

Summer food habits of the patagonian opossum, *lestodelphys halli* (thomas, 1921), in southern arid Patagonian shrub-steppes

Hábitos alimenticios estivales de la comadreja patagónica, *lestodelphys halli* (Thomas, 1921), en el sureste de la estepa patagónica

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ABSTRACT

The summer diet of the Patagonian opossum *Lestodelphys halli* was studied in Argentinean southern Patagonia. Faeces of opossums captured alive and stomach contents from dead animals were collected and analyzed. A wide variety of invertebrates (87.2% frequency of occurrence) followed by birds and reptiles (10.64%) occurred both in faeces and stomachs, and fruits were occasionally consumed. Although the Patagonian opossum was reported as a carnivorous species in captivity, feeding mainly on rodents, reptiles, birds and invertebrates, we did not find remains of rodents in the diet of the opossums. We suggest that Patagonian opossums are not an efficient rodent predator in the wild. The high consumption of invertebrates, reptiles, birds and fruits during the warmer season when these items are abundant reflects the opportunistic behavior of this species.

RESUMEN

Estudiamos la dieta estival de la comadreja patagónica *Lestodelphys halli* en el sureste de la Patagonia Argentina, por medio del análisis de contenidos estomacales provenientes de animales muertos y de fecas. Encontramos una gran variedad de invertebrados (87,2% de frecuencia de ocurrencia) seguido de aves y reptiles (10,64%) tanto en estómagos como en fecas. Los frutos fueron escasos en la dieta. En cautividad, la comadreja patagónica se alimenta fundamentalmente de roedores, reptiles, aves e invertebrados. Sin embargo, no encontramos restos de roedores en la dieta de la comadreja. Sugerimos que la comadreja patagónica no es un predador eficiente de roedores en estado silvestre. El alto consumo de invertebrados, reptiles, aves y frutos durante el verano, cuando estos ítems son abundantes, refleja el comportamiento oportunista de esta especie.

The Patagonian opossum, *Lestodelphys halli* is a small (70-100g) solitary mouse opossum of night habits that is endemic from Argentina. It inhabits the most xeric and cold environments of Patagonia and the Mendoza province (Redford & Eisenberg 1992; Parera 2002; Martin 2008). Patagonian opossums have been suggested to be opportunistic predators feeding mainly on insects, small rodents, reptiles and birds (Parera 2002), and the most predaceous member of its family due to the characteristics of its cranium (Thomas 1921). A recent study of their feeding preferences in captivity showed that Patagonian opossums preferred raw meat and live animals (mice, lizards and beetles) over vegetables and fruits (Martin & Udrizar

Sauthier 2011). Their findings support the generalization of Santori *et al.* (1995), who proposed that most Neotropical opossums, mainly the smaller species, may show a marked preference for insects, while larger ones may be rather omnivorous. Whether the Patagonian opossum, a species that inhabits clearly distinct habitats from the rest of the American marsupials (with the exception of some species of *Thylamys*, Martin 2008, Martin & Udrizar Sauthier 2011), follows this pattern in the wild is unknown, since the diet of this species has not yet been reported. We present the first quantitative study of the diet of the Patagonian opossum in the wild. Moreover, the population we studied inhabits the southernmost known locality of its geographical range in

the southern Patagonian steppes.

We conducted our fieldwork in four different areas of the Monumento Natural Bosques Petrificados (MNB, 47°40'S; 67°60'W) and two surrounded ranches: Laguna Manantiales (47°56'S, 68°27' W), and Las Piedras (47°51'S, 68°05'W), all of them belonging to Deseado Department in Santa Cruz province. The whole area corresponds to the phytogeographical Patagonian province, Central district (León *et al.* 1998). The vegetal cover of this shrub-steppe, locally known as "erial", usually does not exceed 50%. The dominant tussock grass species are *Stipa humilis*, *S. ibari*, *S. speciosa* and *S. neaei*, whereas the dominant shrub species are *Nassauvia glomerulosa*, *Chuquirga aurea*, *Acantholippia seriphoides*, *Lycium chilense*, *Azorella caespitosa*, *Mulinum microphyllum*, *Verbena tridens*, *Colliguaja sp.*, *Prosopis denudans* and *Berberis sp.* (León *et al.* 1998). The weather is dry and cold, with frequent frosts. Mean annual temperatures are about 10°C, with highest temperatures during summer (30°C for January and February) and lowest during autumn and winter (-10°C from May to July). Annual rainfall ranges between 100 and 200 mm.

During the summer of 2006, 2007 and 2011, we placed three trapping grids in each of six sites separated between 15 and 20 km. Trapping-grids consisted of squared arrays of 49 Sherman traps (23 x 7 x 9-cm) operated during five successive nights. The traps had cotton bedding and were baited with a mixture of peanut butter, raisins, green apple and fat. We collected the feces of Patagonian opossums from traps (20 faeces from a total of 22 captured and marked opossums), and also the stomach and gut contents of three dead animals. One of these individuals died during trapping sessions, and the others were found while walking the area. In the laboratory we washed the faeces, stomachs and guts over a 1-mm mesh, examined them under a light microscopy and identified the remains of the different prey by comparing them with our own reference collection. Diet results were expressed as the number of occurrences and also as the frequency of occurrence of different prey types (number of occurrences of a particular prey type divided by the total number of occurrences of all prey types).

