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

by

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Macroscelididae from the lower Miocene of the Northern Sperrgebiet, Namibia

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Macroscelididae are known from four main localities in the Northern Sperrgebiet (Namibia) (Elisabethfeld, Fiskus, Grillental and Langental) which have yielded a rich sample (ca. 600 specimens) including skulls, mandibles and post-cranial elements. The fauna is mainly composed of hypsodont species (*Myohyrax oswaldi* Andrews, 1914 and *Protypotheroides beetzii* Stromer, 1926) which are particularly abundant. A new species *Myohyrax pickfordi* and two new genera and species of rhynchocyonine macroscelidids are erected: *Brachyrhynchocyon jacobi* and *Hypsorhynchocyon burrelli*. Material from the Middle Miocene of Arrisdrift is reconsidered in the light of the newly erected species.

Introduction

Diamond exploitation in the Sperrgebiet (Southern Namibia) led to the discovery of several Miocene deposits which yielded a diverse and rich mammalian fauna. These deposits occur in the fossil loops of the Oranje river (Arrisdrift and Auchas Mine) in the South and in fluvialite and floodplain deposits in the North (Elisabethfeld, Fiskus, Grillental and Langental). Among the mammals, Macroscelididae (elephant-shrews) are well represented.

The rich and diverse Miocene fauna collected from several areas of the Sperrgebiet by the geologist Werner Beetz was described by the German palaeontologist Ernst Stromer during the early 1920's. After these early years of study, several decades passed with no activity, then collecting resumed in the mid 1970's in the Oranje River Valley, when Gudrun Corvinus and Hendey (1978) and her team found the first Middle Miocene site in Southern Africa, the mammalian fossils being described by Corvinus and Hendey (1978). In the early 1990's, new excavations and prospecting by the Namibia Palaeontology Expedition (a Franco-Namibian co-operative program) led to the discovery of more than 10,000 fossils in the Oranje River deposits (Senut, 2003) and several thousand in the Northern Sperrgebiet, including macroscelidids, which are studied here.

The Miocene fossil sites of the Northern Sperrgebiet

During mining activities between 1908 and 1920, several fossiliferous levels were found while drilling near E-Bay Mine in the Northern Sperrgebiet and prospecting in the palaeovalleys in the Lüderitzbucht by the German geologist Werner Beetz who sent his collections to Ernst Stromer at the Naturhistorisches Museum in Munich who published the first Macroscelidea from the area (Stromer, 1922, 1924, 1926). The Miocene sites occur in two different con-

texts (Pickford & Senut, 1999): Lower Miocene infillings of valleys incised during the Late Oligocene such as Langental and Grillental or floodplain deposits such as Elisabethfeld (Figure 1). These deposits yielded abundant macroscelidid remains. Three macroscelidid species were recorded by Stromer: a large, hypsodont species, *Protypotheroides beetzii* Stromer, 1922 (which was synonymised with *Myohyrax osborni* Hopwood, 1929 by Whitworth in 1954), and two smaller hypsodont species *Myohyrax doerdeleini* Stromer 1924 and *Myohyrax oswaldi* Andrews 1914.

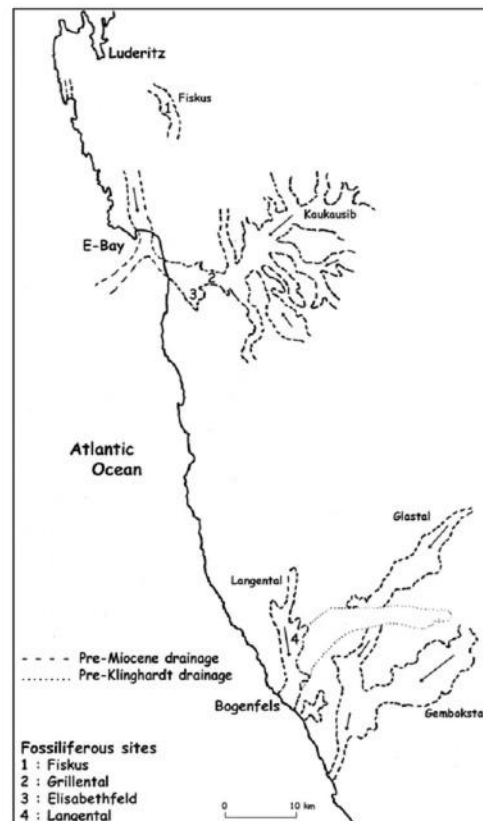


Figure 1. Localisation of the fossil sites of the Northern Sperrgebiet, Namibia.

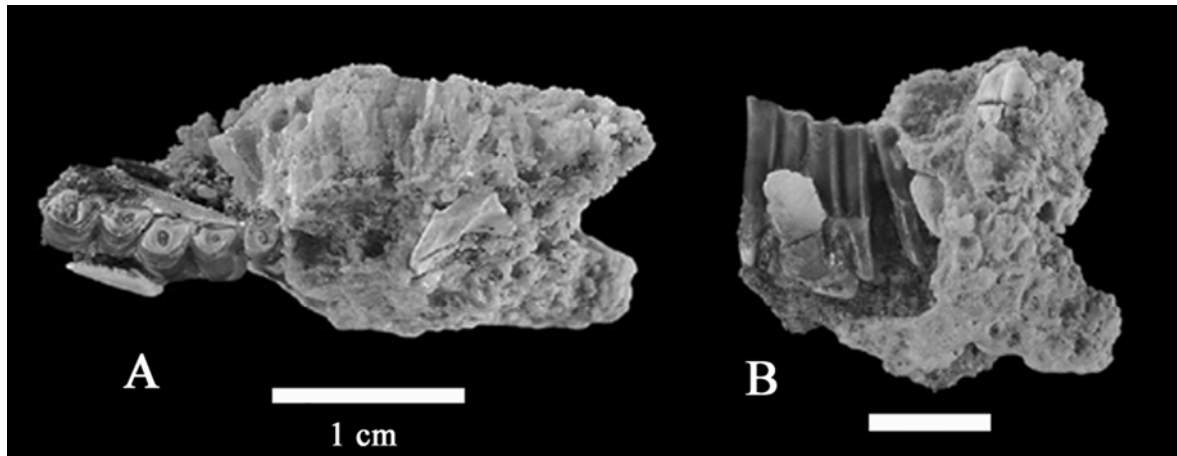


Figure 2. Left mandible of *Protypotheroides beetzii* (LT 86'01) from Langental, Namibia, preserved in gypsum (A) occlusal, and (B) buccal views.

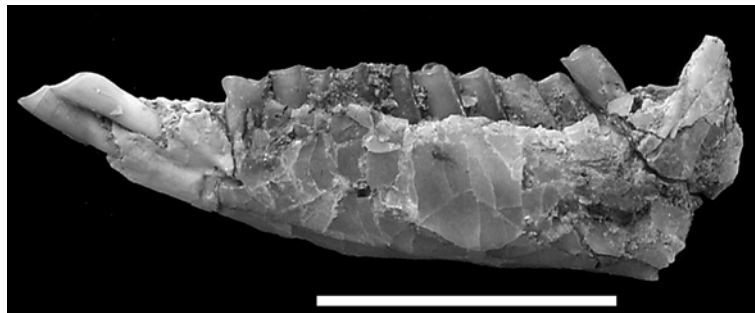


Figure 3. Left mandible of *Myohyrax oswaldi* (EF 53'01) from Elisabethfeld, Namibia, with the bone replaced by gypsum, buccal view.

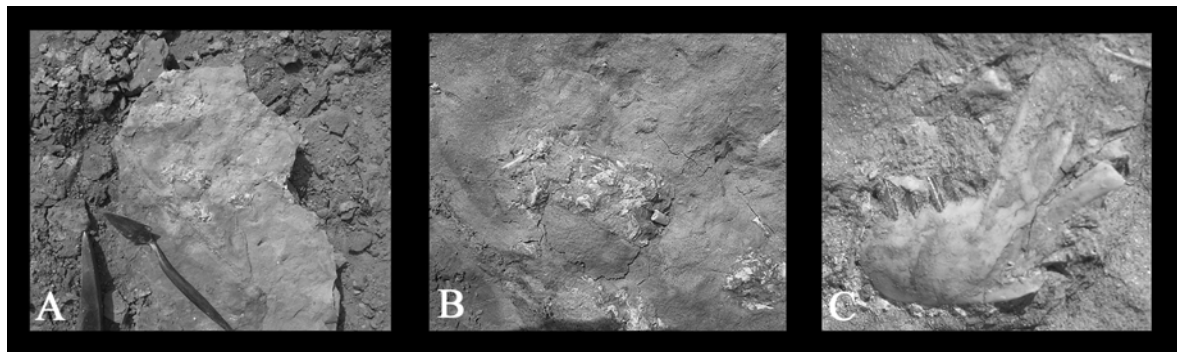


Figure 4. Bones preserved in carnivore scats fossilised in the silty clays at Elisabethfeld (A), close-up (B), sometimes a complete mandible is preserved such as this one of *Myohyrax oswaldi* (C).

It was later shown that *Myohyrax doederleini* was a synonym of *Myohyrax oswaldi*, already known from Karungu in East Africa and subsequently identified at Arrisdrift by Hendey (1978) and Senut (2003).

Two hypsodont taxa are represented at the 3 main sites (Langental, Grillental and Elisabethfeld) by mandibular, dental, cranial and post-cranial remains and a third one is known at Langental. At Elisabethfeld, a mandible of a Miorhynchocyoninae is present but it is bigger than the one from Arrisdrift. At Grillental and Langental, a few specimens (a mandible and a few upper incisors with several digita-

tions) of a very large species have been found which belong to a new taxon.

Material : The macroselidean fauna from the Northern Sperrgebiet is abundant (more than 800 specimens of which a list is given in annexes 1-4). This study includes the early material found by Beetz (Stromer, 1926) and the new specimens discovered during field work by the Namibia Palaeontology Expedition from 1994 to 2008. The fossils have been compared with the vast collection (more than 400 specimens) from Arrisdrift (Senut, 2003), but also

with collections of extant Macroscelididae at the Transvaal Museum (Pretoria) and the Africa Museum at Tervuren (Belgium).

Taphonomy : At Langental, some of the fossils are gypsified and some remains are half replaced by gypsum (Fig. 2, 3).

At Elisabethfeld, a lot of specimens were found in carnivore scats. The bones and teeth are thus damaged, but are still complete (Fig. 4) and they could be measured and included in the hypodigms. Some specimens, including an articulated skeleton of *Myohyrax oswaldi*, were found in their burrows (Fig. 5).

Systematic descriptions

Order Macroscelidea Butler, 1956

Family Macroscelididae Bonaparte, 1838

Subfamily Myohyracinae Andrews, 1914

Genus *Myohyrax* Andrews, 1914

Type species : *Myohyrax oswaldi* Andrews, 1914

Species *Myohyrax oswaldi* Andrews, 1914

Emended diagnosis of the genus : ascending ramus of the mandible vertical. The rest of the diagnosis of the genus and the species is the same as published by Senut (2003).

Description : The material from the Sperrgebiet is comparable in size and morphology to the specimens from Arrisdriift. At Elisabethfeld, complete associated skulls and mandibles (including a young one from Elisabethfeld) have been found in the reddish silty clays (such as EF 240'01 and EF 1'06; Fig. 6) (Pl. 1B, 3, 4, 6C).

Mandible : same morphology as the Arrisdriift material (Senut, 2003) (Pl. 4, Fig. 3).

Lower dentition : Measurements of the teeth are provided in annex 6. The anterior teeth are, as usual, very rare.

I/1 : EF 17'01 (right), EF 17'01 (left), EF 53'01, (left) EF 144'01 (left), EF 33'05(left), EF 86'01(left), EF 33'05 (right), EF 34'05 (right), EF 103'01 (right).

I/2 : EF 17'01 (right), EF 218'01, EF 40'01 (left), EF 53'01 (left), EF 61'01 (left), EF 33'05 (left), EF 34'05 (left), EF 33'05 (right), EF 34'05 (left), EF 33'05 (right), EF 281'01 (right), EF 103'01 (right)

I/3 : EF 17'01 (right), EF 33'05 (left), EF 33'05 (right)

Canine : The canines are preserved *in situ* in 4 specimens: EF 17'01 (right), EF 33'05 (left), EF 33'05 (right), EF 33'05 (right). It resembles the first premolar with two poorly isolated tubercles united by a low crest.

The morphology of the cheek teeth of the specimens from Arrisdriift has already been described in Senut (2003). In the cheek teeth, the p/1 is repre-

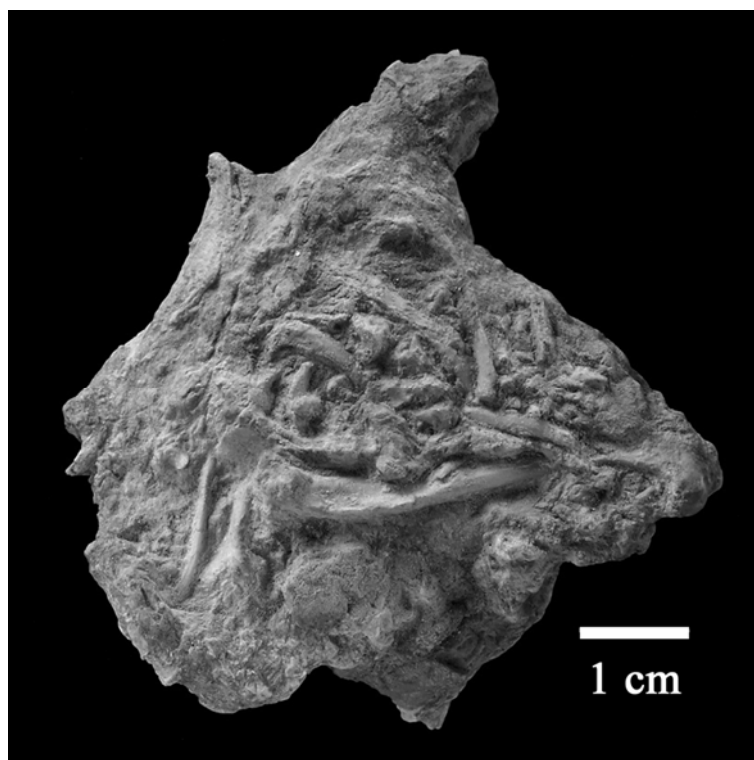


Figure 5. Articulated skeleton of *Myohyrax oswaldi* from Elisabethfeld, Namibia.

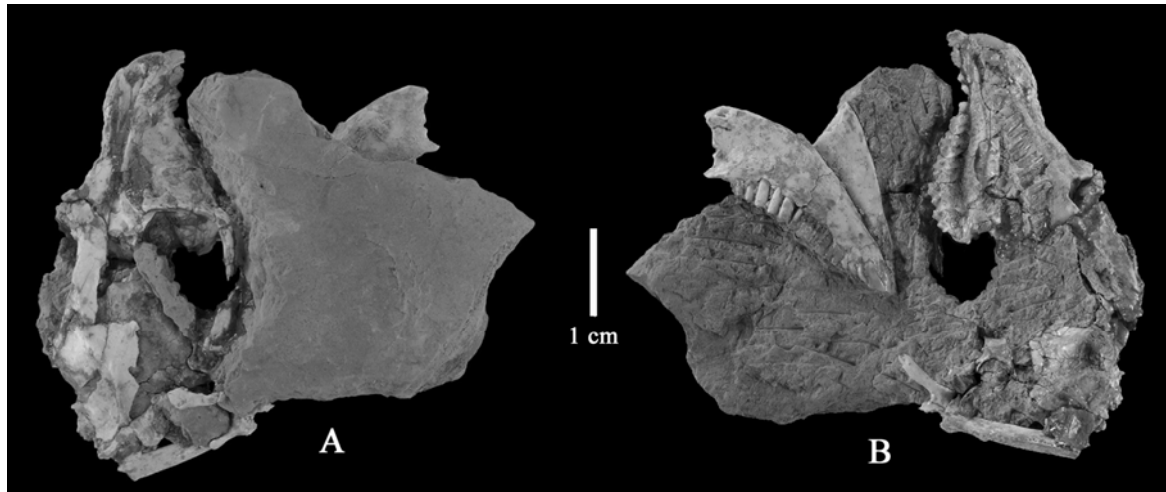


Figure 6. Complete skull and mandible (EF 1'06) of *Myohyrax oswaldi* from Elisabethfeld, Namibia, (A) oblique dorsal view, (B) oblique ventral view. The silty sediment has been left in place to preserve the relationship between the skull and the mandible.

sented by only two specimens from Elisabethfeld: EF 17'01 (left), EF 35'05 (right).

p/2 : EF 17'01 (right), EF 17'01 (left), EF 40'01 (right), EF 53'01 (left), EF 144'01 (left), EF 61'01 (left), EF 33'05 (left), LT 220'03 (left), EF 33'05 (right), EF 34'05 (right), EF 10'04 (right), EF 35'05 (right), EF 18'98 (right), EF 103'01 (right), EF 25'05 (right).

p/3 : EF 69'94, EF 87'94, EF 15'98, EF 18'98, EF 17'01, EF 40'01, EF 41'01, EF 53'01, EF 61'01, EF 83'01, EF 105'01, EF 144'01, EF 218'01, EF 281'01, EF 15'05, EF 25'05, EF 33'05, EF 34'05, EF 35'05, EF 36'05, EF 1'07, EF 22'07, GT 210'06, GT 29'07, LT 198'98, LT 19'00, LT 220'03, LT 167'04, LT 19'08, LT 30'08.

p/4 : see annex 6.

m/1-m/2 : see annex 6.

In general, the jugal teeth from p/3 backwards are composed of two pillars. In the p/3, both the mesial and distal pillars are triangular in shape. In the molariform p/4, the mesial pillar is quadrangular and the distal one triangular. As is usual in the hypsodont macroscelideans, the lingual margin is taller than the buccal one. The p/4 is positioned upright in the mandible whereas from m/1 distally the molars are anteriorly inclined and very much so in the m/3.

The trigonid is more flattened on m/1 and m/2 being different from p/4. The metaconid appears pinched and is reinforced by a stylid. The wear pattern is crescentiform in the trigonid and uniform on the two pillars. The m/3 is formed of a single pillar.

