Chinchilla lanigera (Molina 1782) and C. chinchilla (Lichtenstein 1830): review of their distribution and new findings

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Abstract
Chinchilla lanigera (Molina 1782) and C. chinchilla (Lichtenstein 1830): review of their distribution and new findings.— Millions of Chinchilla chinchilla and C. lanigera were killed during the early twentieth century and they were nearly hunted to extinction. In order to establish the current range of distribution of these two wild species and to localize possible new colonies, we used the available scientific literature, technical reports, information from residents, and live trapping methods. Both species are ‘critically endangered’ since their current distribution is highly fragmented and all recognized colonies are small and isolated. We report a small new wild colony of C. lanigera in the Atacama region, Chile.

Key words: Chinchilla, Critically endangered, Distribution, Endemism, New colonies, Chile

Resumen
Chinchilla lanigera (Molina, 1782) y C. chinchilla (Lichtenstein, 1830): revisión de su distribución y nuevas observaciones.— Tanto Chinchilla chinchilla como C. lanigera estuvieron muy cerca de la extinción debido a la caza histórica y masiva de que fueron objeto, y que acabó con millones de ejemplares durante la primera parte del siglo veinte. Para determinar el rango de distribución de estas especies y localizar nuevas colonias, analizamos las publicaciones científicas, los informes técnicos, la información facilitada por personas residentes y los trampeos en vivo. Detectamos una nueva colonia silvestre de pequeño tamaño de C. lanigera en la región de Atacama, Chile. El estado de conservación de ambas especies sería de “en grave peligro de extinción”, ya que la distribución está muy fragmentada y la mayor parte de las colonias detectadas son pequeñas y están aisladas.

Palabras clave: Chinchilla, En grave peligro de extinción, Distribución, Endemismo, Nuevas colonias, Chile

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Introduction

Chinchilla chinchilla (Lichtenstein, 1830), commonly known as the short–tail or Andean chinchilla, is a rodent of the family Chinchillidae. The historical distribution of this chinchilla included the highlands of Chile, Argentina, Peru and Bolivia (Chacón, 1892; Wallé, 1914; House, 1953; Grau, 1986; Jiménez, 1996; Anderson, 1997; Eisenberg & REDford, 2000; Parera, 2002; Woods & Kilpatrick, 2005). C. lanigera (Molina, 1782), on the other hand, is traditionally known as the long–tail or coastal chinchilla, and it is endemic to north–central Chile (Jiménez, 1996; Valladares, 2002; Spotorno et al., 2004a). In the past, however, it had a wider distribution (Grau, 1986; Jiménez, 1996), ranging from the Choapa River (32°S) to north Potrerillos (26°S).

Over seven million chinchilla furs were exported from Chile during the first part of the twentieth century (Albert,1900). However, this represented only one third of the total number of captured chinchillas as many furs were damaged as a result of the hunting methods used and discarded (Albert, 1901). It is therefore estimated that more than twenty million specimens were killed in Chile during this period. Even though both species were considered extinct during the 1960s, C. chinchilla was rediscovered in the highlands of the Antofagasta region in Chile by Spotorno et al. (1998) and C. lanigera was found near Illapel, Coquimbo region, Chile (Mohlis, 1983). More recently, a colony of C. lanigera was documented near La Higuera, North of the Coquimbo region (Spotorno et al., 2004a).

This study presents the new colony of C. lanigera. We also discuss the range of distribution of the two species of chinchillids in northern Chile based on the information available.

Material and methods

To assess the distribution, ecology and conservation status of the two species we analyzed all the scientific information available (e.g. Jiménez 1987, 1989, 1995, 1996; Spotorno et al., 1998; Cortés et al., 2002; Spotorno et al., 2004a, 2004b; Valladares, 2012; Valladares et al., 2012; Tirado et al., 2012; Lagos et al., 2012) in technical and public reports (e.g. Mohlis, 1983; Schlatter et al., 1987; Lagos et al., 2008; Martínez & Cortés, 2011; Povea et al., 2012). We revisited the sites where the chinchilla species have been observed to confirm their presence. Live trapping, feces and hair collection, and cave and pawprint identification were carried out to establish the presence of chinchillas. We describe the microhabitat, vegetation and the presence of other sympatric species of the newly discovered colonies.