The summer diet of the Patagonian opossum in southern Patagonia was dominated by invertebrates (87.2% frequency of occurrence of arthropods, including insects and arachnids), together with a lower consumption of vertebrates (birds and reptiles, 10.64 %). Fruits were occasionally consumed (2.13%, Table 1). We also found hairs of Patagonian opossum in two feces, which could be attributable to grooming, a behavior reported by Martin & Udrizar Sauthier (2011). Among insects, coleopterans belonging to Tenebrionidae, Carabidae and Crisomelidae

families were the main prey items, with a frequency of occurrence of 40.4%. Orthopterans and lepidopterans had lower occurrences in the diet. Regarding arachnids, scorpions belonging to the Bothriuridae family were also important in the opossum diet with a 27.6% of frequency of occurrence, followed by spiders and solifuges (Table 1). Small lizards of the genus *Liolaemus*, together with passerine birds, one of them identified as *Cistothorus platensis* constituted the vertebrate prey items in the diet (Table 1). Rests of fruit (*Berberis sp.*) were only present in one of the feces (Table 1).

According to our results, the Patagonian opossum in our area behaves as an opportunistic carnivorous species feeding on a wide variety of invertebrates, and vertebrates, as was suggested by Parera (2002). Our findings support the results about feeding preferences of opossums in captivity obtained by Martin & Udrizar Sauthier (2011) and further suggest the Patagonian opossum is primarily a carnivorous species. The similarity between feeding preferences in captivity and food habits in nature has previously been demonstrated by Astúa de Moraes *et al.* (2003) for 12 Neotropical opossums. The term carnivory for the Patagonian opossum includes both faunivory (vertebrate consumption) and insectivory (invertebrate consumption) as often occurs with carnivorous marsupials (Hume 2003), although insectivory tends to be the domain of smaller species (Jones 1997).

Birney *et al.* (1996) and Martin & Udrizar Sauthier (2011) described the mechanisms used by the Patagonian opossum for killing and consuming rodents (*Abrothrix olivaceus* and *Eligmodontia typus*) in captivity. They noted the opossum ability to capture, handle and consume rodents that were up to half their weight. We kept in captivity two juvenile opossums (11 and 12 g) for 8 hours before being released in the field. They exhibited great voracity when fed with an adult dead *E. typus*, beginning the consumption of the rodent by the soft parts of the head, as was described by Martin & Udrizar Sauthier (2011). This behavior suggests that young opossums may be familiar with rodent consumption. Conflicting evidence arises from our own data: although *A. olivaceus* and *E. typus* were the most abundant rodent species in our captures both from the MNB and the surrounding ranches (authors, unpublished data), we did not find remains of rodents in the diet of the opossums. On one hand, we suggest that Patagonian opossums are not such an efficient rodent predator in the wild. On the other hand, the lack of rodents in the diet could just reflect the opportunistic behavior of this species. In fact, our samples were from the warmer season, when changes are produced in Patagonian steppes offering new resources for predator and prey, mainly reptiles, arthropods and fruits (Zapata *et al.* 2007). The relative proportions of these items in the diet could reflect their availabilities, as must be expected in

opportunistic foragers, such as the Patagonian opossum. We ignore whether rodents make a regular part of the opossum diet in other seasons and in other sites of its distribution. Nevertheless, Albanese *et al.* (2012) found that the desert mouse opossum (*Thylamys pallidior*), a didelphid species inhabiting in the Monte desert in Mendoza province, Argentina, did not change the proportions of the main prey consumed (arthropods and plant material) despite the strong variability and seasonality of this arid environment.

Finally, didelphids are considered effective seed dispersers both in tropical and temperate forests of South America (Cáceres 2004; Lessa & da Costa 2010 and references therein, but see Martins *et al.* 2006). It is possible that our sample was too small to detect consumption of fruits of plant species other than *Berberis sp.*, and to assess the possible role of the Patagonian opossum as a seed disperser in arid Patagonia.

TABLE 1. Occurrence (OC) and frequency of occurrence (FO) of the different taxa found in faeces (n = 20) and stomach and gut contents (n = 3) of the Patagonian opossum (*Lestodelphys halli*) in southern Patagonian shrub-steppes.

TABLA 1. Ocurrencias (OC) y frecuencia de ocurrencia (FO) de los diferentes taxones encontrados en las fecas (n = 20) y contenidos estomacales e intestinales (n = 3) de la comadreja patagónica (*Lestodelphys halli*) en el sureste de la estepa patagónica

Prey item	OC	FO (%)
VERTEBRATES		
Passerine birds		
<i>Cistothorus platensis</i>	1	2.13
Unidentified passerine	1	2.13
Reptiles		
<i>Liolaemus spp.</i>	2	4.26
Unidentified lizard	1	2.13
INVERTEBRATES		
Arthropoda		
Arachnida		
Solifugae	1	2.13
Araneae	4	8.51
Scorpionidae	13	27.6
Insecta		
Coleoptera		
Tenebrionidae	8	17.4
Carabidae	1	2.13
Crisomelidae	1	2.13
Unidentified coleoptera	9	19.17
Orthoptera	2	4.26
Lepidoptera (larvae)	1	2.13
Unidentified insect	1	2.33
FRUITS		
Fruit		
<i>Berberis sp.</i>	1	2.13
Total prey	47	100

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