



## On the composite nature of the holotype of *Loxodontomys pikumche* Spotorno *et al.*, 1998 (Rodentia, Cricetidae, Sigmodontinae)

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Central Chilean populations of the mouse *Loxodontomys* Osgood were traditionally (e.g., Pine *et al.*, 1979) included as part of the single species recognized in the genus, *L. micropus* (Waterhouse). Later, Spotorno *et al.* (1998) considered that they belong to an up to then undescribed species for which they coined the name *L. pikumche*. This taxon, with type locality in "... Cajón del Río Maipo, sector Cruz de Piedra (34° 10' S 69° 58' W, 2.450 msnm), a 55 km S de la Central Hidroeléctrica de Las Melosas... en la Cordillera de la Región Metropolitana" is characterized by a  $2n = 32$  (NF = 34) and some subtle morphological differences with *L. micropus* (that, in turn, has a  $2n = 34$ , NF = 36; Spotorno *et al.*, 1998; Teta *et al.*, 2009). More recently, Novillo *et al.* (2009) reported the first record of *L. pikumche* in the Argentinean province of Mendoza and added some putative morphological differences with *L. micropus* to those previously listed by Spotorno *et al.* (1998). As discussed by Cañon *et al.* (2010), the morphological characters documented as differences by Novillo *et al.* (2009) have some degree of variation within populations of *L. micropus* s.s. (e.g., zygomatic plate morphology, lateral profile of nasals, development of posterior palate process; see Hershkovitz, 1962; Steppan, 1995) or were based on misinterpretation of some features (e.g., both specimens studied by Novillo *et al.* [2009] has posteriorly divergent tooththrows, and not only that of *micropus*). Indeed, the distinction of *L. pikumche* was recently put in interdict by Cañon *et al.* (2010) on the base of molecular and morphological evidence. These authors remarked that several putative diagnostic characters (e.g., molar root numbers, incisor orientation, shape of upper incisor dentine fissure) vary within and among populations of *L. micropus* s.s. Further, Cañon *et al.* (2010) suggested that *L. pikumche* may be a junior synonym of *L. m. alsus* (Thomas, 1919).

Additional studies tending to solve the taxonomic status of northern populations of *Loxodontomys*, allowed us to uncover a major, though not yet discussed, issue related to the nature of the type series of *L. pikumche*. The observation of the holotype figures in the original description as well as a recent inspection of the skin, mandible and skull of specimen LCM [Laboratorio de Citogenética, Facultad de Medicina, Universidad de Chile] 1759, selected as the holotype of *pikumche* by Spotorno *et al.* (1998: figure 5), allow us to state that it is a composite. The skin (Fig. 1) is clearly referable to the genus *Loxodontomys* owing to the following characters (cf. Braun, 1993; Steppan, 1995): tail length (shorter than the head and body length), shape and length of ear (rounded and small), and hindfoot morphology (soles naked and slightly scutellated). However, the skull and mandible corresponds to a subadult specimen of *Phyllotis* Waterhouse. In fact, many anatomical traits of skull and mandible of LCM 1759, including the degree of molar hypsodonty, upper third molar reduction, orientation of molar tooththrows, bullae development, degree of anterior expansion of nasal bones and orientation of the condyloid process of the mandible (cf. Steppan, 1995; Fig. 2), are undistinguishable from those of specimens of *P. xanthopygus* (Waterhouse). In addition, at least another specimen (LCM 1761) listed among the hypodigm of *L. pikumche* by Spotorno *et al.* (1998) in the description of *L. pikumche* (1998:362) is referable to the abrotrichine *Chelemys macronyx* (Thomas). In sum, specimens conforming the hypodigm of *L. pikumche* correspond to at least three genera of Sigmodontinae (i.e., *Chelemys*, *Loxodontomys* and *Phyllotis*).

In view of the composite nature of the holotype of *L. pikumche* a nomenclatorial action is needed to solve this issue. The consequences of restricting the name to the skin or to the skull and mandible are markedly dissimilar. The selection of the skull and mandible as the type would imply the need to include *L. pikumche* as subjective junior synonym of *P. xanthopygus*. Meanwhile, the restriction of the name to the skin would allow maintaining it associated to *Loxodontomys*.

