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Taxonomy and distribution of *Abrawayaomys* (Rodentia: Cricetidae), an Atlantic Forest endemic with the description of a new species

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Abstract

Abrawayaomys is a monotypic sylvan cricetid genus that stands out within the sigmodontine radiation due to its spiny pelage associated with unusual craniodental morphology. We made a reappraisal of its knowledge throughout the known distribution, critically addressing their geographic distribution in Argentina (four recording localities restricted to the province of Misiones) and providing a detailed morphological analysis of one trapped individual from Iguazú area; this, plus an examination of other available specimens and literature data permits to produce an emended diagnosis for the genus. Comparisons among the few known specimens from Argentina and Brazil highlighted several differences in measurements as well as in craniodental and external morphology, allowing the description of a new species and suggesting the potential existence of another still undescribed form for the Brazilian populations of Minas Gerais. This new alpha-taxonomy scenario is preliminary correlated to the main geomorphological features that characterize southeastern Brazil. The phylogenetic position of *Abrawayaomys*, historically assigned to Thomasomyini or considered as a sigmodontine incertae sedis, is discussed in the light of the traits described here. Based on this new evidence, we suggest assigning *Abrawayaomys* to Thomasomyini, although similarities (here regarded as convergences) with members of Akodontini are highlighted.

Key words: Argentina, Brazil, Misiones, Sigmodontinae, taxonomy, Thomasomyini

Resumen

Abrawayaomys es un género monotípico de cricétido selvático, que se destaca dentro de la radiación de los sigmodontinos por su pelaje espinoso y una peculiar morfología cráneo-dentaria. En este trabajo efectuamos una revisión de su conocimiento, detallando la distribución geográfica en Argentina (cuatro localidades de registro, todas en la provincia de Misiones), más un análisis morfológico del único ejemplar trampeado en Argentina proveniente del área de Iguazú. Con estos elementos más la revisión de algunos ejemplares adicionales y datos bibliográficos se confeccionó una diagnosis enmendada para el género. Las comparaciones efectuadas sobre la base de los escasos especimenes disponibles de Argentina y Brasil revelan la existencia de variación en la morfología craneodentaria y externa y medidas que permiten la descripción de una nueva especie y sugieren la potencial existencia de otra para las poblaciones de Minas Gerais (Brasil). La posición filogenética de *Abrawayaomys*, ubicado en los Thomasomyini o como un Sigmodontinae incertae sedis, se discute a la luz de los nuevos rasgos aquí descriptos, que permiten considerarlo como un probable tomasomino generalizado. Sin embargo, ciertas similitudes (aquí consideradas como convergencias) con los representantes de la tribu Akodontini son destacadas.

Palabras clave: Argentina, Brasil, Misiones, Sigmodontinae, taxonomía, Thomasomyini

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Introduction

The monotypic genus *Abrawayaomys* Cunha and Cruz, 1979 is one of the most enigmatic living sigmodontines. *Abrawayaomys ruschii* was described from a single individual collected in Reserva Biológica de Forno Grande, Espírito Santo (Brazil). Current knowledge about this species is restricted to what was gathered from a small sample of five trapped specimens, which indicate its occurrence in a narrow area of the Atlantic Forest of Brazil and Argentina (Pereira et al., 2008). The lack of molecular data for *Abrawayaomys* prevents the assessment of its position within the available sigmodontine trees generated on the basis of mitochondrial and nuclear DNA sequences (e.g., Engel et al., 1998; Smith and Patton, 1999; D'Elía, 2003; Weksler, 2003; D'Elía et al., 2006a, 2006b); this fact, coupled with the striking combination of morphological traits promoted that the genus was regarded as an incertae sedis Sigmodontinae (Smith and Patton, 1999; Musser and Carleton, 2005; D'Elía et al., 2007). Musser and Carleton (2005:1088) summarized this situation coining that "diagnostic traits seem to combine aspects of *Neacomys*, *Oryzomys*, and *Akodon*, and both Reig (1987) and Smith and Patton (1999) acknowledged the enigmatic affinities of *Abrawayaomys* as uncertain. Certain cranial features of *Abrawayaomys* suggest an archaic 'thomasomyine,' perhaps distantly related to the other endemic genera of SE Brazil." The only explicit approaches to *Abrawayaomys* phylogenetic position was made by Pacheco (2003) and Salazar-Bravo and Yates (2007), both using morphological traits. Although both contributions included different taxonomic coverage, these studies proposed its allocation in Thomasomyini and within this tribe, although with a weak support, a sister relationship with *Rhagomys* or *Chilomys* Thomas, 1897 was, respectively, suggested.

In this paper we made a reappraisal of *Abrawayaomys* morphology, mainly based on craniodental anatomy but also assessing postcranial and external traits, describing in detail the only trapped specimen from Argentina and providing –in conjugation with data obtained from the examination of other individuals- an emended diagnosis for the genus. We also refine its geographic distribution in Argentina, mostly based on osteological material recovered from owl pellets. The study of the few available specimens of *Abrawayaomys* from Argentina and Brazil pointed out the existence of an important degree of morphological variation that is geographically structured. A new species is proposed to encompass Argentinean populations and the presumptive existence of another undescribed species for Minas Gerais populations is suggested. Finally, we discuss the phylogenetic relationships of *Abrawayaomys* within the sigmodontine radiation.

Materials and methods

We directly studied the following specimens of *Abrawayaomys*:

Museo Argentino de Ciencias Naturales [MACN; Buenos Aires, Argentina] MACN 20253, adult male, skin and partial skeleton, Conjunction Arroyo Mbocai and route 12 (-25.680115º S, -54.508060º W, Province of Misiones, Argentina);

Coleção de Mamíferos do Departamento de Zoologia da Universidade Federal de Minas Gerais [UFMG; Belo Horizonte, Brazil] UFMG 2492, adult male, skin and skull, "Rio Doce/Hotel," (ca. -19.771944º S, -42.619147º W, Parque Estadual do Rio Doce, State of Minas Gerais, Brazil; see additional data in da Fonseca and Kierulff, 1989; Stallings, 1989);

Museu Nacional de Rio de Janeiro [MN; Rio de Janeiro, Brazil] MN 23075, adult female, skin and skull, holotype of *A. ruschii*, Reserva Biológica de Forno Grande (-20.5º S, -41.6º W, State of Espírito Santo, Brazil; see adittional data in Cunha and Cruz, 1979).

In addition, we made a general inspection of one specimen collected in Mata de Prefeitura, 6 km SW Viçosa, Minas Gerais, Brazil (National Museum of Natural History [USNM] 552416, Washington D.C., USA) through digital pictures provided by Lucía Luna (University of Michigan Museum of Zoology) and additional images of the same individual downloaded from http://animaldiversity.ummz.umich.edu/site/accounts/specimens/Abrawayaomys_ruschii.html. João Oliveira (MN) generously benefited us with observations of the specimens housed in his institution (the holotype of *A. ruschii*, MN 23075, and one still uncatalogued specimen recently collected by Maria Olímpia Garcia Lopes in São Sebastião das Águas Claras, -20.068333º S, -43.910553º W, 949 m, State of Minas Gerais, Brazil).

Craniodental descriptions and terminology follow Carleton and Musser (1989), Weksler (2006), Luna and Patterson (2003), Pacheco (2003), and Reig (1977). Cuticular scales were studied and photographed from casts produced applying spines to commercial glue; scale pattern description follows Benedict (1957) and Day (1966). Reported measurements (all in millimeters; body weight in grams) include standard external dimensions taken from museum tags and cranial and dental descriptors obtained accordingly to Pereira et al. (2008), in order to make them comparable to those already available.

Results and discussion

Abrawayaomys Cunha and Cruz, 1979

Type species. *Abrawayaomys ruschii* Cunha and Cruz, 1979:2.

Included species. Currently, *Abrawayaomys* is considered monotypic (see Musser and Carleton, 2005). However, as discussed below, we found morphological differences that allow describing a new species for Argentinean populations. In addition, specimens from Minas Gerais (Brazil) display a unique set of morphological traits that suggests the existence of a third species.

Emended diagnosis. Medium sigmodontine rodents (total length range 200 ~ 290 mm, condilobasal length range 27 ~ 29 mm) with robust head, rounded small ears, and tail from slightly shorter to moderately larger than combined head and body length; dorsal pelage fully intermixed with grooved spiny hairs; dorsal and ventral pelage colors weakly delimited; rigid tail hairs arranged in sets composed by 5 hairs per scale; short apical tail tuft normally present; pes long with dense ungual tufts longer than claws, short claws, and six plantar pads; skull robust, rounded in outline with short and blunt rostrum, flared zygomatic arches, and inflated braincase; short nasals tapering distally; interorbital region hourglass to partially anteriorly convergent; coronal suture U-shaped; reduced interparietal; large foramen magnum; short incisive foramina; short palate; anterior margin of mesopterygoid fossa rounded, typically without sphenopalatine vacuities; carotid circulatory pattern complete (pattern 1; Voss, 1988); broad and high zygomatic plate; upper incisors narrow but noticeably deep and varying from slightly opisthodont to proodont; small brachyodont molars with main cusps slightly alternate; M1 pentalophodont type with anteromedian flexus barely present and reduced mesoloph fused with paracone; M3 reduced, uniradiculate, and cylindrical in outline; dentary with retromolar fossa enlarged and short angular process; stomach hemiglandular-unilocular.

Distribution (Fig. 1). *Abrawayaomys* is known from the Brazilian coastal forests, from northeastern to southeastern regions, from Bahia to Rio de Janeiro and from Paraná-Paraíba interior forest in northeastern Argentina. No fossil of *Abrawayaomys* is known.

Abrawayaomys chebezi, new species

Figs. 1–9, Tables 1–2

Holotype. MACN 20253, adult male collected by Orlando Scaglia on September 11, 1988 (original number Mi 15), preserved as skin (in regular condition), skull (partially damaged on basicranium and temporal flanks), partial postcranial skeleton, and mummified penis.

