



## On the fossil Remains of *Panochthus* Burmeister, 1866 (Xenarthra, Cingulata, Glyptodontidae) from the Pleistocene of southern Brazil

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*Manuscript received on January 23, 2014; accepted for publication on April 3, 2014*

### ABSTRACT

The genus *Panochthus* represents the last lineage of “Panochthini” recorded in the Pleistocene. This genus has a wide latitudinal distribution in South America, and in Brazil it occurs in the southern and northeastern regions. In this paper we describe new material (isolated osteoderms and caudal tube fragments) assigned to *Panochthus* from the state of Rio Grande do Sul (southern Brazil) and discuss some taxonomic issues related to *Panochthus tuberculatus* and *Panochthus greslebini* based on this material. The occurrence of *P. greslebini* is the first for outside the Brazilian Intertropical Region. In addition, we describe new diagnostic features to differentiate the osteoderms of *P. greslebini* and *P. tuberculatus*. Unfortunately, it was not possible to identify some osteoderms at the species level. Interestingly, they showed four distinct morphotypes characterized by their external morphology, and thus were attributed to *Panochthus* sp. Lastly, we conclude that in addition to *P. tuberculatus* registered to southern Brazil, there is another species of the genus, assignable to *P. cf. P. greslebini*. Our analysis reinforce the reliability of caudal tube characters for the classification of species of *Panochthus*.

**Key words:** Glyptodontidae, *Panochthus*, Pleistocene, southern Brazil, osteoderms.

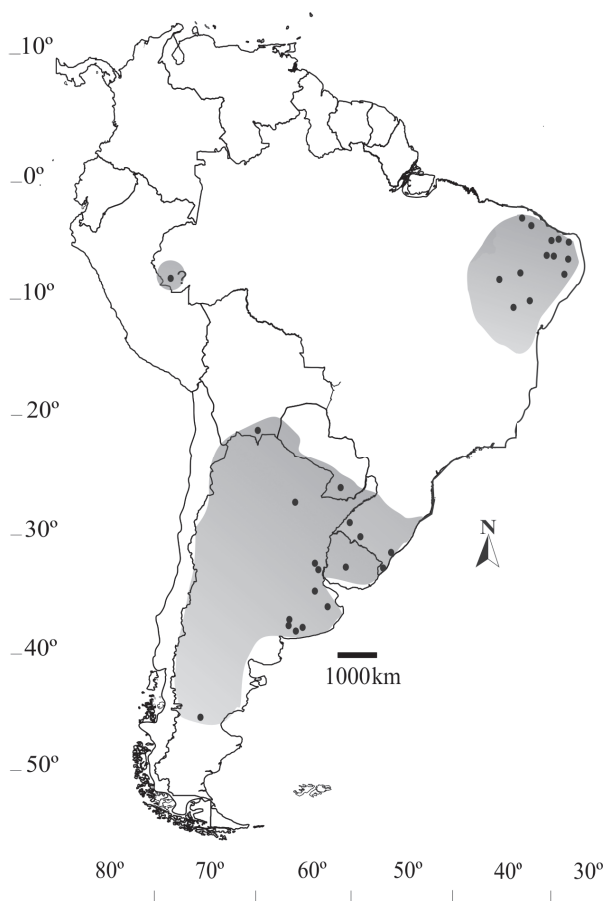
### INTRODUCTION

The tribe “Panochthini” is a taxonomically diverse group of glyptodonts restricted to South America. Its fossil record spans the late Miocene to the late Pleistocene (Zamorano 2012). The genera *Panochthus* Burmeister, 1866, *Nopachthus* Ameghino, 1888 and *Propanochthus* Castellanos, 1925 were traditionally included within this tribe (Castellanos

1942, Hoffstetter 1958, Paula Couto 1979, McKenna and Bell 1997, Zurita et al. 2011, Zamorano 2012); however, in recent cladistic analyses they do not form a natural group (Zamorano and Brandoni 2013, see. Zamorano et al. 2013).

This genus has a wide latitudinal distribution in South America (Tonni and Scillato-Yané 1997), including both southern and northeastern regions (Fig. 1) (Porpino and Bergqvist 2002, Porpino et al. 2004, Ubilla et al. 2004, Zurita et al. 2009a, Zamorano 2012).

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**Figure 1** - Map of the geographic distribution of *Panochthus* in the Pleistocene.

The main characteristics of the genus *Panochthus* are the osteoderms of the carapace, which have a reticular pattern on the external surface, with small polygonal figures that are flat and equivalent in size, and the caudal tube, which has a similar ornamentation pattern to the carapace (Castellanos 1942). According to a recent review of *Panochthus* by Zamorano (2012), six species were recognized: *P. subintermedius* Castellanos, 1937, *P. intermedius* Lydekker, 1895, *P. tuberculatus* (Owen, 1845), *P. frenzelianus* Ameghino, 1889, *P. jaguaribensis* (Moreira, 1965) and *P. greslebini* Castellanos, 1942.

