

Article XVII.—BRACHYOSTRACON, A NEW GENUS OF
GLYPTODONTS FROM MEXICO.

BY BARNUM BROWN.

PLATES XIII—XVIII.

While travelling in Mexico in 1910 the writer examined a deposit of early Pleistocene? age fairly rich in vertebrate remains near the town of Ameca in the state of Jalisco.

The Ameca River valley at this point is enclosed by moderately high mountains at the base of which, on either side of the river, Post Tertiary sediments are exposed in terraces to a height of two hundred feet.

The escarpments, of limited extent, are composed chiefly of volcanic ash, rhyolitic debris and gravel with an admixture of diatomaceous clay having the appearance of a river sediment. Apparently the outlet of the valley was obstructed during Pleistocene times when a shallow lake was formed over a considerable part of the valley.

Fresh water shells, fish teeth and bones, and turtle shells were found *in situ* in the highest clay strata but vertebrate remains were chiefly found in the gravels. Many of these remains are identifiable only as to families.

Invertebrates.

Valvata and *Ammicola*.

Fish.

Siluroids, spines and jaws.

Cyprinidæ, pharyngeal teeth, vertebrae and bones

Mammals

Sciuridæ, teeth.

Geomyidæ, teeth.

Cricetidæ, jaw.

Machærodont, radius.

Equus, sp. teeth, jaws and separate bones.

Elephas columbi, tooth.

Glyptodont, complete carapace and part of skeleton.

The Glyptodont is of chief interest as it forms a new genus and establishes the position of the Mexican representatives of this order.

During the excavation for a drainage canal in the valley of Mexico in

1869? two nearly complete carapaces of Glyptodonts were found near Tequixquiac one of which is preserved in the National Museum of Natural History, the other in the National School of Engineers in Mexico City.

In 1874 two civil engineers, Señors J. N. Cuatáparo and Santiago Ramirez, described¹ the specimen now in the Museum of Natural History, giving to it the name *Glyptodon mexicanus*. No reference is made to this publication in Hay's 'Bibliography' or in the 'Zoölogical Record,' so far as I can find.

In 1884 Professor E. D. Cope,² referred to these specimens as pertaining to a species indeterminate and attributed the first mention to Dr. Mariano Barcena,³ who simply mentions the specimens and their occurrence with other bones.

In 1903 in an article on the fossil fauna of the valley of Mexico, Dr. Manuel M. Villada⁴ mentions the carapace and gives a faulty mechanical drawing of the one in the National Museum collection, a delineation in which the periphery of each plate is round, obviously an incorrect drawing.

The original description of the species (*loc. cit.*) was based on a nearly complete carapace, skull, and sacrum and is accompanied by a restoration. In this restoration the carapace is reversed, end for end, and the delineation is very faulty giving an incorrect reproduction of the sculpturing. The border plates where missing are restored in approximately uniform size and pattern while a solid caudal sheath has been supplied, apparently without existence as it is not mentioned in the description.

The description though meager and insufficient serves to establish the validity of the species.

Through the courtesy of Doctor José G. Aguilera, Director of the Instituto Geologico, I was able to make notes and photograph the carapace of the type specimen in the National Museum of Natural History. I am further indebted to Dr. Aguilera for the accompanying beautiful photographs of this specimen (Plates XIII-XV), which are the first published and introduced here for comparison. Neither skull nor sacrum are exhibited with it at present and I am informed that those parts have been lost.

The original description and these new photographs show at once that it belongs to the genus herein described though a distinct species.

It is distinguished from the following species by the form of the anterior premolars which are more distinctly molariform; central figure of plates

¹ Boletin Sociedad de Geografia y Estadistica, Vol. II (3), pp., 354-362, 1875.

² Proceedings American Philosophical Society, Vol. XXII, p. 2, 1885.

³ Revista Cientifica de Mexico, Vol. I, p. 3, 1882.

⁴ Anales del Museo Nacional de Mexico, Vol. VII, pp. 441-451, 1903.

larger; transverse rows not continued as far beyond the border and the more firmly united; border plates larger and more pendant.

In the order, Glyptodontia, the pattern of the teeth in the upper series is quite faithfully reproduced in opposing teeth of the lower series.

Where they have become molariform the anterior faces of the upper teeth present a plane at right angles or slightly oblique to the longitudinal axis while the posterior face is curved.

The lower teeth are reversed, with anterior faces curved or obtusely angulate; posterior faces plane or rounded and directed at right angles or oblique to the longitudinal axis according to the position in the series.

The obliquity of the plane face in both upper and lower teeth increases, going forward in the series through molars and premolars.

In the earliest known Glyptodonts, *Propalæohoplophorus*, and allied genera from the Santa Cruz (Miocene), the first premolars are cylinders; second compressed cylindroid; third faintly trilobate; fourth distinctly trilobate and molariform.

In the later genera, *Glyptodon*, *Panoctus*, and *Sclerocalyptus* (*Hoplophorus*) of the Pampean (Pleistocene) the premolars have all become molariform with trilobate condition of first premolar, most pronounced in the genus *Glyptodon*.

In *Plohophorus* from Monte Hermosa (Pliocene) the first premolar retains the primitive cylindrical form while the second premolar shows tripartite division only on one side.

According to these relations, determined by a comparative study of skulls representing most of the South American genera, I have placed the loose teeth of the following described species in their respective positions checking the location by the length and curve of each tooth. Future discoveries may show that I have confused the position of premolars but the true molars follow in perfect sequence.

Brachyostracon cylindricus gen. et sp. nov.

