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THE NEBRASKA STATE MUSEUM

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GNATHABELODON THORPEI, gen. et sp. nov.

A new mud-grubbing Mastodon

BY ERWIN HINCKLEY BARBOUR AND GEORGE F. STERNBERG

In February, 1932, while opening a gravel pit to get material for highway construction, the skull, tusks, and mandible of a new longirostral mastodont were found by Robert Arnold on his ranch, Sec. 24, T. 12 S., R. 22 W., 1½ miles due east of Ogallah, Trego County, western Kansas. This point is located about 20 miles west and three miles north of Hays, the seat of the Fort Hays Kansas State College, in the museum of which the above mentioned specimen is mounted and exhibited. When unexpectedly exposed by Mr. Arnold and his associates, the great skull was perfect, and had one tusk in place with the other lying near by. The mandible likewise was complete throughout. The skull, jaw, and tusks were of ivory whiteness, and of substantial outward appearance, and gave little warning of their fragile nature. While they were undermining this great skull it collapsed, and the fragments were lost, with the exception of the larger pieces, such as the palatine region with the upper molars, and the very base of the skull with both occipital condyles.

The mandible fared much better, for, though broken into many pieces, all were saved except ten inches or more from the thin flaring tip of the rostrum. Perceiving the futility of all attempts to dig out this fine skull and mandible without trained assistance, Mr. Arnold promptly made his discovery known to Mr. R. E. Custer, principal of the Trego Community High School, at Wakeeney, Kansas. Mr. Custer in turn notified Mr. G. F. Sternberg by whom the parts were secured, carefully hardened, reconstructed, and properly installed in a case. The specimen seems to be a notable one and the greater is the regret that it could not have been saved in its original condition. It is a matter of congratulation, however, that Mr. Arnold had the foresight to call to his aid those trained in palaeontological practices.

The specimen was found in coarse cross-bedded channel gravel about 12 to 14 feet below the surface, an indefinite amount of material having been weathered off from above. A section at this spot shows four feet of dark clayey soil, and 22

feet of coarse cross-bedded channel gravel, with the skull and mandible near the middle. Professor Maxim K. Elias, of the University of Kansas, who has made special studies of Trego County, when consulted, pronounced this bed Late Pliocene in all probability, although he had not seen a section at this particular gravel pit, and based his opinion on neighboring exposures. This unique, longirostral, mud-grubbing mastodont cannot be referred to the tetrabelodonts, the amebelodonts, or the platybelodonts. Accordingly, we are proposing for this particular "belodon" the name *Gnathabelodon thorpei*. The generic title is in allusion to its tuskless mandible, and the specific in recognition of the work done on fossil mammals by Dr. Malcolm R. Thorpe.

Gnathabelodon is fully entitled to be placed in a new subfamily, namely, *Gnathalodontinae*.

The diagnostic characters of *Gnathabelodon thorpei* are about as follows:

The skull was amongst the largest known to mastodonts. Its tusks are long, thick, slightly helical, and are wholly destitute of the customary enamel band. The upper tusks of the longirostral types found in Kansas and Nebraska are, as a rule, small and short, averaging 2 to 3 feet; they curve downward in one plane, and have distinct enamel bands. Much later the tusks seem to have grown longer and far more robust and curved decreasingly downward, some becoming almost straight, but none being helical as far as observed. Gradually the enamel band was reduced to a vestige. The large tusks of *Gnathabelodon,* however, curve gently upward and slightly outward, unlike all other longirostral proboscideans known to this region. The mandible is notably long, strong, and massive, and is tuskless. It flares immoderately at the tip, where it comes to a thin sharp edge. The shape of the rostrum is that of a wood carver's gouge, or perhaps that of a shoehorn. Since the tip of the great flaring rostrum is drawn out into a thin edge, lower tusks were obviously precluded. Furthermore, sections of the rostrum show that the alveoli are ossified throughout, leaving no traces of tusks. It is inferred that in this genus inferior tusks had been wanting for an extended period, otherwise all vestiges of them could not have been so completely effaced. The upper borders of the rostrum, instead of coming to the usual edge, are strangely flattened to a full inch in width and are rolled outward as may be seen in the figures and sections. This seems to be distinctive, at least no

