56.9,62(118:62)

Article IV.—CONTRIBUTION TO THE KNOWLEDGE OF THE FOSSIL HYRACOIDEA OF THE FAYÛM, EGYPT, WITH DESCRIPTION OF SEVERAL NEW SPECIES

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Forty-Three Text Figures

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INTRODUCTION

The occurrence of hyracoid remains in the well-known fluvio-marine formation of the Fayûm, Egypt, was recorded at the first by C. W. Andrews and H. J. L. Beadnell in 1902,[1] who described *Saghatherium antiquum* and *S. minus*. After this first report, Andrews added more records on the same subject; he described *Megalohyrax eocænus* in 1903,[2] *Geniohyus mirus*, *G. fajumensis*, *G. major*, *Megalohyrax minor* and *Saghatherium magnum* in 1904,[3] *Saghatherium majus*, besides all the above-mentioned species, in 1906,[4] and further materials of *G. mirus* and *S. magnum* in 1907.[5] Thus he recognized three genera and ten species in total, though he referred only two genera of them, *Saghatherium* and *Megalohyrax*, to the Hyracoidea; and the other genus, *Geniohyus*, erroneously to the Suidæ. Moreover, he recognized the last genus only by lower jaws and lower teeth, and erroneously referred the upper jaws and upper teeth of the same to *Saghatherium*. He founded the family Saghatheriidæ to receive *Saghatherium* and *Megalohyrax*, outside the modern hyracoids, viz., Procaviidæ (=Hyracidæ of auct.).

Great progress in the study of the fossil hyracoids of the Fayûm was made by Max Schlosser, whose preliminary report was published in 1910[6] and full report in 1911.[7] He subdivided the fossil hyracoids of the Fayûm, hitherto known, into six genera, which were distinguished by him as follows:

I. Schmelz nahezu glatt, Zähne selenolophodont, untere P und M mit halbmond-förmigen Auszenhöckern und lekiner spitzen Innenhöckern. Obere P und M mit komprimierten, Auszenhöckern, die eine W-förmige Auszenwand bilden, und mit jochartigen Innenhöckern.

[1] 1902, 'A Preliminary Note on some New Mammals from the Upper Eocene of Egypt,' Surv. Dept., Public Works Ministry, Cairo Mus.
[2] 1903, 'Notes on an Expedition to the Fayûm, Egypt, with Descriptions of some New Mammals,' Geol. Mag., N.S., Decade 4, X,
[3] 1904, 'Further Notes on the Mammals of the Eocene of Egypt,' Geol. Mag., N.S., Decade 5, I, p. 109.
[4] 1906, 'A Descriptive Catalogue of the Tertiary Vertebrata of the Fayûm, Egypt,' p. 91, Brit. Mus.
[5] 1907, 'Note on some Vertebrate Remains collected in the Fayûm, Egypt, in 1906,' Geol. Mag., N. S., Decade 5, IV.
[6] 1910, 'Über einige fossile Säugetiere aus dem Oligocän von Ägypten,' Zool. Anz., XXXV, p. 500.
[7] 1911, 'Beiträge zur Kenntnis der Oligocänen Landsäugetiere aus dem Fayûm (Ägypten),' Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV.

(a) Obere und untere P mehr oder weniger M-artig. Mesostyl der oberen P und M scharfkantig.....*Megalohyrax.*

(b) Obere und untere P einfacher als M Mesostyl der oberen M stumpf, unterer C dicht neben P_1.....*Saghatherium.*

II. Schmelz mäszig gerunzelt. Zähne undeutlich selenolophodont, untere M mit kräftigen, pyramidenähnlichen Innenhöckern, die mit dem Hinterende der beiden halbmondförmigen Auszenhöcker verbunden sind. Höcker der oberen P und M dick, daher Auszenwand undeutlich W-förmig und Joche undeutlich. Obere P mehr oder weniger M-artig, untere P einfacher als M.

(c) Obere M und P mit je einem Sporn an der Innenseite der Auszenhöcker und mit scharfem Mesostyl, untere P und M sehr breit..*Pachyhyrax.*

(d) Obere M und P ohne Sporn an der Innenseite der Auszenhöcker, M mit wulstigem, P mit schwachem Mesostyl, untere P und M schmal. *Mixohyrax.*

III. Schmelz stark gerunzelt, Zähne mehr oder weniger bunodont, untere M mit undeutlichen Auszenmonden und dicken Innenhöckern, obere M aus vier dicken Höckern bestehend. Alle P einfacher als M.

(e) Zahnkronen mäszig hoch. Unterer P_3 und $_4$ mit Innenhöcker. Obere M mit mäszig entwickeltem Mesostyl, obere M_3 trapezoidal...*Bunohyrax.*

(f) Zahnkronen niedrig, nur untere P_4 mit Innenhöcker. Obere M mit dickem Mesostyl, obere M_3 nahezu dreieckig.....*Geniohyus.*"

This classification of Schlosser's is excellent as a whole, though it contains a few weak points as follows·

(1) This is essentially an artificial classification; his *Megalohyrax* and *Saghatherium* are not very closely related to each other, as can be judged from the structures of the rostral portion of the skull, as well as of the cheek-teeth; the same appears to hold true also in the relation of *Pachyhyrax* and "*Mixohyrax*," as can be judged from the structure of the cheek-teeth; "*Mixohyrax*" and *Geniohyus* are very closely allied to each other, being very distinct from either his *Megalohyrax* or *Saghatherium*, as can be judged from the structures of the skull and of the cheek-teeth.

(2) The roughness of the enamel of the teeth is not a common character of either *Bunohyrax* or *Geniohyus*; both genera include smaller species, in which the enamel of the teeth is very smooth.

(3) The lower P_3 of *Geniohyus* has an inner cusp, like hat of *Bunohyrax*, though the inner and outer cusps are better differentiated and more widely separated from each other in the latter than in the former.

(4) That the lower C and P_1 are in contact is not a characteristic of *Saghatherium* only, but a common character of this genus and certain smaller species of both *Geniohyus* and *Megalohyrax* (=Schlosser's "*Mixohyrax*").

(5) His "*Megalohyrax*" (=*Titanohyrax* Matsumoto) does not correspond to Andrews' typical *Megalohyrax* at all.

Schlosser described six new species, viz.: *"Megalohyrax" palæotherioides, Pachyhyrax crassidentatus, "Mixohyrax andrewsi," "Mix." niloticus, "Mix." suillus,* and *Geniohyus micrognathus;* besides he made a revision of the generic references of the hitherto known species, viz.: *Megalohyrax eocænus* Andrews, *Meg. minor* Andrews, *Saghatherium minus* Andrews and Beadnell, *S. antiquum* Andrews and Beadnell, *S. magnum* Andrews, *S. majus* Andrews, *Bunohyrax fajumensis* (Andrews), *B. major* (Andrews), and *Geniohyus mirus* Andrews. His creation of the genus *Mixohyrax* and of *Mixohyrax andrewsi* and his reference of the genus *Megalohyrax* and of *Megalohyrax minor, Saghatherium magnum,* and *S. majus* are undoubtedly wrong from the standpoint of the law of priority.

The American Museum of Natural History has an excellent collection of the fossil hyracoids from the fluvio-marine formation of the Fayûm, which I was permitted to study by Professor Henry Fairfield Osborn, President of the Museum. As a result of the present study, I could distinguish nineteen species in the said material, including nine new species, besides the hitherto known species except *Megalohyrax eocænus* and *Pachyhyrax crassidentatus.* A comparison of the genera and species adopted in the present report, and in another one of mine in preparation, with the corresponding forms as reported by Andrews and by Schlosser, is made on page 257.

As a result of my examination of the material of the fossil hyracoids belonging to the British Museum, I have come to the conclusion that the genotype of Andrews' *Megalohyrax* is quite distinct from Schlosser's *"Megalohyrax"* but corresponds to Schlosser's *Mixohyrax.* Naturally a new generic name is necessary for Schlosser's *"Megalohyrax."* I have called this by the name *Titanohyrax.*

As to the classification of families of the Hyracoidea, Osborn[1] recognizes only a single family in this order, while Andrews[2] and Schlosser[3] subdivide this order into two families, one, Saghatheriidæ, including all the known extinct genera, with the exception of the lately described, problematical *Myohyrax,* which is referred by Andrews[4] to a distinct family by itself, and the other, Procaviidæ or "Hyracidæ," including all the existing genera. It is, of course, a matter of fact that the extinct genera are very different from the modern forms. Again, it is equally obvious that there are great divergencies within the extinct genera themselves. For instance, the contrast between *Titanohyrax* and the

[1] 1910, 'The Age of Mammals.'
[2] 1906, *Loc. cit.*
[3] 1911, Zittel, 'Grundzüge der Palæontologie,' Abth. II.
[4] 1914, 'On the Lower Miocene Vertebrates from British East Africa,' Quart. Journ. Geol. Soc., LXX.

Andrews, 1906	Schlosser, 1911	Present Report
....	....	*Geniohyus gigas*, n.
....	*Geniohyus aff. mirus*	*G. subgigas*, n.
Geniohyus mirus, 1904 *Saghatherium majus, pars*	*G. mirus*	*G. mirus*
G. mirus (1907)	*G. mirus, pars* *G. micrognathus*, 1911	*G. micrognathus*
....	....	*G. diphycus*, n.
Saghatherium magnum, 1904	*Saghatherium majus, pars* *S. magnum, pars*	*G. magnus*
Geniohyus major, 1904	*Bunohyrax major*	*Bunohyrax major*
G. fajumensis, 1904	*B. fajumensis*	*B. fajumensis*
....	*B.* sp.	*B. affinis*, n.
Megalohyrax eocænus, 1903	*Megalohyrax eocænus, pars*	*Megalohyrax eocænus*
M. minor, 1904	*Mixohyrax andrewsi*, 1910	*Meg. minor*
....	*Mix. niloticus*, 1910 *Mix. suillus, pars*	*Meg. niloticus*
....	*Mix. suillus*, 1910	*Meg. suillus*
Saghatherium magnum, 1907	*Saghatherium magnum, pars*	*Meg. pygmæus*[1]
....	....	*Titanohyrax ultimus*[1]
....	*Megalohyrax eocænus, pars*	*T. schlosseri*
....	*Meg. palæotherioides*, 1910	*T. palæotherioides*
Megalohyrax minor, pars	*Meg. minor*	*T. andrewsi*[1]
....	*Pachyhyrax crassidentatus*, 1910	*Pachyhyrax crassidentatus*
....	*Saghatherium majus, pars*	*Saghatherium macrodon*, n.
....	....	*S. euryodon*, n.
Saghatherium magnum, pars *S. antiquum*, 1902 *S. minus*, 1902	*Saghatherium magnum, pars* *S. antiquum, pars* *S. minus, pars*	*S. antiquum*
S. antiquum, pars	*S. antiquum, pars*	*S. annectens*, n.
....	*S. minus, pars*	*S. sobrina*, n.

[1]As to these new species of *Titanohyrax* and *Megalohyrax*, see 1921, Proc. Zool. Soc. London, pp. 839-850.

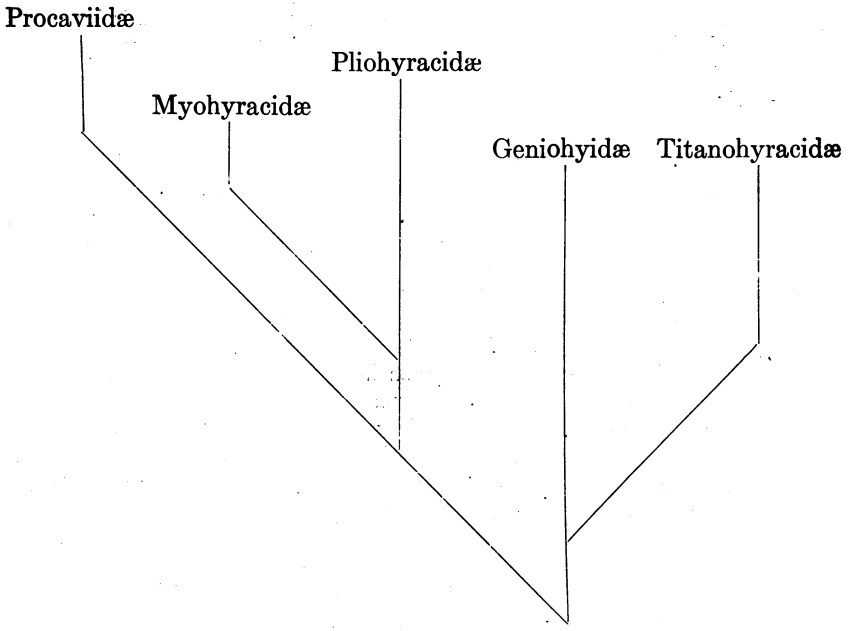
group of *Geniohyus* and *Megalohyrax* in the structure of the rostral portion of the skull is almost parallel to that between the Palæotheriidæ and the Hyracotheriinæ or the Equidæ as a whole; and the contrast between *Saghatherium* and the group of *Geniohyus* and *Megalohyrax* is almost parallel to, though a little less intensified than, that between the existing hyracoids and the last-mentioned group. Among the known extinct genera, *Saghatherium*, as well as *Pliohyrax* of the Pontian of Pikermi and Samos, appears to be closest to the modern hyracoids in the structures of both the skull and cheek-teeth.

Now a few words about problematical *Myohyrax*. This genus is very imperfectly known.[1] Though it looks quite unlike any other hyracoid in its extreme hypselodonty, there are certain probabilities of its belonging actually to the Hyracoidea. So far as it is referred to the hyracoids, it might be rather closely related to *Saghatherium*, as can be judged from the principal plan of structure of the cheek-teeth. According to these facts, I propose here to subdivide the Hyracoidea into five families, four of which are entirely extinct. A comparison of the families and genera adopted in the present report with those adopted by Andrews and by Schlosser is made in the following table:

Andrews, 1906	Schlosser, 1911	Present Report
Suidæ, *pars*	I. Saghatheriidæ	I. Geniohyidæ, n.
Geniohyus, 1904	*Geniohyus*	*Geniohyus*
Geniohyus, pars	*Bunohyrax*, 1910	*Bunohyrax*
I. Saghatheriidæ, 1906		
Megalohyrax, 1903	*Mixohyrax*, 1910	*Megalohyrax*
Megalohyrax, pars	*Megalohyrax*	II. Titanohyracidæ, n.
		Titanohyrax
	Pachyhyrax, 1910	III. Pliohyracidæ, n.
Saghatherium, 1902	*Saghatherium*	*Pachyhyrax*
Pliohyrax	*Pliohyrax*	*Saghatherium*
		Pliohyrax
(II. Myohyracidæ, 1914)		IV. Myohyracidæ
(*Myohyrax*, 1914)		*Myohyrax*
	II. Hyracidæ	V. Procaviidæ
	Hyrax	*Procavia*
	Hyrax, pars	*Dendrohyrax*

[1]This form is represented, in the British Museum material, by four fragmentary specimens. One of them is a fragment of the left mandibular ramus, with P_2-M_1 (P_3-M_2 by Andrews) *in situ*, besides the alveoli or roots of I_2-P_1 (I_3-P_2 by Andrews); the P_2 might be tusk-like; all these teeth form together a closed dental arch, without any diastema. Another specimen is a fragment of right mandibular ramus, with two molars *in situ*, which may be M_2, $_3$. A third is an isolated right lower molar, perhaps M_3. A fourth is an upper molar, perhaps M^2, of right side, attached to a small fragment of maxilla. Judging from the shape of the mandibular ramus and dental arch, this animal might have been short-skulled and short-snouted.

The interrelationships of the families of the Hyracoidea might be somewhat as shown in the following diagram:



In conclusion, I have the greatest pleasure to express here my hearty thanks and best regards to Professor Osborn, who so generously permitted me to study the precious material and so kindly gave me much helpful advice, and to Doctor W. D. Matthew, Professor W. K. Gregory, Mr. H. Lang, and Mr. W. Granger, to all of whom I owe much help and advice during the present study. Again, I have the same pleasure to express my thanks also to Professor Arthur Smith Woodward and Doctor Charles William Andrews of the British Museum, by whom I was permitted to examine the material belonging to that Museum.

II. DESCRIPTION OF FORMS

Key to Families of Hyracoidea

A.—Dental formula: $\frac{3}{3}.\frac{1}{1}.\frac{4}{4}.\frac{3}{3}$; last molar being the largest of all cheek-teeth in either jaw; lower last molar with a well-developed posterior talon; very to moderately brachyodont.

a. Upper cheek-teeth without spurs on inner posterior sides of both paracone and metacone.

b.—Bunodont to bunoselenodont; upper premolars without well-developed mesostyle; parastyle and mesostyle of upper cheek-teeth blunt; lower cheek-

teeth without differentiated metastylid; premaxillæ not specially elongated superoposteriorly; anterior ends of nasals and of premaxillæ lying a certain, but not very great, distance anterior to anterior ends of nasopremaxillary sutures; nasals acutely pointed anteriorly; long-skulled and long-snouted; upper surface of skull very rough.

Geniohyidæ.

b¹.—Selenodont; upper premolars with well-developed mesostyle; parastyle and mesostyle of upper cheek teeth very acute; lower cheek-teeth with well-differentiated metastylid; premaxillæ strongly elongated superoposteriorly; anterior ends of premaxillæ lying a great distance anterior to the anterior ends of nasopremaxillary sutures; probably more or less short-skulled and short-snouted; ? upper surface of skull smooth.

Titanohyracidæ.

a¹.—Upper cheek-teeth with spurs on inner posterior sides of both paracone and metacone; lower cheek-teeth without differentiated metastylid; metaconid and entoconid of lower molars very thick and rounded; bunoselenodont to selenodont; premaxillæ not specially elongated superoposteriorly; anterior ends of premaxillæ lying only a little anterior to anterior ends of nasopremaxillary sutures; rather short-skulled and short-snouted; upper surface of skull smooth.....Pliohyracidæ.

A¹.—Dental formula: $\frac{?}{3}\frac{?}{1}\frac{?}{1}\cdot\frac{?}{4}\frac{?}{3}$; last molar being smaller than the second; lower last one without posterior talon; very hypselodont; selenodont.

Spurs and crochets well-developed in both the anterior and posterior lobes of upper molars, spur and crochet of each lobe uniting so as to divide the valley into two compartments; lower cheek-teeth without differentiated metastylid; skull unknown; in most likelihood short and short-snouted..Myohyracidæ[1]

A².—Dental formula: $\frac{1}{2}\cdot\frac{0}{0}\cdot\frac{4}{4}\cdot\frac{3}{3}$, last molar being smaller than the second in either jaw; lower last one without posterior talon; very to moderately brachyodont; selenodont. Upper cheek-teeth with very rudimentary spurs; lower cheek-teeth without differentiated metastylid; premaxillæ not specially elongated superoposteriorly; anterior ends of premaxillæ, of nasals, and of naso-premaxillary sutures lying nearly on one frontal plane; nasals truncated anteriorly; very short-skulled and short-snouted; upper surface of skull smooth.....Procaviidæ.[1]

1. GENIOHYIDÆ, new family

Long-skulled and long-snouted. Upper surface of skull very rough with irregular pits and grooves and intervening ridges. Anterior ends of both nasals and premaxillæ lying a considerable distance anterior to the anterior ends of nasopremaxillary sutures; anterior part of nasal and that of premaxillary all together embracing a V-shaped bay in lateral view. External nares not retired. Lacrymals fairly large.

Dental formula: $\frac{3}{3}\cdot\frac{1}{1}\cdot\frac{4}{4}\cdot\frac{3}{3}$. Upper I^1 and lower I_2 very large and tusk-like. Cheek-teeth brachyodont, bunodont to bunoselenodont. $M\frac{3}{3}$ the largest of the cheek-teeth.

[1]These two families stand outside the limit of the present report.

This family included *Geniohyus* Andrews, 1904, *Bunohyrax* Schlosser, 1910, and *Megalohyrax* Andrews, 1903; though the skull of the second genus is not yet known, it is very probable that the genus is to be referred to this family.

Key to genera of Geniohyidæ

I.—Cheek-teeth bunodont; upper P^{2-4} three-cusped, with a shelf-like talon just behind protocone; upper M^{1-3} four-cusped; transverse ridges not completely formed in lower cheek-teeth.

a. Mandibular ramus strongly deepened in its posterior half or greater posterior part, so that its lower border is distinctly concave in its anterior half and distinctly convex in its posterior half; a very large fenestra-like opening is present on the inner surface of the ramus; upper M^3 subquadrangular; main cusps of lower $P_{3,4}$ divided into two secondary cusps..... *Bunohyrax.*

II.—Cheek-teeth bunoselenodont; upper $P^{3\text{-}4}$, or at least P^4, and M^{1-3} four-cusped; transverse ridges well-developed in $P_{3,4}$ and M_{1-3}; mandibular ramus not strongly deepened, with a large fenestra-like opening on its inner surface..... *Megalohyrax.*

GENIOHYUS Andrews

ANDREWS, 1904, Geol. Mag., N. S., Decade 5, I, p. 160; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 193. SCHLOSSER, 1910, Zool. Anz., XXXV, p. 502; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 98, 121. Diagnosis, as shown in the key.

GENOTYPE:—*Geniohyus mirus* Andrews, 1904; fixed by elimination.

This genus includes *G. gigas*, new species; *G. subgigas*, new species; *G. micrognathus* Schlosser, 1911; *G. diphycus*, new species; and *Saghatherium magnum* Andrews, 1903, besides the genotype.

SYNOPSIS OF SPECIES OF *Geniohyus*

(1) Very large species, united length of P_{1-4} and of M_{1-3} measuring 64 mm. and 81 mm. respectively (type-specimen: No. 13333)..... *gigas.*

(2) Large species, united length of P_{1-4} and of M_{1-3} measuring 57 mm. and 76 mm. respectively (Schlosser), and that of M^{1-3}, 60 mm. (Schlosser)—63 mm. (type-specimen: No. 13329)..... *subgigas.*

(3) Rather small species, united length of P_{1-4} and of M_{1-3} measuring 48 mm. (No. 14466)—50 mm. (Andrews' type) respectively, and that of P^{1-4} and of M^{1-3}, 47.3 mm.—48.5 mm. and 52.5 mm.—53.5 mm. respectively (No. 14466); lower C and $P_{1,2}$ comparatively large; mandibular symphysis long; diastemata between I_2 and I_3 and between I_3 and C very long..... *mirus.*

(4) Small species, though almost as large as the preceding species in the size of posterior premolars and molars, united length of P_{1-4} and of M_{1-3} measuring 45 mm. (No. 14462)—47 mm. (Schlosser's type; as well as No. 13348), and 53 mm. (Andrews' specimen)—59.5 mm. (No. 13348) respectively; lower C and $P_{1,2}$ very small; mandibular symphysis short; diastemata between I_2 and I_3 and between I_3 and C short..... *micrognathus.*

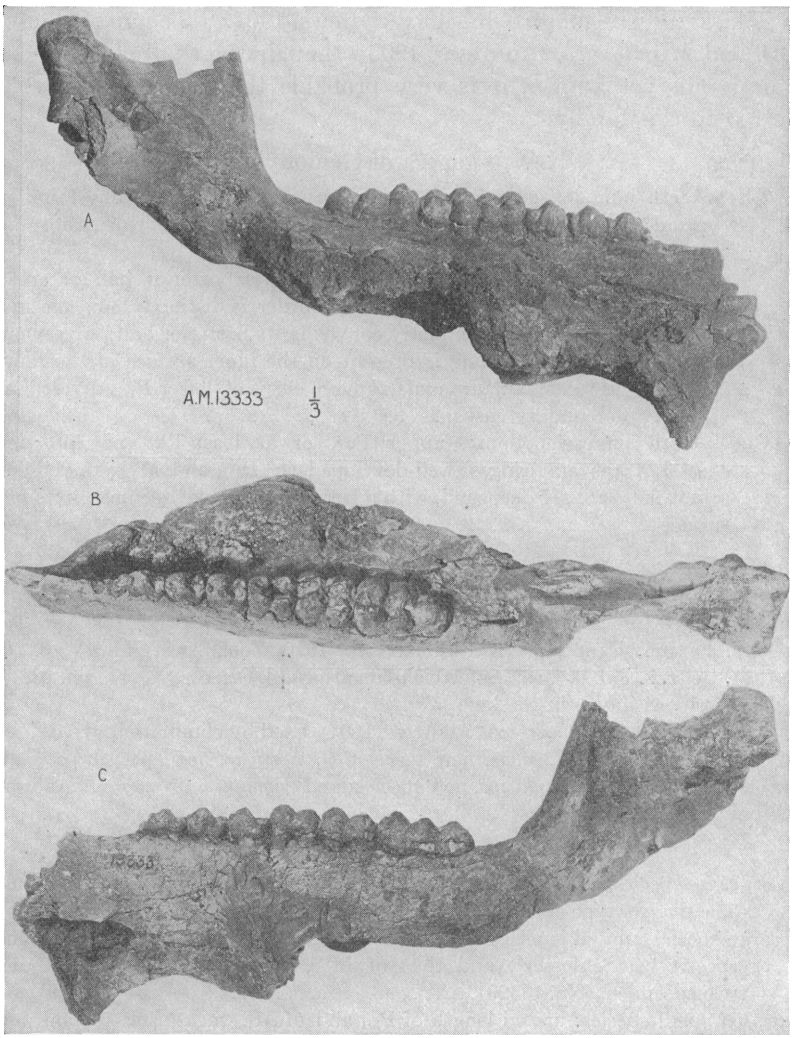


Fig. 1. *Geniohyus gigas.* Type, right mandibular ramus, Amer. Mus. No. 13333. One-third natural size.

A, external view; B, superior view; C, internal view.

(5) Very small species, united length of P_{1-4} measuring 43.5 mm. (type-specimen: No. 13349), that of $M_{1,\ 2}$ measuring 28 mm. (ditto), whereas the same teeth of the preceding two species measure 32–33 mm.; that of M^{1-3}, 43 mm. (No. 14456), mandibular symphysis short, all diastemata in that region being also very short..... *diphycus.*

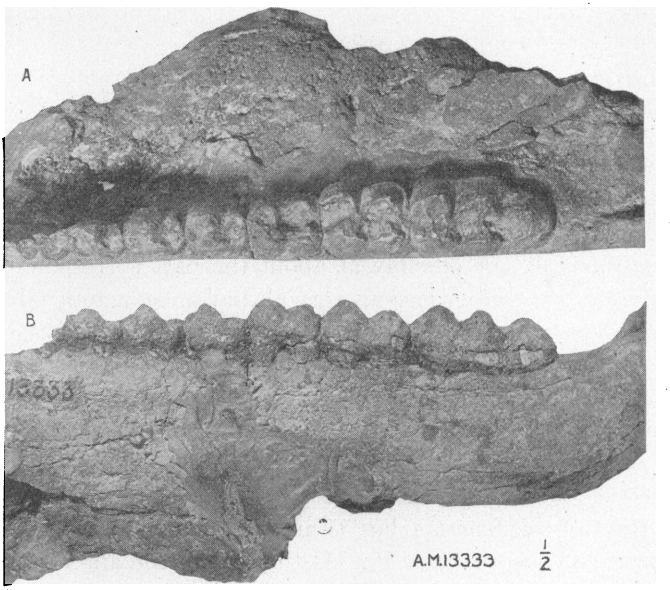


Fig. 2. *Geniohyus gigas.* Type, portion of right mandibular ramus showing P_4-M_3 in place, Amer. Mus. No. 13333. One-half natural size.
A, superior view; B, internal view.

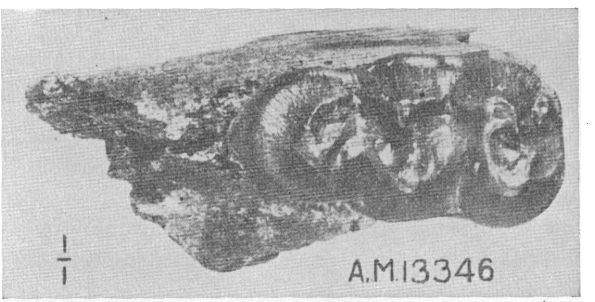


Fig. 3. *Geniohyus gigas.* Paratype, fragment of right mandibular ramus with M_3 in place, Amer. Mus. No. 13346. Natural size. Superior view.

(6) Extremely small species, united length of P^{1-4} and of M^{1-3} measuring ca. 31 mm. (No. 13278)—33 mm. (Andrews' type) and 34 mm. (Schlosser)—39 mm. (Andrews' type) respectively..... *magnus.*

Geniohyus gigas, new species

TYPE SPECIMEN:—No. 13333, large fragment of right mandibular ramus, bearing P_2-M_3 and roots of P_1 *in situ*, Am. Mus. Exp. 1907, Quarry A.

PARATYPES:—No. 13346, small fragment of right mandibular ramus, bearing M_3 *in situ*, Am. Mus. Exp. 1907, Quarry A; No. 13498, isolated left M^3, being much water-worn, Am. Mus. Exp. 1907, Quarry A (this species?).