The first record of *Panochthus*, for the territory of Brazil was mentioned by Ihering (1891), in correspondence to Florentino Ameghino, from the

coastal plain of the state of Rio Grande do Sul, Santa Vitória do Palmar Municipality. Subsequently, *Panochthus* was reported from deposits in northeast Brazil (tanks) by Branner (1915) and by several authors (e.g. Moreira 1971, Bergqvist 1993). The fossil content of these tanks was deposited during the late Pleistocene, with available electron spin resonance (ESR) ages dating it to between 63,000 to 10,000 years BP (e.g. Kinoshita et al. 2005, Oliveira et al. 2009, Silva 2009, Dantas et al. 2011). In the northeastern region of Brazil, *P. greslebini* and *P. jaguaribensis* are considered endemic species (e.g. Bergqvist 1993, Porphino and Bergqvist 2002, Zamorano 2012, but see Chimento and Agnolin 2011). *P. tuberculatus* has only been recorded in Rio Grande do Sul (e.g. Bombin 1976, Ribeiro and Scherer 2009). Another dubious record of *Panochthus* in the Amazon region is referred to by Paula Couto (1956); the material is a single isolated osteoderm collected in the Jurua River, in the state of Acre.

In this paper, we describe new material of the *Panochthus* from the state of Rio Grande do Sul (southern Brazil) and discuss some taxonomic aspects of the species reported.

#### MATERIALS AND METHODS

The material studied here belongs to the paleontological collections of the Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul (MCN/FZBRS), Museu de Ciências Tancredo Filho Melo (MCTFM), Laboratório de Geologia e Paleontologia da Universidade Federal de Rio Grande (LGP/FURG) and Museu Nacional do Rio de Janeiro (MNRJ), Brazil. The anatomical nomenclature follows Porphino and Bergqvist (2002), while the scheme for the different regions of the carapace is based on; systematics follow Zamorano et al. (2013) (see. Zamorano and Brandoni 2013). The description and terminology for osteoderms follows Hill (2006).

## GEOGRAPHIC AND STRATIGRAPHIC PROVENANCE OF MATERIALS

The material was found in the municipalities of Uruguaiana (Touro Passo Creek), Santa Vitória do Palmar (Balneário Hermenegildo, coastal plain and Chui Creek) and Rosário do Sul (Rincão dos Fialho) (Fig. 2).

Touro Passo Creek (29°40'S, 56°51'W) is 13 km the north of Uruguaiana Municipality (Da-Rosa 2003). Despite this, the biogeographic correlation is discussed since it shares faunal elements with the Sopas Formation (Uruguay), which are not recorded in Buenos Aires province, Argentina (see Ubilla 1985, Oliveira 1996, Ubilla and Perea 1999). According to Milder (2000), the age obtained by thermoluminescence dating, encompasses a time span from 42,600 to 6,400 years BP (Kerber et al. 2011).

Balneário Hermenegildo (53°15'S, 33°42'W) comprises the southern portion of the coastal plain of Rio Grande do Sul, 20 km from Santa Vitória do Palmar. Over time, it has suffered modifications to its landscape related to sea level fluctuations (transgressive-regressive events), which developed four lagoon-barrier systems (Villwock and Tomazelli 1995). The fossil remains of the coastal plain are associated with deposits of lagoon-barrier system III, with an estimated age of 120,000 years BP (Villwock and Tomazelli 1995). The dates obtained for the coastal plain of Rio Grande do Sul show a wide variation from younger than 18,000 to 650,000 years BP (Lopes et al. 2008, 2010). According to Lopes et al. (2010), the mixture of fossils from the middle and late Pleistocene is probably the result of reworking of several fossil beds by successive Quaternary transgressive events.

Chuí Creek (33°35'S; 53°20'W) is located in southernmost part of Rio Grande do Sul, in Santa Vitória do Palmar Municipality. The material was found *in situ* exposed along the banks of Chuí Creek. The plain through which the creek flows and where the fossil remains of Chuí Creek occur are associated with deposits of lagoon-barrier system

III located between coastal barrier II (westwards) and barrier III (eastwards). The age of the fossils of Chuí Creek was estimated to be at least 120,000 years BP based on their location within the barrier-lagoon system III (Lopes et al. 2005). However, subsequently it was demonstrated that these fossils are more recent (Lopes et al. 2010). A sample from the bank of Chuí Creek dated by ESR suggests an age between 42,000 and 33,000 years BP (Lopes et al. 2010). The mammal fossils collected are assigned to the Lujanian age (Oliveira et al. 2005).

Rincão dos Fialho is located in Rosário do Sul Municipality (30°12'S; 55°16'W). It is situated in the southwestern state of Rio Grande do Sul. The material was collected near the Fialho farmhouse, in a stream that cuts through layers of sandy sediments of variable thickness, of Pleistocenian age, that are directly in contact with the Triassic (Ferigolo et al. 1997).

## SYSTEMATIC

Superorder Xenarthra Cope, 1889  
Order Cingulata Illiger, 1811  
Suborder Glyptodontia Ameghino, 1889  
Superfamily Glyptodontoidea Gray, 1869  
Family Glyptodontidae Gray, 1869  
Genus *Panochthus* Burmeister, 1866

*Panochthus tuberculatus* (Owen, 1845)  
(Fig. 3A; Fig 4C-D)

