

Eligmodontia morgani (Rodentia: Cricetidae)

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Abstract: *Eligmodontia morgani* Allen, 1901, is a sigmodontine rodent commonly known as the western Patagonian laucha. A small, delicate, arid-adapted rodent, it is 1 of 7 currently recognized species in the genus *Eligmodontia*. The species occurs in the semiarid steppe habitat of western Patagonia of Argentina and Chile. *E. morgani* is listed as “Least Concern” by the International Union for Conservation of Nature and Natural Resources.

Key words: Argentina, Chile, gerbil mouse, laucha, Patagonia

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 Synonymies completed 1 June 2011
 DOI: 10.1644/916.1

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Eligmodontia F. Cuvier, 1837

Eligmodontia F. Cuvier, 1837:168. Type species *Eligmodontia typus* Cuvier, 1837, by monotypy.

Mus: Waterhouse, 1837:19. Part, not *Mus* Linnaeus, 1758.

Mus (*Calomys*): Waterhouse, 1837:21. Part, not *Mus* Linnaeus, 1758.

Elygmodontia Wiegmann, 1838:388. Incorrect subsequent spelling of *Eligmodontia* F. Cuvier, 1837.

Heligmodontia Agassiz, 1846[1847]:136, 175. Unjustified emendation of *Eligmodontia* F. Cuvier, 1837.

Elygmodontia Agassiz, 1846[1847]:136, 175. Unjustified emendation of *Eligmodontia* F. Cuvier, 1837.

Elimodon Wagner, 1841:125. Unjustified emendation of *Eligmodontia* F. Cuvier, 1837.

H[esperomys]: Wagner, 1843. Part.

[*Hesperomys*] (*Calomys*): Thomas, 1884:449. Part.

Eligmodon: Thomas, 1896:307. Unjustified emendation of *Eligmodontia* F. Cuvier, 1837.

Phyllotis: Thomas, 1902:225. Part, not *Phyllotis* Waterhouse, 1837.

CONTEXT AND CONTENT. Order Rodentia, suborder Myomorpha, family Cricetidae, subfamily Sigmodontinae, tribe Phyllotini. Within *Eligmodontia* 7 species are currently recognized: *E. bolsonensis*, *E. dunaris*, *E. hirtipes*, *E. moreni*, *E. morgani*, *E. puerulus*, and *E. typus*. The following key was developed from characteristics provided by Osgood (1943), Mann (1978), Díaz (2000), Mares et al. (2008), and Spotorno et al. (2013).

- | | |
|--|--------------------|
| 1. Soles of feet densely haired | 2 |
| Soles of feet relatively hairless or only lightly haired .. | 3 |
| 2. Found in the Andean region of northern Chile and northwestern Argentina | <i>E. puerulus</i> |
| Found in the Patagonian region of southern Argentina and adjacent Chile | <i>E. morgani</i> |
| 3. Venter white with hairs gray basally | <i>E. typus</i> |
| Venter immaculate white with hairs white to the base | 4 |
| 4. Tail bicolored and tufted | <i>E. moreni</i> |
| Tail light or unicolored, not bicolored, and without tuft | 5 |



Fig. 1.—An adult male *Eligmodontia morgani* from Parque Nacional Laguna Blanca, Neuquén. Used with permission of the photographer R. A. Ojeda.

5. Body size small, average total length < 140 mm; length of hind foot < 20 mm *E. dunaris*
 Body size larger, average total length > 170; length of hind foot > 20 mm 6
6. Length of tail > length of head and body; found only in Catamarca Province, Argentina *E. bolsonensis*
 Length of tail ≤ length of head and body; found in the Andean region of western Bolivia, northern Chile, and extreme northwestern Argentina *E. hirtipes*

***Eligmodontia morgani* Allen, 1901**
Western Patagonian Laucha

Eligmodontia morgani Allen, 1901:409. Type locality “Arroya [= Arroyo] Else, Patagonia” (see “Nomenclatural Notes”).

Eligmodontia elegans morgani: Osgood, 1943:199. Name combination.

Eligmodontia typus morgani: Cabrera, 1961:484. Name combination.

CONTEXT AND CONTENT. Context as for genus. *Eligmodontia morgani* is monotypic (Musser and Carleton 2005).

NOMENCLATURE NOTES. The species’ description was “based on a large series of specimens collected at or near Cape Fairweather” (Allen 1901:410); Allen (1905:53) later clarified the locality as “Basaltic Cañons, 50 miles southeast of Lake Buenos Aires, Patagonia,” Santa Cruz Province, Argentina, noting that the locality was given as Arroyo Else on the labels and in the original description.

Eligmodontia morgani pamparum was described by Thomas (1913:572) with a type locality of “Peru Station F. C. P., about 200 kilometres N. W. of Bahia Blanca,” La Pampa Province, Argentina. The locality is outside of the currently recognized range of *E. morgani* and near that of *E. elegans* (a synonym of *E. typus*). *E. morgani* had been recognized as a synonym of *E. elegans* (Gyldenstolpe 1932) and *E. typus typus* (Hershkovitz 1962). Based on morphology, *E. morgani pamparum* is recognized as a synonym of *E. typus* (Thomas 1929). The holotype of *E. morgani* is deposited in the mammal collection of the American Museum of Natural History (AMNH 27689). Our use of literature in preparing this monograph is based on our work in clarifying the distribution and systematics of *Eligmodontia* (Mares et al. 2008) and that of others. Literature in which the species of *Eligmodontia* could not be determined was not included.

