

# Report of *Microcavia* cf. *robusta* (Rodentia, Caviidae) from the late Pleistocene of Santa Fe, Argentina

Luciano Brambilla, Paula Lopez & Damián Ibarra



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**Abstract.** Rodents are good palaeoecological indicators by which the study of their distribution is especially relevant in palaeontology. *Microcavia* Gervais & Ameghino (family Caviidae) is known from South American arid to semi-arid regions. *Microcavia robusta* Gervais & Ameghino inhabited Argentina during the late Pleistocene, having been the species with largest adult individuals in the genus. The species has been recorded only in the east of the Buenos Aires Province. In this work we present a record of *Microcavia* cf. *robusta* from late Pleistocene sediments of Santa Fe, reconfiguring the biogeographical distribution of the genus, and possibly of *M. robusta*.

**Keywords:** South America ▪ Pleistocene ▪ Mammals ▪ Caviidae ▪ *Microcavia* ▪ Fossil.

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**Resumen. Registro de *Microcavia* cf. *robusta* (Rodentia, Caviidae) en el Pleistoceno tardío de la Provincia Santa Fe, Argentina.** Los roedores son conocidos por ser frecuentemente indicadores paleoecológicos, por lo que el estudio de su distribución es especialmente relevante en paleontología. *Microcavia* Gervais & Ameghino pertenece a la familia Caviidae y se encuentra en Sudamérica en regiones áridas y semiáridas. *Microcavia robusta* Gervais & Ameghino vivió durante el Pleistoceno tardío en Argentina y fue la especie con los adultos de mayor talla del género. Hasta ahora, *M. robusta* solo se registra en el este de la provincia de Buenos Aires. En este artículo presentamos un registro de *Microcavia* cf. *robusta* en sedimentos del Pleistoceno tardío de Santa Fe, reconfigurando la distribución biogeográfica del género, y posiblemente de *M. robusta*.

**Palabras clave:** América del Sur ▪ Pleistoceno ▪ Mamíferos ▪ Caviidae ▪ *Microcavia* ▪ Fósil.

**Luciano Brambilla** [lbrambilla@fbiyf.unr.edu.ar]: Facultad de Ciencias Bioquímicas y Farmacéuticas, Universidad Nacional de Rosario, Suipacha 531, S2002LRK Rosario, Argentina | Consejo de Investigaciones de la Universidad Nacional de Rosario (CIUNR), Rosario, Argentina | Centro de Estudios Interdisciplinarios de la Universidad Nacional de Rosario (CEI-UNR), Maipú 1065, S2000CGK, Rosario, Argentina. **Paula Lopez:** Facultad de Ciencias Bioquímicas y Farmacéuticas, Universidad Nacional de Rosario, Suipacha 531, S2002LRK Rosario, Argentina. **Damián Ibarra:** Facultad de Ciencias Bioquímicas y Farmacéuticas, Universidad Nacional de Rosario, Suipacha 531, S2002LRK Rosario, Argentina.

## INTRODUCTION

The genus *Microcavia* Gervais & Ameghino, 1880 belongs to the caviomorph family of rodents Caviidae, found throughout South America. The species-level diversity has been studied by means of the cranial and dental anatomy (Quintana 1996). There are also specimens with postcranial areas preserved (Ubilla 2008) which are promising for refining these studies of diversity. The genus *Microcavia* is the only for which a moderately continuous fossil record has been assembled. Its origin seems to have been in the middle Pliocene in the Buenos Aires Province, persisting until the present when the highest diversity is known. Its current and past distribution in arid or semi-arid areas (Quintana 1996, Teta et al. 2017) allows referring to these micromammals as important palaeoecological indicators, adding relevance to its study.

*Microcavia* presents a significant diversity of fossil and living species. In 2017 there were recognized three different living species from Argentina (Teta et al. 2017) which were formerly considered as a single one, *Microcavia australis* (Geoffroy & D'Orbigny, 1833). These three species, which differ in size and cranio-dental characteristics (Teta et al. 2017), are: (1) *M. australis*, distributed in southern Argentina and the west-central Andes, (2) *Microcavia maenas* Thomas, 1898, northwestern and central Argentina, and (3) *Microcavia jayat* Teta et al., 2017

inhabiting the Dry Chaco ecoregion (Teta et al. 2017). Thus, five extant species are known in South America: *M. australis*, *M. jayat*, *M. maenas*, *M. shiptoni* (Thomas, 1925) from Argentina and *M. niata* (Thomas, 1898) from Bolivia y Chile.

