

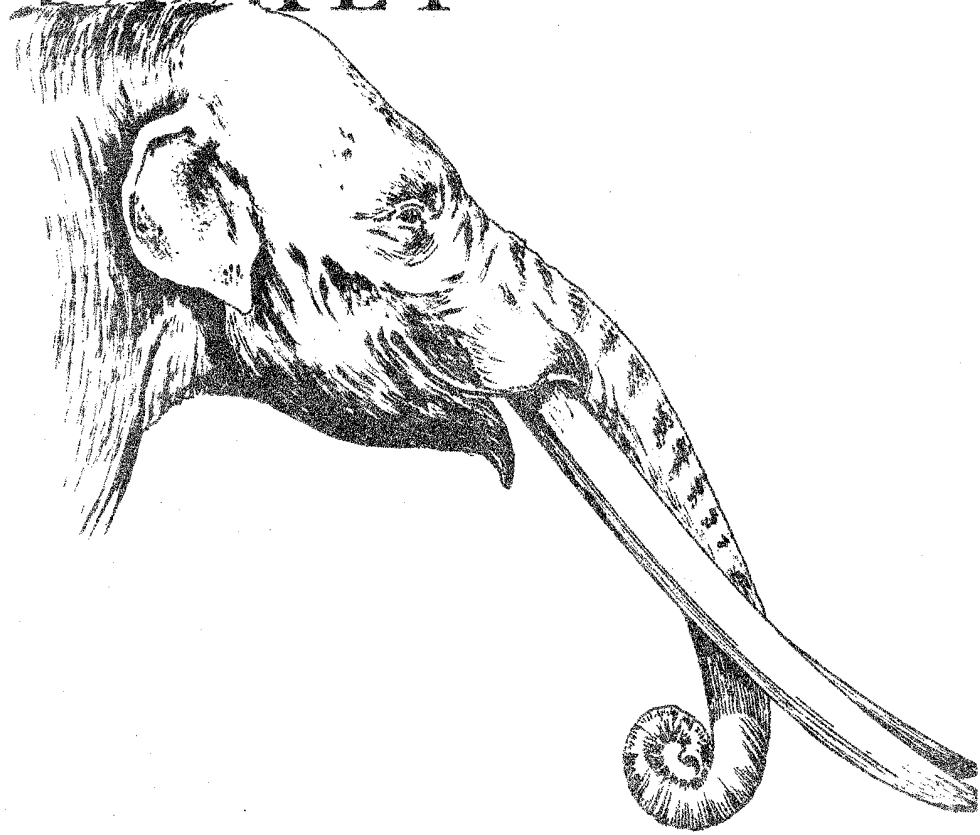
The PLASTER JACKET is a newsletter about fossil vertebrate animals of Florida. Its purpose is to circulate authoritative material on vertebrate paleontology and to foster communication among the growing number of enthusiasts of this subject.

Questions, announcements and other communications are solicited from all readers. Information of general interest will be included in future issues.

It is our intent to produce this series at the rate of about one issue per quarter year. We hope to add as many genuinely interested paleontologists as possible to our mailing list. If you are interested please send your name and address to the PLASTER JACKET. These issues are distributed free of charge to all interested people.

THE PLASTER JACKET
Florida State Museum
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Gainesville, Fla. 32601

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FOSSIL PROBOSCIDEANS OF FLORIDA

S. David Webb

The elephants and their extinct relatives, the mammoths and the mastodonts, comprise one of the most spectacular orders of mammals. The fossil record of this group is quite extensive and, consequently, their evolution is unusually thoroughly understood.

The proboscideans (that is, proboscis-bearing or trunked animals) originated in Africa in the Paleocene. They were confined to that continent until well into the Miocene epoch, when several different lines suddenly appeared in Europe, Asia, and North America. From North America certain groups spread to South America in the Pliocene and Pleistocene.