Skull (Fig. 6, 7; Pl. 3): Several partial skulls are preserved in the new material which permit us to complete the description previously published; despite the fact that some of them are crushed (more or less severely), some aspects of the morphology can be still studied. The skull was not as flattened as in Miorhynchocyoninae (Butler, 1984). The muzzle is short,

narrow, with a triangular outline and not flattened. It is rather globular in the immature specimen (which will be described later). In the best preserved skull (EF 1'06), the sutures are not visible except in the nasal area, where the limit between the premaxilla and the maxilla is clear, despite the supero-inferior crushing of the skull. The suture runs up to the level of P1/. The bony palate can be observed in some specimens (EF 45'96, EF 240'01, EF 1'06), but due to the crushing of the bone, no fenestra can be clearly seen; however in EF 1'06, a lateral border of a clear depression could correspond to the external border of a fenestra which is developed at the level of C1/-P1/. The total length of EF 1'06 is 46.9 mm, which is probably slightly overestimated, but in size, it lies between extant *Elephantulus* and *Rhynchocyon* and close to *Petrodromus* (Fig. 7). The palate of *Myohyrax oswaldi* seems to be more depressed than that of the modern representatives of the group (*Elephantulus*, *Petrodromus*, *Macroscelides*, *Rhynchocyon*), but this might be partly due to fossilisation damage. However, the fenestration of the palate will remain a matter of uncertainty until a perfectly preserved specimen is found. In EF 1'06, the posterior area preserves the upper part of the occipital bone from which originates a short acerate sagittal crest (comparatively longer than in the modern *Rhynchocyon*). This crest is bordered on the left side by a small buttress resembling the morphology seen in extant *Rhynchocyon*. The zygomatic arch can be seen on several specimens and shows the same morphology as in the fossils from Arrisdrift: a thick base which flattens quickly posteriorly. It rises at the level of M1/ and curves backwards. It seems also weakly laterally salient, which is generally the case in extant Macroscelididae. The anterior limit of the orbits lies over P4/-M1/ and is thus different from *Rhynchocyoninae* in which it is situated behind M2/. In overall morphology, the specimen is close to the speci-

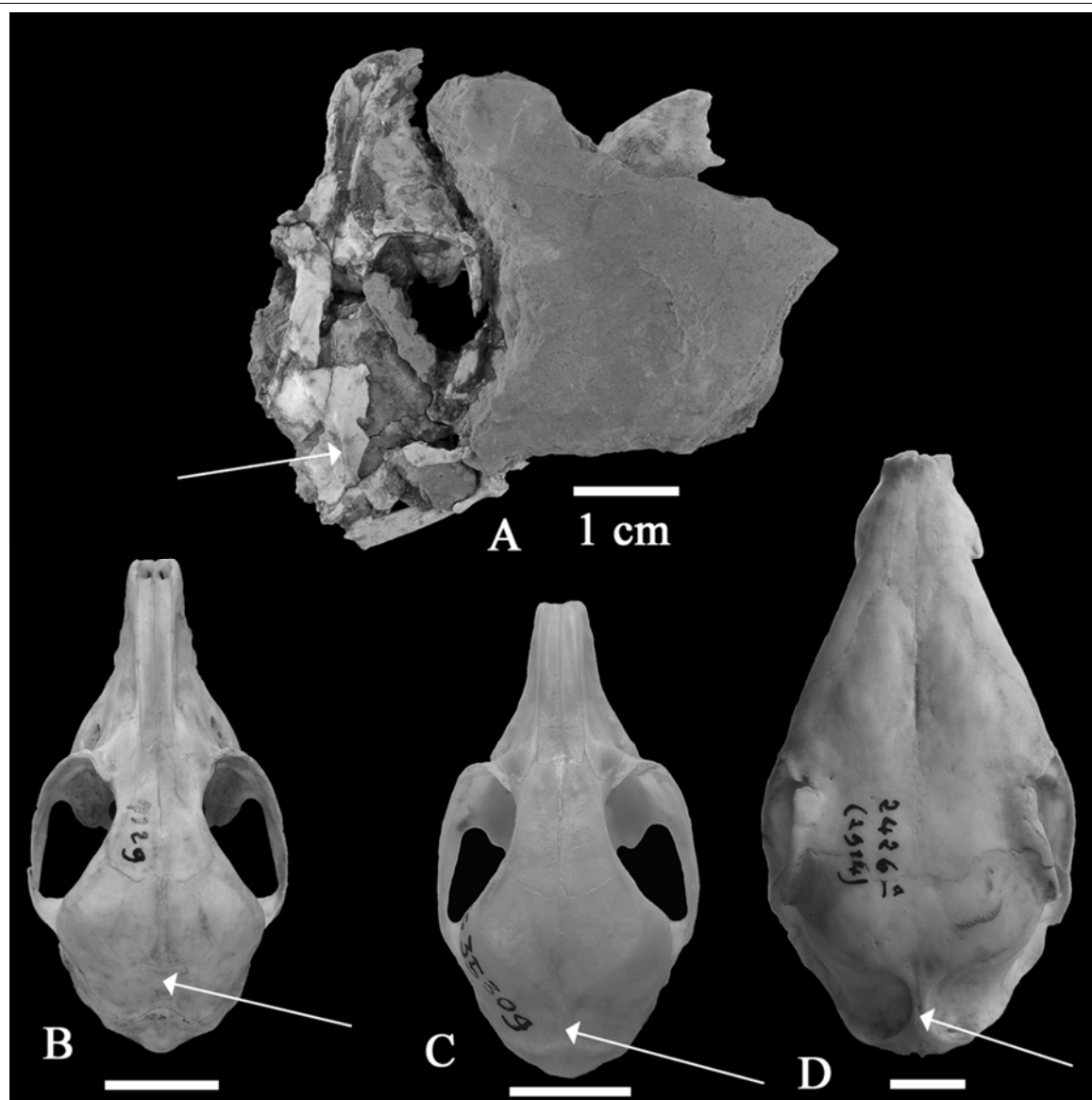


Figure 7. Comparison of a skull of *Myohyrax oswaldi* (EF 1'06) in dorsal view (A) with the skulls of extant *Petrodromus* (B), *Elephantulus* (C) and *Rhynchocyon* (D). Note the development of the sagittal crest (arrow). This area is deepened in *Rhynchocyon* and *Petrodromus* and the fossil whereas it is more inflated in *Elephantulus*. Note also the general morphology of the muzzle and the position of the orbits in the fossil which resembles more closely *Elephantulus* and *Petrodromus* than *Rhynchocyon*. (Scale = 1 cm).

men published by Whitworth (1954) and the specimens already described from Arrisdrift (Senut, 2003).

Upper dentition (Pl. 1B, 3, 6C): Measurements are provided in annex 5. The skull of *Myohyrax oswaldi* from the Northern Sperrgebiet is the same as the Arrisdrift material (Senut, 2003). A few maxillae are known and compare well with the geologically younger specimens from Arrisdrift. In the maxilla from Arrisdrift, the M3/ was rarely present, but in some fossils from Elisabethfeld, the M3/ is present and consists of a single pillar.

This taxon is by far the most abundant of the

macroscelidids in the Sperrgebiet, especially at Elisabethfeld.

Species *Myohyrax pickfordi* nov.

Holotype : LT 116'07, left mandible with i/1-i/3, c/1, alveolus of p/1, p/2-p/4, m/1-m/2, alveolus of m/3 (Fig. 8).

Paratypes : LT 26'99 (fragment of left maxilla with P3/-P4/, weathered M1/); LT 26'00 (fragment of right maxilla with P4/, M1/-M2/ (M2/ broken distally)).

Referred material : LT 171'96 (fragment of right mandible with p/3-p/4); LT 172'96 (fragment of left mandible with half p/2, p/3-p/4 (p/4 broken and all teeth are cracked open); LT 174'96 (fragment of left mandible with m/1); LT 187'98 (fragment of left mandible with m/2, alveolus of m/3 and base of the ascending ramus); LT 25'99 (fragment of right mandible in two pieces with half p/3, p/4, m/1); LT 18'00 (rolled fragment of left mandible with p/4, m/1-m/2); LT 87'04 (right p/4 in mandibular bone); LT 2'05 (fragment of left maxilla with P/4, M1/); LT 112'07 (fragment of left maxilla with P4/-M1/) (Fig. 7, 8; Pl. 6B).

Diagnosis : Species of *Myohyrax* larger than *Myohyrax oswaldi* and slightly smaller than *Protypotheroides beetzii*; stylids more marked and acerate in the lower cheek teeth and presence of fossettids in p/3-p/4 and m/1-m/2; mental foramina present below the junction of p/1-p/2 and between p/4-m/1; teeth highly hypsodont; p/2 smaller than p/3; i/1-i/2 with sharp cutting edge; i/1 procumbent with two poorly expressed denticulations and recurved towards the mesio-distal axis of the mandible; i/2 mesio-distally elongated, spatulate with lingual wear and sharp occlusal edge; its mesial edge is slightly recurved and touches the distal end of the i/1; i/2 triangular in shape with a tiny mesial denticulation; i/3 much

smaller than i/2 with a strongly anteriorly developed crown which overlaps the distal end of i/2; i/3 is the smallest incisor with three indistinct denticulations; c/1 resembles i/3 in the mesio-distal elongation of the crown and it possesses three tubercles (2 mesial equally developed ones and a clear distal one isolated from the mesial ones; c/1 with mesial edge overlapping the distal end of the i/3; upper jugal teeth with ribs more salient than in *Myohyrax oswaldi*. Of the upper dentition only cheek teeth are known in which the styles are sharp and salient; the P4/, M1/ and M2/ are more square than in *Myohyrax oswaldi*, in which the P4/ and M1/ are more mesio-distally elongated; compared to *Protypotheroides*, the M1/ is less rectangular and more trapezoidal with a short distal face and the parastyle is more salient and higher.

Derivatio nominis : the species name *pickfordi* honours Dr Martin Pickford for his personal input into Namibian palaeontology.

Type-locality : Langental, Sperrgebiet (Namibia).

Age : Early Miocene, biochronologically correlated with Eastern African sites (Napak in Uganda, Legetet, Koru and Songhor in Kenya).

The specimens are housed at the Museum of the Geo-

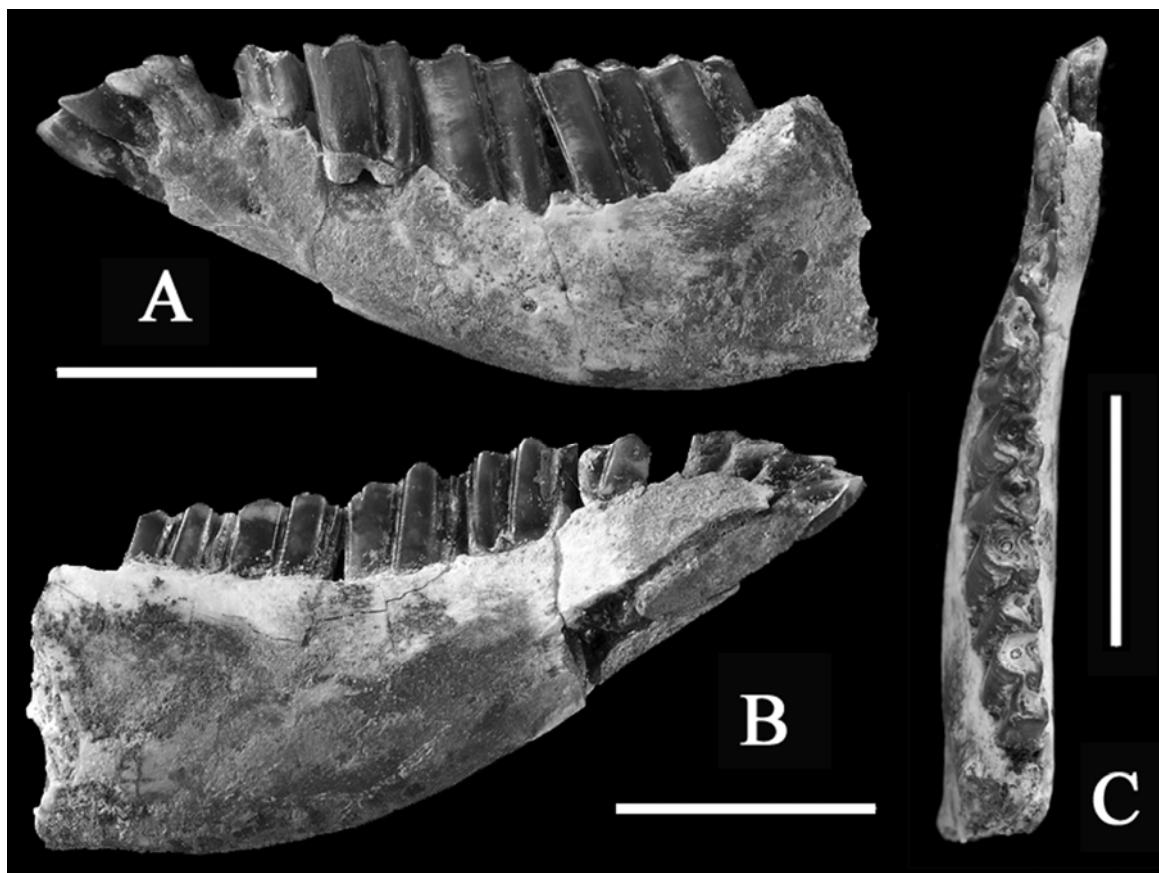


Figure 8. LT 116'07, holotype left mandible of *Myohyrax pickfordi*, A) buccal view, B) lingual view; C) occlusal view (scale = 1 cm).

logical Survey of Namibia, Windhoek.

Description (Pl. 6B, Fig. 8): There is no enamel on the lingual surface of the incisors as is also the case in *Myohyrax oswaldi*; i/1 is elongated with lingual wear and a sharp occlusal edge; i/3 and c/1 are of the same size and are both slightly labially inclined compared to the tooth row. The p/1 is missing but it was uniradicate. The p/2 is the smallest of the premolars, much lower than the p/3. The mandible is shallow under the front teeth and the premolars and deepens under the m/1. Two mental foramina are present: one located beneath p/1-p/2 and the other below p/4-m/1 (Fig. 8). As in *Myohyrax oswaldi*, the molars are inclined forwards, whereas the premolars are upright. The talonid in the cheek teeth resembles a flattened triangle, whereas in *Protypotheroides* this pillar is squarish in shape. The m/3 is formed of a single pillar which can be strongly inclined in the jaw. The jugal teeth resemble those of *Myohyrax oswaldi* except for the stylids which are more marked, the metaconid more salient, the buccal side of the talonid more angular and the ribs sharper. The molars are strongly mesially inclined in the mandible whereas the anterior teeth are more vertical, as is the case in *Myohyrax oswaldi*.

Few maxillary fragments of *Myohyrax pickfordi* are preserved but unfortunately no anterior teeth are preserved. the paracone and the metacone are salient. The parastyle is slightly lower than the paracone in P4/, but is of the same height in the M1/-M2/. In P4/-M1/, there are 4 fossettes: 2 large buccal ones and 2 small lingual ones which are isolated by a strong lingual sinus which runs disto-lingually to mesio-buccally to reach the disto-lingual edge of the mesio-buccal fossette. Measurements of the teeth are presented in annexes 5 and 6.

Genus *Protypotheroides* Stromer, 1922

Type-species : *Protypotheroides beetzi* Stromer, 1922

Synonyms : *Myohyrax osborni* Hopwood, 1929;
Myohyrax beetzi Whitworth, 1954

Original diagnosis (derived from Stromer, 1922) : based on 3 fragments of lower jaws with p/3-m/3 discovered at Langental; size of a small dog; moderately deep lower jaw with well defined battery of teeth, 3 molars and at least 2 premolars present in a closed tooth row, similarly prismatic, weakly buccally convex prisms, size of the teeth decreasing backwards, the m/3 is formed by a single pillar, and the other teeth by two similar pillars, in the middle of which a hole of enamel is present. Buccal wall of the pillar is swollen, lingual face with weak ribs.

Emended diagnosis (Patterson, 1965) : Myohyraci-

nes without cement in fossettes of cheek teeth, M3/ two rooted; fossettids on p/3-m/2 deep.

Emended diagnosis (this paper) : incisors strongly anteriorly inclined, i/1 bigger than i/2 bigger than i/3, i/3 much reduced, spatulate and weakly anteriorly inclined; i/2 recurved and overlaps the distal half of i/1; the mesial edge of i/3 overlaps the distal end of i/2; cheek teeth more rectangular than in *Myohyrax* with less salient styles in the upper teeth and less salient stylids in the lower teeth; vertical ascending ramus, strong inclination below p/4-m/1, thick and sculpted gonial area for the insertion to a strong pterygoid muscle, glenoid apophysis enlarged bilaterally; I1/ with 3 main lobes (2 mesial ones swollen to the same height forming an angle of roughly 120° and isolated from each other by a low groove, and a low distal one separated from the central one by a deep groove), I2/ smaller than the I1/ with 4 main digitations (from mesial to distal : a small one, a large one of the same height as the lingual side of the incisors; teeth generally more massive and lower than in *Myohyrax*; cheek teeth are wider bucco-lingually than in *Myohyrax*, and the pillars in the cheek teeth are less angulated than in *Myohyrax* and less hypsodont; The latter species differs from *Myohyrax* by the less prominent labial ribs which give a flattened aspect to the dental row which is smoothly curved.

Hypodigm : see annexes 1-6.

Species *Protypotheroides beetzi* Stromer, 1922

Diagnosis : as for the genus.

Description : The i/1 is procumbent, bilobed with a mesial elongated lobe and a shorter, smaller and lower mesial one angled with the mesial one; i/2 is strongly bilobed, the mesial part being elongated and overlapping the distal lobe of the i/1 forming a 90° angle with its squarish distal lobe, flat occlusal wear at i/1 and i/2; i/3 is very short with a mesial lobe overlapping the distal part of the i/2; wear pattern on incisors flat; c/1 bigger than i/3 with a mesially elongated crown which bears three tiny tubercles (2 main ones and a tiny mesial one); p/1 very small with 2 main tubercles (the mesial one being preceded by a small stylid); p/2 formed by two short tubercles; p/3 to m/2 are formed of two low columns; (Fig. 9; Pl. 1C, 1E, 1F, 5, 6A, 6D).

In the upper I1/, two main lobes are visible (the mesial being the longer and formed by two lobes of equal height and a distal one which is much lower and isolated from the main one by a clear, deep groove; on its labial side, it bears a facet, probably for the contact with the I2/; the I2/ shows 4 main digitations and is mesio-distally elongated. The mesial digitation is divided at its apex, the mesial part being smaller than the distal part. Next to it there is a large digitation followed by two lower distal ones (these

distal ones are separated from each other by a low faint groove). In morphology, I2/ recalls that of *Myohyrax oswaldi*, but it is much larger in *Protypotheroides beetzi* (Pl. 1; Fig. 9). P1/ is poorly known and P2/ resembles the homologous teeth in *Myohyrax*.

Some mandibular fragments are broken (as in LT 183'98) and the contact between the crown and the roots of the cheek teeth can be observed. The roots are isolated and long; the longest being generally in the p/4. The mandible deepens smoothly from the incisors to the p/4 where it reaches its maximum depth, after which it runs almost horizontally to beneath the ascending ramus whereupon it deepens again and runs obliquely upward to the gonial part of the mandible. This area is robust and bears several crests for the masticatory muscles.

Protypotheroides, less hypsodont than *Myohyrax*, originally described at Langental, is now known from several sites in the Northern Sperrgebiet (Elisabethfeld, Fiskus, Grillental).

Discussion : In 1954, Whitworth synonymized *Protypotheroides* Stromer, 1922 with *Myohyrax* Andrews, 1914. The distinction based on the presence of two enamel islands at the occlusal surface of each lower cheek tooth and the greater size of the teeth seemed to him insufficient to validate the generic distinction. However, the new discoveries clearly show that the two taxa are different at the generic level.

Subfamily Rhynchocyoninae Gill, 1872
Genus *Brachyrhynchocyon* nov.

Diagnosis : Brachyodont species of Rhynchocyoninae with talonid and trigonid well differentiated in the lower molars; talonid lower than the trigonid, no lower m/3, ascending ramus inclined posteriorly thus being reminiscent of Rhynchocyoninae (but being less oblique) and different from Myohyracinae where it is more vertical. The premolars are not sharp, but smooth. *Brachyrhynchocyon* differs from *Miorhynchocyon clarki* and *M. rusingae* by its smoother and buccally less angulated cusps; it differs from *Rhynchocyon* by the lack of an accessory cusplet below the paraconid in the lower premolars.

Type-Species : *Brachyrhynchocyon jacobi* nov. gen. Nov. sp.

Other species : *Brachyrhynchocyon gariensis* (Senut, 2003)

Species *Brachyrhynchocyon jacobi* nov.

Holotype : Fragment of left mandible EF 21'93 with the alveolus for p/1, crowns of p/2, p/3, p/4, m/1, m/2, broken at the level of the alveolus for the lower canine.

Diagnosis : as for the genus. It differs from *B. gariensis* by the paraconid of the p/4 and lower

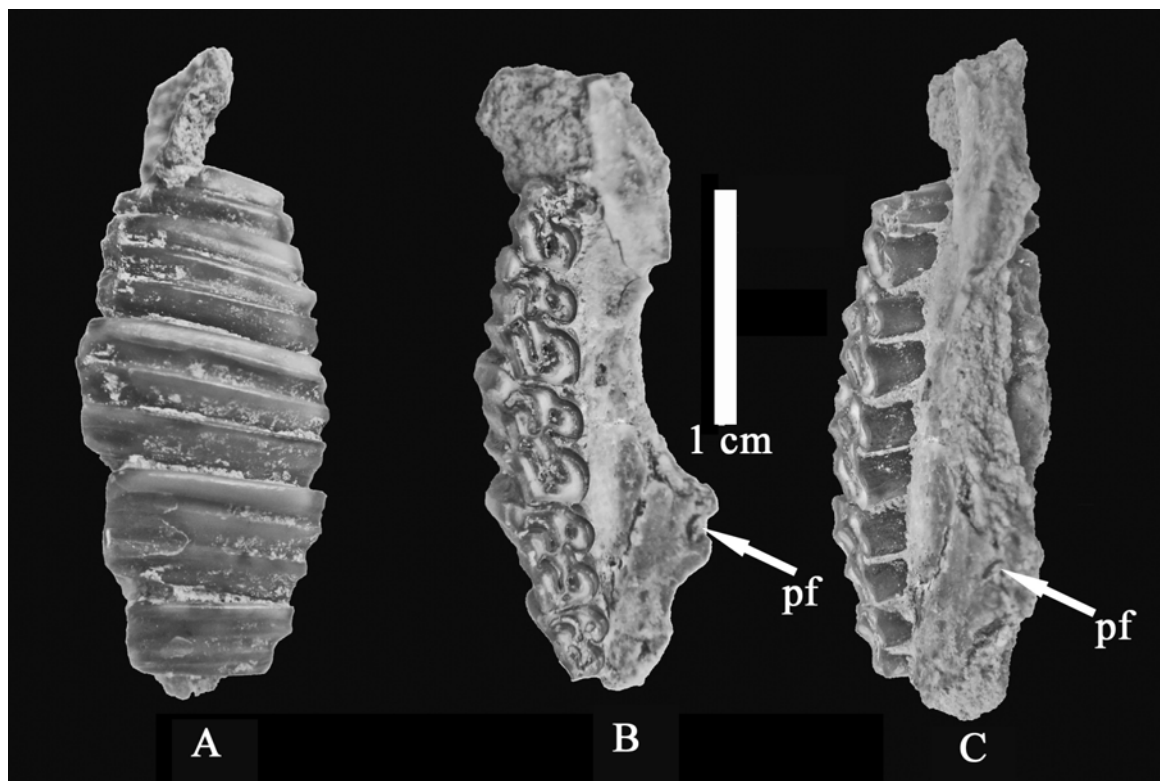


Figure 9. LT 60'04, right maxilla of *Protypotheroides beetzi* containing P2/-M2/ from Langental, Northern Sperrgebiet, Namibia (pf – palatine foramen) (A) buccal, (B) occlusal and (C) lingual views.

molars which are more lingually positioned and by the possession of a larger talonid.

