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PARELEPHAS IN RELATION TO PHYLA AND GENERA OF THE FAMILY ELEPHANTIDÆ¹

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The GENUS of Linnæus comprises a contemporaneous group of species, e.g., *Felis*. The phylogenetic genus of Osborn comprises a geologic succession of species and mutations, constituting a GENERIC PHYLUM. Such phyletic genera, species, and ascending mutations are characterized by the progressive and continuous evolution of all characters along uniform lines of development or degeneration. Genera which exhibit uniformly progressive characters evolved at different rates of acceleration or retardation are united into subfamilies.

According to this principle of classification, the family Elephantidæ is now known to divide into four subfamilies and seven to eight genera, as follows:

STEGODONTINÆ.—? *Zygalophodon* Vacek, *Stegolophodon* Schlesinger (= *Prostegodon* Matsumoto), *Stegodon* Falconer.

MAMMONTINÆ.—Northern and southern mammoths.

Archidiskodon Pohlig; *A. planifrons* progressive to *A. imperator*.

Parelephas, new genus (described below); *P. trogontherioides* progressive to *P. jeffersonii* *progressus*, new subspecies (described below).

Mammonteus Camper; *M. primigenius astensis* Depéret and Mayet progressive to *M. primigenius* Blumenbach, to *M. primigenius compressus*, new subspecies (described below).

ELEPHANTINÆ.—Unknown ancestors, progressive to ?*Elephas hysudricus*, to *E. indicus*.

LOXODONTINÆ.—*Loxodonta ausonia* progressive to *L. namadica*, to *L. africana*.

LOXODONTINÆ

It will probably prove necessary to subdivide the genus *Loxodonta* into three genera or subgenera, because it is becoming apparent that within the subfamily Loxodontinæ there are three entirely separate and distinct lines of generic descent. These three lines may be provisionally separated as follows:

¹This is the author's fourteenth communication on the evolution and classification of the Proboscidea since 1918, and the twenty-fourth in his total list of papers on the Proboscidea since 1907.

Loxodonta F. Cuvier. Progressive from unknown ancestors to *L. africana* and distinguished by narrow grinding teeth with few ridge-plates and prominent 'loxodont sinus.'

Sivalikia, new genus. Typified by *Loxodonta namadica* Falconer, type species, and distinguished by broad grinding teeth, numerous ridge-plates, and absence of 'loxodont sinus.' Unfortunately the name *Falconeria* is preoccupied for a genus of reptiles, consequently the name *Sivalikia* is proposed in honor of Dr. Hugh Falconer's great work on the Siwalik fauna.

Pilgrimia, new genus. Typified by *Elephas falconeri* Busk, type species, *E. melitensis* Falconer, *E. mnaidrae* Adams, and *E. antiquus* Recki Dietrich; distinguished by narrow grinding teeth, numerous ridge-plates, 'loxodont sinus' vestigial or absent. The name *Pilgrimia* is given in honor of Dr. Guy E. Pilgrim of the Geological Survey of India, to whom palæontology is indebted for the complete solution of the stratigraphy of the Siwaliks and of other mammaliferous horizons of India and Burma.

The generic or subgeneric phyla of the Loxodontinæ will be clearly distinguished in the author's forthcoming Memoir on the Phylogeny of the Proboscidea.

MAMMONTINÆ

By many authors all the generic phyla of the mammoths are still referred to the genus *Elephas*. Such reference, from our present knowledge, is inconsistent with the fact that none of the mammoths contains the ancestral characters of *Elephas*. (1) We thus revive the ill-defined name *Mammonteus* Camper for the *Elephas primigenius* phylum, which Depéret and Mayet have traced back to the Upper Pliocene *Elephas primigenius astensis* of northern Italy and into the Lower Pleistocene *E. meridionalis cromerensis* of the Forest Bed of Cromer. Here this line terminates in the typical *E. primigenius* of western Europe and onward into the extremely progressive new subspecies ***Mammonteus primigenius compressus*** of North America. (2) We therefore confirm Pohlig's separation of the southern mammoths *Elephas planifrons*, *E. meridionalis*, and *E. imperator* into the distinct generic phylum *Archidiskodon*. (3) Much more difficult has been the separation of the third generic series of the Mammontinæ, which hitherto has been referred to the genus *Elephas* but which we now remove to the new generic phylum *Parelephas*.

