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ON SOME NEW PLEISTOCENE MAMMALS FROM LIMESTONE CAVES OF THE TRANSVAAL

BY

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With 8 Text Figures.

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Before I came to Pretoria I had heard that in some of the caves in the Dolomite near here masses of bone breccia had been found, and I was naturally interested, as there was always the possibility that a new specimen of *Australopithecus* might be found or evidence of primitive man; and even if we obtained no specimens of Primates it was probable that we would get some interesting new other mammals. In 1934 I gave descriptions of some mammals from bone breccia from the same cave at Taungs as that in which *Australopithecus* had been found. I showed that all the six mammals identified belonged to extinct species and at least two of them to extinct new genera. It therefore seemed not improbable that equally important results might be found in the Transvaal.

Mr. G. van Son, the Entomologist at the Transvaal Museum, informed me that at a cave on the farm Uitkomst, belonging to Mr. Norton, of Krugersdorp, there was a lot of bone breccia, and, further, that he himself had seen a jaw in the rock that seemed much like that of a human being or an anthropoid ape. Unfortunately, he had at the time no tools to have it removed and in returning later he found it had been destroyed. I visited the cave with him and obtained a number of interesting specimens—a tooth of *Equus capensis*, much of the maxilla of a new species of *Procavia*, and a portion of the upper jaw of an extinct baboon, possibly allied to the one occurring at Taungs, *Papio antiquus* Haughton. Other visits to this cave have resulted in the discovery of an extinct fossil pig.

Mr. Herbert Lang, the famous African explorer and naturalist, and Dr. Austin Roberts, our mammalogist, informed me of other caves much nearer to Pretoria at Schurveberg, where there were masses of bone breccia packed with the bones of small mammals. Mr. Lang was so impressed by the apparent importance of the deposit that he wrote some years ago to Dr. W. D.

Matthew, of America, to see if he could arrange to work it up or have it worked, and offered to send him a ton of the breccia, if desired. Dr. Matthew, however, declined, as he considered that the collection in America of the living small mammals of South Africa were insufficient for satisfactory comparisons. Dr. Roberts did not care to venture into the new field.

A visit to Schurveberg with Dr. Roberts enabled me to get some fine blocks of this very rich breccia, and a couple of weeks' work yielded many good jaws and good portions of skulls of all the commoner little mammals.

Later visits have yielded very interesting results.

About the beginning of August, 1936, I heard through two students of the Witwatersrand University, Mr. H. le Riche and Mr. G. W. H. Schepers, that little fossil baboons were found at the caves at Sterkfontein and I immediately visited these caves in their company. There I found a rich deposit of fossil bones, and the manager of the limeworks, Mr. G. W. Barlow, afforded me every help. He had in the little refreshment room at the caves, skulls and teeth of quite a variety of animals—the little baboon, the extinct horse *Equus capensis*, a small species of *Equus*, the horn cores of the eland, some arm bones of what I thought might belong to a giant baboon I had found at Schurveberg and a lot of indeterminable bones. Mr. Barlow had for years worked at Taungs, and he informed me that he believed dozens of adult skeletons and skulls of the Taungs ape were thrown into the lime kilns there and burnt. No one seemed to worry. I impressed on Mr. Barlow the importance of keeping his eyes open for any signs of anything like the Taungs ape. I again visited the caves three days later, when Mr. Barlow gave me three nice little baboon heads and part of the skull of a large carnivore. In the debris in the cave I found some other parts of the carnivore skull, and other parts of the little baboon skulls. Five days later I again visited the caves, when Mr. Barlow gave me much of a brain cast of what appeared to be an anthropoid ape. A hunt for some hours failed to discover any parts of the skull except the cast of the top of the skull on the side of the cave wall. I returned the following day with a fairly large party, including Mr. Herbert Lang, who photographed the cave, showing the exact spot where the skull had lain. A long and careful search resulted in the finding of the base of the skull, and many parts of the cranial vault. Examination at the museum of the matrix round the head revealed the nearly complete right side of the face with the second premolar and the three upper molars, and later the left maxilla with four teeth. Among the bones collected by Mr. Barlow at another cave near by are most of the bones of the hind leg of what is almost certainly another skeleton of the same anthropoid, and a number of metacarpals. The arm that I thought might be that of the giant baboon is probably also the arm of the anthropoid. Unfortunately, some visitor to the caves has removed it and so far I have been unable to trace it.

I visited recently the caves near Potgietersrust and found good remains of *Equus capensis* and a number of large antelopes, but these I have not yet had time to study.

Any account of the fossils of the caves must necessarily be incomplete, and this paper deals mainly with the smaller and commoner mammals. Nearly every visit to one of the caves results in some new discovery, and I have quite a number of new animals on hand, adequate description of which it is impossible to incorporate in this paper.

Australopithecus Transvaalensis sp. nov.

As this anthropoid ape was only discovered near the end of August little more than a brief preliminary description can, as yet, be given. The type consists of two-thirds of the brain cast, much of the parietal bones, much of the supraoccipital, and the supraorbital portion of the frontal, the cast of most of the top of the skull, practically the whole of the base of the skull, and most of the left jugal slightly displaced. Both maxillae are present, but quite detached from the skull. The right one has the second premolar and the first and second molars in beautiful preservation. Attached to this maxilla is most of the right

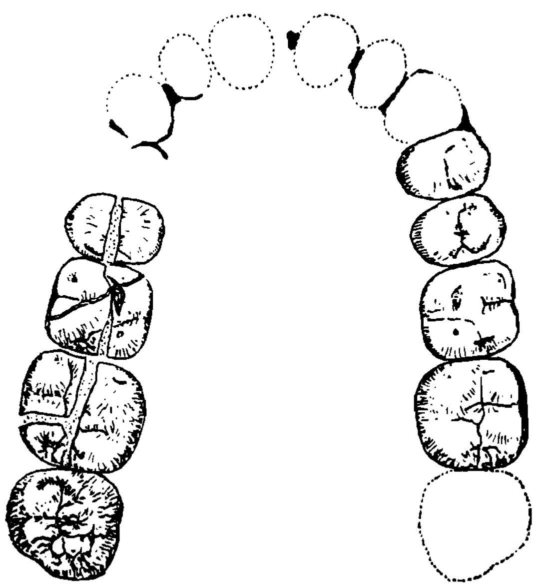


Fig. 1.