Derivatio nominis : the generic name derives from the brachyodonty of the teeth; the species name honors Dr Jürgen Jacob, chief geologist at Namdeb whose help has been important for the field work in the Sperrgebiet.

Type locality : Elisabethfeld, Sperrgebiet (Namibia).

Age : Early Miocene, biochronologically correlated with Eastern African sites (Napak in Uganda, Legetet, Koru and Songhor in Kenya).

The specimen is housed at the Museum of the Geological Survey of Namibia, Windhoek.

Description : EF 21'93 (Fig. 10) is a large mandible with worn teeth in a tooth row (p/3-m/2) which is 21 mm long. The horizontal ramus is low (6 mm below the p/4). The anterior part of the ascending ramus is preserved and is posteriorly inclined (Fig. 10B). It

differs from *Brachyrhynchocyon gariepensis* (Senut, 2003, Fig. 1) by its larger size and its more bunodont cheek teeth; by the absence on the paraconid of a small anterior cusplet, but this may be due to the wear of the tooth. However, on the p/4, the notch between the paraconid and the protoconid is weaker compared to the Arrisdrift specimen (Senut, 2003). The paraconid on the p/4 is slightly more mesially positioned than in AD 666'00. The p/4 is larger (mesio-distal length: 4.5 mm) than the m/1 (mesio-distal length: 4.1 mm) which is larger than the m/2 (mesio-distal length: 3.5 mm). The mental foramina are located below the p/1 and below the p/4. A deciduous upper incisor which possibly represents this species is illustrated in Pl. 1D.

Brachyrhynchocyon differs from *Rhynchocyon* by the paraconid in the p/2-p/4 being slightly lower than the protoconid, metastylid absent in molars, the cristid obliquid ends midway between the protoconid and metaconid (as is the case in *Miorhynchocyon*) and not in the metaconid as in *Rhynchocyon* and has a less inclined anterior part of the ascending ramus. It differs from *Miorhynchocyon* by the cusps which are

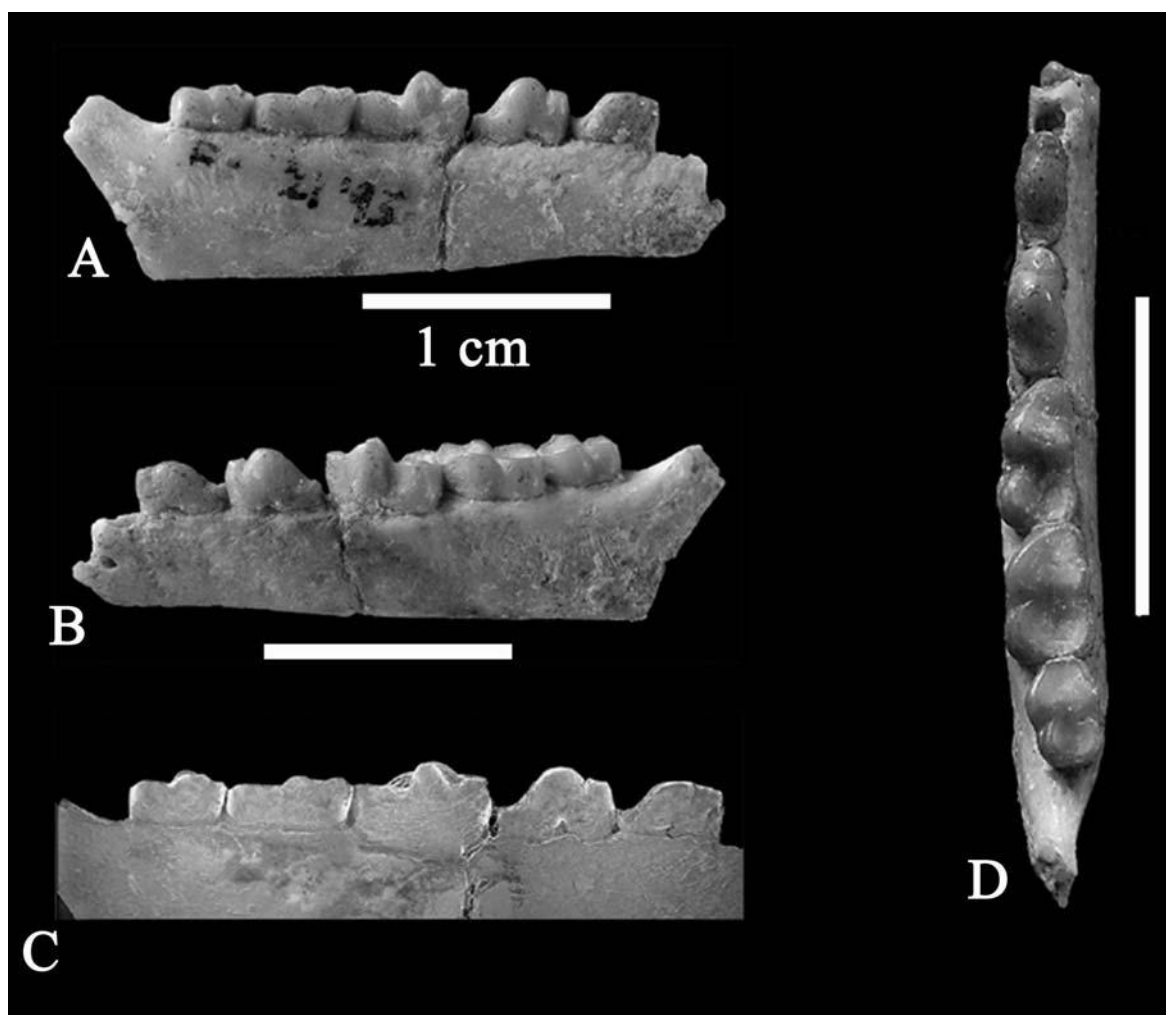


Figure 10. EF 21'93, fragmentary left mandible, holotype of *Brachyrhynchocyon jacobi*, from Elisabethfeld, Namibia, (A) lingual, (B) buccal, (C) lingual view scanning electron micrograph, (D) occlusal view.

less acerate. It recalls the anatomy seen in the specimen from Arrisdrift (Pl. 1A).

Genus *Hypsorhynchocyon* nov.

Diagnosis of the genus : large Rhynchocyoninae with shallow horizontal ramus, tall posteriorly sloping (approximately 120°) ascending ramus; differs from extant *Rhynchocyon* by its high *processus coronoides* which projects well above the glenoid condyle which is weakly bucco-lingually expanded but slopes gently forwards and ventrally. It differs from *Protytopotheroides* by the thinness of the ascending ramus and the lack of strong pterygoid insertions on the gonial surface which suggests different feeding mechanics. The p/4, m/1 and m/2 are low but the lingual cusps are quite high. Due to the hypsodonty of the jugal teeth the separation between the protoconid and the hypoconid, and between the metaconid and the entoconid is high. This gives the jugal teeth a moderately hypsodont and a columnar aspect; paraconid and metaconid separated by a low groove in p/4, less marked in m/1 and fused in m/2 due to the wear of the tooth. Whereas the lingual cusps are as high as the buccal ones in the p/4, they are higher and sharper in the m/1-m/2, the metaconid being the highest cusp in the jugal teeth. The m/2 is mesially inclined in the alveolus and its metaconid and protoconid are almost as high as in the p/4. The p/4 is larger (mesio-distal length: 5 mm) than m/1 (mesio-distal length: 4.5mm), which is larger than m/2 (mesio-distal length: 3.7 mm).

Type Species : *Hypsorhynchocyon burrelli* nov. gen. nov. sp.

Species *Hypsorhynchocyon burrelli* nov.

Holotype : GT 50'00, fragment of left mandible with p/4, m/1, m/2.

Derivatio nominis : the generic name refers to the hypsodonty of the teeth; the species is named in honour of Bob Burrell, head of the Mineral Resources Department at Namdeb who supported our expeditions for many years.

Type locality : Griliental 6, Sperrgebiet (Namibia).

Age : Early Miocene, biochronologically correlated with Eastern African sites (Napak in Uganda, Legetet, Koru and Songhor in Kenya).

The specimen is housed at the Museum of the Geological Survey of Namibia, Windhoek.

Diagnosis : as for the genus

Description : GT 50'00 (Fig. 11) is a fragment of left mandible with p/4, m/1-m/2, the gonial area is broken

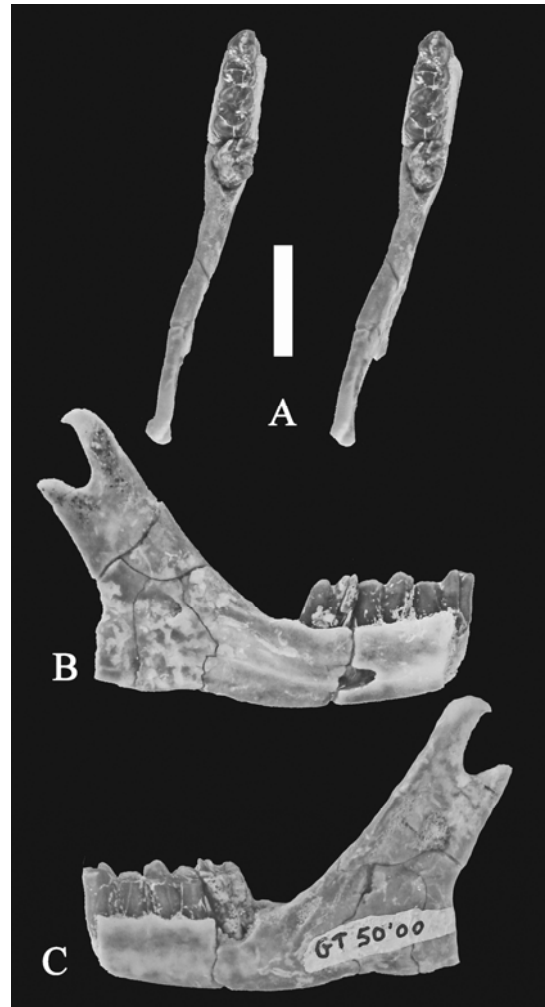


Figure 11. GT 50'00, holotype left mandible of *Hypsorhynchocyon burrelli*, Griliental (Namibia), (A) stereo occlusal view, (B) lingual, (C) buccal views. (Scale : 10 mm).

but at the break, the thinness of the bone is visible. The horizontal ramus is low: 6.5 mm at the anterior break below the p/4. The lingual side of the cusps is flat, but the buccal side is smooth and rounded. The teeth are worn especially m/1 and m/2 which look like two lophs, the buccal side of which is higher than the lingual. The paraconid and the protoconid are much worn, but they are separated by a smooth low groove. The m/2 and m/3 are composed of two pillars. The paraconid and metaconid are well separated in p/4, but almost fused in m/1 and m/2 due to wear. The lingual cusps are worn horizontally whereas the buccal cusps are vertically worn which reinforces the salience of the lingual cusps. The ascending ramus is very high which accords with the hypsodonty of the teeth; but its thinness suggests a peculiar feeding mechanism (which will be studied in detail later). Its base is reinforced. The opening for the mental canal is large, ovoid in shape. In front of the gonion, the horizontal ramus shows a depression. The overall shape of the mandible recalls that of *Rhynchocyon* (Fig. 12).

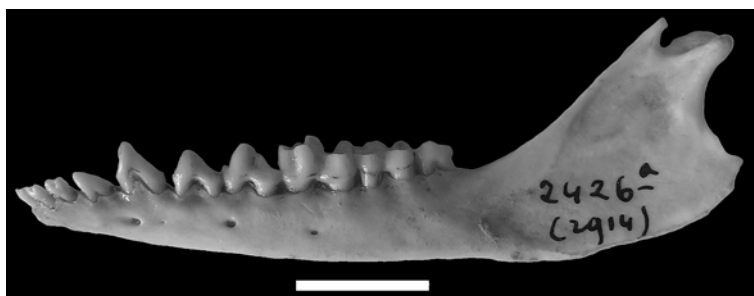
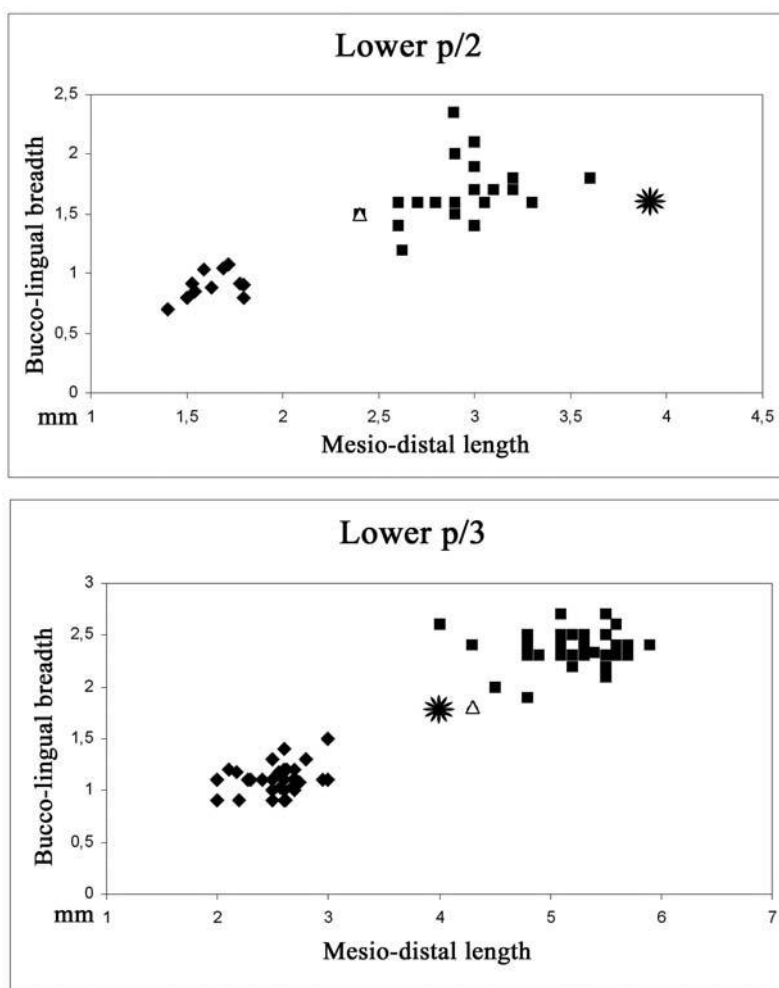


Figure 12. Left mandible of extant *Rhynchocyon*, buccal view (Scale : 10 mm).

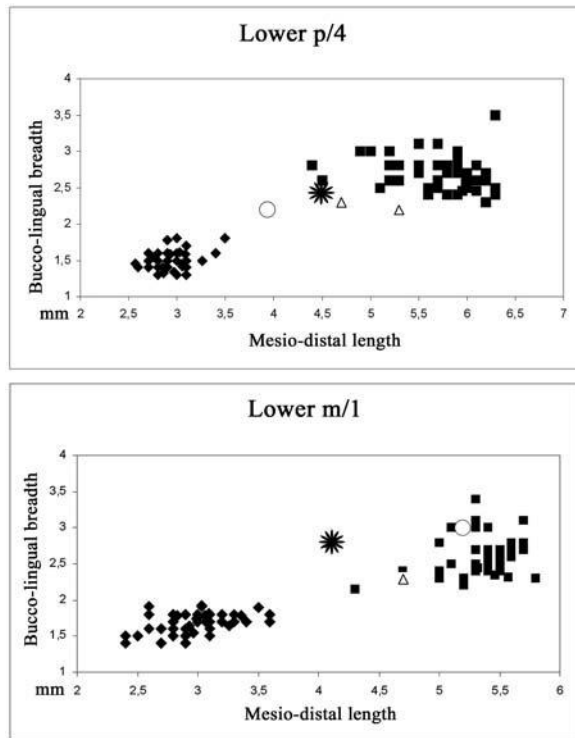
In conclusion, on the basis of dental measurements, it is clear that there are two size groups of macroscelideans in the Sperrgebiet, a small one corresponding to *Myohyrax oswaldi*, and a large one that contains four taxa, *Myohyrax pickfordi*, *Protypotheroides beetzi*, *Brachyrhynchocyon jacobi* and *Hypsorhynchocyon burrelli*. This is why it is difficult to attribute isolated post-cranial remains, although on the basis of quantity of teeth, most of the large ones

are likely to belong to *P. beetzi* (Graph 1, 2, 3, 4). (Annex 5, 6).

As can be seen, in the lower and upper cheek teeth (p/2, p/3, p/4, m/1, P3/, P4/, M1/, M2/) the small species is clearly isolated from the other species in the bivariate diagrams (Graphs 1-4), but it is difficult to sort the larger taxa on the basis of metric data alone. The same applies to the postcranial bones.



Graph 1. Bivariate plots of lower cheek teeth of Miocene macroscelideans of the Northern Sperrgebiet, Namibia. Upper frame: lower p/2; lower frame: lower p/3. (Symbols: star = *Brachyrhynchocyon jacobi*; triangle = *Myohyrax pickfordi*, diamond = *Myohyrax oswaldi*, square = *Protypotheroides beetzi*).

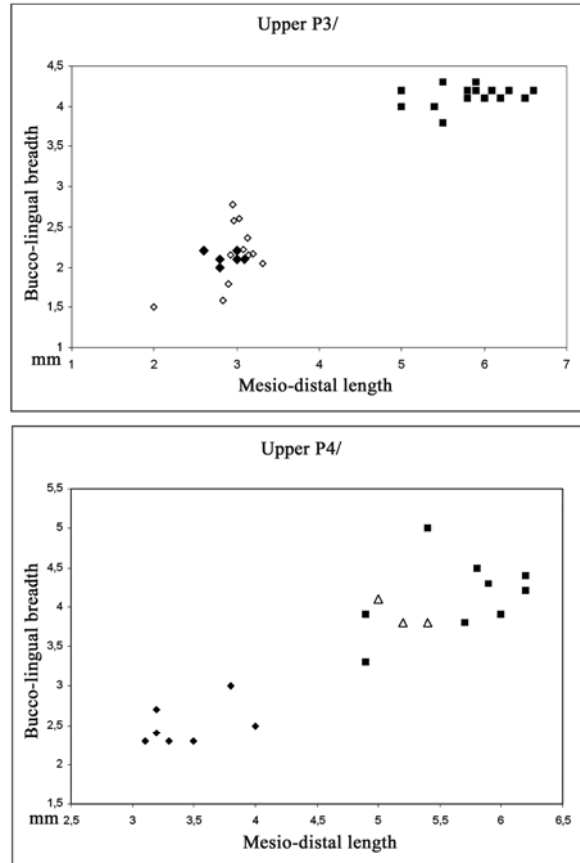


Graph 2. Bivariate plots of lower cheek teeth of Miocene macroscelideans of the Northern Sperrgebiet, Namibia. Upper frame: lower p/4; lower frame: lower m/1. (Symbols: star = *Brachyrhynchocyon jacobi*, triangle = *Myohyrax pickfordi*, circle = *Hypsorhynchocyon burrelli*, diamond = *Myohyrax oswaldi*, square = *Protypotheroides beetzi*).

Postcranial skeleton : Many specimens of macroscelidid postcranials (Fig. 13; Annex 7, 8) are known from the Northern Sperrgebiet. However, despite the large quantity of material, it is difficult to assign them to a particular species, except for the small form, *Myohyrax oswaldi*. This is confirmed by the similarity seen with the published specimens from Arrisdrift (Senut, 2003). A more detailed study of the material is in progress.

Hind limb : The calcaneum (Fig. 13, Annex 8) clearly shows the usual morphology of macroscelidids with the facets for the astragalus salient and wide apart. Two size groups seem to be present (Graph 5); a small one, probably *Myohyrax oswaldi* and a larger one. In the large specimens, the *tuber calcis* is more robust and the medial facet for the astragalus slightly less salient and more rounded. The tibia and fibula (Fig. 13, Annex 8) are fused as is usually the case in macroscelidids and the articular surface for the trochlea of the astragalus is less depressed in the large specimens than in the smaller ones.

The distal tubercle on the fibula is also more salient in *Myohyrax oswaldi* than in the larger species. Again for the astragalus, the trochlea seems



Graph 3. Bivariate plots of the upper cheek teeth of the Miocene macroscelideans of the Northern Sperrgebiet, Namibia. Upper frame: P3/; lower frame: P4/. (Symbols: triangle = *Myohyrax pickfordi*, diamond = *Myohyrax oswaldi*; square = *Protypotheroides beetzi*).

lower in larger specimens (Graph 5).

