NATURAL HISTORY OF *MICROCAVIA NIATA* IN THE HIGH ANDEAN ZONE OF NORTHERN CHILE

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We document the first record of *Microcavia niata* in the high Andes of northern Chile near the border of Bolivia. This species is restricted to bog habitats where it principally feeds on grasses and aquatic plants. Its basal metabolic rate was 0.689 ± 0.1 ml O_2 g^{-1} h^{-1}. Two colonies were studied, each possessing 15 and 17 individuals, and characterized by female-biased sex ratios. Individuals reacted aggressively against the intrusion of non-colony members and elicited alarm calls under risk of predation.

Key words: ***Microcavia niata*, Chile, natural history, metabolism**

The South American rodents of the family Caviidae have been relatively well studied regarding their ecology and natural history. In particular, the reports of Cabrera (1953, 1961), Rood (1970, 1972), Lacher (1981), and Mares and Ojeda (1982) have contributed substantially to our knowledge of these rodents. Several species still remain poorly known, *Microcavia niata* being one of the least known. The Caviidae are represented in Chile by three species; *Microcavia australis* in southern Patagonia, and both *Galea musteloides* and *Cavia tschudii* in northernmost Chile (Mann, 1978; Pine et al., 1979). Herein, we report for the first time the occurrence of *Microcavia niata* in Chile, with specific data regarding habitat, diet, bioenergetics, and behavior.

MATERIALS AND METHODS

We first encountered this species near the village of Enquelga (19°13′S, 68°48′W; 3,850 m; Fig. 1) in the Chilean part of the High Andean Plateau (Altiplano) in 1985 (February). During that expedition, a colony of 30 individuals was found at the center of a high-altitude bog along a water course. During a second expedition to this locality in 1990 (February) we did not observe any individuals in this area, but found additional colonies in a bog area 1 km ESE, near the neighboring village of Colchane (19°17′S; 3,730 m; ca. 10 km E of the previous site; Fig. 1). Here we observed the daily activity of two colonies and captured by hand all individuals of one colony. The information provided below is derived from this second locality. We measured the basal rate of metabolism of six individuals (mass, $\bar{X} \pm SD = 255.2 \pm 40.5$ g) in metabolic chambers at ambient temperature (27–30°C), using a modified closed automatic system (Bozinovic and Rosenmann, 1988). Diet analysis was performed on feces from five individuals (all members of the same colony) and from samples of feces from seven different colonies, following procedures outlined by Meserve (1981). Samples were pooled since no apparent differences among colonies or between juveniles and adult individuals were observed.

RESULTS AND DISCUSSION

Identification was based on comparisons with museum specimens of *Galea muste-*

loides, Microcavia australis, and *Cavia tschudii.* Identification was based on external (pelage color) and cranial characteristics (eye rings, incisor color, dental pattern), which easily separate *M. niata* from the above-mentioned species. Additional comparisons were made with the type specimens of *M. niata* and *Microcavia shiptoni* deposited in the British Museum of Natural History and *M. shiptoni* specimens deposited in the Museo Argentino de Ciencias Naturales. Since the original description of this species by Thomas (1898), which was based on individuals captured at Esperanza, near Mount Sahama, Department of Oruro, Bolivia, and of *M. niata pallidor,* from Pampa Aullaga, Department of Oruro, Bolivia, no further records have been provided in the literature. However, Pearson (1951) considered the possible presence of this species in the highlands of southern Peru and northern Chile. Aspects of its natural history have not been reported.

Microcavia niata, previously known only from the Bolivian High Andean Plateau, is restricted in Chile to bogs at 3,700–4,000 m (Fig. 2). This open and azonal vegetational formation is the focus of human settlements and domesticated camelids and sheep herds (Gundermann, 1984). Bogs are composed of hard cushions of Juncaceae (*Oxychloe andina, Distichia muscoides, Patosia clandestina*), associated with herbs (*Hypsella reniformis, Astragalus bustillosii, Eleocharis albibracteata, Arenaria barbata*), and several species of *Werneria* and *Deyeuxia.* In the water courses that drain these bogs, species of *Mimulus, Ranunculus, Liolaeopsis,* and *Myrtophyllum* were abundant (Villagran et al., 1983). *M. niata* resides in shrubby areas, in contrast to habitats occupied by *G. musteloides* and *M. australis* (Mares et al., 1981; Rood, 1970, 1972). At Colchane, we observed several colonies of *M. niata* in close proximity to colonies of *Ctenomys.* Apparently, *M. niata* occupied abandoned burrow systems of *Ctenomys,* as reported for *G. musteloides* (Mann, 1978; Pearson, 1951). In fact, the museum tag of