Additionally, four extinct species are known: *Microcavia chapalmalensis* Ameghino, 1908 (Chapalmalalan age), *Microcavia reigi* Quintana, 1996 (Marplatan age, Upper Pliocene to Lower Pleistocene), and *Microcavia robusta* (Gervais & Ameghino, 1880), Ensenadan and Lujanian age (Quintana 1996), from Argentina. Finally, the fourth fossil species, *M. criollensis* Ubilla, Piñeiro & Quintana, 1999 was collected from late Pleistocene (Lujanian) sediments of Uruguay (Ubilla et al. 1999). Moreover, under current taxonomy, the genera *Caviops* Ameghino, 1908, *Monticavia* Thomas, 1916, *Nanocavia* Thomas, 1925, and *Propadiolagus* Ortega-Hinojosa, 1963 are synonyms of *Microcavia*. *M. robusta* and *M. reigi* were the species with largest adults among the *Microcavia* in Argentina, although those of *M. robusta* are distinguished by being significantly larger than the rest of the caviids. The only species comparable in size with *M. robusta* is *M. criollensis*, currently known from Uruguay (Ubilla 1999, 2008). During the late Pleistocene to the Holocene in Argentina only two species are recorded: *M. australis* and *M. robusta* (Quintana 1996), specifically in the Buenos Aires Province. *M. robusta* has the longest stratigraphic range within the genus, and

has been recorded in the southern Pampean region: Miramar, Santa Clara del Mar and Santa Elena and Sotelo streams (Mar Chiquita, Buenos Aires) according to Quintana (1996).

In this work we present a record of *Microcavia* cf. *robusta* from sediments deposited during the late Pleistocene in Santa Fe in the northern Pampean region (Fig. 1), expanding the geographic distribution of the *Microcavia* fossil record.

#### MATERIAL AND METHOD

**Abbreviations:** LPB, Laboratorio de Paleontología y Biocronología, Facultad de Ciencias Exactas, Ingeniería y Agrimensura, Universidad Nacional de Rosario (Rosario, Argentina), FC-DPV: Departamento de Paleontología, Facultad de Ciencias (Montevideo, Uruguay), MACN: Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (Buenos Aires, Argentina), MMP, Museo Municipal de Ciencias Naturales de Mar del Plata ‘Lorenzo Scaglia’ (Mar del Plata, Argentina).

**Material:** *Microcavia* cf. *robusta*: LPB-1266. *Microcavia robusta*: MACN-19644, MACN-2445, MACN-19649. *M. australis*: MMP-318, MMP-82-94. *Microcavia criollensis*: FC-DPV-847, FC-DPV-848, FC-DPV-806.

**Measurements:** obtained from scaled photos using the Image J program (Abramoff et al. 2004). The range of the total length of the specimen LPB-1266 dental series (Table 1) was estimated by adding to the measurements of our specimen (m1-m3) the length of the smallest- and the largest-pm4 displayed in Quintana (1996). The other ranges considered are based on measurements from Quintana (1996) and Ubilla (1999).

