

Didelphimorphia and Rodentia (Mammalia) from Sierras de Tecka and surrounding areas, northwestern Chubut, Argentina

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ABSTRACT: The small mammal fauna from northwestern Chubut Province (Argentina) is poorly known. We herein report small mammal assemblages from three new localities: Sierras de Tecka, an extra-Andean system elevated 900 m.a.s.l.; Estancia La Mimosa on the Tecka river valley (at ca. 650 m.a.s.l.); and Arroyo Pescado (at ca. 620 m.a.s.l.) 40 km north of the other sites. Specimens were recovered from disaggregated owl pellets. Total species richness includes 16 native (13 sigmodontine and two caviomorph rodents, and one marsupial) and one introduced species. Estancia La Mimosa had the highest richness (n = 14), while Arroyo Pescado the lowest (n = 11). Four species were only recorded at Estancia La Mimosa (*Akodon iniscatus*, *Calomys musculus*, *Oligoryzomys longicaudatus* and *Mus musculus*), two in Sierras de Tecka (*Notiomys edwardsii* and *Microcavia australis*) and one in Arroyo Pescado (*Geoxus valdivianus*). This work also adds new localities for *Akodon iniscatus*, *Geoxus valdivianus*, *Lestodelphys halli* and *Notiomys edwardsii* in western Chubut Province.

INTRODUCTION

Argentina can be considered a country with a great number of native mammal species; its diverse topography, climate and vegetation conform to a high environmental diversity (Ojeda *et al.* 2002). Some of these ecosystems are separated by extreme environmental gradients, primarily in precipitation and topography. One of these gradients occurs in northwestern Patagonia (Argentina), where a diverse mosaic of environments appear in less than 50 km, ranging from the Valdivian Temperate Rainforest in the west to the Patagonian Steppe in the east (Pearson and Pearson 1982). In northwestern Chubut Province, the extension and variety of these environments are amplified by the relative low altitude of the Andes (< 2100 m.a.s.l.) and the existence of a mountain chain east of them, the Patagónides, lower in altitude and geologically older (as discussed in Ramos 1999). The Patagónides include the Sierras de Tecka, which are located between 43°00' – 43°30' S, 70°50' – 70°40' W and reach a maximum altitude of 1500 m. Because of these geographically complex conditions, an extended ecotone between forest-steppe ecosystems is formed, which allows for the development of a unique community of small mammals (Pearson 1995).

Despite a few works done in northwestern Patagonia (Pearson 1995; Monjeau *et al.* 1997; 1998; Pardiñas *et al.* 2003), several gaps in the knowledge of small mammal biology, such as their distribution patterns, still persists. The objectives of this work were to study the small mammal composition from new localities in northwestern Chubut Province (Argentina).

MATERIALS AND METHODS

Studied localities

The results of this study come from owl pellet

assemblages that were collected at four sites in northwestern Chubut Province (Argentina), north of the town of Tecka (Figure 1). All sites are located within the limits of the Patagonian Phytogeographic Province (PPP), which has been characterized as a shrubby steppe with *Stipa* spp., *Berberis* spp., *Mulinum spinosum* and *Adesmia campestris* as the dominant plant species (León *et al.* 1998).

Study samples were collected in two nearby (ca. 1000 m apart) locations named Sierras de Tecka 1 (11.7 km NE of Tecka, 43°25'47" S, 70°45'00" W), and Sierras de Tecka 2 (12.8 km NE of Tecka, 43°24'33" S, 70°44'46" W), which were treated as a single locality. We collected 84 complete and 60 fragmented pellets from site 1 (Minimum Number of Individuals = 371 specimens); 29 complete and 40 fragmented pellets from site 2 (MNI = 240 specimens). Two extra mountainous localities were analyzed: Estancia La Mimosa (43°22'44" S, 70°52'54" W) with 155 complete and six fragmented pellets (MNI = 500 specimens) and Arroyo Pescado (43°01'10" S, 70°47'48" W) with 43 complete and 12 fragmented owl pellets (MNI = 142 specimens) (Figure 1). The pellets of all localities were generated by *Tyto alba* and/or *Bubo magellanicus*.

The Sierras de Tecka sites are located at ca. 900 m.a.s.l., where important rocky outcrops and bare soil occurs. The sites also show little anthropogenic impact, but are subject to strong western winds and low temperatures, even in the austral summer (Paruelo *et al.* 1998). Estancia La Mimosa is located at ca. 650 m.a.s.l., in the Tecka river valley, and may be considered an agroecosystem due to the substitution of native to forage vegetation (*e.g.* alfalfa). Arroyo Pescado is also an extra mountainous locality, but unlike Estancia La Mimosa it is not heavily altered by human activities. All the studied localities present a holonetz haplic soil type

(Dijkshoorn and Huting, 2009).

