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## Two New Species of *Juscelinomys* (Rodentia: Muridae) from Bolivia

LOUISE H. EMMONS<sup>1</sup>

### ABSTRACT

*Juscelinomys*, a genus of akodontine rodents allied to *Oxymycterus*, has been known only from the nine individuals of the type series of *J. candango*. Two rats recently collected in eastern Bolivia are herein described as new species of the genus. Molecular evidence from sequences of the cytochrome *b* gene confirms the morphological evidence that *Juscelinomys* is a closely related sister group to *Oxymycterus*. From its literature account, the newly described genus *Brucepattersonius* Hershkovitz, 1998, seems more distantly related to *Juscelinomys* than *Oxymycterus* does.

### INTRODUCTION

The genus *Juscelinomys* (Moojen, 1965) is one of the more elusive New World murids, known only from the type series of nine individuals collected in 1960 in the Distrito Federal of Brazil. Subsequent attempts to collect more specimens near the type locality met with failure (e.g., Hershkovitz, 1993). In 1995, on a Conservation International Rapid Assessment Program field course in Parque Nacional Noel Kempff Mercado, eastern Bolivia, a single individual of this genus was

collected in the lowlands at the northern end of the park. In 1997 I captured another individual on top of the tableland massif in the same park. I here describe these as two new species, the second and third of the genus *Juscelinomys*.

### MATERIALS AND METHODS

#### MITOCHONDRIAL DNA MOLECULAR SEQUENCE ANALYSIS

Tissues from the holotype of the first species named below were analyzed by Margar-

<sup>1</sup> Research Associate, Division of Vertebrate Zoology, American Museum of Natural History; Research Associate, Division of Mammals, Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20660-0108.

et F. Smith of the University of California, Berkeley, as follows. DNA was extracted from tissue preserved in ethanol of *Juscelinomys* specimen MNK2632, using Chelex (Walsh et al., 1991). General procedures for amplification followed those in Smith and Patton (1991, 1993, 1999). Sequences for *Juscelinomys* were obtained on an Applied Biosystems model 377 automated DNA sequencer using the Big Dye terminator cycle sequencing kit. Sequences were edited using the Sequence Navigator software (ABI). Kimura 2-parameter distances (Kimura, 1980) were calculated using the Molecular Evolutionary Genetic Analysis (MEGA) program of Kumar et al. (1993). Maximum parsimony analyses were run using PAUP\* 4.0b1 (Swofford, 1998). Analyses were done with all sites weighted equally and with transversions weighted six times as much as transitions (with 100 random orders of addition in each case). Support for the nodes was assessed with bootstrap analyses with 1000 pseudoreplicates with the full heuristic procedure.

#### SPECIMENS EXAMINED

Identifications of *Oxymycterus* species follow the "specimens examined" section of Oliveira (1998).

#### SPECIMENS EXAMINED BY THE AUTHOR:

*Juscelinomys candango*: Brazil: Distrito Federal: Fundação Zoobotânica, elev. 1030 m. Museu Nacional, Rio de Janeiro (MN 23870 holotype, MN 23871; MN 30026–28; MN 30030–32).

*Juscelinomys* sp.: Bolivia: Parque Nacional Noel Kempff Mercado, Huanchaca II, 700 m. Museo de Historia Natural Noel Kempff Mercado, Universidad Autónoma "Gabriel René Moreno" Santa Cruz, Bolivia (MNK 2632).

*Juscelinomys* sp.: Bolivia: Flor de Oro, elev. 150 m. Colección Boliviana de Fauna, La Paz (CBF5555).

*Oxymycterus amazonicus* Hershkovitz, 1994: Brazil: Para; Br 165, km 215. National Museum of Natural History, Smithsonian Institution (USNM 544637–40), Altamira (USNM 521537).

*Oxymycterus paramensis* Thomas, 1902:

Peru: Cuzco; Chospayoc (USNM 194699); Peru: Cuzco, Ollantaytambo (USNM 194700).

*Oxymycterus dasytrichus* (Schinz, 1821): Brazil; São Paulo; Casa Grande (USNM 461882, 462120–3, 484400; Minas Gerais; Passos (USNM 304608).

SPECIMENS EXAMINED BY M. SMITH TO CONSTRUCT MOLECULAR CLADOGRAM (Smith and Patton, 1999):

*Oxymycterus amazonicus*: Brazil: Pará; Rio Xingu, Museu de Zoologia, São Paulo (MZUSP 21317).

*Oxymycterus delator* Thomas, 1903: Paraguay: Canendiyu, 13.3 km by rd. N Curuguaty, University of Michigan Museum of Zoology. (UMMZ 133939, UMMZ 137077).

*Oxymycterus hiska* Hinojosa, Anderson, and Patton, 1987: Peru: Puno; 14 km W Yanahuaya, Museum of Vertebrate Zoology, University of California, Berkeley (MVZ 171518).

*Oxymycterus judex* Thomas, 1909: Brazil: São Paulo; Fazenda Intervalles, Capão Bonito (MVZ 183125–26; 183128–9); Estação Biológica Boracéia (MVZ-JLP 16283); Espírito Santo, Santa Tereza (MN-ML 125).

*Oxymycterus paramensis*: Peru: Cusco; 55.4 km by rd. N Calca, 3560 m (UMMZ 160535).

*Oxymycterus nasutus* (Waterhouse, 1837); Uruguay: Maldonado; Maldonado (MVZ 182701 and CA 695).

*Oxymycterus* sp. 2: Uruguay: Maldonado; Las Flores (MVZ 183264 and MVZ 183265).