Type locality. Argentina: Province of Misiones, Department of Iguazú, conjunction Arroyo Mbocai and route 12 (-25.680115º S, -54.508060º W; Reig and Kirsch, 1988).

Diagnosis. A member of the sigmodontine genus *Abrawayaomys* smaller than *A. ruschii* especially in molar measurements, characterized by a unique combination of morphological traits including tail larger than head and body with a dark apical tuft; venter coloration grey cream yellowish; rostral third of nasals not conspicuously expanded laterally; nasofrontal suture V shaped, surpassing posteriorly the lacrimal level; interorbital region hourglass shaped; alisphenoid strut present; anteromedian flexus on M1 inconspicuous or absent; and upper incisors proodont.

Paratypes. None.

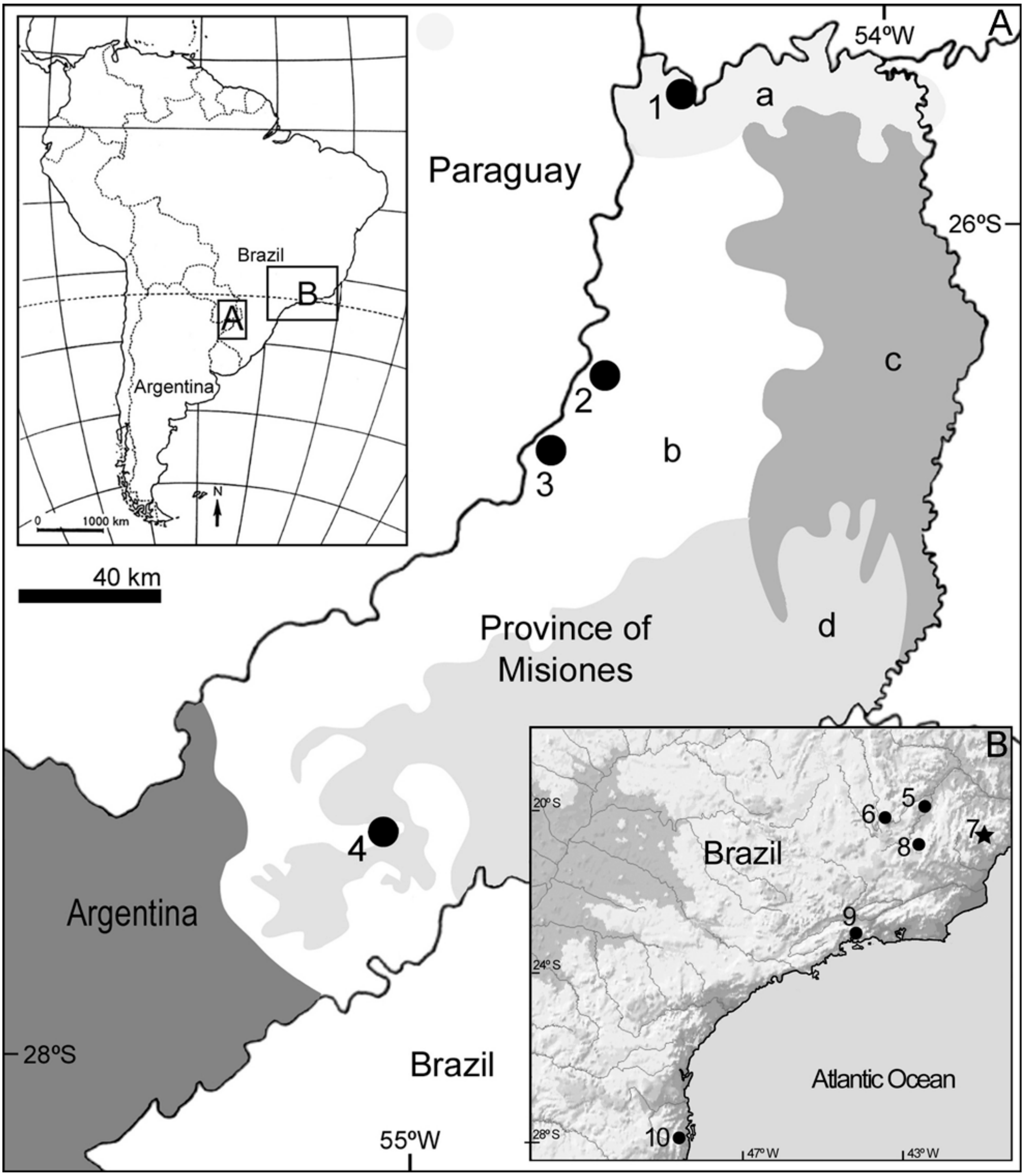

FIGURE 1. Recording localities of *Abrawayaomys*: A. Argentina: 1, Conjunction arroyo Mbocai and route 12; 2, Eldorado; 3, Montecarlo; 4, Campo Ramón. B. Brazil: 5, Parque Estadual do Rio Doce; 6, São Sebastião das Águas Claras; 7, Reserva Biológica de Forno Grande (type locality of *A. ruschii*); 8, 6 km SW Viçosa; 9, Aldea Sapucai; 10, Caldas da Imperatriz. Main phytogeographic units recognized for Misiones are indicated: a. Rosewood and Assai Palm Forest; b. Laurel and Guatambu Forest; c. Montaine Araucaria Forest; and d. Montane Forest.

Other referred specimens (Fig. 1). All specimens are from the province of Misiones:

Colección Elio Massoia (CEM; Buenos Aires, Argentina) CEM s/n, craniodental remains from owl pellets; collected in Escuela Provincial 639 "Rosario Vera Peñaloza," Lote 92, Sección II de Campo Ramón (ca. -27.416667º S, -55.016667º W, Department of Oberá; Massoia, 1988, 1996);

CEM 9970, anterior fragment of skull recovered from an owl pellet collected in Segunda Iglesia Cuadrangular, Barrio Parque Km. 11, Eldorado (-26.4º S, -54.516667º W, Department of Eldorado; Massoia et al., 1991);

CEM s/n, craniodental remains from owl pellets; collected in Montecarlo (ca. -26.566667º S, -54.733333º W, Department of Montecarlo; Massoia, 1993, 1996).

There is an unconfirmed published mention (Massoia, 1993) for Puerto Caraguatay, Misiones.

Distribution (Fig. 1). Western portion of Misiones province in Argentina.

Etymology. In homage to Juan Carlos Chebez, Argentinean naturalist and friend, for his effort towards increasing our understanding and preserving the Atlantic Forest biome in the Province of Misiones, Argentina.

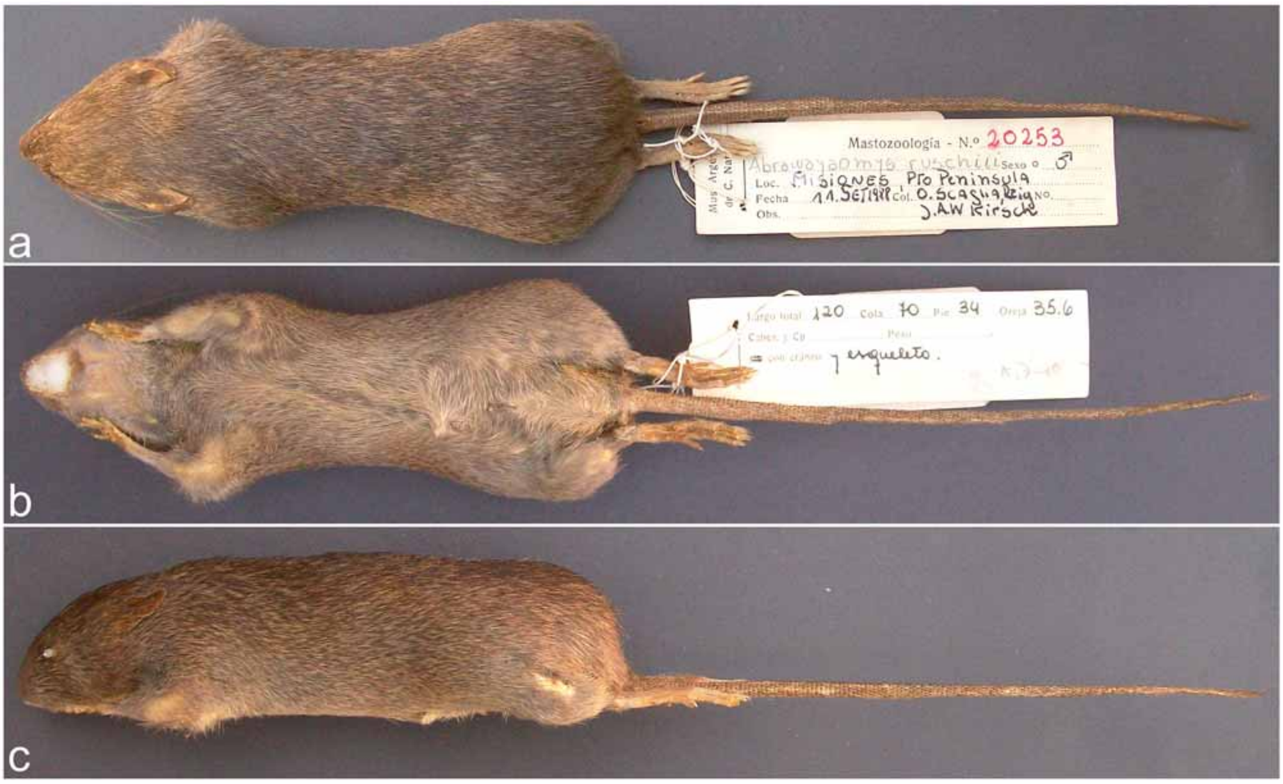

FIGURE 2. *Abrawayaomys chebezi*, new species (MACN 20253, holotype, Misiones, Argentina): skin in dorsal (a), ventral (b), and lateral (c) views.