The mandibular ramus of the specimen No. 13333 is very large, very deep and very strongly bulged outward; it belongs to a full-grown animal, and may probably be male. At about 30 mm., anterior to the anterior side of P_1 (or possibly at about the part corresponding to the position of C), the ramus deepens very abruptly, being much deeper than Andrews' type mandible of *G. mirus*. The outer side of the ramus is strongly bulged out, appearing to be much more so than that of Andrews' type mandible of *G. mirus;* the ramus measures 68 mm. in thickness in the thickest part, which corresponds nearly to P_4 and M_1, as preserved. On the inner side of the ramus, there is present a very large, fenestra-like opening, which extends from just in front of P_1 backward; the highest limit of this fenestra lies 55 mm. below the upper border of the ramus at the anterior root of P_3. At the base of the anterior side of the ascending bar, just behind M_3, there is a conspicuous foramen, which is characteristic of mandibles of hyracoids. On the outer side of the ascending bar, just below and anterior to the mandibular condyle, there is present a conspicuous, large and deep fossa. The ramus measures as follows (in mm.):

		A. M. 13333◇ Prob. ♂
I.	Length from anterior side of P_1 to the anteriormost part of posterior border of ascending bar	257
II.	Ditto from the same to posterior border of mandibular condyle	272
III.	Ditto from the same to upper border of the foramen just behind M_3	170
IV.	Minimum anteroposterior width of ascending bar	78
V.	Maximum thickness of ramus, as preserved	68
VI.	Depth of ramus at anterior side of P_1, as preserved	80+e[1].

[1]In this and subsequent tables of measurement, e means estimated.

The premolars and molars of this type mandible, as well as the other two molars at hand, measure as follows (in mm.):

	Lower dentition		Upper dentition
	A. M. 13333◇	A. M. 13346	A. M. 13498
	Prob. ♂		M^3 water-worn
P_1 Length	15 (roots)	....	....
P_1 Width	....	....	....
P_2 Length	15.3	....	....
P_2 Width	9.7	....	....
P_3 Length	16	....	....
P_3 Width	11.3	....	....
P_4 Length	16	....	....
P_4 Width	14	....	....
M_1 Length	19.5	....	....
M_1 Width	16.5	....	....
M_2 Length	24	....	....
M_2 Width	20.4	....	....
M3 Length	37	41	28.3
M3 Width	22.5	21.8	26.2
Length of P_{1-4}	64	....	....
Length of M_{1-3}	81	....	....

The measurements of the teeth of *G. subgigas*[1], in comparison with those reported by Schlosser as "*G.* aff. *mirus*?," are tabulated as follows (in mm.):

	Lower dentition		Upper dentition		
	Schlosser		A. M. 13329◇		Schlosser
			Right	Left	
P4 Length	14.5	....	14	14.3	....
P4 Width	14	....	19	19	....
M1 Length	17.5	....	17.5	18	18
M1 Width	14.5	....	20.5	20	18
M2 Length	20	21	20.5	21	20
M2 Width	17	17.5	23.5	23.5	20
M3 Length	31	....	24.5	23.5	23
M3 Width	19	....	26	26	22.5
Length of P_{1-4}	57	....	....	....	....
Length of M1-3	76	....	63	62	60

[1]See page 269 (top).

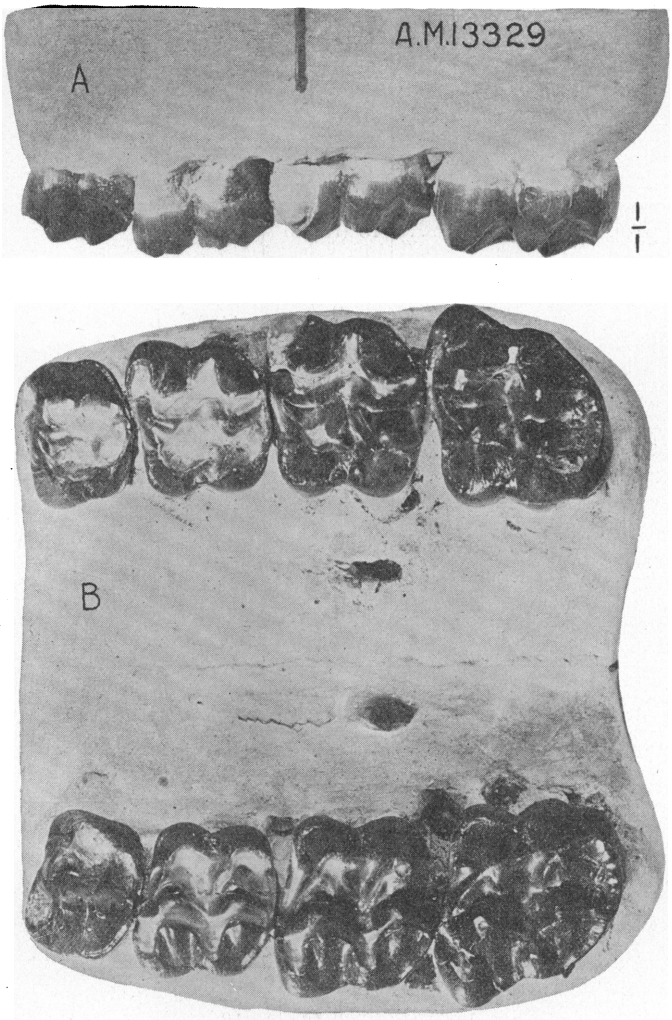


Fig. 4. *Geniohyus subgigas*. Type, superior cheek-teeth, P^4-M^3 of both sides, Amer. Mus. No. 13329. Natural size.
A, external view, left side; B, inferior view.

Geniohyus subgigas, new species

G. aff. mirus SCHLOSSER, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 122. (*pars:* non Andrews), Pl. XII (IV), figs. 4, 5.

TYPE SPECIMEN:—No. 13329, upper P^4-M^3 of both sides, Am. Mus. Exp. 1907, northwest of Quarry A.

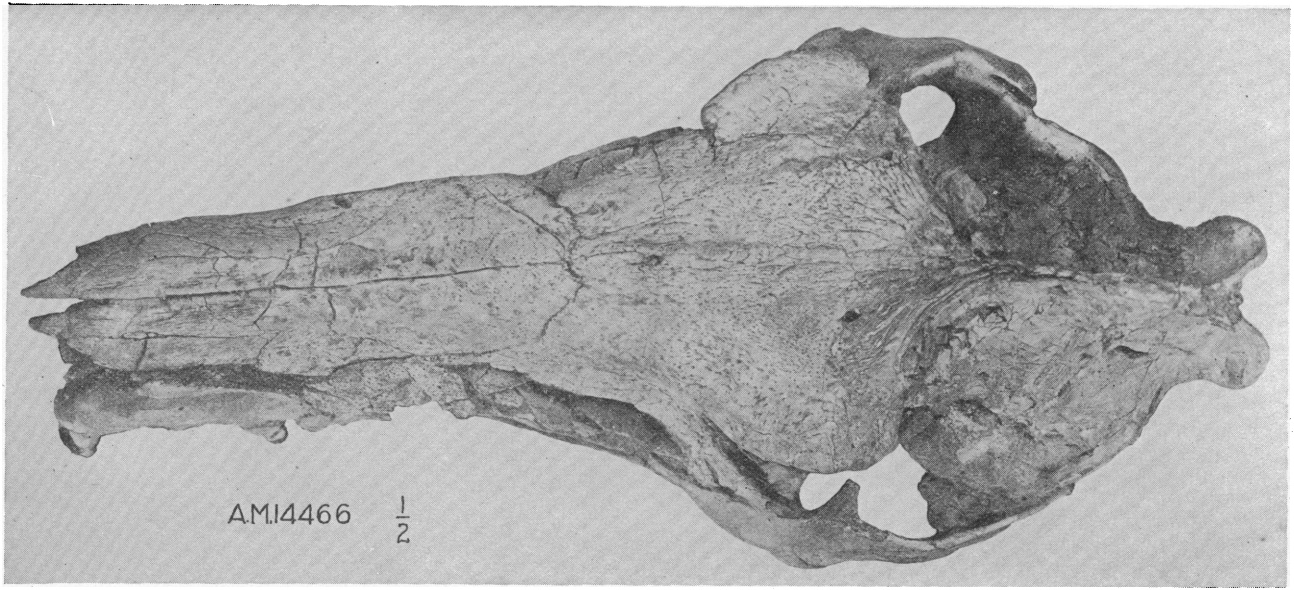


Fig. 5. *Geniohyus mirus*. Skull, Amer. Mus. No. 14466. One-half natural size. Superior view.

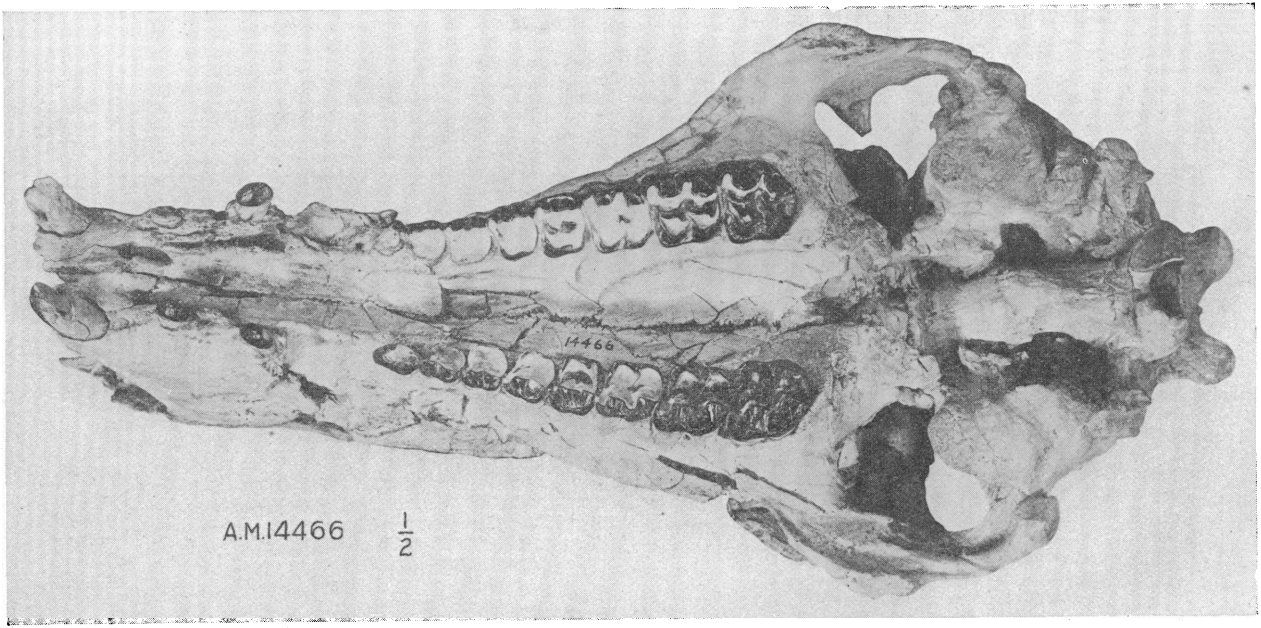


Fig. 6. *Geniohyus mirus.* Skull, Amer. Mus. No. 14466. One-half natural size. Inferior view.

These upper cheek-teeth, which are very similar in structure to, but larger than, those of the next species, appear to suit in size those reported by Schlosser as "*G. aff. mirus?*" It is evident that the latter are much larger than those of the genuine *G. mirus*.[1]

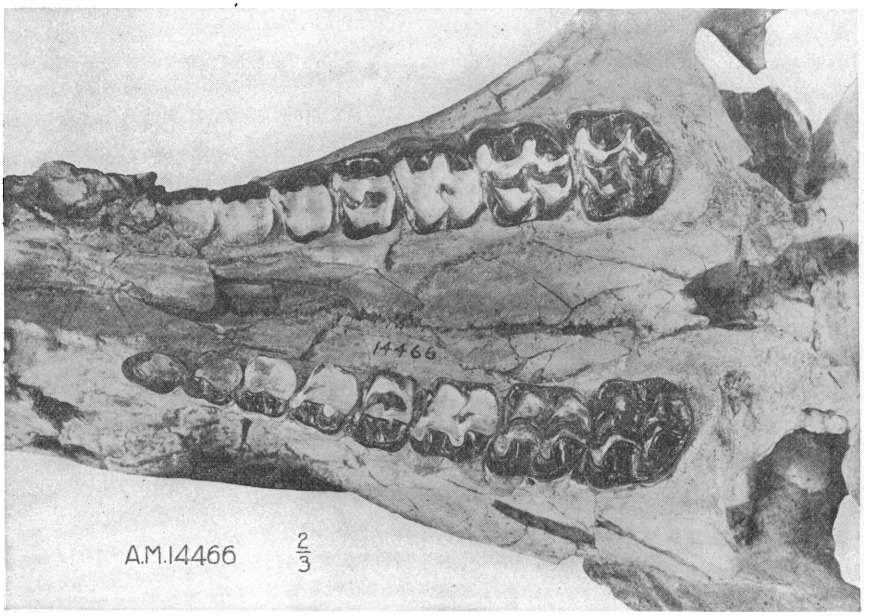


Fig. 7. *Geniohyus mirus*. Palate and upper dentition, Amer. Mus. No. 14466. Two-thirds natural size. Inferior view.

Geniohyus mirus Andrews

Geniohyus mirus Andrews, 1904, Geol. Mag., N. S., Decade 5, I, p. 160, Pl. vi, fig. 4; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 193, Pl. xix, fig. 1. Schlosser, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 123 (*pars*).

Saghatherium majus Andrews, 1906, *loc. cit.*, p. 91 (*pars*), Pl. iv, fig. 5

Specimen.—No. 14459=14466; nearly complete skull, though crushed, with nearly complete symphysial region and left horizontal bar of mandible, bearing all the upper teeth, except left I^2, and all the left lower teeth, except I_1 and I_3, *in situ*, Am. Mus. 1908, fluvio-marine formation.

The general shape of the mandible of the specimen No. 14466 differs considerably from that of Andrews' type mandible, though the size of the teeth and the length of the diastemata of the former are very close to those of the latter. The symphysis is very long; its posterior end appears to lie at about the frontal plane, which is tangential to the pos-

[1]See lower table, page 265

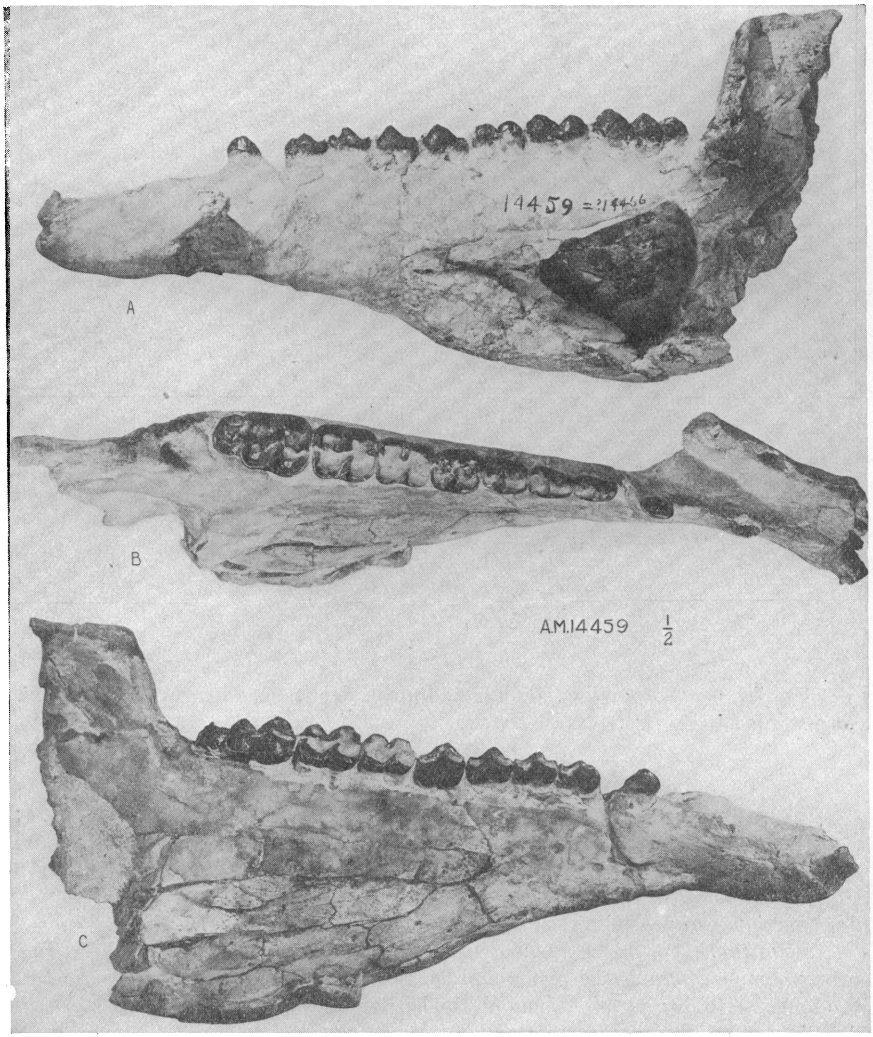


Fig. 8. *Geniohyus mirus.* Right ramus and symphysis of mandible, Amer. Mus. No. 14459 = 14466. One-half natural size.

A, internal view; B, superior view; C, external view.

terior side of C. The ramus deepens very gradually from just below C to just below M_3, quite unlike that of Andrews' type of this species, and that of the specimen No. 13333, type of *G. gigas*. Although it is crushed, its outer side appears to be slightly bulged out, being, however, much less so than in Andrews' type and in the type of *G. gigas*. A large subtriangular fenestra is present on the inner side of the ramus, extending from below the anterior lobe of M_2 to back of M_3; the fenestra measures 43 mm. and ca. 40 mm. in horizontal and vertical diameters respectively; its upper limit lies 8 mm. below the upper border of the ramus at the posterior talon of M_3. The posteriorly situated anterior limit of the fenestra is also one of the distinctive features from that observed in Andrews' type and in the type specimen of *G. gigas*. This specimen may probably represent a female, while both Andrews' type and the type of *G. gigas* may belong to males. The mandible of this specimen, in comparison with Andrews' type, measures as follows (in mm.):

		A. M. 14466	Andrews
		Prob. ♀	Prob. ♂
I.	Length from tips of symphysis to upper border of the foramen behind M_3	185	....
II.	Ditto from the same to posterior side of M_3	172	162+e
III.	Ditto from anterior side of P_1 to upper border of the foramen behind M_3	118	....
IV.	Length of symphysis	57±	63
V.	Minimum width of symphysial region, behind I_2	22	....
VI.	Maximum depth of symphysial region, free of downward bulging of ramus	25	ca.30[1]
VII.	Depth of ramus at anterior lobe of P_1	30	ca.55[1]
VIII.	Ditto at anterior lobe of P_4	45	ca.68[1]
IX.	Ditto at anterior lobe of M_3	63	....
X.	Maximum depth of horizontal bar	70	72

[1]These measurements are estimated from Andrews' figures.

	Geniohyus mirus	*Megalohyrax niloticus*	*Saghatherium antiquum*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	Schlosser's Pl. II, figs. 1, 8	Schlosser's Pl. II, fig. 12	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Basilar length.....	283	350	....	91	83	103	96
II Zygomatic width.....	145	165	....	62	51	63	59
III. Percentage II/I.....	51	47	ca. 59	68	61	61	61

	Geniohyus mirus	*Megalohyrax niloticus*	*Megalohyrax pygmæus*	*Saghatherium antiquum*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	Schlosser's Pl. VII, figs. 1, 8	A. M. 14454	Schlosser's Pl. II, Fig. 12	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Basilar length	283	350	....	....	91	83	103	96
II. Length from tip of premaxilla to anterior side of orbit	183	....	97	....	36	31	43	38
III. Length of palate along median suture	198	....	109	....	52	47	57	54
IV. Length from tip of premaxilla to anterior side of alveolus of P^1	96	....	43	....	21	16	24	22
V. Percentage II/I	65	ca.52	....	ca. 47	40	37	42	40
VI. Percentage III/I	70	ca.56	....	....	57	54	55	56
VII. Percentage IV/I	34	ca.22	....	....	23	19	23	23
VIII. Percentage IV/III	48	ca.39	39	....	40	34	42	41

	Geniohyus mirus	*Megalohyrax pygmæus*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	A. M. 14454	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Length of skull from tip of nasal to median top of lambdoid crest	315	....	95	89	109	102
II. Length of nasals along median suture	145	90	27	24.5	33	28
III. Maximum length of nasals	148	90	29	27	35	29
IV. Maximum width of single nasal	29	23	13	11	13.5	12.5
V. Percentage II/I	46	....	28	28	30	27
VI. Percentage III/IV	510	391	223	245	259	232

	Geniohyus mirus	*Megalohyrax pygmæus*	*Saghatherium ?macrodon*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	A. M. 14454	A. M. 13325	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Length form anterior end of frontal median usture to median top of lambdoid crest	169	....	....	70	65	77	75
II. Length from nasofrontomaxillar junction to posterior side of orbit at postorbital process of frontoparietal	90	56	ca 52	25	24	28	27
III. Length from nasofrontomaxillar junction to anterior side of orbit	49	23	ca 20	4	4.5	5	5
IV. Maximum width of frontal region at postorbital processes	111	76	65	41	33.5	50	48
V. Interorbital width	72	45	ca 45	26.5	21	25	26
VI. Percentage II/I	53	....	....	36	37	36	36
VII. Percentage IV/I	66	....	....	59	52	65	64
VIII. Percentage III/II	54	41	ca 38	16	19	18	19
IX. Percentage IV/II	123	136	ca 125	164	140	179	178
X. Percentage V/II	80	80	ca 87	106	88	89	96

The skull of the specimen No. 14466 is very long, like that of *Megalohyrax niloticus* described by Schlosser, being distinctly longer in proportion to the maximum width across zygomatic arches than that of *Saghatherium* and of the modern hyracoids. The indices of width to length of this skull and of that of some other hyracoids are shown in table on p. 272 (measurements in mm.; ratios in percentage).

In this skull, the rostral portion is very long, as clearly seen in the table on p. 273 (measurements in mm.; ratios in percentage).

The anterior ends of the nasals are acutely pointed, roofing over the external nares, so that there is a distinct indentation of about 33 mm. in anteroposterior depth, between the nasal and premaxilla in lateral view. These characters are observed also in *Megalohyrax*. In the modern hyracoids, on the contrary, the anterior ends of the nasals are truncated, and the border of the external nares is nearly vertical, or only slightly concave, in lateral view. The nasofrontal suture of this skull, quite as well as that of *Megalohyrax*, is distinctly concave forward, while that of the modern hyracoids is almost linear from side to side. The nasals of this skull are exceedingly long, as shown in the table on p. 274 (measurements in mm.; ratios in percentage).

In this skull, the frontoparietal suture is hardly to be traced. The frontal region is wide and flattened, as a character of the hyracoids; the antorbital extent of the frontals is very great, a common character also of *Megalohyrax*, in contrast to the modern hyracoids. Several measurements and ratios of the frontal regions of some hyracoids are tabulated on p. 275 (measurements in mm.; ratios in percentage).

The upper surface of the nasofrontoparietal region free of the temporal fossæ is very rough, with irregular tubercles, grooves, and fine pits. The surfaces of the temporal fossæ are smooth. Sagittal crest well developed, very prominent, occupying about 60 mm. of the posterior portion of the median line of the upper surface of the skull.

The premaxillæ are bordered above by the nasopremaxillary sutures, and behind by the premaxillomaxillary sutures, quite as in the other hyracoids, and are especially long as compared with those of the modern hyracoids. As already stated, the anterior borders of the premaxilla are not linearly continuous with those of the nasals or nearly vertical, but run obliquely from forward below to backward above, so that the anterior ends of the nasopremaxillary sutures lie a considerable distance posterior to the anterior ends of both the nasals and premaxillæ; the nasopremaxillary suture is shorter than the length of the premaxilla along its lower border. These characters are common also to *Megalo-*

hyrax, in striking contrast to the modern hyracoids. Several measurements and ratios of the premaxillæ of this skull, as well as of the skulls of other hyracoids, are shown in the following table (measurements in mm., ratios in percentage):

	Geniohyus mirus	*Megalohyrax pygmæus*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	A. M. 14454	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Length of palate along median suture	198	109	52	47	57	54
II. Length of premaxilla along lower border	65	35	14.5	12	18	16
III. Length of nasopremaxillar suture	34	12	19	16	22.5	19
IV. Maximum height of premaxilla	38	ca.25	12.5	10.5	17	15.5
V. Length of premaxilla along median suture of palate	45	20	14	14	14.5	14.5
VI. Percentage II/I	33	32	28	26	32	30
VII. Percentage III/II	52	34	130	133	125	119
VIII. Percentage IV/II	58	ca.71	86	88	94	97
IX. Percentage V/I	23	18	27	30	25	27

In palatal view, the anterior palatal foramina, which lie between the premaxillæ and maxillæ, are distinct from each other, instead of being united, quite as in the other hyracoids. They measure about 15 mm. in length and about 5 mm. in width; their anterior ends lie about 22 mm. back of the anterior ends of the premaxillæ.

The maxillæ are bordered anteriorly by the premaxillomaxillary sutures and above by the nasomaxillary, frontomaxillary, maxillolacrymal and maxillojugal sutures, quite as in the other hyracoids; the nasomaxillary and frontomaxillary sutures, however, are especially long as compared with those of the modern hyracoids. The antorbital foramina are situated just above P^2 and far anterior to the orbits; the distance between the foramina and the orbits is very great as compared with the modern hyracoids. Several measurements and ratios of the maxillæ of this skull, in comparison with those of some other hyracoids, are tabulated as follows (measurements in mm., ratios in percentage):

		Geniohyus mirus	*Megalohyrax pygmæus*	*Procavia* (*modern*)		*Dendrohyrax* (*modern*)	
		A. M. 14466 Prob. ♀	A. M. 14454	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I.	Basal length	283	....	91	83	103	96
II.	Length of palate along median suture	198	109	52	47	57	54
III.	Length of maxilla along lower border	172	104	52	49	58	55
IV.	Length of nasomaxillar suture	68	45	8.5	7.5	11.5	10
V.	Length of frontomaxillar suture	29	12	1.5	1.5	4	4.5
VI.	Length of maxillolacrymal suture in front of orbit	ca 22	17	8	7.5	6	6.5
VII.	Maximum extent of maxillojugal suture	ca 46	52	34	33	27	29
VIII.	Distance between antorbital foramen and orbit	64	38	9	7.5	8	8
IX.	Distance between antorbital foramen and temporal vacuity	90	62	23	23	24	23
X.	Maximum height of maxilla	ca.40	32	22	20.5	24	25
XI.	Length of maxilla along median suture of palate	100	60	23	20.5	29.5	25
XII.	Percentage III/I	61	....	57	59	56	57
XIII.	Percentage III/II	87	95	100	104	102	102
XIV.	Percentage IV/III	40	43	16	15	20	18
XV.	Percentage V/III	17	12	3	3	7	8
XVI.	Percentage VI/III	ca 13	16	15	15	10	12
XVII.	Percentage VII/III	ca 27	50	56	67	47	53
XVIII.	Percentage VIII/III	37	37	17	15	14	15
XIX.	Percentage IX/III	52	60	44	47	41	42
XX.	Percentage X/III	ca.23	31	42	42	41	45
XXI.	Percentage XI/III	51	55	44	44	52	46

The lacrymals are better developed, larger, and longer than those of the modern hyracoids. The pars facialis of the lacrymal is longer than high, unlike that in *Megalohyrax* and the modern hyracoids; it is bordered forward and above by the frontolacrymal suture and below by the maxillolacrymal suture, being not in contact with the jugal. That of the skull of *Megalohyrax* at hand appears to be higher than long and in contact with the jugal. As to the variability of the relation between the lacrymal and jugal of the modern African hyracoids, I obtained the following result:

		Adult ♂	Adult ♀	Young
Procavia (modern)	Lacrymal in contact with jugal.....	1	9	4
	Lacrymal not in contact with jugal....	2	1	8
Dendrohyrax (modern)	Lacrymal in contact with jugal	0	0.5[1]	0
	Lacrymal not in contact with jugal....	18	12.5	3

In *Procavia*, the presence of the lacrymojugal contact seems to be more common in the adult. In *Dendrohyrax* the absence of the same is a quite usual condition in both the adult and the young. In the former genus the presence of the lacrymojugal contact appears to be a secondary condition embryologically.

Now, turning back to the lacrymal of the present skull, there is a distinct concavity of the pars facialis of the lacrymal, just in front of the lacrymal spine; the spine is very stout, very wide vertically at the base, and directs backward, recalling the lacrymal spine of *Dendrohyrax* but not of *Procavia*. The lacrymal foramen is internal, as in the other hyracoids, and lies just inside the base of the lacrymal spine. Several measurements and ratios of the lacrymals of some hyracoids are shown in the table on page 280 (measurements in mm., ratios in percentage):

The jugals extend from the anterior lower corners of the orbits to back of the glenoid fossæ, quite as in the other hyracoids; their length in proportion to the length of the skull is less than that in the modern hyracoids. The postorbital process of the jugal does not join with that of the frontoparietal, quite as in *Megalohyrax* and the modern *Procavia*, in contrast with the typical section of the modern *Dendrohyrax*. The jugal takes a small share in the formation of the glenoid fossa, a smaller share than in the modern hyracoids; the glenoid surface of the jugal is

[1]Half number indicates only one side of a skull.