#### DESCRIPTIONS OF NEW SPECIES

##### *Juscelinomys huanchacae*, new species

HOLOTYPE: An old female, MNK 2632 cataloged in the Museo de Historia Natural "Noel Kempff Mercado" (Universidad Autónoma "Gabriel René Moreno," Santa Cruz, Bolivia); collected by Louis H. Emmons, 20 July 1997 (field no. LHE 1403). Skin and skull, tissue sample in ethanol. The skin is missing some hair on the right side of the head and around base of the tail, and the tail is broken in two places. The skull is complete and in good condition. The skin was removed in the field, preserved with salt,

TABLE 1  
External Measurements (mm) and Weights (g) of *Juscelinomys* Specimens<sup>a</sup>

Specimen	Sex	Head and body	Tail	Hind-foot	Ear	Weight	Age
<i>J. huanchacae</i> , MNK2632	F	172	98	26	17	99	Ad, old
<i>J. guaporensis</i> , CBF5555	F	130	95	25	20	88	Ad, old
<i>J. candango</i> , holotype, MN23870	F	130	57	26	15	—	Ad, mid
<i>J. candango</i> , MN23871	M	137	116	21	15	—	Ad, yg
<i>J. candango</i> , MN30026	M	155	—	24	12	—	Ad, old
<i>J. candango</i> , MN30027	M	147	90	22	13	—	Ad, old
<i>J. candango</i> , MN30028	M	128	95	22	13	—	Ad, yg
<i>J. candango</i> , MN30030	M	137	85	22	14	—	Young
<i>J. candango</i> , MN30031	—	128	100	22	—	—	Ad, mid
<i>J. candango</i> , MN30032	M	137	—	21	12	—	Ad, old

<sup>a</sup> Because there are no measurements on the associated skin tags, the measurements of *J. candango* are taken from Moojen (1965). The catalog numbers of the latter specimens have all been changed (the original numbers were apparently never recorded in the catalog, and a new number series has been assigned (Langguth et al., 1997). It seems likely that the hindfoot measurements of most *J. candango* were taken without claws, and the wide range of tail measurements suggests that some were broken (e.g., the type), or there are errors in measurement.

and prepared a few days later at another field camp. The holotype is the only known specimen.

**TYPE LOCALITY:** Bolivia: Santa Cruz; Provincia Velasco, Serrania de Huanchaca, Parque Nacional Noel Kempff Mercado, Campamento "Huanchaca II." 14°31'25"; W 60°44'22" (from GPS with map datum WGS-84), elev. 700 m.

**HABITAT:** The type locality is on the Huanchaca or Caparuch tableland massif (meseta). Huanchaca II (Dos) is a campsite maintained by botanists from MNK, Santa Cruz, in a large gallery forest island along a stream about 2 km from the old Huanchaca II airstrip. The camp is about 5 km inland across the pampa from the meseta rim, in a zone of open savanna with scattered trees. We reached the site by backpacking from an old logging road that exits the pampa near Los Fierros guard post. The type and only specimen of *Juscelinomys huanchacae* was trapped in a Sherman live trap, in dense, meter-tall grass on a moist slope with deep sandy soil in the slight landscape depression that borders the stream west of the camp. Other species collected in the same habitat included *Kunsia tomentosa* and *Akodon cf. toba*.

**ETYMOLOGY:** The species is named for the tableland of the type locality.

**DIAGNOSIS:** Dorsal pelage brown-oliva-

ceous, most individual overhairs with broad, subterminal ochraceous yellow bands; ventral pelage gray washed slightly with buff; claws unpigmented (white when dry). Skull narrow when viewed dorsally; rostrum broad; supraorbital ridge and interorbital constriction of frontal bones shallow and not expanding sharply posteriorly; posterior edge of supraorbital ridge smooth, not beaded. When viewed laterally, premaxillary bones with little dorsal inflation; dorsal profile weakly curved; nasal bones with slight upward curve at anterior tips; but premaxillary bones not projected forward with nasals into trumpet shape. Incisive foramen extremely long and wide, palate short, anterior margin of mesopterygoid fossa forward of posterior edge of M3. Viewed ventrally, parapterygoid fossae narrow anteriorly, elongate, and deeply concave, posterior lateral borders weakly divergent, such that fossae are nearly parallel sided. Sphenopalatine vacuities present.

**DESCRIPTION:** The holotype is the largest individual of the genus; see measurements in tables 1 and 2. General appearance coarsely grizzled agouti, with dense pelage; upperparts uniform olivaceous, this color derived from a mixture of yellow- and black-tipped hair; pelage about 12 mm long on midback, with pale gray base, darkening to blackish at midlength, either tipped black or broadly ochraceous yellow with or without a narrow



Fig. 1. *Juscelinomys huanchacae*, holotype (MNK2632) in the flesh. Note the akodontine bauplan, the long, pale claws, and short, thick, hairy tail.

terminal black tip; color of sides similar to dorsum (fig. 1). Ventral pelage uniformly gray based, tinged with buff; sides of rostrum paler, washed with ochraceous yellow. Chin and circumoral region whitish. Ears well clothed inside and out with short, pale-tipped hairs; slight, pale fringe on rim. Hair of fore- and hind feet dusky based, with white tips, ungual tufts silvery; claw of central digit of manus 6 mm. Tail completely covered with stiff hairs, predominantly black, contrasting with body color above; paler, washed with pale buff below, palest near base. Skin of tail strongly adhered to underlying connective tissue; difficult to remove. Four pairs of mammae: one pectoral, one axial, one lower abdominal, and one inguinal. Vibrissae short, fine, and inconspicuous; no genal vibrissae evident, but hair loss from skin makes this observation uncertain; two superciliary vibrissae difficult to distinguish from pelage hairs. No vibrissae evident on forelegs. Skin extremely greasy, exuding oil.

