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Paula Marín-Vial · Daniel González-Acuña · Juan L. Celis-Diez · Pedro E. Cattán · Alberto A. Guglielmone

## Presence of *Ixodes neuquenensis* Ringuelet, 1947 (Acari: Ixodidae) on the endangered Neotropical marsupial Monito del monte (*Dromiciops gliroides* Thomas, 1894, Microbiotheria: Microbiotheriidae) at Chiloé Island, Chile

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**Abstract** The presence of *Ixodes neuquenensis* (Ringuelet, *Notas Mus la Plata* 12:207–216, 1947) (Acari: Ixodidae) parasitizing populations of *Dromiciops gliroides* Thomas, 1894 (Microbiotheria: Microbiotheriidae) at Chiloé Island confirms that this tick species is established in Chile. No preference of the ticks for sex or age of the host was observed.

**Keywords** Ticks · Marsupials · Ectoparasites · Chile

### Introduction

The “Monito del monte”, *Dromiciops gliroides* (Microbiotheria: Microbiotheriidae), is the only living species of the Order Microbiotheria and considered a fossil of the

South American fauna (Hershkovitz 1999). This small and rare mouse opossum is an endemic marsupial of the temperate rainforests of South America which extends along the Pacific rim in Chile and adjacent parts of Argentina and in western Neuquén and southwestern Río Negro provinces. These rainforests hold endemic and endangered flora and fauna (Armesto et al. 1998). In addition, this marsupial has an enigmatic origin, being closely related to Australian marsupials rather than the highly diversified American ones (Kirsh et al. 1991). *D. gliroides* is confined to southern South America, from Talca province (region VII, ca. 35°30') to Chiloé Island (region X, ca. 44°00') in Chile and east to Argentina near Lago Nahuel Huapi (Hershkovitz 1999; Saavedra and Simonetti 2001; Lobos et al. 2005). *D. gliroides* is a tree climber species with nocturnal habits, associated to southern genus *Nothofagus* (Fagaceae) and *Chusquea* bamboo (Jiménez and Rageot 1979). According to IUCN, this species is threatened due to habitat loss, and its population has declined over the previous years (Nowak 1999). Its parasites are also consequently at risk of extinction (Guglielmone et al. 2004).

In continental Chile, *D. gliroides* was found infested with the fleas *Chiliopsylla allophyla* Rothschild 1908 and *Plocopsylla diana* Beaucournu et al. 1986 (Beaucournu and Gallardo 1991, 1992). In Argentina, Ringuelet (1947) presents a description of the holotype female of *Ixodes neuquenensis* on *D. gliroides*, and Guglielmone et al. (2004) recently described the nymph and larvae and re-described the female of *I. neuquenensis*, collected from *D. gliroides* in Llao-Llao Reserve (Río Negro, Argentina). González-Acuña and Guglielmone (2005) previously concluded that, if *I. neuquenensis* was endemic to *D. gliroides*, this parasite–host interaction could also be found in Chile. In this paper, we present information that supports such inference together with additional information on the *D. gliroides*–*I. neuquenensis* relationship at Chiloé Island.

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## Materials and methods

The study area is located northeast of Chiloé Island, Ancud city (41°50' S, 73°36' W). This area is characterized by a wet temperate weather with a strong ocean influence. The annual mean temperature is 12°C, with monthly maximum and minimum means of 16°C (January) and 5°C (July), respectively (Aravena et al. 2002). The rainfall amount is 2,000–2,500 mm yearly, with a dry period during January–February (Di Castri and Hajek 1976). The present-day rural landscape is characterized by a mosaic of remnant forest fragments, woodlands, and grazing pastures in rolling hills with altitudes ranging from 50 to 100 m (Aravena et al. 2002).