## REFERRED MATERIAL

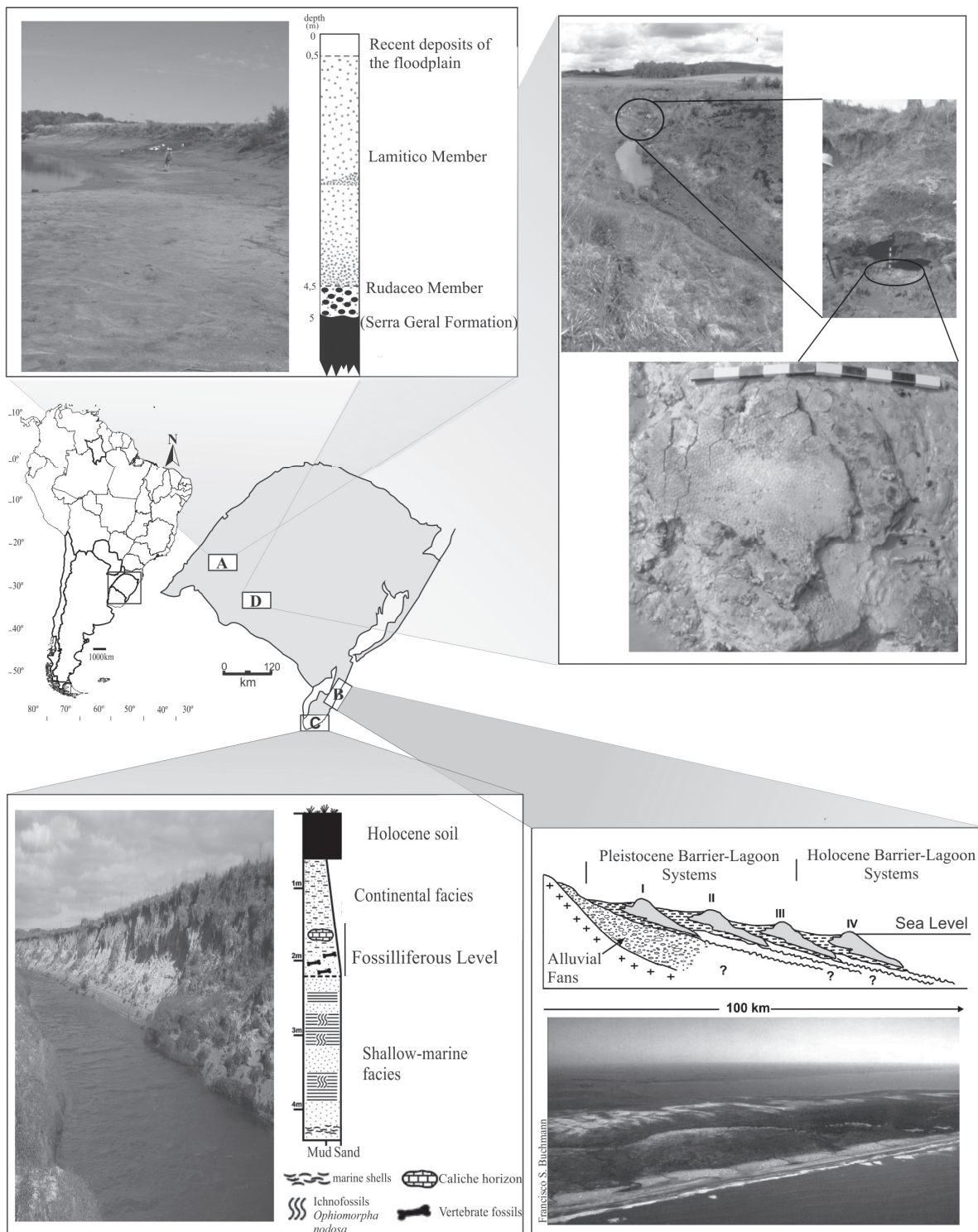
Caudal tube, right distal portion, LGP P0212.  
Isolated osteoderms, MCN-PV 3948; MCN-PV 3953.

## GEOGRAPHIC PROVENANCE

Balneário Hermenegildo, coastal plain of Rio Grande do Sul.

## DESCRIPTION

The caudal tube is a right distal tip belonging to *Panochthus tuberculatus*. The distal portion is rounded, such as in some specimens of *P.*



**Figure 2** - Location map of fossiliferous localities. A. Panoramic view of banks exposing the TouroPasso Formation and stratigraphic sequences (modified from Bombin 1976); B. BalneárioHermenegildo and transect of the coastal plain of Rio Grande do Sul, showing its main depositional systems (modified from Tomazelli and Villwock 2005); C. Panoramic view of banks exposed at Chui Creek and stratigraphic sequences (modified from Lopes 2013); D. Rincão dos Fialho, where the material of *Panochthus* sp was collected.

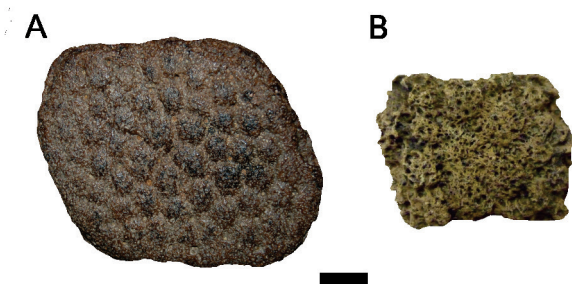
*tuberculatus*, and different from *P. greslebini*, which is heavily truncated, and *P. subintermedius*, which is pointed and subtriangular. In dorsal view, it is possible to distinguish two subapical figures, as in *P. frenzelianus*, *P. jaguaribensis* and *P. tuberculatus*. In *P. greslebini* and *P. subintermedius* there is just one dorsal figure. In dorsal view, the lateral figure can be seen to be of relatively large size as in *P. frenzelianus*, and distinct from *P. jaguaribensis*, *P. subintermedius* and *P. tuberculatus*, in which it is smaller. The terminal figure is oriented laterally as in *P. frenzelianus* and *P. tuberculatus*, while in *P. jaguaribensis* and *P. greslebini* it is oriented ventrally. The terminal figure is surrounded by a shallow slope, which differs from *P. subintermedius* and *P. greslebini*. Although the caudal tube is fragmented, it is possible to identify similar figures on the carapace. The morphology of the caudal tube are the most variable in this species (Zamorano et al. 2012).

