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NEW REMAINS OF *EOSCLEROCALYPTUS TAPINOCEPHALUS* (CABRERA) (MAMMALIA, XENARTHRA, GLYPTODONTIDAE): DESCRIPTION AND IMPLICATIONS FOR ITS TAXONOMIC STATUS

ALFREDO EDUARDO ZURITA [1] & SILVIA A. ARAMAYO [2]

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Abstract. *Eosclerocalyptus tapinocephalus* (Cabrera) from the Huayquerian (Late Miocene) of the Pampean region, was known previously only from the type material. The recent finding of a well preserved specimen, mainly the caudal tube and limb bones, allows improved knowledge of its morphology and comparison with related forms, particularly *Eosclerocalyptus proximus* (Moreno and Mercerat) of the "Araucanian" (Late Miocene-Early Pliocene) from the northwest of Argentina, and *Neosclerocalyptus* Paula Couto (Pleistocene of Argentina, Paraguay and Uruguay). Our observations support the recent proposal of Perea to include *Hoplophractus* Cabrera within *Eosclerocalyptus* C. Ameghino. Morphologically, *E. tapinocephalus* is characterized by: a) the parieto-occipital region of the skull tilting posteriorly; b) the low zygomatic arch descending towards the orbital notch; c) the lateral osteoderms of the dorsal carapace, with anterior peripheral figures of greater development than the posterior ones; d) dorsal carapace of dorsal contour similar to the that of *E. proximus;* e) caudal tube similar to that of *E. proximus* but with less development of the small peripheral figures; f) femoral morphology intermediate between *Propalaehoplophorus* and *Neosclerocalyptus*. Finally, and from a palaeozoogeographic and stratigraphic point of view, *Eosclerocalyptus tapinocephalus* represents (together with *E. proximus*) the first certain species of the tribe Hoplophorini, limited to the Huayquerian Stage (Late Miocene; ca. 8.7-6.8 Ma) of the central area of the Buenos Aires province, characterized by the presence of open environments (savannas, grasslands and herbaceous steppes).

Riassunto. In precedenza, *Eosclerocalyptus tapinocephalus* (Cabrera), proveniente dallo Huayqueriano (Miocene superiore) della regione della Pampa, era conosciuto solo attraverso il suo tipo. Il ritrovamento recente di un reperto ben conservato, in particolare del suo tubo caudale e delle ossa degli arti, consente di migliorare la conoscenza della sua morfologia e di confrontarlo con forme vicine. In particolare con *Eosclerocalyptus proximus* (Moreno & Mercerat) dell' "Araucaniano" (Miocene superiore-Pliocene inferiore) dal nordovest dell'Argentina, e con *Neosclerocalyptus* Paula Couto (Pleistocene dell'Argentina, Paraguay e Uruguay). Le nostre osservazioni concordano con la recente proposta di Perea di includere *Hoplophractus* Cabrera in *Eosclerocalyptus* C. Ameghino. Morfologicamente, *E. tapinocephalus* è caratterizzato da: a) rotazione posteriore della regione parieto-occipitale; b) basso arco zigomatico che scende verso l'incavo orbitale; c) gli osteodermi laterali del carapace dorsale, con le figure periferiche anteriori molto più sviluppate di quelle posteriori; d) il contorno del carapace dorsale simile a quello di *E. proximus;* e) il tubo caudale simile a quello di *E. proximus*, con uno sviluppo minore delle piccole figure periferiche; f) morfologia dei femori intermedia tra *Propalaehoplophorus* e *Neosclerocalyptus*. Infine, da un punto di vista paleozoogeografico e stratigrafico, *Eosclerocalyptus tapinocephalus* rappresenta (insieme a *E. proximus*) la prima specie certa della tribù Hoplophorini, limitata al piano Huayqueriano (Miocene superiore; ca. 8.7-6.8 Ma) dell'area centrale della provincia di Buenos Aires, caratterizzata dalla presenza of ambienti aperti come savana, praterie e steppe erbose.

Introduction

Although the taxonomy of the Glyptodontidae Hoplophorini is complex, and is under revision by one of us (A.E.Z), several Tertiary species have good diagnostic characters. One of them is *Eosclerocalyptus proximus* (Moreno & Mercerat, 1891), a taxon restricted to the "Araucanian" (Late Miocene - Early Pliocene) of the northwestern Argentina, including Catamarca, Santiago del Estero and Tucumán provinces (Zurita in press). In the actual Pampean region, another recognized species is *Eosclerocalyptus tapinocephalus* (Cabrera, 1939), from the Epecuén Formation ("Huayquerian", Late Miocene; ca. 8.7-6.8 Ma; Cione & Tonni 2005)

1 Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata. Paseo del Bosque s/nº (1900) La Plata, Buenos Aires, Argentina. E- mail: aezurita74@yahoo.com.ar

2 Departamento de Geología. Universidad Nacional del Sur, San Juan 670, Bahía Blanca, Buenos Aires, Argentina. E-mail: saramayo@uns.edu.ar