Cranium generally slender, zygomatic arches with almost no lateral bowing, widest at squamosal root and tapering slightly anteriorly (fig. 2). Viewed laterally, zygomatic arches descend dorsoventrally in an almost straight line from maxillary root to posterior tip of jugal; posterior tip of jugal-squamosal

suture on internal face of zygomatic arch well forward of bend on squamosal portion. Braincase at parietals not conspicuously globular; in lateral view, skull is quite flat dorsally and shallow dorsoventrally behind maxillary toothrows. Incisive foramina long and broad, with smoothly curved lateral borders. Suprafrontal foramen well below supra-orbital ridge, below a slight shelflike projection of the ridge. Carotid arterial circulation with prominent squamosal-alisphenoid groove and sphenofrontal foramen. Foramen ovale with opening lateral to parapterygoid processes nearly in a vertical plane, and covered with a broad alisphenoid strut; trough for maxillary-buccinator nerve above foramen ovale broad and prominent. Auditory bullae small, adpressed to basioccipital bone; stapedial foramen and carotid canal large and prominent. Hamular process of squamosal long and slender, with a large vacuity dorsal to process. Mandible with ramus between coronoid and angular process relatively deep dorsoventrally; area of bone above capsular projection between coronoid and condylar processes comprising about one-third of depth of ramus (fig. 3). Mandibular foramen on top of ramus, in line with tooththrow. Teeth extremely worn; no useful features of their morphology observed from occlusal surfaces.

#### *Juscelinomys guaporensis*, new species

HOLOTYPE: Colección Boliviana de Fauna no. CBF 5555, field no. NBH 1308 (Nuria Bernal). An old adult female, collected 23 September 1995, by Cristina Tapia and Teresa Tarifa, during a Conservation International field training course. A skin and skull prepared as a museum specimen, skin with sewn-up tears on muzzle and around eye; skull with occipital, interparietal region, and both bullae separated; mandibles separated.

ETYMOLOGY: Named for the Río Guaporé, which courses a few hundred meters from the site where the holotype was captured.

TYPE LOCALITY: Bolivia; Santa Cruz; Prov. Velasco, Parque Nacional Noel Kempff Mercado, Flor de Oro; 13°33.10'S; 61°00.51'W; elev. 210 m. The type locality is a guard post and tourist camp at an old estancia site on

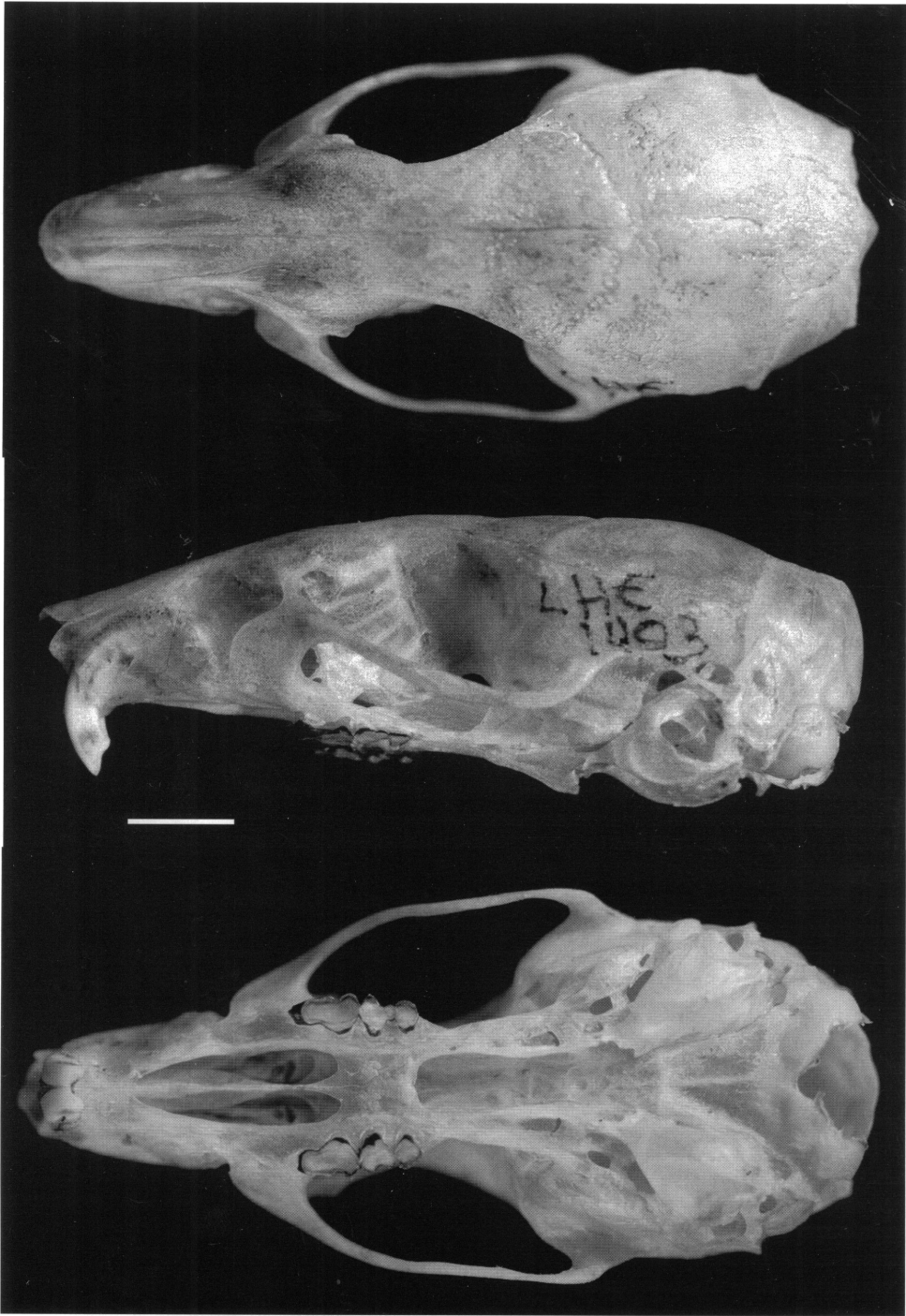


Fig. 2. *Juscelinomys huanchacae*, cranium of holotype (MNK2632), scale bar 5 mm.