The physiognomy of these temperate rainforests is characterized by a multi-layer canopy, with large emergent trees such as *Nothofagus nitida* (Nothofagaceae), *Eucryphia cordifolia* (Eucryphiaceae), *Saxegothea conspicua* (Podocarpaceae), and *Aextoxicon punctatum* (Aextoxicaceae) and large amounts of dead logs biomass and stump covered with epiphytes and vines. The understory is quite abundant, composed of trees, shrubs, and bamboo (Aravena et al. 2002).

Captures of *D. gliroides* were carried out during February to March 2005 at two old-growth forest fragments located in the northeastern area of the island. One of the sites was located inside the private protected area of the “Fundación Senda Darwin” (41° 52' S, 73° 40' W) and the second one was in Fundo “Los Cisnes” located in Bahía Caulín (41° 50' S, 73° 36' W). To capture *D. gliroides* individuals, Tomahawk-like traps (baited with banana) were used as *D. gliroides* are not prone to be caught with Sherman-like traps (Kelt and Martínez 1989). The traps were set up on tree branches at a minimum height of 1 m and disposed in 10×10 grid, with ten lines of 100 m each and 10 m distance between traps. The trapping period was performed in two occasions in both study sites for 15 and 10 nights, respectively (trapping effort=1,500 and 1,000 traps/night, respectively). Each trap was checked daily between 06:00 and 08:00 A.M. To avoid re-sampling, the animals captured were tagged with a 2-mm-long aluminum tag on the right ear, identified according to sex (i.e., female or male) and age (i.e., juvenile or adult), weighed, and finally tick specimens collected. After 10 min of handling, the animals were released at the same capture site.

The site of attachment on the body of the animal was recorded for each tick. All specimens were immediately preserved in 70% alcohol. The description and redescription

of *I. neuquenensis* by Guglielmone et al. (2004) were used to confirm the specific status of the ticks.

Exact Fisher’s test was applied to test differences in tick parasitism on *D. gliroides* in relation to sex and age. Tick abundance according to sex and age was also evaluated with a non-parametric ANOVA for ranking data (Sokal and Rohlf 1995).

## Results and discussion

Twenty seven (40.3%) from a total of 67 captured *D. gliroides* were infested with *I. neuquenensis* (Table 1). *I. neuquenensis* is the only tick ever reported from *D. gliroides*. A total of 56 larvae, 10 nymphs, and 3 female ticks were collected; 87% of them were observed attached to the ears or nearby. These results confirm the hypothesis proposed by González-Acuña and Guglielmone (2005); *I. neuquenensis* is a tick species present in Chile.

No significant differences were found in tick prevalence according to the sex or age of the hosts (Fisher  $P=0.66$ ). The abundance of *I. neuquenensis* in relation to sex (males vs females  $F_{1,63}=0.85$ ,  $P=0.39$ ) and age (juveniles vs adults  $F_{1,63}=0.57$ ,  $P=0.45$ ) were also non-significant, as well as the interaction between the two mentioned variables ( $F_{1,63}=44.25$ ,  $P=0.70$ ).

These results show that *I. neuquenensis* is quite abundant at the study site but independent of the age and sex of its hosts in contrast to observations in Argentina where ticks were only observed on male hosts (Guglielmone et al. 2004). The male of *I. neuquenensis* remains still unknown. This probably means that this tick species is nidicolous with a non-parasitic male which mates female(s) of the host. An alternative explanation could be that this tick species is parthenogenetic. Further sampling of *D. gliroides*’ nests may provide data about the existence of *I. neuquenensis* males. Larvae, nymphs, and female ticks were found at the same time of the year, indicating that this tick needs at least 3 years to complete its life cycle.