Morphological description based on the holotype. Medium-sized, moderately long tailed rat, with a large head (Fig. 2). The body pelage is short and close with a moderately spiny texture. There are two types of dorsal and ventral hairs of approximately the same length (1.1–1.2 mm): spiny hairs and long, thin hairs. Spiny hairs are flat, with a dorsal longitudinal groove, rigid and broadest at its midpoint (0.22 mm), especially at the dorsum. Spines are more abundant at the dorsum and rump, being slightly shorter, without dark tips, and thinner in the underparts and shorter and darker in the head; mental and inguinal areas are free of spines. Spine cuticular scales vary from imbricate with an elongate pattern at the base and middle portion of the spine and gradually transform to imbricate with a wavy crenated-flattened pattern towards the tip (Fig. 3). General appearance is strongly agouti and hispid, darker at the midline and without a clear separation of the dorsal and ventral color. Dorsal and lateral spiny hairs are slightly transparent or whitish at the base and throughout almost their entire length, becoming brownish toward the tip. Thin hairs are brownish at basal portion, with buffy subterminal portions and apical portion. Intermixed with spines and thin hairs there is an unusual type of hair, for which we could not find a name in the literature, composed by a bouquet of thin, dark grey hairs arising from a unique root (Fig. 4a). Chin and the interior sides of the fore- and hind feet are covered by gray-based buffy hairs. On the underparts, spines and fur are silvery-transparent at the base, becoming buffy toward the middle and apical portions. Ears are small and rounded, internally covered by short golden hairs and externally by brown hairs. The dorsal part of the muzzle is slightly lighter than the rest of the head. Vibrissae are long and thin; mystacial, supercilliary, and genal vibrissae reach the mid-portion of the pinnae; all vibrissae are buffy-brown colored. There is also a genal vibrissa 2 (sensu Pacheco, 2003:32). The tail is uniformly brown with conspicuous scales and a short (ca. 8 mm) tuft of dark brown hairs in the tip (Fig. 4b); tail hairs are rigid and dark and are arranged in sets of 5 per scale; each set are composed by 3 central hairs subequal in length flanked side by side by 1 shorter hair; tail hairs are about 1 scale-row long at the base, 1 ½ scale-rows long at the mid-portion, and 3 scale-rows long near the tail end (Fig. 4c). The manus are whitish, with long digits (Fig. 4d); the three interdigital pads are well defined and rounded; the hypothenar and thenar pads are large and narrow; manual DIII and DIV are nearly equal in length, and DII and DV are subequal with DII slightly longer; claws are short (1.7 mm), curved and narrow; the surrounding tufts of hairs reach or surpass claw tips. The pes are withish, long and narrow (Fig. 4e), with five large digits distally appearing bicolored due to the abundance and the whitish color of the ungual tufts (Fig. 4f); DII and DIV are subequal, DIII is slightly longer than the previous ones; DV reaches the middle of the second phalanx of DIV; DI (hallux) is short, level with the middle portion of the second interdigital pad and has a claw; four ovale interdigital pads are present; hypothenar and thenar are large, rounded and narrow; the distal margin of the former plantar pad is leveled with the proximal margin of the second; the plantar surface is smooth and naked, including the heel; pedal claws are short and ungual tufts surpass the claws in length (Fig. 4f).

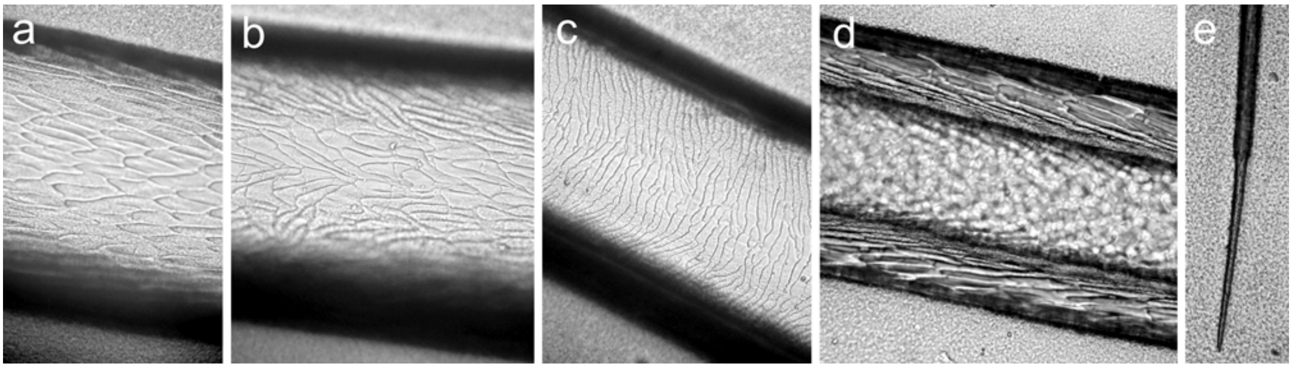

FIGURE 3. Some features of the dorsal spines of *Abrawayaomys chebezi*, new species (based on specimen MACN 20253, holotype, Misiones, Argentina): a, cuticular scale pattern at spine base; b, cuticular scale pattern at spine mid portion; c, cuticular scale pattern at spine distal portion; d, spine longitudinal furrow at mid portion; e, spine tip. All the images were obtained from casts.

The skull is robust, with a short and blunt rostrum, wide interorbital region and a nearly square braincase (Fig. 5). The nasals are narrow, parallel-sided in the proximal half, with a marked abrupt expansion in the anterior one third, and shorter than the premaxillae, leaving visible the anterior part of the later and the incisors in a dorsal view; posterior end of nasals are extended beyond the premaxillary-maxillary suture (Fig. 6a). The narines are wide and the turbinals strongly developed (Fig. 6b). The nasofrontal suture is slightly acuminate and almost without denticulations, positioned surpassing posteriorly the line defined by the lacrimal bones (Fig. 6c). The lacrimals are large, in contact with the maxillaries and the frontals. The anterior part of the interfrontal region has a moderate central depression also extended to the internasal one. The interorbital region can be typified as “hourglass-shaped,” although is relatively broad producing a partial dilution of the constriction point; the supraorbital margins are rounded (Fig. 6c). The coronal suture is wide and U-shaped (Fig. 6c). Lateral parietal crests are slightly marked, but lambdoid suture is concealed by a definite lambdoidal crest where the squamosal meets the occipital bone (Fig. 5). The parietal and the interparietal sutures are meandrous; the interparietal is wide and broad, rhomboidal in form. The occipital region is squared in lateral view, producing a nearly vertical position of the foramen magnum. The zygomatic plate is high, parallel-sided and conspicuously broad from top to bottom, with a dorsal free margin and a nearly vertical anterior border; its posterior margin is situated anterior to the alveolus of M1 (Fig. 6d). Zygomatic notches are wide and nasolacrimal capsules are clearly visible in dorsal view. The zygomatic arches are well flared and partially dorso-ventrally expanded in their midpoints; the jugal is large and the maxillary and squamosal processes of the zygoma are not in contact (Fig. 6e). The squamosal process of the zygomatic arch supports an anterior-posteriorly expanded glenoid cavity. Anteriorly, the periotic is attached to the skull by a well developed tegmen tympani, which overlaps the posterior suspensory process of the squamosal (sensu Voss, 1993:18). The hamular process of the squamosal is broad, distally spatulated and directly applied to the mastoid tubercle; the postglenoid foramen and the subsquamosal fenestra are well developed and sub equal in size (Fig. 6g). The parietal has a moderate lateral expansion subrectangular in form (Fig. 6g). The osteological structures associated to the carotid circulatory pattern include a well developed squamosal-alisphenoid groove that anteriorly leads to a small sphenofrontal foramen; a shallow trough for masticatory-buccinator nerve connects to a small foramen ovale accesorius (Fig. 7c); these traits, along with the presence of a groove moderately expressed on the posterior external edge of the pterygoid plate (Fig. 6f), and the presence of the stapedial foramen on auditory bullae, suggest that *Abrawayaomys* possess the presumably primitive muroid condition (type 1 of Voss, 1988) for the cephalic blood supply (see also Pereira et al., 2008). A well developed alisphenoid strut crossing the foramen ovale accesorius is present (Fig. 7). The incisive foramina are short, not reaching the alveolus of the M1, and narrow, with straight and parallel lateral margins. The palate is, by definition, wide and long (sensu Hershkovitz, 1962), although the anterior margin of the mesopterygoid fossa is only slightly posteriorly placed with respect the plane defined by the M3 posterior faces (Fig. 6f). Three paired small posterior palatine foramina between the upper molars and minute unpaired posterolateral palatal pits side by side the anterior part of the mesopterygoid fossa (Fig. 6f) are present. The mesopterygoid fossa is large and wide, with a rounded U-shaped anterior border and its roof completely ossified (Fig. 6f). The parapterygoid fossae are narrow and well ossified. The periotic capsule of the petrosal is large and moderately inflated, without fenestrae. The ectotympanic bullae are globular capsules of moderate size, being the periotic partially exposed; the auditory meatus are rounded. The manubrium of the malleus is large and distally expanded; a well developed orbicular apophysis is present ("parallel" type, according to Carleton [1980]).

The mandible is relatively short, high, and robust (Fig. 5). The angular process is short with respect to the condyloid process (Fig. 6h). The coronoid process is triangular in shape, short, and posterodorsally oriented. The sigmoid notch is narrow and subelliptical. The lunate notch is shallow (Fig. 6h). The capsular projection of the lower incisor lies under the angular notch and is marked, forming a distinct knob in dorsal view (Fig. 6h). The anteriormost point of the diastema is below the alveolar plane (Fig. 6i). The mental foramen is visible from lateral view, just in front of the conjunction of the upper and lower ridges of the masseteric crests (Fig. 6i); both the upper and lower ridges of the masseteric crest are well marked. The ventromedial process of the mandibular ramus is only slightly expressed. The retromolar fossa is long and wide, moderately foraminated (Fig. 6j). Internally, a well developed and curved duct for the mandibular nerve is visible through the translucent bone and leads to a large mandibular foramen (Fig. 6k).