		Geniohyus mirus	*Megalohyrax pygmæus*	*Procavia* (modern)		*Dendrohyrax* (modern)	
		A. M. 14466 Prob. ♀	A. M. 14454	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
	Lacrymojugal contact	absent	present	absent	present	absent	absent
I.	Basal length	283	....	91	83	103	96
II.	Distance from tip of lacrymal spine to tip of postorbital process of frontoparietal	36	28	17.5	17.5	21	18
III.	Maximum length of *pa s facialis* of lacrymal	28	15.5	6.5	6.5	4.5	4.5
IV.	Maximum height of the same	17	16	7.5	9	6	6.5
V.	Percentage III/I	10	....	7	8	4	5
VI.	Percentage III/II	78	55	37	37	21	25
VII.	Percentage IV/III	61	103	115	138	133	144

much longer than wide, as in *Megalohyrax* (Schlosser's Pl. VII, fig. 8), but not as in the modern hyracoids. The anterior end of the jugal lies very far back as compared with that of *Megalohyrax pygmæus* and especially of the modern hyracoids. It lies just above the posterior lobe of M^2 in this skull, just above the anterior lobe of M^2 in the skull of *Megalohyrax pygmæus* at hand, and above $P^{3\cdot4}$ in the modern hyracoids; again, it lies distinctly back of the middle of the skull in the present specimen, while a long distance anterior to the same in the modern hyracoids. Several measurements and ratios of the jugals of this skull, in comparison with those of the modern hyracoids, are tabulated as follows (measurements in mm., ratios in percentage):

	Geniohyus mirus	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Basal length	283	91	83	103	96
II. Length from the anterior end of premaxillary to that of jugal	175	33	29	43	37
III. Maximum length of jugal	91	51	49	51	49
IV. Maximum height of jugal at postorbital process	38	16	15	21	20
V. Minimum height of zygomatic arch just behind postorbital process	16	8.5	8	10	8.5
VI. Percentage II/I	62	36	35	42	39
VII. Percentage III/I	32	56	59	50	51
VIII. Percentage IV/III	42	31	31	41	41
IX. Percentage V/III	18	17	16	20	17

The orbits are situated far back as compared with those of the hitherto known skulls of hyracoids. The anterior side of the orbit of the present skull lies almost above the posteriormost part of M^2 and far back of the middle of the skull; that of *Megalohyrax* just above the middle of M^2 (No. 14454) to above the anterior lobe of M^3 (Schlosser's Pl. VII, figs. 1 and 8) and nearly at the middle of the skull (Schlosser, *loc. cit.*); that of *Saghatherium*, just above the middle of M^2 and a little

		Geniohyus mirus	*Megalohyrax niloticus*	*Megalohyrax pygmæus*	*Saghatherium antiquum*	*Procavia* (modern)		*Dendrohyrax* (modern)	
		A. M. 14466 Prob. ♀	Schlosser's Pl. VII, figs. 1, 8	A. M. 14454	Schlosser's Pl. II, fig. 12	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I.	Basal length	283	350	....	....	91	83	103	96
II.	Length from tip of premaxilla to anterior side of orbit below lacrymal spine	176	....	97	....	35	31	42	38
III.	Ditto from the same to posterior side of orbit at postorbital process of jugal	215	....	127	....	56	51	64	58
IV.	Maximum length of orbit	44	....	31	....	21	20	25	22
V.	Maximum height of orbit	24+e	....	20+e	....	18	16	19	18
VI.	Percentage II/I	62	ca.49	....	ca.48	38	37	41	40
VII.	Percentage III/I	76	ca.60	....	ca.66	62	61	62	60
VIII.	Percentage IV/I	16	ca.11	....	ca.19	23	24	24	23
IX.	Percentage IV/II	25	ca.21	35	ca.40	60	65	60	58
X.	Percentage V/IV	55+e	....	65+e	ca.68	86	80	76	82

		Geniohyus mirus	*Procavia* (modern)		*Dendrohyrax* (modern)	
		A. M. 14466 Prob. ♀	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I.	Basal length	283	91	83	103	96
II.	Maximum oblique length of body of squamosal	89	35	34	38	38
III.	Ditto of squamosal from anterior end of zygomatic process backward	85	40	36	38	38
IV.	Maximum lateral extension of two squamosals at zygomatic processes	125	58.5	50	61.5	56
V.	Ditto of two glenoid fossæ	108	56.5	49	54	56
VI.	Ditto of glenoid surfaces of two squamosals	98	45.5	40	47	45.5
VII.	Distance between two glenoid fossæ	45	29	....	21.5	21
VIII.	Distance between two parietosquamosal sutures	22	10	10	19	17
IX.	Distance between two squamoso-alisphenoid sutures	41.5	17.5	18	18.5	19
X.	Height from highest point of squamosal to tip of post-tympanic process	60-e	30	29.5	29.5	29
XI.	Percentage II/I	31	38	41	37	40
XII.	Percentage III/I	30	44	43	37	40
XIII.	Percentage IV/I	44	64	60	60	58
XIV.	Percentage V/I	38	62	59	52	58
XV.	Percentage VI/I	35	50	48	46	47
XVI.	Percentage III/II	96	114	106	100	100
XVII.	Percentage IV/II	140	167	147	162	147
XVIII.	Percentage V/II	121	160	144	142	147
XIX.	Percentage VI/II	110	130	118	124	120
XX.	Percentage VII/II	51	83	....	57	55
XXI.	Percentage VIII/II	22	29	29	50	45
XXII.	Percentage IX/II	47	50	53	49	50
XXIII.	Percentage X/II	67	86	87	78	76

anterior to the middle of the skull (Schlosser's Pl. II, fig. 12); that of the modern hyracoids above P^{3-4} and very far anterior to the middle of the skull. Again, the orbits of the present skull are very small in proportion to the length of the skull as compared with those of the modern hyracoids. Several measurements and ratios of the orbits of some hyracoids are shown in the table on page 282 (measurements in mm., ratios in percentage):

The squamosals are very short in proportion to the length of the skull, as compared with those of the modern hyracoids. In lateral view they are bordered above by the parietosquamosal and supra-occipito-squamosal sutures, nearly as in the modern hyracoids, though the supra-occipito-squamosal suture of the modern hyracoids corresponds rather to the posterior border of the squamosal. The zygomatic process of the squamosal is partly overlapped by the posterior part of the jugal and partly rests upon the latter in lateral view, quite as in the other hyracoids; it does not stretch very far forward, also quite as in the other hyracoids. The region of the glenoid fossa of the squamosal projects forward very conspicuously, the anterior border of that region being very convex anteriorly and is distinctly longer than wide, quite unlike that observed in *Megalohyrax* (Schlosser's Pl. VII, fig. 8) and the modern hyracoids. The postglenoid and post-tympanic processes of the squamosal are conspicuous, projecting far below the tympanicum, their tips coming nearly in contact with each other, rather unlike the condition observed in the modern hyracoids. The highest point of the squamosal lies about 16 mm. below the level of the sagittal crest, while that in the modern hyracoids lies on or near the level of the top of the parietal region. Several measurements and ratios of the squamosals of the present skull, in comparison with those of the modern hyracoids, are tabulated on page 283 (measurements in mm., ratios in percentage).

The temporal fossæ of both sides join with each other along the median line of the parietal region, so as to form there a prominent sagittal crest, quite as in *Saghatherium* (No. 13325; Andrews' Pl. VII, fig. 5; Schlosser's Pl. II, fig. 12) and *Titanohyrax?* (Andrews' text figure 39), but not as in the modern hyracoids, of which in *Procavia* the two fossæ are either slightly or hardly in contact with each other, and in *Dendrohyrax* the same are widely separated from each other. As the occiput of the present skull is inclined backward and the region of the lambdoid crest is strongly projected backward, the posterior ends of the temporal fossæ lie far back of the occipital condyles, not as in the modern hyracoids; *Megalohyrax* (Schlosser's Pl. VII, figs. 1 and 8), *Saghatherium*

		Geniohyus mirus	*Procavia* (modern)		*Dendrohyrax* (modern)	
		A. M. 14466 Prov. ♀	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I.	Length of skull from tip of nasal to median top of lambdoid crest	315	95	89	109	102
II.	Basal length	283	91	83	103	96
III.	Maximum oblique length of temporal fossa from posterior side of postorbital process of jugal to posterior side of fossa	117	46.5	45	43	43
IV.	Maximum oblique transverse diameter of fossa	60	26	22	25.5	23
V.	Maximum lateral extension of two temporal vacuities and fossæ seen from above	127	59	49	62	57
VI.	Maximum length of temporal vacuities seen from below	43	22	20	23	23
VII.	Maximum width of the same	44	20	16	18	17.5
VIII.	Maximum lateral extension of two fossæ seen from below	126	57	48	55	53
IX.	Percentage III/I	37	49	51	39	42
X.	Percentage IV/III	51	56	45	59	53
XI.	Percentage V/II	45	65	59	60	59
XII.	Percentage VI/II	15	24	24	22	24
XIII.	Percentage VII/VI	102	91	80	78	76
XIV.	Percentage VIII/II	45	63	58	53	55

	Geniohyus mirus	*Titanohyrax ?*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	Andrews' text-fig. 39	A. M. 669 ♂	A. M. 953 ♀	A M. 1567 ♂	A. M. 239 ♀
I. Maximum width of occiput	78	....	35	34.5	44.5	40.5
II. Maximum width of supra-occipital	44	....	23.5	24.	31.5	30
III. Minimum distance between two squamoso-occipital sutures on occiput	30.5	....	20	20	21	21
IV. Maximum width of two exoccipitals at paroccipital processes	65.5	....	29.5	30	34.5	34.5
V. Maximum lateral extension of two occipital condyles	37	49	20.5	20.5	23	22
VI. Width of foramen magnum	16	....	12	12.5	13.5	13
VII. Height of the same	20	....	10.5	11.5	12	12
VIII. Height of occiput, including foramen magnum	66	....	30	27	27	25.5
IX. Ditto, above foramen magnum	46	....	20	17.5	16	14.5
X. Percentage II/I	56	ca.51	67	70	71	74
XI. Percentage III/I	39	ca.44	57	58	47	52
XII. Percentage IV/I	84	ca.94	84	87	78	85
XIII. Percentage V/I	47	ca.52	59	59	52	54
XIV. Percentage VI/I	21	ca.22	34	36	30	32
XV. Percentage VII/I	26	ca.24	30	33	27	30
XVI. Percentage VIII/I	85	ca.68	86	78	61	63
XVII. Percentage IX/I	59	ca.43	57	51	36	36
XVIII. Percentage VII/VI	125	ca.113	88	92	89	92
XIX. Percentage VII/VIII	30	ca.36	35	43	44	47
XX. Percentage IX/VIII	70	ca.64	67	65	59	57

(Schlosser, *loc. cit.*), and *Titanohyrax?* (Andrews, *loc. cit.*) appear to stand rather between the present form and the modern hyracoids in the structure of the part just mentioned. In lower view the temporal vacuities of the present skull are rather heart-shaped, with the indented upper side directed backward, which corresponds to the anteriorly projected anterior border of the glenoid region of the squamosal; in *Megalohyrax* (Schlosser, *loc. cit.*) and in the modern hyracoids, the vacuities seen from below are rather triangular, with rounded angles. The anterior sides of the vacuities of the present skull seen from below lie some distance back of M^3, as well as of the posterior end of the median suture of the palate; those of *Megalohyrax* (Schlosser, *loc. cit.*) lie some distance back of M^3 and near the frontal plane which passes through the posterior end of the median suture of the palate; those of *Saghatherium* (Schlosser, *loc. cit.*) lie anterior to both the posterior side of M^3 and the posterior end of the median suture of the palate; and those of the modern hyracoids lie anterior to both the posterior sides of M^2 and the posterior end of the median suture of the palate. The temporal vacuities and fossæ of the present skull are very short in proportion to the length of the skull, as compared with those of the modern hyracoids. Several measurements and ratios of the temporal vacuities and fossæ of this skull, in comparison with those of the modern hyracoids, are tabulated on page 285 (measurements in mm., ratios in percentage):

The occiput, and especially its upper part, is inclined backward and is trefoil-shaped in outline seen from behind, the upper part of the supraoccipital, in posterior as well as upper view, being shaped like an upper half of a heart-shaped figure, quite unlike the occiputs of *Titanohyrax?* (Andrews' text figure 39) and of the modern hyracoids. The heart-shaped part of the supraoccipital is very concave from side to side as well as from above to below. The parts of the squamosals, which take a share of the formation of the occiput, are very narrow and high, being much more so than those of the modern hyracoids. Several measurements and ratios of the occiput of the present skull, in comparison with those of some other hyracoids, are tabulated on page 286 (measurements in mm., ratios in percentage):

The basioccipital in lower view is narrow and very convex from side to side, being much more convex than that of the modern hyracoids, and does not so markedly taper anteriorly as in the modern hyracoids, quite as stated in *Megalohyrax* by Schlosser. Corresponding to the convexity of the lower surface of the basioccipital, the upper surface of the same, which forms a part of the bottom of the braincase, is markedly

concave, being much more distinctly so than in the modern hyracoids. The condylar foramen is distinct from the foramen lacerum posterius, as in the other hyracoids. In the modern *Procavia* there is a prominent, sharp, blade-like median keel on the lower surface of the basioccipital, while in the modern *Dendrohyrax* the corresponding keel is very feeble and blunt; in the present skull the corresponding keel is present and is almost like that of *Dendrohyrax;* that of the skull of *Megalohyrax* illustrated in Schlosser's Pl. VII, figs. 1 and 8, appears to be similar to that of the present skull and *Dendrohyrax*. Several measurements and ratios of the basioccipital of this skull, in comparison with those of some other hyracoids, are shown in the table on page 289 (measurements in mm., ratios in percentage):

The basisphenoid is short, wide, and flat, being much more so than that of the modern hyracoid, and does not taper anteriorly at all. In the last-mentioned character the skull of *Megalohyrax* illustrated in Schlosser's Pl. VII, figs. 1 and 8, appears to stand between the present skull and the modern hyracoids. Among the modern hyracoids the basisphenoid of *Dendrohyrax* is less convex ventrally from side to side and tapers anteriorly less markedly than that of *Procavia*. Several measurements and ratios of the basisphenoids of the present skull and some other hyracoids are tabulated as follows (measurements in mm., ratios in percentage):

	Geniohyus mirus	*Megalohyrax niloticus*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	Schlosser's Pl. VII, Figs. 1, 8	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Basal length	283	350	91	83	103	96
II. Length of basisphenoid along median line	30	....	15	15.5	18.2	17
III. Width of the same at basisphenoido-occipital suture	20	....	8.5	7.3	7.7	7
IV. Percentage II/I	11	ca.10	16	19	18	18
V. Percentage III/II	67	ca.89	57	47	42	41

Both the posterior alisphenoid canal and foramen ovale on the alisphenoid are distinct from the more posteriorly situated foramina, as in the other hyracoids.

	Geniohyus mirus	*Megalohyrax niloticus*	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	Schlosser's Pl. VII, figs. 1, 8	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Basal length	283	350	91	83	103	96
II. Length of basioccipital along median line	33	....	18	15.5	17.8	19
III. Minimum width of the same	17	....	8	7.4	7.7	7
IV. Distance between two foramina lacera posteria	28	....	16	14	16	16.5
V. Ditto between two condylar foramina	19	....	12.5	13	12	13
VI. Ditto between two occipital condyles on lower surface of skull	7	....	5.5	7.4	4.7	5
VII. Percentage II/I	12	ca.19	20	19	17	20
VIII. Percentage III/II	52	ca.51	44	48	43	37
IX. Percentage IV/II	85	ca.74	89	90	90	87
X. Percentage V/II	58	....	69	84	67	68
XI. Percentage VI/II	21	ca.31	31	50	26	26
XII. Percentage IV/III	165	ca.145	200	189	208	236
XIII. Percentage V/III	112	....	156	176	156	186
XIV. Percentage VI/III	41	ca.61	69	100	61	71

		Geniohyus mirus	*Megalohyrax niloticus*	*Megalohyrax pygmæus*	*Saghatherium antiquum*	*Procavia* (modern)		*Dendrohyrax* (modern)	
		A. M. 14466 Prob. ♀	Schlosser's Pl. VII, figs. 1, 8	A. M. 14454	Schlosser's Pl. II, fig. 12	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I.	Length of palate along median suture	198	....	109	....	52	47	57	54
II.	Distance between two alveoli of I^1	2× 8 = 16	....	10	....	2.5	3.7	5.7	6.3
III.	Ditto between two I^3	2×10.5 = 21	....	15	....	....	....	....	....
IV.	Ditto between two P^1	2×17 = 34	....	2×11.5 = 23	....	14	11.3	17.5	17
V.	Ditto between two P^4	2×23 = 46	....	2×13.5 = 27	....	17	15	19	19
VI.	Ditto between two M^1	2×24 = 48	....	2×14.5 = 29	....	16.5	16	21	20.3
VII.	Ditto between two M^3	2×23 = 46	....	2×13 = 26	....	14	15	17.5	18.5
VIII.	Percentage II/I	8	ca. 9	9	....	5	8	10	12
IX.	Percentage III/I	11	ca.12	14	18e	....	....	....	....
X.	Percentage IV/I	17	ca.15	21	21e	27	24	31	31
XI.	Percentage V/I	23	ca.22	25	29e	33	32	33	35
XII.	Percentage VI/I	24	ca.26	27	29e	32	34	37	38
XIII.	Percentage VII/I	23	ca.29	24	32e	27	32	31	34

The palatines are long and narrow, as the palate itself is, though they are not especially long in proportion to the length of the skull and the palate, as compared with those of the modern hyracoids. The median suture of the palatines extends from a point lying just a little anterior to the frontal plane, which is tangential to the posterior sides of the two P^4, nearly to that lying on the plane which is tangential to the posterior sides of the two M^3. In the modern hyracoids the median suture of the palatines extends from a frontal plane which cuts some parts of P^4 or M^1 to that which cuts anterior lobes of M^3. In the skull of *Megalohyrax*, illustrated in Schlosser's Pl. VII, figs. 1 and 8, the posterior end of the median suture of the palatines is shown to lie some distance back of M^3. Several measurements and ratios of the palatines of the present skull and of the modern hyracoids are tabulated as follows (measurements in mm., ratios in percentage):

	Geniohyus mirus	*Procavia* (modern)		*Dendrohyrax* (modern)	
	A. M. 14466 Prob. ♀	A. M. 669 ♂	A. M. 953 ♀	A. M. 1567 ♂	A. M. 239 ♀
I. Basal Length	283	91	83	103	96
II. Length of palate along median suture	198	52	47	57	54
III. Ditto of palatine along the same	55	16.3	14.5	14	17.4
IV. Width of two palatines across or tangential to posterior sides of posterior palatine foramina	.2×18.5=37	13.2	13	15	15.4
V. Percentage III/I	19	18	17	14	18
VI. Percentage III/II	28	31	31	25	32
VII. Percentage IV/II	19	25	28	26	29
VIII. Percentage IV/III	67	81	90	107	89

The palate as a whole is very long, as already stated, and is very narrow in proportion to its width, as compared with those of the modern hyracoids. Several measurements and ratios of the palates of some hyracoids are shown in the table on page 290 (measurements in mm., ratios in percentage):

The teeth of this specimen, in comparison with those of Andrews' specimens, measure as follows (in mm.):

	Lower Dentition			Upper Dentition		
	A. M. 14466 right	A. M. 14466 left	Andrews[1]	A. M. 14466 right	A. M. 14466 left	Andrews
	Prob. ♀		Prob. ♂	Prob. ♀		
I1 Anteroposterior diameter	7.5(alv.)	8(alv.)	. . .	12	12	. .
I1 Transverse diameter	5(ditto)	4.5(ditto)	....	9	9	....
I1 Height from border of jaw	....	....	....	25	17+e	....
Diastema between I^1 and I^2	0	0	....	14	13	....
I2 Anteroposterior diameter	10	10.5	....	8.5	8(root)	....
I2 Transverse diameter	7	7	....	5.8	....	....
I2 Height from border of jaw	12	....	....	....	....	....
Diastema between I2 and I3	20	18	....	12	13	....
I3 Length	7(alv.)	8(alv.)	....	9	9.4	....
I3 Width	....	....	....	6.4	6.1	....
Diastema between I3 and C	15	....	14	26	24	....
C Length	9	...	....	13	13(root)	....
C Width	5	....	....	7.8	....	....
Diastema between C and P_1	6.5	....	10	0	0	....
P1 Length	11.3	....	12	11.3	12	....
P1 Width	6.3	....	7.5	10	9.3	...
P2 Length	11.4	....	12	11.2	11	....
P2 Width	7.8	....	8.5	11.5	12	....
P3 Length	11.4	....	13	12	12.3	....
P3 Width	9	....	10	13.8	13.6	....
P4 Length	13	....	14	12	12.5	....
P4 Width	11.5	....	11.5	15.5	15.8	....
M1 Length	14.7	....	15	16	16	....
M1 Width	12.3	....	12	17.2	17.3	....
M2 Length	17.2	....	16.5	18.8	19	19
M2 Width	14	....	14	19.5	19.7	19
M3 Length	26	....	....	20	19	....
M3 Width	15.5	....	16	21.8	21.4	....
Length of P1-4	48	....	50	47.3	48.5	....
Length of M1-3	58	....	56±	52.5	53.5	....

[1]The measurements of this specimen of Andrews' cited here were taken by myself.

Geniohyus micrognathus Schlosser

Geniohyus mirus Andrews, 1907, Geol. Mag., N. S., Decade 5, IV, p. 98, text figure 1.
Geniohyus minutus Schlosser, 1910, Zoöl. Anz., XXXV, p. 503 (nomen nudum).
Geniohyus micrognathus Schlosser, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 123, Pl. x (II), figs. 1 and 2.

Specimens:—No. 13348, large fragment of left mandibular ramus, bearing C-M_3 *in situ*, and with alveoli of I_{1-3}, Amer. Mus. Exp. 1907, west of Quarry A. No. 14462, small fragment of right mandibular ramus, bearing P_{1-4} *in situ*, Amer. Mus. Exp. 1908, fluvio-marine formation.

The mandible of the specimen No. 13348 is very small, notwithstanding it represents an adult individual, though not very aged. It does not bulge outward as well as downward, so that it is very shallow for a mandible of this genus. The symphysis is very short; all the diastemata between I_2 and I_3, between I_3 and C, and between C and P_1 are very short; I_2 and I_3 appear especially to be rather close-set. All these characters are distinct from those observed in the mandible of the immediately preceding species, notwithstanding the fact that the posterior premolars and molars are similar in size to those of the same. A part of the border of the large fenestra on the inner side of the ramus is present in this fragmentary specimen; the fenestra appears to have extended as far anteriorly as the posterior lobe of M_2; its upper limit lies about 16 mm. below the border of the jaw, as well as the base of the crown of M_3. This mandible, in comparison with that of Schlosser's type, measures as follows (in mm.):

		A. M. 13348	Schlosser
		Prob. ♀	Prob. ♀
I.	Length from tip of symphysis to upper border of the foramen behind M_3	145e	....
II.	Ditto from the same to posterior side of M_3	138e.	....
III.	Ditto from anterior side of P_1 to upper border of the foramen behind M_3	114	....
IV.	Length of symphysis	28e	....
V.	Minimum width of symphysial region behind I_3	2×13.5=27	....
VI.	Maximum depth of symphysial region	25	....
VII.	Depth of ramus at anterior side of P_1	25	....
VIII.	Ditto at anterior side of P_4	28	19
IX.	Ditto at posterior side of M_1	32	....
X.	Ditto just behind M_3	.....	40

Judging from the alveolus of the lower tusk, the lower tusk itself night be much smaller than that of the foregoing species. The lower canine is also characteristically very small, with very slender root, as compared with that of the foregoing species. In P_{1-3} the posterior lobe is distinctly wider than the main lobe, so that these premolars look rather like those of *Bunohyrax*. In $P_{3,4}$ the main cusp is divided into two secondary cusps, also a common character with *Bunohyrax*. Yet the contrasts in size between I_2 and I_3, and between I_3 and C or the anterior lower premolars, are not so great as in the genuine *Bunohyrax;* the mandibular ramus is not straight but characteristically curved, and the fenestra on the inner side of the ramus is present, all these characters being characteristics of *Geniohyus* in contrast to *Bunohyrax*. The anterior, external, and posterior basal cingula of M_{1-3} are very well developed, being much stronger than those of the preceding species.

Andrews' specimen referred to *G. mirus* by him and described and figured in 1907 (Geol. Mag., N. S., Decade 5, IV, p. 98, Fig. 1) is similar in the shape of the mandibular ramus to his type specimen of *G. mirus*. The former, however, is much smaller than the latter, notwithstanding the former is very old and the latter rather young. These two mandibular rami measure in the distance between the upper border of ramus and the upper border of the large fenestra-like fossa as follows (in mm.):

	Andrews' specimen 1907	Type specimen of *G. mirus*
	Prob. ♂; aged	Prob. ♂; rather young
At anterior side of P_4.....	22±	28
At the same of M_1.....	21±	26
At the same of M_2.....	19	25
At the same of M_3.....	17	24

Besides, the teeth of the former are smaller than the corresponding ones of the latter. Judging from these facts, the former may probably belong to a smaller species than *G. mirus;* then it may probably belong to *G. micrognathus*. The similarity in the shape of the mandibular ramus of the present genus is, in my opinion, not a specific, but probably a sexual character.

The teeth of the specimens at hand, in comparison with those of Andrews' and Schlosser's, are tabulated to measure as follows (in mm.):

	Lower Dentition				Upper Dentition
	A. M. 13348 Prob. ♀	A. M. 14462	Andrews[1] Prob. ♂	Schlosser Prob. ♀	Schlosser
I_1, anteroposterior diameter	6±(alv.)	....	....	....	....
I_2, anteroposterior diameter	7±(alv.)	....	....	....	....
Diastema between I_2 and I_3	6±	....	....	....	....
I_3 length	6±(alv.)	....	....	....	....
Diastema between I_3 and C	9	....	....	....	....
C Length	8	....	....	6	....
C Width	4	....	....	4	....
Diastema between C and P_1	6	6	....	5	....
P_1 Length	10.3	10	....	10	....
P_1 Width	6	5.3	....	6	....
P_2 Length	11.6	10.5	....	11.3	....
P_2 Width	7.7	6.7	....	7	....
P_3 Length	12.6	12	....	....	....
P_3 Width	9.7e	8.8	....	....	....
P_4 Length	13.7	13	12	12.5	....
P_4 Width	11.9e	10.7	10.5	9	....
M_1 Length	16	....	14	15	....
M_1 Width	14e	....	11.5	12	....
M_2 Length	17.4	....	16.5	17.3	....
M_2 Width	15e	....	13.5	14	....
M3 Length	26.5	....	23.5	25	20
M3 Width	16e	....	15	14	22
Length of P_{1-4}	47	45	....	47	....
Length of M_{1-3}	59.5	....	53	58.5	....

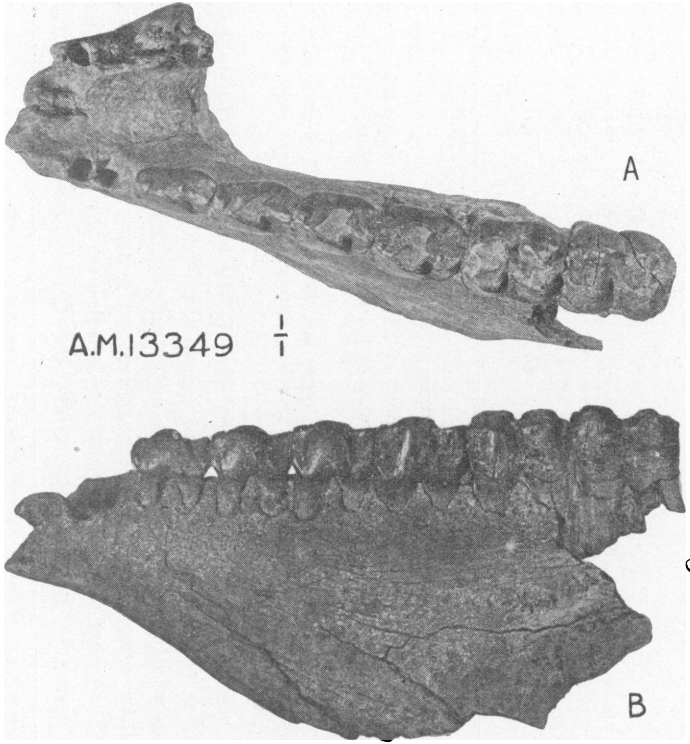
Geniohyus diphycus, new species.

TYPE SPECIMEN:—No. 13349, fragment of left mandibular ramus and symphysis, bearing P_1-M_2 *in situ*, and with alveoli of I_{1-3} and C, Amer. Mus. Exp. 1907, west of Quarry A.

PARATYPE:—No. 14456; fragment of upper jaw, bearing P^2-M^3 of right side *in situ*, the last molar remaining still in its alveolus; Amer. Mus. Exp. 1908, fluvio-marine formation.

The symphysis of the specimen No. 13349 appears to be rather short, and is very deep. From just below C backward, the ramus increases its width very rapidly; its outer side bulges out only slightly; it should be noted here that this specimen represents a half-grown individual. A part of the border of the fenestra on the inner side of the ramus is preserved in this fragmentary specimen, lying about 17 mm.

[1]These measurements of this specimen of Andrews' were taken by myself.



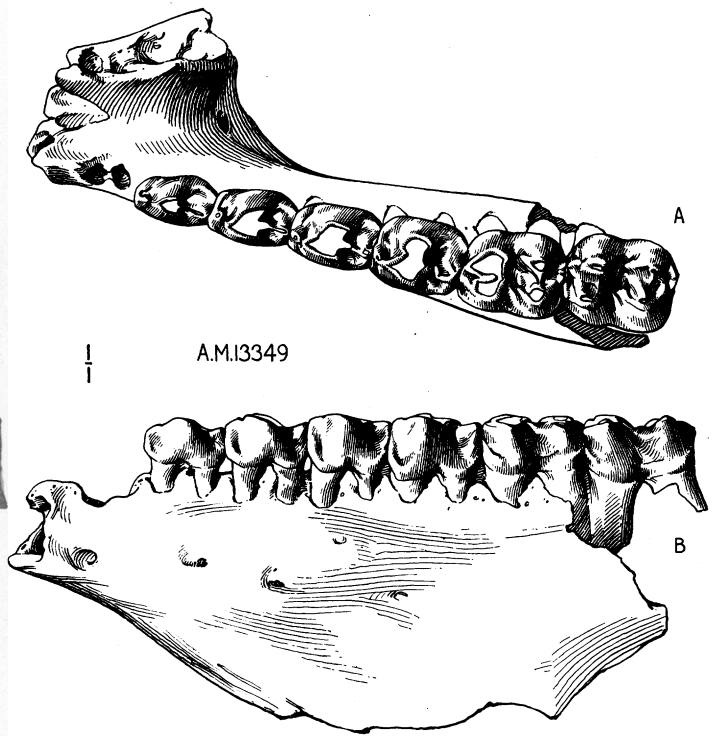


Fig. 9. *Geniohyus diphycus.* Type, fragment of left mandibular ramus and symphysis, Amer. Mus. No. 13349. Natural size. A, superior view; B, external view.