The osteoderms of the postero-dorsal region of *P. tuberculatus* are thick and their tubercular figures are larger than in any other species of *Panochthus* (Fig. 3A).

*P. tuberculatus* is present in the middle Pleistocene and late Pleistocene of Argentina, Uruguay, southern Brazil, Paraguay and Bolivia (Hoffstetter 1963, 1978, Mones and Francis 1973, Zurita et al. 2009b, Zamorano 2012, Zamorano et al. 2012).

*Panochthus* cf. *P. greslebini*

(Fig 3B; Fig 4A-B)



**Figure 3** - A. *Panochthus tuberculatus*. B. *Panochthus*. cf. *P. greslebini*. Scale bars: 10 mm.

REFERRED MATERIAL

Caudal tube, distal right portion, MCN-PV 32182. Isolated osteoderms: MCN-PV 2594; MCN-PV 3296; MCN-PV 5324; MCN-PV 7131; MCN-PV 8766; MCN-PV 8804; MNRJ 2106-V; MNRJ 2107-V; MNRJ 2138-V; MNRJ 2152-V; MNRJ 2155-V; MNRJ 3537.

GEOGRAPHIC PROVENANCE

Balneário Hermenegildo, coastal plain of Rio Grande do Sul.

DESCRIPTION

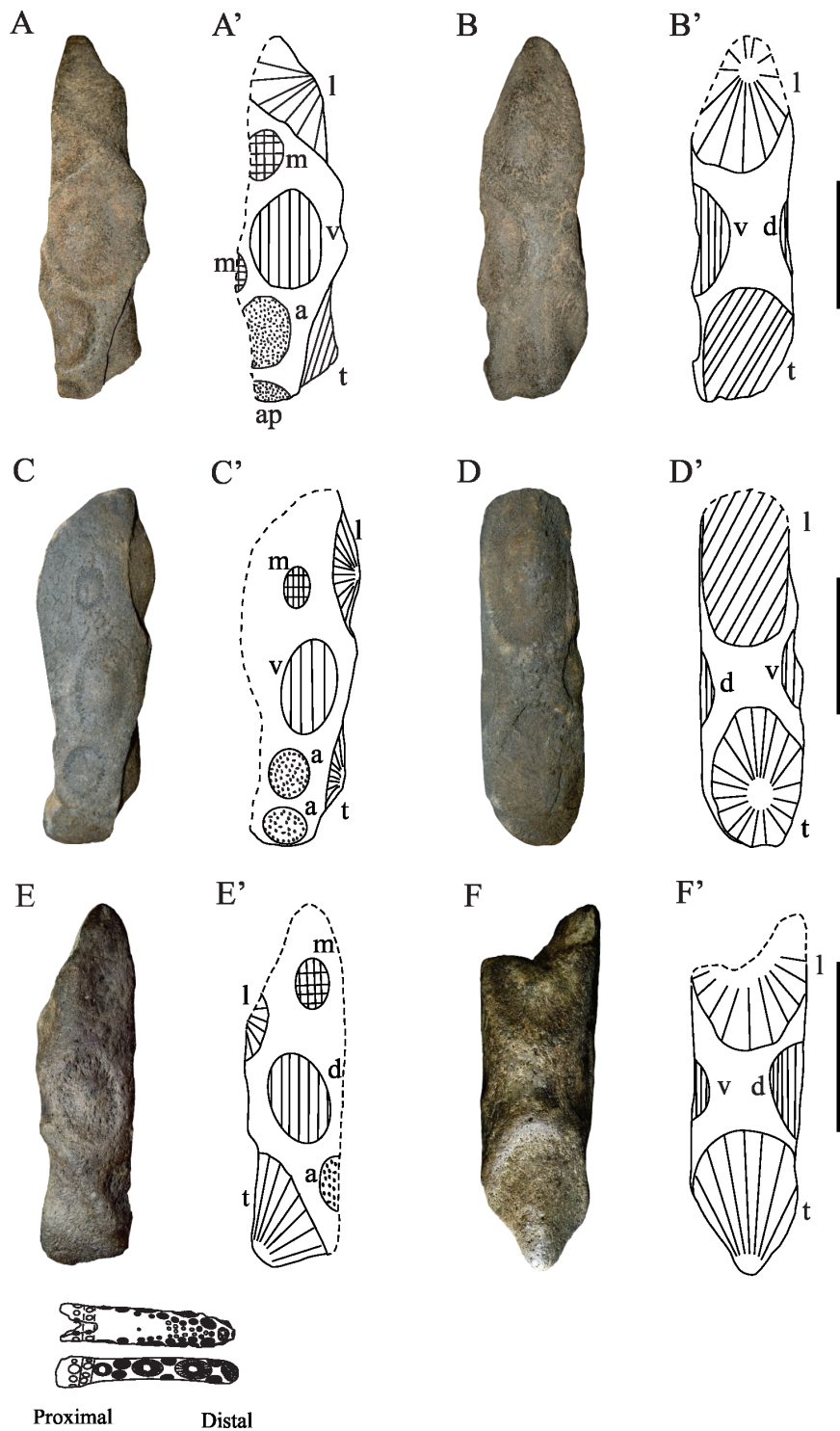
The caudal tube, MCN-PV32182, shows an apexian figure, considered an apomorphy of *Panochthus greslebini*, visible only on the dorsal surface and of subcircular outline (Fig. 4A-A'); however, the apexian figure of *P. greslebini* (DGM 1M) is less deep than in the specimen MCN-PV 32182. In this specimen, it is possible to identify the figure only in posterior view; in anterior view, it is poorly preserved, and it is not possible to describe it in more accurate details.