The upper incisors are proodont (Fig. 6d), markedly deeper but transversally compressed (Fig. 6l) and have deep, orange frontal enamel; the dentine fissure is straight and large (sensu Steppan, 1995:23). The general morphology of the upper incisors suggests their allocation under the seizer-digger type (sensu Hershkovitz, 1962:102); supporting this assignment can be mentioned the following features: cross section above the cutting edge (anteriorly convergent), the acute angle with respect to the sagital plane of the skull, and their narrowing towards the tips (Fig. 6l). The lower incisors are noticeably deep but transversally thin and the frontal enamel paler than upper one (Fig. 6i).

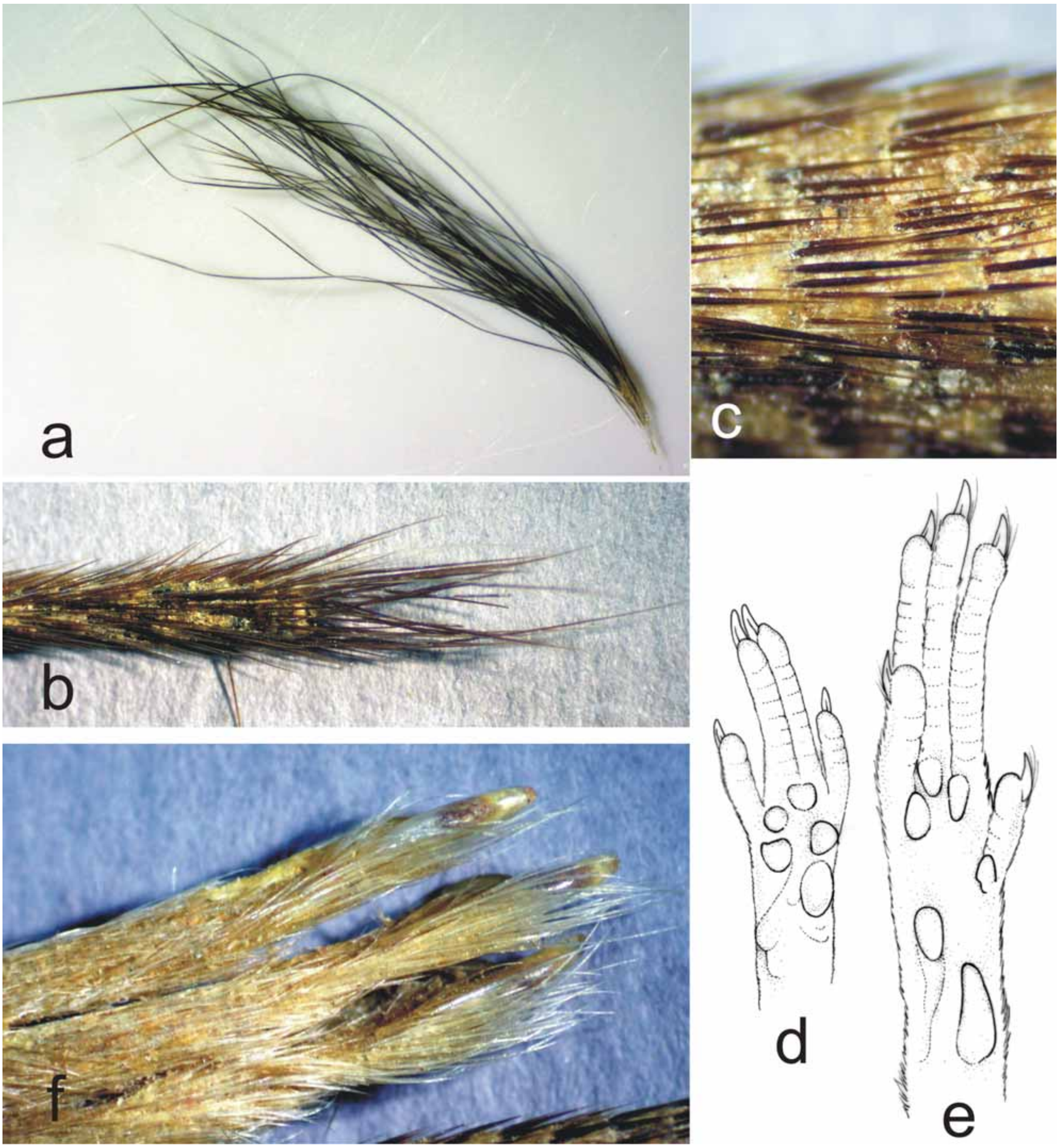

FIGURE 4. Some external traits of *Abrawayaomys chebezi*, new species (based on specimen MACN 20253, holotype, Misiones, Argentina): a, unusual type of hair; b, caudal apical stuft; c, detail of caudal scales and hair sets; d, schematic manus, palmar view; e, schematic pes, plantar view; f, detail of ungual stuft, right pes in dorsal view.

The upper molars are brachyodont and the coronal surface slightly crested being the lingual cusps something taller than the labial ones. The main cusps arrangement is intermediate (sensu Steppan, 1995:24; Fig. 8a). In the M1 the procingulum is anterior-posteriorly compressed and labially displaced. There is no evidence of anteromedian flexus on the enamel anterior wall but an inconspicuous dentine indentation can be ascribed to this structure. The procingulum is lingually projected by a presumptive protostyle and a cingulum that externally reaches the protocone enclosing the protoflexus. The general morphological configuration and orientation of the procingulum of the M1 are achieved by a reduced anterolingual conule and a presumptive parastyle fused and projecting the anterolobial one. The areas of proto- and hypocone are subequal and bulbous; the same is true for the areas of para- and metacone. The hypocone is slightly labially recessed with respect to the protocone; the hypoflexus is wide, scarcely penetrates the molar midline, and has a corrugated base. The lingual margin of the M1 between proto- and hypocone is ridged by a cingulum that closes the hypoflexus transforming it into a basin. Although wear erases occlusal structures in the intermediate area between para- and metacone, an indication of a narrow but long mesoloph fused with a paralophule is distinguishable. At least in this wear stage, the posteroloph is fused to the metacone. The M2 general configuration is very similar to the comparable portion of the M1. The procingulum is well developed, labially and lingually closed by sharp cingula. The hypocone is also recessed with respect to the protocone; a presumptive enterostyle is present. The mesoloph-paralophule development is like those in M1. A posteroloph directly backwards is independent of the metacone. The M3 is notably reduced, cylindrical in outline, and seems to have only one root. The occlusal morphology suggests the persistence of solely the proto- and paracone areas, being the posterior portion of this tooth deeply compressed.

The lower molars, also brachyodont, have the coronal surface crested like the upper molars; the lingual cusps are taller than labial ones and arranged in a clear alternate pattern (sensu Steppan, 1995:24; Fig. 8b). The enamel is thick but there is a good amount of exposed dentine. In the m1 the procingulum is clearly transversally compressed and remains as a narrow structure on the labial sector of the tooth without evidence of an anteromedian flexid. The proto- and hypoconid look like enamel cusps without wear; meta- and entoconid are bulbous and subequals in size. The hypoflexid is wide, short, and slightly labially closed by a weak cingulum. On the posterior face of the metaconid a short mesolophid is present. The posterolophid is well developed. One of the most peculiar characteristic in the m1 morphology is the compression displayed by the lingual cusps and their projection like peninsulas on the lingual margin. The m2, slightly shorter than m1, is rectangular in outline and has the basic pattern of the m1. The posterolophid is short and directed backwards. The m3 is comparatively reduced but not as the upper one, with a greatly reduced entoconid and a posterior enamel lake produced by the obliteration of the posteroflexid.

Axial skeletal counts include 12 ribs, 15 thoracicolumbar (dorsal) vertebrae, 3 sacral vertebrae, and 36 caudal vertebrae. The neural spine on the second thoracic vertebra is much longer than the spines on the adjacent vertebrae (a widespread condition for sigmodontines according to Voss, 1988). Hemal arches are present between tail vertebrae second and third, and between third and fourth; regrettably, hemal arch presence between the first and second caudal vertebrae in impossible to check due the incomplete nature of the skeleton under study. The posterior edges of the hemal arches are extended into a distinct spinous process (sensu Steppan, 1995:49), less developed between third and fourth. Hemal processes starts on fourth vertebrae, becoming most pronounced between fifth and sixth, and then diminishing along the next ten vertebrae. The tuberculum of the first rib articulates with the transverse process of both the seventh cervical and the first thoracic vertebrae. The sternum consists of an anterior manubrium, four sternebrae, and a posterior xiphoid process. The humerus lacks an entepicondylar foramen; the supratrochlear fossa is perforated. The innominate has a well developed femoral tubercle positioned cranially to the acetabulum; the acetabulum is small and rounded; the inferior and superior glutear fossa of the ilium are divided by a rounded lateral ridge. The femur has a small head and a long and narrow patellar fossa; the condyles are slightly rounded in contour.

The gland penis is short, stocky and covered by spines throughout the entire body. The mid-shaft diameter is slightly less than one-half of the overall length. Dorsal and ventral grooves are deep and extend beyond half the length of the body. The crater rim is apparently uniform; but unfortunately the apical portion of the penis, including the bacular mounds, is damaged precluding the possibility of an accurate description. In appearance, lateral bacular mounds are not visible in external view; the medial bacular mound is slightly larger than the lateral ones. The proximal baculum is short, stout, and triangular in appearance, with a laterally flared base. The base has a distinct and deep median notch. The shaft is short and wide. The cartilaginous distal baculum is small, with two laterals and one medial digit.

Measurements. External and craniodental measurements of the holotype of *A. chebezi*, new species, are provided in Table 1 along with those from other specimens of *Abrawayaomys* from Brazil.

FIGURE 5. *Abrawayaomys chebezi*, new species (MACN 20253, holotype, Misiones, Argentina): Skull in lateral (top above), dorsal (bottom left), and ventral (bottom right) views, and mandible (top below) in labial view. Scale = 10 mm.