Fig. 10. *Geniohyus diphycus.* Type, fragment of left mandibular ramus and symphysis, Amer. Mus. No. 13349. Natural size. A, superior view; B, external view.

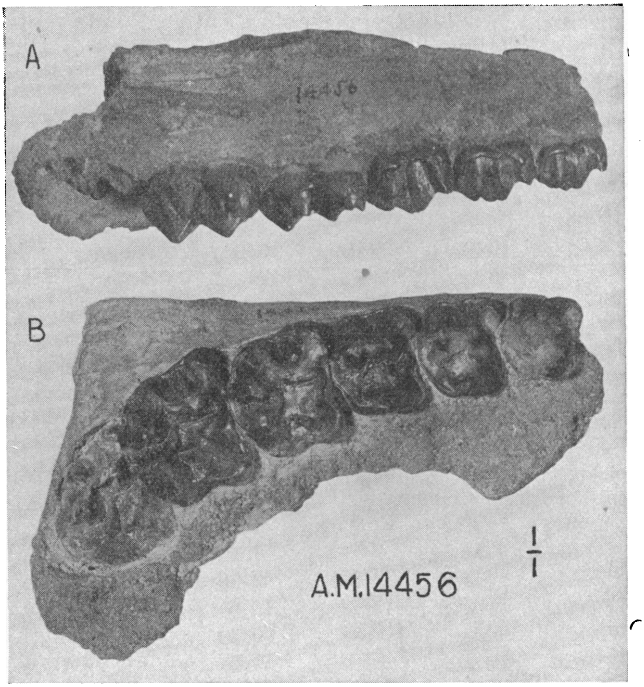


Fig. 11. *Geniohyus diphycus.* Paratype, fragment of upper jaw containing P^2-M^3, Amer. Mus. No. 14456. Natural size.
A, external view; B, inferior view.

below the border of the jaw at M_1. Judging from the alveoli, I_2 and I_3 appear to be set very close together; the diastema between I_3 and C is very short; and C and P_1 might doubtless be in contact with each other, as the mark of compression on the anterior side of the crown of P_1 indicates clearly. In the last-mentioned character this specimen is unique among known mandibles of this genus. This mandible measures as follows (in mm.):

		A. M. 13349◇
		Prob. ♂; half-grown
I.	Length from tip of symphysis to posterior side of M_2	90e
II.	Ditto from the same to posterior side of P_4	63e
III.	Length of symphysis	30e
IV.	Width of symphysis just in front of C	18
V.	Depth of symphysial region at anterior side of C	12.5
VI.	Ditto at posterior end of symphysis and anterior side of P_2	27
VII.	Depth of ramus at anterior side of P_4	33+e

The specimen No. 14456 represents a rather young individual, M_3 being about to erupt. The orbit lies just above M^2; it should be noted here that the anterior situation of the orbit is due to a certain extent to the youth of the animal.

The cheek-teeth of both the upper and lower jaws are rather smooth, quite unlike those of the larger species of this genus. The basal cingula of the lower cheek-teeth are very feeble.

The teeth of the two specimens at hand measure as follows (in mm.):

	Lower dentition	Upper dentition
	A. M. 14349◇ Prob. ♂	A. M. 14456 M^3 embryonic
I_2 Anteroposterior diameter	6.5± (alv.)	....
I_3 Length	4± (alv.)	....
Diastema between I_3 and C	5	....
C, length	9 (alv.)	....
P_1 Length	10.6	....
P_1 Width	6.3	....
P2 Length	10.5	10
P2 Width	7	10.3
P3 Length	11	11
P3 Width	8	12.3
P4 Length	11.7	11.3
P4 Width	9.3	13.5
M1 Length	13	13.5
M1 Width	11	15.5
M2 Length	14.4	15.3
M2 Width	11.6	17.7
M3 Length	....	16
M3 Width	....	17
Length of P_{1-4}	43.5	....
Length of M^{1-3}	....	43

Geniohyus magnus (Andrews)

Saghatherium antiquum Andrews, 1903, Geol. Mag., N. S., Decade 4, X, p. 340 (non Andrews and Beadnell, 1902), Fig. 2.

Saghatherium magnum Andrews, 1904, Geol. Mag., N. S., Decade 5, I, p. 214; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 89 (*pars*), Pl. vi, fig. 3 (non Fig. 4). Schlosser, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 110 and 113 (*pars*).

Saghatherium majus Schlosser, *loc. cit.*, pp. 110 and 114 (*pars*).

SPECIMEN:—No. 13278, fragment of upper jaw, bearing P^2-M^3 *in situ*, besides alveoli of C and P^1 of right side, the last molar being embryonic and not yet erupted, Amer. Mus. Exp. 1907, Quarry A.

Andrews' type of *Saghatherium magnum* is a fragment of an upper jaw bearing I^1, C-M^3 of right side *in situ*, though several specimens of mandibles were subsequently referred to this species by Andrews himself. In my opinion Andrews' type of this species does not belong to *Saghatherium* but represents a small form of *Geniohyus*, while some of the mandibles referred to this species by Andrews belong really to *Saghatherium*. Schlosser preserved the specific name "*magnum*" for the form represented by the mandibles of Andrews' material, but it is, of course, against the law of nomenclature.

		Upper dentition		
	A. M. 13278 M^3 embryonic	Andrews[1] Right	Andrews[1] Left	Schlosser
I^1 Anteroposterior diameter.	....	8	....	....
I^1 Transverse diameter.....	....	7	....	....
Diastema between I^1 and I^2...	....	7	....	....
Ditto between I^2 and I^3.....	....	3	.. .	....
Ditto between I^3 and C.....	....	0	0	....
C Length.....	....	7	7	....
C Width.....	....	5.5	5	....
P^1 Length.....	7.3(alv.)	7.5	8	....
P^1 Width.....	....	7.5	7.5	....
P^2 Length.....	8	8	8	....
P^2 Width.....	8	9.5	9.5	....
P^3 Length.....	8.4	9	8.5	....
P^3 Width.....	10	11	....	....
P^4 Length.....	9	9	9.5	....
P^4 Width.....	11	13	12	....
M^1 Length.....	11	10	....	11
M^1 Width.....	11.3	12.5	....	11.5
M^2 Length.....	12.5	13	....	12.5
M^2 Width.....	13.2	14.5	15	13.5
M^3 Length.....	14±	16	....	13
M^3 Width.....	14±	15.5	....	13.5
Length of P^{1-4}.....	31±	33	33	33?
Length of M^{1-3}.....	36±	39	....	34

[1]These measurements of the type specimen of Andrews' were taken by myself.

In the specimen of the upper jaw at hand, the antorbital foramen lies at about the boundary between P^2 and P^3, and the orbit lies above the posterior lobe of M^1 and M^2; it should be noted here that this specimen represents a young individual. The palate measures $2\times8=16$ mm. and $2\times11=22$ mm. in the distances between the two P^1 and between the two P^4, respectively.

The general structure of the upper cheek-teeth of the present specimen, as well as of Andrews' type, is almost exactly like that of *G. mirus* and *G. pygmæus;* consequently I refer the present species to *Geniohyus* without any hesitation. There is no need to explain that it is quite different from that of the genuine *Saghatherium.*

The teeth of the specimen at hand, as well as of Andrews' and Schlosser's, measure as shown in table on page 299 (in mm.).

Bunohyrax Schlosser

Schlosser, 1910, Zoöl. Anz., XXXV, p. 502; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 98 and 118.

Diagnosis, as shown in the key.

Genotype:—*Geniohyus fajumensis* Andrews, 1904. Schlosser made no statement as to the genotype; but it is obvious that he laid much weight as to the generic characters upon the best-known species, *Geniohyus fajumensis* Andrews. I propose here to treat the said species as the type of this genus.

This genus includes *Geniohyus major* Andrews, 1904, and *Bunohyrax affinis*, new species, besides the genotype just stated.

Synopsis of Species of *Bunohyrax*

(1) Extremely large species; united length of P_{1-3} measuring 55 mm. (Andrews' type), whereas the same of the next species measures 38.5–42.5 mm.; that of $M_{1, 2}$, 49 mm. (No. 13339), whereas the same teeth of the next species measure 38–40 mm.; that of upper $M^{1, 2}$, about 50 mm. (=24+27) (Schlosser), whereas the same teeth of the next species measure about 40 mm. (Schlosser's figure)..... *major.*

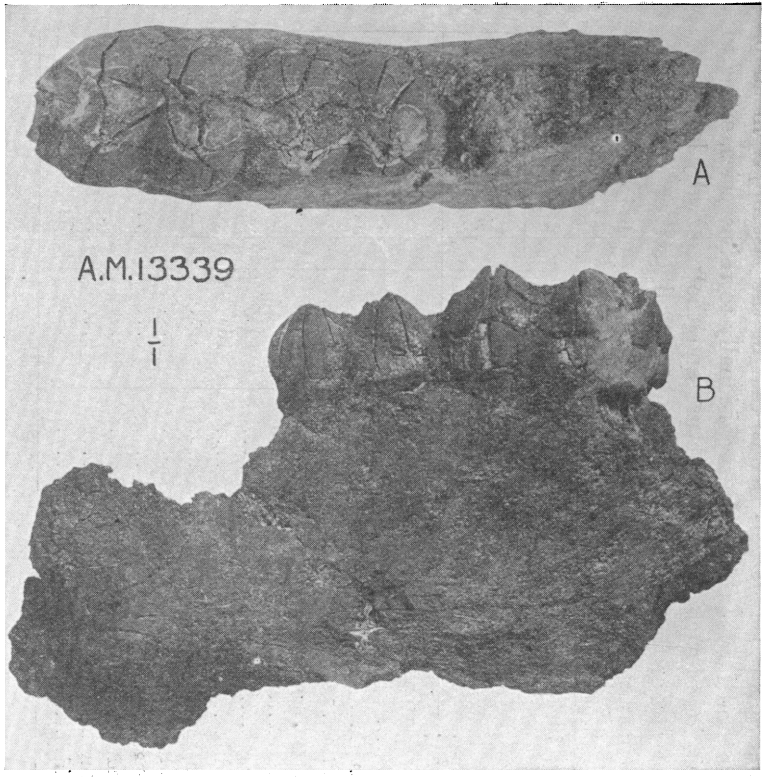
(2) Rather large species, united length of P_{1-4} measuring 53 mm. (No. 13347)–62 mm. (Schlosser); that of M_{1-3}, 66 mm. (Schlosser)—70 mm. (No. 13347); that of P^{1-4}, 52 mm. (Schlosser); that of M^{1-3}, 66 mm. (Schlosser)..... *fajumensis.*

(3) Small species, united length of P_{1-3}, measuring 35 mm. (No. 14461), whereas the same of the immediately preceding species measures 38.5–42 mm.; that of M_{1-3}, 59,5 mm. (Type: No. 13335)..... *affinis.*

Bunohyrax major (Andrews)

Geniohyus major Andrews, 1904, Geol. Mag., N. S., Decade 5, I, p. 212; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 196, text figure 63.

Bunohyrax major Schlosser, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 121.



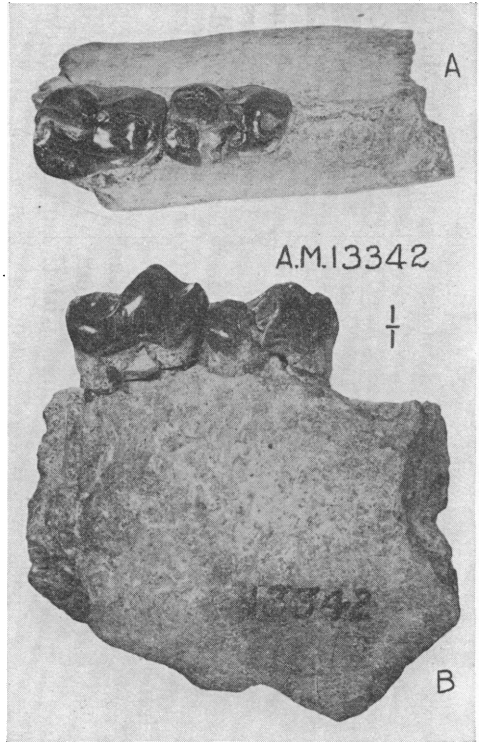


Fig. 12. *Bunohyrax major*. Fragment of right mandibular ramus containing M_1 and M_2, Amer. Mus. No. 13339. Natural size.
A, superior view; B, external view.

Fig. 13. *Bunohyrax major*. Fragment of left mandibular ramus containing P_1 and P_2, Amer. Mus. No. 13342. Natural size.
A, superior view; B, internal view.

SPECIMENS:—No. 13339, small fragment of mandibular ramus, bearing $M_{1,2}$ of right side *in situ*, Amer. Mus. Exp. 1907, Quarry B; No. 13342, small fragment of mandibular ramus, bearing $P_{1,2}$ of left side *in situ*, Amer. Mus. Exp. 1907, Quarry C; No. 13330, isolated left M^3, Amer. Mus. Exp. 1907, Quarry B.

The fragment of the mandibular ramus of the specimen No. 13342 indicates that the ramus might be very stout, wide, and deep, being much wider and deeper than that of the next species. The two premolars of this specimen agree closely in structure and size with the corresponding teeth of Andrews' type, though the former are only a little smaller than the latter.

The fragment of the mandibular ramus of the specimen No. 13339 indicates also that the ramus might be very stout. The two molars of this specimen appear to agree well in length with the upper molars of the corresponding specimens, which were recorded by Schlosser.

The last upper molar of the specimen No. 13330 is very large, quadrangular in outline, and has the prominent metastyle. The general structure of this tooth answers well to that of the last upper molar of this genus, and I refer this tooth provisionally to this species, owing to the association of such a tooth structure and the unusually large size.

The teeth of the specimens at hand, as well as those reported by Andrews and by Schlosser, measure as follows (in mm.):

	Lower dentition			Upper dentition	
	A. M. 13339	A. M. 13342	Andrews[1]	A. M. 13330	Schlosser
Diastema between C and P_1	....	12	....	....	....
P_1 Length	....	16	18	....	....
P_1 Width	....	10.5	11	....	....
P_2 Length	....	16.8	18	....	....
P_2 Width	....	12.3	14	....	....
P_3 Length	....	....	19.5	....	....
P_3 Width	....	....	16	....	....
M1 Length	23	....	....	....	24
M1 Width	18	....	....	....	23
M2 Length	26.5	....	....	....	27
M2 Width	20.5	....	....	....	25
M^3 Length	....	....	....	33.5	....
M^3 Width	....	....	....	32	....

[1]These measurements of Andrews' type specimen were taken by me.

Bunohyrax fajumensis (Andrews)

Geniohyus fajumensis Andrews, 1904, Geol. Mag., N. S., Decade 5, I, p. 162; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 195, Pl. xix, fig. 2.

Saghatherium majus Andrews, 1906, *loc. cit.*, p. 91 (*pars*).[1]

Bunohyrax fajumensis Schlosser, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 119, Pl. xi (iii), fig. 8, Pl. xii (iv), fig. 2.

Specimens:—No. 13336, fragment of right mandibular ramus, bearing $Dm_{3, 4}$ and $M_{1, 2}$ *in situ* and P_{1-4} in alveoli, Amer. Mus. Exp. 1907, northwest of Quarry A; No. 13347, both mandibular rami very well preserved, lacking symphysial region, bearing P_2-M_3, besides alveolus of P_1, of right side and P_1-M_3 of left side *in situ*, and with isolated I_2 of right side, Amer. Mus. Exp. 1907, northwest of Quarry A; No. 14455: fragment of upper jaw and palate, bearing Dc, Dm^{1-4}, and M^1 of right side, and Dc, $Dm^{1, 3, 4}$ of left side *in situ*, associated with fragments of both mandibular rami, bearing Dm_{1-3} and fragments of Dm_4 and M_1 of right side and Dm_{1-4} of left side *in situ*, Am. Mus. Exp. 1908, fluvio-marine formation, Fayûm; No. 14460, well preserved mandible, lacking front lower side of symphysial region, condyle of the right side and greater part of ascending bar of left side, bearing I_2-M_3 of right side and I_3,root of C, P_1- M_3 of left side *in situ*, Am. Mus. Exp. 1908, fluvio-marine formation, Fayûm.

The mandibles of the specimens Nos. 13336 and 14460 are much smaller and the molars of the same are narrower than those of the specimen No. 13347. The former two specimens are of course younger than the latter. But considering this fact together with the difference in size of the molars, it seems to me probable that the former two belong to female individuals and the latter to a male. The mandible of the specimen No. 13336 has a small opening on the inner side of the ramus below the posterior end of M_2; it may correspond to the large fenestra which is present in the mandibles of *Geniohyus* and *Megalohyrax;* it should be noted here that this mandible belongs to a young individual. There is no such opening or fenestra in the mandibles of the specimens Nos. 13347 and 14460. In all the mandibles at hand there is no special deepening of the ramus and no special bulging out of the outer side of the ramus, the lower side of the ramus running rather straight from the symphysial region backward. So that the form of the mandible of this genus is very different from that of *Geniohyus*, notwithstanding the fact that the cheek-teeth of these genera are almost alike. The mandibles of the specimens Nos. 13347 and 14460, in comparison with that reported by Schlosser, are tabulated to measure as follows (in mm.):

[1] Andrews' type specimen of *Saghatherium majus* is, in my opinion, referable to the present species.

	A. M. 13347 Prob. ♂	A. M. 14460 Young Prob. ♀	Schlosser Prob. ♂
I. Length from tip of symphysis to posterior side of angle	....	235±	....
II. Ditto from the same to upper border of the foramen behind M_3	....	173±	....
III. Ditto from the same to posterior side of M_3	....	172±	....
IV. Ditto from the anterior side of P_1 to posterior side of angle	240	190±	210
V. Ditto from the same to upper border of the foramen behind M_3	144	125	....
VI. Length of symphysis	....	40±	....
VII. Minimum anteroposterior width of ascending bar below condyle	66	48	....
VIII. Minimum width of symphysial region behind I_2	....	23	....
IX. Maximum depth of symphysial region	....	25	....
X. Depth of ramus at anterior side of P_1	....	29	33
XI. Ditto at anterior side of P_4	50	30	....
XII. Ditto at anterior side of M_3	55	40	....
XIII. Height of ascending bar at coronoid process	145	98e	....
XIV. Ditto at condyle	135	90e	....

The molars of the specimens No. 13336 and No. 14460 are narrower than those of No. 13347, as already pointed out, while the premolars of the former two are distinctly longer than those of the latter. The latter difference between these two sets of specimens may be partly due to the fact that the premolars of the former two are nearly or entirely fresh, while those of the latter are worn; but may be chiefly due to sexual dimorphism, the increase in size posteriorly of the cheek-teeth being more rapid in the supposed male type than in the supposed female type. The orientation of the two P_4 of the specimen No. 14460 is abnormal, the anteroposterior axes of these teeth being rotated outward, so that the anterior side of the right P_4 faces antero-externally and that of the left P_4 externally. This abnormality might have occurred either when these teeth were replacing Dm_4 or before that time. In the fragment of the skull of the specimen No. 14455, the orbit lies just above Dm^4 and M^1; it should be noted here that this skull is very juvenile. The lacrymal

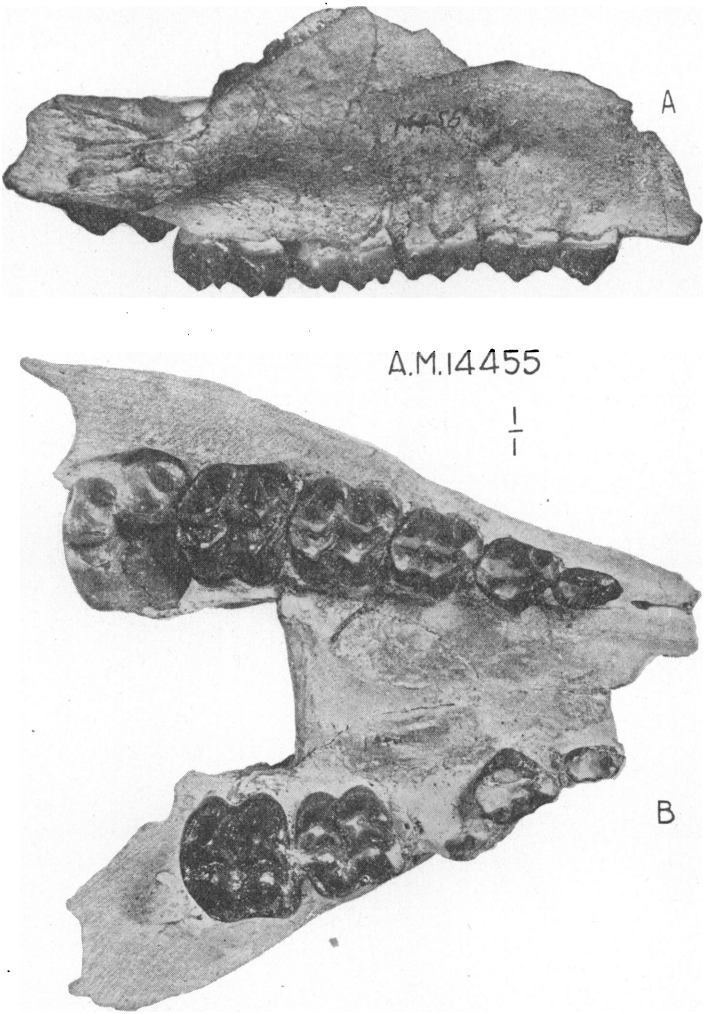


Fig. 14. *Bunohyrax fajumensis*. Fragment of upper jaws and palate containing Dc, Dm^{1-4}, and M^1, of the right side, and Dc, $Dm^{1, 3, 4}$, of the left side, Amer. Mus. No. 14455. Natural size.

A, external view, right side; B, inferior view.

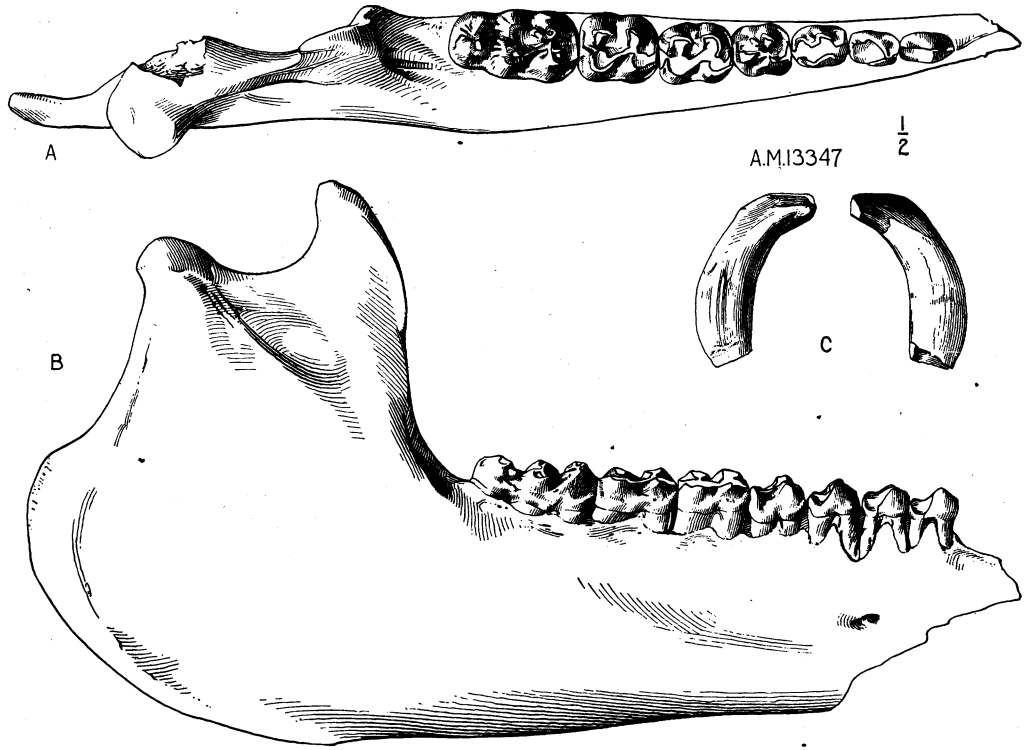


Fig. 15. *Bunohyrax fajumensis* Andrews. Right ramus of mandible and incisor tooth. Amer. Mus. No. 13347. One-half natural size.

A, superior view; B, external view; C, incisor tooth.

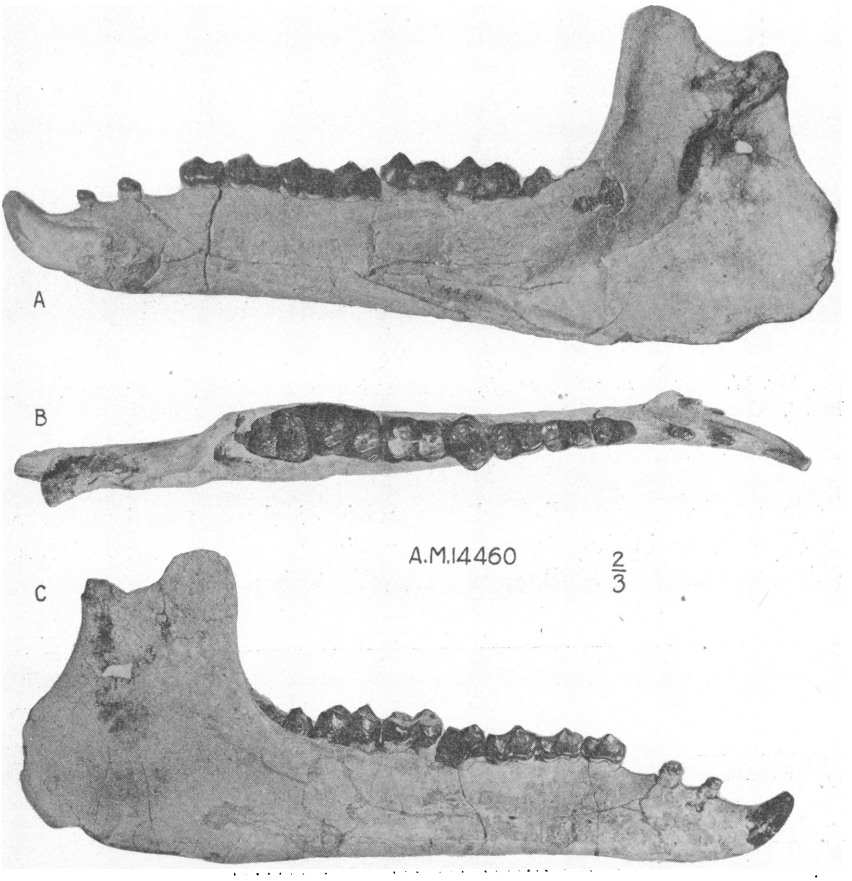


Fig. 16. *Bunohyrax fajumensis*. Right ramus of mandible, Amer. Mus. No. 14460. Two-thirds natural size.

A, internal view; B, superior view; C, external view.