Type of genus and species: No. 15548, Am. Mus. Coll., a complete carapace, cephalic plates, atlas, hyoids, several ribs, a chevron and 20 separate teeth.

Generic and specific characters. Carapace shorter than wide, outside measurement from border to border. A prominent hump above the sacrum divides the carapace into a short posterior and a long anterior part. Posterior end of carapace back of pelvis short and recurved upward. Anterior end greatly decurved and lower than posterior end. Anterior lateral border of carapace without forward extension. Plates of carapace inside of border with a round central figure surrounded by a single row, composed of from eight to twelve marginal polygonal figures. Border plates pendant. Anterior premolars cylindroid. Vaso-dentine ridges feebly branched. Sacrum and posterior lumbar fused in a long tube composed of sixteen vertebrae.

Teeth.—The teeth of *Brachyostracon cylindricus* in size and length are equal to those of *Glyptodon*. They increase in size from the anterior end of both series up to the fifth. The fifth and sixth are equal and largest. The seventh is smaller than the sixth and the eighth is distinctly smallest of the true molars. The last molar in the lower series is considerably larger than the opposing tooth of the upper series.

A Vaso-dentine ridge within the dentine subdivides with faint ramifications according to the lobation of each tooth.

The teeth preserved are, as I place them, L. 2, 3, 4, 5, 6, 7, 8, R. 4, 5, 6, 8; L. 5, 6, 7, 8, R. 1, 2, 6, 7, 8,

In the serial outlines (Figs. 1 and 2) teeth from the right upper side have been transposed to the left, and from the right lower to the left lower, in order to complete each series as far as possible.

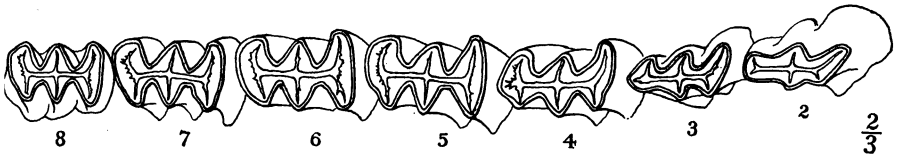


Fig. 1. *Brachyostracon cylindricus*. Left upper series, first molar absent.

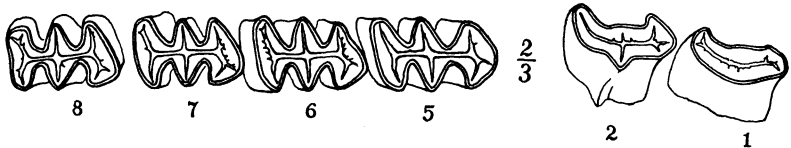


Fig. 2. *Brachyostracon cylindricus*. Left lower series, first and second teeth transposed, third and fourth absent

In the upper series all premolars present are distinctly trilobate but the second and third are considerably smaller than succeeding teeth with outer sulci shallow.

In the lower series the first premolar takes the form of a compressed, elongate cylinder. A shallow sulcus impresses the posterior half of the outer border but the tooth is in no sense lobate.

The second premolar is distinguished by a wide deep sulcus on the outer face and a sharp prismatic column on the inner middle face, flanked on either side by faint sulci, so that in a manner the grinding surface is trilobate on the inner half and bilobate on the outer half.

The last molar is smaller than preceding molars and the posterior face of the last lobe is marked by a faint vertical sulcus.

The above characters at once distinguish this from described species.

They mark a stage of tooth development less progressive than in *Glyptodon*, *Panochtus* or *Sclerocalyptus* (*Hoplophorus*) and comparable to that of *Plohophorus*.

The teeth of *Brachyostracon* (*Glyptodon*) *mexicanus* (*loc. cit.*, pp. 358-59) are all said to be trilobate but with lobation less marked in anterior teeth, a character that distinguishes it from the present species.

The measurements given by Cuatáparo and Ramirez, partly borne out by the projected outline of the skull, are most remarkable. As described this skull differs from the usual Glyptodont form chiefly in extreme elongation of the facial portion, similar to that of *Eutatus*, in the angulation of the lower jaw, and in the position of the teeth in the lower jaw. According to measurements and outline all teeth in the lower jaw are visible from the side whereas in *Glyptodon* only the anterior four, and a half of the fifth, are visible. In *Panochtus*, *Sclerocalyptus* (*Hoplophorus*), and *Plohophorus* six of the anterior teeth are visible. If these measurements are correct and the skull was associated with the carapace described, *Brachyostracon* (*Glyptodon*) *mexicanus* and *Brachyostracon cylindricus* represent not only a new genus but a new family of Glyptodonts.

The carapace in the Mexican Glyptodonts is distinctive, being peculiarly short and high with a greater width than length measured from border to border over the carapace. Near the lateral border vertical and horizontal rows of plates are defined but over the greater part of the carapace the rows are broken.

In the carapace of the primitive Miocene genus *Propalæohoplophorus* and in the Pliocene genus *Glyptotherium* the plates are disposed in transverse rows from border to border.

In the more specialized later genera, *Panochtus* and *Plohophorus*, the rows are retained near the border but are broken a short distance within the border thereby increasing the solidity of the carapace.

In the highly specialized genera there is a greater diversity of pattern. Lydekker¹ has noted this great diversity of pattern in plates from the same carapace, their various gradations and individual differences, in the genus *Glyptodon*.

The complete carapace of *Brachyostracon* still further exemplifies this variety and shows the impossibility of establishing valid species on single plates.

Carapace.—The form of the carapace (Plate XVI) is ellipsoidal in outline and robust, as in *Glyptodon*, but much shorter with postero-superior border recurved and high; anterior portion long, decurved and low.