In Florida proboscideans are plentiful in both the Pliocene and the Pleistocene. Certain mastodonts and mammoths were still here when early man arrived and presumably were hunted by him.

The elephant's proboscis or trunk is a surprisingly sensitive instrument and fulfills much the same purpose as our hands. (An elephant can pick up a pin.) The trunk works in conjunction with paired tusks that are modified incisor teeth. The skull is usually very tall and rounded. Although the proboscideans have many different kinds of teeth, basically all of the teeth consist of a series of transverse crests that are used to chop up vegetable foods. The great thickness (about 1/8 of an inch) of the shiny enamel surface of proboscidean teeth is characteristic and permits recognition of even small fragments of tooth. The skeleton, of course, is characterized by its great size and pillar-like limb bones. Each foot has five toes bound up in a broad rounded pad.

Three families of proboscideans are found in the New World; three additional ones occur in the Old World. Their relationships and characterizing features are shown in Figures 1 and 2. Two of these families, the extinct Gomphotheriidae and Mammutidae, though only distantly related, are commonly grouped together as "mastodonts". The third family, Elephantidae, evolved from the Mammutidae in the Old World. No transitional forms are known in the New World; instead, the mammoths (Elephantidae) appear here suddenly in the Middle Pleistocene.

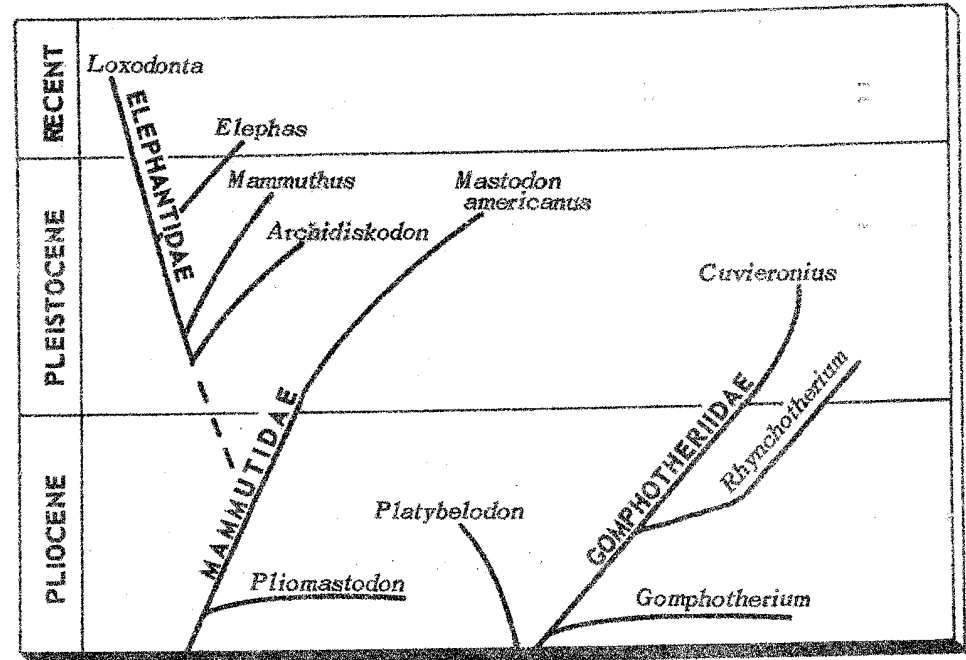


Figure 1. Evolutionary relationships of Florida Proboscideans.

GOMPHOTHERIIDAE

By far the most diversified and abundant group of proboscideans, the gomphotheres, are now extinct. Their teeth are readily distinguished from those of mammutids by their rounded cusps and abundant accessory conules. When these teeth wear down they form a trefoil or cloverleaf pattern, whereas worn teeth of mammutids maintain a pattern of simple transverse crests.

The Pliocene deposits of Florida contain three genera of gomphotheres. They are difficult to distinguish on the basis of isolated teeth, the most diagnostic features being in the jaws and tusks.