Results

According to current scientific literature, C. chinchilla has been documented in restricted areas of Chile, most specifically around El Laco and Morro Negro towns, both near the Llullaillaco volcano, Antofagasta region (Spotorno et al., 1998; Spotorno et al., 2004b; Tirado et al., 2012) and also near the Nevado Tres Cruces National Park and its surroundings, in the Atacama region (Valladares et al., 2012) (fig. 1A). In Argentina it has been documented near the Antofalla, Catamarca (Walker et al., 2007), southwestern Jujuy (OLrog & Lucero, 1981), Salta (Ortiz et al., 2010), La Rioja (Parera, 2002) and northern San Juan (Gajal et al., 1981). In Bolivia, its distribution included the departments of La Paz, Oruro and Potosí (Anderson, 1997). The last wild specimen in this country was captured by residents of Huachacalla, Sabaya, and Caranga (Walle, 1914).

The distribution of C. lanigera includes Las Chinchillas National Reserve (Jiménez, 1995, 1996) in Aucó (about 700 ind/km²) and Quebrada El Cobre (with 4.4 to 72.9 ind/km²; Lagos et al., 2010). Some colonies have been identified outside the limits of the reserve, in the areas of Quebrada Curico and Quebrada El Cuyano (between 17.5–82.6 ind/km² and 12.3 to 58.3 ind/km², respectively; Lagos et al., 2010), while a small and isolated colony of these chinchilla has been found in Corral de Piedras, La Higuera (Spotorno et al., 2004a). No estimate, however, is available on the size of the population.

It appears that C. lanigera inhabited the Atacama region during the first part of the twentieth century, particularly around Vallenar (Wolffsohn, 1923), Quebrada El León (ca. 26° 57′ 34.05″ S, 70° 41′ 31.90″ O) (Gigoux, 1926), and Morro Copiapó (ca. 27° 7′ 51.89″ S, 70° 55′ 48.62″ W) (Gigoux, 1935). According to the literature, they had previously been abundant, but the massive captures were carried out in 1892, and the species was regarded as possibly extinct.

Olave & Monroy (2006) published a photograph taken in 1923 of Pablo Trabucco Onetto, with their breeding of chinchillas captured near Chañaral. Based on this evidence, we thought that finding new colonies in this province was more likely, because local residents mentioned many places where chinchillas were captured at the beginning of the twentieth century. Other authors have mentioned wild colonies of chinchillas in the north of Chile, for instance, in Mejillones (Phillipi, 1880), the Licancabur volcano (Rudolph 1955), and La Ola and Potrerillos (Schlatter et al., 1987). Grau (1986) suggested that both species may have inhabited in sympathy around Potrerillos (north of Atacama region), corresponding to the traditional northern limit of the C. lanigera distribution, and the native southern limit of C. chinchilla (fig. 1A).

A new colony was found by a group of miner–workers in the Atacama region, Chile (26° 55′ 07″ S, 70° 21′ 32″ W). They captured one chinchilla specimen, rescuing it from a group of domestic dogs. The specimen was taken to the Servicio Agrícola y Ganadero (SAG) of Copiapó and examined. It was a C. lanigera adult male, based on its long–tailed proportion (152 mm with hair and 75 mm without hair), the principal diagnostic character of C. chinchilla (with a tail < 110 mm long) (Spotorno et al., 2004b). Later, we visited the locality where this specimen was captured. We found another specimen between large cracked rocks. We identified another
42 points with feces, footprints and/or wallows, nine of which showed recent activity. We roughly estimated a density of some 24.7 to 115.4 ind/km².