¹ Contributions to a knowledge of the Fossil Vertebrates of Argentine, 1894.

A convex hump above the sacrum reaches its highest point above the ilia and divides the carapace in two parts. This is also true of *Panochtus* and *Dædicurus*, but in these genera the part anterior to the hump is shortest whereas in *Brachyostrakon* it is much longer.

Plates from widely separated parts of the carapace show a great variety in external sculpturing but all are characterised by a central, rounded figure surrounded by a single row of polygonal figures which vary from 8 to 12 in number.

The plates are quadrilateral, pentagonal and hexagonal, the form being determined by the number of adjoining plates in contact. Near the lateral border, where vertical and lateral rows are well defined, they are quadrilateral with central figures large, peripheral figures small and not well defined. Some distance within the border where vertical rows are not defined the plates are pentagonal or hexagonal.

The central figure in each plate is flat or slightly excavated except near the border of the carapace where it is slightly raised, convex, and so large as to nearly or quite cover the whole plate.

Toward the top of the carapace the plates are so thoroughly united that the peripheral border figures of adjoining plates fuse across the sutures forming pentagonal figures nearly as large as the central figure of each plate.

The border plates (Plates XVI, XVII, XVIII) are pendant and vary in form and size in different positions. Five plates in the middle of the lateral border project scarcely at all. Posteriorly they gradually increase in size, becoming very pointed. As the line of the posterior border rises they become less projecting but more massive reaching the greatest size and thickness on the reflexed superior surface.

Anterior to the lateral center the border plates increase in size but never reach the size of the posterior ones.

Several loose plates are preserved from between the carapace and the head shield; four of these are long, finger-like points similar to those in the first row of the head shield in *Glyptodon* figured by Lydekker (*loc. cit.*, Pl. V, a). Twenty-four others composed a part of the succeeding rows of the head shield. They are of irregular form and thin without border markings.

Atlas.— The atlas is of the same general form and proportion as in *Glyptodon* but a third smaller with articular surfaces for the axis actually and relatively larger. The vertebrarterial canal is twice the size of that *Glyptodon* and the spinous process is entirely obsolete.

The ribs and anterior chevron show no characters by which they can be distinguished from *Glyptodon*.

Pelvis.— The sacro-lumbar tube (Figs. 3 and 4) is composed of 16 verte-

bræ solidly united, with suture lines between centra and spines faintly indicated. Of these the anterior 7 are free, 4 are united with the ilia, 3 in the sacral arch are free and the last 2 are united with the ischia.

The crest of the spines form an arc, conforming to the carapace, with the greatest diameter at the point of union with the ilia, while the lower borders of the centra form an accentuated compound curve. Consequently the spines of the anterior vertebræ are nearly three times higher than those posterior to the ilia. This character is more pronounced than in any described Glyptodont.



Fig. 3. *Brachyostrocon cylindricus*. Sacro-lumbar tube. $\frac{1}{8}$.

The crests of the central spines are expanded and rugose for union with the carapace but apparently those in the extreme anterior and posterior ends did not unite with the carapace.

The ilia are not as massive as in *Glyptodon* but are inclined slightly forward of a vertical line as in that genus, with superior border greatly expanded.

The pubes are relatively larger than in *Glyptodon* with the cross-bar more massive than in any described form.

The ischia are broad thin expanded plates with superior borders considerably higher than the line of vertebral centra reaching a much greater height than in *Glyptodon*; intermediate in this respect between *Panochtus* and *Lomaphorus*.

The characters of the pelvis in *Glyptotherium* were only partly set forth

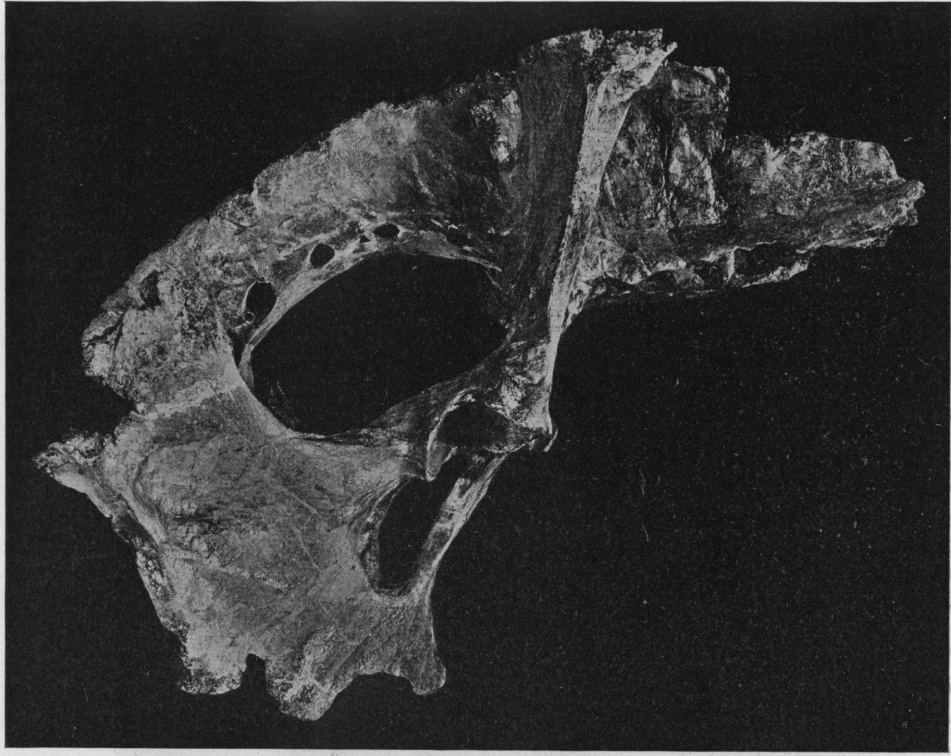


Fig. 4. *Brachyostracon cylindricus*. Sacro-lumbar tube, right side. $\frac{1}{6}$.

in the original description by Osborn (Bull. Am. Mus. Nat. Hist., Vol. XIX, pp. 491-94, 1903) and it is described here in order to show the marked distinction between it and *Brachyostracon*.