1) *Gomphotherium* (often called *Serridentinus*) is by far the commonest of all Pliocene vertebrates in Florida. The pattern of its teeth is moderately complex but it does not develop double trefoils as in *Cuvieronius* (Fig. 3). The lower tusks are moderately elongate; they are not broadened or downturned.

2) *Rhynchotherium* appears in Pliocene and early Pleistocene deposits. Its tooth pattern is relatively simple (Fig. 3). The front end of the lower jaw and the lower tusks are turned downward at nearly a right angle.

continued . . .

"Mammoths"
ELEPHANTIDAE

TUSKS

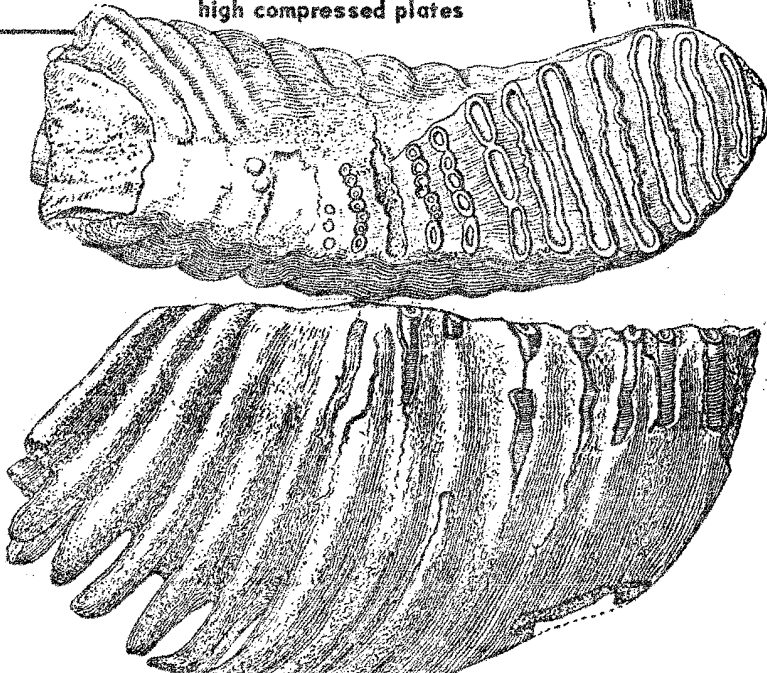
Uppers only ;
no enamel

SKULL

high ; domed

CHEEK
TEETH

high compressed plates



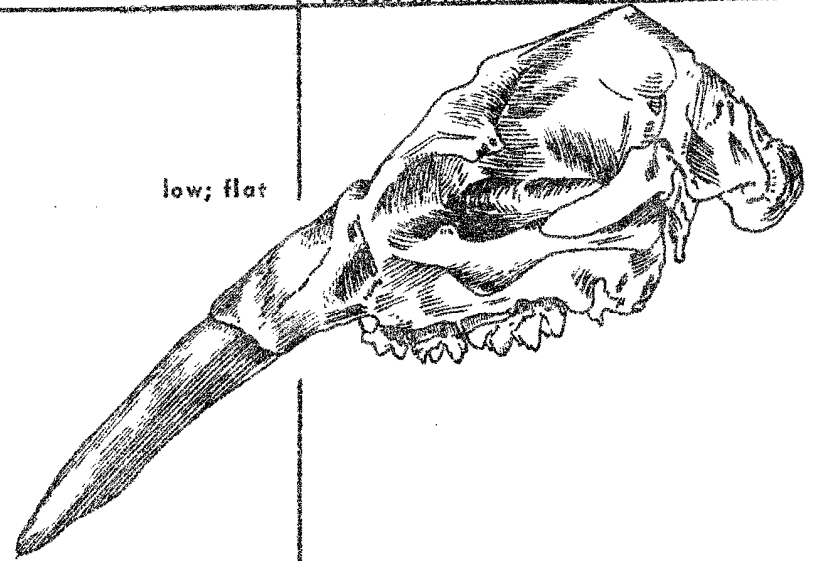
"Mastodonts"
MAMMUTIDAE | GOMPHOTHERIIDAE