Upper dentition of *Australopithecus transvaalensis* Broom. Natural size. The teeth are drawn as preserved. Three teeth of the right maxilla have been fractured and the parts pushed apart during fossilisation. The sockets of the incisors and canines are drawn as preserved. As the two maxillae are completely detached the exact width of the palate is unknown, but was probably as indicated.

jugal. The left maxilla is also preserved with the first and second premolars, and the first and second molars. The third right upper molar is preserved in perfect condition, but quite detached from the bone. Though neither of the canines is preserved and all four incisors are lost we have the sockets of both canines preserved, and on the left side the sockets of both incisors and on the right side part of the socket of the second incisor.

The teeth are of very great interest. The premolars resemble much more those of man than those of the living anthropoids. The first premolar measures 12·3 mm. in width and 9·3 mm. in antero-posterior length. The second measures 13 mm. by 9·3 mm.

The first molar is somewhat worn but the cusps have manifestly been low. The pattern is seen from the figure given to be very similar to that of man. The tooth measures in breadth 12·8 mm. and in antero-posterior length 12·3 mm.

The second molar is very considerably larger, measuring in breadth 15 mm., and in antero-posterior length 14·5 mm. All the cusps are low.

The third molar of the right side is preserved in unworn condition. It measures in width 15·2 mm. and in antero-posterior length 13·4 mm. As in the unworn upper molars of *Sinanthropus* the enamel is very crenulate.

Besides the general human-like pattern of the molars there are three very important characters that seem to suggest a closer affinity with man than with the living anthropoids. Each premolar has only two roots. The canine is relatively small, the socket being smaller than the crown of the first premolar. Then the canine has apparently been in contact with the second incisor. This is a character which sharply divides modern man from all the living and known extinct apes. The agreement of *Australopithecus transvaalensis* and man in this character is striking.

As a lengthy description of the dentition and all the other characters of the skull and brain will be elsewhere published with numerous illustrations it seems unnecessary to say more at present.

A comparison with *Australopithecus africanus* Dart, is difficult, but the brain cast of the Sterkfontein ape is much broader in front. The first upper molars differ in a few characters, and the geological age of the two apes is probably very different. None of the associated mammals found at Taungs occurs at Sterkfontein. Probably the Taungs ape is Lower or Middle Pleistocene; the Sterkfontein ape is more likely to be Upper Pleistocene.

DINOPITHECUS INGENS gen. et sp. nov.

This giant baboon was discovered by me at Schurveberg. The type consists of the two mandibular rami with the left premolars and molars in almost perfect preservation and most of those of the right side. Much of the symphysis is preserved with the sockets of both canines. In addition to the mandibles we have a considerable part of the skull, but it is crushed and unsatisfactory. There are, however, well preserved the posterior upper molars.

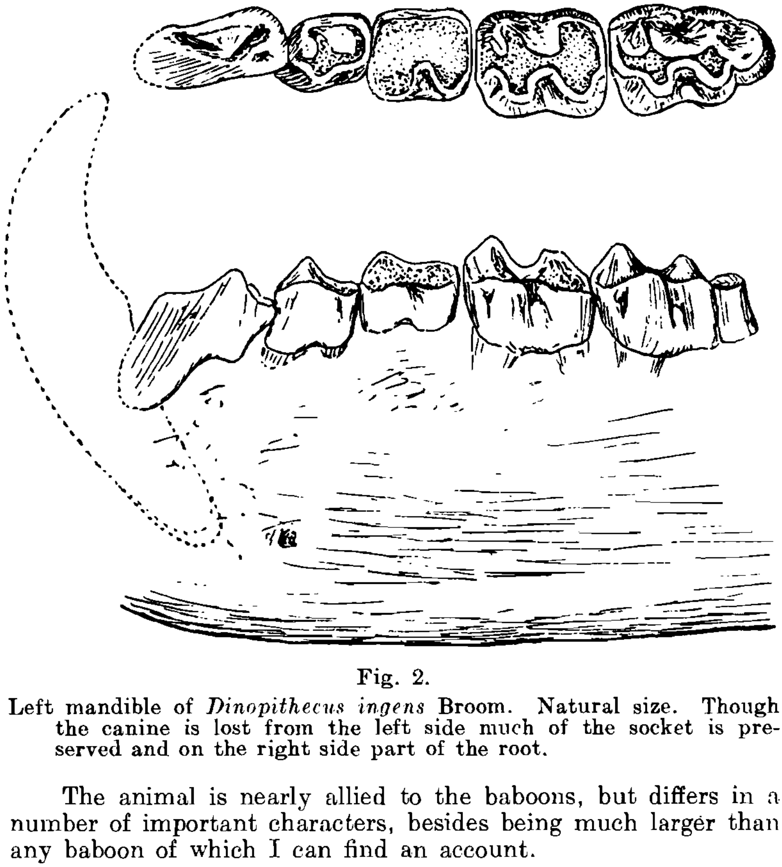


Fig. 2.

