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NOTA PALEONTOLÓGICA

# NEW DATA ON *SCAPTEROMYS HERSHKOVITZI* REIG, 1994 (RODENTIA: CRICETIDAE) FROM THE PLIOCENE OF ARGENTINA

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THE rich paleontological collection housed in the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (MACN-PV, Buenos Aires, Argentina) stores several unstudied fossil cricetids collected from the beginning of the twentieth century. One of them, obtained by the famous paleontologists Lucas Kraglievich (1886-1932), is particularly relevant because it includes a mandible and a maxilla from the same individual. This is an unusual situation within the Argentinean Pliocene sigmodontine record, given that the common scenario consists in a puzzle mostly composed by isolated alternatively upper or lower elements (*e.g.*, *Auliscomys formosus* Reig, 1978, *Graomys dorae* Reig, 1978) that clearly hamper taxonomic work. The examination of this fossil adds new morphological and taxonomical information to the poorly known *Scapteromys hershkovitzi* Reig, 1994. This taxon is the only known extinct species described for the genus *Scapteromys* Waterhouse, 1837 and the oldest record for these semiaquatic rats that currently inhabit a large area in subtropical and temperate Southern South America (D'Elía and Pardiñas, 2004). This note provides the main results of the study of the holotype of *S. hershkovitzi* and the referred materials (housed in the Museo Municipal de Ciencias Naturales y Tradicional de Mar del Plata "Lorenzo Scaglia," Mar del Plata, Buenos Aires, Argentina, **MMP**, and **MACN-PV**), and regular series of related taxa (*Scapteromys* spp., *Kunsia* spp.). Craniodental anatomy used here follows the concepts, nomenclature, and acronyms described or used by Carleton and Musser (1989), Reig (1977), and Pardiñas *et al*. (2008).

### *Historical background*

*S. hershkovitzi* was described and named by Osvaldo Reig in his doctoral dissertation (Reig, 1972, p. 280) but remained unpublished for more than two decades. After Reig passed away, Carlos Quintana and Ana María Báez extracted several parts of Reig's thesis and composed a posthumous work (Reig, 1994) with the objective of publishing his taxonomical novelties. The description of *S. hershkovitzi* was mainly based on the holotype, an isolated skull with fine preservation found in the coastal cliffs of southeastern Buenos Aires Province. An additional fossil identified by Reig (1972, 1994) as part of the hypodigm of *S. hershkovitzi* is composed of the maxillaries and mandibles from a single individual (MMP 1079-M; see taxonomical remarks).

## SYSTEMATIC PALEONTOLOGY

Family CRICETIDAE Fischer, 1817

Subfamily SIGMODONTINAE Wagner, 1843

Genus ***Scapteromys*** Waterhouse, 1837

***Scapteromys hershkovitzi*** Reig, 1994

Figures 1–3

***Type species***. *Mus tumidus* Waterhouse, 1837, by original designation.

***Holotype***. MMP 853-M, fragmented skull missing most of the brain case, the zygomatic arcs and the anterior tip of the nasals and premaxillae. This material was collected by G. Scaglia on June 6, 1963, according to the original label.

***Referred material***. MACN-PV 10003, left fragmentary maxillary with M1–M2 and right mandible with the incisor and

the m1–m3, both from the same individual (Fig. 1).

***Geographic and stratigraphic provenance***. MMP 853-M was collected from "San Andrés Formation, Atlantic cliffs of south east Buenos Aires province, Argentina, close to Punta San Andrés, Partido de General Pueyrredón, Buenos Aires Province, Argentina" (Reig, 1994, p. 107). Regarding MACN-PV 10003, the original label associated with this fossil and handwritten by L. Kraglievich said "*Chapadmalense de Miramar entre Brusquitas y P. Vorohué, 14-IV-1925*." Geographically interpreted, this data indicates that the fossil was recovered from the Atlantic cliffs between Arroyo Las Brusquitas mouth (38°14′S–57°46′W, boundary between General Alvarado and General Pueyrredón counties) and the coastal feature called Punta Vorohué (38°13′S–57°43′W, General Pueyrredón county; geographic location according to Risso Dominguez, 1949, fig. 1), southeastern Buenos Aires Province, Argentina. These cliffs –along *c*. 4.5 km by coastal line– are composed of several stratigraphic units varying from Pliocene to Holocene in age; "*Chapadmalense*" (= Chapadmalalan) seems to indicate, at least presumptively, Pliocene beds. The coloration and type of preservation of the fossil, yellowish cream and with manganese dendrites are typical of materials recovered from the Chapdmalal and Barranca de los Lobos formations.