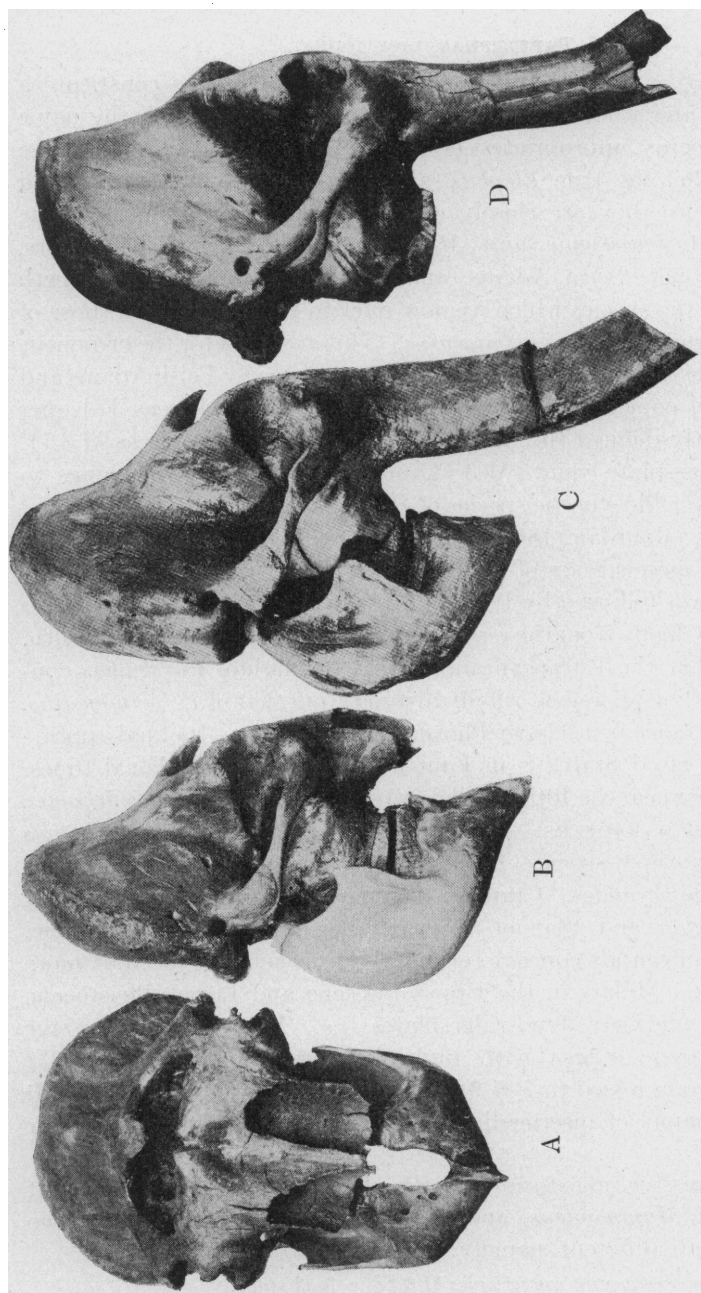


Fig. 1. Profile views of *Mammonites* (A, B) and of *Parelephas* (C, D) crania. One-sixteenth natural size.

The cranium (A, B), Nat. Mus. 8580, belongs to the typical *Mammonites primigenius* of northeastern Siberia. The cranium (C), Amer. Mus. 9950, belongs to the genotypic species *Elephas (=Parelephas) Jeffersoni*. The cranium (D), Amer. Mus. 8681, is a referred skull of the same species.

We observe in *Mammonites* the extreme fore-and-aft compression (cyrtoccephaly), the acute elevation of the occiput (acrocephaly, hypsiccephaly), the extreme depression of the grinding series and jaw (bathyccephaly), as compared with the moderate or intermediate development of the same characters in the *Parelephas* crania (C, D), in which the occiput is rounded, the occipitofrontal crest is relatively less acute, the orbit is more widely removed from the condyles, and the grinding teeth are less produced downwards.

PAELEPHAS, new genus

The eight or ten species included within this genus constitute a very ancient and wholly distinct generic phylum, for which the name *Parelephas* seems appropriate, because in certain characters these animals parallel the true *Elephas*, although in profound cranial and dental structure they are closely related to and convergent with the mammoths *Archidiskodon* and *Mammonteus*. All English authors, namely, Falconer, Leith Adams, and Lydekker, confused the teeth and crania of the species which we now refer to *Parelephas* with those of the true mammoth *Elephas primigenius*. This accounts for the erroneous collective ridge formula attributed to *E. primigenius* by Leith Adams and Lydekker and copied by Hay, namely, $M\ 3\ \frac{18}{8} = \frac{27}{4}$; whereas Falconer (1863) correctly defined the ridge formula of *E. primigenius* as $M\ 3\ \frac{24}{4}$. The lower ridge-plate count ($M\ 3\ \frac{18}{8}$) of Leith Adams really belongs to primitive Lower Pleistocene species of *Parelephas*.