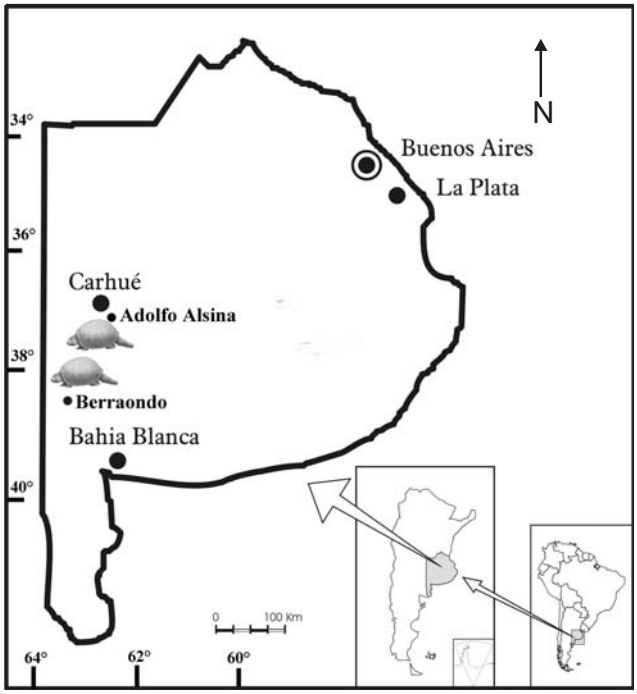


Fig. 1 - Geographic distribution of *Eosclerocalyptus tapinocephalus.*

of Adolfo Alsina state, Buenos Aires province, and first included within *Hoplophractus* Cabrera, 1939. Later, Castellanos (1940) assigned it to the genus *Stromaphoropsis* Kraglievich, 1932 (*S. tapinocephalus*), wrongly arguing that the ornamentation of the dorsal carapace was almost identical to that of the genus *Stromaphoropsis*. As demonstrated by Cabrera (1944), Castellanos' proposal (1940) is arbitrary and incorrect. A recent analysis by Perea (2005) concluded that *Hoplophractus* is a junior synonym of *Eosclerocalyptus* C. Ameghino, 1919. In this sense, our observations agree with Perea's (2005) proposal (Zurita et al. 2004). *E. tapinocephalus* was previously known only from its type material, whose more significant elements include the skull, some isolated osteoderms of the dorsal carapace, osteoderms from the head-shield, part of the atlas and a fragment of the left part of the mandible with m7 and m8. The recent recovery of a specimen from the river bed of the Arroyo Chasicó (Aramayo et al. 2005) by staff of the Department of Geology of the Universidad Nacional del Sur, Bahía Blanca, Argentina, allows a more nearly complete understanding of this species. The new material was recovered near the Berraondo locality, situated at 42 km west of Bahía Blanca, in the southwest part of the province of Buenos Aires, Argentina (Fig. 1).

Abbreviations

M- upper molariforms; **m-** lower molariforms**; MLP,** División Paleontología de Vertebrados, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Argentina; **PV UNS**, Colección Paleontología de Vertebrados, Universidad Nacional del Sur. Bahía Blanca, Argentina;

Systematic palaeontology

Superorder **Xenarthra** Cope, 1889
Order **Cingulata** Illiger, 1811
Superfamily Glyptodontoidea Gray, 1869
Family Glyptodontidae Gray, 1869
Subfamily Hoplophorinae Huxley, 1864
Tribe Hoplophorini Huxley, 1864
Genus *Eosclerocalyptus* C. Ameghino, 1919

Eosclerocalyptus tapinocephalus (Cabrera, 1939)

Pl. 1, figs A-F; Pl. 2, figs A-C

1939 *Hoplophractus tapinocephalus* Cabrera, pp. 7-13, fig. 3-9
1940 *Stromaphoropsis tapinocephalus* - Castellanos, pp. 56-57

Holotype. MLP 37-III-7-7, skull in good state of preservation except for the descending process of the maxillas which are broken at their distal third. A fragment of the left dentary with m7 and m 8; left half of the atlas; distal fragment of the right humerus and a fragment of the pelvic girdle; distal part of hind right zeugopod; astragalus and calcaneum of the same side; first to fourth right and fourth left metatarsals; isolated head-shield osteoderms and from the dorsal carapace.