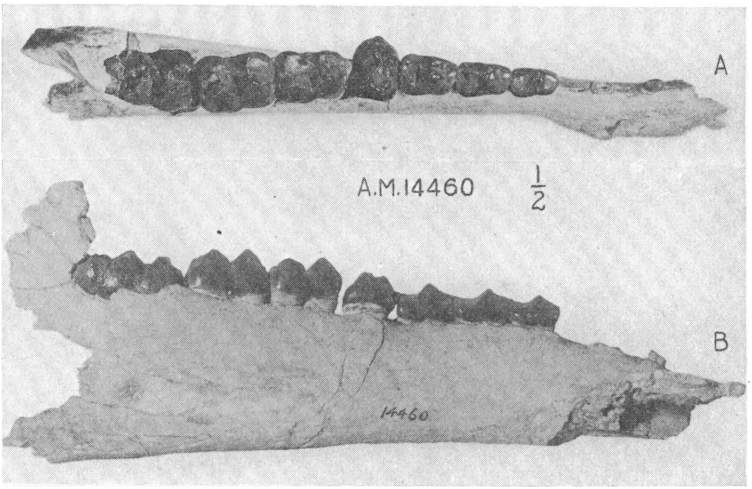


Fig. 17. *Bunohyrax fajumensis.* Left ramus of mandible, Amer. Mus. No. 14460. One-half natural size.
A, superior view; B, internal view.

appears to be rather well-developed and is widely separated from the jugal, quite as in *Geniohyus mirus* and in the modern *Dendrohyrax.* This fragment of the skull measures as follows (in mm.):

	A. M. 14455
	Juv.
I. Length from anterior end of maxilla at lower border to anterior side of orbit	59
II. Ditto from the same to anterior side of temporal fossa in palatal view	82
III. Ditto from the same to posterior side of Dm^4	68
IV. Distance from posterior side of antorbital foramen to anterior side of orbit	28
V. Distance between two Dm^1	$2\times10=20$
VI. Ditto between two Dm^4	$2\times13\pm=26\pm$

The measurements of the teeth of the specimens at hand, in comparison with those of Andrews' and Schlosser's, are tabulated as follows (in mm.):

	Lower Dentition									Upper Dentition			
	A. M. 13336	A. M. 13347 right	A. M. 13347 left	A. M. 14455 right	A. M. 14460 left	A. M. 14460 right	A. M. 14460 left	Andrews[1]	Schlosser	A. M. 14455 right	A. M. 14455 left	Andrews[1]	Schlosser
	Young Prob. ♀	Prob. ♂		Juv.	Young Prob. ♀				Prob. ♂	Juv.			
I_2 Anteroposterior diameter	....	12	....	....	....	12	....	....	....	....	....	....	....
I_2 Transverse diameter	....	8	....	....	....	7	....	....	....	....	....	....	....
I_2 Height from border of jaw	....	....	....	....	....	15	....	....	....	....	....	....	....
Diastema between I_2 and I_3	....	....	....	....	....	11	....	....	....	....	....	....	....
I_3 Length	....	....	....	....	....	5.7	5.7	....	....	....	....	....	....
I_3 Width	....	....	....	....	....	3.4	3.5	....	....	....	....	....	....
Diastema between I_3 and C	....	....	...	..	....	6	6	....	....	....	....	....	....
C(Dc) Length	....	....	....	....	....	6.8	6.4 (root)	....	....	(9)	(8.5)	13	9.5?
C(Dc) Width	....	....	....	....	....	4.3	....	....	....	(5)	(4.5)	9	....
Diastema between C and P_1	....	....	....	....	....	10	10	....	....	0	0	0	0
P1 (Dm1) Length	....	12.5 (alv.)	13	(10.5)	(10.8)	13	13	13	13	(10.5)	(11)	13.5	10
P1 (Dm1) Width	....	....	7	(4.5)	(4.7)	8.4	8.1	7.5	7.5	(9.2)	(9)	12.5	10
P2 (Dm2) Length	....	12	12.8	(11.8)	(12)	15	14.2	13	14	(11.3)	(12±)	13.5	14
P2 (Dm2) Width	....	7.8	8.3	(6)	(6.3)	9.5	9.5	8.5	9.5	(10.6)	....	13.5	14
P3 (Dm3) Length	(15)	13	13.2	(14)	(14)	15.5	15	14.5	15	(13.5)	(13.5)	.....	15
P3 (Dm3) Width	(10)	10.2	10.8	(8.8)	(8.7)	11.2	11.3	10	11	(14)	(13.5)	....	17
P4 (Dm4) Length	(16.2)	15	14.2	....	(15.2)	16	16	16	16	(15)	(15)	....	16
P4 (Dm4) Width	(12)	12	12.5	....	(10.4)	13	12.7	11	13	(15.8)	(15.7)	....	19
M1 Length	19	18.7	18.5	....	....	18.2	18	....	18	20	....	....	20.5
M1 Width	14	15	16	13.3	....	13.8	13.8	....	15	18	....	....	20
M2 Length	21	20.7	20.2	....	....	20.3	20	....	20.5	....	....	....	23
M2 Width	15.3	17.2	17.5	....	....	15.3	15.4	....	17	....	....	....	23
M3 Length	....	31.3	32	....	....	28	28	....	29	....	....	....	24
M3 Width	....	18	18.3	....	....	16	16	....	18	....	....	....	25.5
Length of P1-4 (Dm1-4)	59.5	53±	53	....	(51)	57	56	56	62	(49.5)	(50)	....	52
Length of M1-3	....	70	70	....	....	68	67	....	66	....	....	....	66

[1]The measurements of these specimens of Andrews' were taken by me.

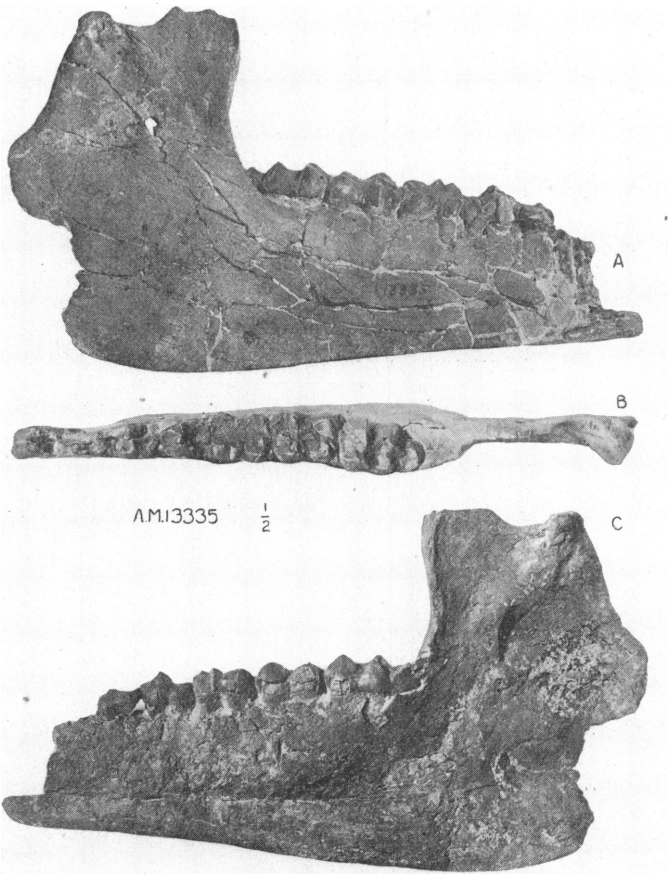


Fig. 18. *Bunohyrax affinis.* Type, Right mandibular ramus, Amer. Mus. No. 13335. One-half natural size.
A, external view; B, superior view; C, internal view.

Bunohyrax affinis new species

Bunohyrax species SCHLOSSER, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 120.

TYPE SPECIMEN:—No. 13335, large fragment of right mandibular ramus, bearing P_3-M_3 *in situ*, of which P_3-M_1 are broken and imperfectly represented, Am. Mus. Exp. 1907, northwest of Quarry A.

PARATYPES:—No. 14461, small fragment of right mandibular ramus, bearing P_{1-3} *in situ*, Am. Mus. Exp. 1908, fluvio-marine formation of the Fayûm.

The general shape of the mandible of the specimen No. 13335 is quite similar to that of the preceding species, and likewise lacks any fenestra on the inner side of the ramus; there is no doubt about its belonging to the present genus.

This mandible measures as follows (in mm.):

	A. M. 13335◇
I. Length from anterior side of P_2 to upper border of the foramen behind M_3	90
II. Minimum anteroposterior width of ascending bar below condyle	43
III. Depth of ramus at anterior side of P_4	32
IV. Ditto to anterior side of M_3	41
V. Height of ascending bar at coronoid process	96e
VI. Ditto at condyle	96

The teeth of the specimens at hand, in comparison with those reported by Schlosser, are tabulated to measure as follows (in mm.):

	Lower Dentition				Upper Dentition
	A. M. 13335	A. M. 14461	ex.	Schlosser	Schlosser
Diastema between C and P_1	....	5	....	....	....
P_1 Length	....	11.5	12±	....	....
P_1 Width	....	6	6	....	....
P_2 Length	....	11.7	12±	10	11
P_2 Width	....	7	....	7	12
P_3 Length	12.5±	12	....	11	....
P_3 Width	....	8.2	....	9	....
P_4 Length	13.7	....	....	12.5	....
P_4 Width	11	....	....	10	....
M_1 Length	16.4	....	....	15.5	17.5
M_1 Width	13.5	....	....	14	17
M_2 Length	18.4	....	....	16	18
M_2 Width	14.8	....	....	14	17
M_3 Length	25	....	....	....	20.5?
M_3 Width	15	....	....	....	20
Length of M_{1-3}	59.5	....	....	....	....

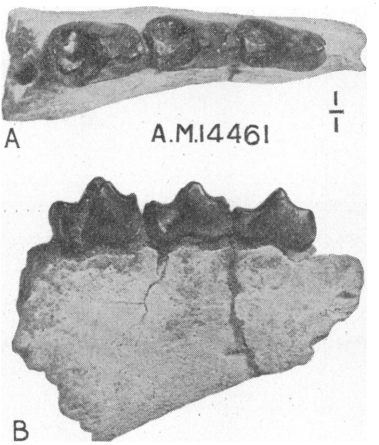


Fig. 19. *Bunohyrax affinis.* Paratype, fragment of right mandibular ramus containing P_{1-3}, Amer. Mus. No. 14461. Natural size.
A, superior view; B, external view.

MEGALOHYRAX Andrews

ANDREWS, 1903, Geol. Mag., N. S., Decade 4, X, p. 341; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 92.

Mixohyrax SCHLOSSER, 1910, Zool. Anz., XXXV, p. 502; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 98, 115.

Diagnosis, as shown in the key.

GENOTYPE:—*Megalohyrax eocænus* Andrews, 1903 (non Schlosser, 1911).

This genus includes *Megalohyrax minor* Andrews, 1904 (non Schlosser, 1911); *Mixohyrax niloticus* Schlosser, 1910; *Mixohyrax suillus* Schlosser, 1910; *Megalohyrax pygmæus* Matsumoto; besides the genotype.

SYNOPSIS OF SPECIES OF *Megalohyrax*

(1) Extremely large species, united length of P^{1-4} and of M^{1-3} measuring 75 mm. and 86 mm. respectively (Andrews' type[1]) ..... *eocænus.*

(2) Large species, united length of lower P_{1-4} and of M_{1-3} measuring ca. 69 mm. (No. 13345)—70 mm. (Schlosser) and ca. 78 mm. (No. 13338)—85 mm. (Schlosser as well as No. 13345) respectively; that of P^{1-4} and of M^{1-3}, 63 mm. (Andrews' type)—64 mm. (No. 13332) and 74 mm. (Andrews' type)—78 mm. (No. 13332) respectively ..... *minor.*

(3) Rather large species, united length of P_{1-4} and of M_{1-3} measuring 55 mm. (Schlosser's cotype)—57 mm. (Schlosser's cotype as well as No. 13334) and 68 mm. (Schlosser's cotype)—76 mm. (No. 13334) respectively; that of P^{1-4} and of M^{1-3}, ca. 54 mm. (Schlosser's fig.) and ca. 62 mm. (ditto) respectively ..... *niloticus.*

[1]These measurements of the type specimen of Andrews' were taken by me. The measurements of the same by Andrews were very confusingly misprinted in his original and subsequent descriptions.

(4) Small species, united length of P_{1-4} measuring 46 mm. (Schlosser's cotype); that of M_{1-2} measuring 32 mm. (ditto), whereas the same teeth of the preceding and the next species measure 42 mm. and 24–25 mm. respectively ..... *suillus*.

(5) Very small species, united length of P_{1-4} and of M_{1-3} measuring 31.5 mm. (Andrews)—33 mm. (Type: No. 14454) and ca. 38 mm. (No. 14463)—40 mm. (type) respectively; that of P^{1-4} and of M^{1-3}, 35.5 mm.—36 mm. and 37 mm. respectively (type) ..... *pygmæus*.

Megalohyrax eocænus Andrews

M. eocænus Andrews, 1903, Geol. Mag., N. S., Decade 4, X, p. 340, text figure 1; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 92, Pl. VI, figs. 1, 2.

There is no specimen of this species in the American Museum collections.

The teeth of Andrews' specimens measure as follows (in mm.):

	Upper Dentition Andrews[1]	
I^1 Anteroposterior diameter	....	22
I^1 Transverse diameter	....	14
I^1 Height from margin of jaw	....	50
Diastema between I^1 and I^2	....	21
Ditto between I^2 and I^3	....	11
C Length	18	..
C Width	11.5	..
P^1 Length	17	..
P^1 Width	18	..
P^2 Length	17	..
P^2 Width	21.5	..
P^3 Length	18.5	..
P^3 Width	25.5	..
P^4 Length	19	..
P^4 Width	....	..
M^1 Length	24	..
M^1 Width	....	..
M^2 Length	28.5	..
M^2 Width	....	..
M^3 Length	34	..
M^3 Width	37	..
Length of P^{1-4}	75	..
Length of M^{1-3}	86	..

[1]These measurements of the type specimen of Andrews' were taken by me. The measurements of the same by Andrews were very confusingly misprinted in his original and subsequent descriptions.

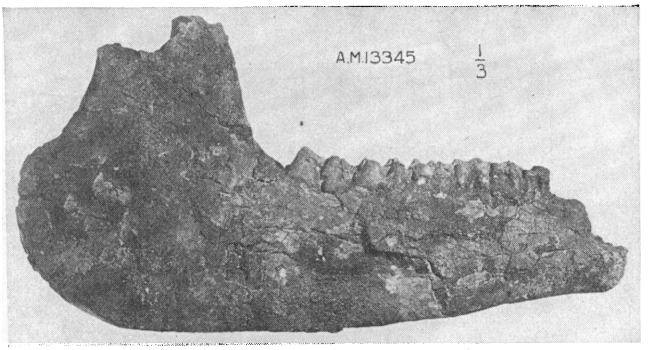


Fig. 20. *Megalohyrax minor*. Right mandibular ramus, Amer. Mus. No. 13345. One-third natural size. External view.

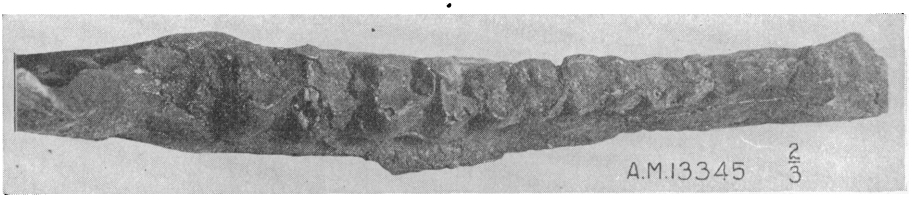


Fig. 21. *Megalohyrax minor*. Right mandibular ramus, Amer. Mus. No. 13345. Two-thirds natural size. Superior view.

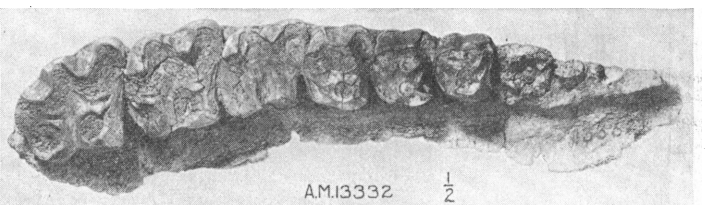


Fig. 22. *Megalohyrax minor*. Right cheek-teeth, Amer. Mus. No. 13332. One-half natural size. Inferior view.

Megalohyrax minor Andrews

M. minor Andrews, 1904, Geol. Mag. N. S., Decade 5, I, p. 213; 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 97 (*pars*), Pl. vii, fig. 1 (non figs. 2, 3).

Mixohyrax andrewsi Schlosser, 1910, Zool. Anz., XXXV, p. 503; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 115, Pl. x (ii), figs. 9–11.

Specimens:—No. 13338, fragment of right mandibular ramus, bearing roots of M_1, imperfectly represented M_2 and fairly complete M_3 *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13345, mandible of a young individual, bearing I_2 of both sides, which were just about to erupt, Dm_1-M_2 of both sides *in situ*, of which left $M_{1,2}$ are imperfectly represented, and P_{1-4} of both sides and M_3 of right side in alveoli, Am. Mus.

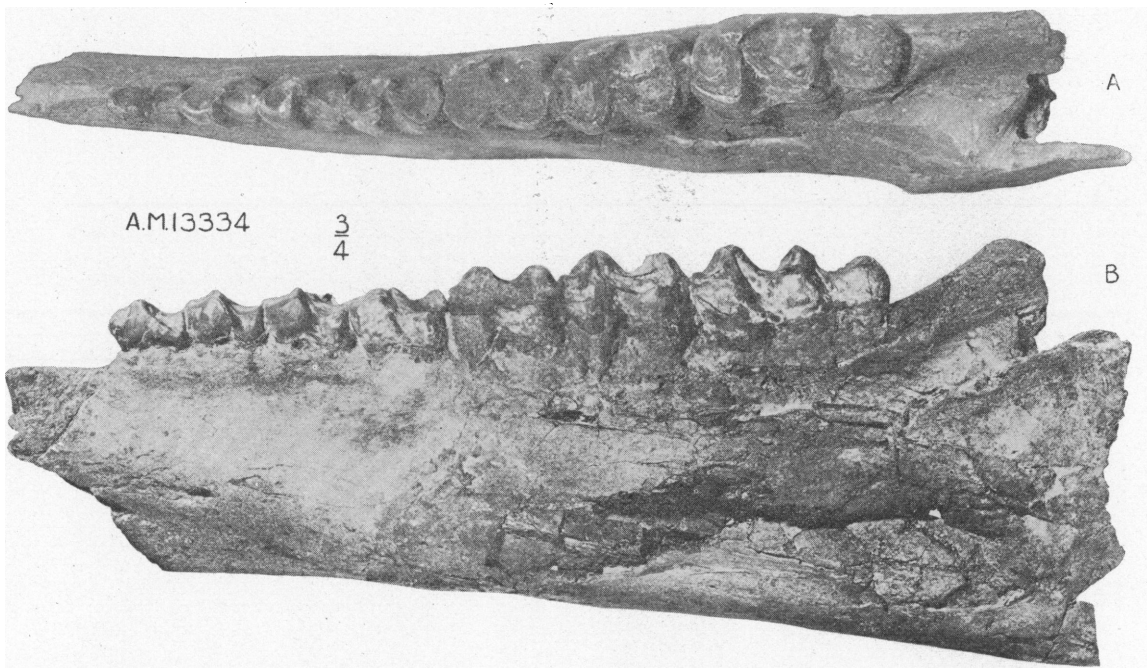


Fig. 23. *Megalohyrax niloticus*. Fragment of left mandibular ramus, Amer. Mus. No. 13334. Three-fourths natural size.

A, superior view; B, external view.

Exp. 1907, north of Quarry B; No. 13332, fragment of upper jaw, bearing roots of C and P^1 and well preserved P^2-M^3 of right side *in situ*, all the cheek-teeth being much worn, Am. Mus. Exp. 1907, southwest of Quarry A. (Besides, No. 15897, cast of Andrews' type specimen of *Megalohyrax minor* in the British Museum.)

The type specimen of this species is, as clearly stated by Andrews, a certain specimen representing upper jaw and cheek-teeth; but subsequently Andrews referred a certain specimen representing lower jaw and cheek-teeth also to this species. According to Schlosser's classification, the former specimen of Andrews' belongs to his "*Mixohyrax*" (=*Megalohyrax*), while the latter belongs to his "*Megalohyrax*" (=*Titanohyrax*). Schlosser has kept the specific name "*minor*" for the latter specimen of Andrews', and adopted a new name "*andrewsi*" for the former specimen of the same. Such a statement of Schlosser's is, of course, against the law of priority: the name "*minor*" must be preserved for the present species.

The mandible of the specimen No. 13345 shows clearly that it belongs to the type with long and shallow rami. The symphysis is short. The ramus deepens backward only very gradually, and the lower border of the ramus runs more or less straight. There is a large fenestra on the inner side of the ramus, just below M_2 and embryonic M_3; the fenestra is about 38 mm. in maximum anteroposterior diameter and 28 mm. in maximum vertical diameter. The presence of such a large fenestra is clearly seen also in the fragmental mandible of the specimen No. 13338; the highest point of this fenestra lies about 19 mm. below the upper border of the jaw, at the posterior talon of M_3. The mandible of the specimen No. 13345 measures as follows (in mm.):

		A. M. 13345
I.	Length from tip of symphysis to posterior side of angle..	275±
II.	Ditto from the same to upper border of the foramen behind M_3	182±
III.	Ditto from the same to posterior side of embryonic M_3..	207±
IV.	Ditto from the anterior side of embryonic P_1 to posterior side of angle	223
V.	Ditto from the same to upper border of the foramen behind M_2	135
VI.	Length of symphysis	42
VII.	Minimum anteroposterior width of ascending bar below condyle	52
VIII.	Maximum depth of symphysial region	29+e
IX.	Depth of ramus at anterior side of Dm_1	40
X.	Ditto at anterior side of Dm_4	48
XI.	Ditto at anterior side of M_2	51
XII.	Height of ascending bar at coronoid process	125+
XIII.	Ditto at condyle	113

The teeth of the specimens at hand, in comparison with those of Andrews' and Schlosser's, are tabulated to measure as shown on page 317 (in mm.).

Megalohyrax niloticus (Schlosser)

Mixohyrax niloticus Schlosser, 1910, Zool. Anz., XXXV, p. 503; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 116, Pl. xi (iii), fig. 9, Pl. xii (iv), figs. 3, 6, Pl. xv (vii), figs. 1, 4, 8.

Mixohyrax suillus Schlosser, 1911, *loc. cit.*, p. 118 (*pars*), Pl. x (ii), fig. 6.[1]

Specimens:—No. 13334, large fragment of left mandibular ramus, bearing P_1-M_3, besides root of C, *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13337, large fragment of right mandibular ramus, bearing P_1 and P_3-M_3, besides roots of P_2 *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13341, left mandibular ramus with symphysial region, bearing Dm_1-M_1 *in situ*, Am. Mus. Exp. 1907, Quarry B.

The general shape and structure of the mandibles of the specimens Nos. 13334, 13337, and 13441 are essentially similar to those of the mandible of the preceding species. In the specimens Nos. 13334 and 13337 the fenestra on the inner side of the ramus lies below the posterior talon of M_3 and backward, and measures 24 mm. and 23 mm. in anteroposterior diameter respectively; 22 mm. and 24 mm. in vertical diameter respectively; and 23 mm. and 24 mm. in the distance from the

[1]The milk molars of the specimen illustrated in Schlosser's Pl. x (ii), fig. 6, appear to me too large to belong to *M. suillus*, as can be judged from the analogy of the milk molars of *M. minor* and *niloticus*. On the other hand, they nearly coincide in dimension with the corresponding milk molars of *M. niloticus*, to which, I think, the said specimen of Schlosser's should be referred.

	Lower Dentition				Upper Dentition		
	A. M. 13338	A. M. 13345 Juv. right	A. M. 13345 Juv. left	Schlosser	A. M. 13332	Andrews[1]	Schlosser
I_1 Longer diameter	....	15	....	....	....	....	....
C, Length	....	...	....	....	18 (roots)	....	....
Diastema between C and P_1 (Dc and Dm_1)	..	....	(16)	....	....	....	....
P1(Dm1) Length	....	(11.3)	(11)	17	16 (roots)	16	....
P1(Dm1) Width	....	(6.8)	(7.2)	10.5	....	12	....
P2(Dm2) Length	....	(13.4)	(13.7)	17	15.5	15	....
P2(Dm2) Width	....	(9.4)	(9.6)	11.5	18	15.5	....
P3(Dm3) Length	....	(14.5)	(14.6)	18	17	16.5	....
P3(Dm3) Width	....	(11.5)	(11.2)	13	20.5	18	....
P4(Dm4) Length	....	(18)	(17)	19	18	17	....
P4(Dm4) Width	....	(12.4)	(14.7)	15.5	22	21	....
M1 Length	19.5±	23	23	22	23	20	....
M1 Width	....	16	....	17	24	23	....
M2 Length	24	27	....	25	26	26	....
M2 Width	18.3	18.3	....	20	27	28	....
M3 Length	35.5	....	....	39	31	30	29
M3 Width	19.2	....	....	21	29.5	31	31
Length of P1-4 (Dm1-4)	....	(56)	(55)	70	64	63	....
Length of M1-3	78±	85±	....	85	78	74	....

[1]These measurements of the type specimen of Andrews' were taken by me.

		A. M. 13334	A. M. 13337	A. M. 13341	Schlosser		
		Prob. ♂	Prob. ♂	Juv.	Prob. ♀	Prob. ♀	Species?
I.	Length from tip of symphysis to posterior side of angle	....	....	200	....	....	276
II.	Ditto from the same to upper border of the foramen behind $M_3(M_1)$	....	....	(144)	....	....	....
III.	Ditto from the anterior side of $P_1(Dm_1)$ to posterior side of angle	....	245e	(154)	....	....	....
IV.	Ditto from the same to upper border of the foramen behind $M_3(M_1)$	....	157	(96)	....	....	....
V.	Length of symphysis	....	....	31	....	....	....
VI.	Minimum anteroposterior width of ascending bar below condyle	....	64	39	....	....	....
VII.	Maximum depth of symphysial region	....	....	27	....	....	....
VIII.	Depth of ramus at anterior side of $P_1(Dm_1)$	41	44	(25)	42	38	....
IX.	Ditto at anterior side of $P_4(Dm_4)$	42	46	(27)	....	....	....
X.	Ditto at anterior side of M_3	50	....	....	....	....	....
XI.	Ditto at posterior side of the same	57	65	....	65	63?	67
XII.	Height of ascending bar at coronoid process	....	137e	100	....	....	145?
XIII.	Ditto at condyle	....	126e	87		....	....

	Lower Dentition							Upper Dentition
	A. M. 13334	A. M. 13337	A. M. 13341	Schlosser[1]				Schlosser[1]
	Prob. ♂	Prob. ♂	Juv.	Prob. ♀	Prob. ♀	Species?	Juv.	Prob. ♀
I^1 Anteroposterior diameter	....	....	....	....	....	....	....	10
I^1 Transverse diameter	....	....	.....	....	....	....	....	7
I^1 Height from border of jaw	....	....	....	....	....	....	....	20
Diastema between I^1 and I^2	....	....	....	....	....	....	....	15
I2 Length	....	....	....	....	....	9±	....	6
I2 Width	....	....	....	....	....	....	....	4
Diastema between I2 and I3	....	....	....	....	....	11±	....	8
I3 Length	....	....	....	....	....	6±	....	9
I3 Width	....	....	....	....	....	4±	....	5.5
Diastema between I3 and C	....	....	....	....	....	7±	....	16
C Length	....	....	....	....	9±	8±	....	12.5
C Width	....	....	....	....	5±	5±	....	7.5
Diastema between C and P_1	14	....	....	....	17±	5±	....	0
P1(Dm1) Length	13.3	14	(10.3)	13	12.5	11.5±	....	12
P1(Dm1) Width	7.3	7.2	(5)	7	7.5	6.5±	....	10.5
P2(Dm2) Length	13.5	14.4± (space)	(12.8)	14	13.5	11.5±	(12)	12.5
P2(Dm2) Width	8.7	....	(7)	8.5	9	8.5±	(6)[2]	14
P3(Dm3) Length	14.5	15	(14)	15	14.5	12±	(14)	13.5
P3(Dm3) Width	9.8	9.8	(8.7)	10	10.5	10±	(7.5)[2]	15.5
P4(Dm4) Length	16.3	16	(16)	16	15.5	14	....	15
P4(Dm4) Width	11.2	11.3	(10.3)	11	11.5	11.5	....	17
M1 Length	19	19	20.3	16.5	18.5	16.5±	....	18
M1 Width	14.3	13.2	12	13	13	12±	....	19
M2 Length	23.3	22.9	....	19	21	20±	....	22
M2 Width	14.5	15.8	....	14.5	14.5	15±	....	22
M3 Length	34.6	34.6	....	30	....	28	....	28
M3 Width	17.5	17±	....	15.5	....	14.7	....	23
Length of P1-4(Dm1-4)	57	57	(53)	57	55	48	....	54±
Length of M1-3	76	75	....	68	69	63	....	62±

[1]The measurements of these specimens of Schlosser's suffixed with ± are estimated from his figures.

[2]These measurements were stated by Schlosser to be 7.5 mm. and 6 mm. respectively. But, judging from his figure of this specimen, it is evident that they are misprints for 6 mm. and 7.5 mm. respectively.

upper border of the jaw just behind M_3 respectively. In the specimen No. 13341 it lies below the posterior lobe of M_1 and backward, and measures 23 mm. in anteroposterior diameter, about 17 mm. in vertical diameter and about 13 mm. in the distance from the upper border of the jaw just behind M_1. These three mandibles, in comparison with one described by Schlosser, are tabulated to measure as on page 318 (in mm.):

Several measurements and ratios of the skull of the present species recorded by Schlosser are already cited under the description of the material of *Geniohyus mirus*.

The teeth of the specimens at hand, in comparison with those of Schlosser's, are tabulated to measure as in table facing page 319 (in mm.).

Megalohyrax suillus (Schlosser)

Mixohyrax suillus Schlosser, 1910, Zool. Anz., XXXV, p. 503; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 118 (*pars;* non Pl. x (II), fig. 6).

Specimen:—No. 13344, small fragment of left mandibular ramus, bearing $P_{1, 2}$ *in situ*, Am. Mus. Exp. 1907, Quarry A (this species?).