HISTORY.—Jourdan (1861) was the first to separate from *E. primigenius* one of these species of *Parelephas* under the name *Elephas intermedius*. He was followed by Pohlig (1885), who clearly defined *Elephas trogontherii*. Chiefly from the researches of Depéret, Mayet, and Osborn, it is shown that the European and American phylum *Parelephas* constitutes a long line of descent wholly distinct from that of *E. primigenius*. Its first appearance is in Upper Pliocene time in Italy. Its final appearance in the United States is in Fourth Glacial and Postglacial times, principally on or near the 40th parallel, in the species *Parelephas jeffersonii*.

GENERIC CHARACTERS.—A phylum of the Mammontinæ. *Elephas jeffersonii*, genotypic species, *E. armeniacus*, *E. intermedius*, *E. trogontherii*, *E. trogontherioides*. Cranium intermediate in form between that of *Archidiskodon* and that of *Mammonteus*, namely, brachycephalic, acrocephalic. Frontals concave, occipital crest elevated; occiput more or less convex. Molars in the Upper Pliocene and Lower Pleistocene stages with relatively few ridge-plates, i.e., $M\ 3\ \frac{18}{8} \pm$; progressive Upper Pleistocene stages with multiple ridge-plates, i.e., $M\ 3\ \frac{20}{8}$. Ridge-plates compressed to 7–8–9 in 100 mm. Molar crowns broad, M^3 short, with enamel of intermediate thickness, more or less crimped or sinuous.

The progressive ridge formulæ in *Parelephas* are distinct throughout from those of *Mammonteus*, and the final ridge formulæ in the two generic phyla are different, namely:

Mammonteus primigenius compressus, $M\ 3\ \frac{27}{4}$ = final stage.

Parelephas jeffersonii progressus, $M\ 3\ \frac{20}{8}$ = final stage.

The crania of *Parelephas* throughout are readily distinguishable both in frontal and lateral aspects, and especially in vertical section, from those of *Mammonteus*, as can be seen in all of Falconer's beautiful plates of *E. primigenius* and in Pohlig's excellent figures of *P. trogontherii*.

The jaws of *Parelephas* and of *Mammonteus* are less readily distinguishable, but by more profound study they can also be separated from those of *Mammonteus*. The contrasts in the crania of the two genera may be summed up as follows:

Mammonteus.—Cranium and jaws extremely compressed fore-and-aft (cyrtoccephalic); extremely elevated and pointed above (hypsicephalic); extremely depressed and foreshortened below (bathycephalic).

Parelephas.—Cranium moderately compressed fore-and-aft (cyrtoccephalic); moderately elevated occipitofrontal borders (acrocephalic); moderately depressed molar-grinding area (bathycephalic).

Thus, while the intermediate forms of crania and teeth of *Parelephas* and of *Mammonteus* may prove difficult to separate, the two finally progressive forms are readily separable, namely, *Parelephas jeffersonii progressus* and *Mammonteus primigenius compressus*.

***Mammonteus primigenius compressus*, new subspecies**

TYPE.—Amer. Mus. 14559. Skull of a female mammoth including both tusks, also superior grinding teeth.

LOCALITY.—From Rochester, Indiana, acquired by purchase in 1921.

HORIZON.—Upper Pleistocene of Alaska and of the central United States (Indiana).

SPECIFIC CHARACTERS.—(1) Extreme fore-and-aft compression and vertical elevation (hypsicephaly, bathycephaly), correlated with extreme hypsodonty and fore-and-aft compression of the twenty-seven ridge-plates which compose M^3 . (2) Measurement across outside of orbits, 262 mm.; from top of skull to bottom of premaxillaries, 393 mm.

PARATYPE.—Amer. Mus. 13749. A third right superior molar, $r.M^3$, from Alaska. For paratype figure, see Osborn, 1922.555, p. 7, fig. 7.