Left mandible of *Dinopithecus ingens* Broom. Natural size. Though the canine is lost from the left side much of the socket is preserved and on the right side part of the root.

The animal is nearly allied to the baboons, but differs in a number of important characters, besides being much larger than any baboon of which I can find an account.

The first premolar differs from that of the typical baboons in having the anterior part relatively shorter and broader. Behind the main cusp are two deep pits, and on the inner side of the anterior cusp another deep pit. The shape of the tooth is shown in the figures.

The second premolar and the molars agree fairly well in structure with those of baboons. One important difference is that there is here only the faintest indication of a posterior cusp. On the outer side of both m^2 and m^3 are small subsidiary cusps usually absent in *Papio*.

The upper molars are very large and they differ in pattern considerably from those of *Papio*, especially m^3. This posterior molar besides having a marked inner cusp between the protocone and hypocone has a well-developed hypoconulid.

The following are some of the chief dental measurements:—

	Length.	Width.
Lower pm^3	about 24 mm.	8·5 mm.
,, pm^4	10·5 mm.	9·2 mm.
,, m^1	13·5 mm.	11 mm.
,, m^2	17 mm.	13 mm.
,, m^3	21·5 mm.	14 mm.
Upper m^2	18·5 mm.	17 mm.
,, m^3	19 mm.	16 mm.

A large Pleistocene baboon from Central Africa has been described by Andrews under the name *Simopithecus oswaldi*, and Hopwood has just described another species as *Simopithecus leakeyi*. Hopwood's description of his species is much too short to enable one to say what affinity it may have with this South African form. Certainly the South African form must be specifically distinct as it is much larger and the teeth are differently shaped. The new species cannot belong to Andrews' genus as the third upper molar is quite differently shaped in the two species.

In Fig. 3 I show for comparison the last two upper molars of some of the large baboons. *Papio speleus* is the fossil form recently described by me, and *Papio rhodesiae* is the Rhodesian baboon described by Haagner. Haagner's species is not recognised by most mammalogists, but in my opinion it is a good species.

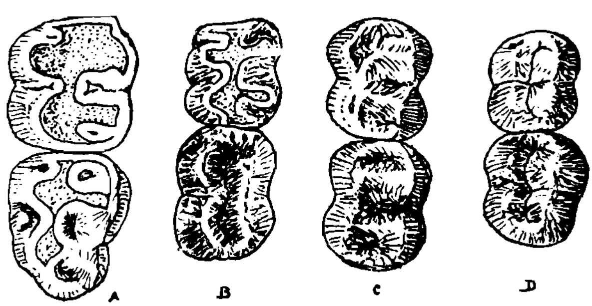


Fig. 3.

Left upper second and third molars of various large baboons.

A. *Dinopithecus ingens* Broom.
B. *Simopithecus oswaldi* Andrews.
C. *Papio speleus* Broom.
D. *Papio rhodesiae* Haagner.

All figures are drawn from the type specimens. Fig. B is after Andrews reversed. All are natural size.

Sterkfontein Cercopithecid.

In the Sterkfontein caves the remains of a small Cercopithecid are common and many good skulls have been found. Mr. T. R. Jones, of the Witwatersrand University, has been for some time studying these small monkeys and he is communicating a paper to the Association containing a description of this new form. I have, therefore, lent him all the Transvaal Museum specimens that his account of the skull may be as complete as possible, and refrain from any description in this paper.

"Felis" whitei sp. nov.

One of the most interesting of the fossil forms is a feline about the size of the leopard but belonging to a different genus. It is represented by a fragment of the left mandible with two premolars and one molar found at Schurveberg. A second specimen of what is probably the same animal is the much crushed snout with three well preserved incisors. This snout closely resembles that of a large leopard, and in case it may not belong to the same species as the mandible fragment, the later with the well preserved teeth will be regarded as the holotype.

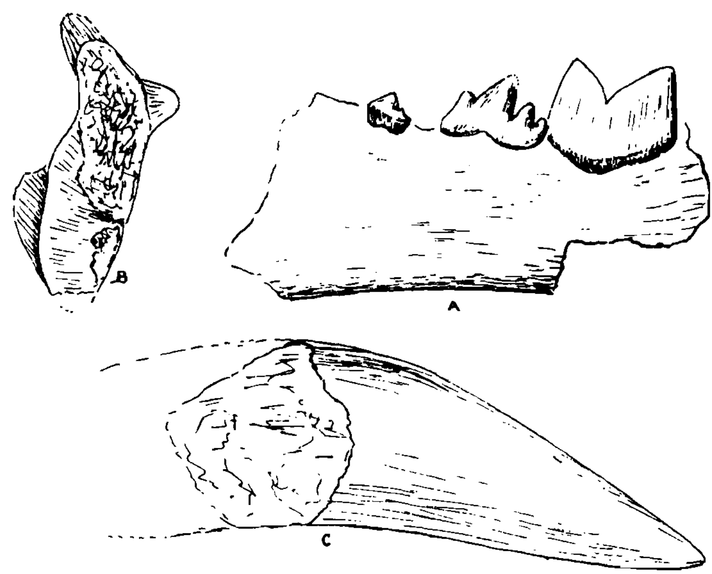


Fig. 4.

Teeth of Cave Carnivores.

A. Outer view of left mandible "*Felis*" *whitei* Broom.

B. Occlusal view of right upper pm[4] of *Megantherеon barlowi* Broom.

C. Inner view of left upper canine of *Megantherеon barlowi* Broom.

All natural size.