Fore limb : With the humeri (Fig. 13, Annex 7), three main groups can be identified, but again, it is difficult to assess their taxonomy except for the smaller species. They all bear a vertically oriented supraepitrochlear fossa and the distal joint has a globular slightly elongated capitulum and the trochlea exhibits a distally projected acerate medial edge. A few ulnae (Fig. 13, Annex 7) are preserved and considering their size belong to *Myohyrax oswaldi*. They are very short and their shaft narrows quickly distally to join the radius, resembling the morphology seen in the extant *Elephantulus*. But they do not seem to have had a wide olecranon process as is the case in the extant animal. However, the specimens being fragile in this area, the process may not have been completely preserved. On the basis of size, the few scapulae identified also belong to *Myohyrax oswaldi*.

Discussion and conclusions

The teeth from the Northern Sperrgebiet attributed to *Myohyrax oswaldi* are similar in morphology

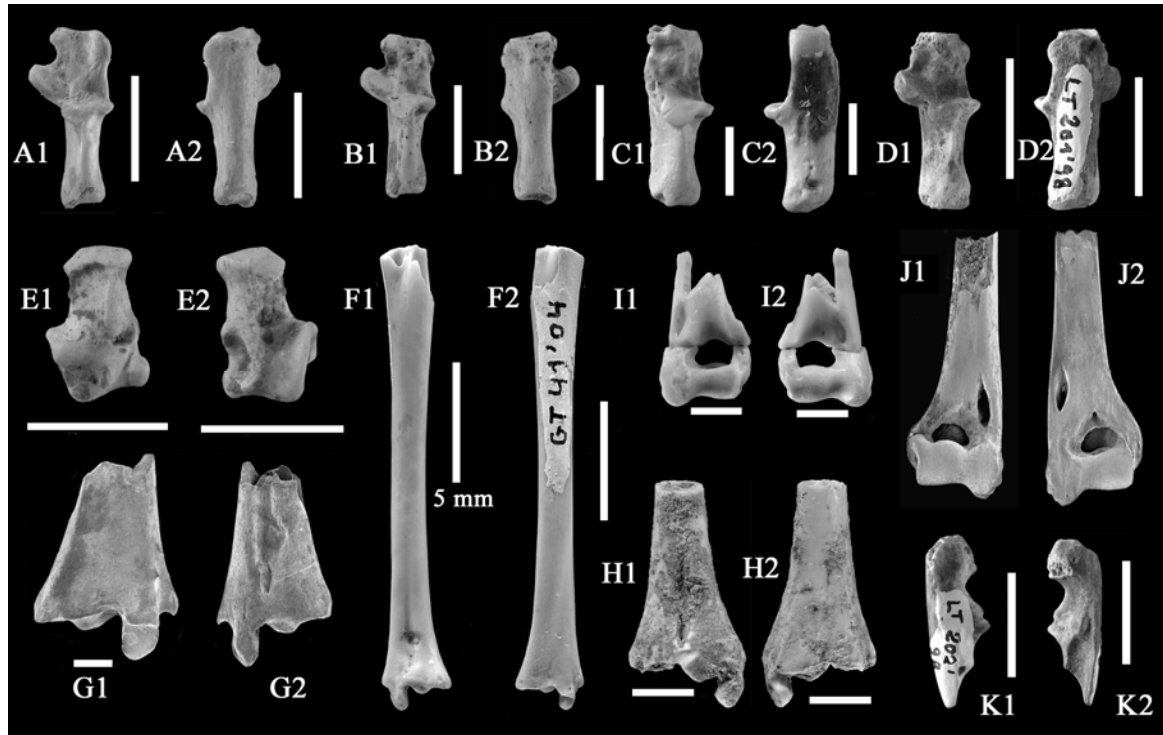
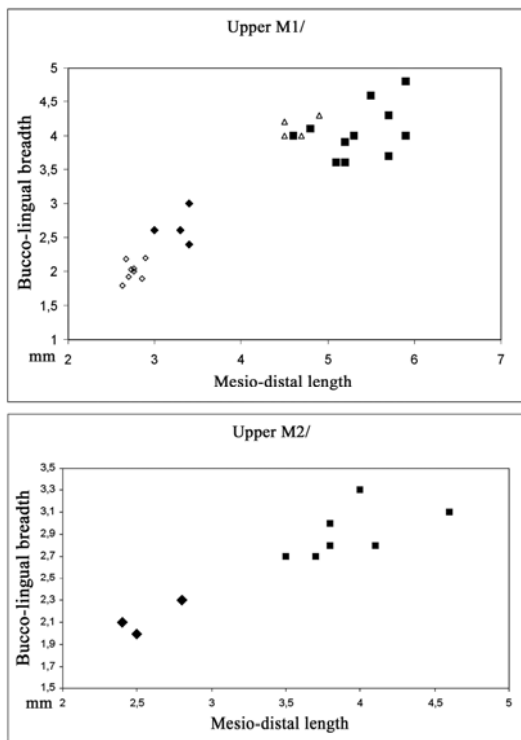
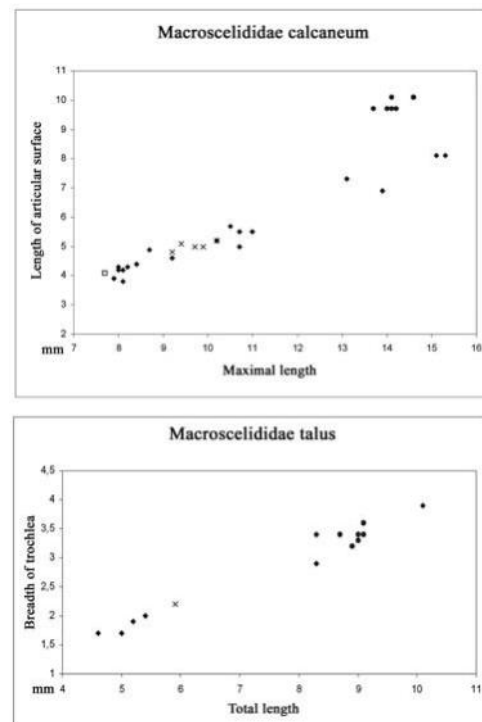


Figure 13. Miocene macroscelidean postcranial bones from the Northern Sperrgebiet, Namibia. A) EF 55'96, right calcaneum; B) EF 48'01, right calcaneum; C) FS 20'07, right calcaneum; D) LT 201'98, right calcaneum; E) EF 48'01, right talus; F) GT 41'04, right tibio-fibula; G) LT 227'98, right distal tibio-fibula; H) GT 119'04, right distal tibio-fibula; I) GT 74'04, left distal humerus; J) GT 138'06, right distal humerus; K) LT 202'98, proximal ulna.



Graph 4. Bivariate plots of the upper cheek teeth of the Miocene macroscelideans of the Northern Sperrgebiet, Namibia. Upper frame: M1/; lower frame: M2/. (Symbols: triangle = *Myohyrax pickfordi*, diamond = *Myohyrax oswaldi*; square = *Protypotheroides beetzi*).



Graph 5. Bivariate plots of the postcranials of the Miocene macroscelideans from the Northern Sperrgebiet. Upper frame: calcaneum; lower frame: talus. (Symbols: diamond = specimens from the Northern Sperrgebiet, cross = specimens from Arrisdrift, open square = *Myohyrax* (Stromer, 1926); dots = modern *Rhynchocyon*).

and size to those from the Lower Middle Miocene site of Arrisdrift, Southern Sperrgebiet. The new material from the Elisabethfeld, Grillental, Fiskus and Langental provides new insights on the morphology of the upper teeth. If we are correct and the brachyodont specimens from Arrisdrift belong to *Brachyrhynchocyon*, then the morphology of the central upper incisor in *B. jacobi* should present the same morphology (5 to 6 digitations). In view of the morphology seen in lower incisors of *Myohyrax oswaldi*, we would expect a similar morphology for the upper incisors, but we did not find any yet. The hypsodont *Protypotheroides* shows a weird morphology of the I1/ and I2/ and of i/1 and i/2. The I1/ must have slightly overlapped the mesial edge of the I2/ as suggested by the contact facet which is present on the I1/. The morphology of the anterior teeth of *Protypotheroides beetzi* suggests a peculiar mode of feeding with a tightly packed and solid anterior tooth battery.

For the hypsodont Rhynchocyoninae species, *Hypsorhynchocyon burrelli*, it is difficult to predict the morphology of the front teeth, especially in view of the very peculiar morphology of the cheek teeth. The presence of digitations on upper and lower incisors is not an unknown phenomenon in African mammals. It still exists in some extant macroscelidids. It is probably a primitive feature for the Afrotheres, as it can also be seen in the lower incisors of the Palaeogene Hyracoidea and Proboscidea. More research is needed on this aspect of Palaeogene African mammals. Functionally, it is difficult to assess the type of jaw movement that was taking place in the hypsodont macroscelidids, but we can suggest a high degree of crushing. The presence of hypsodonty in the Namibian macroscelidean species suggests that these animals were herbivores and could feed on hard food such as harsh grass or seeds. The strange morphology of the incisors might have been designed to crush or cut grass stems.

The macroscelidids of the northern Sperrgebiet might be useful for palaeoecology and biochronology. When all the material is considered, it is obvious that hypsodont species dominated the macroscelidid fauna; two very hypsodont ones (*Myohyrax oswaldi*, *Myohyrax pickfordi*) and a large, slightly less hypsodont one (*Protypotheroides beetzi*). At Elisabethfeld, a brachyodont Rhynchocyonine species (*Brachyrhynchocyon jacobi*) is poorly represented. Finally, at Grillental, a very large and moderately hypsodont Macroscelididae (*Hypsorhynchocyon burrelli*) is represented by a partial mandible.

The environment was relatively open and dry composed of savannah and/or woodland, probably with denser vegetation along river banks. A similar type of environment occurred at Arrisdrift (southern Sperrgebiet): the macroscelidean fauna of the Northern Sperrgebiet was dominated by the hypsodont *Myohyrax oswaldi*. The brachyodont species remain very rare in the Early Miocene and the lower Middle

Miocene of the Sperrgebiet, confirming the aridity of the area. It is further interesting to note that all the large hypsodont macroscelidean species have disappeared by the time of deposition of the Arrisdrift sediments; this might be due to the fact that either the food on which they fed was not available or that the environment was too dry for them.

The composition of the macroscelidean fauna of the Northern Sperrgebiet is not homogeneous between sites; at Elisabethfeld, out of 251 specimens, 76.9% represent *Myohyrax oswaldi*, 9.6% *Protypotheroides beetzi*, for only one specimen of *Brachyrhynchocyon jacobi*; at Grillental, out of 101 specimens, 49.5% represent *Myohyrax oswaldi*, 27.7% *Protypotheroides beetzi*, for only one specimen of *Hypsorhynchocyon burrelli*; at Langental out of 227 specimens, 64.7% represent *Protypotheroides beetzi*, 19.4% *Myohyrax oswaldi* and 6.2% *Myohyrax pickfordi*; while at Arrisdrift, the lower Middle Miocene site in the Oranje River Valley, out of the more than 400 specimens, 99% of the specimens are referred to *Myohyrax oswaldi* and only 3 specimens are attributed to *Brachyrhynchocyon gariensis*.

At Elisabethfeld, the macroscelidean fauna is dominated by the small hypsodont species but a brachyodont one is also present; at Grillental, the same is true except that a hypsodont Rhynchocyoninae is also present but is rare and there is no brachyodont species; finally, at Langental, only hypsodont species are present including two large ones.

The results of the other authors on different mammalian groups, such as rodents, carnivores and suids (see this monograph, papers by Mein, Morales and Pickford), indicate that among the Lower Miocene sites of the Northern Sperrgebiet, Elisabethfeld is the oldest and Langental the youngest. The presence of *Myohyrax pickfordi*, the large hypsodont species at Langental, might be of biochronological significance.

It is also notable that the Sperrgebiet sites have not yielded any of the brachyodont taxa that are common in the East African deposits spanning the same time period (Butler, 1984; Butler and Hopwood, 1957), including *Miorhynchocyon*, *Hiwegicyon* and *Pronasilio*. The latter taxa were undoubtedly more adapted to tropical humid ecosystems than to semi-arid or arid ones.

An interesting possibility which emerges from this study of the Namibian macroscelidids concerns the Fayum, Egypt, genus *Ptolemaia* (Osborn, 1908). Widely accepted as a carnivorous animal but with a long history of debate about its systematic affinities, it has recently been viewed as being close to *Kelba* (Cote *et al.*, 2007). Judging from the resemblance of its mandible and teeth to those of *Hypsorhynchocyon*, its relationships to macroscelideans need to be studied. The teeth in the holotype jaw of *Ptolemaia lyonsi* that have usually been interpreted as m/1, m/2 and m/3 could instead be p/4, m/1 and m/2 as is the case in Macroscelidea. It differs from *Hypsorhynchocyon*

mainly in the position of the mandibular condyle, which is low in *Ptolemaia* and high in *Hypsorhynchocyon*. However, its general morphology is similar to that of *Hypsorhynchocyon burrelli* from Grillental and even to *Brachyrhynchocyon jacobi* from Elisabethfeld, but are the similarities due to convergence?

The middle Eocene (Pickford *et al.*, this volume) and early Miocene Macroscelididae from the Sperrgebiet suggest that the Palaeogene Macroscelididae from Northern Africa classified in the Herodotiinae (Simons *et al.*, 1991), might not be ancestral to any of the Miocene to Recent Macroscelididae. The upper molars of herodotiines are endowed with well developed buccal cingula, a structure that is absent from the Lutetian macroscelidean from Black Crow, Namibia (Pickford *et al.*, this volume) and from all known Neogene members of the order. The Namibian Macroscelididae are thus crucial for throwing light on the evolution of the group.

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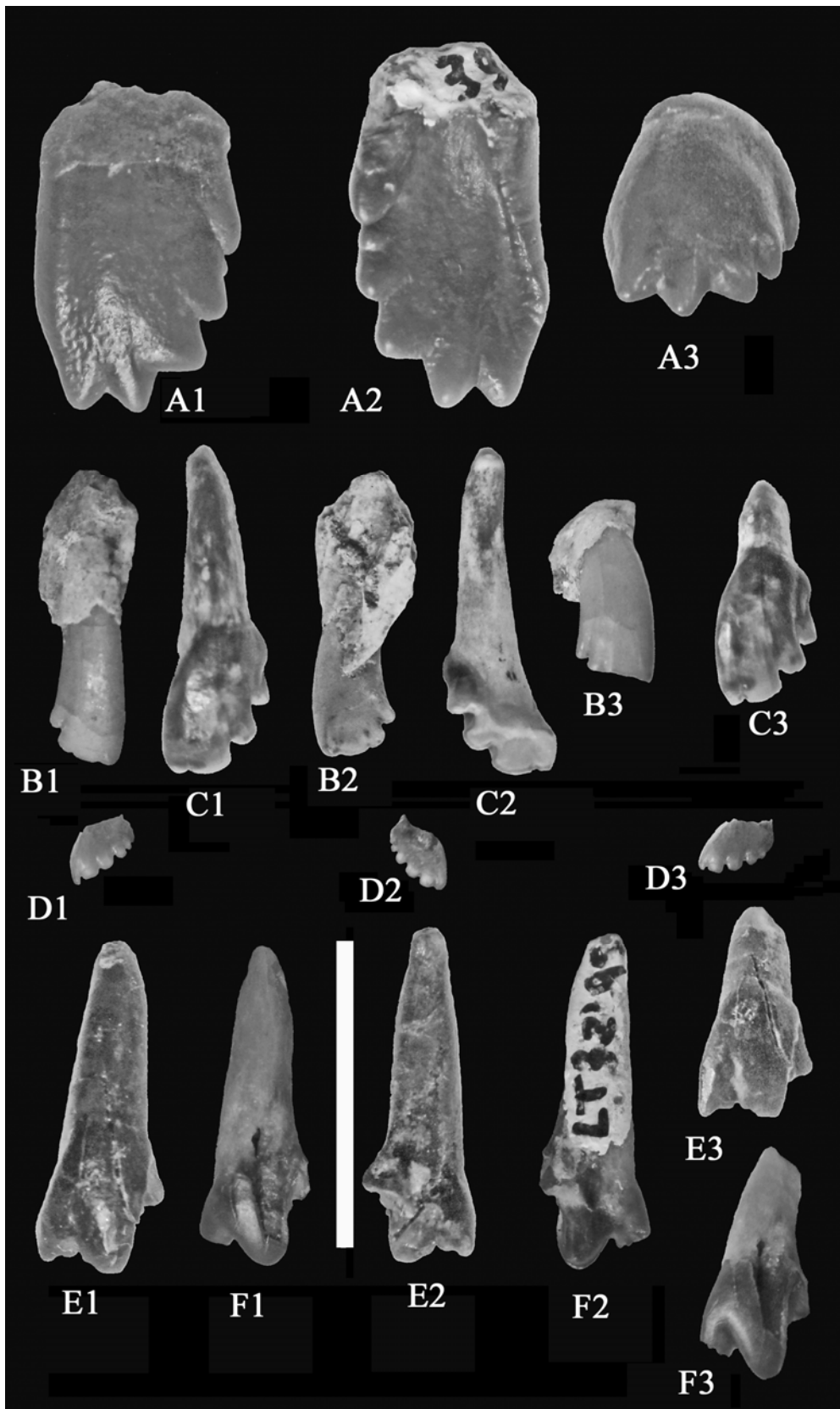


Plate 1. Macroscelidid upper incisors from the Sperrgebiet, Namibia. A) *Brachyrhynchocyon gariopensis* AD 399'96, left I1/ from Arrisdriift; B) *Myohyrax oswaldi* EF 72'05, I1/ from Elisabethfeld; C) *Protypotheroides beetzi* LT No n° left I2/ from Langental; D) *Brachyrhynchocyon* EF 23'05, deciduous I1/ from Elisabethfeld; E) *Protypotheroides beetzi* LT 177'04, left I1/ from Langental; F) *Protypotheroides beetzi* LT 32'95, left I1/ from Langental, (1) buccal; (2) lingual; (3) anterior views, (scale 1 cm).

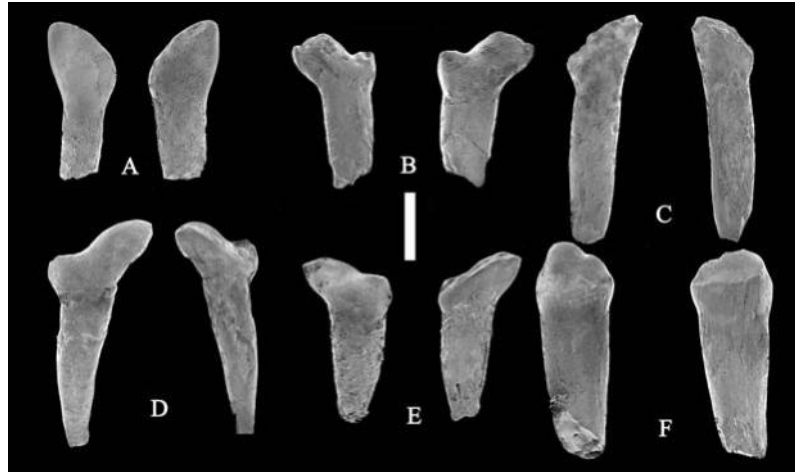


Plate 2. EF 230'01, lot of isolated macroscelidean lower incisors, canines and p/1s and upper incisors from the Northern Sperrgebiet, Namibia, buccal and lingual views (scale 1 cm).