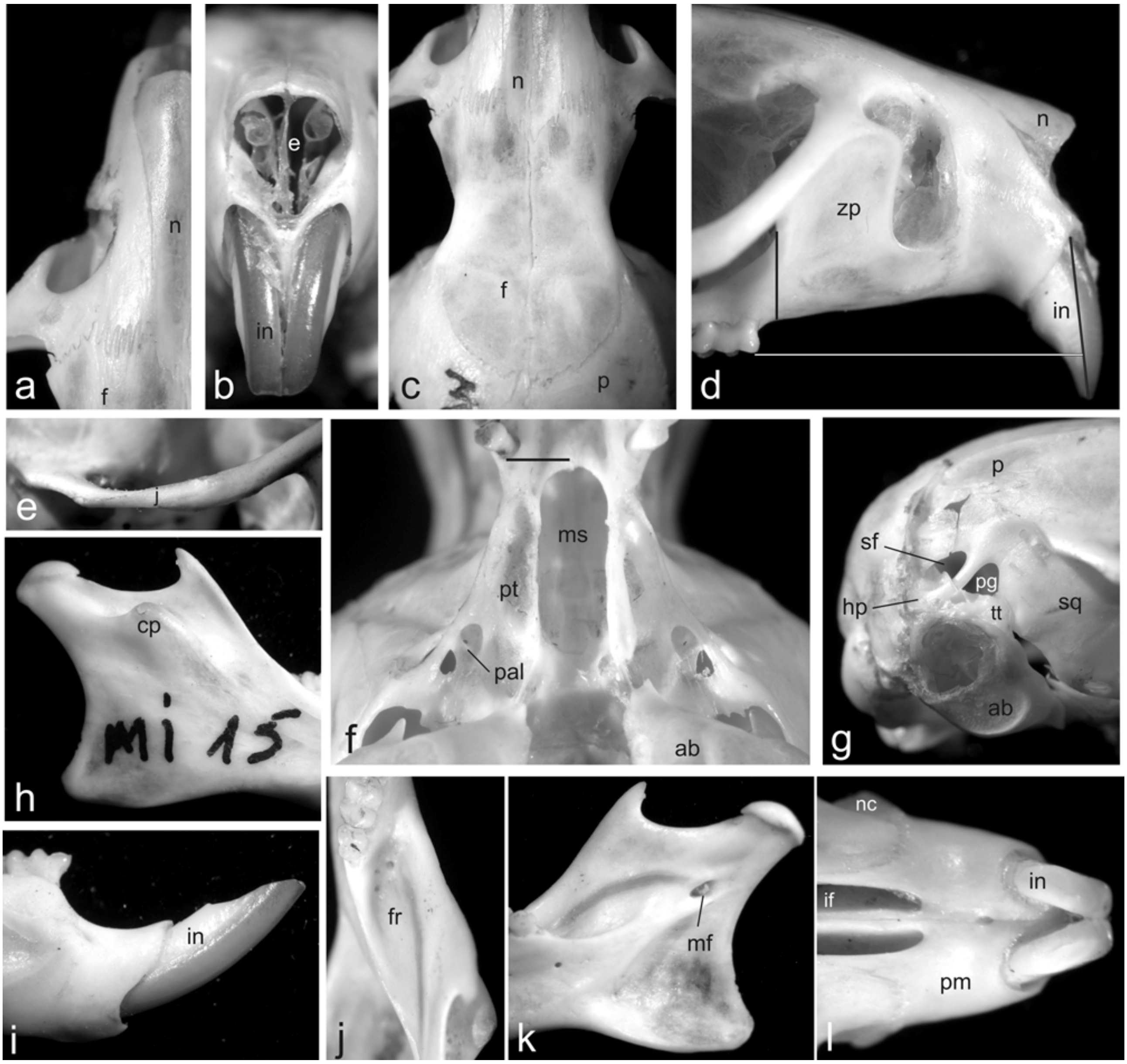

FIGURE 6. Craniodental morphology of *Abrawayaomys chebezi*, new species (based on specimen MACN 20253, holotype, Misiones, Argentina): a, rostrum, dorsal view; b, skull, frontal view; c, interorbital region, dorsal view; d, rostrum, lateral view (note the position of the posterior border of the zygomatic plate and the incisor orientation with respect to molar plane); e, zygomatic arch, lateral view; f, pterygoid region (note the anterior extension of the mesopterygoid fossa with respect the M3 posterior face); g, temporal region, lateral view; h, mandible, ascending ramus in labial view; i, mandible, anterior portion in labial view; j, mandible, retromolar fossa in dorsal view; k, mandible, ascending ramus in lingual view; l, rostrum tip in ventral view. Abbreviations: ab, auditory bulla; cp, capsular projection; e, turbinals; f, frontal; fr, retromolar fossa; hp, hamular process of squamosal; if, incisive foramen; in, incisor; j, jugal; mf, mandibular foramen; ms, mesopterygoid fossa; n, nasal; nc, nasolacrimal capsule; p, parietal; pal, posterior opening of alisphenoid canal; pg, postglenoid foramen; pm, premaxillary; pt, parapterygoid plate; sf, subsquamosal fenestra; sq, squamosal; tt, tegmen tympani; zp, zygomatic plate.

Habitat. Recording localities of *Abrawayaomys* in Argentina are placed in the Paraná-Paraíba interior forest (Olson et al., 2001) of the Misiones Province. Specimen MACN 20253 was captured using a Sherman trap in the southern margin of the arroyo Mbocaí, in a secondary forest belonging to "Rosewood and Assai Palm Forest" unit (sensu Martínez-Crovetto, 1963), where the predominant tree species are *Matayba elaeagnoides*, *Begonia descoleana*, and *Podostemun comatum*. The remainder Argentinean specimens were

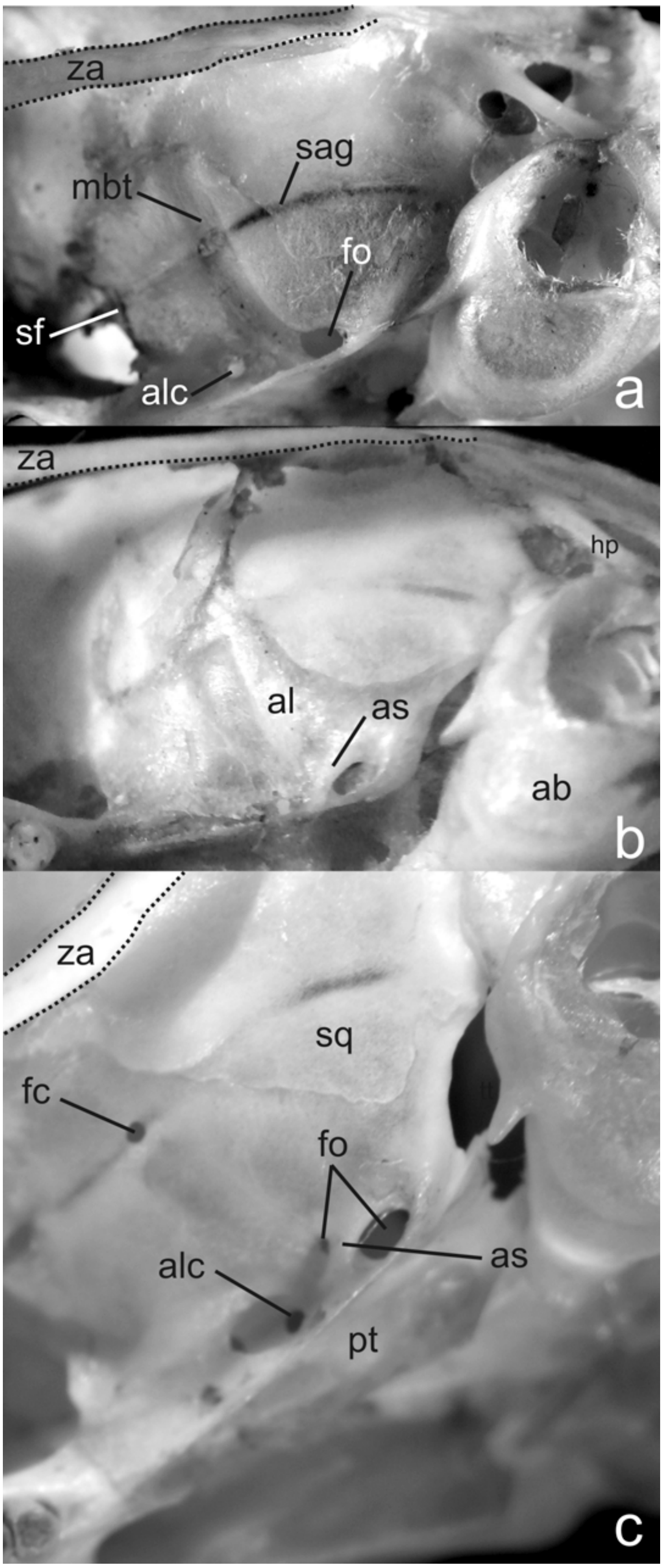

FIGURE 7. Squamosal-alisphenoid region of specimens of *Abrawayaomys*: a, UFGM 2492; b, MN 23075 (holotype of *A. ruschii*); c, MACN 20253 (holotype of *A. chebezi*, new species). Abbreviations: ab, auditory bulla; al, alisphenoid; alc, anterior opening of alisphenoid canal; as, alisphenoid strut; fc, perforation on sag; fo, foramen ovale; hp, hamular process; mbt, trough for masticatory-buccinator nerve; pt, pterygoid plate; sag, squamosal-alisphenoid groove; sf, sphenofrontal foramen; sq, squamosal; za, zygomatic arch.