In *Glyptotherium* the compound curve of the sacrum is not more marked than in *Glyptodon*, so that anterior spines are not more than twice the height of posterior ones. Apparently there were 16 vertebræ in the sacrum but only three vertebræ united with the ilia and only one with the ischia. The pubes are reduced to very thin rods and there is no indication of a cross bar.

Summary.—From the known characters of the internal skeleton *Brachyostreacon* appears to be related to the family Sclerocalyptidæ chiefly in the development of the teeth, in the elongate skull assigned to it and described by Cuatáparo and Ramirez, and in the general development of the pelvis. Some characters of the exoskeleton, as the lack of a lateral anterior prolongation of the carapace and the disposition of known head shield plates in rows, indicate an affinity to the family Glyptodontidæ.

Measurements of carapace.

	Greatest length	Greatest width border to border
<i>Brachyostreacon cylindricus</i>	1.72 meters	2.44 meters
<i>B. (Glyptodon) mexicanus</i>	1.83 “	2.40 “

GLYPTODONTIA.

In all members of this suborder the endoskeleton is modified for the support of a highly complex exoskeleton in which striking characters of generic importance are present. But the tail sheath, usually made the chief basis of distinction, does not show characters of greater value in classification than any other part of the skeleton.

The order is separated at present into three families, the genera of which share many characters in common, chiefly of the exoskeleton. Were the endoskeletons as well known less difficulty would be experienced in classification. Without doubt the Glyptodontidæ and Sclerocalyptidæ include genera that pertain to other families but they cannot at present be separated.

In the following key I have given the chief characters by which the known genera are distinguished, omitting those of doubtful standing.

(A) GLYPTODONTIDÆ.

Glyptodon. Head truncated with nasals short and small. Teeth trilobate throughout with vaso-dentine markedly branched. Humerus without entepicondylar foramen. Manus with four digits. Pes with five digits. Pubis comparatively small with cross-bars united by cartilage. Head shield plates separate. Carapace large, robust and nearly spherical, without anterior lateral prolongation. Caudal sheath short and conical, composed of 9–10 rings with distal plates of each ring large and tuberculate.

Argentina and Brazil; Pleistocene.

Glyptotherium. Pubis greatly reduced, cross-bar vestigial or absent. Carapace medium-sized and elongate, without anterior prolongation. Plates in transverse rows. Caudal sheath composed of 7 movable rings and a tube of 4 fused rings, distal rows in each ring slightly elevated.

Texas; Pliocene.

Propalæohoplophorus. Premaxillaries with vestigial teeth. Anterior premolars simple cylinders. Sacrum composed of 7 or 8 vertebræ. Pubis small, cross-bar small or absent. Manus and pes with five digits. Head shield plates separate. Carapace small, without marked anterior lateral prolongation. Plates in transverse rows. Caudal sheath composed of 5 or 6 rings and a terminal tube of two rings closed by a single plate.

Santa Cruz of Patagonia; Miocene.

Cochlops. Skull and teeth similar to *Propalæohoplophorus*. Head shield plates separate but smaller, thicker and more numerous than in *Propalæohoplophorus*. Carapace small, plates rough and punctate, with a wide transverse band near the middle, and some over pelvis tuberculate.

Santa Cruz of Patagonia; Miocene.

Euclinepeltus. Head shield composed of 11–15 plates coössified, with suture lines raised and no sculptural pattern. Carapace medium-sized with plates marked as in *Propalæohoplophorus*, but with central figure not elevated and border plates non-serrate.

Santa Cruz of Patagonia; Miocene.

Neothoracophorus. Anterior premolar of lower jaw small and conical. Carapace medium-sized. Plates small, thick and united by tissue, only the central elevated figure surrounded by plane surface. Caudal sheath composed of rings as in *Glyptodon*.

Argentina; Pleistocene.

(B) SCLEROCALYPTIDÆ.

Sclerocalyptus (*Hoplophorus*). Anterior teeth elliptical. Carapace medium sized, long, straight and cylindrical with anterior lateral prolongation. Manus and pes with four digits. Plates large, with central figure very large and peripheral figures small. Caudal sheath composed of 5? anterior movable rings and a long tube ornamented with elliptical figures.

Argentina and Brazil; Pleistocene.

Lomaphorus. First anterior premolars in each jaw cylindrical. Carapace medium-sized and elongate with anterior lateral prolongation. Plates with large round central figure surrounded by single row of polygonal figures. Caudal sheath composed of 3 or 4 rings, terminal tube short and wide.

Argentina; Pleistocene.

Panochtus. First lower premolar an elongate ellipse, perpendicular angles present. Manus and pes with four digits. Carapace largest of order, an elongate oval with anterior lateral prolongation. Dorsal region raised above pelvis in a hump. Plates marked by polygonal figures of equal size and complete; central figure sometimes present. Caudal sheath with six rings and a long flattened tube ornamented with tubercles.

Argentina; Pleistocene.

Plohophorus. Carapace medium-sized with anterior lateral prolongation. Plates thin with central figure surrounded by two lines of peripheral figures. Caudal sheath terminating in a cylindrical tube.

