Philodryas chamissonis (Reptilia: Squamata: Colubridae) preys on the arboreal marsupial *Dromiciops gliroides* (Mammalia: Microbiotheria: Microbiotheriidae)

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Abstract

Philodryas chamissonis, the Chilean long-tailed snake, is a diurnal predator mainly of *Liolaemus* lizards, but also of amphibians, birds, rodents and juvenile rabbits. *Dromiciops gliroides* (Colocolo opossum) is an arboreal marsupial endemic of temperate rainforest of southern South America. Little information is available about this marsupial's biology and ecology. Here we report the predation of one Colocolo opossum by an adult female *P. chamissonis* in a mixed *Nothofagus* forest, composed mainly by *N. dombeyi, N. glauca* and *N. alpina* trees, in the "Huemules de Niblinto" National Reserve, Nevados de Chillán, Chile. Since these two species have different activity and habitat use patterns, we discuss how this encounter may have occurred. Although it could just have been an opportunistic event, this finding provides insights into the different components of food chains in forest ecosystems of Chile.

Keywords: long-tailed snake, diet, monito del monte, predation, Chile.

Philodryas chamissonis (Reptilia: Squamata: Dipsadidae) predando o marsupial arborícola *Dromiciops gliroides* (Mammalia: Microbiotheria: Microbiotheriidae)

Resumo

Philodryas chamissonis, cobra de cauda comprida ("Culebra de cola larga"), é uma cobra diurna, predadora principalmente de lagartos do gênero *Liolaemus*, mas também de anfíbios, aves, roedores e coelhos jovens. *Dromiciops gliroides* (colocolo) é um marsupial arborícola endêmico das florestas temperadas do sul da América do Sul. Há pouca informação disponível sobre a biologia e a ecologia deste marsulpial. É reportada, neste estudo, a predação de um colocolo por uma fêmea adulta de *P. chamissonis,* em uma floresta mista de *Nothofagus*, composta principalmente por árvores *N. dombeyi, N. glauca* e *N. alpina*, na Reserva Nacional de Huemules de Niblinto, Nevados de Chillán, Chile. Uma vez que estas duas espécies possuem diferentes padrões de atividade e de uso de habitat, discute-se como este evento poder ter ocorrido. Embora este possa ter sido apenas um evento oportunístico, o achado fornece novas informações sobre os diferentes componentes da cadeia alimentar nos ecossistemas florestais do Chile.

Palavras-chave: cobra, dieta, monito del monte, predação, Chile.

1. Introduction

Members of the genus *Philodryas* (Serpentes: Dipsadidae) typically feed on amphibians, reptiles, birds, and small mammals (Hartmann and Marques, 2005; López and Giraudo, 2008; Quinteros-Muñoz et al., 2010). However, there appears to be ontogenic differences in the diet, the young snakes preying only on ectothermic prey and adult snakes including endothermic prey (Greene and Jaksic, 1992; López and Giraudo, 2008).

The long-tailed snake *P. chamissonis* (Wiegmann, 1835) is widely distributed across Chile (29-39° S, 0-2,200 m.a.s.l.), inhabiting dry places and slopes of hills in open areas and in forests (Donoso-Barros, 1966). It is a diurnal predator principally of iguanas of the genus *Liolaemus* (Donoso-Barros, 1966; Medel et al., 1990; Greene and Jaksic, 1992), but also feeds on amphibians, birds, and mammals, such as rodents and juvenile rabbits (*Oryctolagus cuniculus* (Linnaeus, 1758); Greene and Jaksic, 1992).

The Colocolo opossum (*Dromiciops gliroides* Thomas, 1894) is an arboreal marsupial, endemic to temperate rain forests of southern Chile and Argentina (Iriarte, 2008; Martin, 2010), and the sole living representative of the order Microbiotheria (Mann, 1978). Apart from

this unique feature, few studies provide information regarding the opossum' biology and ecology (Mann, 1978; Bozinovic et al., 2004; Muñoz-Pedreros et al., 2005; Amico et al., 2009; Fontúrbel et al., 2010; Nespolo et al., 2010; Smith-Ramírez et al., 2010)

To our knowledge, consumption of Chilean forest marsupials by Chilean snakes has not been documented. Here, we describe the predation of a Colocolo opossum by a *P. chamissonis* in the Andean forest of the Nevados de Chillán, Chile.