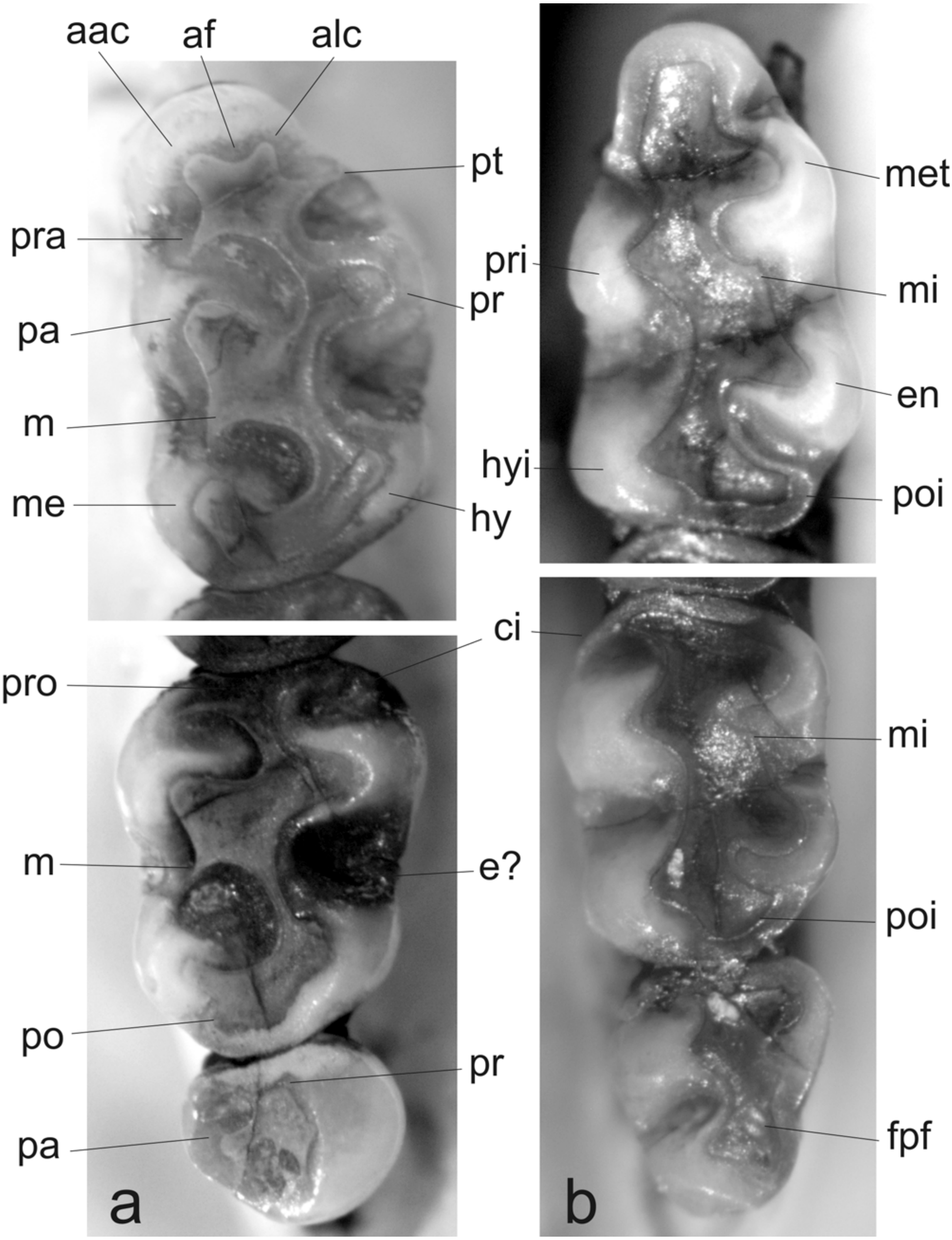

FIGURE 8. Molar occlusal morphology in *Abrawayaomys chebezi*, new species (based on specimen MACN 20253, holotype, Misiones, Argentina): a, upper right molar row; b, lower left molar row. Abbreviations: aac, anterolabial conule; af, anteromedian flexus; alc, anterolingual conule; ci, cingulum; e, enterostyle; en, entoconid; fpf, posterofossetid; hy, hypocone; hyi, hypoconid; m, mesoloph; me, metacone; met, metaconid; mi, mesolophid; pa, paracone; poi, posterolophid; pr, protocone; pra, parastyle; pri, protoconid; pro, procingulum; pt, protostyle.

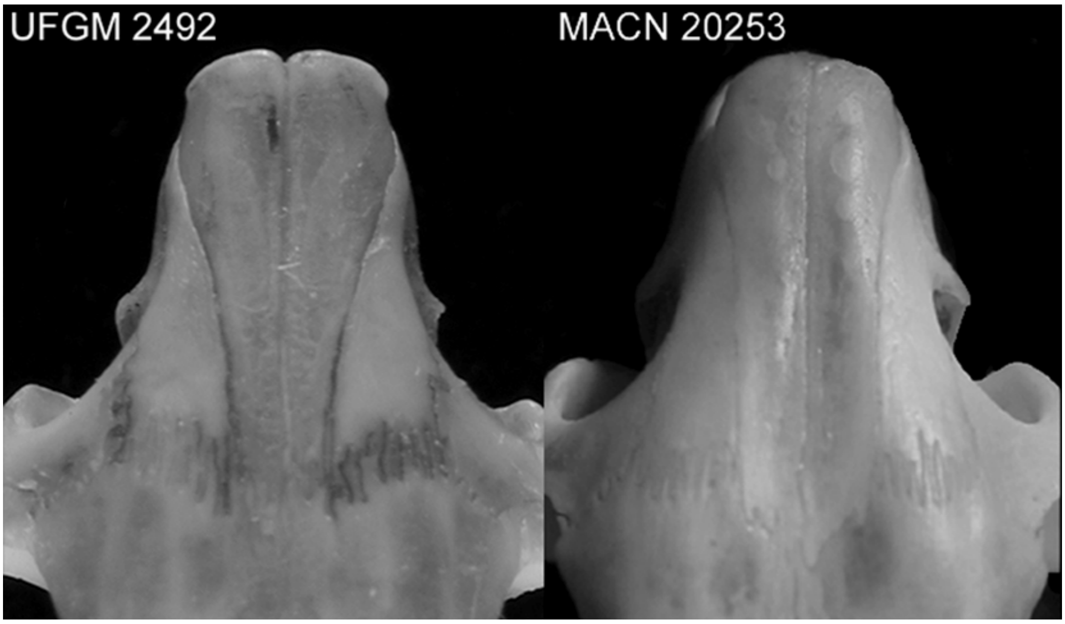

FIGURE 9. Contrasting nasal morphology (in dorsal view) between two *Abrawayaomys* specimens. UFGM 2492 (*A. ruschii*) is from Minas Gerais, Brazil, and MACN 20253 (*A. chebezi*, new species) is from Misiones, Argentina.

recovered from *Tyto alba* owl pellets and came from areas that are highly disturbed by human activities, where only small patches of the "Laurel and Guatambu forest" survives. It is interesting to note that Campo Ramón is placed near the northern border of the natural grassland ecoregion of "Campos." Although small gallery forest fragments persist in this ecoregion, the extensive conversion to agriculture landscapes is noticeable (Giraudo et al., 2002). It is also interesting to remark that collection localities for *Abrawayaomys* in Misiones are located on the western flank of the province that drains towards the Paraná River. No record is known from the eastern flank, which drains towards the Uruguay River. However, is important to remake that trapping effort on the Uruguay basin is clearly lesser than that on the Paraná basin.

Comparisons. Although the small amount of available specimens precludes a thoroughly assessment of intra and interpopulation variation, some comments can be advanced from individual measurements (Table 1). The holotype (MACN 20253, Misiones, Argentina) of *Abrawayaomys chebezi*, new species, and an additional specimen (CEM 9970, Misiones, Argentina) reported by Massoia et al. (1991) seem to be slightly smaller in most of their cranial dimensions than *A. ruschii* holotype (MN 23075, Espírito Santo, Brazil) and those specimens from Brazil that represent the northern part of the range of the genus. This fact is particularly noticeable in the length of the upper molar tooth-row, incisive foramina, and mandible. By contrast, specimen MACN 20253 has the rostral length clearly larger than those of Brazilian specimens despite similar condylobasal lengths among all individuals. Trenchant differences in molar individual measurements arise when MACN 20253 and MN 23075 (data after Cunha and Cruz, 1979:5; in mm) are confronted, respectively: M1: 1.82 vs. 2.62; M2: 1.32 vs. 1.87; M3: 0.63 vs. 0.93; m1: 1.82 vs. 2.29; m2: 1.45 vs. 1.91; m3: 0.89 vs. 1.45.

The contrast in the tail length and other traits of this organ across the available specimens deserves special mention. The tail length of the holotype of *A. ruschii* (MN 23075) was reported by Cunha and Cruz (1979:2) as 85 mm, being clearly shorter than head and body length (116 mm; erroneously indicated in Cunha and Cruz [1979:2] as "cabeça e corpo [head and body]: 201" that must be interpreted as the total length); other *Abrawayaomys* specimens from Argentina and from the Brazilian states of Santa Catarina and Minas Gerais have tails larger than head and body lengths (cf. Table 1). Judging by the tail tip figured by Cunha and Cruz (1979:fig. 3), can be presumed that the holotype exhibit an incomplete tail. However, these authors clearly stated that "A cauda é mais curta que a cabeça e o corpo, com pouco pelo [sic]... e um pincel na extremidade" (Cunha and Cruz, 1979:3), freely translated "the tail is shorter than head and body, less haired... and [with] an

TABLE 1. External and craniodental measurements for specimens of *Abrawayaomys*.