Argentina (Araucanian formation); Pliocene.

Palæohoplophorus. Carapace medium-sized. Plates with large central figures

surrounded by two lines and a third incomplete line of peripheral figures. Caudal sheath with 2? movable rings and a conical elliptical tube as in *Sclerocalyptus*.

Argentina (Patagonia formation); Miocene.

Brachyostrakon. Two anterior lower premolars elliptical, vaso-dentine ridges feebly branched, sacrum composed of 16 vertebræ; 4 united with ilia and 2 united with ischia. Pubis large and cross-bar massive. Carapace large and elliptical; a prominent medium hump divides it into a short posterior recurved and a long anterior decurved end. Plates of carapace inside of border with round central figure surrounded by single row of eight to twelve peripheral figures.

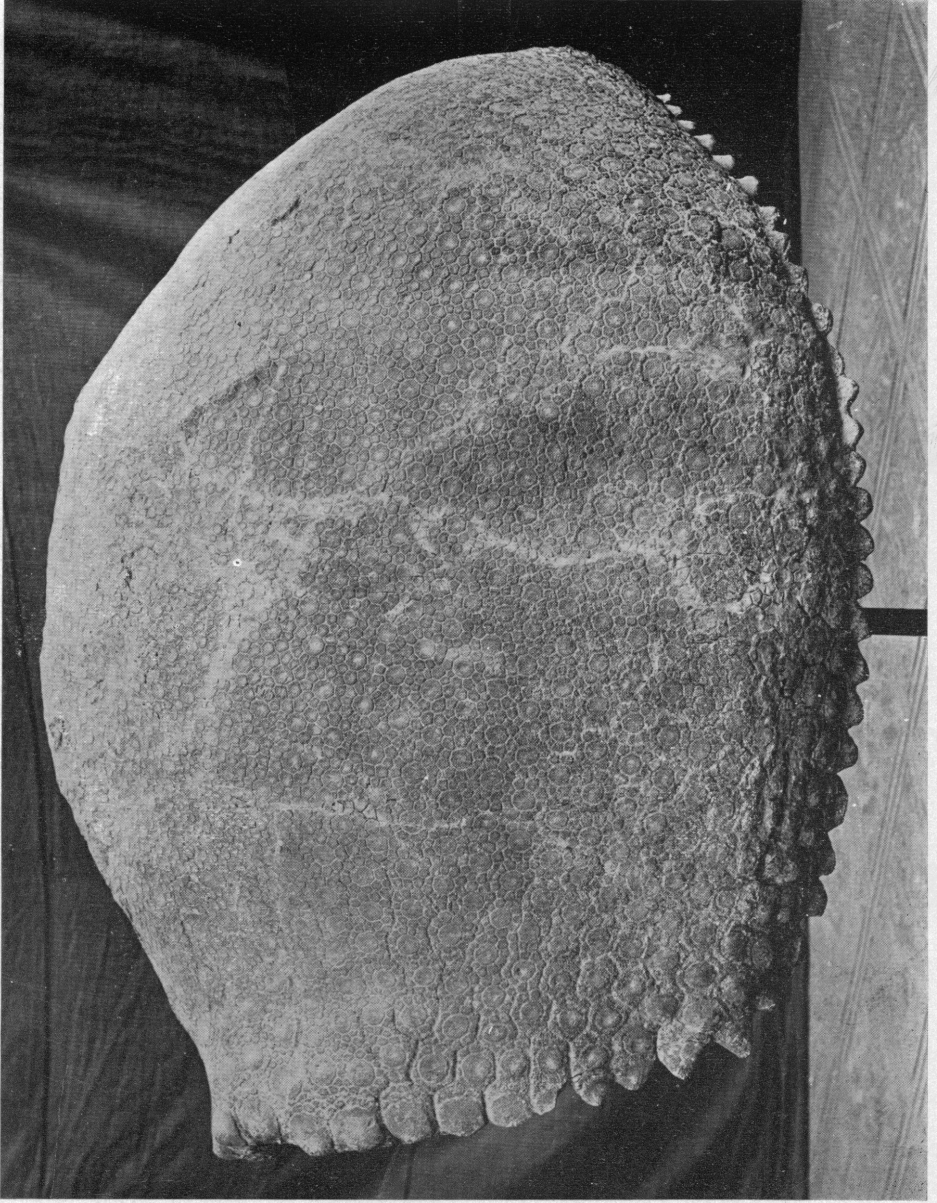
(C) DÆDICURIDÆ.

Neuryurus. Anterior premolars small and elliptical. Carapace medium to large size. Plates of carapace small and disposed in transverse rows; surface elevated in center and pitted, without figures. Caudal sheath ending in long depressed tube composed of plates similar to those of carapace excepting on lateral face when plates are elliptical and large.