#### SYSTEMATIC PALAEOLOGY

Order Rodentia Bowdich, 1821

Suborder Caviomorpha Wood & Patterson, in Wood, 1955

Family Caviidae Waterhouse, 1839

Subfamily Caviinae Murray, 1866

Genus *Microcavia* Gervais & Ameghino, 1880

**Type species.** *Microcavia typus* Gervais & Ameghino, 1880.

#### *Microcavia* cf. *robusta* Gervais & Ameghino, 1880

Fig. 2A, D

**Material.** One specimen (LPB-1266): lower right mandible with complete m2 and m3, and partially preserved m1.

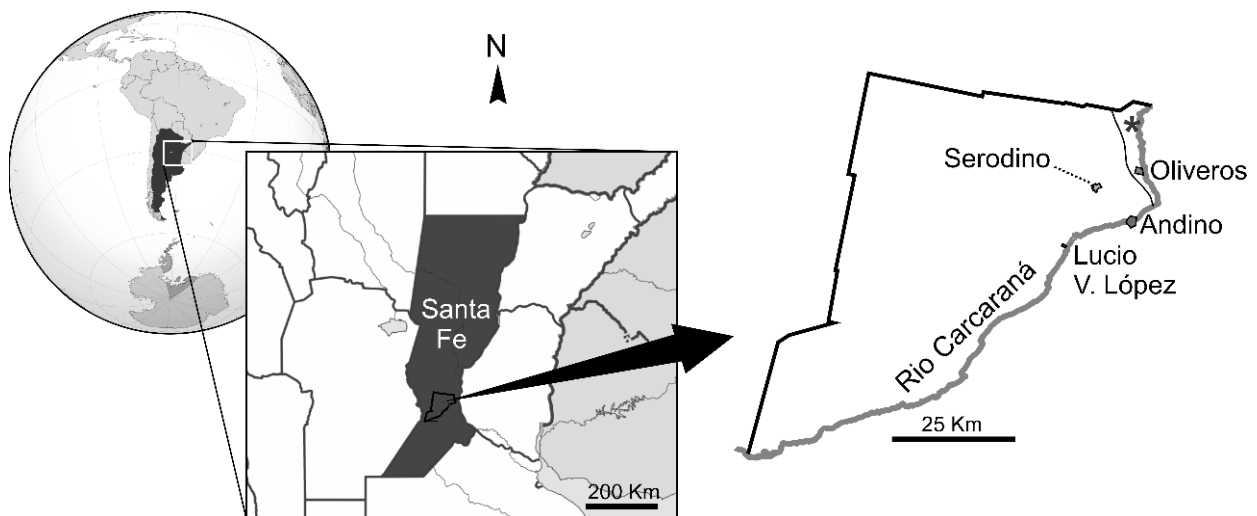
**Stratigraphic and geographic provenance.** The material comes from the loessic sediments on the left bank of the Carcarañá river, north of the town Oliveros, Santa Fe, Argentina (Fig. 1).

**Description.** The m3 prisms are arranged obliquely to the m2 prisms (Fig. 2A, E). Deep internal flexid in m3 and m2, and m3 longer and wider than m2. According to the dimensions of the lower molars and the length of the lower dental row (Table 1) we assign the specimen to the genus *Microcavia*, being *Microcavia robusta* the most closely comparable species.

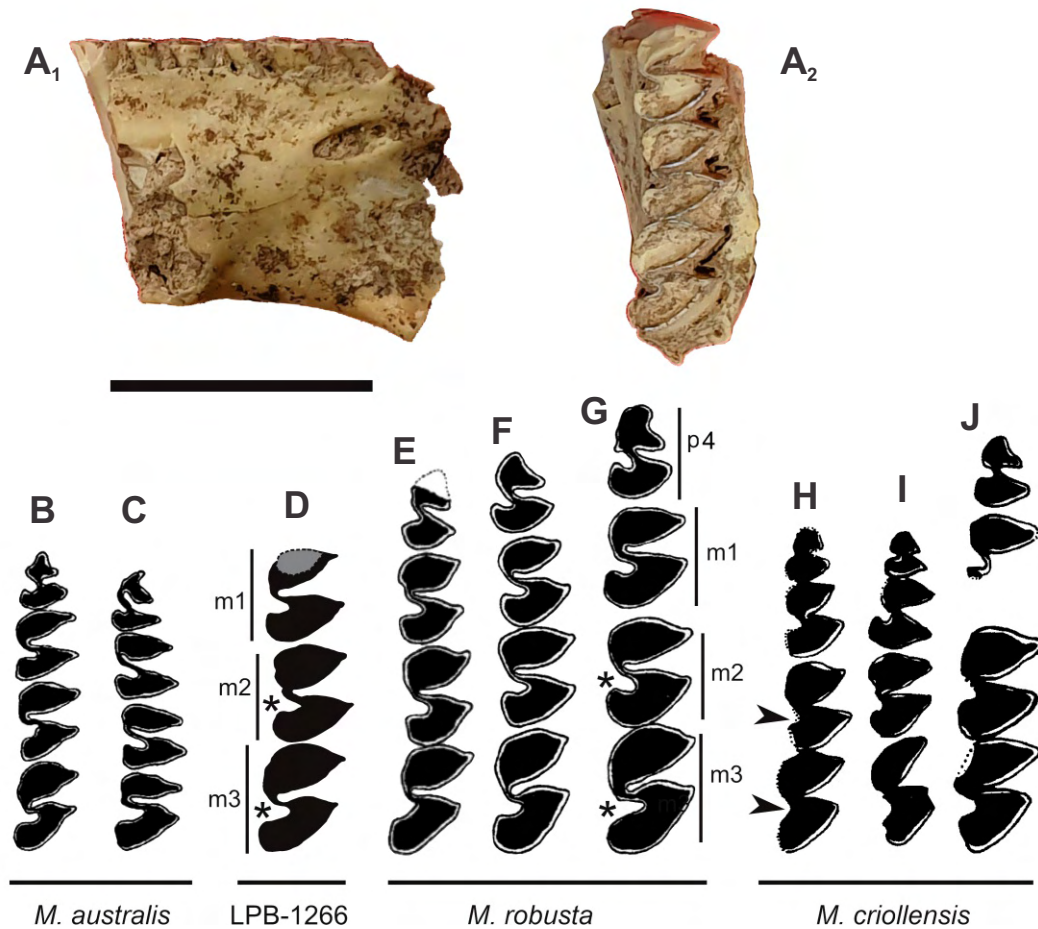
**Discussion.** *Microcavia*, unlike other rodents, presents great intraspecific variability in size and shape of dental rows (Contreras 1964). Despite this, the length of the lower dental rows could in some cases be used as a diagnostic parameter (Quintana 1996). Although, this characteristic does not distinguish, for example, between *M. robusta* and *M. criollensis* (Ubilla et al. 1999).