This new colony was located 44 km from the coast, inhabiting the middle of an extremely arid hill, approximately 1,150 m in height, and surrounded by extensive dunes of the Atacama Desert (fig. 1B). The vegetation was identified as *Heliotropium sclerocarpum*, *Tetragonia microcarpa*, *Gymnophyllum flexuosum*, *Nolana* sp., and particularly *Eriocyse aurata*, probably the main source of water and food. Some 87% of cactus showed signs of being gnawed by rodents. No other sympatric species were reported, but *Phyllotis darwini* and *Eligmodontia dunaris* have been collected near this area (Valladares, 2012; Spotorno et al., 2013). An owl, *Bubo magallanicus*, was observed as possibly the only predator in the zone, although foxes have occasionally been observed by miners.

Another new colony was reported by the mining company ‘Cerro Blanco’ belonging to White Mountain Titanium Corporation, close to Vallenar, Atacama region. They mentioned in their line base a record of *C. lanigera* in winter, 2012 (http://seia.sea.gob.cl/expediente/expedientesEvaluacion.php?modulo=ficha&id_expediente=7895426).

Regarding *C. chinchilla*, colonies were reported in the Atacama region by the mineral project Salares Lithium Company that was developing a survey of the ‘Salar Norte Mining’ from Gold Fields Salares Norte Company showed a wild specimen (http://seia.sea.gob.cl/documentos/documento.php?idDocumento=8230878). However, the population density of these colonies was not assessed.
Discussion

Based on the available evidence, it seems clear that the past distribution of both wild species was indeed extensive. *C. chinchilla* was distributed in southern Peru, Bolivia, and northern Argentina and Chile (Grau, 1986); nonetheless, it has not been documented in Bolivia, Peru and Argentina in the last 50 years. Furthermore, the colonies identified in Chile are small and restricted to the Antofagasta and Atacama regions. On the other hand, *C. lanigera* is an endemic species occupying an area from Antofagasta to the Coquimbo regions (Grau, 1986). However, after a massive extermination, their distribution became restricted to Las Chinchillas National Reserve (Mohlis, 1983), and to a small colony located in the north of the Coquimbo region (Spotorno et al., 2004a). Both species have been reduced to less than 95% of their original distribution and important biological variables regarding their conservation status have not been assessed in the observed colonies.

The new colony reported here is a small and isolated population, inhabiting small hills surrounded by a vast desert. We were unable to locate any nearby colonies. One possible explanation is that the existing colonies of *C. chinchilla* are extremely small and isolated with respect to other group (Valladares et al., 2012; Lagos et al., 2012). The highly fragmented and small mammalian populations generally have a low genetic diversity and a high level of inbreeding. These factors have consequently reduced their fitness, thereby increasing their risk of extinction (Keller & Waller, 2002). It is imperative to analyze their genetic diversity to compare them with those of the other populations that have low reported values (Spotorno et al., 2004a). Such studies could provide greater insight into what its future conservation needs may be.

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References

Albert, F., 1900. La chinchilla. *Anales de la Universidad de Chile*, 107: 913–934.

– 1901. Datos sobre la chinchilla. *Revista Chilena de Historia Natural*, 5(9): 201–209.

Anderson, S., 1997. Mammals of Bolivia, taxonomy and distribution. *Bulletin of American Museum of Natural History*, 231: 1–652.

Cajal, J. L., Reca, A. A. & Pujalte, J. C., 1981. *La Chinchilla lanigera* en el Registro de Chile. In: *Mammaliana* 3. *Caura, Dacnotherium y Chinchilla lanigera*. Ed. E. E. Gigou, pages 149–155. Ediciones de la Universidad de Chile, Santiago, Chile.

Chacón, J. C., 1892. Descripción Zoológica. In: *Monografía del Departamento de Potosí (Bolivia)*, 8: 197–240. Centro de Estudios, Potosí.