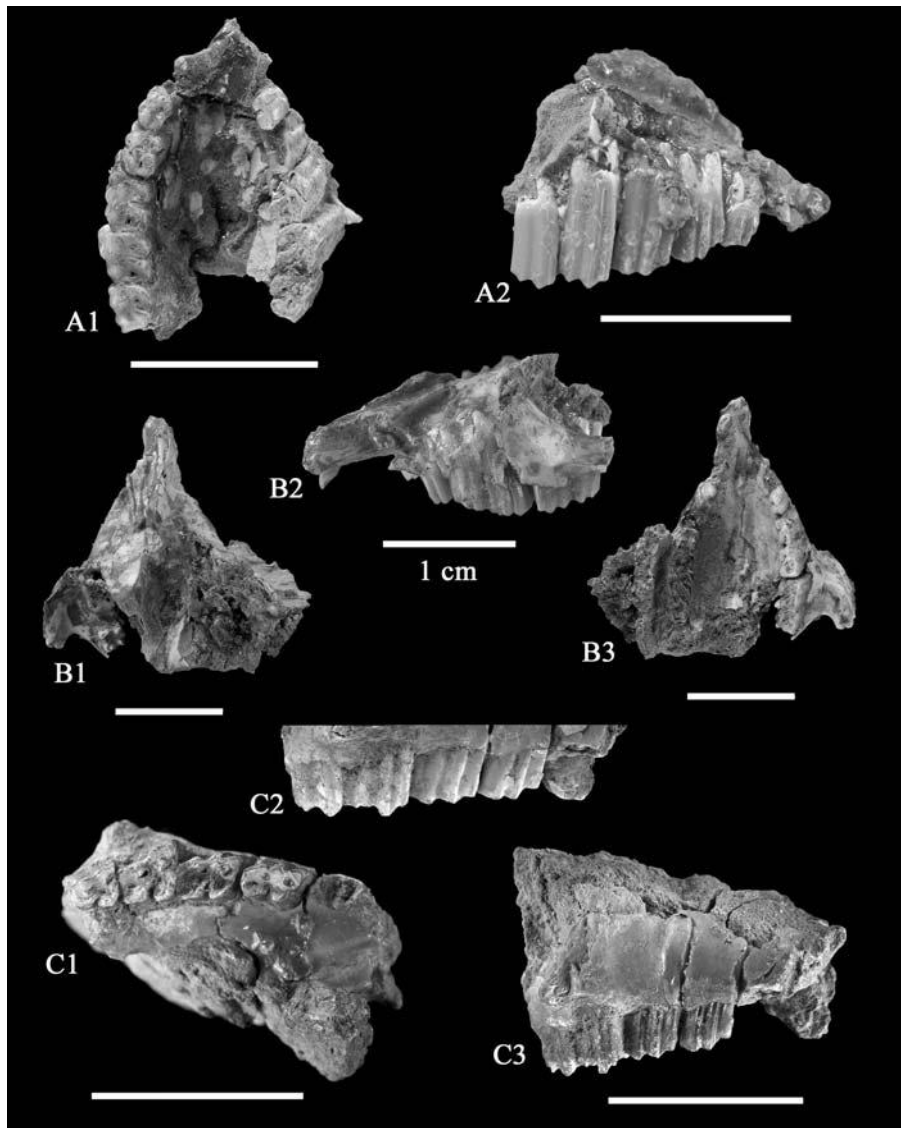


Plate 3. *Myohyrax oswaldi* maxillae from the Elisabethfeld, Northern Sperrgebiet, Namibia. A) EF 206'01, A1) occlusal view; A2) buccal view; B) EF 240'01, B1) superior view, B2) buccal view, B3) occlusal view; C) EF 10'03; C1) occlusal view, C2) lingual view, C3) buccal view (scale 1 cm).

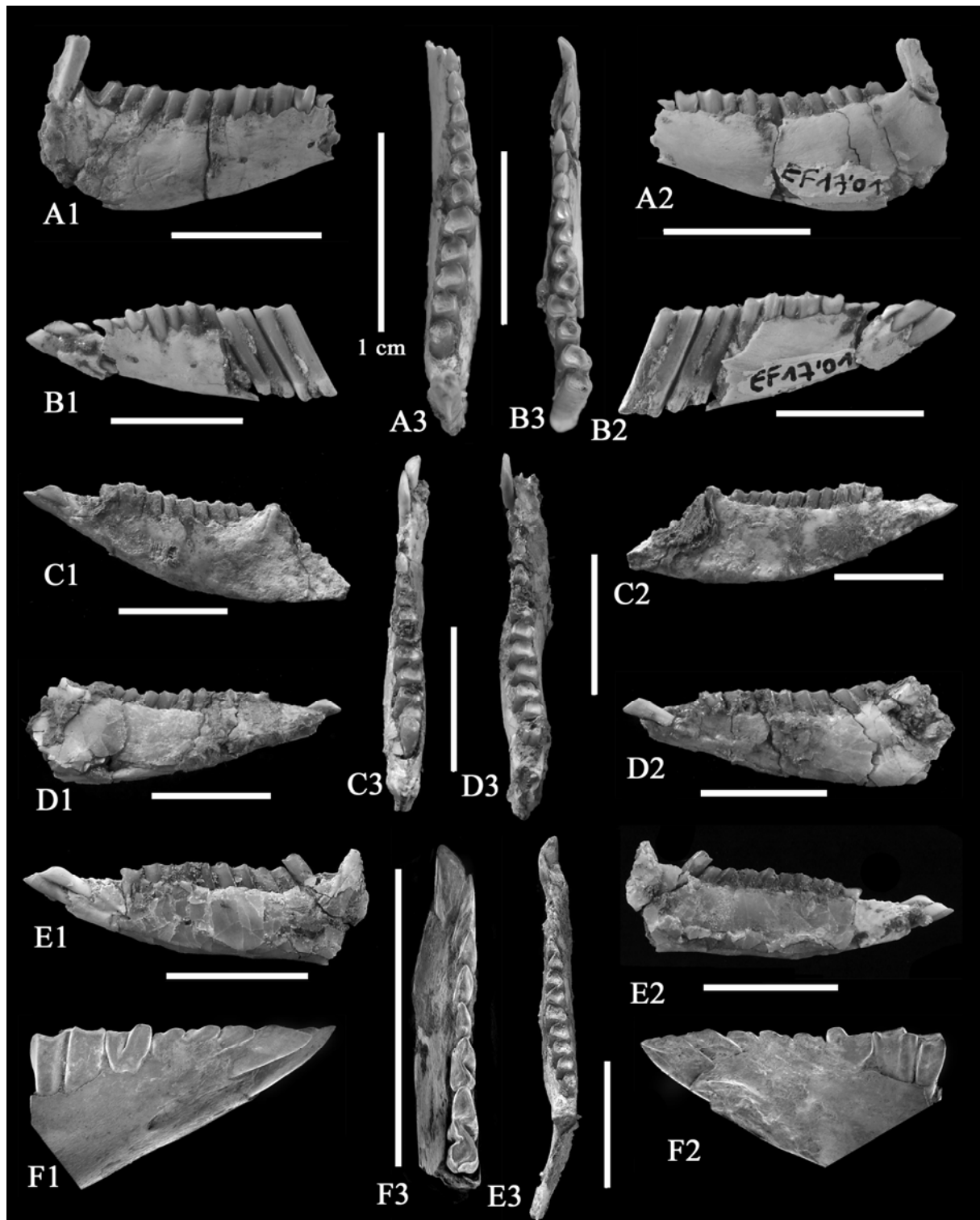


Plate 4. Mandibles of *Myohyrax oswaldi* from the Northern Sperrgebiet, Namibia. A) EF 17'01, left mandible; B) EF 17'01, right mandible C) EF 144'01, left mandible, D) EF 40'01, left mandible, E) EF 53'01, left mandible, F) EF 29'05, right mandible (1) buccal, (2) lingual and (3) occlusal views SEM images (scales : 1 cm).

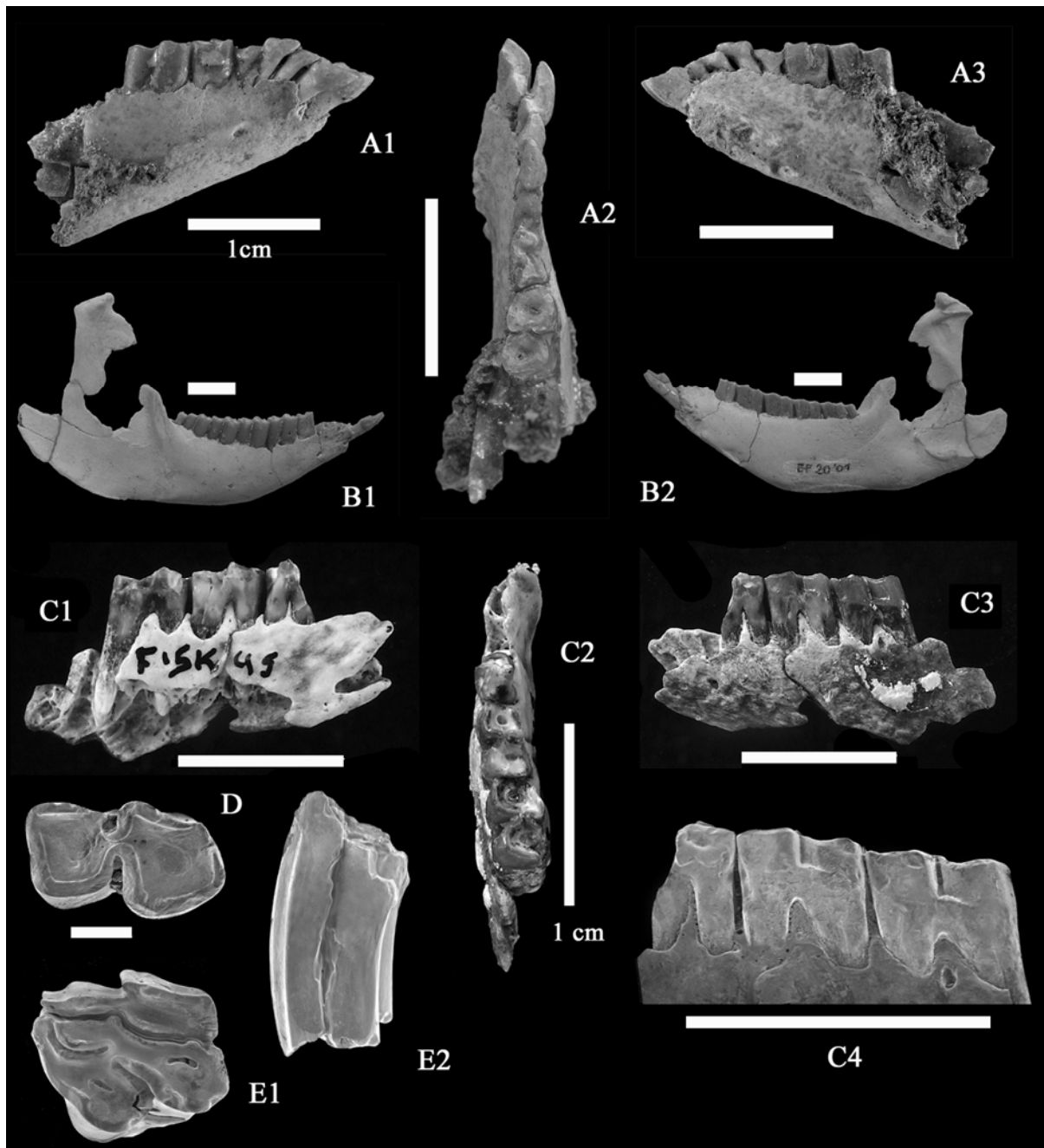


Plate 5. *Protypotheroides beetzi* from Elisabethfeld (EF) and Fiskus (FS), Northern Sperrgebiet, Namibia. A) right mandible, EF 100'01; A1) buccal view, A2) occlusal view, A3) lingual view; B) right mandible, EF 20'01; B1) buccal view, B2) lingual view; C) left mandible, FS 29'93; C1) lingual view, C2) occlusal view, C3) buccal view, C4) buccal view enlarged SEM image; D) left lower p/4, FS 11'01, occlusal view; E) left upper M1/, FS 11'01; E1) occlusal view, E2) mesial view (scales : 1 cm).

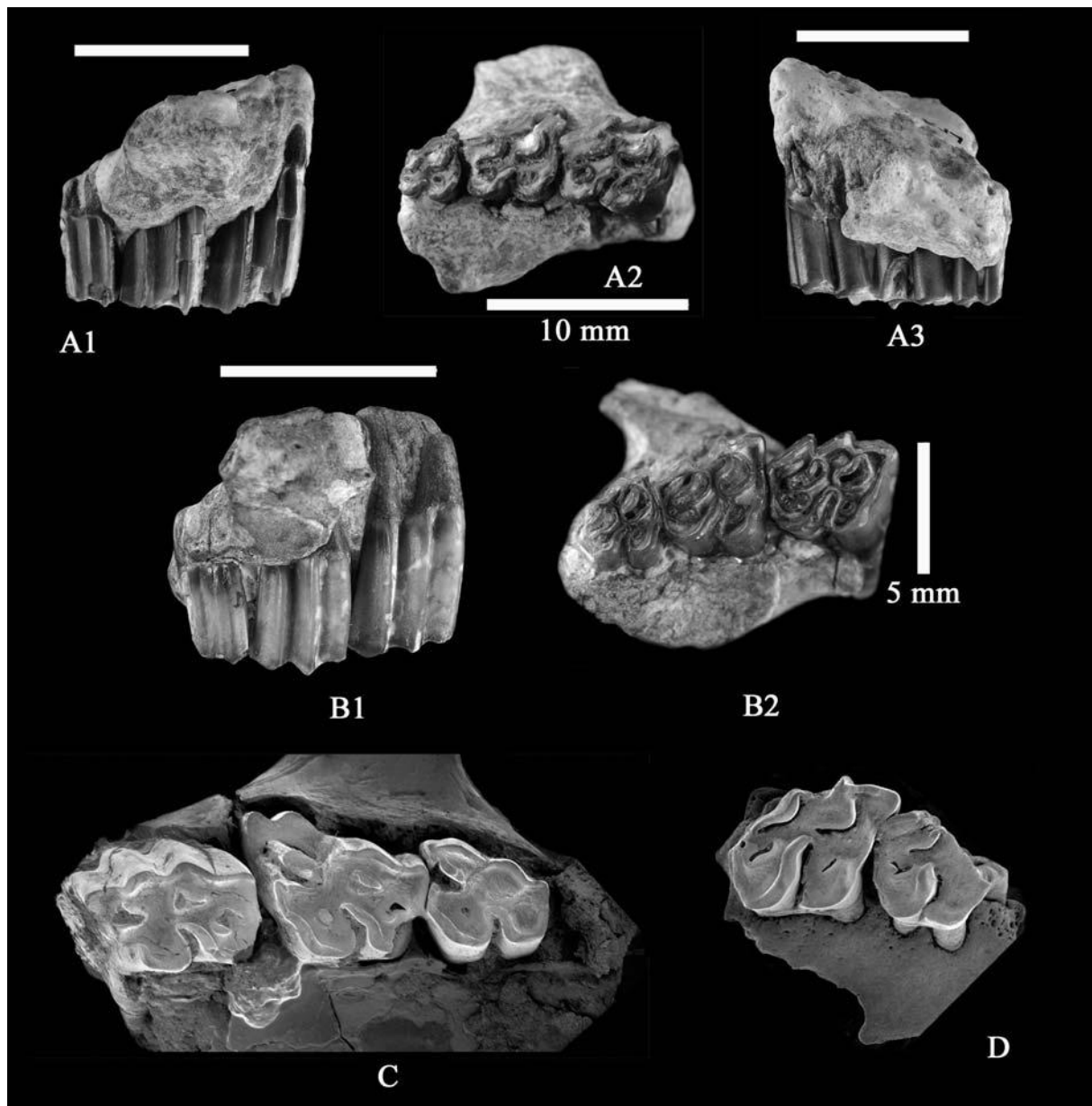


Plate 6. Macroscelidid upper jaws from the Grillental (GT) and Langental (LT) Northern Sperrgebiet, Namibia. A) fragmentary right maxilla with P4/, M1/ M2/ (LT 20'00) of *Protypotheroides beetzi*; A1) buccal view; A2) occlusal view; A3) lingual view. B) fragmentary right maxilla with P4/, M1/, M2/ (LT 26'00) of *Myohyrax pickfordi*; B1) buccal view; B2) occlusal view; C) fragmentary left maxilla with P4/, M1/ M2/ (GT 122'04) of *Myohyrax oswaldi*, occlusal view; D) fragmentary right maxilla with P2/, P3/ (GT 60'00) of *Protypotheroides beetzi*, occlusal view SEM images.

Annex 1. Macroscelididae from Elisabethfeld, Northern Sperrgebiet, Namibia.

Catalogue	Specimen	Side	Taxon
1993			
EF 18'93	mandible with m/1-m/3	left	<i>Myohyrax oswaldi</i>
EF 21'93	mandible	left	<i>Brachyrhynchocyon jacobi</i>
EF 41'93	mandible	left	<i>Protypotheroides beetzi</i>
EF 49'93	upper molar		<i>Myohyrax oswaldi</i>
EF 52'93	jaws and teeth, 11 individuals		<i>Protypotheroides beetzi</i>
EF 53'93	lot of postcranials		<i>Protypotheroides beetzi</i>
EF 94'93	3 P2/ (a, b, c)		<i>Protypotheroides beetzi</i>
1994			
EF 69'94	mandible	left	<i>Myohyrax oswaldi</i>
EF 85'94	lot of teeth		<i>Protypotheroides beetzi</i>
EF 86'94	lot of fragments of bone, cairn		<i>Protypotheroides beetzi</i>
EF 87'94	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 88'94	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 89'94	mandible		<i>Myohyrax oswaldi</i>
EF 90'94	mandible with m/3	right	<i>Protypotheroides beetzi</i>
EF 91'94	fragments mandible		<i>Myohyrax oswaldi</i>
EF 95'94	pellet with skeleton + teeth		<i>Myohyrax oswaldi</i>
1996			
EF 16'96	calcaneum	right	<i>Protypotheroides beetzi</i>
EF 30'96	proximal femur	right	Macroscelididae
EF 31'96	proximal femur	left	Macroscelididae
EF 37'96	femur	left	Macroscelididae
EF 45'96	2 skulls		<i>Myohyrax oswaldi</i>
EF 52'96	lot of mandible and maxilla		<i>Protypotheroides beetzi</i>
EF 53'96	fragment of mandible	left	<i>Protypotheroides beetzi</i>
EF 54'96	2 upper cheek teeth		<i>Protypotheroides beetzi</i>
EF 55'96	calcaneum	right	
EF 96	tibio-fibula	left	
EF 169'96	fragment of mandible	left	<i>Protypotheroides beetzi</i>
1997			
EF 10'97	mandible fragment	right	<i>Protypotheroides beetzi</i>
EF 14'97	3 fragments of mandibles		<i>Myohyrax oswaldi</i>
1998			
EF 14'98	fragment of mandible	right	<i>Protypotheroides beetzi</i>
EF 15'98	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 16'98	calcaneum	right	<i>Protypotheroides beetzi</i>
EF 18'98	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 26'98	distal humerus	right	Macroscelididae
EF 73'98	various teeth		<i>Myohyrax oswaldi</i>
2000			
EF 43'00	2 lower cheek teeth	left	<i>Myohyrax oswaldi</i>
EF 45'00	pellet with bone		Macroscelididae
EF 69'00	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 70'00	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 71'00	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 73'00	various broken teeth		<i>Myohyrax oswaldi</i>
EF 77'00	humerus	left	<i>Myohyrax oswaldi</i>
EF 87'00	dP2 and DP4	left	<i>Myohyrax oswaldi</i>
EF 100'00	mandible	right	<i>Protypotheroides beetzi</i>
2001			
EF 7'01	mandible	left	<i>Protypotheroides beetzi</i>
EF 17'01	mandibles	lt & rt	<i>Myohyrax oswaldi</i>
EF 20'01	mandible	left	<i>Protypotheroides beetzi</i>
EF 21'01	mandible	left	<i>Protypotheroides beetzi</i>
EF 24'01			
EF 25'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 26'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 27'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 29'01	mandible fragment	right	<i>Myohyrax oswaldi</i>
EF 30'01	fragment of mandible + maxilla	left	<i>Myohyrax oswaldi</i>
EF 40'01	mandible	left	<i>Myohyrax oswaldi</i>
EF 41'01	mandible	left	<i>Myohyrax oswaldi</i>
EF 46'01	fragment maxilla	left	<i>Myohyrax oswaldi</i>

Annex 1. (Continued)