At first sight the jaw looks like that of a leopard but the premolars are strikingly different. The third premolar in apparently all cats is a double-rooted tooth with a large main cusp and with small, sometimes rudimentary, anterior and posterior cusps. In the allied *Acinonyx* there are four cusps—a small anterior, a large main cusp and two small posterior cusps. In the fossil form this premolar is a small single-rooted tooth with a very short main cusp, and rudimentary posterior cusp. The tooth has an antero-posterior length of 6·5 mm., and the crown is 3·8 mm. in width. The height of the main cusp is 3·5 mm.

Between the third premolar and the fourth is a diastema of about 4 mm., but owing to the jaw having been slightly crushed this measurement is not quite reliable. The fourth premolar is moderately large. It has a fairly well developed anterior cusp about 5 mm. in height, a main cusp about 9·5 mm. high and two posterior cusps. Of these latter the front one is about 6 mm. in height, and the fourth cusp practically a cusp-like development of the cingulum.

This fourth premolar measures in antero-posterior length 15 mm. and the breadth of the tooth is about 7 mm., but owing to the tooth having been somewhat crushed and broken during fossilisation, this measurement may not be quite correct. The tooth differs considerably from that of the leopard and other cats in having a relatively smaller main cusp and in the cusp-like development of the cingulum. But in all essentials it agrees with the fourth premolar of the hunting leopard (*Acinonyx*).

The carnassial tooth agrees closely with that of *Acinonyx*. It has the rudimentary posterior cusp which is lost in the cats.

As the form is clearly a new species I am calling it after Mr. A. G. White, the Museum preparator, who has been of much assistance in the collection of the fossil mammals, "*Felis*" *whitei*. Though it clearly belongs to a different genus it is at present quite impossible to say whether this genus has or has not been already described. Over forty genera of Felids have been named mostly from isolated teeth, and even Dr. Matthew, the greatest authority on fossil mammals, was quite unable to clear up the confusion, and probably for many years the confusion will have to remain. Quite manifestly it cannot be cleared up by a worker in South Africa.

MEGANTHEREON BARLOWI sp. nov.

A second new Felid was discovered by Mr. G. W. Barlow in the same cave as has yielded *Australopithecus transvaalensis*. It is much larger than the Felid from Schurveberg and most probably belongs to another genus. The greater part of the top of the skull is preserved, with much of the right maxilla somewhat displaced from its original position. In this maxilla are much of the fourth premolar with the top of the crown badly damaged, the socket of pm^3 and much of the socket of the canine. There is no evidence of pm³. In the matrix round the skull were found much of the root of the other pm⁴ and the greater part of the left canine.

The skull is a little larger in size than that of a large leopard, having been about 250 mm. in length. The frontal and parietal regions resemble those of the leopard considerably, but the interorbital region is here wider—probably about 60 mm.

The canine has a crown which measures about 60 mm. in height. Its antero-posterior length at the base is 25 mm. and its width about 16 mm. There are no serrations on either the front or the back, but on the anterior and inner side is a marked curved ridge.

The fourth premolar is of large size, the crown having an antero-posterior measurement of 39 mm. The general shape is shown in the figure given. The inner cusp, though small, is not rudimentary.

A comparison with the Siwalik *Meganthereon falconeri* Pomel, shows that it is highly probable that the South African species should be put in the same genus, though our form is considerably larger and the inner cusp of the carnassial better developed. I have much pleasure in naming it after Mr. G. W. Barlow, to whom we also owe the Sterkfontein ape.

ELEPHANTOMYS LANGI gen. et sp. nov.

The Elephant shrews of South Africa are usually placed in four distinct genera, *Petrodromus*, *Macroscelides*, *Nasilio* and *Elephantulus*. *Petrodromus* differs from the others in having only four toes on the hind feet and in being moderately large. *Macroscelides* is distinguished by having the ear regions of the skull greatly expanded by air cells. *Nasilio* differs from the other genera in having three lower molars, while the others have only two; and *Elephantulus* differs from *Macroscelides* and *Nasilio* in that its upper third premolar is not molariform. The fossil form that occurs at Schurveberg will be seen to resemble considerably *Nasilio* and *Elephantulus*, but to differ from *Nasilio* in having only two lower molars and from *Elephantulus* in having the second upper premolar molariform, and to be thus worthy of forming the type of a new genus.

Fig. 5.
Occlusal view of teeth of left maxilla of *Elephantomys langi* Broom. × 6.

This little Elephant shrew must have been very abundant at the time when the deposit was formed. Though no perfect skull has been obtained we have numerous mandibles, one good anterior portion of a skull with the maxillary teeth well preserved, some other less satisfactory maxillae and much of the posterior part of a skull.

The maxillary teeth—canine, four premolars, and two molars—measure together 13·2 mm. All the teeth are moderately close to each other. The canine is relatively small. The first premolar has a fairly large anterior, a smaller second cusp and a trace of a posterior third cusp. The second premolar when viewed from the outer side has a large anterior cusp, a smaller but still well-developed second cusp and a trace of a third cusp. When the crown is examined there are seen to be two small internal cusps as shown in the figure. These internal cusps are closer together than are the two main outer cusps. The tooth is thus molariform. In this it agrees with *Nasilio* and *Macroscelides* and differs from *Elephantulus.* The small size of the internal cusps gives the crown a somewhat different pattern than in *Nasilio* and *Macroscelides.* The third premolar has two well-developed outer cusps, the second a little smaller than the first, and there are two well-developed internal cusps though they are much smaller than the outer. The fourth premolar and the two molars all agree fairly closely with those of *Nasilio* and *Elephantulus.*

The lower jaw in one specimen which is complete measures 24 mm., and the whole dental series is about 14·5 mm. The incisors are lost and their size unknown. The corresponding measurements in *Elephantulus myurus jamesoni* are 29 mm. and 18 mm., and in *Nasilio brachyrhyncha* 25·5 mm. and 17 mm. The dentition of the lower jaw agrees in all important characters with that in *Nasilio* except that there is no third molar. In *Nasilio brachyrhyncha* the angular process of the jaw is markedly hooked upwards, and in *Elephantulus* also curved upwards but to less degree. In this little fossil Elephant shrew the angular process is almost horizontal.