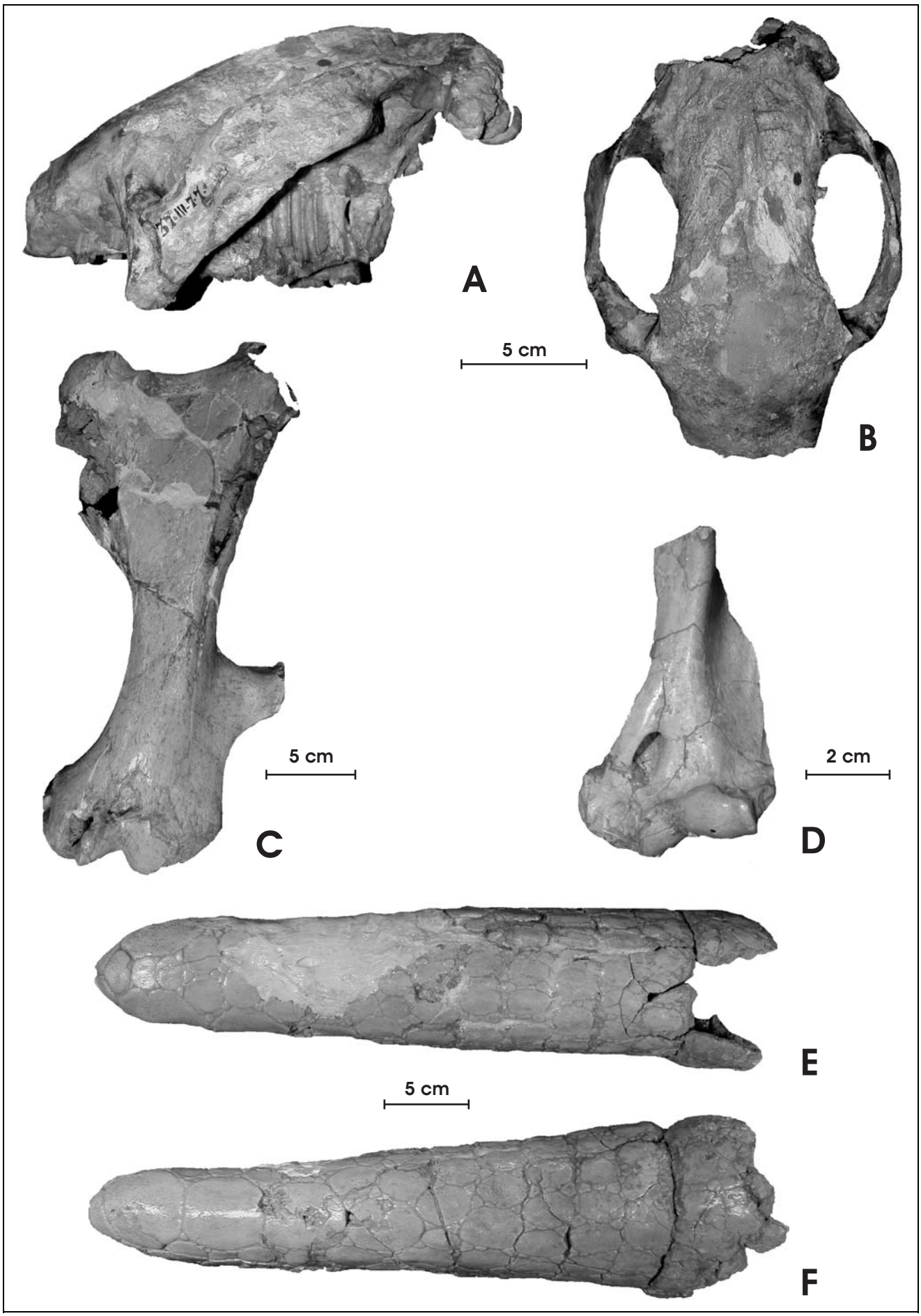
Type locality. Laguna de los Paraguayos, Adolfo Alsina, Buenos Aires Province, Argentina.

Hypodigm. PV UNS 260; skull compressed laterally and in badly preservation due to diagenetic processes; right zygomatic arch absent; complete atlas; dorsal carapace in fragmentary condition with many dissociated osteoderms; caudal tube with the first ring associated and fragments of others; right femur complete whereas the left one does not preserve the distal epiphysis and the greater trochanter; distal half of the left humerus and fragments of the right humerus and some phalanges.

Amended diagnosis. Hoplophorini comparable in size with *Eosclerocalyptus proximus* and *E. lineatus* (Ameghino, 1888); dorsal contour of the carapace similar to that of *E. proximus*, i.e., intermediate profile between *Glyptodon* Owen, 1839 (high carapace and convex profile) and *Neosclerocalyptus* Paula Couto, 1957 (low and extended carapace, of subcylindrical shape and almost straight profile). Dorsal carapace composed by approximately 39-45 transversal rows of osteoderms. Skull also similar to that of *E. proximus*, except for the parietal-occipital region tilting ventrally, as in *Neosclerocalyptus paskoensis* (Zurita, 2002) and the zygomatic arch lower and descending towards the orbital notch, as does the front-nasal area. Narial aperture similar to that of *E. proximus* and *Plohophorus figuratus* Ameghino, 1887, with the dorsal border wider than the ventral. The free portion of the descending processes of the maxilla slightly tilted anteriorly; infraorbital

PLATE 1

Eosclerocalyptus tapinocephalus. A) skull in lateral view, B) skull in dorsal view, C) left femur in anterior view, D) distal part of right humerus in anterior view, E) caudal tube in dorsal view, F) caudal tube in lateral view.


A
5 cm
B
5 cm
C
2 cm
D
E
5 cm
F

foramen small located between M3-M4, with a very thick ventral margin (as in *Neosclerocalyptus pseudornatus* (Ameghino, 1889) and placed more laterally than in *E. proximus*. M1-M2 elliptic in section and peg-like, with its major axis parallel, while the rest (M3-M8) are trilobated. Dorsal surface of the osteoderms of the head-shield are smooth, slightly convex in the central part and without evidence of peripheral figures, similar to the condition observed in *Eucinepeltus* Ameghino, 1891 (Propalaehoplophorinae). Lateral osteoderms with a more prominent development of the distal peripheral figures than the proximal ones, as in *Eosclerocalyptus proximus*, *E. lineatus* and *Eonaucum colloncuranum* Scillato-Yané & Carlini, 1998 and the Propalaehoplophorinae (sensu Castellanos 1932), and different from *Neosclerocalyptus,* where the peripheral figures are symmetric. In some cases, an accessory row of peripheral figures along the anterior margin may be present. Caudal tube similar to that of *Eosclerocalyptus proximus*, but with small and less developed peripheral figures, displaying a single row between two contiguous central figures, in contrast with *Neosclerocalyptus* and *Hoplophorus* Lund, 1839, in which there may be as many as two rows of peripheral between two contiguous central figures. Femur similar but smaller and slender than *Neosclerocalyptus*.