Ferreira et al. (2013) observed that osteoderms of the lateral region of the carapace present distinctive features to *P. greslebini*: they are thinner and have smaller tubercles, which, in turn, show a greater distance between the radial sulci (Fig. 3B); the tubercular figures are small and have a flat surface, with a diameter of approximately 2-7 mm. Some osteoderms from the postero-dorsal region show a slight concavity in the center of the plane figures, resembling in this respect *P. subintermedius* from the early Pleistocene of Argentina Ensenadan age.

*P. greslebini* is recorded in the Pleistocene of the northeast of Brazil, and is considered an endemic species of the Brazilian intretropical region (Bergqvist 1993, Porpino and Bergqvist 2002).

*Panochthus* sp.

(Fig. 4E-F; Fig 5; Fig 6)



**Figure 4** - Caudal tubes. A, A' – B, B'. *Panochthus*. cf. *P. greslebini*. A–A', View ventral; B–B', View lateral; C, C' – D, D'. *P. tuberculatus*. C–C', View ventral; D–D', View lateral. E, E' – F, F'. *Panochthus* sp. E – E', View dorsal; F – F', View lateral. Abbreviations: a. apical figure; ap. apexian figure; m. marginal figure; t. terminal figure; l. lateral figure; v. ventral figure; d. dorsal figure. Scale bars: 100 mm.

## REFERRED MATERIAL

Distal left portion of caudal tube (MCN-PV 2960); isolated osteoderms (MCN-PV3977; MCN-PV 3979; MCN-PV 3980; MCN-PV 3981; MCN-PV 3982; MCN-PV 3987; MCN-PV 3958; MCN-PV 3966; MCN-PV 3965; MCN-PV 3964; MCN-PV 3963; MCN-PV 3954; MCN-PV 3960; MCN-PV3971; MCN-PV 3975; MCN-PV 3985; MCN-PV6897; MCN-PV 6321; MCN-PV 4139; MCN-PV 4617; MCN-PV6326; MCN-PV4616; MCN-PV 4136; MCN-PV 4108; MCN-PV 4098; MCN-PV 4099; MCN-PV 4155; MCN-PV 6967; MCN-PV 8772; MCN-PV 8780; MCN-PV 8508; MCN-PV 7260; MCN-PV 7107; MCN-PV 7118; MCN-PV 1150; MCN-PV 3949; MCN-PV 3957; MCN-PV 3976; MCN-PV 6324; MCN-PV 6325; MCN-PV 6345; MCN-PV 6322; MCN-PV 6323; MCN-PV 6319; MCN-PV 6639; MCN-PV 6657; MCN-PV 6842; MCN-PV 6843; MCN-PV 6859; MCN-PV 5350; MCN-PV 5396; MCN-PV 5420; MCN-PV 5345; MCN-PV 5360; MCN-PV 5441; MCN-PV 5442; MCN-PV 5924; MCN-PV 5394; MCN-PV 5325; MCN-PV 5395; MCN-PV 5923; MCN-PV 5443; MCN-PV 5433; MCN-PV 5700; MCN-PV 5421; MCN-PV 5464; MCN-PV 5341; MCN-PV 5327; MCN-PV 5326; MCN-PV 5445; MCN-PV 5589; MCN-PV 3961; MCN-PV 3951; MCN-PV 3955; MCN-PV 3959; MCN-PV 7112; MCN-PV 6320; MCN-PV 5444; MCN-PV 5551; MCN-PV 4988; MCN-PV 3974; MCN-PV 4001; MCN-PV 4002; MCN-PV 4033; MCN-PV 4738; MCN-PV 4739; MCN-PV 4740; MCN-PV 4741; MCN-PV 4742; MCN-PV 4743; MCN-PV 4744; MCN-PV 4745; MCN-PV 4746; MCN-PV 4747; MCN-PV 8800; MCN-PV 8803; MCN-PV 8805; MCN-PV 2960; MCN-PV 448; MCN-PV 461; MCN-PV 145; MCN-PV 210; MCN-PV 134; MCN-PV 1681; MCN-PV 2043; MCTFM-PV 859; MCTFM-PV 850; MCTFM-PV 117); articulated osteoderms of dorsal carapace (MCN-PV 5659).