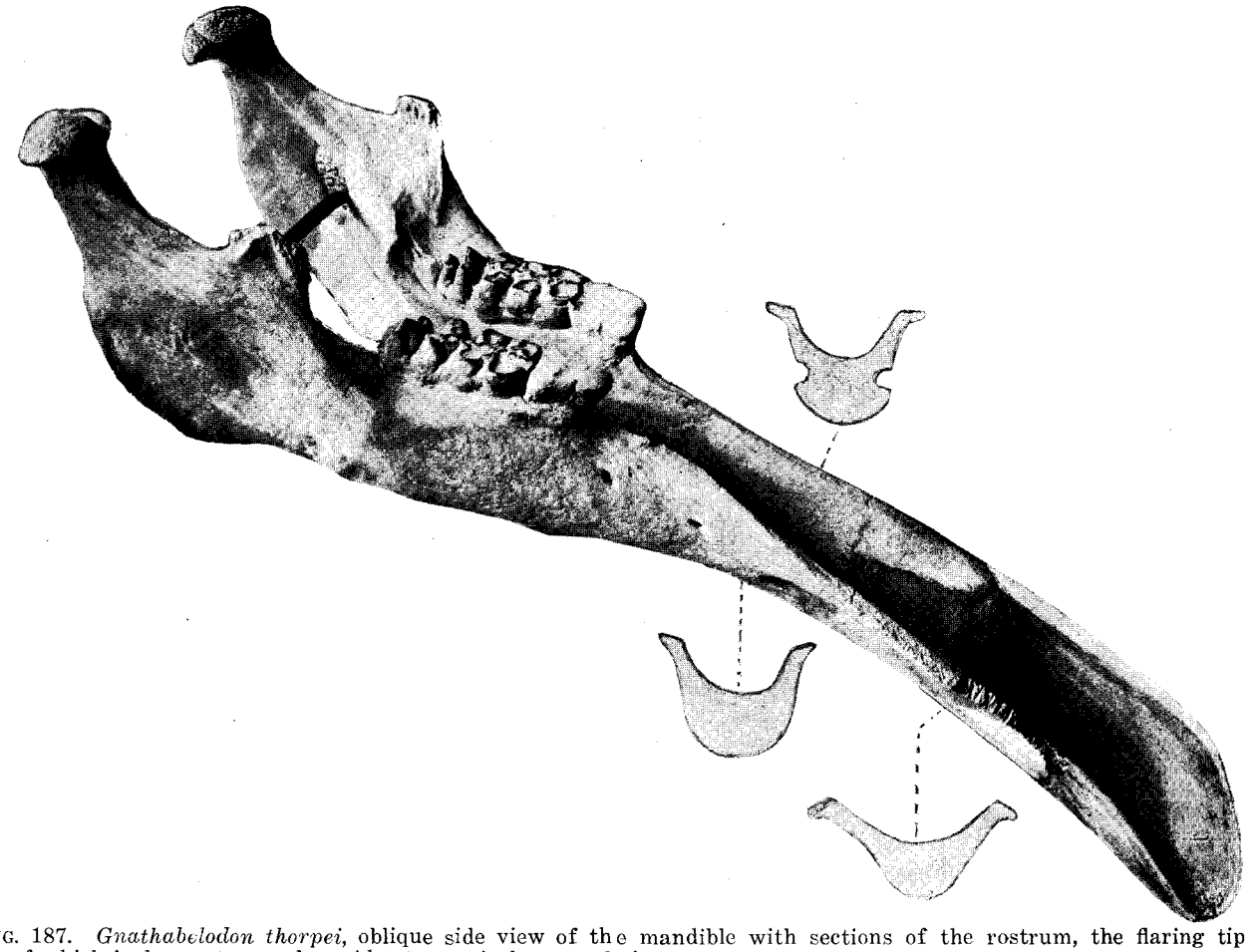

FIG. 187. *Gnathabelodon thorpei*, oblique side view of the mandible with sections of the rostrum, the flaring tip of which is drawn to an edge. About one-ninth natural size.

like modification has fallen under our observation. These flattened borders suggest the possibility that they may have been covered by a calloused hide on which the proboscis pressed, and habitually rested.

When compared with the mandibles of all of the long-jawed types, that of *Gnathabelodon* agrees most closely in form, length, and strength with *Amebelodon*, barring its tuskless state, its flattened borders, and the flared tip of the rostrum. Unlike *Amebelodon* it has an immoderately lengthened mental foramen, as that of *Megabelodon*. The total length of this mandible, as it stands, measured on the median line from the condyles to the broken tip of the rostrum, is 50 inches. According to the statements of those who were present when the jaw was found, not less than ten inches were broken off of the tip, and all but three fragments, each about the size of one's hand, were lost. Although actual contacts have not yet been made, the largest piece when set in place extends the length of the mandible at least three inches. The mandible originally must have been five feet or more in length. Hence it is closely comparable in length and strength to *Amebelodon fricki*. When compared with *Megabelodon lulli*, which has a long, slim, weak rostrum, that of *Gnathabelodon* seems massive and powerful.