The following comparative measurements of the maxillary teeth in various species are of interest:—

Elephantulus rupestris (from Smith's figure)	16·5 mm.
Elephantulus vandami (type)	15·2 mm.
Elephantulus myurus jamesoni	14·5—15·8 mm.
Elephantulus myurus mapogonensis ...	14 —14·5 mm.
Elephantulus edwardsi	13·5—14 mm.
Elephantulus capensis	14 —14·5 mm.
Elephantulus ocularis	13·5—13·8 mm.
"*Elephantulus*" *intufi*	13·2—13·5 mm.
Nasilio brachyrhyncha	12·5—13 mm.
Macroscelides proboscideus	13 mm.
Macroscelides typicus	12 mm.
Elephantomys langi	13·2 mm.

Characterised by having a molariform second upper premolar, no third lower molar and no large development of air cells in the ear region of the skull, the little fossil Elephant shrew differs from all previous known forms except "*Elephantulus*" *intufi*, Smith. Both Dr. Roberts and Mr. Lang have recognised this species ought to be placed in a new genus distinguished from *Elephantulus* by having the second upper premolar molariform, and for this genus the name *Elephantomys* may be proposed, and the genus will be represented by two species, the living *Elephantomys intufi* (Smith), and the new fossil species which I am naming in honour of Mr. Herbert Lang, *Elephantomys langi.*

Cryptomys robertsi.

In the bone breccia are numerous specimens of a fairly large rodent mole, which must be placed in the genus *Cryptomys.* Until 1898 all the South African rodent moles were placed in the two genera *Bathyergus* and *Georychus*, when de Winton pointed out that *Georychus capensis* differs from all the other species in having the molars with the enamel much more infolded, and in 1917 Thomas added the additional character, that in *Georychus capensis* the "capsules of the incisor roots are extended backwards into the pterygoids." While *Georychus* can thus be lopped off, the genus *Cryptomys* is left with a large number of species. some of which come pretty near to *Georychus*. *Cryptomys darlingi* has the molars with the enamel almost as much infolded as in *Georychus*, and *C. holisericeus* has the incisor capsule extending well back behind the molars.

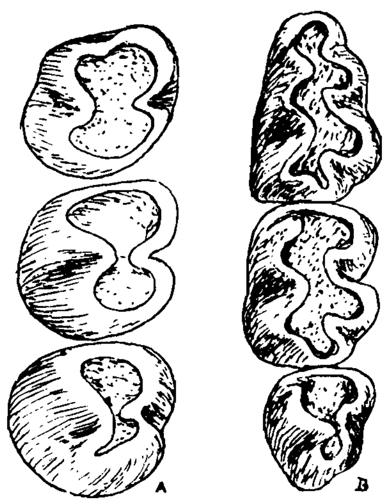


Fig. 6.

A. Left lower pm^4, m^1, and m^2 of *Cryptomys robertsi* Broom.
B. Left lower m^1, m^2, and m^3 of *Mystromys hauslichtneri* Broom.
Both figures 12 times natural size.

I have compared the fossil form with all the living South African species of *Cryptomys*, and find it very distinct. Of living forms it comes nearest to *Cryptomys holisericeus*. It is a moderately large species. One lower jaw measures from the front of the incisor to the back part of the angular portion of the jaw 40 mm. The shape of the back part of the jaw differs from that of any of the species I have been able to compare it with. A very distinct ridge passes forward on the outer side of the jaw from the condyle. This is not entirely formed by the base of the incisor, and I can find no living species with a similar character. As in most species of *Cryptomys* the molars are relatively small. In one specimen we have three teeth well preserved. These are apparently the fourth premolar and the first and second molars. The three teeth together measure 5·2 mm. The crowns are low, and each tooth has the enamel of the upper half folded in on both the outer and inner sides.

The upper incisors are relatively slender, and have their front surfaces rounded and without grooving. The premaxillaries ascend considerably upwards from the incisor region to meet the narrow nasals, so that the snout is somewhat adpressed. This seems to be a very variable character in *Cryptomys*; some specimens of *C. holosericeus* show it, and some do not. The lateral process of the frontal that supports the lacrimal is much less developed than in *C. holosericeus*.

I have no specimen showing the upper molars, but from the sockets I infer they agree with the lower molars.

I have much pleasure in naming this fossil species of *Cryptomys* after Dr. Austin Roberts, the very active mammalologist and ornithologist of the Transvaal Museum.

Palaeotomys gracilis sub-gen. et sp. nov.

In the bone breccia from Schurveberg there are numerous jaws of a small species of "*Otomys*." No complete skull has as yet been found, but I have been fortunate in getting out the anterior two-thirds of two skulls in a fairly satisfactory condition. It very clearly differs from any of the many species and subspecies at present alive in South Africa, with all of which I have compared it.

The genus *Otomys* Cuvier, has within recent years been subdivided into a number of genera and sub-genera, as it is very manifest that some of the species differ too greatly to be all placed in one genus. The latest classification we have is that of Miss J. St. Leger, published in 1931. This is mainly founded on the work of Oldfield Thomas, and while it is fairly satisfactory as far as it goes, its value is lessened by ignoring all species, the types of which are in South Africa.