Uppers and very small lowers ;
no enamel band

Enamel band on each tusk ;
uppers and lowers
(except in *Cuvieronius*)

low ; flat

low ; flat



low ridges and open valleys

low ridges ;
valleys blocked by conules

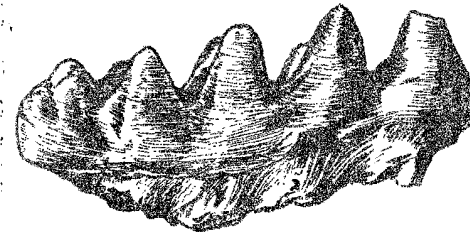
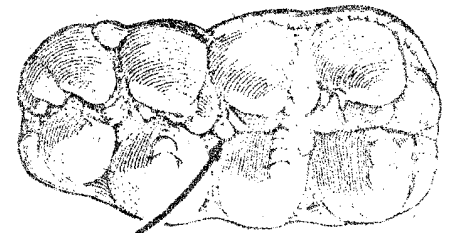
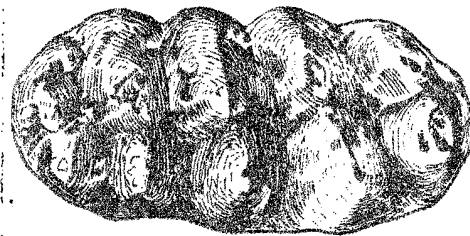
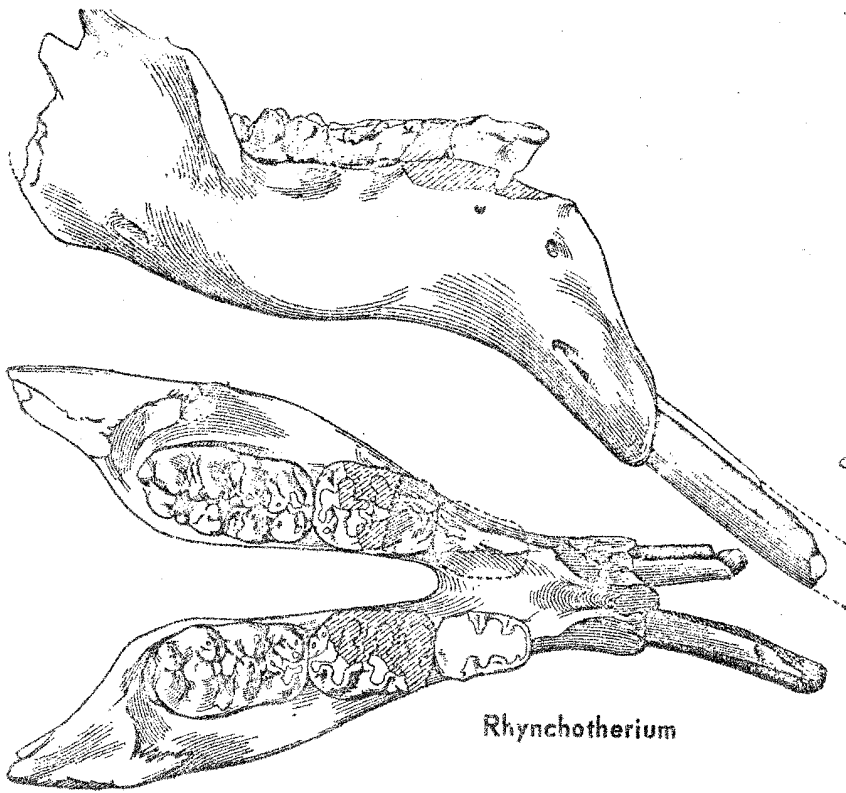