## GEOGRAPHIC PROVENANCE

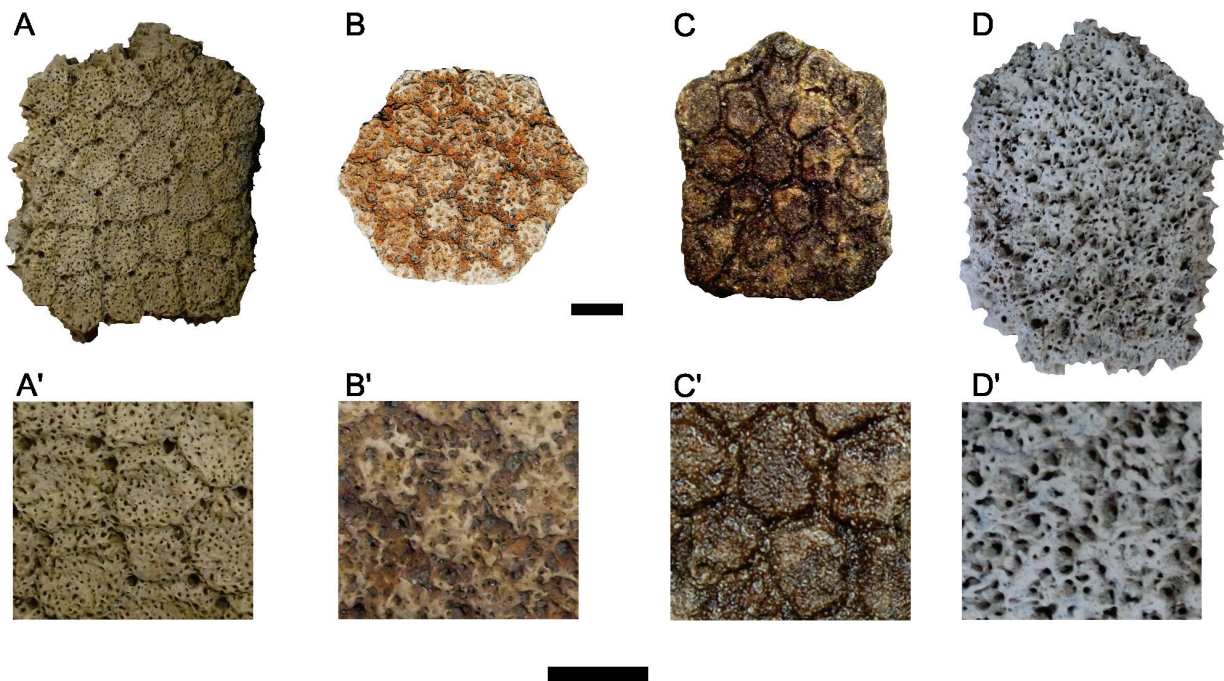
Balneário Hermenegildo, coastal plain of Rio Grande do Sul; Rincão dos Fialho and Chuí Creek.

## DESCRIPTION

The caudal tube (Fig 4 E-F) has a distal, semi-oval extremity and has a subtriangular shape, ending in a conical tip. In dorsal view, the caudal tube presents only one dorsal figure, shared only by *P. greslebini* and *P. subintermedius*, and lacks a secondary dorsal figure, which differs from *P. frenzelianus*, *P. jaguaribensis* and *P. tuberculatus*. The terminal figure is oriented laterally as in *P. frenzelianus* and *P. tuberculatus*. Therefore, due to the fragmentary condition of the specimen MCN-PV 2960 and the absence of diagnostic features, its specific assignment is not possible.

All the carapace osteoderms analyzed are pentagonal, hexagonal, rectangular or subquadrangular form, with thicknesses ranging from 17.2 mm (MCN-PV 2016) to 42.8 mm (MCN-PV 4139), and show a tendency for merging between the osteoderms, especially those of the lateral side of the carapace. The osteoderms show the general ornamentation pattern of the dorsal region of the carapace of *Panochthus*, characterized by the presence of multiple polygons on the surface; these polygons are undefined and do not possess the formation of a distinct central figure. In a few osteoderms there is a distinct central figure, typical of the lateral edges of *P. tuberculatus* and *P. frenzelianus* (Zamorano 2012). In the south of Brazil, most of the records of glyptodonts are isolated osteoderms, which weakens the establishment of species identifications. Morphological differences that enable us to classify these isolated osteoderms into four main morphotypes were noted (Fig 5).

Morphotype I (MCN-PV 2043, Fig 5A). The contact area between osteoderms has a rough aspect; in the external view the osteoderm presents several subcircular and concave figures, which are separated from each other by shallow radial sulci



**Figure 5** - Morphotypes of the osteoderms of *Panochthus* sp. and detail. A–A', Morphotype I; B–B', Morphotype II; C–C', Morphotype III; D–D', Morphotype IV. Scale bars: 10 mm.

and limited by shallow radial sulci with foramina in the connection between them. The morphotype I osteoderms are larger than the other morphotypes identified and were found only in the Chuí Creek locality (Fig 6).

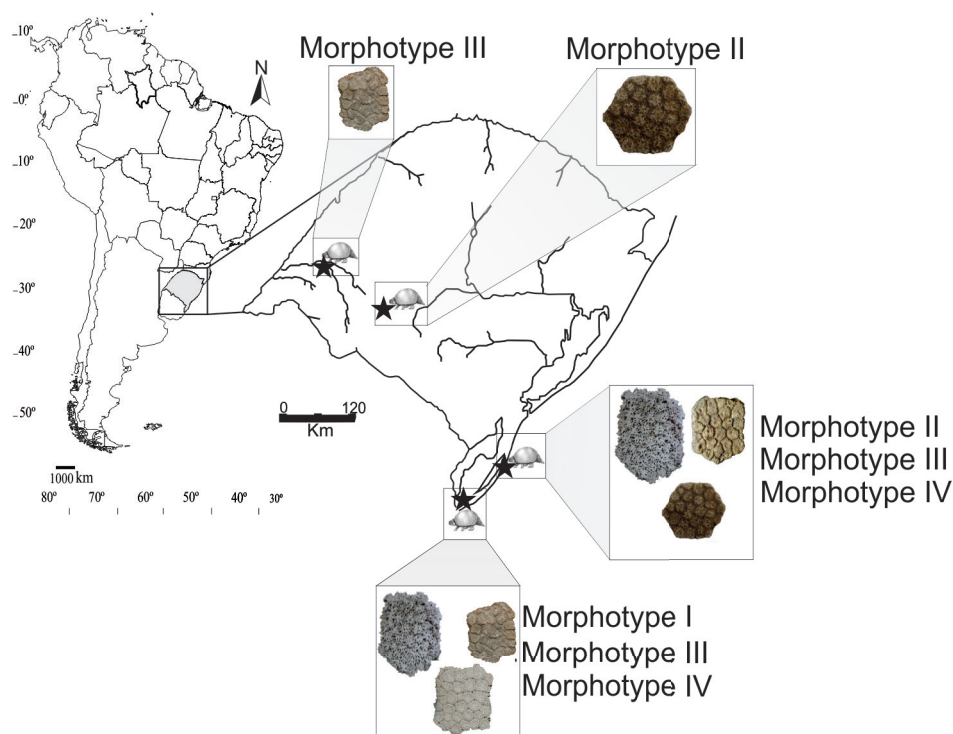
Morphotype II (MCN-PV 5659, Fig 5B). The contact area between osteoderms does not have a rough aspect as in morphotype I; in external view the osteoderms present several circular figures, small, prominent and trabecular in aspect. The figures are limited by wide and shallow radial sulci with relatively large foramina. The morphotype II osteoderms are smaller than the morphotypes I and IV, and were found in the Rosário do Sul, Rincão dos Fialho locality and Santa Vitória do Palmar, Balneário Hermenegildo locality (Fig. 6).