The teeth of this specimen, which is to be doubtfully and provisionally referred to the present species, and those reported by Schlosser, measure as follows (in mm.):

	Lower Dentition	
	A. M. 13344	Schlosser
Diastema between I_2 and I_3	....	12
Ditto between C and P_1	5	5
P_1 Length	11	....
P_1 Width	6	....
P_2 Length	11.2	11
P_2 Width	7	7
P_3 Length	....	12
P_3 Width	....	8
P_4 Length	....	12.5
P_4 Width	....	9.5
M_1 Length	....	14
M_1 Width	....	11
M_2 Length	....	17
M_2 Width	....	13
Length of P_{1-4}	....	46

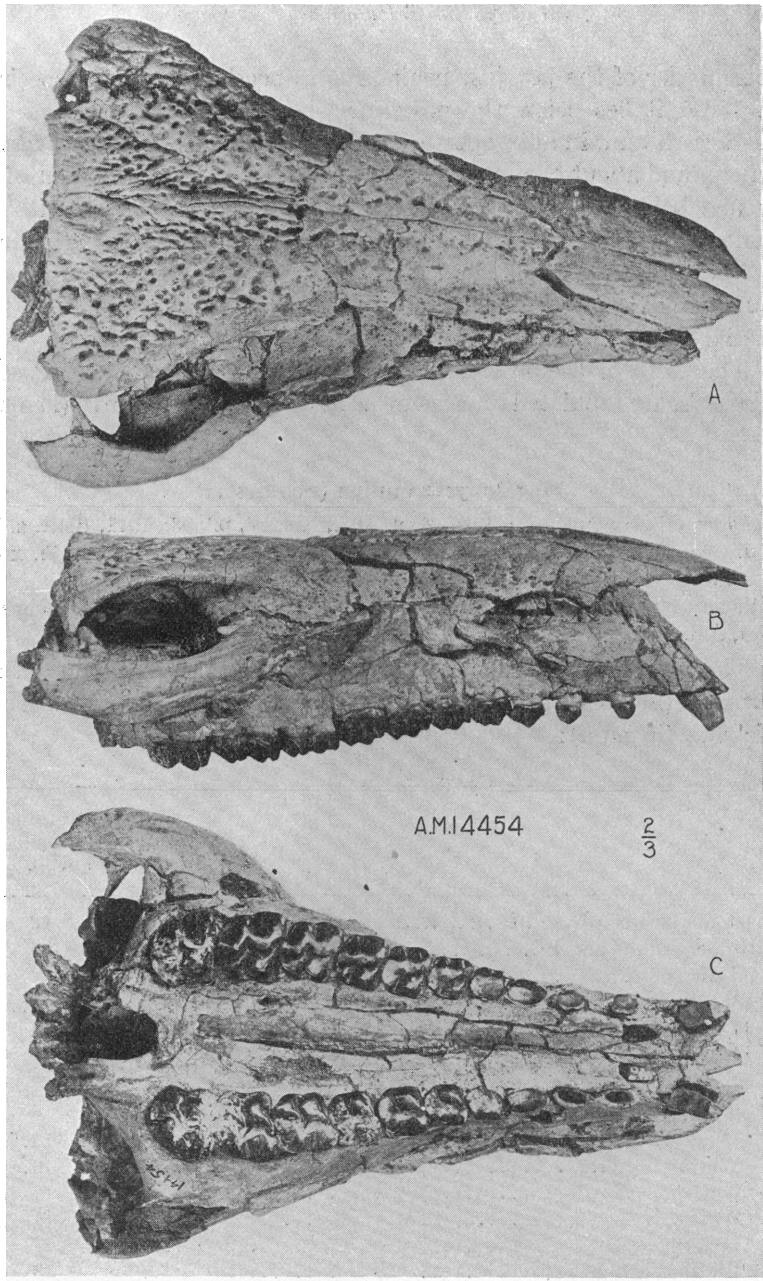


Fig. 24. *Megalohyrax pygmæus*. Type, anterior portion of skull, Amer. Mus. No. 14454. Two-thirds natural size.

A, superior view; B, lateral view, right side; C, inferior view.

Megalohyrax pygmæus Matsumoto

Saghatherium magnum Andrews, 1907, Geol. Mag., N. S., Decade 5, IV, p. 99 (non Andrews, 1904), text figure 2.

Megalohyrax pygmæus Matsumoto, 1921, Proc. Zool. Soc. London, pp. 840, 843, Fig. 1.

Type Specimen:—No. 14454, fragment of skull, represented by the part anterior to posterior sides of orbits, associated with large fragment of right mandibular ramus,

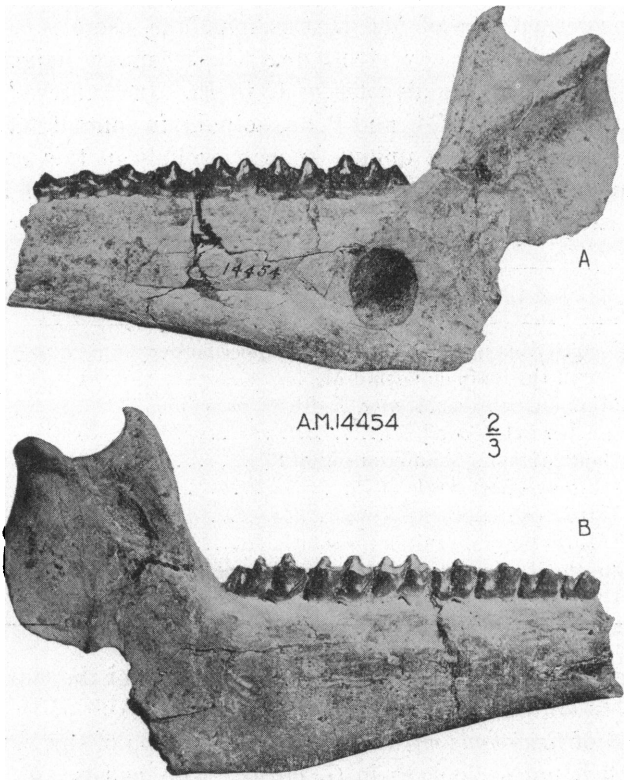


Fig. 25. *Megalohyrax pygmæus.* Type, right ramus of mandible, Amer. Mus. No. 14454. Two-thirds natural size.
A, internal view; B, external view.

all the upper cheek-teeth except left I^{2-3}, and P_1-M_3 of right side being present *in situ*, Am. Mus. Exp. 1908, north of Birket-el-Qurun.

Paratypes:—No. 14463; fragments of mandibles belonging to three individuals, one with P_3-M_3 of right side *in situ*, one with $P_{3,4}$ and M_2 of left side *in situ*, and one with $P_{3,4}$ of left side *in situ*, Am. Mus. Exp. 1908, fluvio-marine formation of the Fayûm; No. 14464, fragment of right mandibular ramus, bearing P_3-M_2 *in situ*, Am. Mus. Exp. 1908, fluvio-marine formation of the Fayûm.

In the mandible of the type specimen, the lower border is not straight, but convex just below M_3, and the outer side of the ramus shows a slight bulging at the part corresponding to this convexity. A large round fenestra is present on the inner side of the ramus just below the greater posterior part of M_3 and backward; the fenestra measures 14 mm. in anteroposterior diameter, 16 mm. in vertical diameter, and 10 mm. in the distance from the upper border of the ramus, corresponding to the second lobe of M_3. In this mandible, there is no diastema between C and P_1; these two teeth might be in contact, judging from the relative position of the alveolus of C to P_1. In Andrews' specimen, reported by him in 1907, C and P_1 are actually in contact. The contact of lower C and P_1 is a unique known example in this genus. This mandible and that reported by Andrews as *Saghatherium magnum* in 1907 measure as follows (in mm.):

		A. M. 14454	Andrews
I.	Length from anterior side of P_1 to upper border of the foramen behind M_3	81	....
II.	Minimum anteroposterior width of ascending bar below condyle	29	....
III.	Depth of ramus at anterior side of P_1	20.5	....
IV.	Ditto at anterior side of P_4	25	....
V.	Ditto at anterior side of M_3	33	....
VI.	Ditto at posterior side of the same	38	....
VII.	Height of ascending bar at coronoid process	71	....
VIII.	Ditto at condyle	66	65

Several measurements and ratios of the skull of the type specimen are already stated under the description of the skull of the specimen No. 14466 of *Geniohyus mirus*. The rostral portion of this skull is fairly long, though not so long as in *G. mirus*. The nasals are very long, though not so long as in *G. mirus*. The anterior ends of the nasals are acutely pointed, roofing over the external nares; there is a distinct indentation of about 22 mm. in anteroposterior depth, between the nasal and premaxilla in lateral view. The nasofrontal suture is distinctly concave forward. All these characters of the nasals are distinct from the modern hyracoids. The upper surfaces of the nasals and especially of the frontals are very rough, with irregular pits and grooves and intervening ridges, being much more so, with larger pits and grooves, than in the skull of *G. mirus*. The anterior border of the premaxilla is not

	Lower Dentition						Upper Dentition	
	A. M. 14454	A. M. 14463 (a)	A. M. 14463 (b)	A. M. 14463 (c)	A. M. 14464	Andrews[1]	A. M. 14454 right	A. M. 14454 left
I^1 Anteroposterior diameter	....	....	....	....	....	....	7.5	7.5
I^1 Transverse diameter	....	....	....	....	....	....	5	4.8
I^1 Height from border of jaw	....	....	....	....	....	....	14.5	10e
Diastema between I^1 and I^2	....	....	....	....	....	...	5.5	5.5
I^2 Length	....	....	....	....	....	....	5	5.5 (alv.)
I^2 Width	....	....	....	....	....	....	3	....
Diastema between I^2 and I^3	....	....	....	....	....	....	4	3.5
I^3 Length	....	....	....	....	....	....	5.3	6 (alv.)
I^3 Width	....	....	....	....	....	....	3.5	....
Diastema between I^3 and C	....	....	....	....	....	....	2.5	2.5
C Length	....	....	....	....	....	4.5	7.5	8
C Width	....	....	....	....	....	2.7	4.8	4.8
Diastema between C and P1	0	....	....	....	....	0	0	0
P1 Length	7.8	....	....	....	....	7	8	8.5
P1 Width	4.5	....	....	....	....	4.4	6.4	6.4
P2 Length	8	....	....	....	....	7.7	8.6	9
P2 Width	5.1	....	....	....	....	5	8.3	8.6
P3 Length	8.2	8.8	8.9	8.5	8	8	9	9.7
P3 Width	6	5.6	6	5.6	5.7	6	10.2	10
P4 Length	9	8.6	8.9	8.6	8.8	8.7	9.2	10
P4 Width	7	6.4	6.7	6.2	6.7	7.2	11.2	11
M1 Length	11.2	9±	....	....	11.5	10.7	11.5	12.3
M1 Width	7.8	7.5	....	....	7.6	7.5	12.4	12.3
M2 Length	12.6	12	12.5	....	12.5	11.8	13	13.5
M2 Width	8.7	8	8.6	....	8.6	8.5	14.2	14.3
M3 Length	15.5	15	....	....	....	17.5	13	12.5
M3 Width	9	7.7	....	....	....	9.6	14.4	14.4
Length of P1-4	33	....	....	....	....	31.5	35.5	36
Length of M1-3	40	38±	....	....	....	39	37	37

[1]These measurements of the specimen of Andrews' were taken by me.

vertical but runs obliquely from forward below to backward above. The nasopremaxillary suture is very short, being the shortest among the known skulls of the hyracoids. The premaxillomaxillary suture is decidedly V-shaped, with the angle pointed backward, as a striking contrast to the modern hyracoids. In palatal view, a pair of anterior palatal foramina are present on the premaxillæ, their posterior borders, however, corresponding to the anterior sides of the maxillæ; the foramina measure 7 mm. in length, 4 mm. in width, and 12 mm. in common lateral extension. The nasomaxillary and frontomaxillary sutures are very long, quite as in *Geniohyus* but not as in the modern hyracoids. The antorbital foramen lies just above P^2 and far anterior to the orbit, also as in *Geniohyus*, but not as in the modern hyracoids. There is a large, deep, and very prominent fossa above and anterior to the antorbital foramen, a unique example among known skulls of the hyracoids, though much shallower and less prominent ones are invariably observed in the other hyracoids. The lacrymal is very large and especially high, being higher than long and occupying the greater part of the anterior border of the orbit; it is in most likelihood in contact with the jugal; the lacrymal spine is wide and blunt. The orbit lies above the posterior lobe of M_2 and backward. The postorbital processes of the frontoparietal and of the jugal appear to be not in contact with each other. The palate is long and narrow, though proportionately shorter and wider than that of the skull of *G. mirus*, as well as that of *Megalohyrax niloticus* described and illustrated by Schlosser.

The teeth of the specimens at hand in comparison with those of Andrews' measure as on page 323 (in mm.):

TITANOHYRACIDÆ, new family

Skull imperfectly known; perhaps rather short-skulled and short-snouted. Upper surface of skull probably smooth. Premaxillaries greatly elongated superoposteriorly, so that their anterior ends lie a great distance anterior to the anterior ends of nasopremaxillary sutures. Judging from the shape of premaxillaries, this group might have had posteriorly retired external nares.

Dental formula: $\frac{3}{3}.\frac{1}{1}.\frac{4}{4}.\frac{3}{3}$. I^1 very large and tusk-like; none of lower incisors tusk-like. Cheek-teeth brachyodont, though rather high, selenodont; Dm_{2-4} and P_3-M_3 with well-differentiated metastylid, $M\frac{3}{3}$ being the largest of the cheek-teeth on either jaw.

This family consists at present only of a single genus, *Titanohyrax*.

TITANOHYRAX Matsumoto

Megalohyrax SCHLOSSER, 1910 (non Andrews, 1903), Zool. Anz., XXXV, p. 502; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 97, 104.
Titanohyrax MATSUMOTO, 1921, Proc. Zool. Soc. London, p. 844.

Diagnosis, the same as that of the family. Some other dental characters are: P^{1-4} and M^{1-3} four-cusped. All the upper premolars provided with well-developed mesostylar fold, as a distinct character from all the genera of the Geniohyidæ; parastylar and mesostylar folds of upper cheek-teeth very acute, being not so rounded as those of the other fossil hyracoids. Even in the true molars of the upper jaw, the hypocone is conical and the metaloph is scarcely developed, also a distinct character from all the other hyracoids. The presence of the well-differentiated metastylid in the lower cheek-teeth is also a distinct character from all the other hyracoids.

GENOTYPE:—*Megalohyrax palæotherioides* Schlosser, 1910.

This genus includes *T. ultimus*, *T. schlosseri*, and *T. andrewsi*, besides the genotype.

SYNOPSIS OF SPECIES OF *Titanohyrax*

(1) Gigantic species, being the largest of all the hitherto known hyracoids, upper and lower M_2 measuring about 40 mm. in length, whereas those of the next species measure about 30 mm. ..... *ultimus*.

(2) Gigantic species, united length of P_{1-4} and of M_{1-3} measuring ca. 70 mm. (=165–94) and 94 mm. respectively (Schlosser); that of P^{1-4} and of M^{1-3}, 70 mm. and 84 mm. respectively (ditto) ..... *schlosseri*.

(3) Large species, length of M_1 measuring 22 mm. (Schlosser), whereas the same tooth of the immediately preceding and the next species measures 24.5 mm. and 19–20 mm. respectively; united length of P^{1-4} and of M^{1-3}, ca. 73 mm. and ca. 75 mm. respectively (Schlosser); lower cheek-teeth, of long and narrow type; snout rather long, the distance from the tip of mandibular symphysis to the posterior side of Dm_4 measuring ca. 114 mm. in a young individual with functional milk molars (Schlosser's figure). *palæotherioides*.

(4) Rather small species, united length of M_{1-3} measuring 76 mm.; lower cheek-teeth of short and wide type; snout very short, the distance from the tip of mandibular symphysis to the posterior side of P_4 measuring only 86 mm. in an old individual with much-worn premolars and molars .... *andrewsi*.

Titanohyrax ultimus Matsumoto

Titanohyrax ultimus MATSUMOTO, 1921, Proc. Zool. Soc. London, p. 844, Fig. 2. Type and paratypes belonging to the British Museum.

Titanohyrax schlosseri Matsumoto

Megalohyrax eocænus SCHLOSSER, 1913, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 105 (non Andrews, 1903), Pl. XI (III), fig. 7.
Titanohyrax schlosseri MATSUMOTO, 1921, Proc. Zool. Soc. London, p. 844.

Schlosser's specimens, referred by him to *Megalohyrax eocænus*, evidently belong to the genuine *Titanohyrax* (=his "*Megalohyrax*"),

though Andrews' type specimen of the said species evidently does not. So Schlosser's specimens want a new specific name.

The teeth of Schlosser's specimens are stated by Schlosser to measure as follows (in mm.):

	Lower Dentition Schlosser	Upper Dentition Schlosser	
Diastema between I^1 and I^2	....	33	23
" " I^2 " I^3	....	14	13
" " I^3 " C	....	37	....
C Length	....	12	....
C Width	....	10.3	....
P1 Length	14	16	....
P1 Width	12	17.2	....
P2 Length	17.5	18	....
P2 Width	14.3	21	....
P3 Length	19.5	20	....
P3 Width	16	25	....
P4 Length	22	21.5	....
P4 Width	17	30	....
M1 Length	24.5	27	....
M1 Width	17	30	....
M2 Length	29.5	30	....
M2 Width	19	34	....
M_3 Length	40	....	....
M_3 Width	18	....	
Length of P1-4	165–94 =70±	70	
Length of M1-3	94	84?	

Titanohyrax palæotherioides (Schlosser)

Megalohyrax palæotherioides Schlosser, 1910, Zool. Anz., XXXV, p. 502; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 106, Pl. XI (III), fig. 1, Pl. XII (IV), fig. 1.

Specimens:—No. 14555, fragment of left mandibular ramus of very young individual, bearing Dm_{1-4} *in situ*, Am. Mus. Exp. 1909, north of Qurun Lake; No. 13328, premaxilla of left side, bearing I^1 *in situ*, and with alveoli or I^{2-3}, Am. Mus. Exp. 1909, northwest of Quarry A; No. 14470, fragment of upper jaw, bearing P^3-M^2 of left side *in situ*, Am. Mus. Exp. 1908, fluvio-marine formation of the Fayûm.

The lower border of the specimen No. 14555 is slightly concave, and the ramus deepens very gradually backward. It measures 20 mm. and 22 mm. in the depth of the ramus at the anterior side of Dm_1 and at the same of Dm_4 respectively.

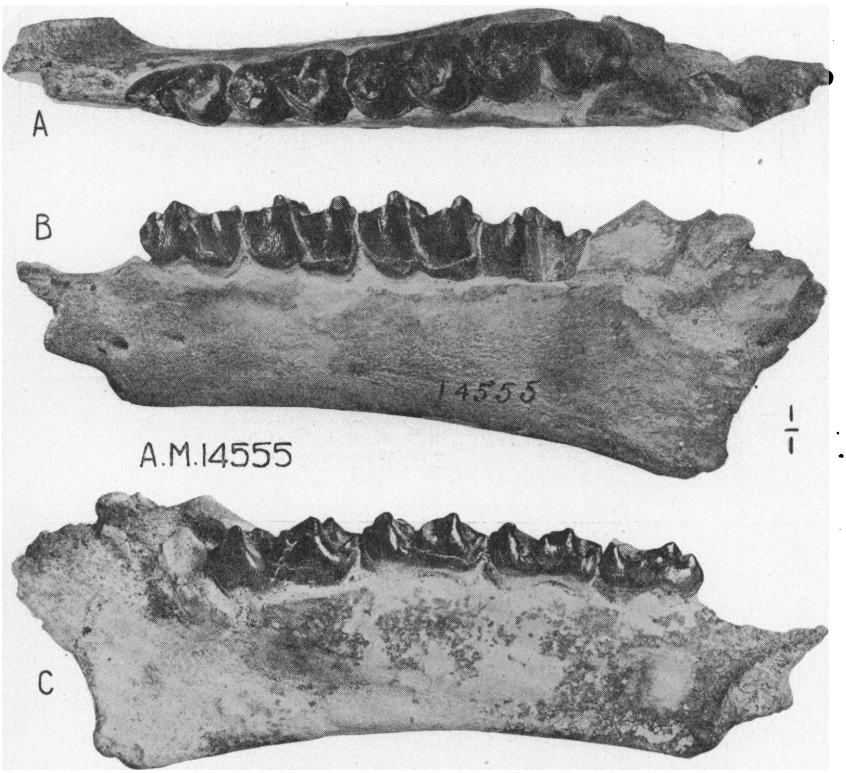


Fig. 26. *Titanohyrax palæotherioides.* Fragment of left mandibular ramus containing Dm_{1-4}, Amer. Mus. No. 14555. Natural size.
A, superior view; B, external view; C, internal view.

The upper anterior free side of the premaxilla of the specimen No. 13328 is very long, and rounded from side to side throughout; the posterior end of the upper anterior free side lies far posterior to I_3; the premaxillomaxillary suture runs obliquely from forward below to backward above; as a whole, the premaxilla shows a distinct prolongation of the upper posterior part. These peculiarities are not yet observed to exist in the other genera of the hyracoids. Probably *Titanohyrax* might look unlike the other hyracoids, of which the premaxillary and narial regions are known, in the structure of the said regions; and again, probably it might have retired and gaping external nares, somewhat as in tapirs and in *Palæotherium.*

The teeth of the specimens at hand, as well as of those reported by Schlosser, are tabulated to measure as follows (in mm.):

	Lower Dentition		Upper Dentition		
	A. M. 14555	Schlosser[1]	A. M. 13328	A. M. 14470	Schlosser[1]
	Juv.	Juv.; M_2 embryonic	Juv.	....	Young; M^3 embryonic
I^1 Anteroposterior diameter	....	....	11	....	10±
I^1 Transverse diameter	....	....	9.5	....	....
I^1 Height from border of jaw	....	....	13	....	15±
Diastema between I^1 and I^2	....	....	10	....	13.5
I^2, Length	....	....	6 (alv.)	....	6±
Diastema between I^2 and I^3	....	....	2.3	....	1±
I^3, Length	....	....	7 (alv.)	....	6±
Diastema between I^3 and C	....	....	....	....	9
C Length	....	....	....	....	12.7
C Width	....	....	....	....	10
P1 (Dm1) Length	(14)	(14±)	....	....	16.3
P1 (Dm1) Width	(8.2)	(8.5±)	....	....	15
P2 (Dm2) Length	(15.6)	(16±)	....	...	19
P2 (Dm2) Width	(10)	(11±)	....	....	18
P3 (Dm3) Length	(16.5)	(17±)	....	20	20
P3 (Dm3) Width	(10.4)	(11.5±)	....	21.4	22.5
P4 (Dm4) Length	(20)	(19±)	....	21	22?
P4 (Dm4) Width	(10.8)	(13±)	....	23.5	23?
M1 Length	....	22	....	25	28
M1 Width	....	15.5	....	23.5	25
M2 Length	....	24?	....	28.5	30
M2 Width	....	16.5?	....	28.5	26
M^3 Length	....	....	....	....	32
M^3 Width	...	...	....	....	27
Length of P1-4 (Dm1-4)	(65)	(66)	....	....	73±
Length of M^{1-3}	....	....	....	....	75±

[1]The measurements suffixed with ± in these specimens of Schlosser's were estimated from Schlosser's figures.

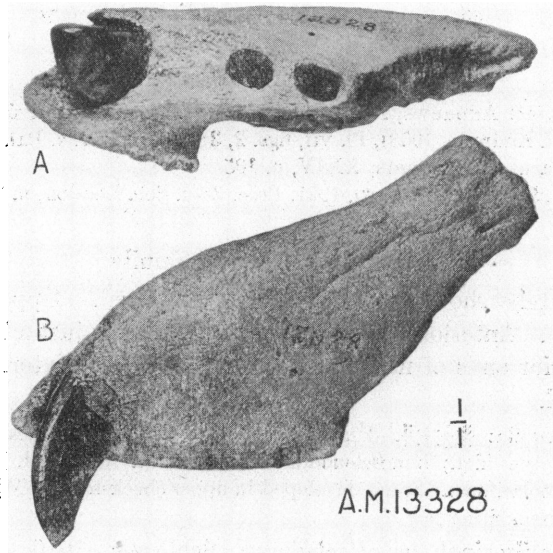


Fig. 27. *Titanohyrax palæotherioides.* Left premaxilla containing I^1, Amer. Mus. No. 13328. Natural size.
A, inferior view; B, external view.

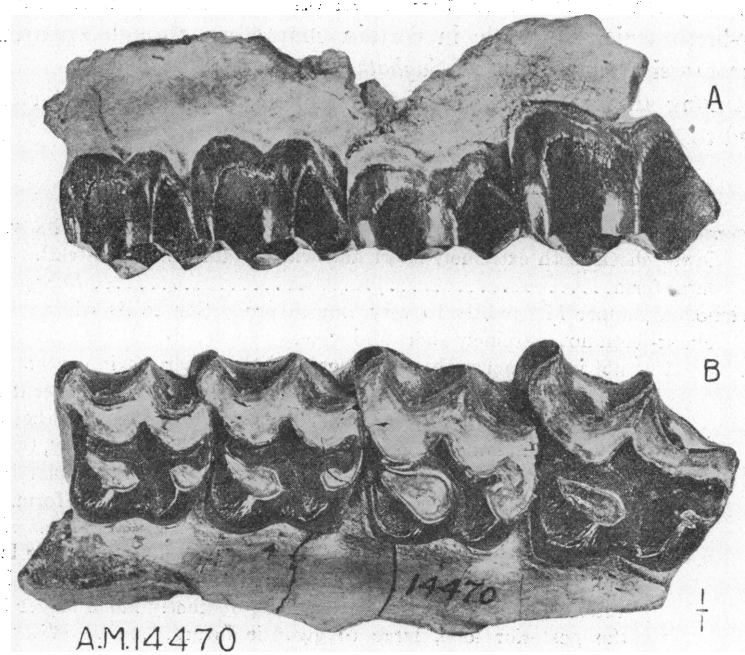


Fig. 28. *Titanohyrax palæotherioides.* Fragment of left maxillary containing P^3-M^2, Amer. Mus. No. 14470. Natural size.
A, external view; B, inferior view.

Titanohyrax andrewsi Matsumoto

Megalohyrax minor Andrews, 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 97 (*pars:* non Andrews, 1903), Pl. VII, figs. 2, 3; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 105.

Titanohyrax andrewsi Matsumoto, 1921, Proc. Zool. Soc. London, p. 845.

Pliohyracidæ, new family

Moderately short-skulled and short-snouted. Upper surface of skull smooth. Anterior ends of premaxillaries lying just a little anterior to the anterior ends of nasopremaxillary sutures. External nares not retired at all.

Dental forumla: $\frac{3}{3}.\frac{1}{1}.\frac{4}{4}.\frac{3}{3}$. I^1 and I_2 large and tusk-like. Cheek-teeth brachyodont, though rather high; bunoselenodont to selenodont. C of both jaws complex in structure, premolariform. Spurs developed in upper cheek-teeth. $M\frac{3}{3}$ the largest of the cheek-teeth on either jaw.

This family includes *Pachyhyrax* Schlosser, 1910, *Saghatherium* Andrews and Beadnell, 1902, and *Pliohyrax* Osborn, 1898. The reference of the first genus to this family is merely provisional, this genus being very imperfectly known—known only from a small number of cheek-teeth which resemble in certain characters, though apparently less progressive than, those of *Saghatherium.*

Among all the extinct families, the Pliohyracidæ are most closely related to the modern hyracoids, viz., Procaviidæ.

Key to genera of Pliohyracidæ

A.—*Inserte sedis*, bunoselenodont, upper M^3 very short in proportion to its width, lower cheek-teeth extremely short and wide, enamel of cheek-teeth rough, large form ..... *Pachyhyrax.*

B.—Selenodont, upper M^3 slightly to very long in proportion to its width; lower cheek-teeth not extremely short and wide.

a.—$I^{2,3}$ not in contact with each other, and the latter not in contact with upper C, with a diastema between each set of them; lower dental series not entirely closed, diastemata being present at least between I_3 and C, and often also between C and P_1; M^3 moderately, but not extremely, long, anterior and posterior lobes of this molar being subequal in length, enamel of cheek-teeth smooth, small form. *Saghatherium.*

b.—Upper teeth from I^2 to M^3 in contact with one another; entire lower tooth series closed, without any diastema; upper M^3 extremely long, anterior lobe of the same molar being distinctly much longer than the posterior lobe, large to gigantic form ..... *Pliohyrax.*[1]

[1]This genus is known from the Pontian of Pikermi and Samos. It stands outside the limit of the present report.

PACHYHYRAX Schlosser

SCHLOSSER, 1910, Zool. Anz., XXXV, p. 502; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 98, 114.

Diagnosis, as shown in the key. This imperfectly known genus appears to me to show certain resemblances in dental characters to *Saghatherium*. The upper premolars and molars have postero-internally projected spurs on the inner posterior sides of the paracone and the metacone, quite as in *Saghatherium*. In the unique known lower cheek-tooth (? P_4 or M_1), the two principal outer cusps have distinct median costæ on their inner surface, and the two principal inner cusps are thick and rounded, characters which are also found in the lower molars of *Saghatherium*. Schlosser appears to have laid much weight upon the roughness or smoothness of the enamel of cheek-teeth in his classification of the fossil hyracoids of the Fayûm, *Pachyhyrax* being large and stated by him to have rough enamel of the cheek-teeth, and *Saghatherium* being small, with smooth enamel of the cheek-teeth. Now as a matter of fact, the larger species of both *Geniohyus* and *Megalohyrax* have rough enamel of the cheek-teeth, while the smaller species of the same genera have very smooth enamel of the cheek-teeth. The only exception to this rule is *Titanohyrax*, which is large and has smooth enamel of the cheek-teeth. Thus it appears to me to be rather hard to point out any tangible distinctive character of *Pachyhyrax* from *Saghatherium*, except their size, at least in the present state of our knowledge.

GENOTYPE:—*P. crassidentatus* Schlosser, 1910, the unique known species.

Pachyhyrax crassidentatus Schlosser

Pachyhyrax crassidentatus SCHLOSSER, 1910, Zool. Anz., XXXV, p. 503; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, p. 115, Pl. XI (III), figs. 2–6.

There are no specimens of this species in the American Museum material.

The measurements of the teeth reported by Schlosser are as follows (in mm.):

		Lower Dentition	Upper Dentition	
		Schlosser	Schlosser	
P^3 (?)	Length	....	....	16
	Width	....	....	20
P_4 (? or M_1)	Length	18	....	....
	Width	16	....	....
M^1	Length	....	22	....
	Width	....	23	....
M^2	Length	....	26	26.5
	Width	....	27	28
M^3	Length	....	24	....
	Width	....	24.5	....