We here restrict the name *Loxodontomys pikumche* to the skin of specimen LCM 1759 even when for taxonomic purposes this material might be less informative than the skull and mandible. Our choice is based on different lines of arguments. For nomenclatural stability reasons, we feel that is more appropriate to retain the name *pikumche* allied to

*Loxodontomys*. Second, an exhaustive study of the hypodigm probably allows finding the skull and mandible that match the skin LCM 1759 (see below). In addition, this specimen was figured alive and has an associate karyotype (Spotorno *et al.*, 1998: figures 1 and 4). This karyotype is alike to those reported by Novillo *et al.* (2009) for Argentinean populations of *L. pikumche* (*contra* Cañon *et al.* [2010], who overlooked the different manners in which Novillo *et al.* [2009] and Spotorno *et al.* [1998] counted the number of chromosome arms). The selection of a skin as type in cases of composite specimens had some precedents in the literature (e.g., Musser, 1977). Finally, this kind of act (i.e., the exclusion of some component from a type material) is contemplated by the Art. 73.1.5 of the ICZN (1999). We note that the opposite choice was followed in other cases, including that of the original description of the sigmodontine *Chelemyscus fossor* (Thomas) (see Thomas, 1899).

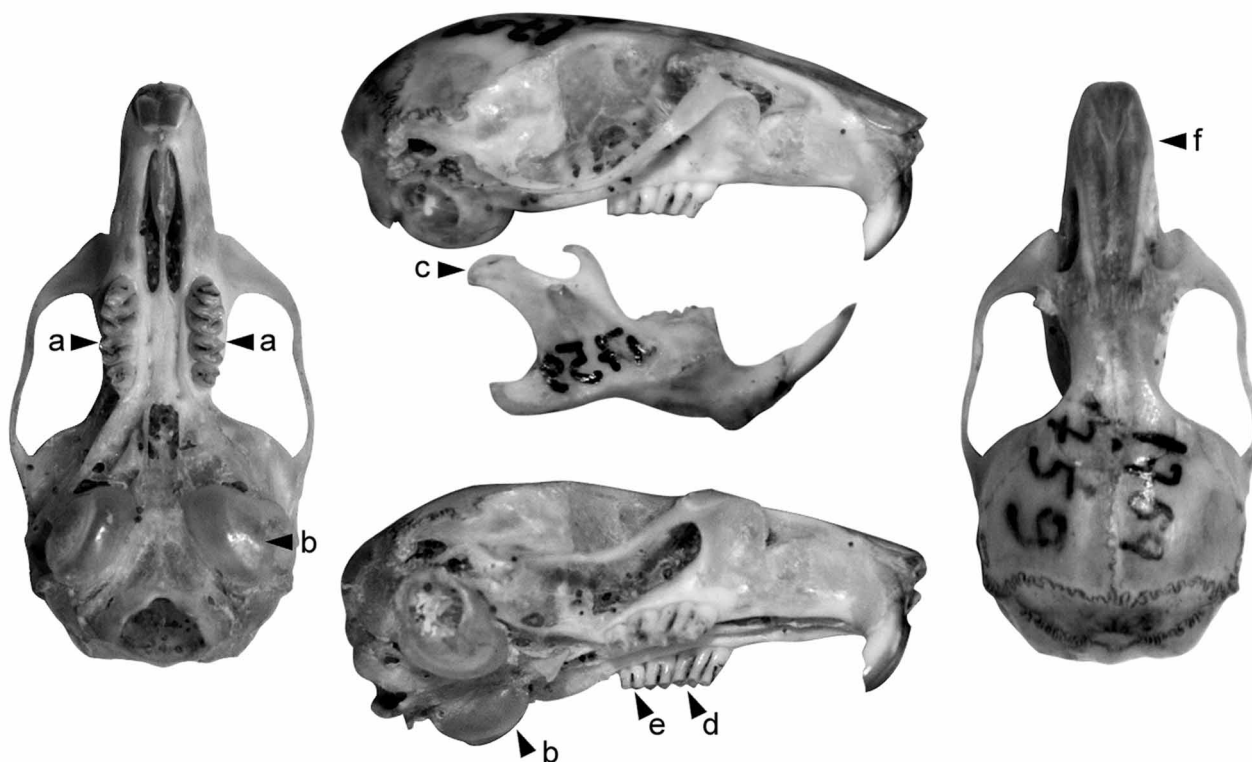


**FIGURE 1.** Dorsal (above), ventral (middle), and lateral (below) views of the skin of the holotype of *Loxodontomys pikumche* Spotorno *et al.*, 1998.