	CEM 9970[a]	MACN 20253 holotype	MN 23075[b] holotype	MN 67557[b]	MN[c]	UFMG 2492[b]	UFSC 3427[d]	USNM 552416
Sex	-	male	female	male	male	male	male	male
Age class[e]	-	4	3	3	?	4	?	3
Head and body length [HBL]	-	120	116	135	122	128	116	140
Tail length [TL]	-	133[f]	85	116[g]	144	146	124	150
Hind foot length without claw	-	27.5	-	-	-	-	30	-
Hind foot length with claw	-	29[f]	29	32	30	31	32	30
Ear length	-	17[f]	20	16	20	20	18	-
Weight (in grams)	-	-	46	55	59	63	42	-
TL/HBL	-	1.10	0.73	-	1.18	1.14	1.06	1.07
Condylobasal	-	27.67	27.46	28.64	-	27.64	-	-
Occipital condyle width	-	6.53	8.01	8.00	-	7.07	-	-
Diastema	-	7.68	7.57	8.43	-	7.97	-	-
Palatal bridge	-	5.25	5.46	5.21	-	5.87	-	-
Incisive foramina length	4.40	4.65	5.33	5.56	-	4.83	-	-
Incisive foramina width	1.20	1.44	1.72	1.63	-	1.68	-	-
Upper molar row length	3.30	3.96	4.51[h]	4.25	-	4.62	-	-
M1 breadth	-	1.16	1.32	1.29	-	1.39	-	-
Breadth between M1	-	5.32	5.67	5.33	-	5.82	-	-
Bullar length less tube	-	4.84	5.48	5.34	-	4.86	-	-
Cranial height	11.00	9.68	9.94	10.34	-	10.22	-	-
Rostral length	-	10.94	8.26	8.41	-	9.15	-	-
Rostral width	5.60	5.62	5.04	5.34	-	5.44	-	-
Least interorbital breadth	5.90	6.02	6.29	6.21	-	6.23	-	-
Internal orbital length	-	9.81	10.10	11.06	-	10.70	-	-
Zygomatic breadth	16.00	16.99	17.20	17.40	-	16.00	-	-
Braincase width	-	13.67	13.18	13.57	-	13.08	-	-
Zygomatic plate width	-	3.56	4.34	4.31	-	3.70	-	-
Mandible height	-	9.03	9.18	9.23	-	9.45	-	-
Mandible length	-	16.56	17.30	17.70	-	17.41	-	-

[a] After Massoia et al. (1991:40);

[b] After Pereira et al. (2008:table 1);

[c] Still unnumbered specimen; data from Maria Olímpia Garcia Lopes (pers. comm.);

[d] Data from Cherem et al. (2005:110), UFSC = Universidade Federal de Santa Catarina, Santa Catarina, Brazil;

[e] Following toothwear classes proposed by Voss (1991);

[f] From dry skin; original measurements on specimen label [tail = 70, hind foot = 34, and ear = 35.6] are clearly wrong;

[g] Partial, according to Pereira et al. (2008:table 1);

[h] Cunha & Cruz (1979:5) reported 5.42.

apical tuft." João Oliveira, curator from Museu Nacional, kindly examined for us the tail of the holotype; he obtained a value of 95 mm from the dry skin and could not find any indication of tail cutting and discarded the hypothesis of an individual with a tail cut during life and later cicatricized. From all these data we can state that typical *A. ruschii* has a tail shorter than head and body length (ratio tail length/head and body length = 0.73). All other measured specimens have tails larger than head and body (Table 1), accounting in *A. chebezi*, new species, a ratio of 1.10. Regrettably, the length of the tail in the MN 67557 (Rio de Janeiro, Brazil) is not available.

TABLE 2. Comparisons among *Abrawayaomys* specimens using selected morphological traits.

	MACN 20253	MN 67557	MN 23075	UFMG 2492	USNM 552416
Belly coloration	Grey	White	White	Grey	White
TL/HBL	1.1	Not available	0.8	1.1	1.1
Tail apical tuft	Inconspicuous, dark	Not available	Very short	Conspicuous, white	Conspicuous, white
Nasals posterior extension	Surpassing lacrimal level	Surpassing lacrimal level	Lacrimal level	Lacrimal level	Lacrimal level
Interorbital region morphology	Amphoral	Amphoral	Convergent	Convergent	Convergent
Alisphenoid strut	Present	Present	Present	Absent	Present
Foramen ovale on pterigoyd plate	Small	Small	?	Large	Large
Upper incisors orientation	Proodont (ca. 95º)	Proodont (ca. 95º)	Slightly opisthodont (ca. 88º)	Opisthodont (ca. 86º)	Orthodont (ca. 90º)
Anteromedian flexus on M1	Inconspicuous	Absent	Conspicuous	Absent	Conspicuous

Other contrasting tail trait is the apical tuft. While in *A. chebezi*, new species, the tuft is moderately short and composed by brown dark stiff hairs, in the *A. ruschii* holotype the tuft is almost non-existent, whereas in Minas Gerais specimens (e.g., UFMG 2492, USNM 552416, and a recently collected and still unpublished specimen [J. Oliveira, pers. comm.]) the tuft is well haired with large white or white-cream in coloration elements. More indeed, the ending one inch of the tail of the UFMG 2492 is entirely white all-around.

Specimens MACN 20253 and MN 67557 (see Pereira et al., 2008:fig. 2) have an acute naso-frontal suture surpassing posteriorly the line defined by the lacrimal bones. By contrast, in specimens from further northern localities (UFMG 2492, USNM 522416) the nasals are abruptly truncated at or near the lacrimal plane having a straight naso-frontal suture. These latter specimens also shown the anterior tips of the nasals more flared and upturned (Fig. 9).

More intriguing are the differences reported in molar morphology, particularly in the M1 procingulum. According to Cunha and Cruz (1979:3) and to our direct inspection, the holotype of *A. ruschii* (MN 23075) has an anteromedian flexus dividing the procingulum in subequals anterolabial and anterolingual conules. Pacheco (2003:70) also noted the presence of an anteromedian flexus in the specimen USNM 522416 (Minas Gerais, Brazil), although he indicated an anterolingual conule smaller than the anterolabial one. However, in an additional specimen from Minas Gerais (UFMG 2492) there is no trace of anteromedian flexus. Either MN 67557 (Rio de Janeiro, Brazil), and MACN 20253 (Misiones, Argentina) lack the anteromedian flexus or it has reduced to a minimum expression, respectively. Clearly, this trait is partially age-dependent but when the anteromedian flexus is well expressed in young individuals, at least an indication of it, usually as a shallow notch in the anterior face of the M1, remains in adults.

Finally, some degree of variation was observed with respect to the presence of the alisphenoid strut. Although reported by Pereira et al. (2008:35) as absent in the specimen MN 67557 (Rio de Janeiro, Brazil), our suspicion of their presence, based on a detailed inspection of the figure provided by these authors, was confirmed by João Oliveira through a direct study. In fact, only the specimen UFMG 2492 (Minas Gerais, Brazil) lacks the alisphenoid strut that is present in all the remainder specimens examined (Fig. 7).

TABLE 3. Morphological comparison using selected traits between *Abrawayaomys* and *Rhagomys*.

Characters	*Abrawayaomys*	*Rhagomys*
Ungual tufts	Present	Present
Incisive foramina	Short	Very short
Pes morphology and plantar pads	Long, six pads, hallux with claw	Broad, six pads, hallux with nail
Facial vibrissae	Long	Very long
Mammae	?	six
Rostrum	Short	Short
Zygomatic notch	Shallow	Shallow
Interorbital region	Broad, amphoral or partially convergent, frontal sinuses inflated	Broad, convergent, beaded margins, frontal sinuses flat
Interparietal	Reduced	Enlarged
Dorsal/ventral body contrast	Inconspicuous	Conspicuous
Posterior palate	In line with M3 posterior face	Extended forward M3 posterior face
Alisphenoid strut	Typically present	Present
Carotid circulation	Pattern 1	Pattern 3
Capsular process	Present	Present
Incisors	Proodont to orthodont, very deep	Orthodont, narrow
Molar cusp arrangement	Intermediate to alternate	Opposite
Relation M3/M2	0.4–0.5	0.7
Relation m3/m2	0.6–0.7	0.8
Entoconid in m3	Greatly reduced	Well developed to reduced
Anteromedian flexus	Present to absent	Present
Mesoloph	Reduced	Well developed
Gall bladder	?	Absent
Stomach type	Unilocular-hemiglandular, antrum < corpus in area	Unilocular-hemiglandular, antrum = corpus in area
Number of hairs per tail scale	5	3
TL/HBL	0.7–1.2	1
Retromolar fossa	Enlarged	Enlarged
Apical tail pincel	Present	Present
Pelage condition	Spiny	Spiny to non-spiny

Perhaps the more marked differences arise when the specimen USNM 522416 (Minas Gerais, Brazil) and MACN 20253 (holotype of *A. chebezi*, new species, Misiones, Argentina) are directly compared to. The former has partially convergent interorbital region (hourglass in the latter), shorter rostrum (longer), well on inflated nasolacrimal capsules (less conspicuous), more rounded braincase (more squared), rhomboidal and smaller interparietal (oblong and larger), longer and more robust molars (shorter and slender), broader incisive foramina (narrower), sphenopalatine vacuities present as fissures (absent, roof of mesopterygoid fossa completely ossified), large posterior openings of the alisphenoid canal on parapterygoid plates (small), and slightly opisthodont upper incisors (proodont). In addition, specimen USNM 522416 has the tail tuft white while that of MACN 20253 is dark brown.

Differences previously commented are summarized in Table 2. We are confident that those specimens from the southernmost part of the range of the genus (Misiones, Argentina) reflect a new species here described as *A. chebezi*. Regarding the remaining specimens from Brazil, the biological significance of these differences, if there is any significance apart from individual variability, is hard to evaluate without voucher specimens at hand. Specimens from Argentina and Rio de Janeiro appear to be more similar (maybe conspecific?) and, morphologically depart less from *A. ruschii* holotype than from those from Minas Gerais. Taking in mind the amplitude of the morphological variation observed across the entire *Abrawayaomys* sample, a coordinate treatment for specimens from Minas Gerais (e.g., UFMG 2492, USNM 552416) would be their placement on a new specific entity. The adequacy of this action should be tested and implemented, if needed, by a future reviewer, based on larger series.