Morphotype III (MCN-PV 4988, Fig. 5C). This morphotype is distinguished by deep radial sulci and by clearly polygonal figures (pentagonal and hexagonal), flat and without any trabecular aspect.

This morphology suggests that these osteoderms were found in a more lateral region of the carapace. The morphotype III osteoderms were found in Balneário Hermenegildo and Touro Passo Creek.

Morphotype IV (MCTFM-PV 117, Fig 5D). This type presents a spongy aspect, making it possible to differentiate small figures on the surface of the osteoderm. The morphotype IV osteoderms differ from the other morphotypes by their greater thickness; they are quite similar to *Neuryurus trabeculatus* Zurita and Ferrero 2009 (UAP 1510, Fig 2G) in external view, but in lateral view, *N.traberculatus* presents layers of compact bone that are much thicker than in *Panochthus*, with a smaller maximum diameter, and in internal view fewer foramina are observed (eight to ten in *N. trabeculatus* and three in the Brazilian material, MCTFM-PV 117). The morphotype IV osteoderms were found in Balneário Hermenegildo and Chui Creek.





**Figure 6** - Distribution of the morphotypes in localities of the study.

The morphotypes present significant morphological differences, which could indicate that the osteoderms are from different areas of the carapace. Chuí Creek and Balneário Hermenegildo are the localities with the most morphological diversity of osteoderms. However, it is interesting to note that the morphotype I osteoderms were found only in Chuí Creek. At present, it is safer to assign these specimens to *Panochthus* sp.

#### DISCUSSION AND CONCLUSIONS

Thus far, the previous records of *Panochthus tuberculatus* in Rio Grande do Sul (Paula Couto 1943, Bombin 1976) are dubious. Oliveira (1996) in a study on the Xenartha of Rio Grande do Sul, analyzed the material assigned to *P. tuberculatus* and considered it as *Panochthus* sp. because the specimens were isolated and insufficiently preserved osteoderms, which were not enough to differentiate the species. In addition, Kerber and

Oliveira (2008) revised the fauna of mammals from Touro Passo based on new materials, and proposed the presence of *Panochthus* sp. previously reported to the locality by Bombin (1976) as *P. tuberculatus*. Herein, we identify *P. tuberculatus* and *P. cf. P. greslebini* to the Balneário Hermenegildo, while for the other locations studied (Touro Passo Creek, Chuí Creek and Rincão dos Fialhos) assigning *Panochthus* sp.

The caudal tubes, although very fragmented, are more informative than osteoderms, and they were cautiously used to identify *Panochthus tuberculatus* and *P. cf. P. greslebini*. Unfortunately, the caudal tubes are derived from the continental shelf, so they do not possess a stratigraphic context. Thus, a better identification of these species is still dependent on new findings from the continental Quaternary beds.

All other osteoderms despite having different shapes (quadrangular, pentagonal and hexagonal)

show the same reticular pattern, characteristic of the genus. The depth of the radial sulci may vary considerably in *Panochthus*, according to its location on the carapace so it cannot be used as a diagnostic feature. Most of the osteoderms found could not be assigned to a particular species; however, some individuals were possible to be identified at level. An example of this are the osteoderms of *P. frenzelianus* located on the caudal edge of the carapace, which bear an opening that narrows down and closes with a rounded, almost cylindrical cross-section (Zamorano 2012). It has also been found that the osteoderms of the postero-dorsal region of *P. tuberculatus* and lateral osteoderms of *P. greslebini* can be used to distinguish these species (see Fig 3).

The species of *Panochthus* show the external surface of osteoderms with similar morphological pattern comprising small tubercles. Particularly, in *P. intermedius* (antero-dorsal and postero-dorsal regions) and *P. jaguaribensis* (dorsal region following Moreira 1971) the carapace shows the typical rosette pattern (Zurita et al. 2011); however, Costa Pereira et al. (2014) interpret this fragment of *P. jaguaribensis* as having similarities with the cephalic shield of other species of *Panochthus*. The pattern differs from that observed on the dorsal regions of the carapace of *P. frenzelianus*, *P. tuberculatus* and *P. greslebini*, in which a clear reticular pattern is observed (Zamorano 2012). Porpino and Bergqvist (2002) point out that the carapace of *P. jaguaribensis* is less thick than in *P. greslebini*, and that this feature represents another distinguishing characteristic among the taxa. Costa Pereira et al. (2014) indicate the need for a detailed revision of *P. jaguaribensis*.