Stratigraphic and geographic distribution. Huayquerian (Late Miocene). The specimens are from the Adolfo Alsina locality (Laguna de los Paraguayos), and the environs of the locality of Berraondo, Buenos Aires, Argentina.

Descriptions and comparisons

Skull (Pl. 1, figs A and B; Tab 1). Maximal length is 211 mm. The skull is similar to that of *Eosclerocalyptus proximus*, but is characterized by the parietal-occipital region tilting ventrally, as in *Neosclerocalyptus paskoensis*, although the frontal-nasal area is much more inclined ventrally, so that the dorsal profile is clearly convex in *Eosclerocalyptus tapinocephalus*. As noted above, the ventral inclination of the parietals and occipitals, although less evident than in *H. euphractus* Lund, 1839, is clearly evident in lateral view. This condition contrast that in with *Eosclerocalyptus proximus*, *N. pseudornatus* and *N. ornatus* (Owen, 1845), in which these surfaces incline dorsally. The frontal and nasal regions are positioned further ventrally than in *E. proximus* and *Neosclerocalyptus,* although similar to that observed in *Propalaehoplophorus* Ameghino, 1887 and *Plohophorus figuratus*. The zygomatic arches are more ventral than in *E. proximus* and inclined towards the orbital notches; the latter present a contour similar to that observed in *E. proximus*. The descending processes of the maxilla are, in their free part, slightly tilted anteriorly. The rostrum, including the nasals and maxilla, is similar to that of *E. proximus*, but somewhat more ventral.

In dorsal view, the sagittal crest is shorter anteroposteriorly than in *E. proximus*, *Neosclerocalyptus ornatus* and *N. pseudornatus* but longer than in *Hoplophorus euphractus*. This sagittal crest divides anteriorly into two branches at the level of the posterior end of the frontals, with each part extending to contact the postorbital process of the frontal. On either side of the sagittal crest are many vascular foramina. The postorbital area narrows markedly. The frontal and nasal bones form a smooth and slightly convex surface, as in *E. proximus*, and in contrast to *Neosclerocalyptus,* in which a deep furrow separates the nasals from the frontals. In anterior view, the narial aperture is wider dorsally than ventrally. The nasals, as in *E. proximus*, give no evidence of the kind of pneumatization observed in *Neosclerocalyptus*. In ventral view the infraorbital foramen is located more laterally than in *E. proximus* and *N. pseudornatus*, and also opens anteriorly. The tooth rows tend to narrow at the level of M6. The pre-dental area of the palate is prominently expanded transversely, as in *E. proximus* and *Propalaehoplophorus*, and unlike *Neosclerocalyptus,* which is longer and a more pointed. The two first and last two molariforms of the right side are preserved. The M1 is simple, subelliptic and elongated anteroposteriorly; the M2 presents a slightly marked notch on the labial surface, forming two large lobes; the M7 and M8 do not have significant differences with those of *E. proximus*.

In posterior view, only the most lateral part of the left side of the occipital is preserved, and does not differ significantly from that of *E. proximus*, except for slightly narrower condyles. The supra and paraoccipital processes are less prominent than in *Neosclerocalyptus*. The internal choana is nearly quadrangular in outline, resembling that of *N. pseudornatus*, but with the ventral margin wider than the dorsal.

Head shield. Only some isolated osteoderms are preserved. They are of a relatively large size. Each osteoderm has an external porous dorsal surface and is slightly convex, particularly in its central part, which is surrounded by a rough well defined edge, without vestiges of peripheral or central figures. In general, they are very similar to those of *Eucinepeltus*, except for the central depression that is present in the latter.

Mandible. Fragment of the left dentary with the last two molariforms is preserved, and is not significantly different form that present in *Neosclerocalyptus* and *E. proximus*.

Femur (Pl. 1, fig. C). The femur is 295 mm length. It is of similar morphologically to that of *Neosclerocalyptus*, but smaller and more slender, resembling that of *Propalaehoplophorus*. The femoral head is wider anteroposteriorly than transversely, as occurs in *Neosclerocalyptus*. The articular surface has a subtriangular contour and, as in *Neosclerocalyptus*, extends markedly anteriorly, at the point where the neck is best defined. The lesser trochanter, on the medial surface of the femur extends distally as a very fine crest. As in *Panochthus* Burmeister, 1866 and *Propalaehoplophorus*, the great trochanter extends more proximally than the femoral head, although is not as evident as in *Neosclerocalyptus*. It presents an extremely rough and rhomboidal dorsal