Catalogue	Specimen	Side	Taxon
EF 48'01	associated bones		<i>Myohyrax oswaldi</i>
EF 48'01	humerus distal	left	
EF 51'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 53'01	mandible	left	<i>Myohyrax oswaldi</i>
EF 54'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 59'01	P2	left	<i>Myohyrax oswaldi</i>
EF 61'01	mandible	left	<i>Myohyrax oswaldi</i>
EF 62'01	fragment of maxilla	left	<i>Myohyrax oswaldi</i>
EF 63'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 72'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 73'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 74'01	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 75'01	fragment of maxilla	left	<i>Myohyrax oswaldi</i>
EF 76'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 78'01	ascending ramus of mandible	left	<i>Protypotheroides beetzi</i>
EF 82'01	fragment of mandible		<i>Myohyrax oswaldi</i>
EF 83'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 84'01	fragment of mandible		<i>Myohyrax oswaldi</i>
EF 85'01	fragment of mandible	right ?	<i>Myohyrax oswaldi</i>
EF 86'01	isolated teeth	left	<i>Myohyrax oswaldi</i>
EF 94'01	mandible	left	<i>Myohyrax oswaldi</i>
EF 99'01	distal tibio-fibula	left	Macroscelididae
EF 100'01	mandible	right	<i>Protypotheroides beetzi</i>
EF 103'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 105'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 106'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 109'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 113'01	mandible fragment juvenile	right	<i>Myohyrax oswaldi</i>
EF 115'01	isolated teeth		<i>Myohyrax oswaldi</i>
EF 125'01	upper I2/	left	<i>Myohyrax oswaldi</i>
EF 126'01	mandible	left	<i>Myohyrax oswaldi</i>
EF 127'01	dP4/ + upper molar	left	<i>Myohyrax oswaldi</i>
EF 128'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 129'01	i/1-i/2	right	<i>Myohyrax oswaldi</i>
EF 130'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 131'01	maxilla with P1/-P4/, M1/-M2/	left	<i>Myohyrax oswaldi</i>
EF 132'01	maxilla with P3/-P4/, M1/-M2/	right	<i>Myohyrax oswaldi</i>
EF 133'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 134'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 135'01	small fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 138'01	calcaneum		Macroscelididae
EF 139'01	P3/, M2/	right	<i>Myohyrax oswaldi</i>
EF 141'01	lot of teeth upper	right	<i>Myohyrax oswaldi</i>
EF 144'01	mandible	left	<i>Myohyrax oswaldi</i>
EF 148'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 149'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 161'01	fragment of mandible with m/2-m/3	left	<i>Protypotheroides beetzi</i>
EF 162'01	mandible fragment	right	<i>Myohyrax oswaldi</i>
EF 163'01	distal humerus	right	<i>Myohyrax oswaldi</i>
EF 173'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 178'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 180'01	mandible	right	<i>Myohyrax oswaldi</i>
EF 182'01	fragment of mandible	left?	<i>Myohyrax oswaldi</i>
EF 183'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 184'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 186'01	fragment of mandible	left	<i>Protypotheroides beetzi</i>
EF 187'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 189'01	fragment of premaxilla		<i>Myohyrax oswaldi</i>
EF 190'01	fragment of maxilla	left	<i>Myohyrax oswaldi</i>
EF 191'01	fragment of maxilla	left	<i>Myohyrax oswaldi</i>
EF 192'01	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 193'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 200'01	skull + mandible + skeleton		<i>Myohyrax oswaldi</i>
EF 201'01	skull		<i>Myohyrax oswaldi</i>

Annex 1. (Continued)

Catalogue	Specimen	Side	Taxon
EF 205'01	skull		<i>Myohyrax oswaldi</i>
EF 206'01	palate		<i>Myohyrax oswaldi</i>
EF 218'01	mandible		<i>Myohyrax oswaldi</i>
EF 230'01	lot of teeth (I, P, M)		<i>Myohyrax oswaldi</i>
EF 231'01	postcranial		Macroscleridae
EF 233'01	lot of milk teeth		<i>Myohyrax</i>
EF 235'01	associated teeth		Macroscleridae
EF 240'01	skull + mandible		<i>Myohyrax oswaldi</i>
EF 241'01	M1/ lot of teeth	right	<i>P. beetzi</i> & <i>M. oswaldi</i>
EF 242'01	p/4, M1/	right	<i>Myohyrax oswaldi</i>
EF 243'01	2nd + 3rd phalanges associated		Macroscleridae
EF 244'01	premolars upper	left	<i>Myohyrax oswaldi</i>
EF 245'01	Isolated anterior teeth	right	<i>Myohyrax oswaldi</i>
EF 248'01	mandible fragment	right	<i>Myohyrax oswaldi</i>
EF 249'01	mandible damaged	left	<i>Myohyrax oswaldi</i>
EF 251'01	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 253'01	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 255'01	Skull and skeleton fragments in scat		
EF 265'01	associated remains		<i>Myohyrax oswaldi</i>
EF 266'01	fragment of maxilla + isolated teeth		<i>Myohyrax oswaldi</i>
EF 274'01	fragment of maxilla		Macroscleridae
EF 276'01	fragments of teeth		Macroscleridae
EF 278'01	bones in pellet		Macroscleridae
EF 281'01	mandible	right	<i>Myohyrax oswaldi</i>
2003			
EF 2'03	fragment of mandible		Macroscleridae
EF 6'03	fragment of edentulous mandible		<i>Protypotheroides beetzi</i>
EF 7'03	fragment of mandible (= 8'03 ?)	right	<i>Myohyrax oswaldi</i>
EF 8'03	fragment of maxilla (= 7'03 ?)	left	<i>Myohyrax oswaldi</i>
EF 10'03	maxilla	right	<i>Myohyrax oswaldi</i>
EF 11'03	fragments of teeth upper		<i>Protypotheroides beetzi</i>
EF 17'03	Fragment of mandible	left	<i>Myohyrax oswaldi</i>
2004			
EF 10'04	mandible	right	<i>Myohyrax oswaldi</i>
EF 16'04	maxilla in sediment	right	<i>Myohyrax oswaldi</i>
EF 20'04	skeleton (M1 left + 2 mandibles)		<i>Myohyrax oswaldi</i>
EF 32'04	fragment of P4	left	<i>Myohyrax oswaldi</i>
EF 33'04	eroded distal humerus	right	<i>Myohyrax oswaldi</i>
2005			
EF 5'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 10'05	humerus	left	<i>Myohyrax oswaldi</i>
EF 14'05	distal humerus fragment	right	<i>Myohyrax oswaldi</i>
EF 15'05	mandible fragment	right	<i>Myohyrax oswaldi</i>
EF 16'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 17'05	fragment of maxilla	left	<i>Myohyrax oswaldi</i>
EF 18'05	postcranial remains		Macroscleridae
EF 19'05	lot of fragments of teeth		Macroscleridae
EF 23'05	deciduous incisor	left	<i>Miorhynchocyon</i>
EF 25'05	mandible fragment	left	<i>Myohyrax oswaldi</i>
EF 26'05	lot of d/4		<i>Myohyrax oswaldi</i>
EF 27'05	lot lower teeth cheek teeth		<i>Myohyrax oswaldi</i>
EF 28'05	lot of upper cheek teeth	left	<i>Myohyrax oswaldi</i>
EF 29'05	mandible	right	<i>Myohyrax oswaldi</i>
EF 30'05	mandible	left	<i>Myohyrax oswaldi</i>
EF 31'05	anterior fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 32'05	anterior fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 33'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 34'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 35'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 36'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 37'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 38'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 39'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 40'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>

Annex 1. (Continued)

Catalogue	Specimen	Side	Taxon
EF 41'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 42'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 43'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 44'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 45'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 46'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 47'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 48'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 49'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 50'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 51'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 52'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 53'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 54'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 55'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 56'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 57'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 58'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 59'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 60'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 61'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 62'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 63'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 64'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 65'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 66'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 67'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 68'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 69'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 70'05	fragment of mandible + fgt maxilla		<i>Myohyrax oswaldi</i>
EF 71'05	fragment of mandible	right	<i>Myohyrax oswaldi</i>
EF 72'05	lot of premaxillae		<i>Myohyrax oswaldi</i>
EF 73'05	lot of incisors		<i>Myohyrax oswaldi</i>
EF 74'05	maxilla		Macroscelididae
EF 75'05	maxilla		Macroscelididae
EF 76'05	maxilla		Macroscelididae
EF 77'05	maxilla	left	<i>Myohyrax oswaldi</i>
EF 78'05	maxilla	right	<i>Myohyrax oswaldi</i>
EF 79'05	maxilla	right	<i>Myohyrax oswaldi</i>
EF 80'05	maxilla	right	<i>Myohyrax oswaldi</i>
EF 81'05	maxilla		<i>Myohyrax oswaldi</i>
EF 82'05	fragment of mandible in scat		<i>Myohyrax oswaldi</i>
EF 83'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 84'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 85'05	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 86'05	fragment of maxilla	left	<i>Myohyrax oswaldi</i>
EF 87'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 88'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 89'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 90'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 91'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 92'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 93'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 94'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 95'05	fragment of maxilla	left	<i>Myohyrax oswaldi</i>
EF 96'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
EF 97'05	fragment of maxilla	right	<i>Myohyrax oswaldi</i>
2006			
EF 1'06	skull and mandibles		<i>Myohyrax oswaldi</i>
EF 12'06	mandible	left	<i>Myohyrax oswaldi</i>
2007			
EF 1'07	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 10'07	mandible fragment	right	<i>Myohyrax oswaldi</i>
EF 11'07 a	fragment of mandible	right	<i>Myohyrax oswaldi</i>

Annex 1. (Continued)

Catalogue	Specimen	Side	Taxon
EF 11'07 b	fragment of mandible	left	<i>Myohyrax oswaldi</i>
EF 16'07	distal tibia		
EF 11'07	2 fragments of mandible		<i>Myohyrax oswaldi</i>
EF 18'07	fragment of mandible	left	
EF 22'07	mandible fragment	right	<i>Myohyrax oswaldi</i>
EF 24'07	fragment of mandible (digested)		Macroscelididae ?
No N°	maxilla	left	<i>Myohyrax oswaldi</i>

Annex 2. Macroscelididae from Grillental, Northern Sperrgebiet, Namibia

Catalogue	Specimen	Side	Taxon	Locality
1996				
GT 187'96	molar in fragment of mandible	lt	<i>Protypotheroides beetzi</i>	GT 3
GT 188'96	isolated premolar (same as GT 187'96)	lt	<i>Protypotheroides beetzi</i>	GT 3
1997				
GT 19'97	fragment of mandible	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 25'97	upper molar	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 33'97	lot of isolated teeth		<i>Myohyrax oswaldi</i>	GT 6
2000				
GT 50'00	fragment of mandible	lt	<i>Hypsorhynchocyon burrelli</i>	GT 6
GT 54'00	fragment of mandible	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 57'00	lot of upper & lower teeth		<i>M. oswaldi</i> & <i>P. beetzi</i>	GT 6
GT 58'00	molars (lower + upper)		<i>Myohyrax oswaldi</i>	GT Carrière
GT 59'00	mandible	lt	<i>Myohyrax oswaldi</i>	GT carrière
GT 60'00	fragment of maxilla	rt	<i>Protypotheroides beetzi</i>	GT carrière
GT 65'00	distal tibio-fibula	lt	Macroscelididae	GT 6
GT 66'00	upper molar	lt	<i>Myohyrax oswaldi</i>	GT carrière
2001				
GT 17'01	fragment of mandible	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 38'01	tibio fibula distal	lt	Macroscelididae	GT carrière
2003				
GT 17'03	2 tooth fragments (m/l)	rt	<i>Myohyrax oswaldi</i>	GT6
GT 30'03	mandible	rt	<i>Myohyrax oswaldi</i>	GT 1
GT 47'03	lot of upper molars		<i>Protypotheroides beetzi</i>	GT 1
2004				
GT 33'04	mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 41'04	distal tibia-fibula	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 74'04a	distal humerus	rt		GT 6
GT 90'04	mandible	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 93'04	fragment of mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 94'04	fragment of mandible	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 96'04	upper incisor	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 97'04	p/3	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 114'04	fragment of mandible	lt	<i>Myohyrax oswaldi</i>	GT carrière
GT 115'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>	GT carrière
GT 119'04	distal tibio-fibula	rt	<i>Protypotheroides</i>	GT carrière
GT 120'04	1 upper and 1 lower cheek tooth fragments		<i>Myohyrax oswaldi</i>	GT carrière
GT 122'04	palate	lt	<i>Myohyrax oswaldi</i>	GT carrière
GT 123'04	3 small fragments of mandibles	lt	<i>Myohyrax oswaldi</i>	GT carrière
GT 133'04	lot of teeth		Macroscelididae	GT carrière (screen)
GT 134'04	lot of talus and calcanei		Macroscelididae	GT carrière (screen)
GT 159'04	mandible	rt	<i>Myohyrax oswaldi</i>	
GT 160'04	mandible	rt	<i>Myohyrax oswaldi</i>	GT carrière
GT 166'04	calcaneum		Macroscelididae	GT carrière
2005				
GT 3'05	fragment of mandible	rt	<i>Protypotheroides beetzi</i>	GT 1
GT 16'05	fragment of mandible	rt	<i>Protypotheroides beetzi</i>	GT 6
GT 20'05	distal humerus	rt	<i>Protypotheroides beetzi</i>	GT 6
GT 25'05	fragment of mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 39'05	mandibular apophysis		Macroscelididae	GT 6
GT 40'05	P4/ upper	rt	<i>Myohyrax oswaldi</i>	GT 6
2006				
GT 15'06	mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 16'06	fragment of mandible		Macroscelididae bunodont	GT 6

Annex 2. (Continued)

Catalogue	Specimen	Side	Taxon	Locality
GT 19'06	lower molar		<i>Myohyrax oswaldi</i>	GT 6
GT 20'06	2 calcanei	rt + lt	<i>Myohyrax</i>	GT 6
GT 25'06a	humerus		<i>Myohyrax oswaldi</i>	GT 6
GT 33'06	2 distal tibio-fibula		<i>Myohyrax oswaldi</i>	GT 6
GT 34'06	fragment of mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 35'06	mandible	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 42'06	distal tibio-fibula	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 44'06a	talus	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 65'06	fragment of mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 67'06	fragment of mandible	rt	<i>Protypotheroides beetzi</i>	GT 6
GT 98'06	fragment of mandible	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 99'06	upper molar	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 100'06	lower molar	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 107'06a	calcaneum	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 138'06	humerus	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 146'06	fragment of mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 147'06	fragment of mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 150'06	fragment of mandible	rt	<i>Protypotheroides beetzi</i>	GT 6
GT 151'06	fragment of mandible	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 201'06	calcaneum	rt	Macroscelididae	GT 6
GT 210'06	fragment of mandible	rt	<i>Myohyrax oswaldi</i>	GT 1
2007				
GT 17'07	fragment of mandible	rt	<i>Protypotheroides beetzi</i>	GT 6
GT 18'07	fragment of mandible	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 29'07	mandible	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 42'07	upper molar fragment		<i>Protypotheroides beetzi</i>	GT 6
GT 43'07	distal tibio-fibula	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 56'07	2 deeply eroded teeth of Macroscelididae		Macroscelididae	GT 6
GT 81'07	mandible	rt	Macroscelididae	Borrow Pit
GT 83'07	upper incisor (I1/)	lt	<i>Myohyrax oswaldi</i>	Borrow pit
GT 85'07	lower molar (m/1)	rt	<i>Myohyrax oswaldi</i>	Borrow pit
GT 101'07	pulverised mandible	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 92'07	calcaneum	lt	<i>Myohyrax oswaldi</i>	Borrow Pit
GT 104'07	fragment of mandible	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 105'07	mandible		<i>Myohyrax oswaldi</i>	GT 6
GT 106'07	damaged mandible		<i>Protypotheroides beetzi</i>	GT 6
GT 109'07	2 distal humerus	lt	Macroscelididae	GT 6
GT 122'07	M1/ upper		<i>Protypotheroides beetzi</i>	GT 6
GT 123'07	P2/ upper	lt	<i>Myohyrax oswaldi</i>	GT 6
2008				
GT 2'08	fragment of mandible	lt	<i>Protypotheroides beetzi</i>	GT 6
GT 20'08	P4/ upper	lt	<i>Myohyrax oswaldi</i>	GT 6
GT 21'08	calcaneum	rt	<i>Myohyrax oswaldi</i>	GT 6
GT 33'08	M2/ upper	lt	<i>Protypotheroides beetzi</i>	GT 1

Annex 3. Macroscelididae from Fiskus, Northern Sperrgebiet, Namibia

Catalogue	Specimen	Side	Taxon
1993			
FS 29'93	fragment of mandible	lt	<i>Protypotheroides beetzi</i>
1994			
FS 9'94	upper and lower teeth		<i>Myohyrax oswaldi</i>
1996			
FS 18'96	fragment of mandible	lt	<i>Protypotheroides beetzi</i>
2001			
FS 11'01	upper molar + half molar		<i>Protypotheroides beetzi</i>
2007			
FS 20'07	calcaneum	rt	<i>Protypotheroides beetzi</i>

Annex 4. Macroscelididae from Langental, Northern Sperrgebiet, Namibia

Catalogue	Specimen	Side	Taxon
1994			
LT 244'94			
1996			
LT 150'96	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 169'96	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 170'96	mandible fragment eroded	lt	<i>Protypotheroides beetzi</i>
LT 171'96	mandible fragment	rt	<i>Myohyrax pickfordi</i>
LT 172'96	mandible fragment	lt	<i>Myohyrax pickfordi</i>
LT 173'96	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 174'96	mandible fragment	lt	<i>Myohyrax pickfordi</i>
LT 175'96	lower molar	lt	<i>Protypotheroides beetzi</i>
LT 176'96	lot of lower teeth		<i>Protypotheroides beetzi</i>
LT 435'96	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 455'96	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 456'96	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 457'96	mandible fragment		
LT 458'96	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 459'96	mandible fragment	rt	Macroscelididae
LT 460'96	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 461'96	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 462'96	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 463'96	mandible fragment	lt	Macroscelididae
LT 464'96	mandible fragment	lt	Macroscelididae
LT 465'96	mandible fragment	lt	Macroscelididae
LT 466'96	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 467'96	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 468'96	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 469'96	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 470'96	3 associated upper cheek teeth	lt	<i>Protypotheroides beetzi</i>
LT 471'96	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 472'96	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 473'96	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 474'96	lot of teeth upper		<i>Protypotheroides</i>
LT 475'96	lot of lower teeth		<i>Protypotheroides</i> + <i>Myohyrax</i>
LT 522'96	mandible fragment	lt	<i>Protypotheroides beetzi</i>
1997			
LT 61'97	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 62'97	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 63'97	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 64'97	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 71'97	mandible fragment		<i>Myohyrax oswaldi</i>
LT 73'97	isolated teeth		<i>Myohyrax</i> + <i>Protypotheroides</i>
LT 82'97	lot of teeth		Macroscelididae
1998			
LT 181'98	mandible fragment p/2-p/4,m/1-m/2	rt	<i>Protypotheroides beetzi</i>
LT 182'98	mandible fragment p/2-p/4,m/1-m/2	lt	<i>Protypotheroides beetzi</i>
LT 183'98	mandible fragment p/3-p/4,m/1-m/ +m/3		<i>Protypotheroides beetzi</i>
LT 184'98	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 185'98	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 186'98	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 187'98	mandible fragment	lt	<i>Myohyrax pickfordi</i>
LT 188'98	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 189'98	mandible fragment	lt	<i>Myohyrax pickfordi</i>
LT 190'98	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 191'98	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 192'98	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 193'98	lot of lower teeth		<i>Protypotheroides beetzi</i>
LT 194'98	lot of upper teeth		<i>Protypotheroides beetzi</i>
LT 195'98	incisor		
LT 196'98	fragment upper molar + M1	lt	<i>Myohyrax oswaldi</i>
LT 197'98	fragments lower molars		<i>Myohyrax oswaldi</i>
LT 198'98	mandible	rt	<i>Myohyrax oswaldi</i>
LT 199'98	mandible rolled	rt	<i>Myohyrax oswaldi</i>

Annex 4. (Continued)

Catalogue	Specimen	Side	Taxon
LT 201'98	calcaneum	rt	<i>Protypotheroides beetzi</i>
LT 204'98	talus	rt	<i>Protypotheroides beetzi</i>
LT 225'98	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 227'98	distal tibio-fibula	rt	<i>Myohyrax oswaldi</i>
LT 229'98	distal humerus	lt	<i>Myohyrax oswaldi</i>
1999			
LT 6'99	mandible	lt	<i>Protypotheroides beetzi</i>
LT 7'99	mandible		<i>Protypotheroides beetzi</i>
LT 8'99	mandible	lt	<i>Protypotheroides beetzi</i>
LT 9'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 10'99	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 11'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 12'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 13'99	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 14'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 15'99	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 16'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 17'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 18'99	mandible fragment		<i>Protypotheroides beetzi</i>
LT 19'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 20'99	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 21'99	mandible fragment		<i>Protypotheroides beetzi</i>
LT 22'99	coronoid apophysis		<i>Protypotheroides ?</i>
LT 23'99	mandible fragment		<i>Protypotheroides beetzi</i>
LT 24'99	edentulous mandible		<i>Protypotheroides beetzi</i>
LT 25'99	mandible fragment (same as 26'99 ?)	rt	<i>Myohyrax pickfordi</i>
LT 26'99	maxilla fragment (same as 25'99 ?)	lt	<i>Myohyrax pickfordi</i>
LT 27'99	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 28'99	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 29'99	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 30'99	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 32'99	ll	lt	<i>Protypotheroides beetzi</i>
LT 33'99			Macroscelididae
LT 34'99	maxilla fragment	lt	<i>Protypotheroides beetzi</i>
LT 35'99	maxilla fragment	lt	<i>Protypotheroides beetzi</i>
LT 36'99	maxilla fragment	lt	<i>Protypotheroides beetzi</i>
LT 37'99	maxilla fragment		Macroscelididae
LT 38'99	maxilla fragment	rt	<i>Protypotheroides beetzi</i>
LT 39'99	3 associated teeth upper	rt	<i>Protypotheroides beetzi</i>
LT 49'99	molar lower (m/1 ?)	rt	<i>Myohyrax oswaldi</i>
LT 48'99	lot of upper molars		<i>Protypotheroides beetzi</i>
2000			
LT 18'00	mandible fragment	lt	<i>Myohyrax pickfordi</i>
LT 19'00	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 20'00a	mandible	rt	<i>Protypotheroides beetzi</i>
LT 20'00b	mandible	lt	<i>Protypotheroides beetzi</i>
LT 20'00c	maxilla fragment	lt	<i>Protypotheroides beetzi</i>
LT 21'00	mandible	lt	<i>Protypotheroides beetzi</i>
LT 22'00	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 23'00	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 24'00	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 25'00	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 26'00	maxilla fragment	rt	<i>Myohyrax pickfordi</i>
LT 27'00	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 28'00	maxilla fragment (juvenile)	rt	<i>Myohyrax oswaldi</i>
LT 29'00	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 30'00	lot of upper teeth		<i>Protypotheroides beetzi</i>
LT 31'00	lot of fragments of lower teeth		<i>Protypotheroides beetzi</i>
LT 60'00	maxilla fragment	rt	<i>Protypotheroides beetzi</i>
LT 153'00	isolated teeth		<i>Myohyrax oswaldi</i>
2001			
LT 32'01	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 69'01	mandible fragment	rt	<i>Myohyrax pickfordi</i>