The tip, when restored according to instruction, was no less in width than 10 to 12 inches. This is about as wide as that of *Platybelodon grangeri*, the widest known, and fully as wide as that of *Platybelodon barnumbrowni*.

The region may have been one of increasing aridity, in which event many creatures would of necessity have been driven for sustenance to the marshy places, where could be found grasses, sedges, and the like. If water lilies were present there would have been at hand a source of very nutritious food, for the rootstocks of pond lilies are of large size and are rich in starch, and serve even as an article of food in the dietary of man. It may be unsafe, however, to step upon the untrodden ground of palaeodietetics.

The condyles are very large, five inches in diameter, and each has a large process on the inner border. As established by Henry Fairfield Osborn, the ambelodonts were derived from *Phiomia* of the Middle Oligocene of Egypt. *Gnathabelodon* seems to have been in this line of ascent, and may be the final product of the amebelodonts. The shovel-tuskers must have been adapted to a life more or less aquatic. In considera-

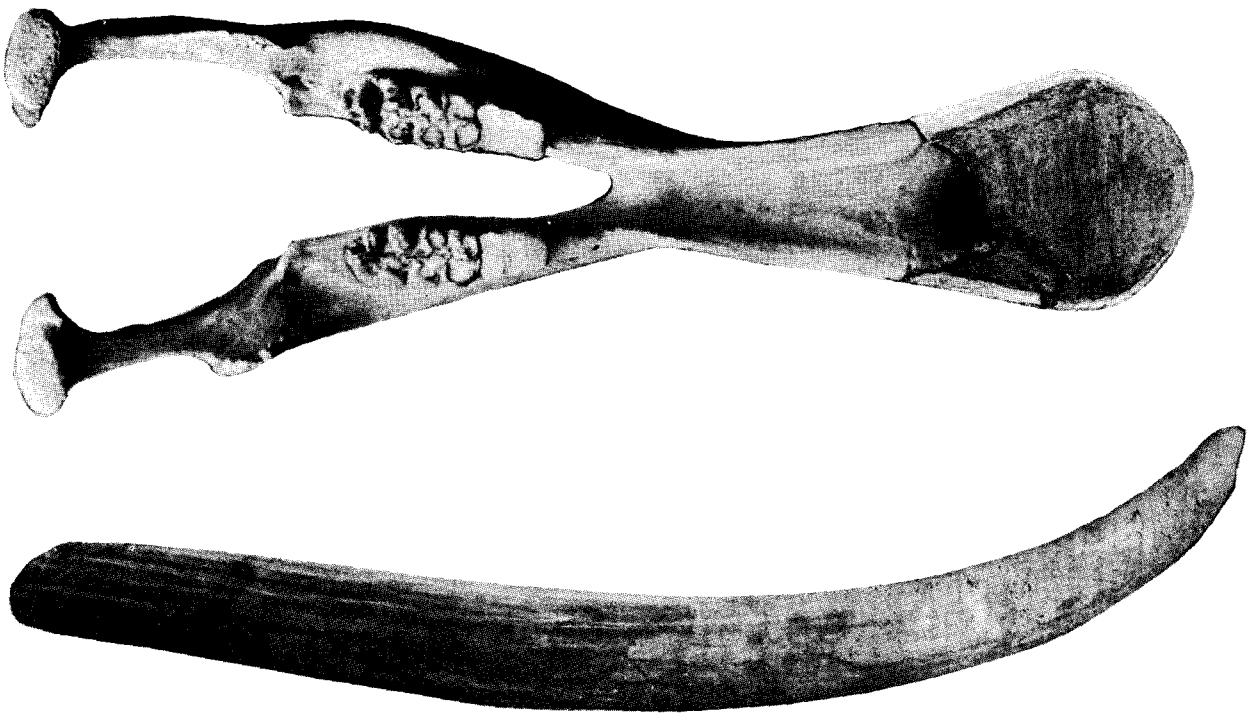

FIG. 188. *Gnathabelodon thorpei*, mandible viewed from above showing the flared, tuskless, gouge-shaped rostrum drawn to an edge.
Below is shown the robust slightly helical tusk. Length 6 feet, 7 inches. Greatest diameter 6¼ inches.