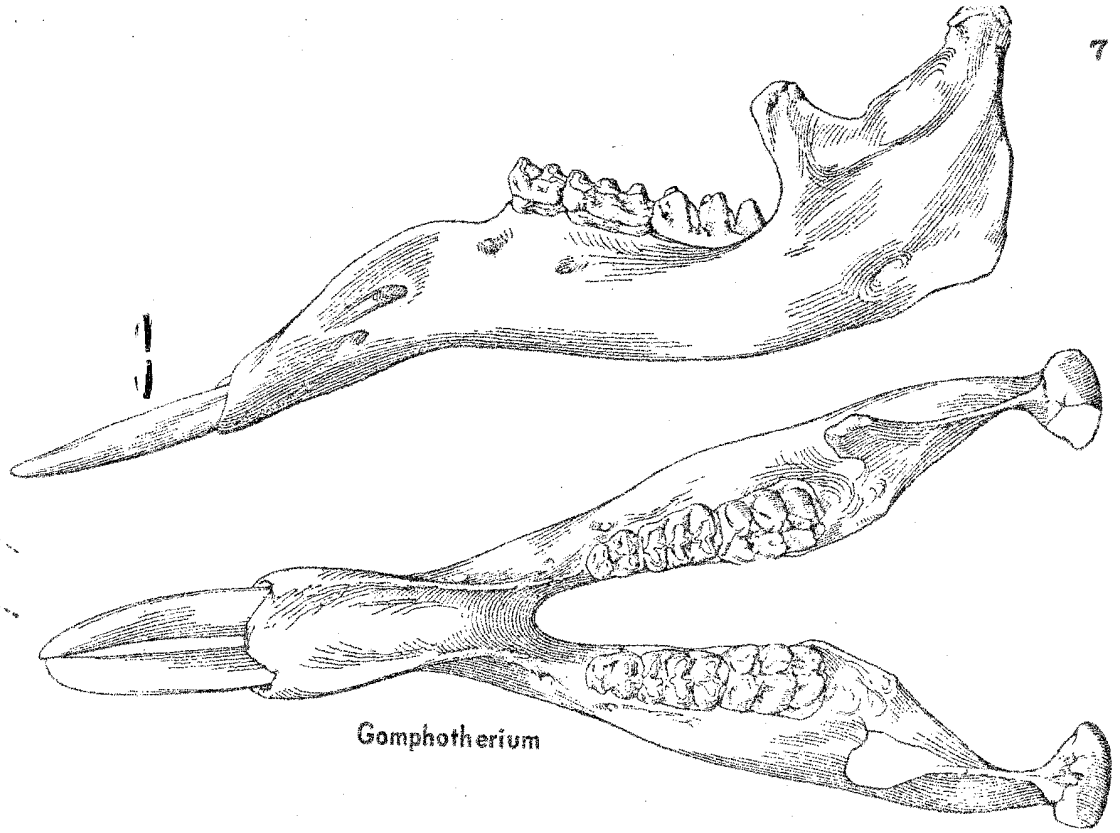
Figure 2.
Principal Features of Proboscidean Families .