Fig. 3. Mandibles: left, *Juscelinomys huanchacae*, holotype (MNK2632); right, *Juscelinomys guaporensis*, holotype (CBF5555), lower figure reversed.

the margin of the Río Itenez (Guaporé), left bank.

**HABITAT:** Open savanna woodland (Cerrado) on upland (not prone to flooding) with dense, long grass. The small savannas at Flor de Oro are surrounded by forests, entirely isolated from other grassland or cerrado habitats, and appear to be relictual. However, cattle ranching in the recent past may have increased or otherwise modified the extent of grasslands.

**DIAGNOSIS:** Dorsum olivaceous, some overhairs with subterminal ochraceous yellow bands; ventral pelage gray washed slightly with buff; claws pigmented, ungual tuft brownish. Cranium small, short, and dorsoventrally deep; rostrum slender; maxillary bones swollen dorsally; bony palate long, anterior margin of mesopterygoid fossa behind level of M3 (fig. 4). Viewed ventrally, parapterygoid fossae narrow anteriorly, elongate, and deeply concave, posterior lateral borders divergent such that fossae are roughly triangular. Viewed dorsally, frontal bones widening sharply posterior to interorbital constriction; supraorbital ridge lightly beaded.

**DESCRIPTION:** General appearance dusky agouti, with smooth, not very dense pelage; upperparts with pelage pale gray at base, tips either black or with yellowish buff terminal or subterminal bands; hair about 10 mm at midback, sides about same color as dorsum; ventral pelage gray based, washed with buff. Chin and sides of muzzle yellowish buff, lacking admixture of black; ears lightly clothed with agouti hairs, similar in color to dorsum. Feet dusky, with pigmented claws; claw of central digit of manus 4.8 mm. Tail entirely covered with stiff hairs, black above, pale buff below except near tip. Vibrissae fine and inconspicuous, one genal vibrissa somewhat longer than pelage hairs; no evident superciliary vibrissae, no salient vibrissae on forelegs.

Cranium smaller than other *Juscelinomys* specimens in almost half of all measurements (table 2). Skull with strongly curved lateral profile due to pronounced dorsal swelling of the maxillary bones; nasal bones not conspicuously elevated at tip; braincase broad and deep; zygomatic arches in dorsal view widest at squamosal root, tapering anteriorly;

posterior tip of jugal-squamosal suture on internal face of arch extends onto bend on squamosal portion. Interorbital constriction narrow, hourglass shaped. Maxillary toothrows slightly convergent posteriorly. Sphenopalatine vacuities present. Carotid arterial circulation with prominent squamosal-alisphenoid groove and sphenofrontal foramen.

Ramus of mandible between coronoid and angular process shallow dorsoventrally; area of bone above capsular projection between coronoid and condylar processes narrow, comprising about one-quarter or less of depth of ramus (fig. 3).

As with *J. huanchacae*, the teeth of the holotype are so worn that little can be concluded about the occlusal morphology of the species.

#### COMPARISONS WITH *J. CANDANGO*

I examined the holotype, a series of seven paratype skins, and nine skulls of *Juscelinomys candango* Moojen, 1965, all from the Distrito Federal, Brazil, in the Museu Nacional, Rio de Janeiro, and compared them with the skulls of the two species described herein. Unfortunately, the *J. candango* specimens were poorly cleaned and in poor condition, so that some regions of the skull, such as the alisphenoid, were not visible. To facilitate comparisons with the taxa described above, I here briefly describe the external appearance of *J. candango*. There are no field measurements on the specimen labels.

The upperparts are strongly tinged rusty orange with individual hairs gray based, with either orange or black tips, so that the overall impression of the pelage is reddish streaked with black. The mystacial area and cheeks are pure orange; the eye rings orange; the nose completely hairy except between the nostrils. Underparts orange-buff, with a sharp transition from dorsal color on sides; ventral hairs pale based, but some individuals have sooty patches on the underparts, which may be either natural, or due to soiling. Ears small and fully haired on back and on internal, lateral surface. Tail short and broad at base, fully clothed with hairs, which are black at base and orange at tips; generally blackish above and more orange below. Many of the tails are broken, perhaps by difficulty during skin-