tion of the hordes of proboscideans frequenting this part of the Great High Plains, where they were more populous perhaps than in any like area, the amebelodonts in the consequent competition for food may have sought the shallow swamps as unoccupied territory. From the start it has been assumed that *Amebelodon* and *Platybelodon* haunted the borders of streams, marshes, and ponds, and that they were shovellers of sand, mud, and soft earth, and it may be that *Gnathabelodon* was more habitually aquatic than either of the others. In any event we now know of three genera of proboscideans which in their mode of life seem to have been mud-grubbers as truly as modern elephants are browsers. In digging and shovelling the other two mud-grubbing mastodons, namely, *Amebelodon* and *Platybelodon*, had an apparent advantage in their broad, flat mandibular tusks. In the case of *Platybelodon* these tusks were immoderately broad and had sharp cutting edges well fitted for scooping and for shearing off vegetation. *Gnathabelodon*, the great gouge-jawed proboscidean, though lacking this cutting edge of dentine, may nevertheless have continued to exercise the ancient perogative of the shovelling proboscideans by gouging in the softer muds with its calloused mandibular shovel. As a better adaptation for their mud-grubbing proclivities the thick hide covering the borders and tip of the rostrum may have been very callous, even corneous, thus enabling them not only to grub in sandy and muddy bottoms but, by pressure of the proboscis upon the hardened edges of the jaw, to obtain many kinds of edible herbage such as leaves, twigs, pond lilies, reeds, rushes, and the like. In addition there was at hand a variety of floating pond weeds which could be scooped up by such a gouge-shaped jaw and conveyed readily down the symphysial trough into the mouth.

In the case of each of the three above mentioned mud-grubbing mastodons, the proboscis may have been broadened into a flange-like projection, or into a thickened pad, as indicated in the pencil sketch, so as to clamp down like a lid upon the rims of the jaw as an aid in securing and holding floating pond weeds. In this manner the floating weeds could be held in the symphysial trough, and the water strained off, and then the plants fed upon. Perhaps, as already suggested, the gnathabelodonts may have been able to tear off and devour certain plants, leaves, twigs, and the like by pressure of the broadened proboscis upon the edges of the jaw. The main dependence, however, may have been the floating pond weeds,

FIG. 189. *Gnathabelodon thorpei,* left upper molar 3, showing trefoils and cones. Length 8¼ inches, width 4¼ inches.

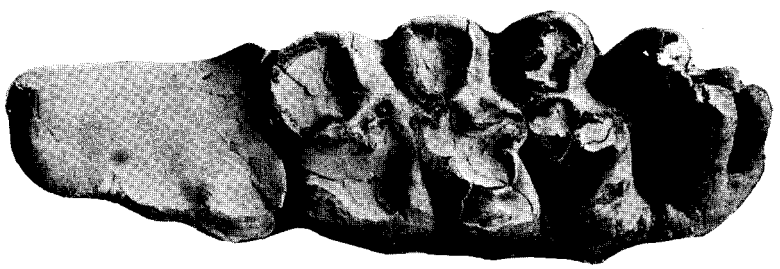

FIG. 190. *Gnathabelodon thorpei,* left lower molars showing the heavily worn second molar and the third molar, with distinct outer trefoils.

for the interference offered by the great projecting tusks would hinder effective digging or gouging with the jaw. The upper tusks had a length of six feet and seven inches and projected a couple of feet beyond the tip of the jaw, thus interfering with mud-grubbing operations. The tusks, because of their upturned tips, may possibly have been put to good account in digging. It is a reasonable inference that the continued interference offered by the great upper tusks may have changed the feeding habits of these creatures, eventually forcing the gnathabelodonts into increasing dependence upon the more available floating pond vegetation. Altogether, *Gnathabelodon thorpei* must have been a novel, even grotesque, long-jawed mastodont with its modernized, helical tusks and its great antiquated, gouge-shaped mandible.

Respecting the dentition of *Gnathabelodon,* it is a fortunate circumstance that it is practically perfect.

The third upper molar is very large, being 8¼ inches long by 4¼ inches wide. It displays distinct trefoils in the two anterior ridges and multiplied cones in the posterior. There are four grinding ridges and a well developed heel. The valleys are abrupt and deep and all show cement. Lower molar number two is well worn and rounded. Molar three is 6½ inches long by 3½ inches wide. The two front ridges exhibit well-developed trefoils.