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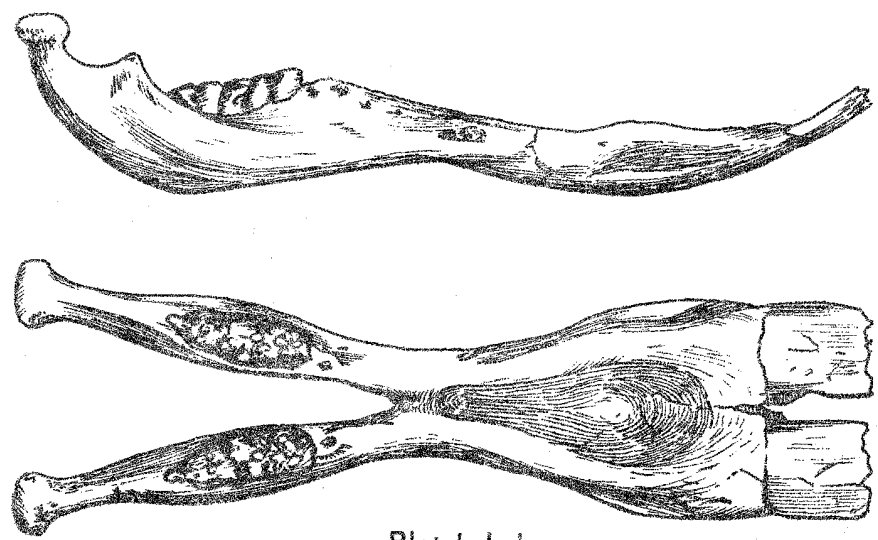


Rhynchotherium

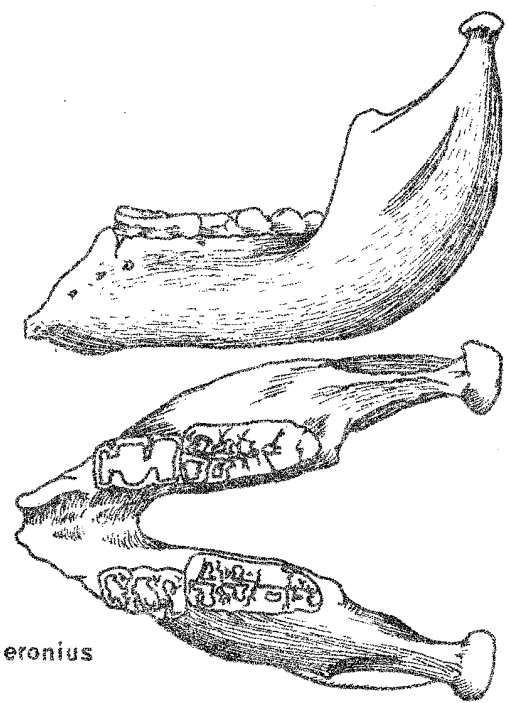
7



Gomphotherium



Platybelodon



Cuvieronius

Figure

3.

3) *Platybelodon* is found only rarely. Its teeth are rather low-crowned, but the pattern is complex with double trefoils developing in advanced stages of wear. The second and third molars have more ridges than the corresponding teeth of other gomphotheres (4 ridges in the second molar, and $5\frac{1}{2}$ or more in the third; as compared with 3 and $4\frac{1}{2}$ to 5 in other Florida gomphotheres). The most distinctive feature of *Platybelodon* is that the front of the lower jaw and the lower tusks are modified into a short, broad concavity that in size, shape and presumably function, closely resembles a large scoop shovel (Fig. 3).

In some Pleistocene faunas of Florida a fourth genus of gomphotheres is found :

4) *Cuvieronius* is named after the great French anatomist and vertebrate paleontologist of the early nineteenth century, Georges Cuvier. The genus occurs abundantly in South America, but is rare in North America. It is characterized by a very complex enamel pattern with double trefoils well developed (Fig. 3). The lower jaw bears no tusks.

MAMMUTIDAE

This family of mastodonts is much less diversified than the gomphotheres. Teeth of mammutids consist of a series of simple sharp ridges and valleys; no intermediate conules or trefoil patterns are developed (Fig. 2). The teeth do not develop extra ridges (as in *Platybelodon* and especially the mammoths). The lower jaw usually retains a vestigial pair of tusks which are not so well developed as in most gomphotheres. The Pliocene genus *Pliomastodon* is rare. It is difficult to distinguish from the Pleistocene genus *Mammut*. *Mammut americanum*, the American mastodont, is a common species in most late Pleistocene faunas.