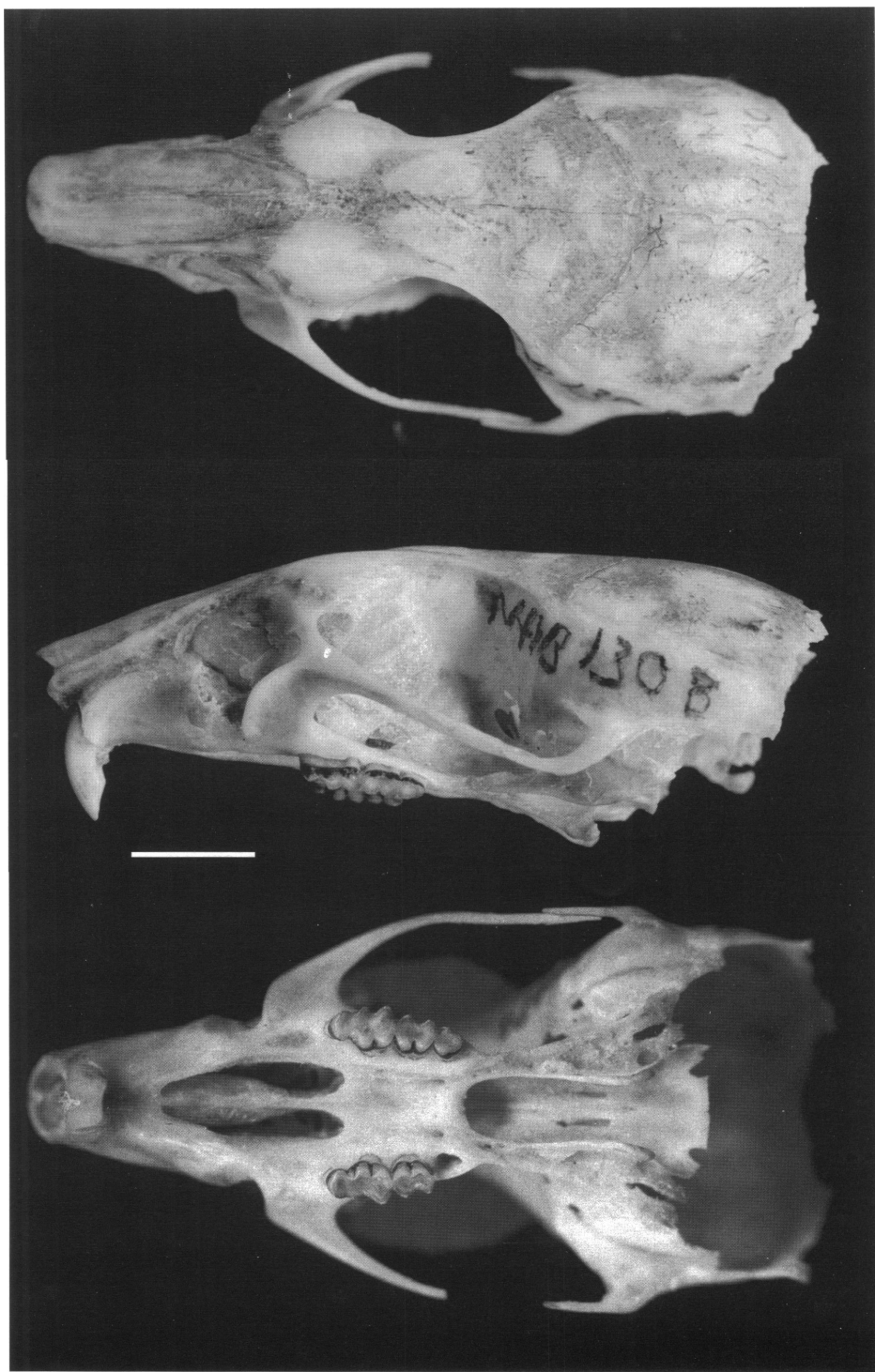


Fig. 4. *Juscelinomys guaporensis*, cranium of holotype (CBF5555), scale bar 5 mm.



TABLE 2  
Cranial Measurements (mm) of *Juscelinomys*, Including Two New Species and the Type Series of *J. candango*<sup>a</sup>

Specimen	Sex	GLS	ZB	BR	LR	DIA	LBP	PPL	MTR	M1B	IFL	IFB	IOC	BOC	BZP	BBP	CIL	ZL
<i>huanchacae</i>																		
MNK2632	F	36.24	16.48	6.58	11.86	9.14	3.13	15.33	5.00	1.45	8.39	3.14	5.89	8.30	3.37	7.35	33.49	12.26
<i>guaporensis</i>																		
CBF555	F	—	14.76	6.13	10.77	8.12	4.35	—	4.73	1.50	6.55	2.95	5.32	7.59	2.63	6.52	—	11.27
<i>candango</i>																		
MN23870	F	34.86	17.01	6.98	11.37	8.84	4.42	14.21	5.15	1.49	7.46	2.56	5.64	7.86	2.75	7.69	—	—
MN30028	M	32.11	—	6.04	10.06	6.23	4.34	13.07	4.97	1.24	6.82	2.59	5.26	8.03	2.56	7.52	—	—
MN30027	M	36.70	17.32	7.31	11.65	9.42	4.81	14.85	5.09	1.52	8.01	2.92	6.04	8.62	2.95	8.04	—	—
MN30026	M	36.70	—	7.71	12.72	9.56	4.88	14.78	5.57	1.71	7.37	2.75	5.60	8.37	2.68	7.99	—	—
MN30030	M	32.64	—	6.09	10.74	7.53	4.02	12.52	5.56	1.65	6.88	2.50	5.32	—	1.86	7.36	—	—
MN30031	?	—	16.24	6.80	—	8.42	4.44	14.78	5.51	1.70	7.36	2.71	5.88	8.40	2.54	7.91	—	—
MN30032	M	35.23	—	6.80	11.80	9.31	4.51	14.63	5.18	1.53	7.40	2.72	5.46	7.91	2.74	7.98	—	—
MN23871	M	35.35	16.14	7.15	11.51	8.42	4.55	13.73	5.76	1.40	7.34	2.79	5.52	7.72	2.97	7.79	—	—

<sup>a</sup> Measurements: GLS, greatest length of skull; ZB, zygomatic breadth; BR, breadth rostrum; LR, length rostrum; DIA, diastema; LBP, length bony palate; PPL, postpalatal length; MTR, molar toothrow; M1B, breadth M1; IFL, incisive foramen length; IOC, interorbital breadth; BOC, breadth across occipital condyles; BZP, breadth zygomatic plate; BBP, breadth bony palate; CIL, condyloincisive length; ZL, zygomatic length. Most measurements as illustrated in Musser et al. (1998).

ning. Feet dusky washed with ochraceous; ungual tufts sparse, on hind toes the few hairs do not reach the tips of the claws. Vibrissae fine and inconspicuous; mystacial reach to just behind eye when pressed back; no genals evident; two inconspicuous superciliary vibrissae.

The rust-colored *Juscelinomys candango* specimens are strikingly different in color from the two species I described above, which are both olivaceous. The tail of *J. candango* is markedly thicker than that of either of the new taxa, judging from the photograph of live animals in the original description of that species (Moojen, 1965, fig. 1). All specimens of the genus seem to share the characteristic greasy skin, and tail-skin strongly attached to the underlying connective tissue—prone to break during skinning. *Juscelinomys huanchacae* is longer in head and body length than the individuals of other two species. The pelage color of *J. huanchacae* is coarser-grained and more hispid-looking than that of *J. guaporensis*.