According to Ubilla et al. (1999), *M. robusta* and *M. criollensis* can be differentiated by the additional flexid of M3, which has diverging and deep internal margins in *M. criollensis*, whereas in *M. robusta* the additional flexid of M3 has very deep and parallel internal margins. The present material (LPB-1266) consists of the lower molars only, what hampers the comparison proposed by Ubilla et al. (1999). Here, we identify the present material as *Microcavia* cf. *robusta* due to the presence of a pronounced internal flexid (Quintana 1996) in m3 and m2, while in *M. criollensis* a weakly marked internal flexid is observed in m2 and m3 (Fig. 2). In the same way, the measurements obtained from our specimen (Table 1) match, as pointed out above, average values of the *M. robusta*, and clearly differs from *M. criollensis* and *M. australis* (Fig. 3). Additionally, the oblique arrangement of the prisms m3 with respect to the prisms m2 is an important characteristic of *M. robusta* that is also present in the studied material.

In a biogeographical perspective, *Microcavia* species distribute through large arid regions. *Microcavia robusta* with previous record only in the south east of the Buenos Aires Province



**Figure 1.** Study area and localization of the studied specimen of *Microcavia* cf. *robusta* (LPB-1266), marked by an asterisk at right.



**Figure 2.** A: *Microcavia* cf. *robusta* (LPB-1266), lingual (A<sub>1</sub>) and occlusal (A<sub>2</sub>) views. B-C: *M. australis*, B: MMP-318, C: MMP-82-94. D: *Microcavia* cf. *robusta* (LPB-1266). E-G: *M. robusta*, E: MACN-19644, F: MACN-2445, G: MACN-19649. H-J: *M. criollensis*, FC-DPV-847, FC-DPV-848, FC-DPV-806. The asterisk indicates the deep flexids in *M. robusta* and in *M. cf. robusta* (LPB-1266). The arrow heads point shallow flexids in *M. criollensis*. Drawings of occlusal views modified from Quintana (1996) and Ubilla et al. (1999). Bar is 10 mm length.

seemed to show a marked endemism. However, the material presented herein as *M. cf. robusta* strongly suggests the distribution zone of *Microcavia robusta* could be extended at least up to include the southern Santa Fe Province (Fig. 4). If this would be confirmed, one could assume rather similar habitat conditions in this later region. The strong association of the genus with arid climates (Teta et al. 2017) makes *Microcavia* an important palaeoclimatic indicator of arid conditions during the late Pleistocene in the Pampean region. Its occurrence also coincides with the presence of sediments of eolian origin deposited in the late