The existence of more than one species, two or maybe three, in this poorly known cricetid cannot be considered as an unforeseen event on sigmodontine history. We should remember that sympatric and ecologically similar sigmodontines, which for decades were considered monotypic, recently were shown to have a moderate specific diversity (e.g., *Juliomys*, *Rhagomys*; Luna and Patterson, 2003; Costa et al., 2007; Pardiñas et al., 2008).

No much can be said about the processes behind the diversification of *Abrawayaomys*; however, its species seem to be geographically delimited by the main montane (Serras) systems of south-eastern Brazil (Fig. 1). Given this, cladogenetic events within *Abrawayaomys* may have been occurred in isolation on montane forest fragments prompted by climatic changes (e.g., Grazziotin et al., 2006; Cabanne et al., 2007; Carnaval and Moritz, 2008). This hypothesis, loosely framed in the Montane Isolate Hypothesis (Moreau, 1966; Roy, 1997; see also Lara et al., 2005), should be tested with the analysis of additional samples once the specific status of populations from Minas Gerais has been clarified.

Tribal affiliation and final considerations

The knowledge on *Abrawayaomys* is just in a growing stage. Still, external morphology and soft anatomical traits are poorly known (e.g., penis morphology) or directly unknown (e.g., mammae number, gall bladder presence/absence). The skull of *Abrawayaomys* impact to the eye of sigmodontine students by its partially bizarre aspect produced by a combination of a very short rostrum and trunked nasals, conspicuously domed posterior profile, very deep and partially proodont upper incisors, and noticeably small molars. The most conspicuous external trait is its spiny pelage, being the spine morphology very similar to that described for murids (Hoey et al., 2004) or other cricetids (Hershkovitz, 1940:1; Patton and da Silva, 1995:320; Luna and Patterson, 2003:5). Pereira et al. (2008) stated a diploid complement of 58 chromosomes (fundamental number unknown). Stomach morphological description made by Finotti et al. (2003) suggests a hemiglandular-unilocular type, the widespread condition among sigmodontines (see Carleton, 1973).

The above summarized data formulate a picture in which is difficult to unequivocally associate *Abrawayaomys* with any genus or suprageneric group within Sigmodontinae. Reig and Kirsch (1989), when reporting the first Argentinean specimen, briefly mentioned—without explanation—a morphological resemblance between this genus and *Rhagomys*. It is important to note that this inference was made previously to the knowledge of the spiny condition of *Rhagomys longilingua* (Luna and Patterson, 2003). Voss (1993:25) listed *Abrawayaomys* as another sigmodontine plenty of “primitive attributes” with ambiguous tribal affiliation. Pacheco (2003:130) recovered, within Thomasomyini, a clade composed by *Abrawayaomys* and *Rhagomys* supported by the following morphological traits: broad zygomatic plate, interorbital region convergent with supraorbital margins squared or weakly beaded, jugal long, mesolophids absent, masseteric crest anterior to procingulum of m1, and retromolar region of mandible deeply excavated. Pacheco (2003) also highlighted the retromolar region condition, broad and foraminated, as a synapomorphy of the *Abrawayaomys-Rhagomys* clade. It is important to note that Pacheco (2003:part II) also conducted a more restricted phylogenetic analysis focused in exploring the relationship of species of *Thomasomys* and presumed related genera. In this analysis he obtained a topology where *Abrawayaomys* is recovered sister to a clade formed by *Rhagomys*, *Chilomys*, *Rhipidomys*, *Thomasomys*, and *Aepeomys*.

Almost all features listed by Pacheco (2003) to join *Abrawayaomys* and *Rhagomys* are also present in other sigmodontines; in addition, Pacheco (2003:142) scored *Abrawayaomys* on the basis of a single specimen (USNM 552416), a situation that, we think, biased some state character descriptions (e.g., interorbital region, dental morphology). More intriguing is why Pacheco (2003) scored as absent the mesolophids in *Abrawayaomys* and *Rhagomys*. The morphology of the retromolar region indicates a general similarity between these genera, but in *Rhagomys* (cf. Luna and Patterson, 2003:fig. 8) is clearly more excavated, perforated by nutritive foramina, and transversely broader than in *Abrawayaomys* (Fig. 6j). Other differences between *Abrawayaomys* and *Rhagomys* are more than trenchant, including both external and craniodental traits (Table 3).

We agree with Reig and Kirsch (1989), Pacheco (2003), and Musser and Carleton (2005) in the general resemblance between *Abrawayaomys* and *Rhagomys*. In fact, we consider that molar morphology is one of the strongest line of evidence linking the mentioned genera, especially when both species of *Rhagomys*, *R. rufescens* and *R. longilingua* (Luna and Patterson, 2003:fig. 9), are taken into account. *Rhagomys* has very well developed mesolophs/phids (although in form of low enamel crests more than the widespread condition of lophs/lophids); procingulum of M1 clearly crossed by a deep anteromedian flexus; well expressed posterolophs (shorter in *R. rufescens* than those of *R. longilingua*); slightly reduced m3 with respect to m2; backwards pointed main molar cusps with a reduced exposition of dentine, and several other traits that conforms a pentalophodont dental bauplan. *Abrawayaomys* molars are clearly different from those of *Rhagomys* but can be morphologically linked. In general, *Abrawayaomys* molars are simpler and the dentine exposition is more evident. Additionally, reductions of M3/m3 and main cusps alternation are clearly greater than in *Rhagomys*. In *Abrawayaomys* the M1 procingulum varies from being composed by two roughly equal conules (*A. ruschii*) to an undivided structure (*A. chebezi*, new species). The cylindrification process of the M3 of *Abrawayaomys* is more marked than in *Rhagomys*, like the m3 simplification where the entoconid is greatly reduced.

The thomasomyine condition of *Rhagomys* has been subject of recent inspection. As mentioned above, phylogenetic analysis of morphological characters place this genus in Thomasomyini (Pacheco, 2003). Meanwhile, Percequillo et al. (2004), using cytochrome b sequence data and depending on the analytical methods employed obtained variable results for the phylogenetic position of *Rhagomys*. These authors concluded that "...*Rhagomys* would constitute an additional divergent lineage interposed among more supported suprageneric groups" (Percequillo et al., 2004:254). Few years later an IRBP gene based phylogeny performed by D'Elía et al. (2006a) with a taxon dense-approach strongly retrieved *Rhagomys* sister to *Thomasomys*, supporting its placement in the tribe Thomasomyini (see also D'Elía et al., 2007).

Recently, a new phylogenetic hypothesis also based in morphology (based largely on Pacheco's dataset) recovered a clade (although weakly supported) composed by *Abrawayaomys* and *Chilomys*, which between the thomasomyine radiation is distantly related to *Rhagomys* (Salazar-Bravo and Yates, 2007:fig. 1). Contrasting results obtained by Pacheco (2003) and Salazar-Bravo and Yates (2007) regarding the phylogenetic position of these three genera are possibly related to methodological differences, including taxonomic coverage, between both analyses. *Chilomys* is a sigmodontine from Colombia, Ecuador, and Venezuela with a large set of presumed primitive traits (Voss, 1993:25) usually related to Thomasomyini (Musser and Carleton, 2005 and the references therein) and considered sister to *Thomasomys* (Smith and Patton, 1999; D'Elía et al., 2003). A general inspection (limited to the figures provided by Pacheco, 2003:figs. 31 and 32) of the craniodental morphology of *Chilomys* show similarities with that of *Abrawayaomys* especially in molar pattern and some skull features (e.g., interorbital region, nasal extension).

As discussed above, it seems to be a considerable amount of evidence to phenetically and phylogenetically relate *Abrawayaomys* with *Chilomys* and *Rhagomys*. In addition, independent sets of data (i.e., D'Elía et al., 2006a; Salazar-Bravo and Yates, 2007) place the two latter genera in Thomasomyini. In this context, the reference of *Abrawayaomys* to Thomasomyini emerges as the better supported hypothesis.

However, it must be recalled that recent studies have revealed an impressive amount of morphological convergence among sigmodontines producing very similar morphologies in distantly related lineages (e.g., the "*Reithrodon* group;" see D'Elía, 2003). The homoplasy in sigmodontine dental morphology appears to be relatively common instead of an exception. However, we observe a major tendency to convergence within and among tetralophodont lineages than with respect to pentalophodont ones (e.g., dental patterns of *Euneomys*, *Holochilus*, *Reithrodon*, and *Sigmodon*, all allocated in the tribe Sigmodontini by Hershkovitz, 1955). Therefore, the proposed allocation of *Abrawayaomys* into Thomasomyini must be taken tentatively and further test of it is much needed.

Finally, it is interesting to point out that the skull of *Abrawayaomys* shows some features seen in Akodontini, including inflated frontal sinuses, hour glass shaped interorbital region with a broad interorbital constriction, U-shaped coronal suture, and some traits of the simplified molar occlusal pattern. Among the latter deserve mention the alternate disposition of the main molar cusps, the great reduction of the M3/m3, and the tendency to fused mesolophids. These craniodental traits can be presumptively interpreted as convergences between akodontines and *Abrawayaomys*. Alimentary preferences of a captive *Abrawayaomys* individual showed a diet focused to fruits, seeds, and leaves (Finotti et al., 2003), a specialization that could be linked with the reduction in size and simplification in occlusal accidents of the molars.

The uniqueness of *Abrawayaomys* and its restriction to the Atlantic Forest support the hypothesis originally advanced by Smith and Patton (1999) on the singularity of this biome as a main center of sigmodontine diversification (see also D'Elía, 2003 for additional evidence at the genus level; and Gonçalves et al., 2007 for examples at the species level). As Smith and Patton (1999:113) pointed out "apparently in the early radiation of the Sigmodontinae, a number of lineages diversified in the region [southeastern Brazil] and have been preserved there ever since." Finally, the present disconnected pattern among *Abrawayaomys* main populations must be taken as a call of attention in order to increase the efforts to study and conserve this highly disturbed habitat and its splendid mice.

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