Cofré, H. & Marquet, P. A., 1999. Conservation status, rarity, and geographic priorities for conservation of Chilean mammals: an assessment. *Biological Conservation*, 88: 53–68.

Cortés, A., Miranda, E. & Jiménez, J., 2002. Seasonal food habits of the endangered long–tailed chinchilla (*Chinchilla laniger*): the effect of precipitation. *Mammalian Biology*, 67: 167–175.

Eisenberg, J. F. & Redford, K. H., 2000. *Mammals of the Neotropics*. The Central Neotropics. *Ecuador, Perú, Bolivia y Brazil*. The University of Chicago Press, Chicago.

Gigoux, E. E., 1926. La Quebrada del León (Caldera). *Revista Chilena de Historia Natural*, 30(1): 288–297.

– 1935. El Morro Copiapó. *Revista Chilena de Historia Natural*, 39(1): 253–265.

Grau, J., 1986. La *Chinchilla*. Su crianza en todos los climas. 3ra edición. El Ateneo, Buenos Aires.

House, R., 1953. *Animales salvajes de Chile*. Universidad de Chile, Santiago.

Jiménez, J. E., 1987. Eficiencia relativa de seis modelos de trampa para la captura viva de micromamíferos silvestres, con énfasis en *Chinchilla lanigera* (Molina, 1782). *Medio Ambiente (Chile)*, 8: 104–112.

– 1989. Uso de la técnica de tarjetas ahumadas para evaluar la efectividad de cebos para micromamíferos silvestres, con énfasis en *Chinchilla lanigera*. *Medio Ambiente*, 10: 84–91.

– 1995. Conservation of the last wild chinchilla (*Chinchilla lanigera*) archipelago: a metapopulation approach. *Vida Silvestre Neotropical*, 4: 89–97.

– 1996. The extirpation and current status of wild chinchillas *Chinchilla lanigera* and *C. brevicaudata*. *Biological Conservation*, 77(1): 1–6.

Keller, L. F. & Waller, D. M., 2002. Inbreeding effects in wild populations. *Trends in Ecology and Evolution*, 17(5): 230–241.

Lagos, V., Rodrigo, J., Cortés, I., Fuenzalida, R., Silva, J., Segovia, R. & Saavedra, B., 2010. Catálogo de los mamíferos de Chile, incluyendo chinchillas (*Chinchilla lanigera*). *Biological Conservation*, 348: 32–38. Corporación Nacional Forestal, Santiago, Chile.

Lagos, N., Villalobos, R. & Iriarte, A., 2012. Nuevos registros de poblaciones de chinchilla de cola corta, *Chinchilla brevicaudata* en el abanico de la Cordillera de los Andes. *Bolletin del Museo de Historia Natural (Chile)*, 61: 191–196.

Lichtenstein, M. H. C., 1830. *Eriomys chinchilla* Licht. le Chinchilla–Wollmaus. In: *Darstellung der neuerdings durch eine besondere Stelle mitbestellte Quellen, Verhandlungen und Beschreibungen von eine und ander Art aten auf fünfzehn Coloritriangen der Stadtwahl* Tübingen, *Museum der Königlichen Akademie der Wissenschaften* Heft 5, palte 28, plus 2 unnumbered pages of text.
Molin, J. I., 1782. Saggio sulla storia naturale del Chipili. Stamperia di S. Tommaso d’Aquino, Bologna.

Olave, N. & Monroy, O., 2006. Chañaral, imágenes del pasado. Catálogo. Primera edición, Talleres AMF, Ciudad de Chañaral, Región de Atacama, Chile.

Olrog, C. C. & Lucero, M. M., 1981. Guía de los mamíferos argentinos. Ministerio de Cultura, Fundación Miguel Lillo, Tucumán, Argentina.