Annex 4. (Continued)

Catalogue	Specimen	Side	Taxon
LT 70'01	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 71'01	incisor		<i>Protypotheroides beetzi</i>
LT 72'01	lower molar	lt	<i>Myohyrax oswaldi</i>
LT 73'01a	1/2 lower tooth		<i>Protypotheroides beetzi</i>
LT 73'01b	1/2 upper tooth		<i>Protypotheroides beetzi</i>
2003			
LT 43'03	lot of teeth upper		<i>Protypotheroides beetzi</i>
LT 44'03	lot of incomplete lower teeth		<i>Protypotheroides beetzi</i>
LT 48'03	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 69'03	mandible fragment	lt	
LT 100'03	mandible	rt	<i>Protypotheroides beetzi</i>
LT 105'03	lot of lower teeth		<i>Protypotheroides beetzi</i>
LT 107'03	3 isolated upper teeth		<i>Protypotheroides beetzi</i>
LT 108'03	lot of fragments of teeth		<i>Myohyrax oswaldi</i>
LT 116'03	mandible	rt	<i>Protypotheroides beetzi</i>
LT 130'03	mandible	lt	<i>Protypotheroides beetzi</i>
LT 140'03	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 149'03	distal tibio-fibula	lt	<i>Protypotheroides beetzi</i>
LT 154'03	mandible	rt	<i>Protypotheroides beetzi</i>
LT 167'03	lot of lower teeth	rt	<i>Protypotheroides beetzi</i>
LT 170'03	lot of upper teeth		Macroscelididae
LT 205'03	upper teeth		<i>Protypotheroides beetzi</i>
LT 210'03	maxilla fragment	rt	<i>Protypotheroides beetzi</i>
LT 213'03	2 associated upper teeth	lt	<i>Protypotheroides beetzi</i>
LT 218'03	3 associated lower teeth	rt	<i>Protypotheroides beetzi</i>
LT 219'03	lot of lower teeth		Macroscelididae
LT 220'03	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 224'03	mandible	rt	<i>Protypotheroides beetzi</i>
LT 225'03	lower molar, p/4	lt	<i>Protypotheroides beetzi</i>
LT 226'03	upper molar	lt	<i>Protypotheroides beetzi</i>
LT 227'03	maxilla fragment	rt	<i>Myohyrax oswaldi</i>
LT 228'03	upper molar	rt	<i>Protypotheroides beetzi</i>
LT 240'03	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 248'03	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 249'03	distal humerus	lt	<i>Myohyrax oswaldi</i>
LT 252'03	fragment mandible	rt	<i>Myohyrax oswaldi</i>
LT 256'03	fragments of teeth		<i>Myohyrax oswaldi</i>
2004			
LT 60'04	maxilla	rt	<i>Protypotheroides beetzi</i>
LT 61'04	lot of upper teeth		<i>Protypotheroides beetzi</i>
LT 62'04	mandible fragment rolled		<i>Myohyrax oswaldi</i>
LT 65'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 66'04	fragment of goniac region	lt	<i>Protypotheroides beetzi</i>
LT 70'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 87'04	isolated tooth in mandible	rt	<i>Myohyrax pickfordi</i>
LT 88'04	fragment of scapula	rt	Macroscelididae
LT 93'04	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 127'04	upper premolar in fragment of maxilla	lt	<i>Protypotheroides beetzi</i>
LT 131'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 132'04	mandible		Macroscelididae
LT 152'04	lower molar	rt	<i>Protypotheroides beetzi</i>
LT 158'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 163'04	upper teeth		<i>Protypotheroides beetzi</i>
LT 164'04	P2/	rt	<i>Protypotheroides beetzi</i>
LT 166'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 167'04	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 177'04	upper I1/	lt	<i>Protypotheroides beetzi</i>
LT 178'04	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 179'04	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 180'04	mandible fragment		<i>Protypotheroides beetzi</i>
LT 184'04	maxilla fragment	rt	<i>Protypotheroides beetzi</i>
LT 220'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 221'04	mandible fragment	lt	<i>Protypotheroides beetzi</i>

Annex 4. (Continued)

Catalogue	Specimen	Side	Taxon
2005			
LT 2'05	maxilla fragment	lt	<i>Myohyrax pickfordi</i>
LT 3'05	maxilla fragment	rt	<i>Protypotheroides beetzi</i>
LT 5'05	3 upper molars	lt	<i>Protypotheroides beetzi</i>
LT 36'05	calcaneum fragment		<i>Protypotheroides beetzi</i>
LT 53'05	2 lower molars	rt	<i>Protypotheroides beetzi</i>
2006			
LT 21'06	2 upper teeth		<i>Protypotheroides beetzi</i>
LT 26'06a, b	a : upper rt M2/; b: lower,	rt	<i>Protypotheroides beetzi</i>
LT 26'06c	c : upper		<i>Myohyrax oswaldi</i>
LT 32'06	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 33'06	Mandible (2 associated)	rt	<i>Protypotheroides beetzi</i>
LT 44'06	upper molar + fragment arcade		<i>Protypotheroides beetzi</i>
LT 50'06	maxilla fragment	rt	<i>Protypotheroides beetzi</i>
LT 56'06	mandible fragment	lt	Macroscelididae
LT 68'06	lot of teeth	lt, rt	<i>Protypotheroides beetzi</i>
LT 81'06	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 88'06	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 97'06	mandible fragment slightly rolled	rt	<i>Protypotheroides beetzi</i>
LT 112'06	lot of teeth		<i>Protypotheroides beetzi</i>
LT 140'06	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 150'06	mandible	rt	<i>Protypotheroides beetzi</i>
LT 153'06	mandible fragment	rt	<i>Myohyrax oswaldi</i>
LT 179'06	P4/	rt	<i>Protypotheroides beetzi</i>
LT 180'06	mandible fragment	lt	<i>Myohyrax oswaldi</i>
2007			
LT 24'07	2 associated upper molars		<i>Protypotheroides beetzi</i>
LT 25'07	3 associated upper molars		<i>Protypotheroides beetzi</i>
LT 30'07	mandible	lt	<i>Protypotheroides beetzi</i>
LT 32'07	lot of upper teeth		Macroscelididae
LT 33'07	lot of lower teeth		Macroscelididae
LT 57'07	mandible	lt	<i>Protypotheroides beetzi</i>
LT 64'07	mandible fragment		<i>Protypotheroides beetzi</i>
LT 76'07	two associated mandible fragments.	lt, rt	<i>Protypotheroides beetzi</i>
LT 112'07	maxilla fragment	lt	<i>Myohyrax pickfordi</i>
LT 116'07	mandible	lt	<i>Myohyrax pickfordi</i>
LT 119'07	lower p/4	lt	<i>Protypotheroides beetzi</i>
LT 119'07	mandible fragment with 2 teeth	rt	<i>Myohyrax oswaldi</i>
LT 121'07	maxilla fragment		<i>Protypotheroides</i>
LT 137'07	mandible	rt	<i>Protypotheroides beetzi</i>
LT 139'07	lot of teeth		Macroscelididae
LT 142'07	fragment of tooth		Macroscelididae
2008			
LT 17'08	fragment of mandible	rt	<i>Protypotheroides beetzi</i>
LT 19'08	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 22'08	maxilla fragment	lt	<i>Protypotheroides beetzi</i>
LT 30'08	mandible	lt	<i>Myohyrax oswaldi</i>
LT 33'08	lot of molars, premolars upper + lowers		<i>Protypotheroides beetzi</i>
LT 35'08	lower i/2	lt	<i>Protypotheroides beetzi</i>
LT 48'08	maxilla fragment	lt	Macroscelididae
LT 77'08	mandible	rt	<i>Myohyrax oswaldi</i>
LT 78'08	mandible fragment	rt	<i>Protypotheroides beetzi</i>
LT 79'08	upper M1/	lt	<i>Protypotheroides beetzi</i>
LT 80'08	mandible fragment	rt	
LT 83'08	upper I1/	lt	<i>Protypotheroides beetzi</i>
LT 86'08	3 upper premolars	lt	<i>Myohyrax pickfordi</i>
LT 87'08	lot of fragments of teeth		<i>Protypotheroides beetzi</i> + <i>Myohyrax pickfordi</i>
LT 88'08	mandible fragment	lt	<i>Protypotheroides beetzi</i>
LT 100'08	lot of upper teeth		<i>Protypotheroides beetzi</i>
LT 120'08	mandible fragment	lt	<i>Myohyrax oswaldi</i>
LT 124'08	2 lower cheek teeth	lt	<i>Protypotheroides beetzi</i>

Annex 5. Measurements (in mm) of the upper teeth of Macroscelididae from the Northern Sperrgebiet, Namibia.

I1/	Mesio-distal length	Anterior bucco-lingual breadth
GT 83'07 right	2.6	1.2
LT 177'04 left	4.3	2.5
LT 71'01 left	3.0	2.2
LT 83'08 left	5.1	2.8
I2/		
EF 125'01 left	1.6	0.9
EF 240'01 right	1.9	1.0
P1/		
LT 50'06 right	2.6	1.3
P2/		
EF 17'05 left	2.1	1.7
EF 240'01 left	1.9	1.6
EF 94'93 a	4.1	3.9
EF 94'93 b	4.2	3.8
EF 94'93 c	4.2	4.1
GT 123'07 right	2.8	2.5
GT 60'00 right	4.5	3.4
LT 121'07 right	3.6	3.0
LT 164'04 left	4.1	3.5
LT 170'03 right	3.6	3.6
LT 22'08 left	3.7	3.5
LT 25'07 left	3.4	3.5
LT 50'06 right	3.8	3.6
P3/		
EF 10'03 right	3.1	2.1
EF 17'05 left	2.8	2.1
EF 240'01 left	2.8	2.0
GT 60'00 right	5.0	4.2
LT 127'04 left	6.5	4.1
LT 163'04 right	6.0	4.1
LT 163'05 a right	5.8	4.1
LT 163'05 b right	6.1	4.2
LT 184'04 right	5.0	4.0
LT 22'08 left	5.5	3.8
LT 24'07 right	5.9	4.3
LT 50'06 right	5.5	4.3
LT 5'05 left	6.6	4.2
LT 73'97 right	2.6	2.2
P4/		
EF 10'03 right	3.1	2.3
EF 240'01 left	3.5	2.3
GT 122'04 left	4.0	2.5
GT 20'08 left	3.2	2.4
GT 40'05 right	3.8	3.0
GT 40'05 right	3.9	3.0
LT 112'07 left	4.9	3.3
LT 139'07 left	3.3	2.3
LT 163'04 left	5.9	4.3
LT 163'05 left	6.0	4.5
LT 179'06 right	4.9	3.9
LT 184'04 right	5.8	4.5
LT 20'00 c left	5.4	5.0
LT 2'05 left	5.4	3.8
LT 22'08 left	5.7	3.8
LT 26'00 right	5.0	4.1
LT 26'00 right	5.2	3.8
LT 50'06 right	5.8	4.5
M1/		
EF 10'03 right	3.4	3.0
EF 240'01 left	3.0	2.6
GT 122'04 left	3.4	2.4
GT 122'07 left	5.3	4.0
GT 58'00 right	3.3	2.6

Annex 5. (Continued)

M1/	Mesio-distal length	Anterior bucco-lingual breadth
LT 112'06 left	5.5	4.6
LT 163'04 right	5.9	4.0
LT 184'04 right	5.2	3.9
LT 20'00 c left	4.8	4.1
LT 2'05 left	4.5	4.0
LT 210'03	4.6	4.0
LT 22'08 left	5.2	3.6
LT 24'07 left	5.2	3.6
LT 25'07 left	5.7	3.7
LT 26'00 right	4.5	4.2
LT 26'00 right	4.9	4.3
LT 26'99 left	4.7	4.0
LT 3'05 right	5.1	3.6
LT 79'08 left	5.9	4.8
M2/		
EF 10'03 right	2.4	2.1
EF 240'01 left	2.5	2.0
GT 122'04 left	2.8	2.3
GT 33'08 right	4.1	2.8
LT 184'04 right	4.0	3.3
LT 210'03	4.6	3.1
LT 22'08 left	3.7	2.7
LT 25'07 left	3.8	2.8
LT 26'06 left	3.8	3.0
LT 3'05 right	3.5	2.7

Annex 6. Measurements (in mm) of the lower teeth of Macroselididae from the Northern Sperrgebiet, Namibia

i/1	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
EF 103'01 rt	1.7	0.6	
EF 144'01 lt	1.43	0.96	
EF 17'01 rt	1.62	0.91	
EF 17'01 lt	1.55	0.88	
EF 20'01	3.4	1.7	
EF 33'05 rt	1.5	0.5	
EF 33'05 lt	1.37	0.69	
EF 34'05 rt	1.5	0.5	
EF 53'01 lt	1.41	1.13	
EF 73'05 lt	1.7	0.9	
EF 86'01 lt	1.6	0.5	
LT 116'07 lt	2.6	1.5	
LT 178'04 rt	3.7	1.8	
LT 240'03 rt	4.1	1.5	
i/2			
EF 103'01 rt	1.8	0.5	
EF 17'01 rt	1.74	0.84	
EF 218'01	1.72	0.56	
EF 281'01 rt	1.6	0.6	
EF 33'05 rt	1.4	0.4	
EF 33'05 lt	1.72	0.68	
EF 34'05 lt	1.5	0.72	
EF 40'01 lt	1.67	0.72	
EF 53'01 lt	1.33	0.69	
EF 61'01 lt	1.72	0.87	
EF 73'05 rt	1.9	1.3	
GT 104'07 lt	2.3	1.3	
LT 116'07 lt	2.4	1.2	
LT 178'04 rt	3.9	1.8	
LT 35'08 lt	3.8	1.7	
LT No n° rt	3.2	1.5	
i/3			
EF 17'01 rt	0.92	0.73	
EF 33'05 lt	0.87	0.62	

Annex 6. (Continued)

i/3	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
EF 33'05 rt	0.8	0.5	
LT 116'07 lt	2.1	1.2	
c/1			
EF 17'01 rt		0.64	
EF 33'05 rt	1.4	0.5	
EF 33'05 rt	1.0	0.5	
EF 33'05 lt	0.97	0.55	
LT 116'07 lt	2.2	1.15	
p/1			
EF 17'01 lt	1.17	0.73	
EF 35'05 rt	1.0	0.6	
GT 104'07 lt	2.2	1.6	
p/2			
EF 10'04 rt	1.8	0.8	
EF 103'01 rt	1.7	0.8	
EF 144'01 lt	1.54	0.85	
EF 17'01 rt	1.69	1.05	
EF 17'01 lt	1.59	1.03	
EF 18'98 rt	1.8	0.9	
EF 20'01	2.89	2.35	
EF 21'93 lt	3.9	1.6	
EF 25'05 rt	1.6	0.9	
EF 33'05 rt	1.4	0.7	
EF 33'05 lt	1.63	0.88	
EF 34'05 rt	1.5	0.8	
EF 35'05 rt	1.6	0.8	
EF 40'01 rt	1.72	1.08	
EF 53'01 lt	1.53	0.92	
EF 61'01 lt	1.78	0.92	
GT 104'07 lt	2.8	1.6	
GT 150'06 rt	3.2	1.8	
GT 67'06 rt	3.6	1.8	
LT 116'07 lt	2.4	1.5	
LT 11'99 lt	3.1	1.7	
LT 130'03 rt	2.7	1.6	
LT 13'99 rt	3.0	1.9	
LT 154'03 rt	2.9	1.6	
LT 166'04 lt	3.1	1.7	
LT 166'04 lt	3.05	1.6	
LT 16'99 lt	3.0	1.7	
LT 172'96 lt	2.4	1.5	
LT 178'04 rt	3.0	2.1	
LT 181'98 rt	2.6	1.6	
LT 182'98 lt	2.9	2.0	
LT 19'08	2.62	1.2	
LT 190'98 rt	3.3	1.6	
LT 199'98 rt	2.5	1.3	
LT 220'03 lt	1.8	0.9	
LT 224'03 rt	3.0	1.4	
LT 240'03 rt	2.8	1.6	
LT 33'06 rt	2.6	1.4	
LT 33'06 lt	2.8	1.6	
LT 76'07 lt	2.9	1.5	
LT 88'06 lt	3.2	1.7	
LT 97'06 rt	3.0	1.7	
p/3			
EF 10'04 rt	2.5		1.0
EF 105'01 rt	2.3	1.1	
EF 1'07	2.17	1.18	1.03
EF 1'07 lt	2.0		1.1
EF 144'01 lt	2.68	1.04	1.09
EF 15'05 rt	2.5	1.1	
EF 15'98 rt	2.7	1.1	
EF 17'01 rt	2.69	1.0	0.96

Annex 6. (Continued)

p/3	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
EF 17'01 lt	2.7	1.12	1.09
EF 18'98 rt	2.7	1.1	
EF 20'01	5.4	2.33	2.46
EF 218'01	2.74	1.08	1.0
EF 21'93 lt	4.0	1.8	
EF 22'07 rt	2.57	1.03	1.12
EF 22'07 rt	2.5		0.9
EF 25'05 rt	2.6	1.1	
EF 281'01 rt	2.6		1.0
EF 33'05 rt	2.0		0.9
EF 33'05 lt	2.61	0.91	0.96
EF 34'05 rt	2.5		0.9
EF 34'05 lt	2.57	1.14	1.13
EF 35'05 rt	2.3	1.1	
EF 36'05 rt	2.8	1.3	
EF 40'01 rt	2.56	1.18	1.36
EF 41'01 lt	2.95	1.1	1.15
EF 53'01 lt	2.28	1.1	1.16
EF 61'01 lt	2.62	1.2	1.16
EF 69'94 lt	2.5		1.3
EF 83'01 lt	2.1		1.2
EF 87'94 lt	2.6		1.4
FS 29'93 lt	4.3		2.4
GT 104'07 lt	4.9		2.3
GT 150'06 rt	5.2		2.5
GT 210'06 rt	2.6	1.2	
GT 29'07 rt	2.6		0.9
GT 29'07 rt	2.4		1.1
GT 67'06 rt	5.3	2.4	
LT 105'03 rt	5.5		2.5
LT 112'06 lt	5.5		2.5
LT 116'07 lt	4.3		1.8
LT 11'99 lt	5.6		2.4
LT 130'03 rt	5.3	2.3	2.2
LT 137'07 rt	5.7		2.4
LT 13'99 rt	5.1		2.5
LT 150'06 rt	5.2		2.2
LT 154'03 rt	5.7	2.3	2.25
LT 167'03 rt	5.5		2.7
LT 167'04 rt	2.7	1.2	1.3
LT 16'99 lt	5.1		2.4
LT 17'08 rt	5.3		2.5
LT 171'96 rt	4.5	2.0	
LT 172'96 lt	4.8	1.9	
LT 181'98 rt	5.2	2.3	2.4
LT 182'98 lt	4.5		
LT 183'98 rt	4.8	2.4	2.6
LT 185'98 rt	5.1	2.3	
LT 186'98 lt	5.9	2.4	
LT 19'00 lt	2.2		0.9
LT 19'08	3.0		1.5
LT 198'98 rt	2.8		1.3
LT 20'00 a rt	4.8	2.5	
LT 21'00 lt	5.2	2.5	
LT 220'03 lt	3.0	1.1	1.05
LT 224'03 rt	5.2	2.2	2.2
LT 23'00 rt	5.6	2.6	
LT 240'03 rt	5.2		2.3
LT 30'08 lt	2.7		1.0
LT 32'01 rt	5.3		2.45
LT 32'06 lt	4.0	2.6	2.8
LT 33'06 rt	5.6	2.3	2.2
LT 33'06 rt	5.2		2.3
LT 33'06 lt	5.3	2.4	2.3