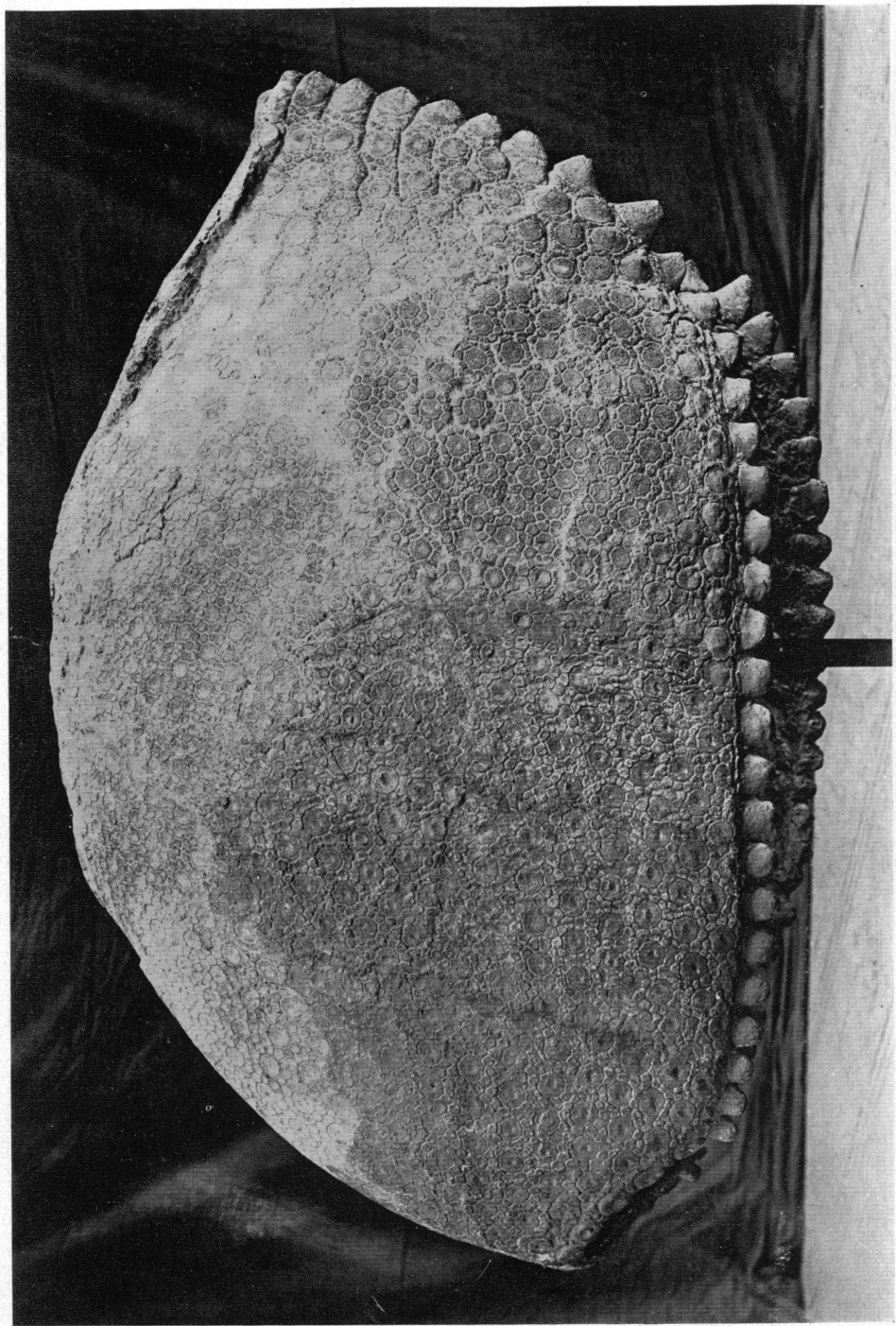
Argentina, Miocene; Brazil, Pleistocene.

Dædicurus. Head convex as in *Panochtus* and orbit completely enclosed by bony ring. First premolars smaller than succeeding teeth and semi-elliptical. Humerus with entepicondylar foramen. Manus with three functional digits. Pes with four digits. Head shield formed of small plates not suturally united. Carapace large, with anterior lateral prolongation. Plates polygonal, no figures, pitted, and convex or plane with three or five large openings on surface. Caudal sheath a large tube, very long, depressed and thickened transversely at the end where it is ornamented with large spines.

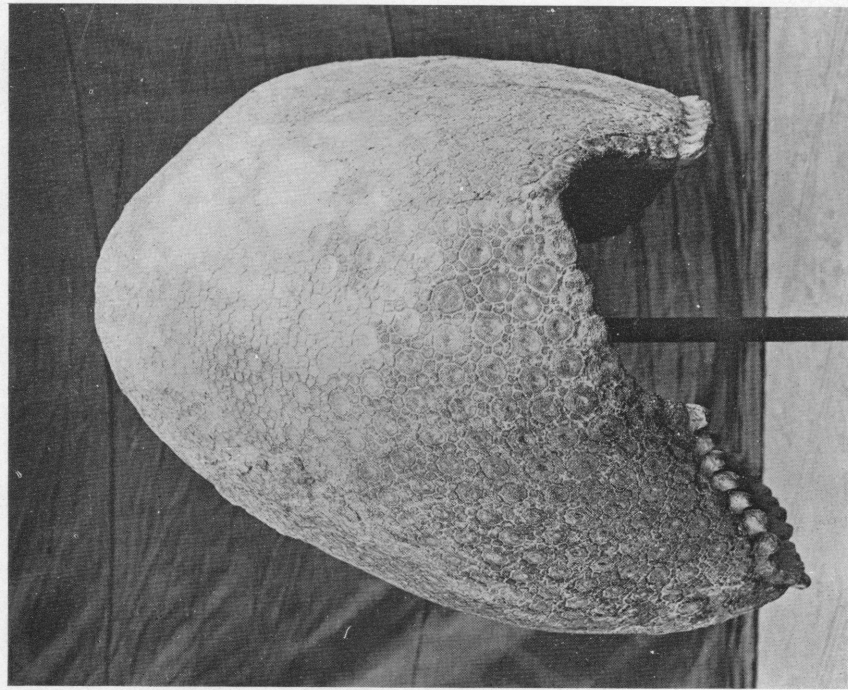
Argentina and Uruguay; Pleistocene.