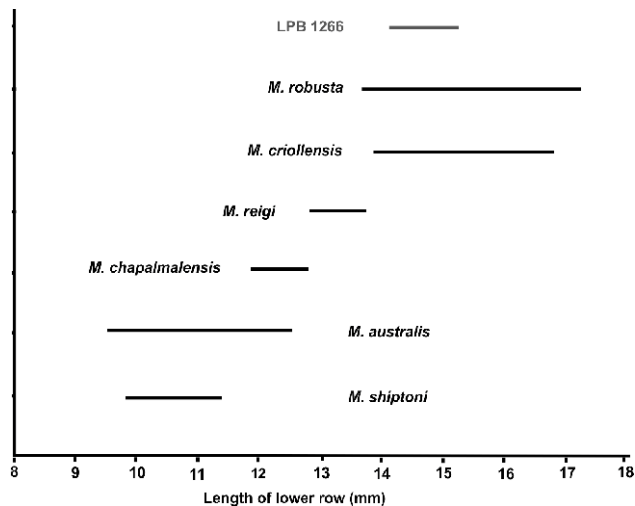
Pleistocene on the Pampean region previously associated with cold, dry and arid periods (Tonni & Fidalgo 1982, Kröhling 1999, Toledo 2011).

**CONCLUSION**

The rodents of the Santa Fe Province have received little attention with respect to those of the Buenos Aires Province. The find of *Microcavia cf. robusta* in Lujanian sediments of the southern

**Table 1.** Measurements from the lower dental row of *M. cf. robusta* (LBP-1266), *M. robusta*, *M. australis*, and *M. criollensis*.

	Ranges [mm]			
	LPB-1266	<i>M. robusta</i>	<i>M. australis</i>	<i>M. criollensis</i>
Maximum length of m2	3.7	3.5-4.5	2.1-2.5	3.6-4.7
Maximum length of m3	4.4	4.1-5.4	3.6-3.9	4.3-5.0
Maximum width of m1	2.6	2.5-3.4	2.1-2.5	2.5-2.9
Maximum width of m2	2.6	2.5-3.4	2.1-2.4	3.0-3.5
Maximum width of m3	2.9	2.9-3.9	2.1-2.4	3.0-3.8
m1-m3 series length	11.5	10.4-11.4	7.9-8.2	8.5-10.2
Length for bottom series p4-m3	14.1-15.1	13.7-17.2	9.5-12.6	13.8-16.8



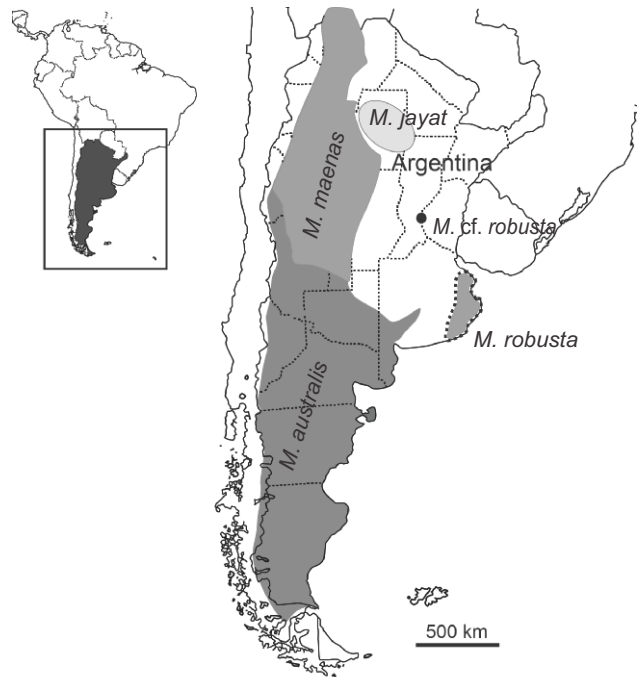
**Figure 3.** Length of *Microcavia* lower molar row. The segments represent the length ranges of each species (after Quintana 1996). Length of the lower row of *Microcavia* cf. *robusta* (LPB-1266) estimated as indicated in the text.

Santa Fe Province reconfigures the distribution of the genus in Argentina (Fig. 4). Furthermore, it could be assumed arid conditions for this region.

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**Figure 4.** Geographical distribution of *M. australis*, *M. maenas*, *M. jayat*, and *M. robusta* from Argentina (modified from Ubilla 2008 and Teta et al. 2017) and occurrence of *M. cf. robusta* (this report).