surface, being almost identical morphologically to that of *Neosclerocalyptus*. The proximal margin between the great trochanter and femoral head is broadly concave. Distally to this margin, it exists a concave area in form of inverted triangle, with base located between the great trochanter and femoral head. This region is not as concave as in the different species of *Neosclerocalyptus,* and is delimited laterally by a crest that extends distally from the great trochanter, but is not as developed as in *Neosclerocalyptus*. The diaphysis becomes more nearly circular distally, reaching its minimal width immediately above the third trochanter. The latter is subtriangular in shape, with the apex much more inclined anteriorly and laterally than in *Neosclerocalyptus*, as in the Propalaehoplophorinae, producing a markedly concave anterior surface. Compared with *Neosclerocalyptus* and *Panochthus*, the third trochanter is located more proximally, as in *Propalaehoplophorus australis* Ameghino, 1887. Distally, the supratrochlear fossa has a subtriangular contour. The internal condyle, which lies more distally than the lateral condyle, bears two articular surfaces separated by a convexity. A series of scars, between the third trochanter and lateral condyle, possibly correspond in proximal to distal order the insertion areas for the plantar muscle, external gastronemius muscle, the right colateral ligament and the popliteus muscle. The lateral margin, located between the third trochanter and lateral condyle is considerably more concave than in *Neosclerocalyptus*, *H. euphractus* and *Panochthus*, and is similar to that observed in *Propalaehoplophorus*. In posterior view, at the level of the proximal epiphysis, the femoral head is poorly defined. Immediately distal to the greater trochanter a slight rhomboidal depression is present, but without the numerous rugosities and foramina found in *Neosclerocalyptus.* The diaphysis is flatter posteriorly than anteriorly and without noticeable scars, resembling that of *Neosclerocalyptus*. The popliteus fossa lies distally, positioned mainly above the external condyle, but is less expanded laterally than in *Neosclerocalyptus* and *H. euphractus*. The intercondylean notch shows at both sides two articular facets with concave surfaces in its central part. The articular surface of the medial condyle shows a greater development posteriorly and distally than in *Neosclerocalyptus.*

Humerus (Pl. 1, fig. D). Only the distal part is preserved. In the anterior view, the entepicondylar foramen is observed, oriented similarly to that of *H. euphractus*. Distally, the entepicondylus projects more laterally than in *Neosclerocalyptus.*

Caudal rings. A ring associated with the tube and fragments of others are preserved. Each is formed by two transverse rows of osteoderms, similar to those of *E. proximus*. The osteoderms forming the distal row are pentagonal. The central figure extends over most of the surface of each osteoderm, and in most cases is somewhat convex centrally, with its major axis oriented anteroposteriorly. Peripheral figures are not present at the posterior edge, and are almost imperceptible on the lateral edges; the anterior edges bear three to five well developed pentagonal figures. The osteoderms of the proximal row are also pentagonal, and sit in staggered position with respect to the osteoderms of the posterior row. At the proximal end of each of these osteoderms the articular surface for the next ring is located, formed by a key-shaped surface. Generally, three large foramina are present on the middle of the osteoderms. At the last proximal third, each osteoderm is thinner and tilts laterally, in such a way that it forms a structure that prevents the backward displacement of the caudal rings, as occurs in *E. proximus*. As in all Hoplophorini, the ornamentation is very similar to that of the Glyptatelinae (sensu Castellanos 1932).

Caudal tube (Pl. 1, figs E and F; Tab.1). The tube is 340 mm long, excluding the first associated ring. The tube presents morphology similar to that of *E. proximus*, given its cylindrical-conical shape and posteriorly decreasing dorsal-ventral height, whereas its proximal extremity is nearly completely circular. The main difference with the caudal tube of *E. proximus* and *Neosclero-*

Taxa / Measurements	*Eosclerocalyptus tapinocephalus*	*Eosclerocalyptus proximus*
Skull	**CC 703**	**MLP 37-III-7-7**
Length	211	220
Maximun transverse diameter between zygomatic arches	140	141
Transverse diameter between lacrimals	78	71
Transverse diameter of postorbital region	58	55
Transverse diameter of occipital		98
Height of skull	90	119
M8 sagittal crest		
Height of narial aperture	34	37
Transverse diameter of narial aperture	56	72
Length of palate	142.5	150
Length of toothrows	121	120
Mandible		
Length	----	205
Length of toothrows	----	126
Anteroposterior diameter of ascending ramus at alveolar level	----	104
Carapace	**PV-UNS 260**	**MACN 4853**
Lenght	910	900
Caudal tube		
Length	340	358

Tab. 1 - Comparative measurements (in mm) of *Eosclerocalyptus tapinocephalus* and *E. proximus*.