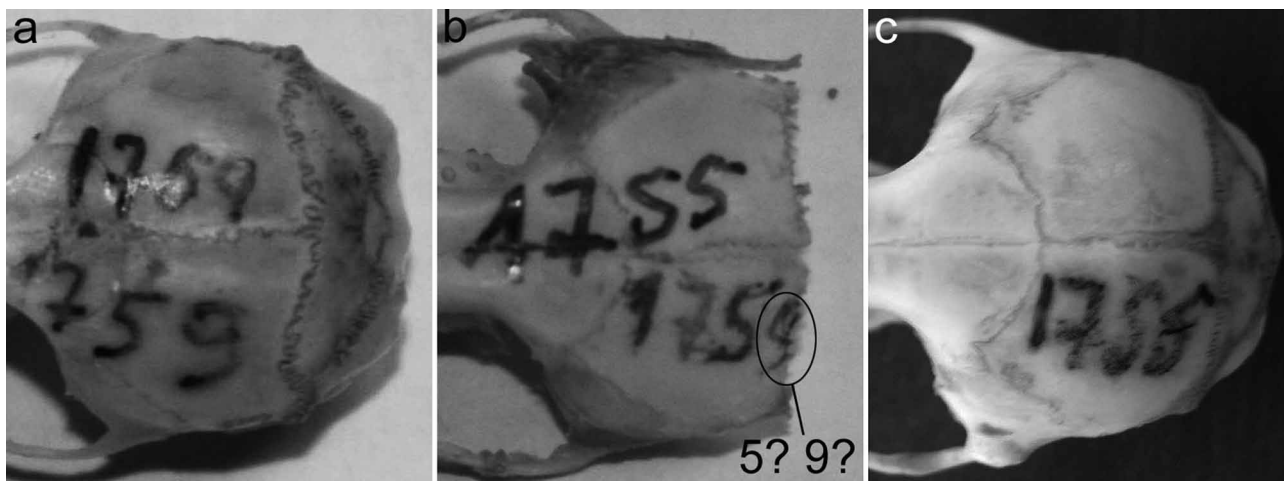
At the LCM mammal holding there are at least two skulls labeled with the number 1755. This is not a minor issue given that one of these two LCM 1755 individuals is the single member of the paratype series of *L. pikumche*. In addition, one of the skulls labeled as LCM 1755, which miss the posterior part, has two handwritten numbers. One of this numbers lies at the posterior border of the leaf parietal, and seems to be incomplete; it looks like the posterior part of the digit was at the now missing portion of the skull (Fig. 3). As such, current last digit “5” of the number 1755 may have originally been a “9” (the final digit of the number assigned to the holotype of *L. pikumche*: 1759). This suggestion implies that the second 1755 number written in that skull would have be a mistake when trying to rewrite a second and complete 1755 number. Of course, this scenario, difficult to probe with the evidence at hand, does not explain the fact that another skull, one of *Phyllotis*, was numbered 1759 as was a skin of *Loxodontomys*.

Notably, the composite nature of the holotype of *L. pikumche* was not detected by the authors at the time of the original description of this taxon (Spotorno *et al.*, 1998) or by subsequent researchers (Novillo *et al.*, 2009; Cañon *et al.*, 2010). This is surprising because the skull of the holotype portrayed by Spotorno *et al.* (1998: Fig. 5) clearly shows the trenchant morphological traits of *Phyllotis*. In this context the recognition of *L. pikumche* as a distinct species of *L. micropus* seems to be mainly based on subtle karyological differences, being the morphologic evidence relegated to a

second plane. We strongly call for a balanced approach integrating different lines of evidence (e.g., Percequillo *et al.*, 2011) in order to refresh and consolidate sigmodontine taxonomy.



**FIGURE 2.** Ventral (left), lateral (middle, above), ventrolateral (middle, below) and dorsal (right) views of the skull and labial view (middle, center) of the left dentary (reversed) of specimen LCM 1759, referred as the holotype of *Loxodontomys pikumche* by Spotorno *et al.* (1998: figure 5). Arrows indicate some morphological differences between *Phyllotis* and *Loxodontomys* (cf. Braun, 1993; Stepan, 1995; Teta *et al.*, 2009): a—parallel molar toothrow (posteriorly divergent in *Loxodontomys*); b—well inflated auditory bullae (slightly inflated); c—mandibular condyle obliquely oriented (more transversely oriented); d—hypsodont molars (hypsodonty much less marked); e—M2 larger than M3 (M2 subequal to M3); f—anterior portion of nasal bones slightly expanded in the anterior third (well expanded).