After careful and prolonged examination of the specimens and the descriptions of Falconer (1863), we conclude that the typical *Mammonteus primigenius* of Eurasia and of North America displays a very constant ridge formula, as especially observed by Falconer, namely:

$$Dp\ 2\frac{1}{4}\ Dp\ 3\frac{3}{8}\ Dp\ 4\frac{1}{2}\ M\ 1\frac{1}{2}\ M\ 2\frac{1}{8}\ M\ 3\frac{3}{4}.$$

Falconer himself remarked that while American specimens of the true *E. primigenius* display a similar formula, namely, $M\ 3\frac{3}{4}$, the grinding teeth in general show more closely compacted ridges.

It is owing to the excessively high compression (hypsodonty) and multiplication of the plates (polydiskodonty), amounting to $M\ 3\frac{3}{7}$,

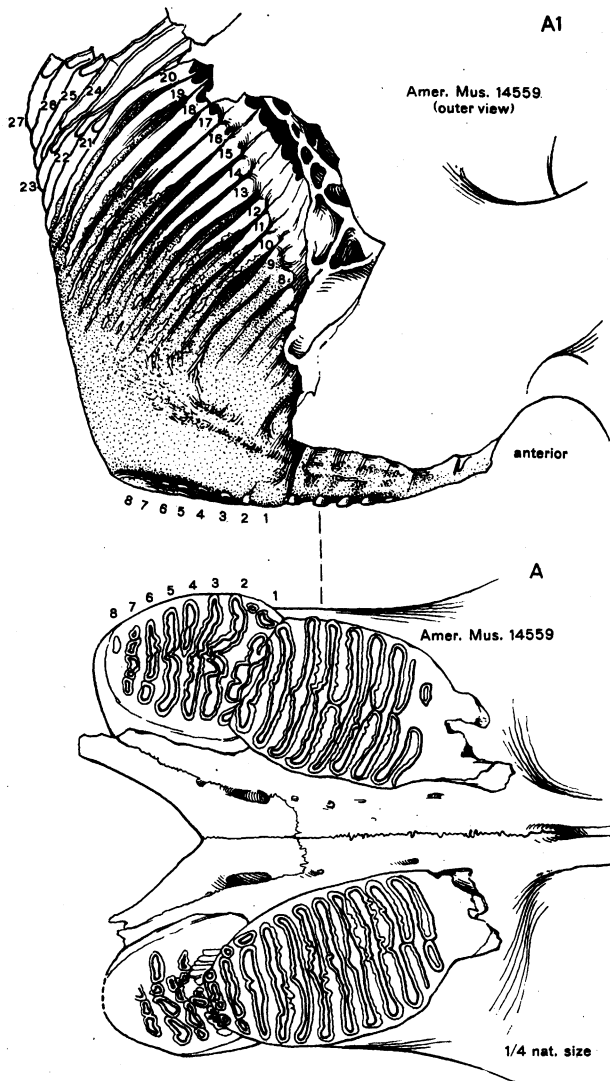


Fig. 2. Type four and third superior molars of female *Mammonteus primigenius compressus* (Amer. Mus. 14559), from Rochester, Indiana. One-fourth natural size.

that the new subspecific name *Mammonteus primigenius compressus* is now defined and illustrated by figure 2.

***Parelephas jeffersonii progressus*, new subspecies**

TYPE.—Amer. Mus. Warren Coll. 10457. A pair of superior and inferior grinding teeth of both sides.

LOCALITY.—Zanesville, Muskingum County, Ohio.

HORIZON.—Upper Pleistocene, ?post-Wisconsin (IV Glacial) age.

These progressive grinders, described by Warren in 1855 as *Elephas primigenius*, by Osborn in 1922 as a paratype of *Elephas jeffersonii*, belong to a much more progressive stage than the type of *Elephas jeffersonii*, and referred specimens, presenting a progressive ridge-plate formula of $M\ 3\ \frac{3}{8}$, as compared with the typical ridge-plate formula of *Parelephas jeffersonii*, namely, $M\ 3\ \frac{2}{4}$. It is interesting to observe that these type molars (Osborn, 1922.555, p. 14, fig. 12) show eighteen ridge-plates in use in both M^3 and M_3 ; the superior molars show from four to six ridge-plates in excess of the inferior molars; thus they are readily distinguishable from those of *Mammonteus primigenius compressus*, as described above. In all other characters these type grinding teeth (Osborn, 1922.555, fig. 12) are related to those of *Parelephas jeffersonii*. Consequently, we assign the subspecific name *progressus* to denote this extreme stage in the long *Parelephas* series.