Annex 6. (Continued)

p/3	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
LT 461'96 lt	5.2		2.3
LT 57'07 lt	5.1		2.7
LT 70'01 rt	5.5		2.1
LT 76'07 rt	5.5		2.2
LT 76'07 lt	5.2		2.2
LT 88'06 lt	5.5		2.3
LT 97'06 rt	4.8	2.3	2.3
d/4			
EF 86'01 lt	4.0	1.7	
EF 103'01 rt	4.3	1.9	
EF 26'05 rt	4.6	1.3	
EF 26'05 lt	4.2	1.4	
p/4			
EF 10'04 rt	2.8	1.5	
EF 10'07 rt	2.74	1.54	1.58
EF 10'07 rt	2.85	1.4	
EF 105'01 rt	3.4	1.6	
EF 1'07	3.03	1.61	1.41
EF 1'07 lt	3.1	1.4	
EF 144'01 lt	2.93	1.59	1.54
EF 14'98 rt	5.3	2.6	
EF 15'05 rt	2.9	1.4	
EF 15'98 rt	3.1	1.5	
EF 16'05 lt	2.8	1.6	
EF 17'01 lt	2.9	1.5	1.42
EF 17'01 rt	3.06	1.46	1.45
EF 177'01 rt	3.1	1.7	
EF 18'07 lt	4.5	2.6	
EF 20'01	5.99	2.56	2.58
EF 21'01	5.95	2.46	2.6
EF 218'01	3.06	1.42	1.34
EF 21'93	4.5	2.4	
EF 22'07 rt	2.97	1.34	1.49
EF 22'07 rt	2.7	1.4	
EF 241'01 rt	5.5	2.7	
EF 25'05 rt	2.9	1.6	
EF 281'01 rt	2.7	1.5	
EF 33'05 lt	2.86	1.33	1.43
EF 33'05 rt	2.6	1.4	
EF 35'05 rt	2.8	1.6	
EF 36'05 rt	3.5	1.8	
EF 37'05 lt	2.8	1.5	
EF 40'01 rt	2.9	1.78	1.71
EF 41'01 lt	3.09	1.59	1.55
EF 5'05 lt			1.33
EF 53'01 lt	2.57	1.46	1.66
EF 61'01 lt	3.26	1.5	1.55
EF 69'94 lt	2.9	1.6	
EF 7'01	6.1	2.45	2.31
EF 71'05 lt	2.7	1.4	
EF 83'01 lt	3.1	1.3	
EF 86'01 lt	3.0	1.8	
EF 87'94 lt	2.8	1.5	
EF 88'94 rt	3.0	1.5	
FS 29'93 lt	4.4	2.8	
GT 104'07 lt	5.5	2.8	
GT 150'06 rt	5.9	2.7	
GT 210'06 rt	2.8	1.4	
GT 25'05 rt	2.9	1.4	
GT 29'07 rt	2.8	1.3	
GT 29'07 rt	3.1	1.3	
GT 50'00	3.94	2.19	
GT 58'00 lt	3.0	1.6	
GT 65'06 rt	3.0	1.3	

Annex 6. (Continued)

p/4	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
LT 100'03 rt	5.2	2.8	2.7
LT 105'03 rt	6.1	2.8	
LT 116'07 lt	5.3	2.2	
LT 119'07 lt	6.2	2.7	
LT 130'03 rt	5.9	2.7	2.6
LT 137'07 rt	6.2	2.6	
LT 139'07 lt	6.2	2.6	
LT 140'06 lt	2.7	1.6	
LT 150'06 rt	5.6	2.4	
LT 152'04 rt	6.2	2.3	2.2
LT 154'03 rt	5.9	2.8	2.5
LT 15'99 rt	5.3	2.8	
LT 166'04 lt	6.3	2.5	2.5
LT 166'04 lt	6.3	2.4	2.3
LT 167'03 rt	6.0	2.7	
LT 167'04 rt	2.8	1.6	1.5
LT 171'96 rt	5.1	2.5	
LT 178'04 rt	5.0	3.0	
LT 181'98 rt	6.0	2.5	2.5
LT 182'98 lt	4.9	3.0	2.9
LT 183'98 rt	5.2	3.0	2.8
LT 184'98 lt	6.2	2.7	
LT 19'00 lt	2.7	1.4	
LT 19'08 lt	3.0	1.8	
LT 198'98 rt	2.9	1.5	
LT 20'00a rt	5.7	2.8	
LT 21'00 lt	5.9	2.9	
LT 218'03 rt	5.7	2.5	2.3
LT 220'03 lt	3.1	1.5	1.4
LT 220'04 lt	5.5	3.1	
LT 224'03 rt	6.0	2.6	2.5
LT 225'03 lt	5.9	2.4	2.4
LT 240'03 rt	5.6	2.5	
LT 30'07 lt	5.8	2.7	2.4
LT 30'08 lt	2.9	1.4	
LT 32'01 rt	6.2	2.7	
LT 32'06 lt	5.7	3.1	2.7
LT 33'06 lt	6.1	2.6	2.5
LT 33'06 rt	6.1	2.6	2.4
LT 33'06 rt	5.9	2.7	
LT 455'96 rt	6.1	2.6	
LT 57'07 lt	5.9	3.0	
LT 61'97 rt	5.7	2.8	
LT 62'97 rt	5.8	2.8	
LT 65'04 lt	5.8	2.4	2.25
LT 70'01 rt	5.7	2.6	
LT 73'97 lt	5.2	2.6	
LT 76'07 lt	6.3	3.5	
LT 76'07 rt	6.1	2.6	
LT 77'08 rt	3.0	1.3	
LT 81'06 lt	5.9	2.7	
LT 88'06 lt	5.9	2.8	
m/l			
EF 10'04 rt	2.8	1.7	
EF 10'07 rt	2.83	1.79	1.72
EF 10'07 rt	3.1	1.6	
EF 103'01 rt	2.9	1.8	
EF 105'01 rt	3.3	1.8	
EF 1'07	3.03	1.92	1.67
EF 1'07 lt	3.2	1.8	
EF 144'01 lt	2.99	1.74	1.72
EF 14'98 rt	5.2	2.3	
EF 15'05 rt	3.2	1.7	
EF 16'05 lt	2.9	1.5	

Annex 6. (Continued)

m/l	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
EF 169'96 lt	5	2.3	
EF 17'01 rt	3.09	1.82	1.65
EF 17'01 lt	2.93	1.65	1.33
EF 177'01 rt	3.1	1.8	
EF 18'07 lt	5.3	3.0	
EF 20'01	5.32	2.44	2.13
EF 21'01	5.46	2.35	2.21
EF 218'01	3.07	1.7	1.53
EF 21'93 lt	4.1	2.8	
EF 22'07 rt	3.26	1.65	1.55
EF 22'07 rt	2.8	1.6	
EF 25'05 lt	3.3	1.8	
EF 281'01 rt	2.6	1.6	
EF 35'05 rt	2.8	1.8	
EF 37'05 lt	3.0	1.7	
EF 38'05 lt	3.6	1.7	
EF 40'01 rt	3.03	1.91	1.74
EF 41'01 lt	3.36	1.79	1.74
EF 5'05 lt	2.97	1.54	1.49
EF 5'05 lt	3.1	1.5	
EF 53'01 lt	2.6	1.91	1.82
EF 61'01 lt	3.06	1.79	1.63
EF 69'94 lt	3.4	1.7	
EF 7'01	5.57	2.32	1.99
EF 71'05 lt	2.8	1.7	
EF 83'01 lt	3.3	1.7	
EF 86'01 lt	2.7	1.6	
EF 87'94 lt	2.8	1.7	
EF 88'94 rt	3.5	1.9	
GT 101'07 lt	5.4	2.6	
GT 151'06 lt	5.2	2.2	
GT 2'08 lt	5.4	2.6	
GT 25'05 rt	2.4	1.5	
GT 29'07 rt	2.8	1.5	
GT 29'07 rt	2.5	1.5	
GT 3'05 rt	5.7	2.8	
GT 50'00 lt	5.2	3.0	
GT 65'06 rt	2.9	1.4	
GT 85'07 rt	3.2	1.8	
LT 100'03 rt	5.1	3.0	2.3
LT 105'03 rt	5.6	2.7	
LT 116'07 lt	4.7	2.3	
LT 12'99 lt	5.3	3.4	
LT 130'03 rt	5.5	2.7	2.1
LT 140'06 lt	3.2	1.7	
LT 150'06 rt	5.4	2.7	
LT 154'03 rt	5.4	2.6	2.4
LT 166'04 lt	5.5	2.5	2.2
LT 167'04 rt	2.4	1.4	1.2
LT 174'96 lt	5.4	2.4	
LT 180'06 lt	3.6	1.8	
LT 181'98 rt	5.4	2.5	2.1
LT 182'98 lt	5.0	2.8	2.3
LT 183'98 rt	5.0	2.8	2.4
LT 184'98 lt	5.6	2.6	
LT 19'00 lt	2.9	1.6	
LT 19'08 lt	2.7	1.4	
LT 198'98 rt	3.0	1.8	
LT 20'00a rt	5.4	3.0	
LT 20'00b lt	5.7	2.7	
LT 21'00 lt	5.6	2.8	
LT 218'03 rt	5.5	2.4	2.0
LT 220'04 lt	5.3	3.1	
LT 224'03 rt	5.8	2.3	2.1

Annex 6. (Continued)

m/1	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
LT 240'03 rt	4.3	2.15	
LT 248'03 rt	2.6	1.8	
LT 30'07 lt	5.4	2.6	2.1
LT 30'08 lt	3.0	1.7	
LT 32'06 lt	5.6	broken	2.6 >
LT 33'06 rt	5.1	2.5	2.15
LT 33'06 rt	5.3	2.7	
LT 33'06 lt	5.5	2.5	2.2
LT 455'96 rt	5.5	2.5	
LT 464'96	4.7	2.4	
LT 48'03 rt	2.9	1.5	1.45
LT 57'07 lt	5.6	2.7	
LT 62'97 rt	5.3	2.5	
LT 65'04 lt	5.3	2.45	1.95
LT 70'01 rt	5.5	2.7	
LT 76'07 rt	5.0	2.4	
LT 76'07 lt	5.3	2.4	
LT 77'08 rt	3.1	1.7	
LT 78'08 rt	5.7	3.1	
LT 81'06 lt	5.1	2.5	
LT 88'06 lt	5.5	2.6	
m/2			
EF 10'04 rt	2.7	1.6	
EF 10'07 rt	2.65	1.75	1.42
EF 10'07 rt	2.7	1.6	
EF 103'01 rt	2.6	1.6	
EF 105'01 rt	2.5	1.6	
EF 1'07	2.81	1.63	1.32
EF 1'07 lt	2.6	1.7	
EF 144'01 lt	2.73	1.58	1.45
EF 15'05 rt	2.7	1.6	
EF 169'96 lt	4.8	2.3	
EF 17'01 lt	2.99	1.8	1.62
EF 17'01 rt	2.85	1.71	1.45
EF 177'01 rt	2.6	1.7	
EF 20'01	4.71	2.15	1.77
EF 218'01	2.85	1.62	1.29
EF 21'93	3.5	2.3	
EF 22'07 rt	2.78	1.49	1.25
EF 22'07 rt	2.5	1.4	
EF 25'05 lt	2.7	1.6	
EF 281'01 rt	2.3	1.5	
EF 37'05 lt	2.8	1.5	
EF 38'05 lt	3.0	1.7	
EF 40'01 rt	2.65	1.75	1.42
EF 41'01 lt	2.74	1.74	1.51
EF 5'05 lt	2.65	1.34	1.13
EF 5'05 lt	2.6	1.4	
EF 53'01 lt	2.31	1.8	1.5
EF 61'01 lt	2.75	1.54	1.34
EF 69'94 lt	2.7	1.5	
EF 71'05 lt	2.5	1.5	
EF 83'01 lt	2.8	1.5	
EF 88'94 rt	2.8	1.6	
GT 101'07 lt	4.4	2.2	
GT 107'07 lt	4.5	2.2	
GT 151'06 lt	4.5	2.1	
GT 29'07 rt	2.5	1.3	
GT 29'07 rt	2.2	1.3	
GT 3'05 rt	5.6	2.8	
GT 50'00 lt	5.0	3.5	
GT 65'06 rt	2.2	1.3	
LT 100'03 rt	4.3	2.3	2.0
LT 116'07 lt	4.1	2.1	

Annex 6. (Continued)

m/2	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
LT 119'07 rt	2.2	1.5	
LT 130'03 rt	4.6	2.0	1.6
LT 140'06 lt	2.3	1.6	
LT 166'04 lt	4.7	2.1	1.7
LT 179'04 rt	4.6	2.5	
LT 180'06 lt	3.0	1.7	
LT 181'98 rt	4.0	2.4	1.6
LT 182'98 lt	3.9	2.3	1.7
LT 183'98 rt	4.3	2.2	1.8
LT 188'98 lt	4.4	2.2	
LT 189'98 lt	4.1	2.1	
LT 19'00 lt	2.6	1.5	
LT 198'98 rt	2.8	1.7	
LT 20'00a rt	4.5	2.2	
LT 21'00 lt	4.6	2.1	
LT 218'03 rt	4.7	2.2	1.8
LT 248'03 rt	2.5	1.7	
LT 27'99 lt	2.7	1.6	
LT 30'08 lt	2.6	1.5	
LT 32'06 lt	4.6	2.3	1.8
LT 33'06 lt	4.6	2.2	1.6
LT 33'06 rt	4.7	2.2	1.7
LT 33'06 rt	4.5	2.5	
LT 455'96 rt	4.9	2.1	
LT 456'96 lt	4.7	2.3	
LT 48'03 rt	2.5	1.35	1.2
LT 49'99 rt	2.9	1.7	
LT 522'96 lt	4.8	2.4	
LT 57'07 lt	4.5	2.3	
LT 65'04 lt	4.8	2.1	1.5
LT 70'01 rt	4.6	2.0	
LT 76'07 lt	4.3	2.2	
LT 76'07 rt	4.6	2.1	
LT 77'08 rt	2.6	1.4	
LT 80'08 rt	3.6	2.1	
LT 88'06 lt	4.6	2.2	
m/3			
EF 10'04 rt	1.0	0.8	
EF 103'01 rt	1.4	1.6	
EF 105'01 rt	1.5	1.2	
EF 1'07 lt	1.5	1.2	
EF 144'01 lt	1.47	1.04	
EF 17'01 rt	1.59	1.17	
EF 20'01	1.8	1.65	
EF 218'01	1.54	1.16	
EF 25'05 lt	1.5	1.2	
EF 281'01 rt	1.1	1.0	
EF 37'05 lt	1.6	1.1	
EF 38'05 lt	1.7	1.1	
EF 40'01 rt	1.43	1.26	
EF 5'05 lt	1.46	1.01	
EF 5'05 lt	1.3	0.8	
EF 53'01 lt	1.37	1.17	
EF 61'01 lt	1.28	1.08	
EF 69'94 lt	1.5	1.2	
EF 7'01 lt	--	1.3	
EF 71'05 lt	1.6	1.5	
GT 101'07 lt	1.9	1.5	
GT 16'05 rt	2.0	1.8	
GT 29'07 rt	1.6	0.9	
GT 29'07 rt	1.3	1.1	
GT 50'00 lt	3.7	3.0	
LT 166'04 lt	1.7	1.3	
LT 179'04 rt	1.9	1.8	

Annex 6. (Continued)

m/3	Mesio-distal length	Anterior bucco-lingual breadth	Posterior bucco-lingual breadth
LT 180'06 lt	1.5	1.3	
LT 19'00 lt	1.4	1.4	
LT 20'00a rt	2.0	1.6	
LT 27'99 lt	1.3	1.1	
LT 456'96 lt	1.7	1.7	
LT 65'04 lt	2.0	1.35	

Annex 7. Measurements (in mm) of bones of the fore limb of macroscelideans from the Northern Sperrgebiet, Namibia. (L. – Length, B. – Breadth, H. – Height).

Scapula	H. glenoid	B. glenoid		
EF 98'05aa lt	4.1	2.5		
EF 98'05ab lt	4.0	2.6		
EF 98'05ac lt	4.0	2.5		
EF 98'05ad lt	4.5	2.5		
EF 98'05ae E	4.4	2.6		
Humerus	B. distal medio-lateral	B. distal antero-posterior		
EF 98'05o lt	4.6	2.7		
EF 98'05p lt	4.7	2.5		
EF 98'05q rt	4.4	2.7		
EF 98'05r rt	4.6	2.8		
EF 98'05 ah lt	4.6	2.9		
EF 10'05 lt	4.7	2.8		
EF 18'05 rt	4.0	2.1		
GT 20'05 rt	6.5	3.7		
GT lt	9.3	5.1		
GT 109'07 lt	7.6	3.9		
GT rt	4.1	2.4		
GT 138'06 rt	6.3	3.5		
LT 249'03 lt	4.5	2.6		
EF 26'98	9.1	5.0		
EF 48'01 lt	5.2	3.0		
GT 74'04a	9.3	5.2		
GT 170'06	4.1	2.5		
LT 229'98	6.8	4.2		
EF 77'00	5.2	3.0		
Stromer	3.9			
Radius	B. medio-lateral head	B. antero-posterior head		
LT 45'99 lt	6.2	2.9		
LT 46'99 rt	5.5	3.0		
EF 98'05g	6.5	3.0		
EF 98'05v lt	2.8	1.5		
EF 98'05w rt	2.8	1.4		
EF 98'05x rt	3.0	1.5		
EF 98'05y rt	2.8	1.5		
EF 98'05ai lt	2.8	1.4		
Stromer	3.0	1.5		
Ulna	L. max. proximal	L. max. antero-posterior	B. olecranon	L. olecranon
EF 98'05s lt	2.7	3.6	1.8	3.0
EF 98'05t lt	2.7	3.7	1.5	3.0
EF 98'05aj lt	2.9	3.4	1.5	3.1

Annex 8. Measurements (in mm) of bones of the hind limb of macroselideans from the Northern Sperrgebiet, Namibia. (L. – Length, B. – Breadth, H. – Height).

Tibio-fibula	Antero-post. L.	Distal B.					
LT 149'03	4.0	8.4					
GT 43'07 rt	2.0	3.9					
GT 42'06 rt	3.0	6.3					
GT 65'00 lt	3.0	6.4					
EF 98'05a lt	4.0	8.5					
EF 48'01 rt	2.5	5.1					
EF vol 1	2.2	4.5					
EF 99'01 lt	4.2	8.0					
EF 96 lt	2.4	4.9					
EF 98'05d lt	2.2	4.9					
EF 98'05e rt	2.4	4.6					
EF 98'05h	2.2	4.5					
EF 98'05u rt	2.3	4.5					
EF 227'98 rt	2.2	4.5					
GT 119'04 rt	4.6	9.4					
GT 41'04	2.9	5.9					
GT 38'01 lt	3.8	>7.2					
Talus	Total L.	Max. B.	B. trochlea	L. neck	B. neck	B. head	H. head
LT 204'98 rt	8.3	5.7	3.4	2.6	3.1	3.7	2.8
GT 44'06a lt	8.3	5.2	2.9	3.1	2.7	3.8	2.9
EF 98'05b lt	10.1		3.9	4.2	3.8	4.7	3.0
EF 48'01 rt	5.4	3.2	2.0	2.2	2.0	2.5	1.9
EF 48'01 lt	5.2	3.5				2.2	1.6
EF 98'05af lt	4.6	2.8	1.7	1.9	1.7	2.0	1.5
EF 98'05ag rt	5.2	3.0	1.9	2.2	1.7	1.9	1.5
EF 77'01	5.0	3.2	1.7	1.5	1.7		
Stromer	5.2		2.1				
Calcaneum	Total L.	L. tuber calcis	Max. B.	H. tuber calcis	B. tuber calcis	B. articulation	
LT 201'98 rt	15.1	7.3	7.2	3.9	4.3	8.1	
GT 107'06 lt	11.0	6.6		3.1	2.8	5.5	
FS 20'07 rt	13.1	7.3		3.4	3.7	7.3	
EF 48'01 rt	9.2		4.6	2.4	2.2	4.6	
EF 16'96 rt	13.0		6.4	3.3	3.9		
EF 55'96 rt	8.4		4.2	1.9	2.0	4.4	
GT 201'06 rt	10.7	5.5	5.2	2.9	2.9	5.5	
GT 20'06 rt	10.7	6.2	4.9	3.1	2.7	5.0	
GT 92'07 lt	10.5	5.7		3.0	2.9	5.7	
EF 98'05c rt	13.9	7.9		3.1	3.6	6.9	
EF 98'05f rt	7.9	4.3		1.5	1.9	3.9	
EF 77'01 lt	8.7	4.2		2.0	2.0	4.9	
EF 98'05 i lt	8.1	3.9	3.9			3.8	
EF 98'05k rt	8.0	3.8	4.0	2.0	2.1	4.2	
EF 98'05l lt	8.1	3.9	4.0	2.2	2.2	4.2	
EF 98'05m lt	8.0	4.0		2.2	2.2	4.3	
EF 98'05n rt	8.2	4.0	4.0	2.0	2.2	4.3	
GT 21'08 rt	10.2	5.1				5.2	
EF 16'98 rt	15.3	7.3	8.0	4.5	4.8	8.1	
Stromer	7.7	5.0	3.6			4.1	