SAGHATHERIUM Andrews and Beadnell

ANDREWS AND BEADNELL, 1902, 'Preliminary Note on some New Mammals from the Upper Eocene of Egypt,' Cairo Mus., p. 5. ANDREWS, 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 84. SCHLOSSER, 1910, Zool. Anz., XXXV, p. 502; 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 97, 107. Diagnosis, as shown in the key.

GENOTYPE:—*Saghatherium antiquum* Andrews and Beadnell, 1902. The type was mentioned by Andrews, 1906.

This genus includes *Saghatherium macrodon*, new species, *S. euryodon*, new species; *S. annectens*, new species; and *S. sobrina*, new species; besides the genotype.

SYNOPSIS OF SPECIES OF *Saghatherium*

(1) Very large species in this genus, M_1 and M_2 measuring 13 mm. and 15 mm. in length respectively (Schlosser), whereas those of the next species measure 10–10.3 mm. and 11.5–11.6 mm. in length respectively, and of the second following species, 9–10 mm. and 10.5–12 mm. respectively; united length of M^{1-3} measures 40 mm. (type specimen: No. 13283)..... *macrodon.*

(2) Rather large species in this genus; the lower premolars are distinctly larger than those of the next species, while the lower molars are not distinctly longer, though rather wider, than those of *S. antiquum;* P_3 measures 8 mm. (type specimen: No. 13292)–8.6 mm. (No. 13314) in length and 5.8 mm. (type specimen: No. 13292)–6.3 mm. (No. 13314) in width, and P_4 measures 8.8 mm. (type specimen: No. 13292)–9 mm. (No. 13314) in length and 6.8 mm. (type specimen: No. 13292)–7.1 mm. (No. 13314) in width, while P_3 of the next species measures 6–7.3 mm. in length and 4.7–5.4 mm. in width, and P_4 of the same measures 7–8.1 mm. in length and 5.7–6.3 mm. in width; rudimentary paraconid of lower premolars very feeble and no longer cusp-like, being much feebler than that in the next species; no median costa on the inner side of the outer cusps of lower molars; posterior basal cingulum of $M_{1, 2}$ very feeble, being nearly discontinuous with the external basal cingulum, which is also very feeble; posterior talon of the same teeth also very feeble; that of M_3 very large and wide, embracing a spacious valley, united length of M_{1-3} measuring 38 mm. (type specimen: No. 13292)–40 mm. (No. 13314)..... *euryodon.*

(3) Rather large species in this genus; lower premolars small, as stated above; rudimentary paraconid of lower premolars not very feeble, still remaining cusp-like, though small; usually a distinct median costa is present on the inner side of each outer cusp of lower molars, though sometimes it is almost absent as in the immediately preceding species; posterior basal cingulum and posterior talon of $M_{1, 2}$ usually strong, the former being usually continuous with the external basal cingulum which is also strong, though sometimes both the cingulum and talon are as feeble as those of the immediately preceding species; the posterior talon of M_3 is distinctly smaller and narrower, embracing a distinctly less spacious valley than that of the immediately preceding species, united length of lower P_{1-4} and of M_{1-3} measuring 26 mm. (Andrews; Schlosser; No. 13296)–28.5 mm. (No. 13291) and

ca. 36 mm. (No. 13319)–39 mm. (No. 13296) respectively; that of upper P^{1-4} and of M^{1-3}, 25 mm. (Andrews' type; Schlosser) and 32 mm. (Schlosser) –34 mm. (No. 13281) respectively..... *antiquum.*

(4) Small species; posterior inner corner of upper M^3 not angular, but curved very gradually, so that the tooth as a whole is subtriangular in palatal view, united length of P_{1-4} and of M_{1-3} measuring 23 mm. (No. 14554)–ca. 24 mm. (No. 13297) and 33 mm. (No. 13290)–36 mm. (No. 14465) respectively; that of P^{1-4} and of M^{1-3}, 22 mm.. (Schlosser) and 27 mm. (Schlosser)–29.5 mm. (type specimen: No. 13279) respectively..... *annectens.*

(5) Very small species; posterior inner, as well as posterior outer corner of M^3 rather angular, and the posterior side of the tooth between the two corners is nearly straight, so that the tooth as a whole is subquadrangular in palatal view, united length of P_{1-4} and of M_{1-3} measuring ca. 21 mm. (No. 13313) –23 mm. (No. 13287*b*), and ca. 28.5 mm. (No. 13309)–32 mm. (Nos. 13287*a*, 13295 and 13315); that of P^{1-4}, 22 mm. (type specimen: No. 13232), length of each of M^1 and M^2 measuring 7.5 mm. (Schlosser)–7.7 mm. (type specimen: No. 13232) and 8.5 mm. (Schlosser) respectively, while the same teeth of the immediately preceding species measure 8.5–9 mm. and 10–11.5 mm. respectively..... *sobrina.*

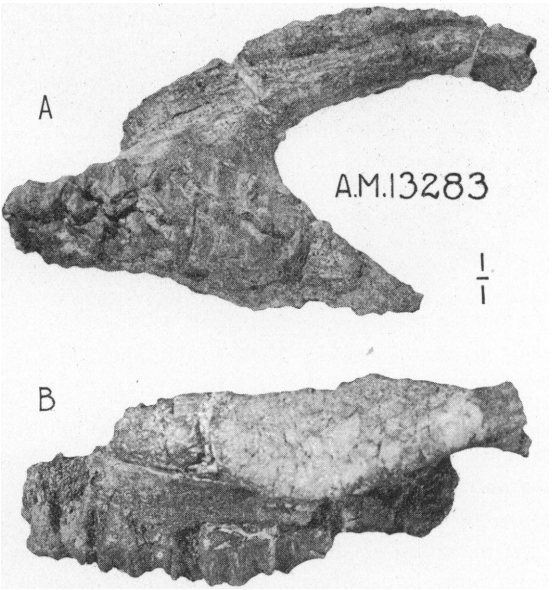


Fig. 29. *Saghatherium macrodon.* Type, fragment of left maxillary bone and zygomatic arch, Amer. Mus. No. 13283. Natural size.

A, inferior view; B, external view.

Saghatherium macrodon, new species

Saghatherium majus SCHLOSSER, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, pp. 110, 114 (*pars*: non Andrews, Pl. x (II), fig. 7.

TYPE SPECIMEN:—No. 13283, fragment of maxilla and zygomatic bar of left side, bearing M^{1-3} *in situ*, Am. Mus. Exp. 1907, Quarry B. Specimen doubtful in specific reference: No. 13325, fragment of skull, Am. Mus. Exp. 1907, Quarry A (? this species or *S. antiquum*).

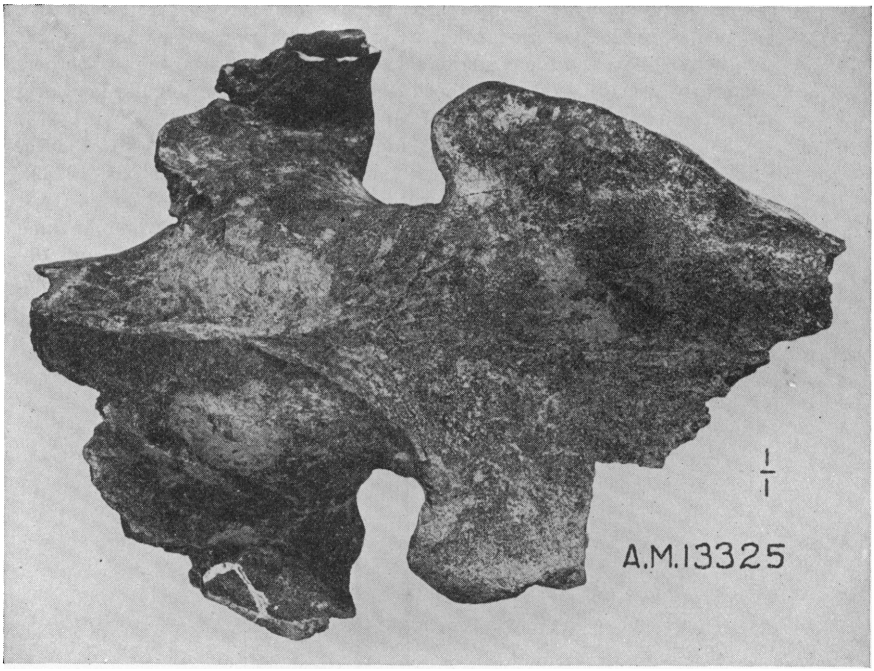


Fig. 30. *Saghatherium macrodon.* Part of skull, Amer. Mus. No. 13325. Natural size. Superior view.

Andrews' type specimens of both *S. magnum* and *S. majus* are not genuine *Saghatherium* at all, though certain specimens of mandibles referred by him subsequently to *S. magnum* are genuine *Saghatherium* and belong, in my opinion, to *S. antiquum.* It is, therefore, evident that the specific name "*magnum*" and "*majus*" cannot be kept for a certain form, which belongs to the genuine *Saghatherium* and is larger than *S. antiquum.*

Schlosser's specimen, which represents lower molars, reported by him under "*S. majus,*" appears to me really to belong to genuine *Sagha-*

therium. Now the type specimen, No. 13283, at hand, unlike Andrews' type specimens of *S. magnum* and *majus*, is thoroughly *Saghatherium* in the structure of the upper molars.

In the type specimen, the orbit lies above $M^{2, 3}$; the anterior limit of the temporal fossa lies outside and above the anterior part of the second lobe of M^3; the maximum width of the temporal fossa viewed from below measures 32 mm.; and the zygomatic bar is stout, wide vertically, and thick from side to side.

The fragmentary skull of the specimen No. 13325 is very similar in the general structure to those of *S. antiquum* reported by Andrews (1906, Pl. VII, fig. 5) and by Schlosser [1911, Pl. X (II), fig. 12]; but the former represents an individual which is distinctly larger than those represented by the latter two, notwithstanding the fact that all these three belong to full-grown individuals. It is almost certain that this specimen belongs to the genus *Saghatherium;* but it is less certain whether this specimen may belong to the present species or to *S. antiquum*, though there are certain probabilities that the former may be the case. The upper surface of the skull is quite smooth, a common character of *Saghatherium* and the modern hyracoids in contrast to *Geniohyus* and *Megalohyrax*. The sagittal crest is well developed. This specimen measures as follows (in mm.):

		A. M. 13325
I.	Length of frontals along median suture	55±
II.	Length of parietals along median suture and sagittal crest	48+e
III.	Minimum interorbital width.	2×22.5=45±
IV.	Maximum width of frontal region at postorbital processes of frontoparietal	65
V.	Minimum width of mid-cranial region at the constriction just behind frontal region	33
VI.	Maximum lateral extension of two parietosquamosal sutures	45
VII.	Minimum distance between two parietosquamosal sutures.	12.5±
VIII.	Maximum lateral extension of two glenoid surfaces of squamosals	70
IX.	Distance between two glenoid fossæ	39

The teeth of the type specimen at hand, in comparison with those of Schlosser's specimen, are tabulated to measure as follows (in mm.):

	Lower Dentition	Upper Dentition
	Schlosser[1]	A. M. 13283
M1 Length	13	13
M1 Width	8.5±	....
M2 Length	15	15
M2 Width	9.3±	13.3
M3 Length	....	17
M3 Width	9.5±	14.3
Length of M^{1-3}	....	40

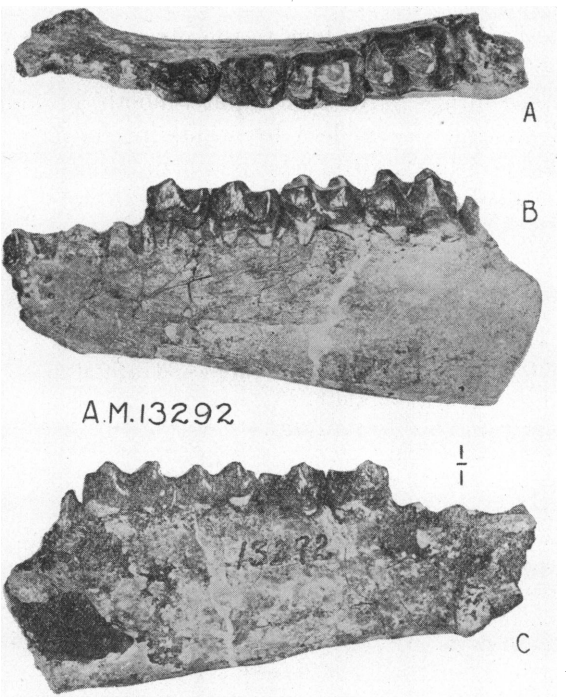


Fig. 31. *Saghatherium euryodon.* Type, part of left ramus of mandible, Amer. Mus. No. 13292. Natural size.
A, superior view; B, external view; C, internal view.

[1]The measurements suffixed with ± were estimated from Schlosser's figure of this specimen.

Saghatherium euryodon, new species

TYPE SPECIMEN:—No. 13292, fragment of left mandibular ramus, bearing P_3-M_3 *in situ*, of which M_3 is about to erupt, and with alveoli of $P_{1, 2}$, Am. Mus. Exp. 1907, Quarry A.

PARATYPE:—No. 13314, fragment of right mandibular ramus, bearing P_2-M_3 *in situ*, Am. Mus. Exp. 1907, Quarry B.

It is rather difficult to distinguish the lower cheek-teeth of this species from those of *Megalohyrax pygmæus*. They are distinguished from each other as follows:

Saghatherium euryodon	*Megalohyrax pygmæus*
(1) In $P_{3, 4}$ the protoconid and metaconid are rather close-set to each other, so that the ridge between them is short.	(1^1) In $P_{3, 4}$ the protoconid and metaconid are rather widely separated from each other, so that the ridge between them is long.
(2) In $P_{2, 3}$ the inner surface of the protoconid is distinct from both the posterior wall of the anterior valley and the anterior wall of the posterior valley; no sharp, blade-like edge between them.	(2^1) In $P_{2, 3}$ the inner surface of the protoconid and the posterior wall of the anterior valley are confluent with each other; very sharp, blade-like edge present between the former and the anterior wall of the posterior valley.
(3) No distinct entoconid and no well-formed hypolophid in all premolars.	(3^1) In $P_{3, 4}$ a distinct entoconid and a well-formed hypolophid are present.
(4) External basal cingulum very well developed in all molars.	(4^1) External basal cingulum hardly or very feebly developed in all molars.
(5) $M_{1, 2}$ are proportionately short and wide.	(5^1) $M_{1, 2}$ are proportionately long and narrow.
(6) The posterior talon of M_3 is very large and wide; the valley belonging to the talon is also large and wide.	(6^1) The posterior talon of M_3 is rather small and very narrow; the valley belonging to the talon is also very small and narrow.

The lower molar series of this species does not agree with the upper molar series of the type specimen of the preceding species, the former indicating a smaller form than that represented by the latter; so that I have come to look upon these two forms as different species.

The mandible of the type specimen, viz., No. 13292, belongs to a rather young individual, the M_3 being just on the way to erupt. The mandibular ramus is very shallow for this genus, and its lower border is nearly straight. A fenestra-like opening is present on the inner side of the ramus, just below the posterior border of M_2 and the anterior half of M_3 (? a juvenile character). This mandibular ramus and that of the specimen No. 13314 measure as on page 339 (in mm.).

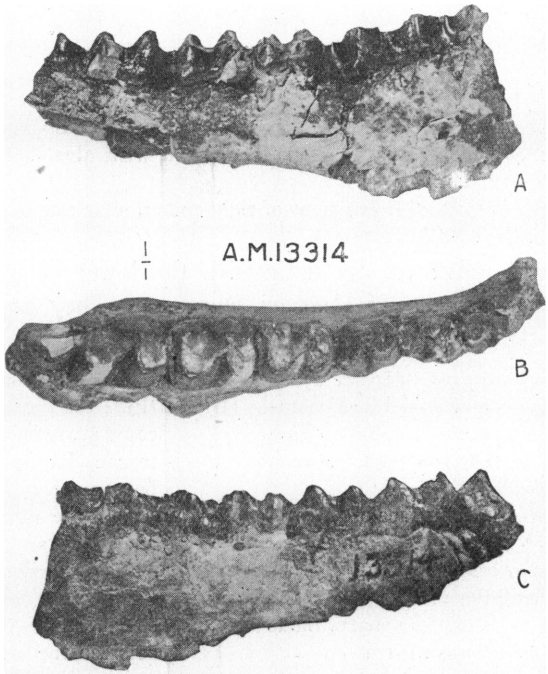


Fig. 32. *Saghathe ium eu yodon.* Paratype, part of right ramus of mandible, Amer. Mus. No. 13314. Natural size.
A, external view; B, superior view; C, internal view.

Fig. 33. *Saghathe ium antiquum.* Part of left ramus of mandible, Amer. Mus. No. 13296. Natural size. Superior view.

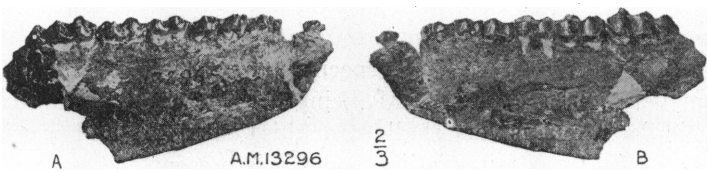


Fig. 34. *Saghathe ium antiquum.* Part of left ramus of mandible, Amer. Mus. No. 13296. Two-thirds natural size.
A, internal view; B, external view.

	A. M. 13292	A. M. 13314
	Young	....
I. Depth of ramus at posterior end of symphysis.	17±	....
II. Ditto at anterior side of P_4	19	21
III. Ditto at the same of M_3	22	....

The teeth of these two specimens measure as follows (in mm.):

	Lower Dentition	
	A. M. 13292 M_3 embryonic	A. M. 13314 ....
P_2 Length	....	7+
P_2 Width	....	5.4
P_3 Length	8	8.6
P_3 Width	5.8	6.3
P_4 Length	8.8	9
P_4 Width	6.8	7.1
M_1 Length	10.3	10
M_1 Width	7.7	7.8
M_2 Length	11.5	11.6
M_2 Width	8.8	9.4
M_3 Length	17	18.2
M_3 Width	9	9.9
Length of M_{1-3}	38	40

Saghatherium antiquum Andrews and Beadnell

S. antiquum Andrews and Beadnell, 1902, 'Preliminary Note on some New Mammals from the Upper Eocene of Egypt,' Cairo Mus., p. 5, fig. 4. Andrews, 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 85 (*pars*)[1], Pl. vii, figs. 4, 5 (non Pl. vi, fig. 6). Osborn, 1906, Bull. Am. Mus. Nat. Hist., XXII, p. 263, text figure 1. Schlosser, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 110, 112 (*pars*)[2], Pl. x (ii), fig. 12, Pl. xiii (v), fig. 12.

S. minus[3] Andrews and Beadnell, 1902, *loc. cit.*, p. 7. Andrews, 1906, *loc. cit.*, p. 89.

S. magnum Andrews, 1906, *loc. cit.*, p. 89 (*pars:* non Andrews, 1904)[4], Pl. vi, fig. 4 (non Fig. 3); Schlosser, 1911, *loc. cit.*, pp. 110, 113 (*pars*)[5].

S. majus Andrews, 1906, *loc. cit.*, p. 91 (*pars:* non the type specimen)[6].

[1]Andrews' specimens, numbered as C10057 (his Pl. vi, fig. 6), M8869, C8106 a and b, M8868 a, and M8399, which were reported by him under *S. antiquum*, are in my opinion not to be referred to this species.

[2]Schlosser's specimen, designated by him as "München A," appears to me to belong not to *S. antiquum* but to *S. annectens*.

[3]The type specimen of *S. minus* Andrews and Beadnell is in my opinion merely a young form of *S. antiquum*, representing Dm^{1-4} (not P^4, M^{1-3}, as stated by the original writers).

[4]Andrews' specimens, numbered as M8868 (his Pl. vi, Fig. 4), C8057, and C8106, are in my opinion to be referred to the present species.

[5]Schlosser's specimens, designated by him as "München C and D," and "Stuttgart B," are in my opinion to be referred to the present species.

[6]Andrews' specimen numbered as M8879 is in my opinion to be referred to the present species.

SPECIMENS:—No. 13280, palate of a young individual, bearing Dm^{1-4} of right side and Dc-Dm^4 of left side *in situ*, Am. Mus. Exp. 1907, west of Quarry A; No. 13288, fragment of mandible, with symphysial region, bearing $P_{1, 2}$ of right side, roots of $P_{1, 2}$ of left side, P_3-M_1, and incompletely represented M_2 of left side *in situ*, and with alveoli of I_1-C of both sides, Am. Mus. Exp. 1907, Quarry B; No. 13291, fragment of right mandibular ramus, bearing P_1-M_3 *in situ*, and with alveolus of C, Am. Mus. Exp. 1907, Quarry B; No. 13296, fragment of left mandibular ramus,

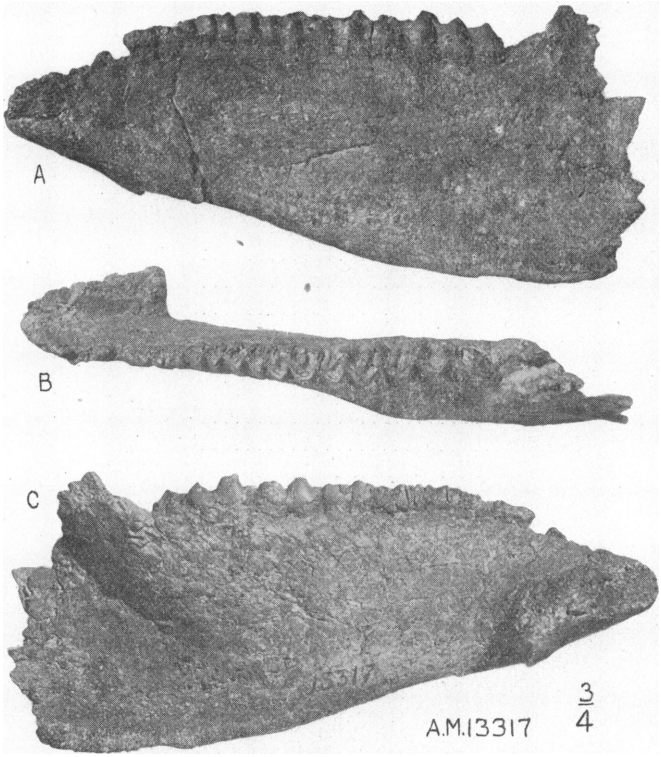


Fig. 35. *Saghathe. ium antiquum.* Part of left ramus of mandible and symphysis, Amer. Mus. No. 13317. Three-fourths natural size.
A, external view; B, superior view; C, internal view.

bearing C-M_3 *in situ*, P_1 being broken and incompletely represented, Am. Mus. Exp. 1907, Quarry A; No. 13298, fragment of right mandibular ramus, bearing M_{1-3}, *in situ*, Am. Mus. Exp. 1907, Quarry A; No. 13303, fragment of left mandibular ramus, bearing Dm_2-M_2 *in situ*, besides embryonic $P_{1, 2}$ in alveoli, Am. Mus. Exp. 1907, Quarry B; No. 13304, fragment of left mandibular ramus, bearing $M_{2, 3}$ *in situ*, M_1 being broken and incompletely represented, Am. Mus. Exp. 1907, Quarry B; No. 13317, fragment of left mandibular ramus, bearing root of C and P_1-M_3 *in situ*, and with alveoli of $I_{1, 2}$ of both sides and of I_3 of left side, Am. Mus. Exp. 1907,

Quarry B; No. 13319, small fragment of right mandiblar ramus, bearing $M_{1, 2}$ *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13322, fragment of left mandibular ramus, bearing P_4-M_3 *in situ*, both the mandible and the teeth, M_3 being macerated and poorly preserved, Am. Mus. Exp. 1907, Quarry B; No. 13323, fragment of right mandibular ramus, bearing P_3-M_3 *in situ*, M_2 being broken and incompletely represented, Am. Mus. Exp. 1907, Quarry B; No. 13326, fragment of left mandibular ramus, bearing roots of $P_{3, 4}$ and M_{1-3} *in situ*, Am. Mus. Exp. 1907, near Quarry A; No. 13350, fragment of left mandibular ramus, bearing P_2-M_3 *in situ*, all of which are more or less broken and incompletely represented, Am. Mus. Exp. 1907, Quarry B;

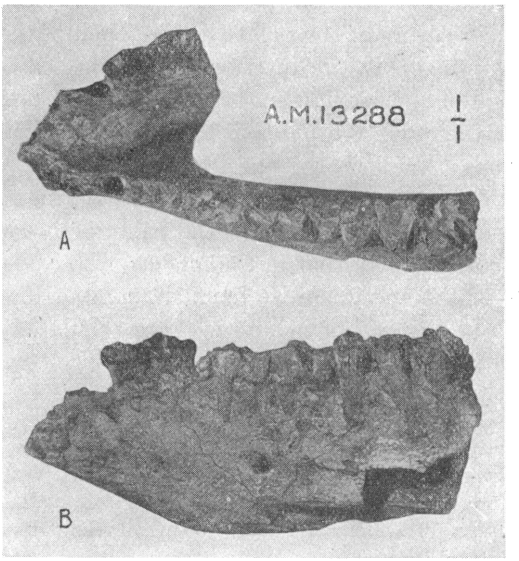


Fig. 36. *Saghatherium antiquum*. Part of left ramus of mandible and symphysis, Amer. Mus. No. 13288. Natural size.
A, superior view; B, external view.

No. 13281, fragment of upper jaw bearing P^4-M^3 of right side *in situ*, Am. Mus. Exp. 1907, near Quarry A; No. 13285, fragment of upper jaw bearing P^4-M^3 *in situ*, both the jaw and the teeth being macerated and badly preserved.

The mandibles of the specimens Nos. 13288 and 13317 differ from each other in the size of the symphysis and of $I_{1, 2}$ (as judged from the alveoli). That of the specimen No. 13288 has short and narrow symphysial region and small $I_{1, 2}$ (alveoli), while that of the specimen No. 13317 has rather long and wide symphysial region and very large $I_{1, 2}$ (alveoli). Judging from the analogy in the modern hyracoids, the former may very probably represent the female type and the latter the male type. Following this principle, the mandibles of the specimens Nos. 13291 and

13296 may also belong to the male type, having very large alveolus of I_2. The mandibles of the specimens Nos. 13288, 13291, 13296, 13303, 13317, 13326 and 13350, as well as those reported and illustrated by Andrews and by Schlosser, are tabulated to measure as on page 343 (in mm.):

In the fragments of the upper jaws of the specimens Nos. 13281 and 13285, the orbit lies above $M_{2,\ 3}$; the anterior limit of the temporal fossa viewed from below lies on a frontal plane, which cuts M_3 and passes through just a little in front of the posterior end of M_3; and the posterior end of the median suture of the palate lies far back of the posterior end of M_3. Thus, all the orbit, the anterior limit of the temporal fossa, and the posterior end of the median suture of the palate are located much farther back in their relative position to the molars than those in the modern hyracoids. In both the specimens there is a very prominent thickening and downward protuberance of the palatine at the posterior terminal part of the median suture of the palate; this protuberance is much more prominent than that in the modern hyracoids.

The teeth of the specimens at hand, in comparison with those of Andrews', of Osborn's and of Schlosser's, are tabulated to measure as in folding table facing page 343 (in mm.):

Saghatherium annectens new species

Saghathe ium antiquum ANDREWS, 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, p. 85 (*pars:* non Andrews and Beadnell, 1902),[1] Pl. VI, fig. 6 (non Pl. VII, figs. 4, 5). SCHLOSSER, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 110, 112 (*pars*).[2]

TYPE SPECIMEN:—No. 13279, fragment of upper jaw, bearing P^4-M^3 of left side *in situ*, Am. Mus. Exp. 1907, Quarry B.

PARATYPES:—No. 13284, fragment of upper jaw, bearing $M^{2,\ 3}$ of right side *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13289, fragment of left mandibular ramus, bearing P_3-M_3 *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13290, fragment of right mandibular ramus, bearing P_3-M_3 *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13293, fragment of left mandibular ramus, bearing incompletely represented Dm_4 and complete $M_{1,\ 2}$ *in situ*, Am. Mus. Exp., Quarry B; No. 13294, fragment of right mandibular ramus, bearing P^3-M^2 *in situ*, M^2 being incompletely represented, Am. Mus. Exp. 1907, Quarry B; No. 13297, two unassociated fragments of mandibular rami, one of which belongs to right side and bears P_3-M_1 *in situ*, besides alveoli of I_3-P_2 and a part of alveolus of I_2; the other belongs also to right side and bears incompletely represented Dm_4 and M_2 and complete M_1 *in situ*, Am. Mus. Exp. 1907,

[1]Andrews' specimens, numbered as C10057 (his Pl. VI, fig. 6), M8869, C8106 a and b, and M8868 a, referred by him to *S. antiquum*, appear to me really to belong to the present species.

[2]Schlosser's specimen, designated by him as "München A," appears to me to belong not to *S. antiquum* but to the present species.