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**Table 1** Prevalence of infestation of 67 *D. gliroides* by the tick *I. neuquenensis*

Sex	Age						Total		
	Juvenile			Adult					
	Total	Positive	%	Total	Positive	%	Total	Positive	%
Female	17	5	29.4	10	4	40	27	9	33.3
Male	24	10	41.6	16	8	50	40	18	45.0
Total	41	15	36.6	26	12	46.2	67	27	40.3

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## References

- Aravena JC, Carmona MR, Pérez CA, Armesto JJ (2002) Changes in tree species richness stand structure and soil properties in a successional chronosequence in northern Chiloé Island, Chile. *Rev Chil Hist Nat* 75:339–360
- Armesto JJ, Rozzi R, Smith-Ramírez C, Arrollo MTK (1998) Conservation targets in South American temperate forest. *Science* 282:1271–1272
- Beaucournu JC, Gallardo MH (1991) Catalogue provisoire des puces du Chili (Insecta; Siphonaptera) (1ère partie). *Bull Soc Fr Parasitol* 9:237–270
- Beaucournu JC, Gallardo MH (1992) Catalogue provisoire des puces du Chili (Insecta; Siphonaptera) (2ème partie). *Bull Soc Fr Parasitol* 10:93–130
- Beaucournu JC, Gallardo MH, Launay H (1986) Puces (Siphonaptera) nouvelles ou peu connues du Chili: description de *Plocopsylla diana* n. sp. (Stephanocircidae). *Ann Parasitol Hum Comp* 61:359–366
- Di Castri F, Hajek ER (1976) Bioclimatología de Chile. Editorial de la Universidad Católica de Chile, Santiago
- González-Acuña DA, Guglielmone AA (2005) Ticks (Acari: Ixodidae: Argasidae, Ixodidae) of Chile. *Exp Appl Acarol* 35:147–163
- Guglielmone AA, Venzal JM, Amico G, Mangold AJ, Keirans JE (2004) Description of the nymph and larva and redescription of the female of *Ixodes neuquenensis* Ringuelet, 1947 (Acari: Ixodidae), a parasite of the endangered Neotropical marsupial *Dromiciops gliroides* Thomas (Microbiotheria: Microbiotheriidae). *Syst Parasitol* 57:211–219
- Hershkowitz P (1999) *Dromiciops gliroides* Thomas, 1894. Last of the Microbiotheria (Marsupialia), with a review of the Family Microbiotheriidae. *Fieldiana Zool* 93:1–60
- Jiménez J, Rageot R (1979) Notas sobre la biología del “Monito del Monte” (*Dromiciops australis* Philippi 1893). *An Mus de Hist Nat Valparaiso (Chile)* 12:83–88
- Kelt DA, Martínez D (1989) Notes on the distribution and ecology of two marsupials endemic to the Valdivian forests of southern South America. *J Mammal* 70:220–224
- Kirsh JAW, Dickerman AW, Reig OA, Springer MS (1991) DNA hybridization evidence for the Australasia affinity of the American marsupial *Dromiciops gliroides*. *Proc Natl Acad Sci USA* 88:10465–10469
- Lobos G, Charrier A, Carrasco G, Palma RE (2005) Presence of *Dromiciops gliroides* (Microbiotheria: Microbiotheriidae) in the deciduous forests of central Chile: range expansion and comments on its conservation status. *Mamm Biol* 70:376–380
- Nowak RM (1999) *Walkers mammals of the world*, 6th edn. The John Hopkins University Press, Baltimore
- Ringuelet R (1947) La supuesta presencia de *Ixodes brunneus* Koch en la Argentina y descripción de una nueva garrapata *Ixodes neuquenensis* nov. sp. *Notas Mus la Plata* 12:207–216
- Rothschild NC (1908) A new flea from Chili. *Rev Chil Hist Nat* 13:104–106
- Saavedra B, Simonetti JA (2001) New records of *Dromiciops gliroides* (Microbiotheria: Microbiotheriidae) and *Geoxus valdivianus* (Rodentia: Muridae) in central Chile: their implications for biogeography and conservation. *Mammalia* 65:96–100
- Sokal RR, Rohlf FJ (1995) *Biometry*, 3rd edn (editorial). Freeman, San Francisco, USA, p 896