CRANIA: Selected measurements of all crania are given in table 2. The holotype is the only female specimen in the series of *J. candango*, and presently it is not possible to determine the existence or extent of sexual di-

morphism; but the crania of males seemed to have a more highly developed occipital crest than that of the holotype, and all adult males have longer skulls (GLS). The cranium of the holotype, and that of an old adult comparable in age to the holotypes of the new species described herein, are illustrated in figures 5 and 6.

The cranium of *J. guaporensis* is smaller and more delicate overall and has a slenderer rostrum than that of the other two species, but in general shape it is similar to that of *J. candango*. The cranium of *J. huanchacae* is larger in four dimensions (postpalatal length, incisive foramen length and breadth, breadth of zygomatic plate). It has a shorter length of bony palate and a less curved dorsal profile than do the other two taxa; it is less dorsoventrally deep throughout in lateral profile. In *J. huanchacae* the incisive foramen is longer and broader, with more evenly curved lateral borders; those of the other two species each have the foramina parallel-sided posteriorly, converging anteriorly from a "shoulder" at the maxillary-premaxillary suture. In *J. candango* the parapterygoid fossa is broad anteriorly, while in both *J. huanchacae* and *J. guaporensis* it narrows behind the maxillary suture.

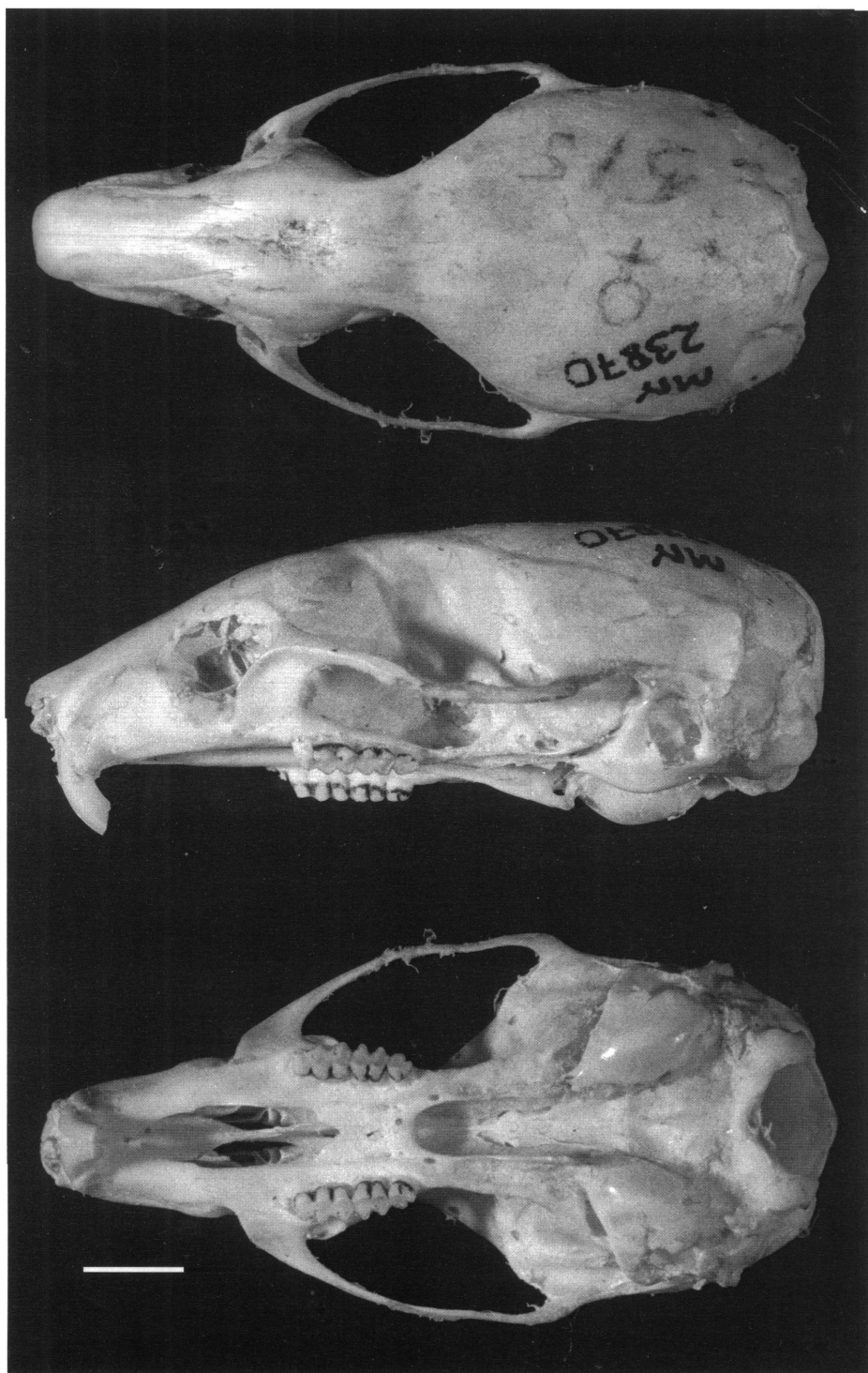


Fig. 5. *Juscelinomys candango*, cranium of holotype (MN23870), scale bar 5 mm.