In the Transvaal Museum, Pretoria, Dr. Austin Roberts has accumulated by far the most representative collection of South African mammals in the world. In fact the collection is probably more important than the combined collections of all the other museums. And Dr. Roberts has not only placed all the collection at my disposal, but has given me the greatest assistance from his unrivalled experience.

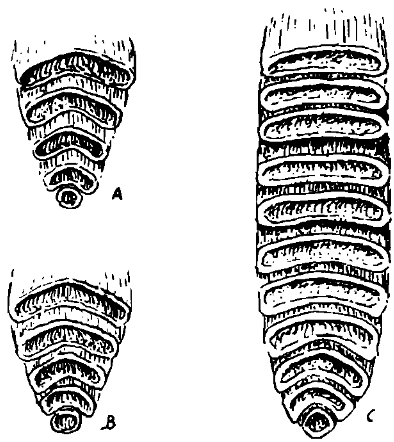


Fig. 7.

A. Left third upper molar of *Palaeotomys gracilis* Broom (Type).
B. Right third upper molar of *Palaeotomys gracilis* Broom (Type).
C. Right upper molar series of *Palaeotomys gracilis* Broom (Topo type).
All figures about 8 times natural size.

Briefly the classification of Miss St. Leger is as follows: —

A. Nasal not excessively expanded anteriorly, lower incisors not or faintly grooved; m^3 with four or at most five laminae.
  (a) Bullae very large; m^3 with two laminae and modified third portion.
    a^1 Upper incisors grooved. *Parotomys*.
    a^2 Upper incisors smooth. *Liotomys* sub-gen.
  (b) Bullae normal; m^3 with three laminae and posterior trefoil. *Myotomys*.

B. Nasal extremely broadened anteriorly; incisors grooved; m^3 with six laminae or more.
  (a) m^1 with four laminae. *Otomys*.
  (b) m^1 with more than four laminae.
    b^1. m^1 with five laminae; m^3 with seven. *Anchotomys* sub-gen.
    b^2. m^1 with six to seven laminae; m^3 with nine to ten. *Lamotomys* sub-gen.

A few observations may be made on this table. *Parotomys* is a very clearly defined genus, and *Liotomys* differs from it so much that it is well worthy of being regarded as at least a distinct sub-genus. One would almost be inclined to make it a distinct genus.

Myotomys is a less satisfactory genus. *Myotomys unisulcatus* with the sub-species *M.u. broomi* Thomas, fit naturally into Miss St. Leger's table, and *Myotomys unisulcatus* is the only species she recognises. There have, however, been described a considerable number of other species and sub-species which Miss St. Leger completely overlooks, and which cannot be fitted into the table as it stands.

Myotomys turneri is a very distinct species which has five laminae in the upper third molar. *Myotomys sloggetti jeppei* Roberts, also has five laminae, and so has *Myotomys sloggetti basuticus* Roberts.

Myotomys unisulcatus granti Thomas, in my opinion cannot be regarded as a sub-species of *M. unisulcatus* at all, and ought to be placed with *M. turneri*, *M. jeppei* and *M. basuticus* in a new sub-genus characterised by having five laminae in m^3. In the Transvaal Museum there are 24 specimens of *M. u. granti.* Of these 23 have the laminal formula of 325, and one has the formula 324. But even this exceptional specimen has not, as Miss St. Leger's table has it for *Myotomys*, "three complete laminae and a posterior trefoil," but four complete well developed laminae.

Myotomys karoensis Roberts, ought to be removed to the genus *Otomys*. It has deeply grooved incisors; has the nasal expanded as in *Otomys*, and has six laminae in the third upper molar.

Otomys and the allied genera *Anchotomys* and *Lamotomys* form a very distinct group characterised by having deeply grooved incisors, greatly expanded nasals, and by the third upper molar having from six to nine laminae. There have been described besides the typical *O. irroratus* seven or eight other species and over a dozen sub-species. *Otomys silberbaueri* Roberts, ought in my opinion to be placed in the genus *Lamotomys*. It has a molar laminal formula of 329/622.

Dr. Hewitt has recently described under the name *Otomys robertsi* a very distinct species from the eastern border of Basutoland. Unfortunately the type specimen is the only known specimen from the locality, and it is immature. It is characterised by having deeply grooved incisors, nasals only moderately expanded, and the third upper molars with on the right side five laminae and on the left side a rudimentary sixth lamina.

Hewitt in recognising these characters refers to the somewhat anomalous position of the species. "On this classification (Thomas's) which attaches primary importance to the nasal character *robertsi* could not be placed in *Otomys*; but on the other hand, it would not fit in well with *Myotomys*, the genus which includes *unisulcatus*. I therefore venture to suggest that

Myotomys cannot now be maintained as a distinct genus, for *robertsi* is a truly intermediate type." "The form . . . is a very distinct one, combining the characters of the two species *irroratus* and *unisulcatus*, the molar characters being of essentially *irroratus* type, whilst the shape of the nasals, of the palatine foramina of the antorbital plate, and the more vertical arrangements of the upper incisors are *unisulcatus* characters. The molar characters are, however, of greater taxonomic value, and it may be that *robertsi* should be regarded as an environmental form of *irroratus* or even *vice versa*."

In the Transvaal Museum there are two specimens from the western side of Basutoland that seem to belong to Hewitt's species. Each has in the third upper molars only five laminae. The nasals are broader than in the type specimen, but they are not folded down as in *Otomys irroratus;* and the incisors are deeply grooved.

There is little doubt that *Otomys robertsi* is an intermediate type, but I fear the merging of the genus *Myotomys* in *Otomys* would rather increase the confusion than simplify matters, as *M. unisulcatus* has the third upper molar with only four laminae, while *Otomys irroratus* has six.

