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First report of complete ophiophagy and cannibalism in the wild and captivity for the Chilean Long-tailed Snake *Philodryas chamissonis* (Wiegmann 1835) (Squamata, Dipsadidae)

Primer reporte de ofiofagia completa y canibalismo en vida silvestre y en cautiverio para la Serpiente de Cola Larga de Chile *Philodryas chamissonis* (Wiegmann 1835) (Squamata, Dipsadidae)

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Abstract. Ophiophagy, or predation on snakes, is a common behavior in snakes. Specifically, predating on the same species (i.e. cannibalism) or attempts thereof have been recorded for many species. This has been reported in three species of the *Philodryas* genus, recently including *Philodryas chamissonis*. Most of the species of the genus *Philodryas* have a generalist diet and ophiophagy is a common finding in snakes that have this type of diet. *Philodryas chamissonis* is a Chilean endemic snake that presents a very extreme latitudinal distribution, which might play a role in its generalist habits and prey choices. *P. chamissonis* mainly feeds on reptiles and amphibians, and here we report the first case of successful ophiophagy and cannibalism in the wild and in captivity.

Keywords: generalist species, feeding habits, herpetophagia

Resumen. La ofiofagia, o depredación sobre serpientes, es un comportamiento común en serpientes. Específicamente, la depredación sobre la misma especie (canibalismo), o intentos de ella, se ha registrado en varias especies. Esto ha sido reportado en tres especies del género *Philodryas*, recientemente incluyendo *Philodryas chamissonis*. La mayoría de las especies del género *Philodryas* presentan una dieta generalista y la ofiofagia es un hallazgo común en serpientes que presentan este tipo de dieta. *Philodryas chamissonis* es una serpiente endémica de Chile que presenta una distribución latitudinal muy extrema, lo que podría influir en sus hábitos generalistas y en la elección de diversas presas. *P. chamissonis* se alimenta principalmente de reptiles y anfibios. En este estudio, reportamos el primer caso de ofiofagia y de canibalismo exitosos en la naturaleza y en cautiverio.

Palabras clave: especies generalistas, hábitos alimenticios, herpetofagia

Ophiophagy (feeding on snakes) is a common behavior for some Neotropical snakes such as *Anilius* Linnaeus 1758, *Boiruna* Boulenger 1896, *Clelia* Daudin 1803 and *Micrurus* Wagler 1824, as some species of these genera have preferences for longer prey

(Martins and Oliveira 1998, Pinto and Lema 2002). While some snake species have specialist ophiophagous diets, other species will also consume snakes as part of a generalist or opportunistic diet, such as some species of the genus *Philodryas* (Brongersma 1957, Hartmann

and Marques 2005, Mesquita and Borges-Nojosa 2009, Winck et al. 2012).

Usually, species of the genus *Philodryas* have a generalist diet, feeding on small mammals, squamate reptiles, amphibians (anurans), and birds (Thomas 1976). In the genus *Philodryas*, ophiophagy has been observed in three species. *Philodryas nattereri* Steindachner 1870 has been observed feeding on *Oxybelis aeneus* (Wagler 1824) (Mesquita and Borges-Nojosa 2009), and performing cannibalism (Coelho-Lima et al. 2021). *Philodryas olfersii* (Lichtenstein 1823) has been observed preying on *Bothrops* sp., *Chlorosoma viridissimum* (Linnaeus 1758) and other unidentified snake species (Hartmann and Marques 2005, Winck et al. 2012, Brongersma 1957, Thomas 1976).

Very recently, a failed attempt at cannibalism was reported for the Chilean Long-tailed Snake, *Philodryas chamissonis* (Wiegmann 1835) (Olivares and Olivares 2021), a widely distributed (26°S-40°S) endemic Chilean snake, and here we report the first successful ophiophagous predations in this species. Due to its extensive distribution, this species inhabits a very diverse set of habitats and altitudes (0-2500 m) (Sallaberry-Pincheira et al. 2011, Demangel 2016). Their generalist diet is based on lizards, amphibians, small mammals and birds, as well as reptile eggs (Greene and Jaksic 1992). On January 14th, 2009, at 12:35 pm at Sitio Prioritario N° 55 Acantilados de Quirilluca (-32.694722°S, -71.455000°W, Datum WGS84, altitude = 56 m), Valparaiso Region, an event of ophiophagy was recorded for *P. chamissonis*. The event involved an adult specimen swallowing a smaller snake on a designated path used by visitors for ecotourism. The individual did not move and continued to swallow the smaller snake, while the visitors and the guides in charge left the area without interfering with the action (Fig. 1).



Figure 1: Adult individual of *Philodryas chamissonis* predating on another snake, likely of the same species at Parque Ambiental Acantilados de Quirilluca, Chile. Photograph by Rinaldo Verdi.

In this region only two species of snakes are described: *P. chamissonis* and *Tachymenis chilensis* (Schlegel 1837) (Chilean Short-tailed Snake) (Mella 2017). These two species are morphologically distinct and can be easily distinguished in the field. The color pattern of both *P. chamissonis* is opposite to that of *T. chilensis*. The former has a vertebral dark longitudinal band, while the latter has a vertebral light longitudinal band followed by to perivertebral dark bands (Donoso-Barros 1962). Furthermore, the tail of *P. chamissonis*, as its common name states, is longer (1/3 of the total length), than the tail of *T. chilensis* (1/6 of the total length). Due to the fact that the observers were partaking in ecotourism activities and did not want to disturb the snake, they did not get close enough to see the dorsal area of the tail of the prey that was being swallowed. However, by evaluating the photographs taken, it is possible to

assume that the prey was another individual of *P. chamissonis* since the cloacal scale is visible in the photographs and the tail appears to be too long for *T. chilensis*.

Aside from this case in the wild, we also report a case of cannibalism of *Philodryas chamissonis* in captivity. In a zoo located in the Metropolitan Region, Chile, two individuals of *P. chamissonis* were housed in a naturally designed terrarium for two years. One day during the year 2009, only one individual was found in the enclosure, presenting a larger girth than usual (Fig. 2A). Following a radiograph, the evidence of the ophiophagy was evident, as a snake skeleton could be observed inside the living snake (Fig. 2B).



Figure 2: (A) Photograph of an individual of *Philodryas chamissonis* maintained in captivity with a large individual of the same species in its digestive tract. (B). Radiograph of snake maintained in captivity with evidence of another individual in its digestive tract. Photographs by Sebastian Celis-Diez.

In conclusion, we present the first records of successful ophiophagy and cannibalism for *P. chamissonis*. While Olivares and Olivares (2021) reported the first case of failed ophiophagy and cannibalism in the species, here we compliment the data by showing two cases of successful cannibalism in *P. chamissonis*. Feeding habits of herpetofauna are usually obtained by anecdotal data, and increasing this knowledge is key to further understand trophic webs in nature. Moreover, this data is important for *ex situ* conservation efforts, since our reports suggest that maintaining two or more individuals of this species together in one enclosure should be avoided.

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