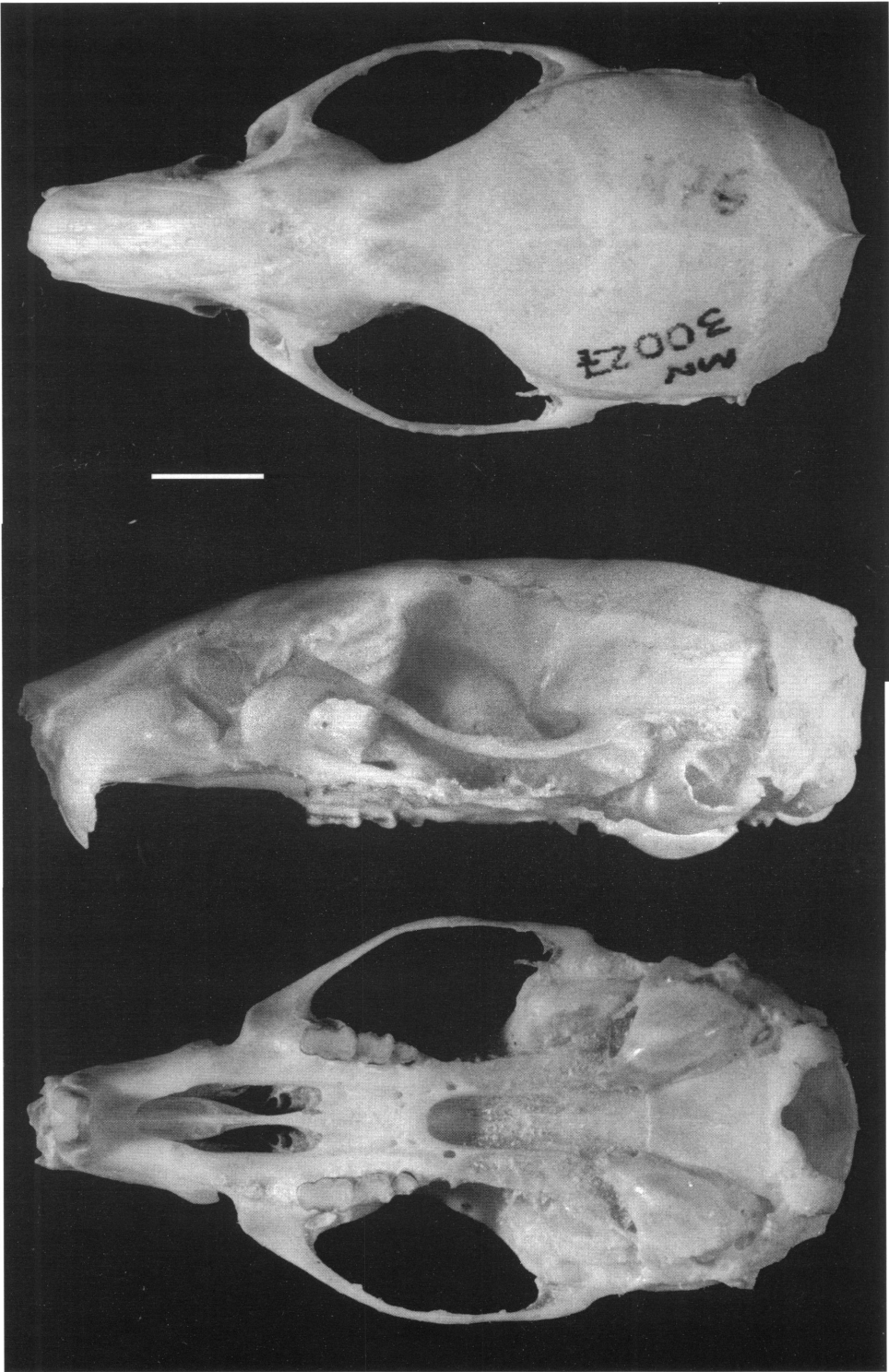


Fig. 6. *Juscelinomys candango*, cranium of old adult (MN30027), center view reversed, scale bar 5 mm.

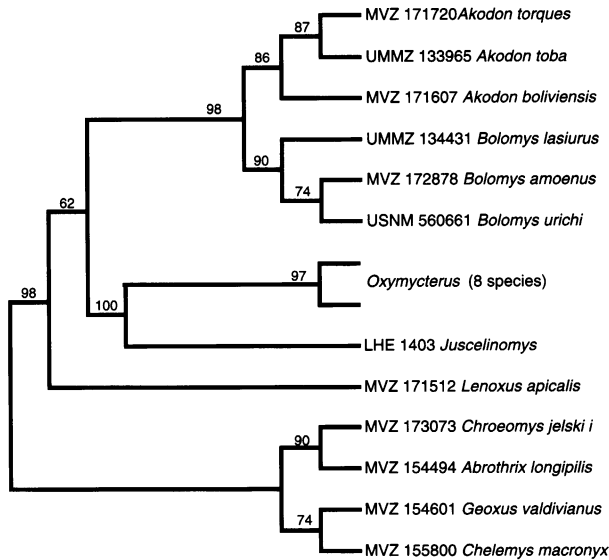


Fig. 7. Maximum parsimony analysis of *cyt b* sequences in PAUP\*4.0b1 with all sites weighted equally. The distribution of random trees suggests that there is significant nonrandom information in the data set [ $g_i = -0.5923700$ ,  $p < 0.01$  (Hillis and Huelsenbeck, 1992)]. Bootstrap values were obtained in a separate analysis with 1000 replicates.

## COMPARISONS WITH OTHER GENERA

### RESULTS OF DNA SEQUENCE ANALYSIS

As noted by Moojen (1965), the genus *Juscelinomys* seems most closely allied with the long-nosed rats of the genus *Oxymycterus*. Mitochondrial cytochrome *b* sequences from tissues of the holotype of *J. huanchacae* were analyzed in relation to other akodontines by Dr. Margaret Smith of the University of California at Berkeley. Complete sequence for the cytochrome *b* (*cyt b*) gene (ca. 1140 base pairs) for *Juscelinomys huanchacae* (Gen Bank accession no. AF133667) was compared to that for representative genera from the akodontine tribe, including *Akodon*, *Bolomys*, *Oxymycterus*, and *Lenoxus* (Smith and Patton, 1993, 1999). The out-group sequences were from genera in a central and southern Andean clade; these taxa are quite distinct from the akodontine tribe (Smith and Patton, 1993, 1999). An unsuccessful attempt was made to amplify the gene from a small piece of the ventral skin of *J. guaporensis*.