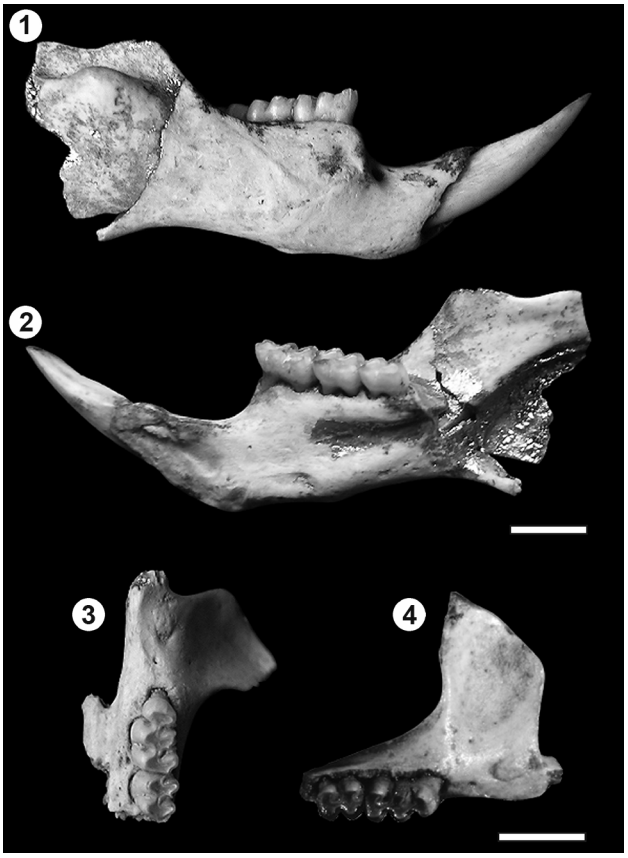


**Figure 1**. MACN-PV 10003, right mandible in labial (1) and lingual (2) view and left maxillary in dorsal (3) and lateral (4) view, both from the same individual referred to ***Scapteromys hershkovitzi*** (upper Pliocene, Buenos Aires, Argentina). Scale bar= 3mm.

***Description of MACN-PV 10003***. The zygomatic plate is broad, parallel-sided and moderately high, not deeply excavated; its posterior margin is placed slightly anterior to the anterior face of the M1, while the upper free border descends in an angle of 45° to a straight anterior margin (Fig. 1). The origin of the superficial masseter is moderately marked at the base of the zygomatic plate anterior portion. The posterior extension of the incisive foramen is rounded and reaches the procingulum of M1. The preserved portion of the palate region is flat without structures. The M1–M2 are crested with the labial cusps taller than lingual ones and with moderately developed unilateral coronal hypsodonty. The M1 has a slightly compressed procingulum and an almost imperceptible anteromedian flexus defining two conules, the anterolabial slightly smaller than the anterolingual. The main cusps display an opposite pattern. The parastyle is well developed and the mesoloph is also present but partially fused with the paracone being its labial free portion an enamel ridge without exposed dentine. The proto- and hypoflexus are broad and short, while the para- and mesoflexus have their funds bent backwards close to the molar midline. The M2 is square in outline with the main cusps opposite in pattern. The paraloph is short; the mesoloph shows the same pattern described for the m1; the hypoflexus is short and broad. The mandible is robust and high (Fig. 1). The diastema region is broad with its anterior point located slightly below the alveolar plane. A large mental foramen is situated at the base of the diastema, visible in lateral view. The masseteric crest is inconspicuous and short; its inferior portion rises from the middle part of the horizontal ramus to meet the upper portion and produces a common ridge which ends close to the mental foramen. The coronoid process is broken but its base suggests a robust structure of medium size. The capsular process of the lower incisor alveolous is well-developed as a conspicuous rounded swelling –but not concealing the sigmoid notch– placed near the coronoid process base. The symphysis region is moderately rugged and there is a well marked area posterior to it that indicates a powerful attachment for the digastric. The retromolar fossa is particularly enlarged and its lingual border pointed as a projection of the alveolar process of the dentary. The den-

tal foramen is large and placed on the mylohyoid line. The lower incisor has orange frontal enamel and a large cutting edge with a straight dentine fissure. All the lower molars have a thick enamel margin and a moderate hypsodonty; the coronal surface is crested and the lingual cusps are taller than labial ones. The m1 has an anterior-posteriorly compressed procingulum with a shallow anteromedian flexid, and a short anterolabial cingulum. The main cusps of the molar display an alternate pattern. The mesoflexid is broad and directs to the hypoflexid. The mesolophid is mainly fused with the entoconid. The posterolophid is short and directed backwards. The m2 configuration is basically the same of the m1, square in outline and with the mesolophid shorter. The m3 is partly 8-shaped with a reduced mesolophid.