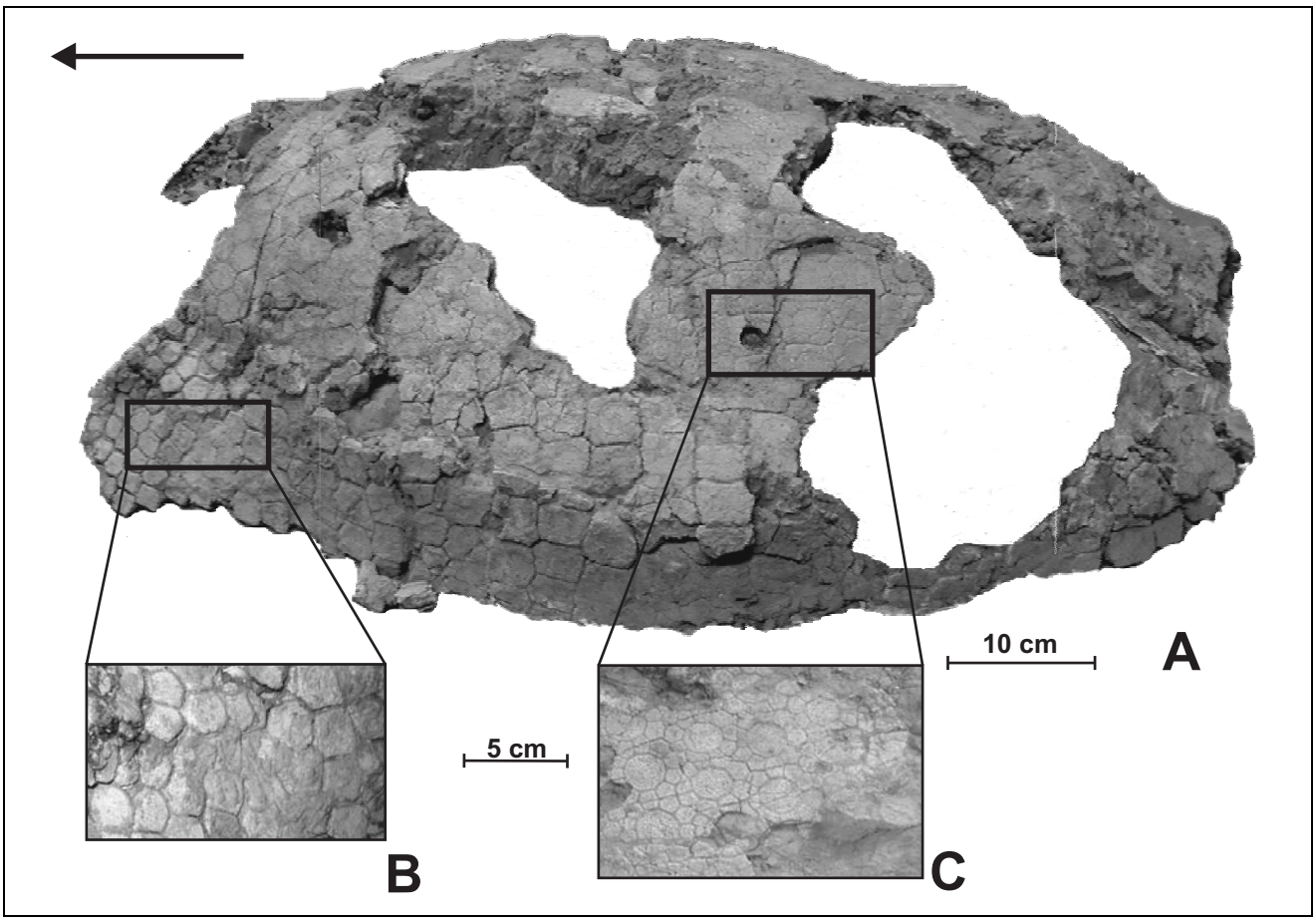


PLATE 2

Eosclerocalyptus tapinocephalus. A) dorsal carapace in lateral view, B) detail of antero-lateral osteoderms, C) detail of dorso-lateral osteoderms.

calyptus is the minor development of small peripheral figures (although this feature may be related to the ontogeny) and a bit straighter along its length. As in *E. proximus* and *Plohophorus figuratus* one row of peripheral figures lies between contiguous central figures. In some specimens of *Neosclerocalyptus* and *Hoplophorus euphractus* a double row of peripherals figures is present.

In dorsal view, the proximal half of the tube shows the osteoderms aligned in six transverse rows. The central figures of each osteoderm is subelliptical, with it major axis oriented anteroposteriorly and the dorsal surface flat or somewhat convex. Around each central figure, there are small peripheral figures which are more developed sideways, in number of three or four; in the proximal and distal edges, they are poorly developed. In *Neosclerocalyptus* and *E. proximus* the development of these small peripheral figures is symmetric.

In ventral view, at the distal end of the tube, there are three big figures, which show a convex and rough dorsal surface. Proximally, and until the 50 per cent of the total length of the tube, the figures are big and subcircular in form, and showing no signs of peripheral figures. As seen in dorsal surface, the osteoderms align into six transversal rows at the proximal half of the tube. Each of these osteoderms has a central figure with a subelliptical outline, but showing a scarce development of the small peripheral figures.

In lateral view, there are five subelliptical figures, with it major axis oriented anteroposteriorly, which size diminishes proximally. At the distal end, it is observed two great figures that cover up to part of the dorsal surface and that join at the middle line of the tube. On the contrary with the feature observed in *Neosclerocalyptus* and *E. proximus*, small figures in the meeting points of the lateral figures do not exist, but develop on the distal half of the tube.

Dorsal carapace (Pl 2, fig. A; Tab.1). The left lateral and the dorsal portions are preserved, in addition to many isolated osteoderms. Anterior-posterior length is approximately 910 mm, and is composed approximately by 39-45 rows of transversal osteoderms; length along the dorsal profile is 1050 mm. Although fragmented, the dorsal contour of the carapace is apparently similar to that of *E. proximus* and *E. lineatus*; and thus intermedi-