In a maximum parsimony analysis with 20 taxa, with transitions weighted equally with transversions, 666 characters are constant, 89

variable characters are parsimony uninformative, and 385 variable characters are parsimony informative. There is one shortest tree (score 1546), which shows *Juscelinomys* as the sister to *Oxymycterus* (fig. 7). The same topology is found when transversions are weighted six times as much as transitions. Smith and Patton (1999) reported that eight species of *Oxymycterus* differ from each other by a maximum of 0.101 Kimura-2-parameter distance (K2p). *Juscelinomys* differs from *Oxymycterus* by 0.102–0.118 K2p. Bootstrap support for the grouping of *Juscelinomys* with *Oxymycterus* is 100% (fig. 7). *Juscelinomys* differs from the three representative species of *Bolomys* by 0.181–0.190 K2p, and from the three representative species of *Akodon* by 0.190–0.203 K2p.

### MORPHOLOGICAL COMPARISONS

I confine intergeneric morphological comparisons of the new *Juscelinomys* species to the genus *Oxymycterus*, with a few remarks about the newly described akodontine genus *Brucepattersonius* Hershkovitz, 1998, which is apparently also closely allied to *Oxymycterus*. These comparisons are not exhaustive;

they are intended to highlight the morphological distinctiveness of the genus *Juscelinomys*, and aid in its diagnosis. The taxonomy of *Oxymycterus* species follows Oliveira (1998).

*Juscelinomys* species share with *Oxymycterus* species a generally rotund, akodontine body shape, short ears, tail shorter than head and body, forefeet with greatly elongated claws on middle three digits, a short fifth digit, an elongated rostrum, narrow cranium, and slender mandible. Members of the genus *Juscelinomys* can be distinguished from all other members of the tribe Akodontini by the combination of broad and unusually long mesopterygoid fossae, narrow and extremely long parapterygoid plates, and smoothly convex posterior margins of the plates. It can be distinguished from all *Oxymycterus* by its relatively broad and vertically oriented zygomatic plates. Detailed comparisons are given below.

**EXTERNAL:** In *Oxymycterus* spp. the tail is almost naked (*O. amazonicus*) to only slightly hairy, and it is not conspicuously thick at the base, where in *Juscelinomys* spp. the tail is completely covered with hair and so thick basally as to be almost cone-shaped. In *Juscelinomys* spp. the toes of the forefeet are relatively much shorter and the claws much longer than in *Oxymycterus* spp. A diagnostic feature of *Bucepattersonius* is that the longest claw on the forefeet is 3 mm or less, relatively shorter than those of *Oxymycterus* (HersHKovitz, 1998; I have not examined specimens of *Bucepattersonius*, all comparisons are based on the published description). *Bucepattersonius* has "minute" eyes (HersHKovitz, 1998), but those of *Juscelinomys* spp. are of normal size (fig. 1).

**CRANIAL:** The rostrum of *Juscelinomys* spp. is shorter, with the nasal and premaxillary bones projecting for a much shorter distance anterior to the incisor plane than in either *Oxymycterus* or *Bucepattersonius*; and the nasal tips are not so flared into a trumpet shape as in *Oxymycterus* spp. The root capsule of the upper incisor of *Juscelinomys* nearly reaches to the zygomatic plate, whereas in *Oxymycterus* the capsule is well forward of the plate in most species. The suprafrontal foramen in *Juscelinomys* spp. is located below to well below the supraorbital

ridge; in *Oxymycterus* spp. it is high on the ridge itself, but the anterior-posterior placement varies with species. The parapterygoid fossae of *Juscelinomys* species are narrow anteriorly and deeply concave. In this they differ from those of *Oxymycterus* species and of all other akodontines (P. Myers, personal commun.). The medial edge of the parapterygoid fossa is extended much more ventrally than the external edge in *Juscelinomys*, so that two sides of the parapterygoid fossa almost form a right angle; but in most *Oxymycterus* species the two sides are nearly equal in depth and the fossa is shallow and flat, except in *O. dasytrichus*, which resembles *Juscelinomys*. Sphenopalatine vacuities are absent in both *Oxymycterus* and *Bucepattersonius*, but they are present in all three *Juscelinomys* species. The canal for the postglenoid vein below the hamular process of the squamosal is open dorsally, forming an open trough in *Juscelinomys*, but covered, or narrower, and forming a canal in *Oxymycterus*; *Juscelinomys* has a larger subsquamosal fenestra posterior to the hamular than does *Oxymycterus*. The sigmoid notch of the mandible is conspicuously shallower in *Juscelinomys* than in *Oxymycterus* spp. The mandibular toothrow is strongly twisted medially and ventrally from front to back in *Juscelinomys* (fig. 3), much less so in *Oxymycterus* spp.; the mental foramen is on top of the ramus, in line with the toothrow *Juscelinomys*; but placed more laterally in *Oxymycterus* spp.; the superior masseteric ridge in *Juscelinomys* spp. is more salient anteriorly when viewed from above, than in *Oxymycterus* spp.

The genus *Bucepattersonius*, recently segregated from *Oxymycterus* by HersHKovitz (1998), appears more distantly related to *Juscelinomys* than does *Oxymycterus*, based on the few morphological characters available from the literature. The relevant characters include: feet more specialized in *Juscelinomys*, with shorter toes and longer claws than *Oxymycterus*, while those of *Bucepattersonius* are less specialized than those of *Oxymycterus* (longer toes and shorter claws); eye-size reduced in *Bucepattersonius*, but not in the other two genera; and sphenopalatine pits absent in *Oxymycterus* and *Bucepattersonius* but present in *Juscelinomys*.

## CONCLUSIONS

The addition of two new species to the genus *Juscelinomys* establishes it as a more diverse radiation than previously recognized. The molecular and morphological evidence presented here confirms its distinctiveness and places it as a sister taxon to *Oxymycterus*. All members of the genus are currently known only from grasslands of Cerrado habitats of the Brazilian Shield. These habitats are undergoing rapid conversion to agroindustry, a land use probably incompatible with survival of these mice; but the two species described herein are both currently known within a large national park, where they are likely to persist if their grassland habitat is preserved by allowing periodic burning.

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