The fossil form is clearly more closely allied to *Otomys* than to *Myotomys*. It has the nasals rather widely expanded in front and the incisors deeply grooved. The upper incisors have the deep groove running down a little to the outside of the middle of the tooth, which is thus divided into two sub-equal rounded ridges. On the inner side of the inner ridge is a feeble groove which divides off a very small ridge. This arrangement is exactly as in *Otomys*. The lower incisor as in *Otomys* has the front enamel divided into three portions, a small outer separated from the other part by a deep groove, while the inner three-quarters of the face is divided into two by a sharp ridge.

The upper molars are relatively smaller than in *Otomys*, and the laminal formula is 3, 2, 5 or 6. The third molar has the posterior plates narrower than in *Otomys*. The first and second laminae are sub-equal in width, but the third is considerably narrower, and the fourth still narrower, while the fifth is only a little oval pillar. In one old specimen there are six elements in the third molar, but the fifth is small and the sixth rudimentary. In this species the three molars are perfectly preserved, and the length of the three is 6·2 mm. The third molar is 3·5 mm. in length and 2 mm. in greatest width.

The lower molars have the typical laminal formula of 422. The length of the series is from 6 mm. to 7 mm.

The skull probably measures in length in adult specimens about 30 mm., though no complete skull is known.

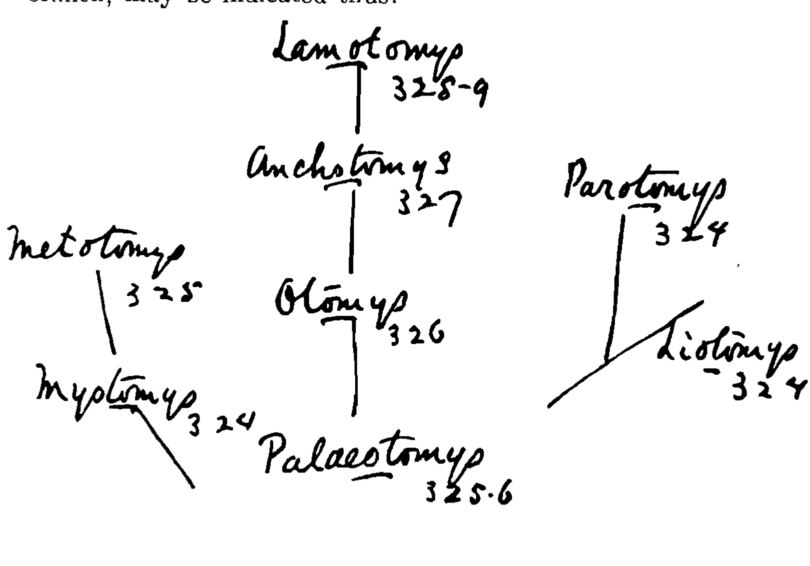
The fossil form which I propose to place in a new subgenus of *Otomys*, and to call *Palaeotomys gracilis*, is probably near the common ancestor of *Otomys* and *Myotomys*. Though the ridges and grooves on the incisors are feebly marked in

Myotomys they agree so closely with those in *Otomys* as to suggest that they have degenerated from the *Otomys* type.

Otomys robertsi Hewitt, ought, I think, to be placed in this sub-genus *Palaeotomys*, though it approximates to the new subgenus I am proposing, *Metotomys*, in having the nasals less expanded. And if *Anchotomys* is divided off because it has a laminal formula of 326·7/522, *Myotomys* with a dental formula of 324/422 can hardly be placed with *Otomys*. It is true that the laminal formula varies a little in most species. Thus *Otomys maximus* has usually an upper molar laminal formula of 326, but some specimens have 325 and others 327. But in some species the formula is remarkably constant. In the Transvaal Museum there are eleven specimens of *Myotomys turneri*, and all have the formula 325.

It seems to me that least confusion will be caused by leaving the genera and sub-genera as Miss St. Leger has them, and adding two new sub-genera—one a sub-genus of *Myotomys* for those species with an upper molar formula of 325, and of which *M. turneri* may be taken as the type, and another sub-genus of *Otomys* for those species allied to *Otomys*, but which have also an upper molar formula of 325. The former sub-genus, which may be called *Metotomys*, would be characterised by having the nasals moderately expanded, the upper incisors slightly grooved and the lower incisors not or very faintly grooved, and the third upper molar with five laminae. Though *M. turneri* may be considered as the type species, other species of the same subgenus would be *M. granti* Thomas, *M. sloggetti* Thomas, *M. bergensis* Roberts, *M. jeppei* Roberts, and *M. basuticus* Roberts.

The phylogenetic relations of *Otomys* and its allied forms, excluding *Parotomys* and *Liotomys*, which belong to a different branch, may be indicated thus:—



MYSTROMYS HAUSLICHTNERI sp. nov.

In the breccia are the remains of many specimens of a small *Mystromys*. I have been able to extract half a dozen good lower jaws, and much of two skulls. Most of the mandibles show the molars in perfect condition, and one of the skulls shows the upper molars in beautiful preservation.

The species agrees pretty closely with *Mystromys albicaudatus*, but the skull is slightly differently shaped. The snout in the fossil species is shorter and the palate wider. In typical specimens of *M. albicaudatus* the measurement from the front of the incisor to the back of the third molar is from 18 mm. to 20 mm. In the fossil form this measurement is only 16·5. The incisors here are narrower and more rounded. The anterior palatine foramen measures in typical specimens of *M. albicaudatus* about 8·5 to 9 mm. in length. Here the foramen is only 7·5 mm. long. In *M. albicaudatus* the measurement across the first molars is 7·5 mm. In the fossil species it is 8 mm.