**FIGURE 3.** a) LCM 1759, skull of the holotype of *Loxodontomys pikumche* (referred in this work as a specimen of *Phyllotis xanthopygus*); b) LCM 1755 (or 1759?), *Loxodontomys pikumche*; c) LCM 1755, a second *Loxodontomys* individual referred to the same number that the previous one.

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Angel E. Spotorno granted us access to the holotype and part of the hypodygm of *Loxodontomys pikumche*. We appreciate the comments made by Michael D. Carleton, Robert S. Voss and two anonymous reviewers to solve this case. Funds for this research were obtained from PICT 2008-0547 (Agencia Nacional de Promoción Científica y Tecnológica) to UFJP and FONDECYT 1110737 to GD.

## Literature cited

- Braun, J.K. (1993) Systematic relationships of the tribe Phyllotini (Muridae: Sigmodontinae) of South America. Special Publication, Oklahoma Museum of Natural History, Norman, 50 pp.
- Cañón, C., D'Elía, G., Pardiñas, U.F.J. & Lessa, E.P. (2010) Phylogeography of *Loxodontomys micropus* with comments on the alpha taxonomy of *Loxodontomys* (Cricetidae: Sigmodontinae). *Journal of Mammalogy*, 91, 1449–1458.
- Hershkovitz, P. (1962) Evolution of Neotropical cricetine rodents (Muridae), with special reference to the Phyllotine Group. *Fieldiana, Zoology*, 46, 1–524.
- ICZN (1999) International Code of Zoological Nomenclature, Fourth edition. International Trust for Zoological Nomenclature, London, 117 pp.
- Musser, G. (1977) *Epimys benguetensis*, a composite, and one zoogeographic view of rat and mouse faunas in the Philippines and Celebes. *American Museum Novitates*, 2624, 1–15.
- Novillo, A., Ojeda, A. & Ojeda, R. (2009) *Loxodontomys pikumche* (Rodentia, Cricetidae) a new species for Argentina. *Mastozoología Neotropical*, 16, 239–242.
- Percequillo, A.R., Weksler, M. & Costa, L.P. (2011) A new genus and species of rodent from the Brazilian Atlantic Forest (Rodentia: Cricetidae: Sigmodontinae: Oryzomyini), with comments on oryzomyine biogeography. *Zoological Journal of the Linnean Society*, 161, 357–390.
- Pine, R.H., Miller, S.D. & Schamberger, M.L. (1979) Contributions to the mammalogy of Chile. *Mammalia*, 43, 339–376.
- Spotorno, A., Cofre, H., Manriquez, G., Vilina, Y., Marquet P. & Walker, L. (1998) Una nueva especie de *Loxodontomys*, otro mamífero filotino en los Andes de Chile central. *Revista Chilena de Historia Natural*, 71, 359–373.
- Steppan, S.J. (1995) Revision of the tribe Phyllotini (Rodentia: Sigmodontinae), with a phylogenetic hypothesis for the Sigmodontinae. *Fieldiana, Zoology, new series*, 80, 1–112.
- Teta, P., Pardiñas, U.F.J., Udrizar Sauthier, D.E. & D'Elía, G. (2009) *Loxodontomys micropus*. *Mammalian Species*, 837, 1–11.
- Thomas, O. (1899) Description of new Neotropical mammals. *Annals and Magazine of Natural History*, (7) 4, 278–288.

## APPENDIX 1.

Specimens examined in this study, originally referred by Spotorno *et al.* (1998) as *Loxodontomys pikumche*: LCM (Laboratorio de Citogenética, Facultad de Medicina, Universidad de Chile, Santiago, Chile) 339 (*L. pikumche*); 1755 (two individuals with the same number, both referable to *Loxodontomys*); 1759 (holotype, here restricted to the skin; the skull and mandible correspond to *Phyllotis* specimen); 1760 (*Loxodontomys*); 1761 (reidentified as *Chelemys macronyx*).