ate between those of *Glyptodon* (high armor and convex profile) and *Neosclerocalyptus* (low and extended armor, subcylindrical shape and almost straight profile). Osteoderms of the row adjacent to the caudal notch are quadrangular. The central figure is subeliptical, with major axis oriented transversely, and flat or slightly centrally. Small peripheral figures are poorly developed on either side of the central figure in the posterior edge. This condition is reminiscent of the Glyptatelinae (see Scillato-Yané 1977a). At the proximal edge three to four pentagonal small figures are well developed, and in some osteoderms appear an accessory row of small figures (as in some specimens of *E. lineatus, E. proximus*, *N. pseudornatus*, *N. ornatus* and *H. euphractus*), is present, so that as many as three rows of peripheral figures lie between two adjacent central figures. The most lateral osteoderms of the caudal notch are not preserved. Anteriorly on the carapace, each osteoderm is characterized by a large subcircular figure, with flat or somewhat concave dorsal surface and surrounded by ten – eleven peripheral figures of four or five sides. On the lateral parts of the carapace, the osteoderms are pentagonal or hexagonal with major axis oriented anteroposteriorly, and as in *Eosclerocalyptus proximus*, *Eonaucum colloncuranum* and *Propalaehoplophorus*, the small figures on the anterior edge, three or four in number, are better developed than those on the posterior edge. In some osteoderms is present along the anterior edge an accessory row of peripheral figures, as suggested by Cabrera (1939, p. 12). In general, each figure is surrounded by nine to eleven small figures. On the most anterolateral part of the carapace, the pentagonal and hexagonal are markedly smaller and nearly isodiametric. Their dorsal surface is almost smooth, although in some a large circular or subcircular central figure is faintly marked, but never in the more ventrally located osteoderms. On the dorsal area, the rows of osteoderms adjacent to the cephalic notch do not differ from those of *Neosclerocalyptus* and *Eosclerocalyptus proximus*, and only some of them have large foramina. Most of these osteoderms are pentagonal, with major axis oriented antero-posteriorly, and bears a large circular or subcircular central figure, surrounded by eight or nine small peripheral figures.

Results

Paleobiogeographic and paleoenvironmental aspects

The Chasicoan Age (Middle to Late Miocene; ca. 10-8.7 Ma) marks the end of Argentinean Patagonia as a center of cladogenesis and radiation (Pascual & Odreman Rivas 1973; Pascual et al. 1984), that later, during the Huayquerian, Montehermosan and Chapadmalalan (Late Miocene -Early Pliocene), moved towards northeastern Argentina (Pascual 1984, Pascual et al. 1996). During the Chasicoan Age, all Eutatini and almost all Pansantacrucian Euphractini (Cingulata, Dasypodidae), as well as the Glyptodontidae Propalaeohoplophorinae, are extinguished (Scillato-Yané et al. 1993). The Glyptodontidae records are limited to the southern part of the present Pampean region being the Hoplophorinae Palaehoplophorini the most diversified glyptodonts in that period (Scillato Yané et al. 1993). During the Huayquerian age – when the Hoplophorinae had their acme – (Carlini & Scillato-Yané 1999) and the Montehermosan age (Late Miocene – Early Pliocene; ca. 8.7 – 3.9 Ma), the Cingulata Glyptodontidae undergo an important radiation and a taxonomic diversification, probably impelled by the dominance of open plain environments ("Age of austral plains"; see Pascual & Bondesio 1982; Pascual 1984).

The paleontological evidence suggests that the process of differentiation of the present biogeographic areas may have begun during the Huayquerian (ca. 8.7 – 6.8 Ma; Cione & Tonni 2001) (Pascual & Odreman Rivas 1973; Pascual & Bondesio 1982). The fauna of Glyptodontidae of Argentina is congruent with this hypothesis. Those cingulates are highly diversified in the "Mesopotamian" (Ituzaingó Formation; Late Miocene-Pliocene) of Corrientes and Entre Ríos provinces, with taxa of great size and a clear predominance of the Palaehoplophorini (Hoplophorinae) and Doedicurinae. The faunistic evidence indicates humid and warm climatic conditions (Argañaraz & Piña 2000; Piña & Argañaraz 2000; Carlini et al. 2000), conditions that probably influenced the low frequency of glyptodonts (in spite of their high taxonomic diversification). From a palaeobiogeographic point of view, it is probably that this region was acted as corridor linking the Pampean region and northern areas (Cozzuol 1993).

On the other hand, in the "Araucanian" (Late Miocene -Early Pliocene; ca. 8.7-3.9 Ma) of the northwest of Argentina, the Glyptodontidae are also highly diversified (although not as much as in the "Mesopotamian" Age), but characterized by a remarkable predominance of the Plohophorini, the total absence of Palaehoplophorini and the first report of a Glyptodontinae (Cabrera 1944; Cione et al. 2000). Also remarkable are the instances of endemism among the Cingulata, such as *Eosclerocalyptus proximus*, *Paleuphractus* Kraglievich, 1934, *Neophractus* (Esteban & Nasif, 1996) and *Paraeuphractus prominens* (Scillato-Yané, 1975). Unlike what happened in the "Mesopotamian", the frequency of Glyptodontidae records is very common. Probably this is due to the development of much more open environments (savannas, grasslands and herbaceous steppes) than those of the Mesopotamian region (Cione et al. 2000).