Ortúzar, A., 2002. Los mamíferos de la Argentina y la región austral de Sudamérica. Editorial El Ateneo, Buenos Aires.

Philippi, R. A., 1860. Viaje al desierto de Atacama. Halle em Sajonia, Librería Autum.

Povea, P., Lara, C., Cortés, S., Rodríguez, J. & Saavedra, B., 2012. Zonificación de colonias de Chinchilla en Quebrada El Cuyano. Corporación Nacional Forestal. Documento de Trabajo. Oficina Provincial Choapa, Región de Coquimbo, Coquimbo.

Rudolph, W., 1955. Licancabur: mountain of the Atacameños. Geographic Review, 45: 151–171.

Schlatter, R., Murúa, R. & Oltremari, J., 1987. Diagnóstico de la situación actual de la fauna silvestre (aves y mamíferos) más característica que habita entre la II y VII Región administrativa de Chile. Corporación Nacional Forestal (CONAF), DPE/CHI/83/017, Documento de trabajo, Santiago de Chile.

Spotorno, A. E., Valladares, P., Martínez, P. & Cortés, S., 2011. Prospección de colonias de chinchillas (Chinchilla laniger) en Quebrada Curico, Comuna de Llamea. Corporación Nacional Forestal, Departamento de Áreas Silvestres Protegidas, Región de Coquimbo, Documento de Trabajo.

Spotorno, A. E., Zuleta, C. A., Valladares, P., Deane, A. L. & Jiménez, J. E., 2004b. Chinchilla laniger. Mammalian Species, 758: 1–9.

Spotorno, A. E., Zuleta, C. A., Walker, L. I., Manríquez, G., Valladares, P. & Marin, J. C., 2013. A small, new gerbil–mouse Igla modesta (Rodentia: Cricetidae) from dunes at the coasts and deserts of north–central Chile: molecular, chromosomal, and morphological analyses. Zootaxa, 3853(4): 377–394.

Tirado, C., Cortés, A., Miranda–Urbina, E. & Carretero, M. A., 2012. Trophic preference in an assemblage of mammal herbivores from Andean Puna (Northern Chile). Journal of Arid Environments, 79: 8–12.

Valladares, P., 2002. Divergencia Molecular de las Especies Silvestres y Cepas Domesticadas del Género Chinchilla (Rodentia: Chinchillidae) Basada en el gen para citocromo b. Mastozoología Neotropical, 9: 96–98.

– 2012. Mamíferos terrestres de la Región de Atacama. Comentarios sobre su distribución y estado de conservación. Gayana, 76(1): 13–28.

Valladares, P., Espinoza, M., Torres, M., Díaz, E., Zeller, N., De la Riva, J., Grimberg, M. & Spotorno, A., 2012. Nuevo registro de Chinchilla chinchilla (Rodentia, Chinchillidae) para la Región de Atacama. Extensión de su rango de distribución y estado de conservación. Mastozoología Neotropical, 19(1): 173–178.

Walker, R. S., Novaro, A. J., Perovic, P., Palacios, R., Donadio, E., Lucherini, M., Pia, M. & López, M. S., 2007. Diets of three species of Andean carnivores in high–altitude deserts of Argentina. Journal of Mammalogy, 88(2): 519–525.

Walle, P., 1914. Bolivia, its people and its resources, its railways, mines, and rubber–forest. T. Fisher Unwin, London.

Wolffsohn, J. A., 1923. Medidas máximas y mínimas de algunos mamíferos chilenos colectados entre los años 1896 y 1917. Revista Chilena de Historia Natural, 1: 159–167.

Woods, C. A. & Kilpatrick, C. W., 2005. Infraorder Hystrixognathi. In: Mammal Species of the World. A Taxonomic and Geographic Reference, Third Edition, Vol. 2, 1538–1600 (D. E. Wilson & D. M. Reeder, Eds.). The Johns Hopkins University Press, Baltimore, U.S.A.