The upper molars are fairly similar in the two species, but in the fossil form the infoldings of the enamel are more rounded and form much less acute angles than in the living form.

The lower jaw, though very similar to that in the living species, is very distinctly shorter. One specimen, and of quite an old animal, has the measurement from the alveolar margin in front to the hollow between the condyle and the angular process 16·5 mm. In specimens of *M. albicaudatus* the corresponding measurement is 17 to 18 mm. In pattern the molars agree pretty closely, but in *M. albicaudatus* the outer enamel is as in the upper molars more acutely infolded than in the fossil form.

For this fossil, *Mystromys*, which seems worthy of being placed in a distinct species, I propose the name *Mystromys hauslichtneri*, after Mr. Hauslichtner, owner of the farm, and who has given every assistance.

PROCAVIA OBERMEYERAE sp. nov.

In the large cave at Uitkomst, Miss A. A. Obermeyer, the Transvaal Museum Botanist, discovered the remains of the skull of a species of *Procavia*. The specimen consists of the left maxilla with most of the maxillary teeth well preserved, and with parts of both pre-maxillaries. The type is allied to *Procavia capensis*, and most probably belongs to this genus, but not only is it much larger than any of the living South African species of dassie, but apparently the largest true dassie yet known. From the front of the premaxilla to the back of the last molar the measurement is 69 mm., as compared with 55 mm. in a large old male of *Procavia capensis*. It is probable that this new species of *Procavia* had a skull about five inches in length.

The premolars and molars together measure about 51 mm. The premolars measure about 26 mm. and the molars measure 28 mm. How very different this species of *Procavia* is from the fossil species I described from Taungs may be seen from the fact that in *Procavia antiqua* the seven maxillary teeth measure only 34·5 mm.

The third premolar measures 8 mm. in length and 7·2 mm. in breadth. The pattern agrees essentially with that of the corresponding premolar in *Procavia capensis*, but there is here a much better developed inner cingulum. The fourth premolar measures 9 mm. by 8 mm.

The first molar measures in length 9·6 mm., and in breadth 9 mm. The pattern is almost as in *P. capensis*, but the inner cingulum is larger. The posterior molars have most of their outer sides lost, but they agree in general structure with those of *P. capensis*.

NOTOCHOERUS sp.—possibly N. PAICEAE Broom.

At Uitkomst I found a portion of the lower jaw of a pig with two good teeth and portion of another. The animal is immature. The teeth preserved are half of the much worn fourth milk molar, the first molar slightly worn, and the completely unworn second molar, which is still imbedded in the jaw.

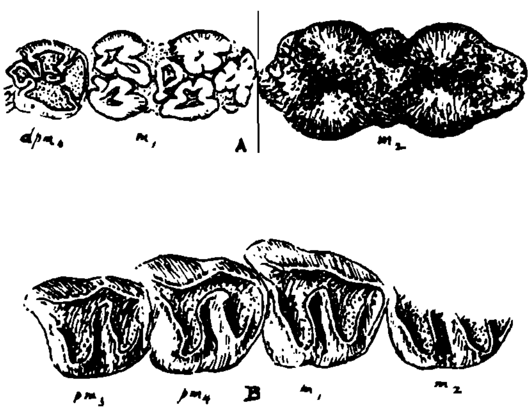


Fig. 8.

A. Left lower molars of *Notochoerus* sp. Natural size.
B. Left upper teeth of *Procavia obermeyerae* Broom. Twice natural size.

The milk molar has apparently four well developed typical pig cusps with a large posterior median cusp, and a smaller central cusp, and possibly a small anterior cusp. The way in which the enamel is infolded is shown in the figure given.

The first true molar has four main cusps, a large median posterior cusp, a small central cusp, and a still smaller anterior median cusp. All the cusps have the enamel markedly infolded. This tooth measures in greatest length 23 mm. The width between the anterior pair of cusps is about 12 mm., and between the posterior pair 13 mm.

The second molar is essentially similar in structure to the first, but is relatively very much larger. The four main cusps are large and somewhat hypsodont. There is a fairly large anterior median cusp. There are between the main pairs of cusps one well developed median cusp, small outer and inner cusps, and a second small median cusp considerably in front of the large median cusp. Posteriorly there is a large median cusp, and behind it two smaller cusps. The whole tooth has an antero-posterior measurement of 35 mm. The transverse measurement across the anterior pair of cusps is about 15 mm., and across the posterior pair also 15 mm.

If the teeth are compared with those of living pigs very marked differences are at once apparent. The large development of the median cusps and the great antero-posterior length show that the fossil pig is not nearly allied to either *Sus*, *Potamochoerus*, *Hylochoerus* or *Phacochoerus*, but in the lengthening of the molars, the large median cusps and the tendency to hypsodonty there is a suggestion of affinity with the warthogs.

Some years ago I discovered a giant pig in the diamond gravels of the Barkly West district which had a number of characters of *Phacochoerus*, but was much more primitive. I named it *Notochoerus capensis*. Two other species were described later, *Notochoerus meadowsi* and *Notochoerus paiceae*. Unfortunately all these are known only by the third lower molars. Hopwood has described a somewhat allied pig from Central Africa under the name *Metridiochaerus andrewsi*.

The new fossil pig most probably belongs to a species of *Notochoerus*. It cannot be *N. capensis*, which is really a giant, nor *N. meadowsi*, which is extremely hypsodont; but it is just possible that it may be *N. paiceae*, but owing to the type of *N. paiceae* being only the last molar with a fragment of m^2, and the last molar being unknown in this new fossil pig, a doubt must remain until we get the third molar.