***Comparisons***. The measurements of the studied materials are given in Table 1. Observed differences between MMP 853-M, the holotype of *S. hershkovitzi*, and MACN-PV 10003 are partly artificial; our measurements of the former render a zygomatic plate depth= 7.39, while for the zygomatic plate breadth= 4.03, indicating that values noted by Reig (1994, table 3) are underestimated. Comparable portions between MMP 853-M and MACN-PV 10003 are restricted to the zygomatic plate and M1–M2 morphology. In both specimens the zygomatic plate anatomy is essentially similar, being robust and high with the upper free border inclined forward, clearly departing in general appearance from the lower and broader zygomatic plate of living *Scapteromys* spp. (*cf*. Reig, 1994, fig. 5A). The left zygomatic plate of the holotype of *S. hershkovitzi* is partially damaged, which obscures the upper free border morphology producing an artificial rounded edge as those figured by Reig (1994, fig. 5A). The real morphology can be surmised from the right counterpart (Fig. 2). The upper free border –although slightly broken in the anterior angle– descends from the anterior zygomatic root producing a near 45º slope. Another trait of the zygomatic plate is their strong inclination with respect to the sagittal plane of the skull determining a basally open and well-developed infraorbital foramen. Occlusal morphology of MACN-PV 10003 indicates a fully adult stage, while MMP 853-M is subadult. This age difference can explain the differential backward penetration of the incisive foramina between both specimens. Reig (1994, p. 107) stated in the diagnosis of *S. hershkovitzi* that "incisive foramina extended backwards to middle of M1." In MACN-PV 10003 the base of the incisor foramen is located adjacent to the procingulum of M1. The study of a large series of *Scapteromys* spp. and *Gyldenstolpia fronto* (Winge, 1887) spec-

***Table 1 - Measurements in millimeters of the known specimens of* Scapteromys hershkovitzi *(upper Pliocene, Buenos Aires, Argentina)***

| *Measurement* | *MMP 853-M (holotype after Reig, 1994, table 3)* | *MACN-PV 10003* |
|---|---|---|
| *M1, length* | *2.82* | *2.50* |
| *M1, breadth* | *1.74* | *1.75* |
| *M2, length* | *1.74* | *1.55* |
| *M2, breadth* | *1.64* | *1.50* |
| *Zygomatic plate, depth* | *3.84* | *7.19* |
| *Zygomatic plate, breadth* | *2.94* | *4.02* |
| *m1, length* | - | *2.25* |
| *m1, breadth* | - | *1.50* |
| *m2, length* | - | *1.85* |
| *m2, breadth* | - | *1.50* |
| *m3, length* | - | *1.65* |
| *m3, breadth* | - | *1.25* |
| *Lower incisor, depth* | - | *1.78* |
| *Lower incisor, breadth* | - | *1.20* |
| *m1–m3 (alveolar length)* | - | *5.85* |
| *Diastema length* | - | *4.76* |
| *Horizontal ramus depth at m1* | - | *5.23* |

imens demonstrate that the posterior extension of this structure varies according to the age of the individual, penetrating more in young and subadults (Pardiñas *et al.*, 2008). The upper molar morphologies are also very similar between MACN-PV 10003 and MMP 853-M. The main differences arise in the partly free nature displayed by the mesolophs of the latter, especially in the M2. Similarly, Reig (1977) suggested that the degree of mesoloph fusion with the paracone is clearly age (or wear) dependent.

***Taxonomical remarks***. Reig (1972, 1994) linked to the holotype of *S. hershkovitzi* an additional fossil, MMP 1079-M, composed by a left maxilla with M1–M3, a right maxilla with M1–M2, a right lower jaw missing the m3 and the angular and the ascending processes, and a fragmentary right pelvis. These materials were collected by J. Prina and G. Scaglia in 1971, according to the original label, in "Lower Vorohué Formation, Atlantic cliffs of south east Buenos Aires Province, ½ kilometer south of Arroyo Lobería, Partido de General Pueyrredón, Buenos Aires Province, Argentina" (Reig, 1994, p. 107). A direct inspection allowed updating the anatomical information provided by Reig (1994, p. 107) since the fossil is actually composed of a right mandible with m1 and a left mandible with m1–m2, both with the incisors in their respective alveolus (plus the maxillaries and pelvis above mentioned). In several parts of his paper Reig (1994) clearly stated doubts about the reference of MMP 1079-M to *S. hershkovitzi*. He wrote "The concept of *Scapteromys hershkovitzi* is based on the holotype. The other specimen [i.e. MMP 1079-M] is tentatively referred to the same species but it shows differences in morphology which could be an indication that we are dealing with another form" (Reig, 1994, p. 108). These doubts mostly appear in the contrasting morphologies between the holotype and the comparable portions of MMP 1079-M. Specifically, the zygomatic plate of the holotype is robust and high, while in MMP 1079-M is low and narrow. In addition, differences in molar morphology are significant (Fig. 3). The new remains studied here, MACN-PV 10003, unequivocally exclude MMP 1079-M from *S. hershkovitzi* as Reig (1994) supposed earlier. MMP 1079-M could be allocated to or close to the extinct species *Abrothrix magnus* Reig, 1987. It is necessary to point out that the generic status of this form is debatable. Fortunately, in the last two decades there has been plenty of findings of fossil cricetids probably referable to this species (*e.g.*, MACN-PV 19559). This gives the opportunity in the future to deal with the difficult task of revising this taxon.