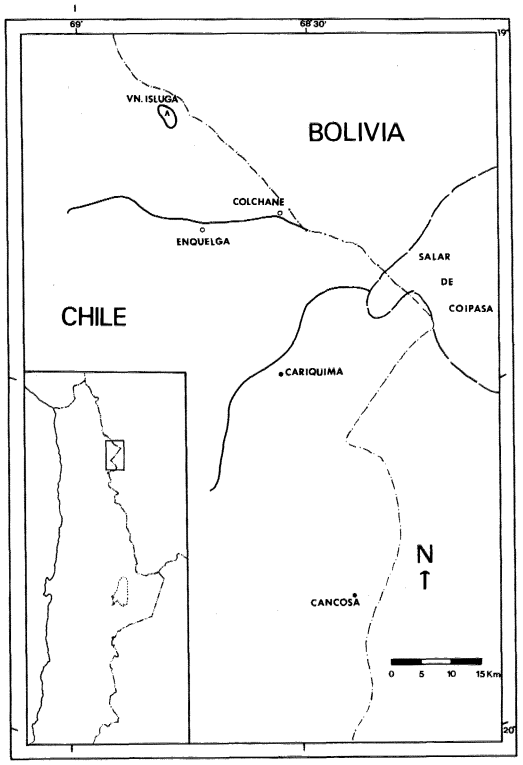

FIG. 1.—Localities where *Microcavia niata* has been collected (open circles) in Chile, 1985–1990.

one of the specimens of *M. niata* examined (BMNH 22281) read "in abandoned *Ctenomys* burrows." *M. niata* lacks well-developed morphological features associated with digging activities (strong forelimbs, claws, incisors), adaptive in penetrating the hard cushion cover of bogs. Within bogs, colonies of *M. niata* and *Ctenomys* were found in areas located 0.5–1 m above the water level. Colonies of *Ctenomys* also were observed in xeric, upland area devoid of vegetation adjacent to the bog habitat.

The diet of *M. niata* consists of herbs, primarily those of the genera *Eleocharis, Distichlis, Werneria,* and *Deyeuxia,* and aquatic plants such as *Liolaeopsis* (Table 1), all abundant in bogs (Villagran et al., 1983). Most plant species consumed by *M. niata* are restricted to bog communities, which suggests that this rodent is restricted to such habitats.