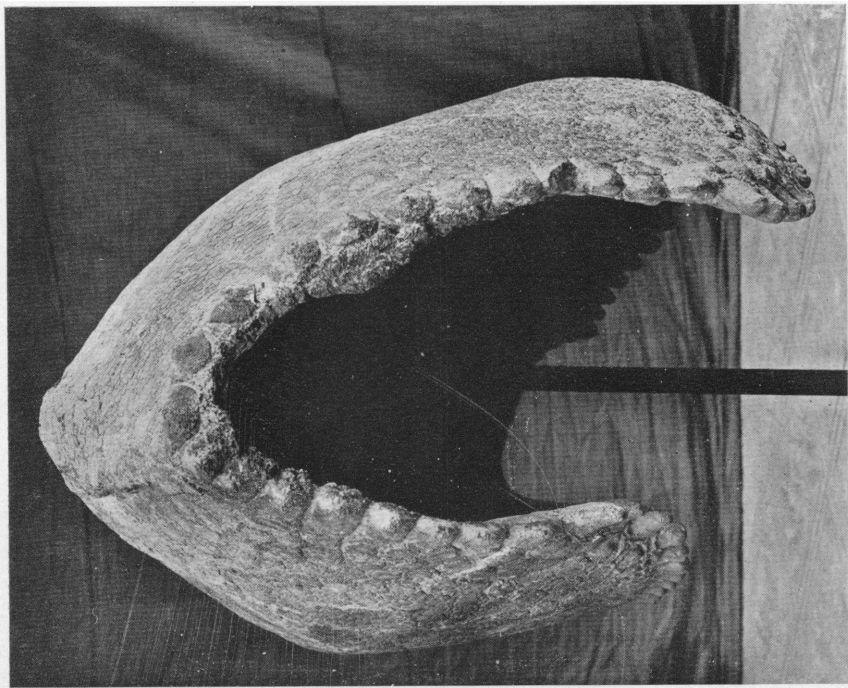
BRACHYOSTRACON (GLYPTODON) MEXICANUS. TYPE. RIGHT SIDE.



BRACHYOTRACON (GLYPTODON) MEXICANUS. TYPE. LEFT SIDE.

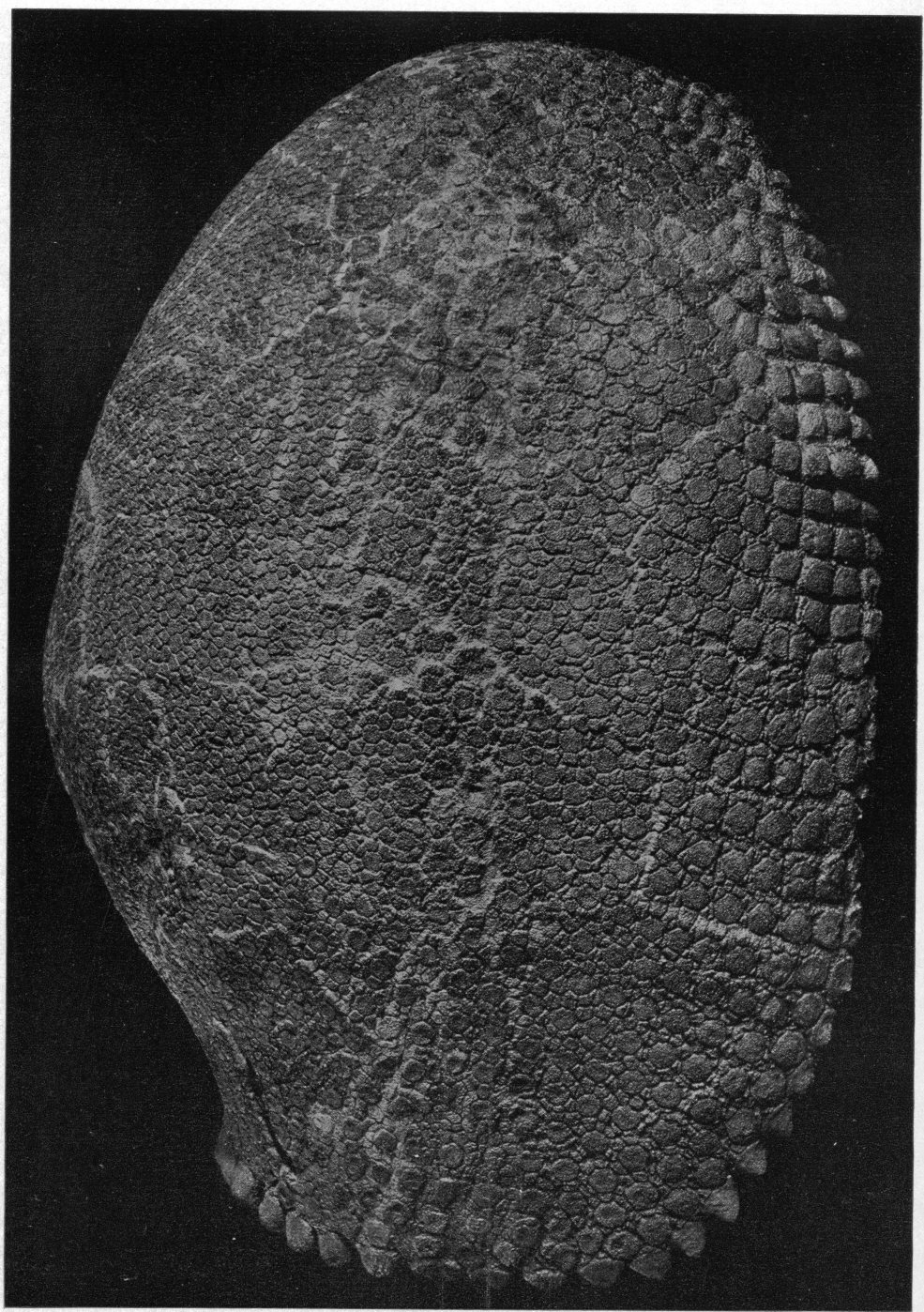


ANTERIOR VIEW.

