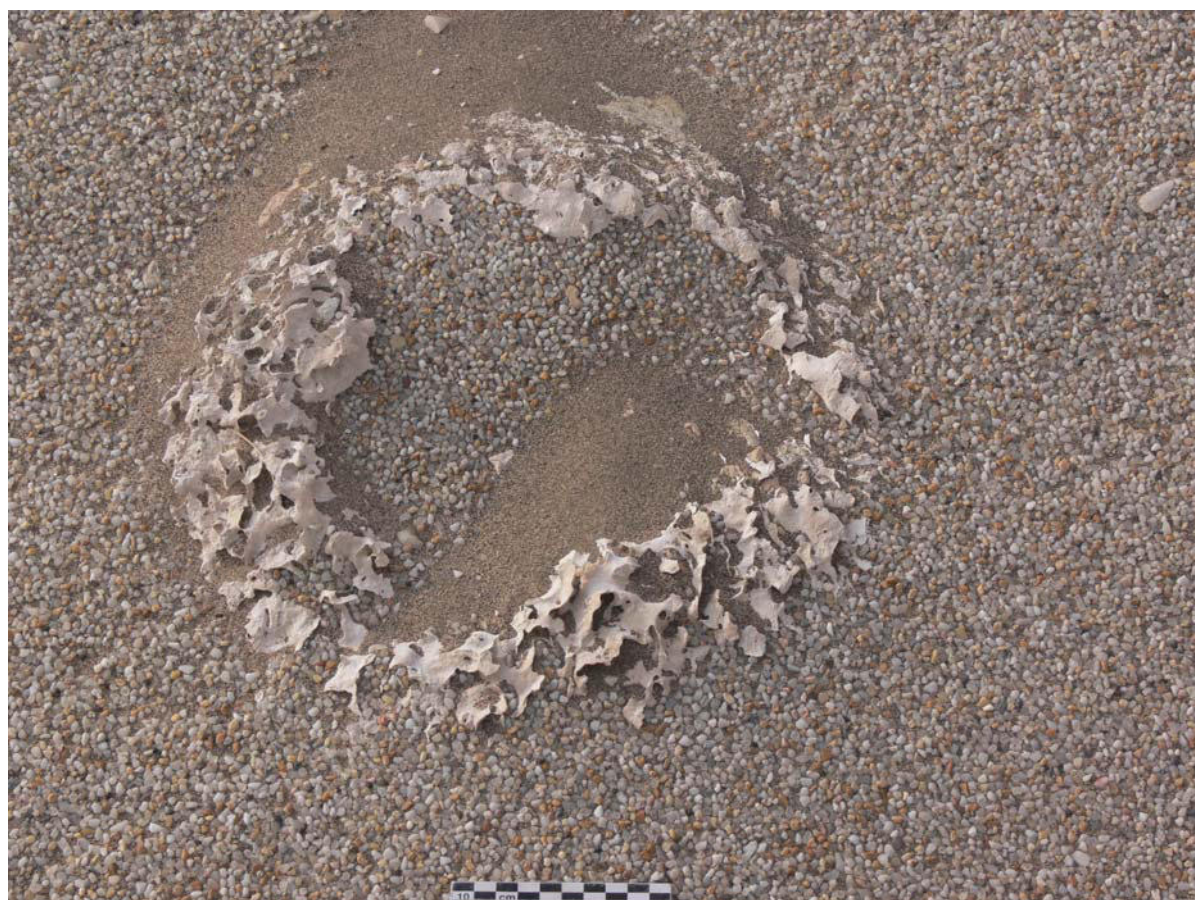


Figure 2. *Namajenga mwichwa*, fossilised hive of *Hodotermes*, the harvester termite, from Grillental 6, northern Sperrgebiet, Namibia, possible food source for *Orycteropus africanus/chemeldoi*.

langes are difficult to confuse with those of other mammals, the only ones even approaching this morphology being those of the hind foot of pedetids, which also spend a great deal of time burrowing. However, pedetid phalanges are generally considerably smaller than those of armadillos, even those of the giant genus *Megapedetes*, and detailed scrutiny reveals differences in the position of the distal articulation relative to the diaphysis, and other characteristic features such as the slenderness of the phalanges relative to their length.

The Grillental distal first phalanx accords in all its morphological details with those of *Orycteropus*. Given that its position within the hand or foot cannot be determined, it is not possible to be categorical about the species identification, but it is clearly too large to belong to *Orycteropus minutus* (Table 1) and too small to belong to *Orycteropus afer*. It is compatible in size with *O. africanus* and *O. chemeldoi* (MacInnes, 1956; Patterson, 1975; Pickford, 1975, 1994). This discovery complements previous records of the order Tubulidentata in southern Africa by extending their fossil record downwards in time to about 20 Ma.

Conclusions

Armadillo fossils are rare in the Early Miocene deposits of the northern Sperrgebiet. The single specimen found by the Namibia Palaeontology Expedition accords in size and morphology with the Early Miocene East African species *Orycteropus africanus* MacInnes, 1956 and the Middle Miocene species *Orycteropus chemeldoi* Pickford, 1975. The discovery of Tubulidentata in the northern Sperrgebiet extends their southern African fossil record downwards in time to about 20 Ma, the previous oldest record from the subcontinent being material from Arrisdrift in the Orange River Valley dated about 17.5 Ma (Pickford, 2003). The common occurrence of hives of the harvester termite, *Hodotermes*, in the green silts at Grillental (Fig. 2), suggests a possible source of nutrition for *O. africanus*.

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