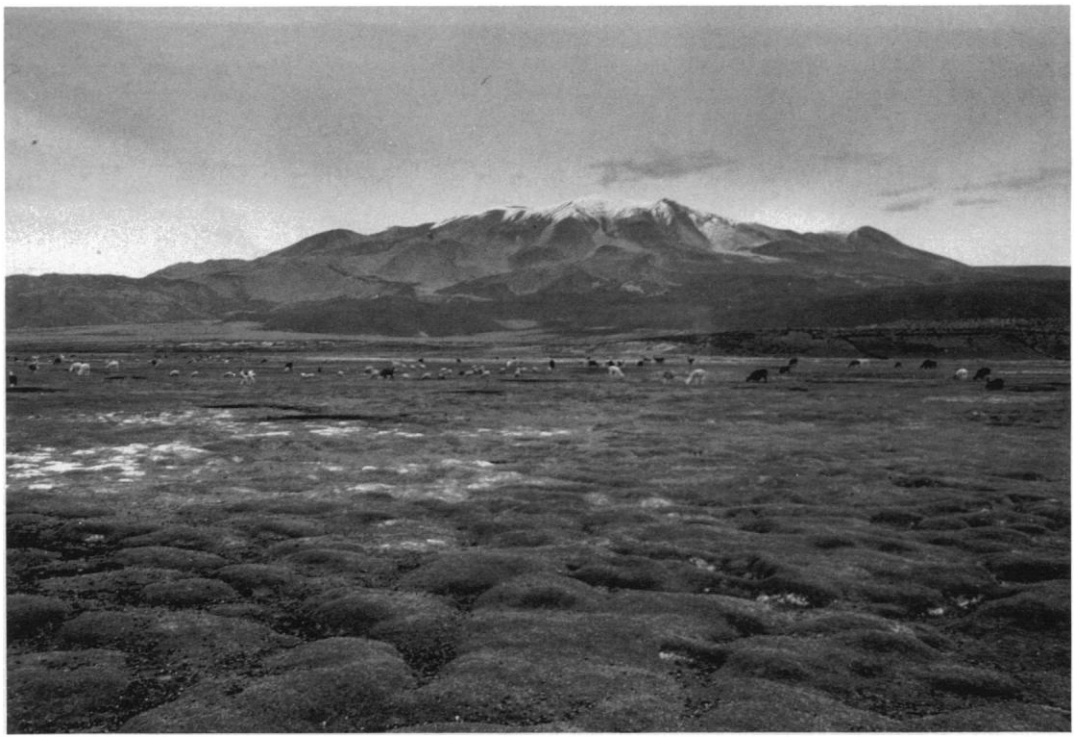

FIG. 2.—Habitat inhabited by *Microcavia niata*. Corresponding to high-Andean bogs 3,850 m above sea level.

The basal metabolic rate was determined as 0.689 ± 0.143 ml O_2 g^{-1} h^{-1}, a figure equivalent to 80.6% of the expected rate according to Kleiber's (1961) equation. This relatively low basal rate, a characteristic shared with sciurid rodents, may be a consequence of the low caloric content and nutritional value of the food of *M. niata* (McNab, 1986).

TABLE 1.—*Diet composition of* Microcavia niata *expressed as percentage volume and frequency of occurrence based on feces from seven colonies near the Bolivian border in northern Chile (*n = *40; number of feces analyzed).*

Item	Volume (%)	Frequency (%)
Eleocharis albibracteata[a,b]	43.0	70.5
Distichlis sp.[a,b]	31.1	81.0
Werneria pygmea[a,b]	12.7	29.2
Liolaeopsis andina[a]	4.4	15.8
Deyeuxia sp.[a,c]	3.0	10.4
Hipochoeris taraxacoides[a,b]	2.4	10.2
Unidentified	3.3	21.9

[a] Leaf fragments.
[b] Stem fragments.
[c] Flower fragments.

The trapping of an entire colony of *M. niata* ($n = 15$) allowed us to make inferences on colony structure. Body mass ranged from 81 to 380 g ($\bar{X} \pm SE = 174 \pm 25.7$; $n = 15$); the smallest was a lactating individual and the largest was a pregnant female with one embryo in each uterine horn. The sex ratio was 5 males: 10 females. This figure differs significantly from the expected 1 : 1 ratio (Chi-square test, $P < 0.01$). There was a similar number of juveniles ($n = 8$; three males and five females) and adults ($n = 7$; two males and five females). We considered nonscrotal males, and imperforate females as juveniles. In general, juveniles weighed < 190 g. A nearby colony, located 10 m east across a small pond from the colony de-

scribed above, had 17 individuals. A third colony located at the periphery of the bog had only four.

We observed the activity and behavior of individuals belonging to two colonies of *M. niata* throughout an 11-h period. Observations were made on 8 February 1990 from 0810 to 1905 h at roughly 1-h intervals The area occupied by each colony was ca. 0.01 ha, with 15 and 17 individuals each. The percentage of individuals active above ground decreased with time of day from 100% at 0900 h to <50% at 1900 h. Typically, resting periods were interrupted by bouts of foraging, exploration, and social interactions (mainly grooming). Neither sexual (Rood, 1970) nor agonistic behaviors were seen among members of the same colony. However, individuals of a given colony were highly territorial and reacted aggressively to intrusions by individuals of a different colony by chasing them out (the same reaction against a non-colony member was observed in caged individuals). The most conspicuous behavior was elicited by intrusion of potential predators (humans) or other local species (camelids). In three periods, one of us slowly walked toward a colony aiming at inducing a reaction from its members. The first reaction was clearly evidenced at a distance of 50 m from the colony area; at this distance individuals in the periphery returned to the center of the colony in apparent response to alarm calls of conspecifics. Once the intruder was near the colony center, some individuals entered into burrows while others remained at the burrow entrances, adopting an upright posture with the head pointed in the direction to the stimulus. Individuals could remain immobile in this posture for several minutes if the potential predator remained immobile at 50 m without approaching the colony. In general, alarm-callers entered burrows after other individuals, and only when the intruder was in close proximity to the colony. Members of the caged colony produced a great variety of sounds; some adults produced an aggressive teeth chattering; juveniles emitted a contact signal (sound) toward their parents.

It is surprising that this species heretofore remained unreported for Chile, despite its being so conspicuous. This is probably related to its relative scarcity (the villages of Colchane and Enquelga are, to date, the only localities in the country). The lack of ecological reports for Bolivian populations of *M. niata* make comparison impossible at the moment.

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