ELEPHANTIDAE

The mammoths are closely related to the modern African and Indian elephants (*Loxodonta* and *Elephas*, respectively) and hence are classified in the same family. This family evolved in the Old World from certain mammutids in the late Pliocene. Mammoths did not appear in North America until mid-Pleistocene and they never reached South America.

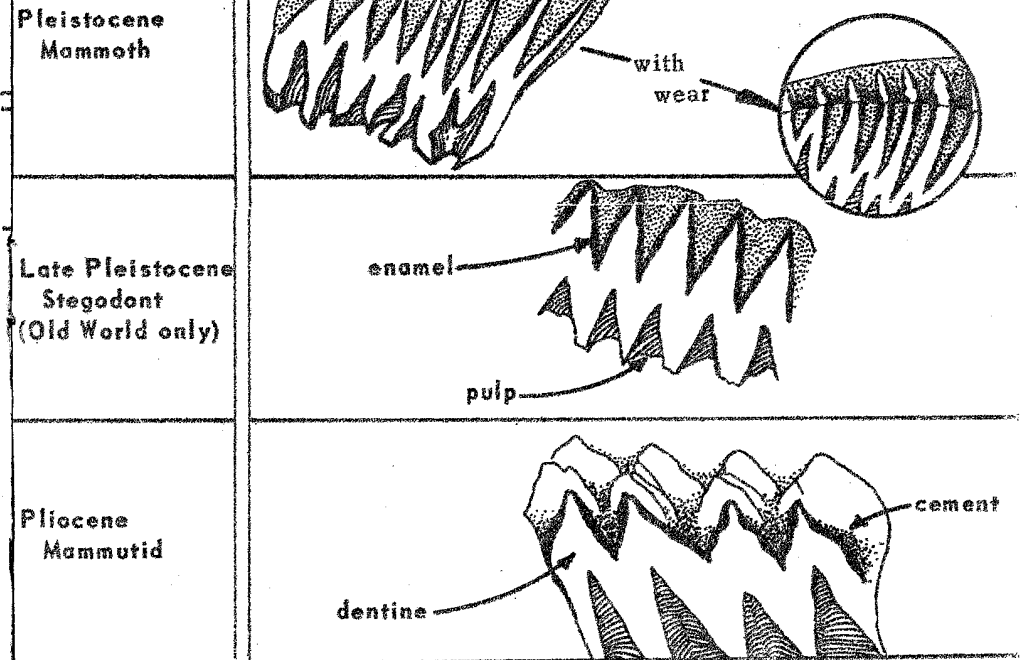


Figure 4. Evolution Of Mammoth Teeth .

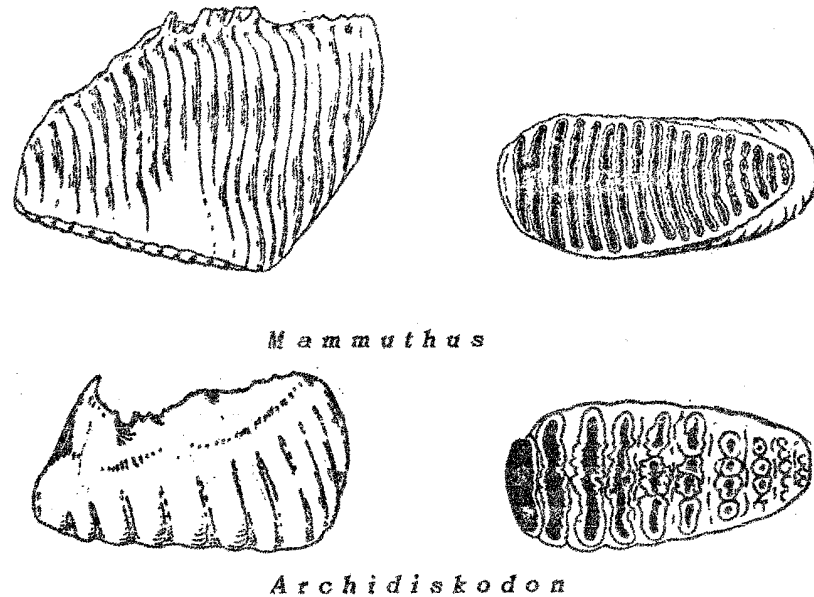


Figure 5 .