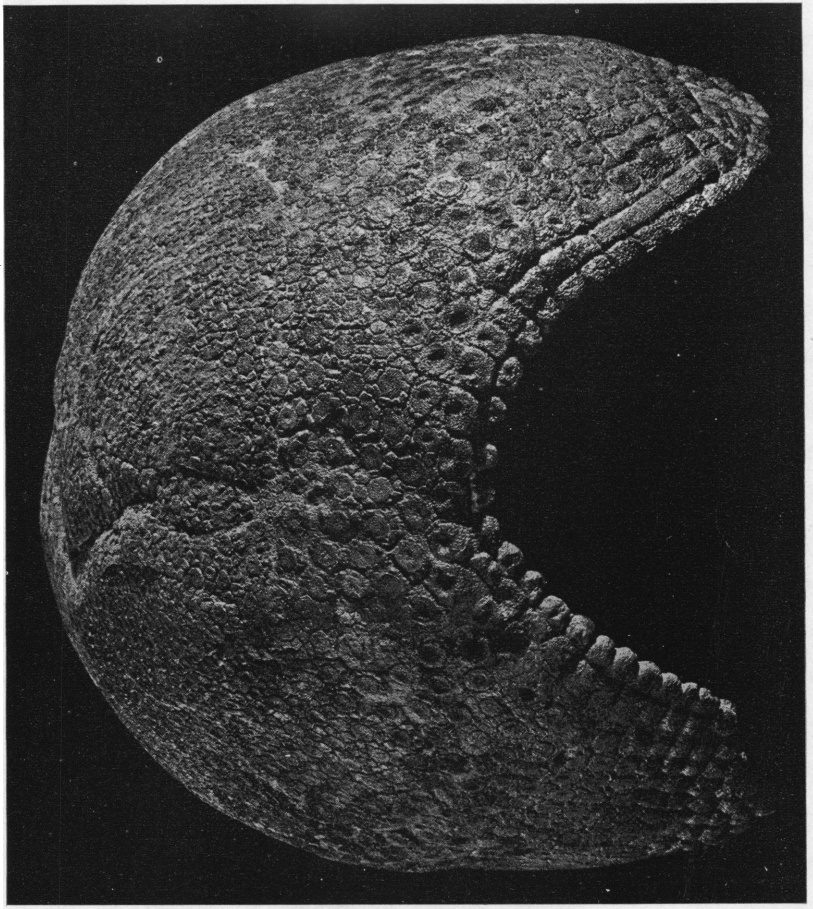


POSTERIOR VIEW

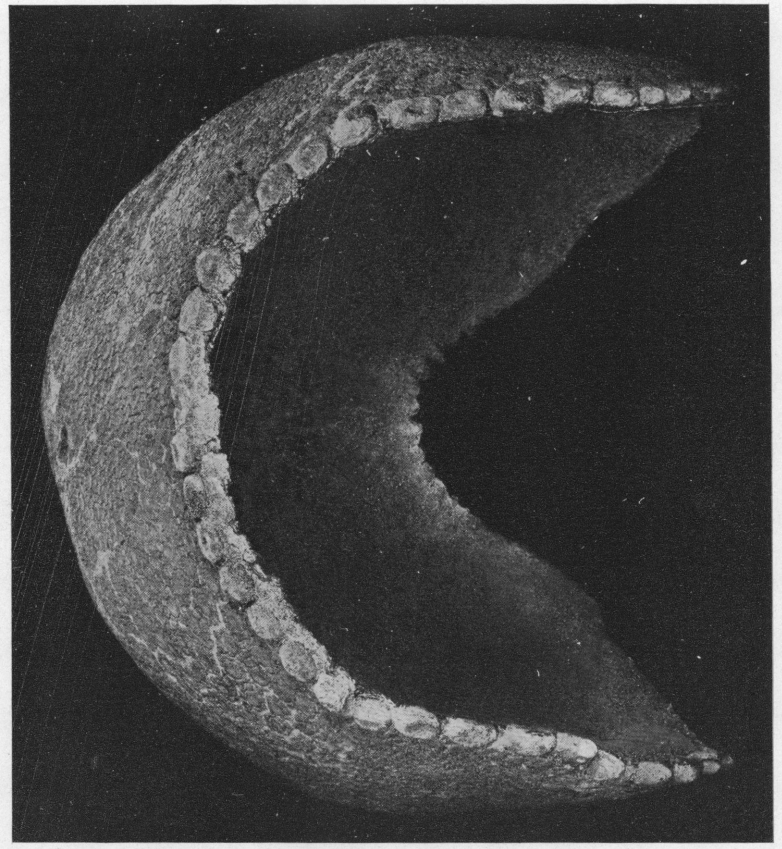
BRACHYOTRACON (GLYPTODON) MEXICANUS. TYPE



BRACHYOSTRACON CYLINDRICUS. TYPE. RIGHT SIDE.



BRACHYOSTREON CYLINDRICUS. TYPE. ANTERIOR VIEW. $\frac{1}{3}$.



BRACHYOSTREON CYLINDRICUS. TYPE. POSTERIOR VIEW. $\frac{1}{3}$.