Although Reig's (1994, p. 107) diagnosis of *S. hershkovitzi* was mainly constructed using the holotype, he also added several traits from MMP 1079-M. This fact determines that the

**Figure 2**. MMP 853-M, holotype of ***Scapteromys hershkovitzi***, an anterior portion of skull in lateral view (upper Pliocene, Buenos Aires, Argentina). Scale bar= 5mm.

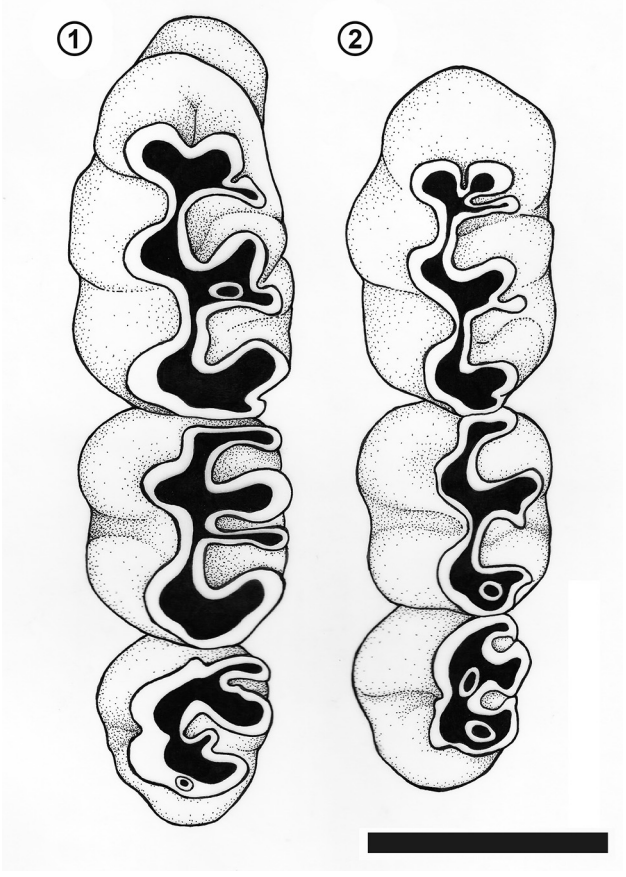


**Figure 3**. Occlusal view of upper molars in MMP 853-M, holotype of ***Scapteromys hershkovitzi*** (1), and MMP 1079-M, referred to the same species (2). Note differences in the mesoloph development and the complexity of the M3. Scale bar= 2mm.

diagnosis of *S. hershkovitzi* must be emended, excluding the anatomical information retrieved from MMP 1079-M and also adding those from MACN-PV 10003. However, Pardiñas *et al*. (2008) made a study of the genera *Kunsia* Hershkovitz, 1966, and *Scapteromys* suggesting that *S. hershkovitzi* is not a *Scapteromys*. This assertion is now supported by the morphological traits displayed by MACN-PV 10003. Living species of *Scapteromys* are very conservative in their craniodental morphology (see also D'Elía and Pardiñas, 2004), strongly departing from *S. hershkovitzi* which appears to be phenetically closer to representatives of *Kunsia* and *Gyldenstolpia* Pardiñas, D'Elía, and Teta, 2008. It is in fact possible that *S. hershkovitzi* requires a new generic entity. However, this proposition must be made based in the context of an integral study of the available fossil material that should include specimens from the Tarija Basin in Bolivia and from Necochea and Mar del Plata in Argentina, all earlier referred to *Kunsia*, *Scapteromys*, or relatives (Pardiñas *et al*., 2008).

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