	Lower Dentition																				
	A. M. 13288		A. M. 13291	A. M. 13296	A. M. 13298	A. M. 13303	A. M. 13304	A. M. 13317	A. M. 13319	A. M. 13319	A. M. 13323	A. M. 13326	A. M. 13350	Andrews[1]				Schlosser				
	right	left ♀	♂	♂		Juv.		♂														
I1 Anteroposterior diameter	4 (alv.)	4 (alv.)	....	....	....	....	....	6.5 (alv.)	....	....	....	....	....	....	....	....	....	....	....	....	....	....
I2 Anteroposterior diameter	....	4 (alv.)	....	....	....	....	....	7 (alv.)	....	....	....	....	....	....	....	....	....	....	....	....	....	....
I3 Length	2.5 (alv.)	2.5 (alv.)	....	....	....	....	....	3 (alv.)	....	....	....	....	....	....	....	....	....	....	....	....	....	....
C(Dc) Length	3 (alv.)	2.5 (alv.)	3.5 (alv.)	6	....	....	....	4.5 (root)	...	....	....	...	....	....	....	....	....	. ..	...	....	....	....
C(Dc) Width	....	....	....	2.7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	....	....	....
P1(Dm1) Length	6	5 (roots)	6.5	....	....	....	....	5.7	....	....	...	. .	. .	....	....	...	. .	. .	. .	5.5	. ..	....
P1(Dm1) Width	3.5	....	4	3.3	....	....	....	3.8	....	....	....	....	....	....	....	....	....	....	....	....	....	....
P2(Dm2) Length	6.8	6±	7	6.2	....	....	....	6.5	....	....	....	....	6	6	....	....	....	. .	....	6	....	....
P2(Dm2) Width	4.2	4.1	4.8	4.3	....	....	....	4.5	....	....	....	....	....	4	....	...	...	. .	. .	. .	....	....
P3(Dm3) Length	....	7.3	7.2	6.7	....	....	....	7	....	....	7.3	....	6.3	6.5	....	....	....	6	....	6.5	....	....
P3(Dm3) Width	....	4.7	5.3	5.2	....	(4.7)	....	5.3	....	....	5.3	....	5.4	5	....	....	....	....	....	....	....	....
P4(Dm4) Length	....	7.8	8.1	7.6	....	(8)	....	8	....	....	7.4	....	7.6	7.5	8	8	....	7.5	....	7	7	....
P4(Dm4) Width	....	5.7	6.2	6.1	....	(5.3)	....	6.3	....	....	6.3	....	6	6	....	....	....	....	....	....	....	....
M1 Length	....	9.8	9.8	10	10	9.5	...	9.2	....	9±	9.4	9.1	9.8	9.5	9	9[2]	....	9	9.5	9	9.5	....
M1 Width	....	6.7±	7.1	7.5	7.3	6.6	....	7±	....	....	6.9	6.3	6.9±	7	....	....	7.3	....	....	....	....	....
M2 Length	....	....	10.8	12	11.8	11	....	11.8	11.2	11	....	11	11.5	11	12	12	11±	10.5	10.5	11	11	11
M2 Width	....	7.4±	8.5	8.4	7.8	7	7.9	7.9±	7.8	....	....	7.3	....	8	....	....	8.4	....	....	....	....	....
M3 Length	...	....	15.3	17	16.8	...	17	17.2	16.2	16.4	15.9	16	17	17	....	18	17	17	17	16	....	16
M3 Width	....	....	....	8.6	8	....	7.8	8.5	8.2	9.7	8.5	7.7	....	8	....	....	8.4	....	....	....	....	....
Length of P1-4(Dm1-4)	....	26.5	28.5	26±	....	....	....	26.5	....	....	....	....	....	....	26	....	....	....	....	26	....	....
Length of M1-3	....	....	37	39	38	....	....	38	....	36±	....	37.3	38	37	....	....	....	37.5	38	38	....	....

	Upper Dentition									
	A. M. 13280		A. M. 13281	A. M. 13285	ex.	Andrews[3]		Osborn[4]; Schlosser	Schlosser	
	right Juv.	left	Badly preserved				Juv.	Juv.; M^2 embryonic		
I1 Anteroposterior diameter	....	....	....	....	....	....	....	....	....	....
I2 Anteroposterior diameter	....	....	....	....	....	....	....	....	....	....
I3 Length	....	....	....	....	....	....	....	....	....	....
C(Dc) Length	....	(4)	....	....	....	5 (roots)	....	....	....	....
C(Dc) Width	....	....	....	....	....	....	....	....	....	....
P1(Dm1) Length	....	(5)	....	....	....	6	(5.5)	(5±)	5	....
P1(Dm1) Width	....	....	....	....	....	5.5	....	(5±)	....	....
P2(Dm2) Length	(6.2)	(6.3)	....	....	....	6.5	(5.5)	(6±)	6.3	....
P2(Dm2) Width	(6.3)	(6.2±)	....	....	....	7	(6)	(6±)	....	....
P3(Dm3) Length	(7.8)	(8)	....	....	(8)	7	(7.5)	(8±)	7	6.5
P3(Dm3) Width	(7.7)	(7.4)	....	....	(8)	8.5	(7)	(8±)	....	....
P4(Dm4) Length	(8.5)	(8.5)	8.2	....	....	7	(8.5)	(9.5±)	7.5	7.5
P4(Dm4) Width	....	....	10.4	....	....	9.5	(8.5)	(9±)	....	....
M1 Length	....	....	11	10.5±	....	10	....	11[5]	10.5	10
M1 Width	....	....	11	....	....	11	....	11.5[5]	10	10.5
M2 Length	....	....	13	12.5±	....	12	....	13±	14	....
M2 Width	....	....	12.8	....	....	12.5	....	12±	12.5	....
M3 Length	....	....	14	14±	....	14	....	....	13.5	....
M3 Width	....	....	13.5±	....	....	13.5	....	....	13	....
Length of P1-4(Dm1-4)	....	(26±)	....	....	....	25	....	(26±)	25	....
Length of M1-3	....	....	34	33±	....	33	....	....	32	....

[1]The measurements of the first and the last one of these specimens of Andrews' were taken by myself.
[2]This measurement is stated by Andrews to be "1.9 cm." It may be a misprint for "0.9 cm."
[3]These measurements of Andrews' specimens were taken by myself.
[4]The measurements of this specimen, suffixed with ±, were estimated from Osborn's figures.
[5]These measurements are not Osborn's but Schlosser's.

		A. M. 13288 ♀	A. M. 13291 young ♂	A. M. 13296 ♂	A. M. 13303 Juv.	A .M. 13317 ♂	A. M. 13326	A .M. 13350	Andrews[1]	Schlosser[2] Prob. .... ♀ ....
I.	Length of symphysis	23	....	....	....	26	....	....	....	....
II.	Depth of ramus at posterior end of symphysis	19	17	. .	....	23	....	....	....	20 ....
III.	Ditto at anterior side of $P_4(Dm_4)$	20	....	23.5	(17)	28	27.5	28	26	24± ....
IV.	Ditto at anterior side of M_3	....	....	30	25	37	38	40	33	34± ...
V.	Ditto at posterior side of M_3	....	. .	....	....	40	....	49	37±	43 ...
VI.	Height of ascending bar at condyle	....	....	....	....	....	....	....	....	84± 64

[1]These measurements of Andrews' specimen were taken by myself.
[2]The measurements of one of Schlosser's specimens suffixed with e were estimated from his figures.

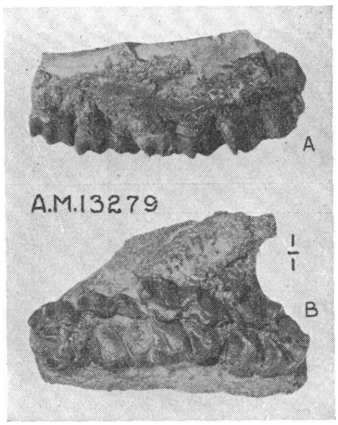


Fig. 37. *Saghatherium annectens.* Type, part of left maxillary bone containing P^4-M^3, Amer. Mus. No. 13279. Natural size.
A, external view; B, inferior view.

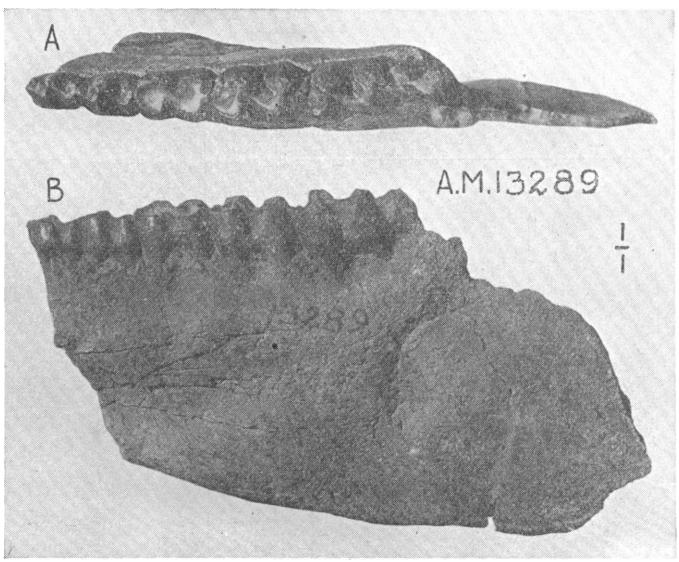


Fig. 38. *Saghatherium annectens.* Paratype, fragment of left ramus of mandible containing P_3-M_3, Amer. Mus. No. 13289. Natural size.

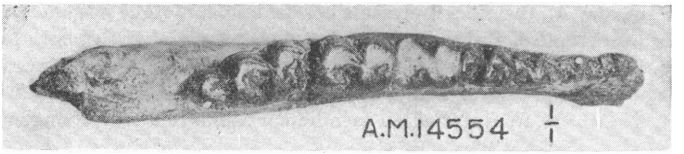


Fig. 39. *Saghatherium annectens.* Paratype, part of left ramus of mandible, Amer. Mus. No. 14554. Natural size. Superior view.

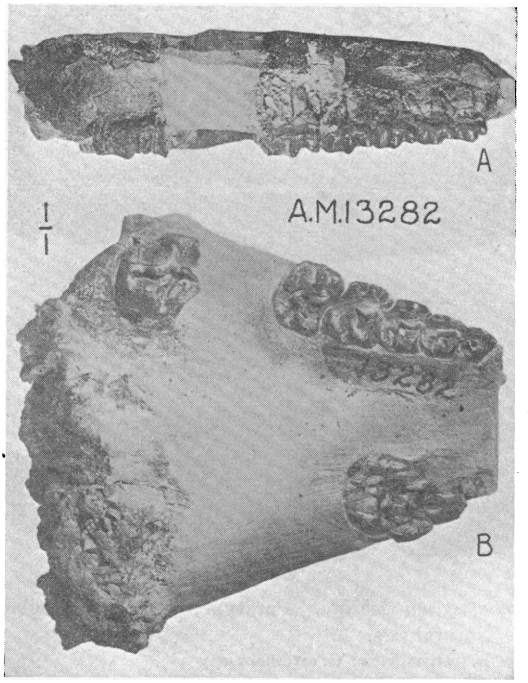


Fig. 40. *Saghatherium sobrina.* Type, fragments of upper jaw and palate containing P^1-M^1 and part of M^3 of the right side, and $P^{2,3}$ of the left side, Amer. Mus. No. 13282. Natural size.

A, external view, right side; B, inferior view.

near Quarry A; No. 13300, two unassociated fragments of mandibles; one of them represents a part of right ramus and bears P_3-M_3 and roots of P_3 *in situ*, Am. Mus. Exp. 1907, Quarry A; the other represents horizontal bar of right side and symphysial region and bears roots of P_1-M_2 *in situ* and parts of alveoli of $I_{1,2}$ of both sides, Am. Mus. Exp. 1907, east of Quarry A; No. 13305, fragment of left mandibular ramus of a very young individual, bearing $Dm_{3,4}$ and embryonic M_1 *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13306, fragment of left mandibular ramus of a very young individual,

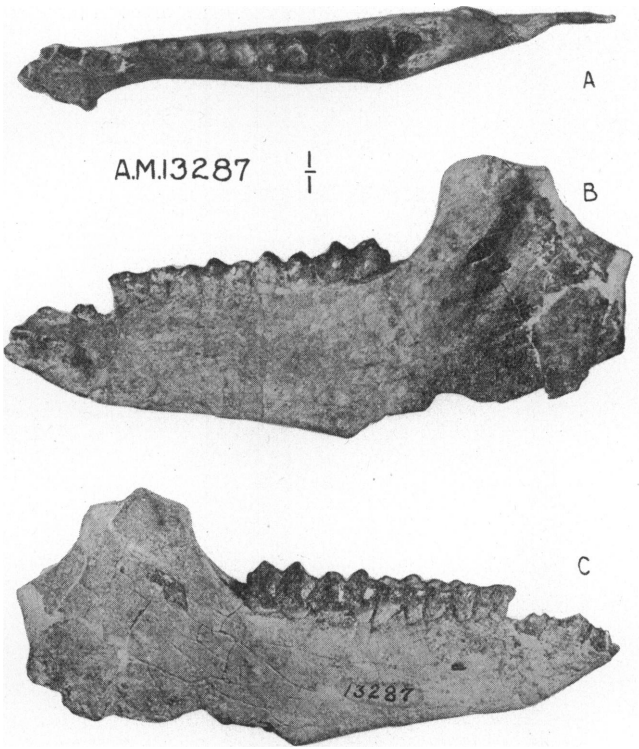


Fig. 41. *Saghatherium sobrina.* Paratype, right mandibular ramus, Amer. Mus. No. 13287. Natural size.

A, superior view; B, internal view; C, external view.

bearing $Dm_{3,4}$ and embryonic M_1 *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13310, small fragment of right mandibular ramus, bearing P_{1-3}, besides root of C, *in situ*, Am. Mus. Exp. 1907, Quarry A; No. 13312, fragments of left mandibular ramus nearing P_2-M_3 *in situ*, which, except P_3, are broken and more or less incompletely represented, Am. Mus. Exp. 1907, Quarry B; No. 13316, fragment of right mandibular ramus, bearing P_3-M_3 *in situ*, which are more or less incompletely represented, Am. Mus. Exp. 1907, Quarry B; No. 13324, fragment of left mandibular ramus and symphysial region of a very young individual, bearing Dm_1 and incompletely repre-

		Lower Dentition																					Upper Dentition				
		A. M. 13289	A. M. 13290	A. M. 13293	A. M. 13294	A. M. 13297 *a*	A. M. 13297 *b*	A. M. 13300 *a*	A. M. 13300 *b*	A. M. 13305	A. M. 13306	A. M. 13310	A. M. 13312	A. M. 13316	A. M. 13324	A. M. 14465	A. M. 14554	ex.	Andrews			Schlosser	A. M. 13279	A. M. 13284	Andrews[1]		Schlosser
						♂			♂	Juv.	Juv.				Juv.						Prob. ♀[1]							
C	Length	....	....	....	....	....	....	....	....	....	....	4.3± (root)	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	Width	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
P1(Dm1)	Length	....	....	....	....	....	....	....	....	....	....	4.8	....	....	(4.5)	....	5	....	5	....	....	....	....	....	....	....	5
	Width	....	....	....	....	....	....	....	....	....	....	3.1	....	....	(2.5)	....	2.9	....	....	....	....	....	....	....	....	....	....
P2(Dm2)	Length	....	....	....	....	....	....	....	5± (roots)	....	....	5.5	....	....	(4.7±)	....	5.6	....	6	....	5.5	....	....	....	....	....	6
	Width	....	....	....	....	....	....	....	....	....	....	3.6	4.1	....	(3±)	....	3.7	....	....	....	4	....	....	....	....	....	....
P3(Dm3)	Length	6.2	6	....	6.6	6.5	....	6.3	5.5± (roots)	(7)	(7)	6.3	6.4	....	(6.7)	6.9	6.2	....	6	....	6	....	....	....	....	....	7
	Width	4.4	4.2	....	4.9	4.5	....	4.7	....	(4)	(3.7)	4.6	4.9	....	(4±)	4.4	4.6	....	....	....	5	....	....	....	....	....	....
P4(Dm4)	Length	6.9	6.8	7±	6.5	7	(7)	6.8	6.5± (roots)	(7)	(7.3)	....	7.2	6.9	....	6.9	7	6.9	7	7	6.8	8	7.5	....	....	....	7.5
	Width	5.3	5.2	5.2	6.2	5.6	(5±)	5.4	....	(4.7)	(4.3)	....	6.2	....	....	5.3	5.7	5.2	....	....	5.6	....	8.4	....	....	....	....
M1	Length	9	8.3	8.4	7.8	8.7	8.3	8.6	8.5± (roots)	....	....	....	8±	8.2	....	8.8	8.8	8± (space)	8	9	9	9	9	....	....	9	8.5
	Width	6.4	6.2	6.2	6.7	7	5.8	6.8	. ..	....	....	....	6.8	....	....	6	7	....	....	....	7	....	9.6	....	....	9	9
M2	Length	10.8	10.2	10.4	....	....	10±	10.4	9± (roots)	....	....	....	10.8	10.5	....	10.6	10.2	....	10	10	10.8	10	11.5	11.5±	11.5	10	10
	Width	7.3	7.2	7.4	....	.. .	6.6	7.7	....	....	....	....	7.5±	....	....	6.9	7.7	7±	....	....	8	....	11.3	11.5±	11.5	10.7	11
M3	Length	16.2±	15.6	....	....	....	....	15.6	....	....	....	....	15.4	15.4	....	16.2	16	....	14	15	16	15	12	13	13	12	12
	Width	7.4	7.4	....	....	....	....	7.7	....	....	....	....	7.7±	7.8±	....	8	8.1	....	....	....	7.6	....	12	12	12.5	11.3	11.5
Length of P1-4		....	....	....	....	24±	....	....	....	....	....	....	....	....	....	....	23	....	....	....	....	....	....	....	....	....	22
Length of M1-3		35	33	....	....	....	....	34.5	....	....	....	....	34	34	....	36	35.2	....	....	....	36	35.5	29.5	....	....	29	27

[1]The measurements of these specimens of Andrews' were taken by me.

sented $Dm_{2,3}$ *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 14465, fragment of left mandibular ramus, bearing P_3-M_3 *in situ*, Am. Mus. 1908, fluvio-marine formation of the Fayûm; No 14554, fragment of left mandibular ramus bearing P_1-M_3 *in situ*, Am. Mus. Exp. 1909, 8 km. west of Quarries; No. 13499, fragment of right mandibular ramus bearing P_4, roots of M_1, and anterior half of M_2 *in situ*, Am. Mus. Exp. 1907, Quarry B.

The mandibles of the specimens Nos. 13289, 13297*a*, 13300*b*, 13312, 13316, and 14554 measure as follows (in mm.):

	A. M. 13289	A. M. 13297*a*	A .M. 13300*a* ♂	A. M. 13312	A. M. 13316	A. M. 14554
I. Length from anterior side of P_1 to upper border of the foramen behind M_3.....	....	....	....	....	....	72±
II. Length of symphysis.....	....	....	25	....	....	....
III. Depth of ramus at anterior side of P_4.....	....	18.5	27	22±	26±	....
IV. Ditto at anterior side of M_3....	33	....	33±	....	35±	....
V. Ditto at posterior side of M_3....	38±	....	....	....	41	....

In the type specimen, viz., No. 13279, the anterior limit of the temporal fossa, viewed from below, lies just outside of the anterior lobe of M^3.

The teeth of the specimens at hand, in comparison with those of Andrews' and of Schlosser's, are tabulated to measure as in folding table facing page 347 (in mm.):

Saghatherium sobrina, new species

Saghatherium antiquum ANDREWS, 1906, Brit. Mus. Cat. Tert. Vert. Fayûm, Egypt, pp. 85–88 (*pars*)[1].

Saghatherium minus SCHLOSSER, 1911, Beitr. z. Pal. u. Geol. Österreich-Ungarns u. d. Orients, XXIV, pp. 110, 112 (*pars:* non Andrews and Beadnell, 1902),[2] Pl. x (II), fig. 5.

TYPE SPECIMEN:—No. 13282, fragments upper jaw and palate, bearing P^1-M^1 and greater posterior part of M^3 of right side and $P^{2,3}$ of left side *in situ*, besides parts of roots of P^1, P^4, and M^3 of left side, Am .Mus. Exp. 1907, Quarry A.

PARATYPES:—No. 13287, two unassociated mandibular rami, one belonging to left side, and the other to right side; the former bears P_{2-4}, Dm_4, and M_{1-3} *in situ*, both the P_4 and M_3 being embryonic and not yet erupted; besides, outer walls of the

[1]Andrews' specimen, numbered as M8399, is in my opinion to be referred to the present species.
[2]Schlosser's specimens, designated by him as "Stuttgart A, C, D, E, and F," appear to me to belong to the present species.

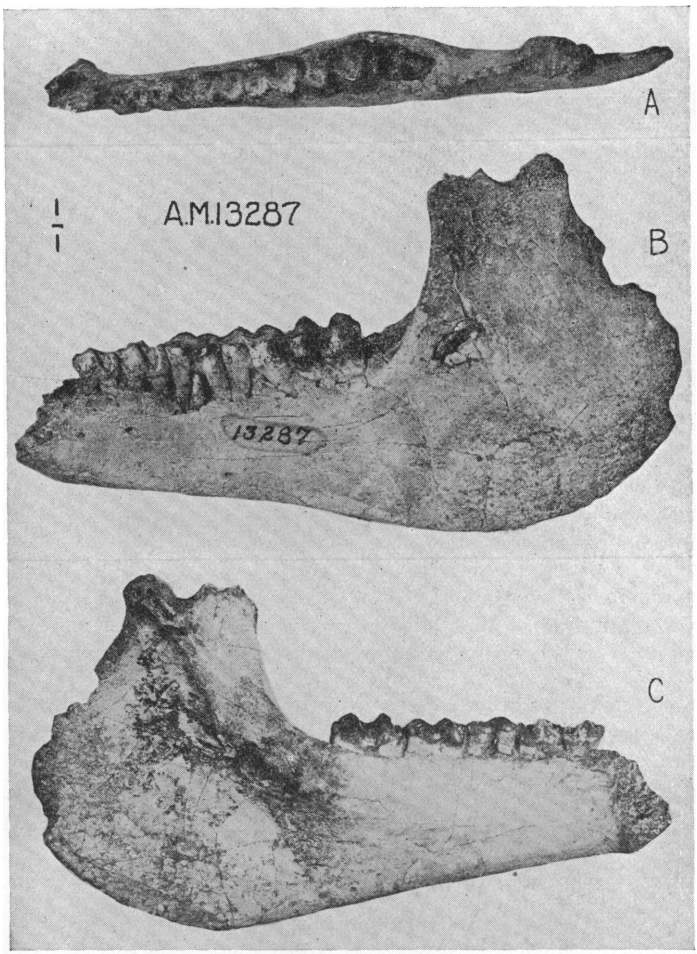


Fig. 42. *Saghatherium sobrina.* Paratype, left mandibular ramus, Amer. Mus. No. 13287. Natural size.

A, superior view; B, external view; C, internal view.

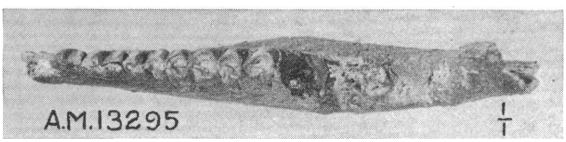


Fig. 43. *Saghatherium sobrina.* Paratype, fragment of right mandibular ramus, Amer. Mus. No. 13295. Natural size. Superior view.

		A. M. 13287		A. M.	A. M.	A. M.	A. M.	A. M.
		a	*b*	13295	13299	13301	13313	13315
		Juv. ♂	Juv. ♀					
I.	Length of ramus from top of symphysis to angle	86+	....	....	....	....	....	....
II.	Length of symphysis	11+	11+	....	....	....	....	....
III.	Minimum anteroposterior width of ascending bar below condyle	18	....	....	....	....	....	....
IV.	Depth of ramus at posterior end of symphysis	13.5	12±	....	....	....	....	....
V.	Ditto at anterior side of $P_4(Dm_4)$	(15)	(14.5)	....	18.5	30	25.5	28±
VI.	Ditto at anterior side of M_3	22	22±	....	22.5	38	32	36
VII.	Ditto at posterior side of M_3	....	....	37	27	....	36.5	46
VIII.	Height of ascending bar at condyle	48	....	....	....	....	....	....

alveoli of I_{1-3}, C, and P_1 are also represented in this specimen; the alveolus of I_2 is very large, probably indicating that this specimen belongs to a male individual; the latter specimen bears P_1, Dm_{2-4}, and M_{1-3} *in situ*, both the P_1 and M_3 being embryonic and not yet cut out; besides, the alveoli of I_{1-3} and C are represented in this specimen; the alveolus of I_2 is very small, probably indicating that this specimen belongs to a female individual, Am. Mus. Exp. 1907, Quarry B; No. 13295, fragment of right mandibular ramus, bearing P_2-M_2, besides roots of M_3 *in situ*, Am. Mus. Exp. 1907, half a mile south of Quarry B; No. 13299, fragment of right mandibular ramus, bearing $M_{2, 3}$, besides roots of P_4 and M_1 *in situ*, Am. Mus. Exp. 1907, south of Quarry B; No. 13301, fragment of right mandibular ramus, bearing P_{2-4} and M_2, besides roots of M_1 and a small part of M_3 *in situ*, Am. Mus. Exp. 1907, west of Quarry A; No. 13308, small fragment of left mandibular ramus, bearing $Dm_{3, 4}$ *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13309, fragment of left mandibular ramus, bearing M_{1-3} *in situ*, the last molar being embryonic, Am. Mus. Exp. 1907, half a mile south of Quarry A; No. 13311, fragment of right mandibular ramus, bearing Dm_4, besides roots of $Dm_{2, 3}$ *in situ*, Am. Mus. Exp. 1907, Quarry B; No. 13313, fragment of left mandibular ramus, bearing P_3 and M_3, besides roots of $P_{1, 2}$ and P_4-M_2 *in situ*, Am. Mus. Exp. 1907, half a mile south of Quarry A; No. 13315, fragment of right mandibular ramus, bearing crushed and badly preserved $M_{1, 3}$ *in situ*, Am. Mus. Exp. 1907, south of Quarry A; No. 13320, fragment of left mandibular ramus, bearing P_3-M_3 *in situ*, Am. Mus. Exp. 1907, Quarry B.

The mandibular rami of the specimens Nos. 13287*a* and *b*, 13295, 13299, 13301, 13313, and 13315 measure as on page 349 (in mm.):

In the type specimen, viz., No. 13282, the cheek-tooth series from P^1-M^1 is almost straight, being not curved outward at all, as a striking contrast to that in the other species of the present genus; the posterior internal choana opens a very short distance back of the frontal plane, which is tangential to the posterior sides of the last two molars; and the anterior limit of the temporal fossa viewed from below lies nearly on the same frontal plane. The width of the palate between the last two molars measures ca. 25 mm.

The teeth of the specimens at hand, in comparison with those of Andrews' and Schlosser's, are tabulated to measure as follows (in mm.):

		Lower Dentition															Upper Dentition		
		A. M. 13287		A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	Andrews[1]	Schlosser				A. M. 13232		Schlosser
		a	*b*	13295	13299	13301	13308	13309	13311	13313	13315	13320						right	left	
		Juv. ♂	Juv. ♀				Juv.	Young M_3 embryonic	Juv.											
P1(Dm1)	Length	....	5±	....	....	....	....	....	....	4.6 (roots)	....	....	....	4.5	4.8	....	....	5	....	....
	Width	....	....	....	....	....	....	....	....	....	....	....	. .	....	....	....	....	4.4	....	....
P2 (Dm2)	Length	5.5	(5.3)	5	....	5	....	....	(4.3±) (roots)	4.6±	....	....	....	6	6	....	6	5	5	....
	Width	3.4	(2.8)	3.5	....	3	....	....	....	....	....	....	...	....	....	....	....	5.3	5.3	....
P3 (Dm3)	Length	5.8	(6.5)	5.8	....	5.6	(6.6)	....	(6±) (roots)	6	....	5.8	....	6.5	7	....	6	6	6.5	....
	Width	4.3	(3.7)	4.4	....	3.8	(3.9)	....	....	4.1	....	3.9	....	....	....	....	....	7.1	7±	....
P4 (Dm4)	Length	(6.8)	(6.7)	6.1	....	6.4	(6.8)	....	(6.7)	6.2± (roots)	....	6.5	6.6	7	....	....	7	7	....	....
	Width	(4.8)	(4.6)	5.3	....	5	(4.5)	....	(4.3)	....	....	5.2	5	....	....	....	....	8.4	....	....
M1	Length	8	7.7	7.7	7.3±	7.8± (space)	....	7.1	....	7.4 (roots)	7.7 (roots)	7.8±	8	8	....	....	8	7.7	....	7.5
	Width	6	5.7	6	....	....	....	....	....	....	....	....	6	....	....	....	....	9.5	....	8
M2	Length	10	9.4	8.8	9.2	9.4	....	8.9	....	8.7 (roots)	9.4±	9.4±	9.3	8.5	....	10	....	....	....	8.5
	Width	7	6.4	7	6.2	7.3	....	5.8	....	....	....	6.8	6.9	....	....	....	....	....	....	9
M3	Length	....	....	14	13.6	....	....	12±	....	14.2	14±	14.7±	14.5	11	....	13	....	....	....	....
	Width	....	....	....	6.7	....	....	....	....	7	....	7	7.2	....	....	....	....	11.5±	....	....
Length of P1-4		22.5	23	....	....	....	....	....	....	21±	....	....	21.5	25.5?[2]	....	....	....	22	....	....
Length of M_{1-3}		32±	31.5±	32	30±	....	....	28.5±	....	30±	32±	31.5	32	30	....	....	....	....	....	....

[1]These measurements of Andrews' specimen were taken by myself.

[2]This measurement appears to me to be disproportionately large. As a rule, the united length of cheek-teeth is slightly less than the total sum of the length of individual teeth. The total sum of the length of premolars of this specimen is 24 mm. Then that value given by Schlosser might possibly be a misprint for "23.5" or some value near it.