2. Material and Methods

On January 13, 2007, we found one dead *P. chamissonis* (Weight: 99.5 g; Snout vent length: 743 mm.) on a path near a mixed *Nothofagus* forest in the "Huemules de Niblinto" National Reserve (36° 43' 34" S and 71° 30' 56" W), Nevados de Chillán, Chile. The forest was composed of *Nothofagus dombeyi*, *N. glauca*, *N. alpina*, *Embothrium coccineum*, and *Lomatia hirsuta* trees, shrubs as *Pernnetia mucronata, Berberis* spp., and bamboo vegetation (*Chusquea* spp.). Additionally, fallen logs and ground mosses were abundant.

The specimen was an adult female and showed no obvious signs of injury or physical damage. The snake had a flare in the anterior third of the body, and we concluded that the animal had recently fed. When we opened the stomach with a knife, we found a whole Colocolo opossum with signs of digestion (see Figure 1a). Initially, the animal was recognized by the species characteristics (e.g., general shape, fur, prehensile tail; Mann, 1978) (see Figure 1b). Subsequently, its identification was confirmed by laboratory analysis of the skull, jaws, and teeth. From dental characteristics, the animal was a young *D. gliroides* (Weight: 15 g). Both specimens were deposited in the Zoology Collection of the Veterinary Sciences Faculty at Universidad de Concepción, Chillán, Chile (ZCVUC 123, 124).

3. Results and Discussion

The consumption of a Colocolo opossum by a long-tailed snake is intriguing because these two species appear to have different activity, space use, and habitat use patterns. The long-tailed snake is a diurnal predator (Donoso-Barros, 1966; Mella, 2005) while the Colocolo opossum is a nocturnal marsupial (Greer, 1965; Kelt and Martínez, 1989; Iriarte, 2008). In addition, the long-tailed snake has been described as having terrestrial habits (Donoso-Barros, 1966; Mella, 2005) while the Colocolo opossum as being an arboreal marsupial (Osgood, 1943; Kelt and Martínez, 1989).

According to the habitat use, the long-tailed snake tends to inhabit hot and dry sites in thickets and forest edges (Donoso-Barros, 1966; Ortiz et al., 1994; Mella, 2005). In contrast, the Colocolo opossum usually inhabits well-protected sites within the forest (Osgood, 1943; Greer, 1965; Kelt and Martínez, 1989; Martin, 2010). Thus, the encounter of these species seems unlikely to occur. However, some authors have affirmed that the long-tailed snake has the ability to climb trees (Donoso-Barros, 1966; Mella, 2005). In fact, Escobar and Vukasovic (2003) observed these snakes climbing trees to prey on eggs and nests of birds (e.g. *Aphrasthura spinicauda* (Gmelin, 1798)). This suggests that the long-tailed snake may have found a burrow or nest of Colocolo opossum in its raids in the trees. It is also possible that some nest with Colocolo opossum' young had accidentally dropped to the ground and the long-tailed snake captured it.

Although it is an arboreal species, the Colocolo opossum can occasionally use the forest floor for refuge or to build its nest under fallen logs (Osgood, 1943; Mann, 1978). Additionally, some individuals may also use cavities in isolated trees in open areas near forest patches (RAF, pers. comm.). The logs on the ground, particularly those near forest edges, are usually occupied by long-tailed snakes in forest sites (RAF, pers. comm.), increasing the vulnerability of those prey that share the same microhabitat. It should be noted that the Colocolo opossum is the prey of native terrestrial carnivores such as the gray fox (*Lycalopex griseus* (Gray, 1837); Martínez et al., 1993; Rau et al., 1995; Zúñiga et al., 2008) and the Darwin's fox (*Lycalopex fulvipes* (Martin, 1837); Jaksic et al., 1990; Elgueta et al.,

Figure 1. Predation of the arboreal marsupial *Dromiciops gliroides* by *Philodryas chamissonis*. Sample of *D. gliroides* in the stomach of *P. chamissonis* (a). Skull of *D. gliroides* showing the degree of digestion (b).

2007). They probably capture these marsupials scratching and exploring the fallen logs on the edge or inside the forest.

The predation of a Colocolo opossum by a long-tailed snake, even though it may be an opportunistic event, may reflect the potential links between the different components of food chains in forest ecosystems of Chile. Quantitative studies are needed to elucidate the impact of the long-tailed snake predation on the Colocolo opossum.

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