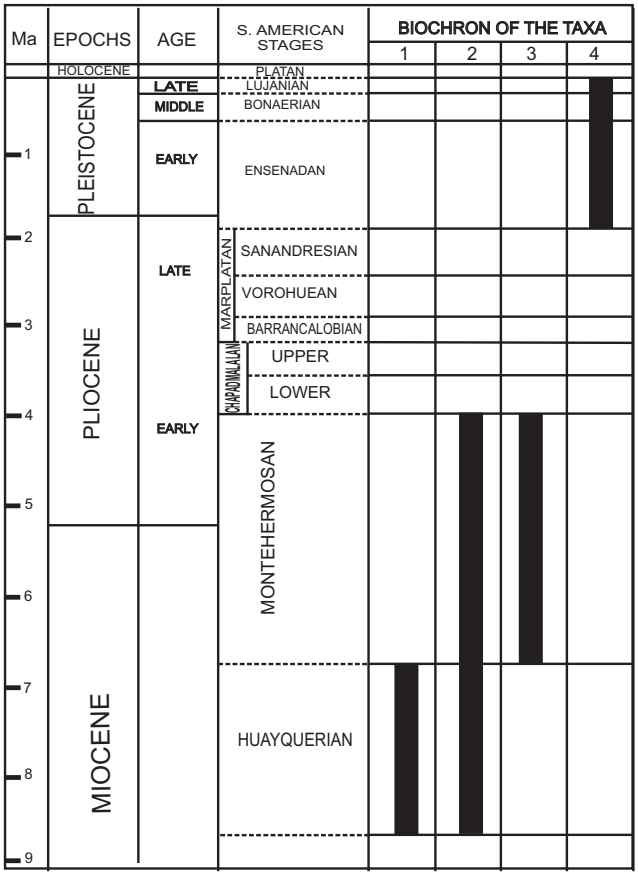


Fig. 2 - Chronological distribution of 1) *Eosclerocalyptus tapinocephalus*, 2) *E. proximus*, 3) *E. lineatus*, and 4) *Neosclerocalyptus* (modified from Cione & Tonni 1999).

In this biogeographic context, the Pampean region was defined during the Huayquerian and Montehermosan by a clear predominance of open environments and the absence of pansantacrucian taxa characteristically present during the Chasicoan (Late Miocene): the Peltephilinae, and the Homalodotheriidae and Interatheriidae (Notoungulata) (Scillato-Yané 1977 b; Bondesio et al. 1980; Pascual & Ortiz Jaureguizar 1990). Within the Glyptodontidae, the Palaehoplophorini are scarce (*Aspidocalyptus castroi* Cabrera, 1939) and the Plohophorini are common (see Cabrera 1939). In general and from a paleofaunistic perspective, the Pampean region was apparently more related during the Huayquerian and Montehermosan (Late Miocene – Early Pliocene) with the "Araucanian" than with the "Mesopotamian" (Bondesio et al. 1980).

In this sense, the last record of the genus *Eosclerocalyptus* is represented by *E. lineatus*, coming from the Montehermosan (ca. 6.8-3.9 Ma.) of Farola Monte Hermoso, Buenos Aires province (Zurita & Tomassini 2006).

Succinctly, the Glyptodontidae Hoplophorini seem to be glyptodonts adapted to open, arid and semi-arid environments along their evolutionary history (Miocene-Late Pleistocene) (Fig. 2). Thus, *Eosclerocalyptus* is recorded in the Pampean region and in the "Araucanian" in North West of Argentina (Tucumán, Catamarca and Santiago del Estero provinces). Likewise, the Pleistocene representatives (*Neosclerocalyptus)* are frequent in the Pampean region and in the central and northern part of Argentina, but scarce in those regions where humid and warmer climatic conditions prevailed during the Pleistocene (e.g. Argentinean Mesopotamia, western part of Uruguay and southern part of Brazil (Noriega et al. 2004; Zurita et al. 2005).

Conclusions

From a paleobiogeographic and stratigraphic perspective, *E. tapinocephalus* is a Hoplophorini (Glyptodontidae) restricted to the Huayquerian (Late Miocene) of the actual Pampean region (Fig. 2), and represent the first certain species of the tribe Hoplophorini, while *Eonaucum colloncuranum* could be an advanced Propalehoplophorinae. The inferred paleoenvironment is that of extensive, open grasslands and a semi-arid climate, given that the Huayquerian apparently mark the climax of the episode that Pascual & Bondesio (1982) referred to as "Age of austral plains". Another Hoplophorini contemporaneous with *E. tapinocephalus* is *E. proximus*, a species probably endemic of northwestern Argentina that would have lived under more humid and warm climatic-environmental conditions than that inferred for the Pampean region (Pascual & Ortiz Jaureguizar 1990; Menéndez 1962; Volkheimer 1971; Pascual & Odreman Rivas 1973; Scillato-Yané 1975, 1977b; Latorre et al. 1997). The last species of the genus is represented by *E. lineatus*, from the Montehermosan Stage (Fig. 2).

From a taxonomic perspective, our observations agree with the Perea's (2005) proposal that the genus *Hoplophractus* be synonymized with *Eosclerocalyptus*, as their morphologic differences do not justify generic separation (see Zurita, in press). Morphologically, it is characterized by: a) the parieto-occipital region of the skull tilting posteriorly; b) the low zygomatic arch descending towards the orbital notch; c) the lateral osteoderms of the dorsal carapace, with anterior peripheral figures of greater development than the posterior ones; d) dorsal carapace of dorsal contour similar to the that of *E. proximus;* e) caudal tube similar to that of *E. proximus* but with less development of the small peripheral figures; f) femoral morphology intermediate between *Propalaehoplophorus* and *Neosclerocalyptus*.

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