MEASUREMENTS

	inches	mm
Mandible		
Width across condyles	20.5	52
Across coroncids	17.5	44
Tip of rostrum, greatest flare	9.25	23
Tip of rostrum restored	10 to 12	255 to 305
Back of condyle to the last molar	18	
Back of condyle to the mental foramen	40.4	1017
Second molar to symphysis	4.5	114
Second molar to mental foramen	12.25	311
Width of mandible, posterior border, molar 3	17	432
Length of jaw from the back of the condyle to the broken tip on the median line	50	1271
Length of jaw when restored	60 or more	1524
Depth back of last molar	6.5	166
Depth at mental foramen	4.5	115
Depth near tip	5.25	133
Skull		
Width across palate at third upper molars outside	10.25	266
Width across second molars	8	204
Width of palate between molars	3	75
Width across occipital condyles	11.5	294
Diameter of foramen magnum	3.5	89

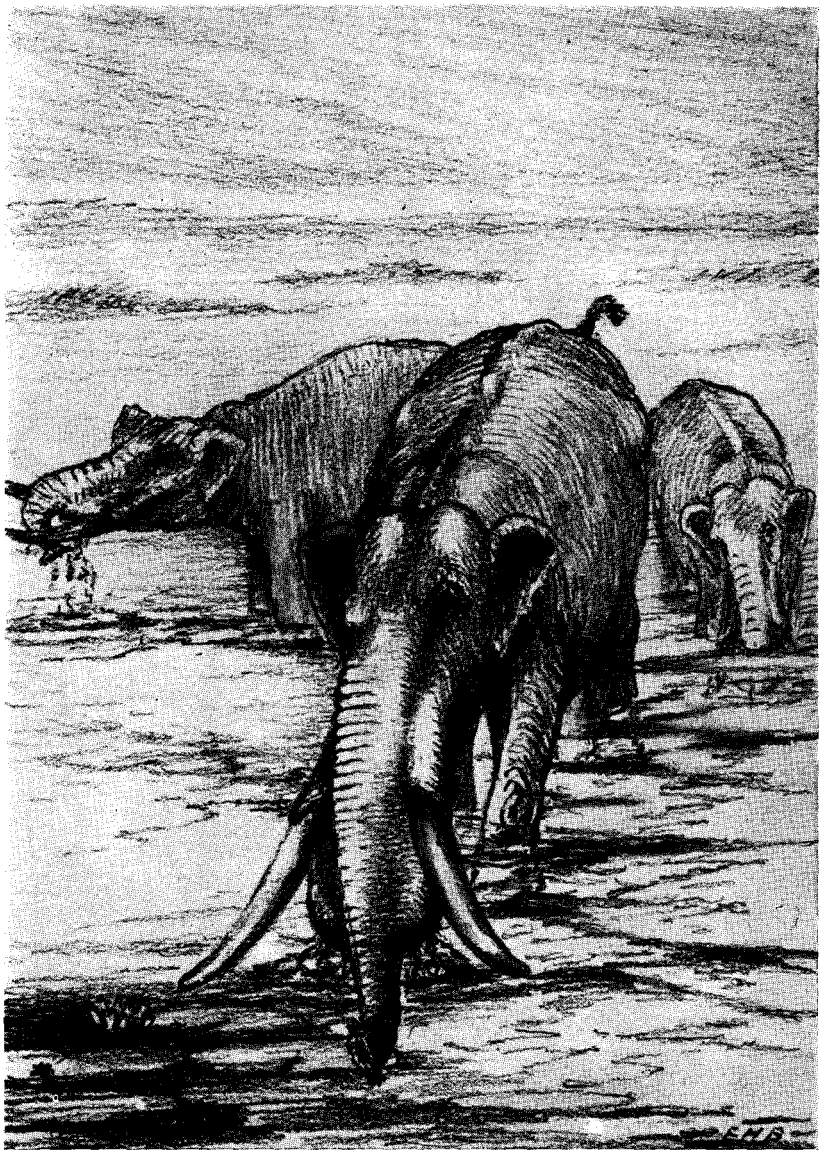

FIG. 191. *Gnathabelodon thorpei*, a pencil sketch, as they may have appeared in life, feeding upon pond weeds.

Tusk		
Measured on outer curve	79	2007
Circumference near the base	18.5	471
Greatest diameter at this point	6.25	160
Teeth		
Third upper molar, length	8.25	205
Third upper molar, width	4.25	111
Third lower molar, length	6.5	166
Third lower molar, width	3.5	99
Second lower molar, length	3.5	99
Second lower molar, width	2.5	63
For comparison		
Megabelodon lulli		
Length of jaw, exclusive of tusks	52	1322
When restored by fragments at hand	56	1424
Across coronoids	19	483
Width across condyles, outside	23.5	597
Length of third lower molar	8.75	222
Width of third lower molar	3.5	89
Amebelodon fricki		
Length of jaw, exclusive of tusks	58	1475
Length of third lower molar	9	229
Width of third lower molar	3.5	89

The University of Nebraska,
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