Data collection

Studied materials were recovered from the owl pellets and determined to the finest taxonomic level using keys (Pearson 1995) and comparative specimens deposited at the Mammalogy Section of the Laboratorio de Investigaciones en Evolución y Biodiversidad (LIEB-M) and Museo de la Plata, following the taxonomy of Bárquez *et al.* (2006). All specimens have been deposited at LIEB's Mammalogy Collection, Facultad de Ciencias Naturales, Universidad Nacional de la Patagonia SJB, Esquel, Chubut, Argentina. Collection numbers were assigned to the complete assemblage and not to each mammal specimen recovered (see below). For each sample we calculated the Minimum Number of Individuals (MNI) following Lyman (1994).

RESULTS AND DISCUSSION

We found a total of 17 species of non-volant small mammals from all three localities: one marsupial of the family Didelphidae and 16 rodents, belonging to four families, Cricetidae, Muridae, Caviidae and Ctenomyidae. *Abrothrix olivaceus* was the most abundant species (30.8%), while *Geoxus valdivianus* and *Oligoryzomys longicaudatus* (0.07%) were the most uncommon. These localities represent new records for all species of small

mammals studied at a regional scale (Patagonia *sensu lato*), and include some poorly recorded species at a somewhat local scale (Chubut province, *e.g.*, *Akodon iniscatus*, *Geoxus valdivianus*, *Lestodelphys halli*, *Notiomys edwardsii*).

A total of 12 species of non-volant small mammals were found at both Sierras de Tecka sites (LIEB-M-30E and LIEB-M-31E), including four families: Didelphidae, Cricetidae, Caviidae and Ctenomyidae (Table 1). *Euneomys chinchilloides* (22.3%), *Abrothrix olivaceus* (19.0%) and *Reithrodon auritus* (14.4%) were the most abundant species (Table 1). Several remains of two species with a poorly known distribution in northwestern Chubut Province were also recovered from these samples: *Lestodelphys halli* (Didelphidae), the southernmost living marsupial (Martin *et al.* 2008), and *Notiomys edwardsii* (Cricetidae, Sigmodontinae, Abrotrichini), a rodent known from only three localities in northwestern Chubut (Pardiñas *et al.* 2008).

At Estancia La Mimosa (LIEB-M-33E) species richness was scarcely higher (one more species), and at Arroyo Pescado, lower ($n = 11$), but their composition noticeably different (Table 1). Several fossorial and semi-fossorial species (*e.g.* *Chelemys macronyx*, *Microcavia australis* and *Notiomys edwardsii*) were not registered at Estancia La Mimosa despite the abundant number of owl pellets, but were recorded for Sierras de Tecka and Arroyo Pescado (except *Microcavia australis*). Of these, *M. australis* can be found in both Monte and Patagonian Phytogeographic Provinces (MPP and PPP, respectively), *N. edwardsii* is distributed extensively in the PPP, while *C. macronyx* is typically distributed in Andean and sub-Andean environments (Pardiñas *et al.* 2003). Despite the fact that these habitats are represented at Estancia La Mimosa, the anthropogenic impact generated from the substitution of native to forage vegetation may have influenced ecosystem structure reducing suitable habitats for these species. The species abundance between Estancia La Mimosa and Sierras de Tecka was considerably different, *Abrothrix olivaceus* (43.7%) and *Calomys musculus* (20.1%) being the most represented species in the former. *Euneomys chinchilloides*, a very abundant species at Sierras de Tecka, was poorly represented (0.2%) at Estancia La Mimosa. Four species were only found at Estancia La Mimosa: *Akodon iniscatus*, *Calomys musculus*, *Oligoryzomys longicaudatus* and *Mus musculus* (the last two poorly represented). Records of *A. iniscatus* in northwestern Chubut Province are rare, and separated by a 300 km gap from the nearest known locality (Udrizar Sauthier unpublished data). The new records presented herein barely shorten such a distance to 200 km, and seem to indicate an association between this species and habitats typical of the Subandean District (*sensu* León *et al.* 1998), because most records from northwestern Chubut province fall within this District. The high abundance values obtained for *C. musculus* and the presence of *M. musculus* in this sample, two common species in agroecosystems (Bilenca and Kravetz 1995) may be associated with the intensive human activities developed in the locality.

