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

by

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Introduction to the Early Miocene Palaeontology of the Northern Sperrgebiet

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Over 80 years have passed since the first Early Miocene fossils were described from "south of Lüderitz", in what was at the time German South West Africa. Over the years more than 4,000 fossils have been collected from the region, of which more than 3400 were collected by the Namibia Palaeontology Expedition between 1993 and 2006. Quite a few of the taxa described by Stromer (1926) and Hopwood (1928) were known from inadequate material, sometimes just a single incomplete jaw, but others were known from articulated skeletons. As is usually the case, the new collections reveal the limitations of the previously available samples, and permit a thorough revision of the faunas. Not unexpectedly, these discoveries have implications for the interpretations of other African Early Miocene faunas, especially those from Kenya and Uganda which have traditionally been compared to those from the Sperrgebiet. It is shown that some of the taxa hitherto considered to be distinct, are in fact synonyms, whereas others thought to be identical are different.

Introduction

For the purposes of this monograph, the northern Sperrgebiet is defined as that part of the Sperrgebiet lying north of the latitude of Chameis and south of Lüderitz. The Early Miocene deposits in the region occur in several geomorphological settings, the richest localities being in palaeovalleys that were incised into the Namib Unconformity Surface during the Oligocene, when sea level was considerably lower than it is today. These valleys were backfilled with sediments when sea level rose in the Early Miocene. Other Early Miocene localities in the Sperrgebiet occur in craters and yet others are in palaeosols.

Previous work

The earliest palaeontological collections in the region were made before 1920 by E. Kaiser and W. Beetz (1926) who sent the fossils to München, Germany, where they were studied by E. Stromer (1922, 1923, 1926), E. Ahl (1926), and W. Wenz (1926), who never saw the deposits from which they came. Similarly, a small collection presented to the American Museum of Natural History, New York, by F. Lang was described by A.T. Hopwood (1929) who did not visit the Sperrgebiet. An exception was the collection made by R. Hamilton and J. Van Couvering in 1975, the first in which a practising palaeontologist visited the region and made his own collections and descriptions (Hamilton and Van Couvering, 1977). A few fossils that were donated from time to time to the South African Museum in Cape Town were found on an *ad hoc* basis by geologists and archaeologists.

Recent surveys

The Namibia Palaeontology Expedition started

surveying these deposits in 1994 after a brief introductory visit in 1993 in the company of geologist John Ward of CDM (Pty) Ltd, now Namdeb (Pickford and Senut, 2000). The NPE has visited the region every year since then save for 2002, and each time has found important fossil material. The NPE not only surface collected, but also wet screened suitable deposits, acid-treated impure limestones containing fossils and excavated areas with *in situ* fossils, the first time that these techniques were used in the Sperrgebiet (Fig. 1). It was also the first expedition during which palaeontologists spent substantial periods of time crawling over deposits in search of fossils and prospecting for new sites in a systematic way. By this means several fossil groups that were not previously known from the Early Miocene deposits such as small gastropods, fish, and charophytes, were discovered. It is not surprising therefore, that many new species have been found, in particular small vertebrates and microfossils, and that several of the hitherto poorly known taxa such as *Diamantomys luederitzi* are now represented by complete maxillae and mandibles and sometimes associated skeletons. This species, which has become emblematic of the Sperrgebiet on account of its name, was hitherto known only by two specimens; the holotype (Stromer, 1922), a damaged right mandible with p/4 with part of the incisor and a right mandible with m/1-m/3, both from Langental (Stromer, 1926). It is now known by dozens of specimens from several localities, meaning that the range of variation of the species can be better appreciated. Comparisons with East African material attributed to the species can also be made on a more secure basis. Previously unknown medium and large mammals have also been collected, including the first large hyracoids from the Miocene of Southern Africa.

Over the years the NPE has improved the sample of almost all the taxa described by Ahl (1926), Stro-



Figure 1. Grillental Carrière Early Miocene locality (rough surface in foreground) with large barchan dune encroaching the site.

mer (1922, 1923, 1926), Hopwood (1929) and Wenz (1926). The exception is *Metapterodon kaiseri*, a small creodont of which the holotype is still the only known specimen. It has also found many fossils belonging to groups that had not previously been recorded from the deposits, including termite hives (Fig. 2).

The NPE has also found that some of the taxa erected by Stromer, such as *Myohyrax doederleini* are synonyms of others, in this case *Myohyrax oswaldi*. The same applies to *Austrolagomys simpsoni* Hopwood, 1929, which is a synonym of *A. inexpectatus* Stromer, 1924, the supposed differences in size being due to measurement error. Hopwood gives the measurement of p/4-m/3 as 6.1 mm, but the specimen he had available only has the p/4-m/2, which are 6.3 mm long (Mein and Pickford, 2003). The genus *Kenyalagomys* MacInnes, 1953, is a synonym of *Austrolagomys*, the supposed differences listed by Whitworth, being due to the poor state of the material described and illustrated by Stromer (1926) (Mein and Pickford (2003). This monograph examines many fundamental questions about the taxonomy of Namibian and East African fossil mammals, and reveals that in-depth revision of several groups is required.

All the sites in the northern Sperrgebiet are subjected to the action of persistent, often violent winds,

predominantly from the south, but also from the east and occasionally from the north (Fig. 1). These winds constantly shift the sand cover at the sites and uncover or rebury fossils exposed at the surface, so that each time the wind changes direction previously hidden fossils can be recovered as the sand is removed from them. In the Sperrgebiet, the rate of erosion of sediments that are unprotected by a gravel or granule cover can be extremely high. Trommel screen heaps left by German miners on level ground at Grillental are now perched on small hillocks that are waist high, meaning that about 1 metre of deflation has occurred since the trommel heaps were made in the 1920's. At Langental, the trommel heaps are between knee height and waist height.

The only previously known mammal locality that the NPE did not resample was the Bohrloch near Betrieb 4, an artesian well drilled by German miners, from which W. Beetz collected several fossils which include some holotypes of species erected by Stromer (1926). Attempts to excavate through the Fiskus Aeolianite with heavy machinery in order to reach the Early Miocene sediments beneath were not successful, so for the time being this site is still not available for research. It should be noted that the descriptive coordinates of the locality published in Stromer (1926) are incorrect, although the map is more or less right. The site is in fact south of Betrieb 4 and not



Figure 2. Grillental 6 locality - *Hodotermes* hive in green silts underlying coarse grits of Early Miocene age.

2 km west of it. The well was drilled to a depth of 30 metres.

Conclusions

A brief summary of previous and recent palaeontological work in the Northern Sperrgebiet provides a background for the present monograph. Prior to the surveys of the Namibia Palaeontology Expedition, about 800 fossils belonging to 20 vertebrate species had been reported from the area. The collections now stand at over 4,000 specimens, among which, not surprisingly, there are several new taxa.

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