There are some diagnostic features at least for some species of *Panochthus* (presence of main figures in osteoderms from the antero and posterodorsal regions of carapace in *P. intermedius* and presence of an apexian figure in *P. greslebini*, for instance). Furthermore, some authors (e.g. Cruz et

al. 2011) have argued that the species of *Panochthus* can be differentiated by unique combinations of carapace and caudal tube characteristics.

Moreira (1971) observed a wide variation between specimens of *P. greslebini*, interpreted by him as ontogenetic. Chimento and Agnolin (2011) described a piece fragment of caudal tube from Santiago del Estero province, Argentina, this fragment described and figured by them, do not present evidence of an apexian figure, but a detailed note on the figure provided by these authors in view ventral is observed two ventral figures, which do not correspond to *P. greslebini*. It is noteworthy that that the fragment described here may actually represent the first occurrence of *P. greslebini* outside the Brazilian Intertropical Region. The presence of the species *P. subintermedius* (based in MCN-PV 2960) may not be ruled out either, although it is a taxon typical of the early-middle Pleistocene, while *P. greslebini* and *P. jaguaribensis* are from the Pleistocene *sensu lato* and considered endemic to the northeast of Brazil (Bergqvist 1993, Porpino and Bergqvist 2002).

In Brazil, the fossil record of *Panochthus* is restricted to the southern and northeast of Brazil (see Fig 1); the fossils recorded between these regions are mainly in caves of karstic origin (see Lund 1839, Salles et al. 2006, Castro and Langer 2011, Ghilardi et al. 2011, Silva et al. 2012). The glyptodonts previously reported for this type of depositional environment are *Glyptodon* and *Hoplophorus*. The absence of *Panochthus* in these localities may be due to the lack of further study in these regions, where the Pleistocene deposits are still poorly known.

Zurita et al. (2005) suggested that the strong development of frontonasal sinuses and a strongly pneumatized skull in *Neosclerocalyptus* and *Panochthus* played a major role in thermoregulation and would represent an adaptation for savanna-like environments in a semiarid climate period. Carlini et al. (2004) suggest, based on the fauna of Mesopotamia, Argentina, southern Brazil

and Uruguay West, would be associated an environmental conditions wetter and warm.

During the Quaternary, there were several glacial cycles, with cold and dry periods interrupted by hot and wetter periods (Haberle and Maslin 1999). Multiple pulses of expansion/contraction of the fields and regression/transgression of sea levels were recorded. According to Scillato-Yane et al. (2002) during mainly the last interglacial period there was development of an ecological corridor connecting the Mesopotamia region of Argentine with the intertropical region of Brazil. Sánchez et al. (2004) propose a corridor along the east of South America and some coastal areas of the Atlantic, which was formed during regression of sea level, and was used by mammals adapted to mesic environments. These pulses can justify the concurrent presence of genera from intertropical and pampaeen regions through the Pleistocene, for example: *Panochthus*, *Pampatherium* Gervais and Ameghino, 1880, *Holmesina* Simpson 1930, *Glyptodon* Owen, 1839 and *Notiomastodon* Cabrera, 1929 in southern Brazil mainly in the plain coast of Rio Grande do Sul. The interesting thing is the simultaneous presence of purportedly endemic intertropical species and pampaeen species belonging to those genera in the same area (see Oliveira and Pereira 2009).

#### ACKNOWLEDGEMENTS

The authors thank the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for financial support to J.D.F. as a fellowship of the Programa de Pós-Graduação em Geociências/ Universidade Federal do Rio Grande do Sul; FZBRS and LGP-V FURG for the infrastructure provided; D.da Silva, L.Kerber, V.G. Pitana (*in memoriam*), E.V.Oliveira, K.O.Porpino and A.E.Zurita for reading and commenting on the first version of the manuscript; we are greatly indebted to D.D.Rego (MNRJ), R.P.Lopes (LGP/FURG), R.R.Machado (DNPM) and J. Pereira (MCTFM) for enabling access to the specimens studied; and to L. Rota for enabling access to comparative material under his care.

#### RESUMO

O gênero *Panochthus* representa a última linhagem de "Panochthini" registrado no Pleistoceno. Este gênero tem uma ampla distribuição latitudinal na América do Sul, e no Brasil ocorre nas regiões sul e nordeste. No presente trabalho se descreve novos materiais (osteodermos isolados e fragmentos de tubo caudal) de *Panochthus* do estado de Rio Grande do Sul (Sul do Brasil) e se discute algumas questões taxonômicas relatada para a ocorrência de *P. greslebini* é o primeiro para fora da Região Intertropical Brasileira. Além disso, nós descrevemos novas características para diferenciar osteodermos de *P. greslebini* e *P.tuberculatus*. Infelizmente, não foi possível identificar alguns osteodermos em nível de espécie. Curiosamente, eles mostraram quatro morfotipos, caracterizados por sua morfologia externa, e atribuídos a *Panochthus* sp. Finalmente, nós concluímos que ao lado de *P.tuberculatus* registrados para o sul do Brasil, há outras espécies do gênero designada a *P. cf. P. greslebini*. Nossas análises reforça a confiabilidade das características do tubo caudal para a classificação das espécies de *Panochthus*.

**Palavras-chave:** Glyptodontidae, *Panochthus*, Pleistoceno, Sul do Brasil, osteodermos.

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