The most abundant rodents at Arroyo Pescado (LIEB-M-9E) were *A. olivaceus* (35.0%) and *Eligmodontia* sp. (15.5%) (see Table 1). The fossorial *Geoxus valdivianus*, a

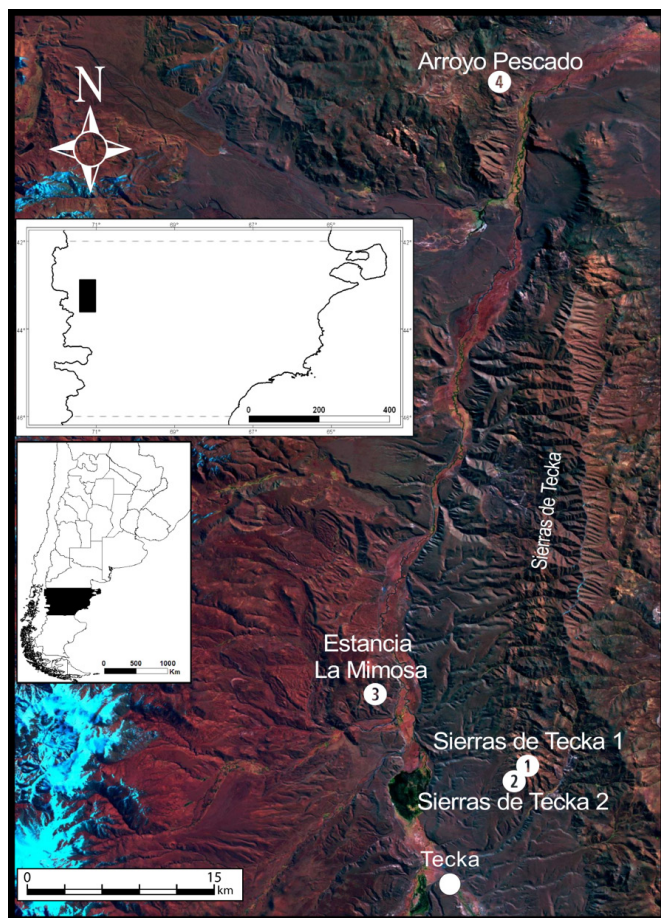


FIGURE 1. Map (satellite image from Instituto Geográfico Nacional, Argentina, corresponding to the topographic charts N° 4372-3-4) showing the Chubut Province in Argentina and the northwestern region of Chubut Province in the left, and the sample localities: (1) Sierras de Tecka 1; (2) Sierras de Tecka 2; (3) Estancia La Mimosa; (4) Arroyo Pescado, in detail.

species associated with forested regions (Osgood, 1943) which are marginally represented by *Nothofagus* spp. in creeks and narrow valleys at this site, was only registered at this locality. Differences in the proportions of *L. halli*, *Loxodontomys micropus* and *Phyllotis xanthopygus* (higher at Arroyo Pescado) and *C. macronyx*, *Ctenomys* sp., *E. chinchilloides* and *R. auritus* (higher at Sierras de Tecka) were found between Sierras de Tecka and Arroyo Pescado (Table 1).

Small mammal richness, composition and abundance differences between the sampled localities could be the

outcome of (amongst other factors): 1) the species which generated the pellet assemblage (e.g. *Tyto alba* and/or *Bubo magellanicus*); 2) the different number of pellets or MNI sampled; or 3) environmental variations between sites at a habitat scale.

This study is one of the first conducted in a poorly known region. Future works in this somewhat environmentally complex area should improve our knowledge of northwestern Patagonian small mammals, providing a better understanding on aspects as basic as their distribution.

TABLE 1. Minimum Number of Individuals (MNI) and relative abundance, expressed as percentage (between parentheses), of small mammals from Sierras de Tecka, Estancia La Mimosa and Arroyo Pescado (Chubut Province, Argentina). Asterisks indicate genera that could not be identified to species level.