Mammoth teeth were derived from mammutid teeth by the gradual development of higher and steeper enamel ridges and by multiplication of the number of ridges in each tooth. In advanced mammoths each ridge of resistant enamel actually forms a pair of vertical plates (Fig. 4). Between the two plates lies dentine but the space between each pair of plates (in the old valley) and the next is filled with cement. The intermediate stages of evolution are seen in the stegodonts from the late Pliocene of the Old World. The elephantids lost completely the lower tusks that were greatly reduced in mammutids.

The two genera of mammoths occur in most parts of Florida :

1) *Archidiskodon* is the more primitive genus of mammoths. Its teeth are characterized by being relatively low, having very thick enamel, with major wrinkles on each plate, and a small number of loosely packed plates (Fig. 5). The common species of *Archidiskodon* in Florida is *A. imperator*. The last (largest) upper molar has 17 or 18 plates and the last (largest) lower molar consists of 18 to 20 plates. Imperial Mammoths were very large; they stood more than 13 feet high at the shoulders.

2) The genus *Mammothus* includes the more advanced mammoths. Their teeth (Fig. 5) are high crowned, have relatively thin enamel, with only minor wrinkles on each plate, and a larger number of more closely packed plates than the teeth of *Archidiskodon*. The common species of *Mammothus* in Florida is *M. floridanus*. It has 21 or more plates in the upper and lower molars. The Florida mammoth is an unusually large species of *Mammothus*, approaching the Imperial Mammoth in size.



The author of this issue, Dr. S. David Webb, is Associate Curator of Fossil Vertebrates at the Florida State Museum and Assistant Professor of Zoology at the University of Florida. He has written numerous articles on fossil vertebrates, particularly on camels, horses, carnivores, rodents, sloths and proboscideans.

THE FOSSIL RECORD OF VERTEBRATES IN FLORIDA

ERA	PERIOD	EPOCH	Years ago	Fauna	
Cenozoic	Quaternary	Recent	5,000 to 20,000(?)	Modern fauna plus a few exotics such as bison, monk seal, great auk, beaver, and flat-tailed muskrat. Grading back in time into Pleistocene fauna.	
		Pleistocene	1,000,000 to 2,000,000	Abundant record of land forms from many localities through the state; includes almost all species now in Florida plus exotics such as capybara, hog-nosed skunk, vampire bat, jaguar, camel, mammoth, mastodon, peccary, grouse, condor, and giant tortoise.	
	Tertiary	Pliocene	13,000,000	Sparse record of terrestrial and aquatic fauna from Bone Valley phosphate area and from Alachua formation. Land forms include rhinos, pronghorns, mastodonts, camels, etc.	
		Miocene	25,000,000	First record of land vertebrates, represented by more than 50 species (including rhinos, camels, small horses, exotic birds, etc.) best known from the Thomas farm and a locality in Tallahassee. Sea cows and small whales from scattered localities. Sharks and rays common.	
			Oligocene	36,000,000	Marine fishes from a few localities.
			Eocene	58,000,000	Archaic whales and marine fishes from scattered localities. One sea snake vertebra from Alachua County.
			Paleocene	63,000,000	NO RECORD
		Meso- zoic	Cretaceous	140,000,000	One unidentified turtle from 9210 feet down in oil test well in Okeechobee Co.
	230,000,000			NO RECORD	
	Paleo- zoic			600,000,000	NO RECORD