TAXA	SIERRAS DE TECKA	ESTANCIA LA MIMOSA	ARROYO PESCADO
DIDELPHIMORPHIA			
Didelphidae			
<i>Lestodelphys halli</i>	3 (0.5)	1 (0.2)	6 (4.2)
RODENTIA			
Cricetidae			
<i>Abrothrix longipilis</i>	47 (7.7)	5 (1)	8 (5.6)
<i>Abrothrix olivaceus</i>	116 (19)	220 (43.7)	50 (35)
<i>Abrothrix</i> sp.*	---	2 (0.4)	---
<i>Akodon iniscatus</i>	---	3 (0.6)	---
<i>Calomys musculus</i>	---	101 (20.1)	---
<i>Chelemys macronyx</i>	25 (4.1)	---	2 (1.4)
<i>Eligmodontia</i> sp.*	60 (9.8)	81 (16.1)	22 (15.5)
<i>Euneomys chinchilloides</i>	136 (22.3)	1 (0.2)	13 (9.2)
<i>Geoxus valdivianus</i>	---	---	1 (0.7)
<i>Loxodontomys micropus</i>	33 (5.4)	5 (1)	13 (9.2)
<i>Notiomys edwardsii</i>	6 (1)	---	---
<i>Oligoryzomys longicaudatus</i>	---	1 (0.2)	---
<i>Phyllotis xanthopygus</i>	24 (3.9)	8 (1.6)	10 (7)
<i>Reithrodon auritus</i>	88 (14.4)	53 (10.5)	13 (9.2)
Undetermined	11 (1.8)	9 (1.8)	1 (0.7)
Muridae			
<i>Mus musculus</i>	---	3 (0.6)	---
Caviidae			
<i>Microcavia australis</i>	2 (0.3)	---	---
Ctenomyidae			
<i>Ctenomys</i> sp.*	60 (9.8)	9 (1.8)	3 (2.1)
Total	611	500	142

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LITERATURE CITED

- Bárquez, R., M.M. Díaz and R.A. Ojeda. 2006. *Mamíferos de Argentina. Sistemática y distribución*. Tucumán: Sociedad Argentina para el Estudio de los Mamíferos. 359 p.
- Bilenca, D.N. and F.O. Kravetz. 1995. Patrones de abundancia relativa en ensambles de pequeños roedores de la región pampeana. *Ecología Austral* 5: 21-30.
- Dijkshoorn, K. and J. Huting. 2009. *Soil and Terrain Database for Argentina*. Wageningen: ISRIC, World Soil Information.
- Leon, R.J.C., D. Bran, M. Collantes, J.M. Paruelo and A. Soriano. 1998. Grandes unidades de vegetación de la Patagonia extra andina. *Ecología Austral* 8: 125-144.
- Martin, G.M., L.J.M. De Santis and G.J. Moreira. 2008. Southernmost record for a living marsupial. *Mammalia* 72: 131-134.
- Monjeau, J.A., R.S. Sikes, E.C. Birney, N. Guthmann and C.J. Phillips. 1997. Small mammal community composition within the major landscape divisions of Patagonia, southern Argentina. *Mastozoología Neotropical* 4:113-127.
- Ojeda, R.A., C.E. Borghi and V.G. Roig. 2002. Mamíferos de Argentina; p. XX-XX In G. Ceballos and J.A. Simonetti (ed.). *Diversidad y Conservación de los Mamíferos Neotropicales*. Mexico City: CONABIO-UNAM.
- Osgood, W.H. 1943. The mammals of Chile. *Field Museum of Natural History, Zoological series* 30:1-268.
- Pardiñas, U.F.J., G. Moreira, C. García Esponda y L.J.M. De Santis. 2000. Deterioro ambiental y micromamíferos durante el Holoceno en el nordeste de la estepa patagónica (Argentina). *Revista Chilena de Historia Natural* 72: 541-556.
- Pardiñas, U.F.J., P. Teta, S. Cirignoli and D.H. Podestá. 2003. Micromamíferos (Didelphimorphia y Rodentia) de norpatagonia extra andina, Argentina: Taxonomía alfa y Biogeografía. *Mastozoología Neotropical* 10: 69-113.
- Pardiñas, U.F.J., D. Udrișar Sauthier, P. Teta and G. D'Elia. 2008. New data on the endemic Patagonian long-clawed mouse *Notiomys edwardsii*

- (Rodentia: Cricetidae). *Mammalia* 72(4): 273-285.
- Pearson, O.P. and A.K. Pearson. 1982. Ecology and biogeography of southern rainforests of Argentina; p. 129-142: M.A. Mares and H.H. Genoways (ed.). *Mammalian Biology in South America. Special publication series, Pymatuning Laboratory of Ecology, University of Pittsburgh* 6: 1-539.
- Pearson, O.P. 1995. Annotated keys for identifying small mammals living in or near Nahuel Huapi National Park or Lanin National Park, Southern Argentina. *Mastozoología Neotropical* 2: 99-148.
- Pearson, O.P. and Christie, M. I. 1991. Sympatric Species of *Euneomys* (Rodentia, Cricetidae). *Studies on Neotropical Fauna and Environment* 26(2): 121-127.
- Ramos, V.A. 1999. Las provincias geológicas del territorio argentino; p. 41-96 In R. Caminos (ed.). *Geología Argentina*. Buenos Aires: Segemar Anales 29.

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