The etymology of the genus name is derived from *eligma* (Greek), meaning curling or winding, and *odous* (Greek), meaning tooth, which are references to the occlusional pattern of the molars (Palmer 1904; Braun and Mares 1995). The specific epithet was chosen to honor Mr. J. Pierrepont Morgan, who supported the Princeton Patagonian Expedi-

tion during which the type specimen was collected (Allen 1901). *E. morgani* also is known as Morgan’s gerbil mouse (Wilson and Cole 2000); the silky desert mouse (Tiranti 1997); laucha sedosa (Argentina—Díaz and Ojeda 2000); ratita de pie sedoso del sur (Chile—Pedreros and Valenzuela 2000); Patagonia or southern silky-footed mouse and ratita patagonica de piel sedosa (Chile—Kelt 1994); and laucha sedosa de Patagonia (Chile—Mann 1978).

DIAGNOSIS

Species of the genus *Eligmodontia* (*bolsonensis* [highland gerbil mouse], *dunaris*, *hirtipes*, *moreni* [monte laucha], *morgani* [western Patagonian laucha], *puerulus* [Altiplano laucha], and *typus* [eastern Patagonian laucha]) are distinguishable from other species of phyllotine rodents by their elongated hind feet; the fusion of plantar pads 2, 3, and 4 on the hind feet; absence of the hypothenar pad; and the hair in the pectoral region being entirely white from base to tip (Hershkovitz 1962; Steppan 1995). *Eligmodontia morgani* differs from *E. bolsonensis* in coloration of the dorsum and venter (brownish or grayish with hairs of the venter gray basally versus yellowish brown with hairs of the venter immaculate white with white bases), tail color (dark dorsally and whitish ventrally versus whitish both dorsally and ventrally), and by having more densely haired soles of hind feet (versus soles that are relatively hairless or lightly haired—Mares et al. 2008). *E. morgani* is larger than (total length average 166.36 mm versus 139.5 mm) and has more densely haired hind feet than the Chilean endemic *E. dunaris* (Spotorno et al. 2013). *E. morgani* differs from *E. hirtipes* in coloration of the dorsum (brownish or grayish versus sandy buff), venter (whitish hairs with gray bases versus immaculate white with white bases), and tail (dark dorsally and whitish ventrally versus whitish both dorsally and ventrally—Thomas 1902); the karyotype also differs, being diploid number (2n) = 50, fundamental number (FN) = 48 in *E. hirtipes* (Lanzone and Ojeda 2005) and 2n = 32–34, FN = 32 in *E. morgani*. *E. morgani* differs from *E. moreni* in having more densely haired soles of hind feet (versus soles that are relatively hairless or lightly haired), pelage coloration (brownish or grayish with hairs of the venter gray basally versus brownish yellow with hairs of the venter immaculate white with white bases), and absence of a tail tuft (Thomas 1896); the karyotype also differs, being 2n = 52, FN = 50 in *E. moreni* (Lanzone and Ojeda 2005). *E. morgani* differs from *E. puerulus* in length of the tail (generally ≥ length of the head and body versus generally < length of the head and body) and width of the band on the dorsum of the tail (broad versus thin—Osgood 1943; Mann 1978); the karyotype also differs, being 2n = 32–34, FN = 48 in *E. puerulus* (Lanzone and Ojeda 2005). *E. morgani* is slightly smaller (166.36 mm, range = 146–197 mm) than *E. typus* (175.84 mm, range = 146–197 mm) and has a shorter (69–90 mm

versus 77–104 mm), more well haired, bicolored tail, more densely haired soles of hind feet, and shorter ears (14–19 mm versus 16–22 mm—Pearson 1995; Sikes et al. 1997); the karyotype also differs, being $2n = 43\text{--}44$, $FN = 44$ in *E. typus* (Lanzone and Ojeda 2005).

GENERAL CHARACTERS

Eligmodontia morgani is a relatively small, delicate phyllotine rodent with large ears (Fig. 1). Fur is long, soft, and silky. Dorsal color is dull ochraceous gray. Sides are paler and buffier than dorsum, passing into a well-defined pale yellowish lateral line. Venter is pure white. Ears are dusky brown externally, pale buffy-gray internally. The tail is well haired, sharply to moderately bicolored, dark brown above and grayish white below with a tip that lacks a conspicuous tuft. Tail length is nearly equal to the length of the head and body. Hind legs and hind feet are elongated and well haired. Hypothenar pad is absent, whereas plantar pads 2, 3, and 4 are fused. Toes 1 and 5 on the hind feet are reduced. Soles of hind feet are well haired.

Skull is delicate (Fig. 2). Rostrum is typical of the genus, superorbital region is divergent, and frontal parietal suture is crescent shaped. Zygomatic arches are parallel sided, and the anterior borders of the zygomatic plates are planar or slightly concave. Width of parapterygoid fossa is 1.5–2.5 times the width of mesopterygoid fossa. Bullae are moderately inflated.

External measurements (mm; mean with parenthetical range and n) were: total length, 166.36 (146–197; $n = 22$); length of tail, 78.05 (69–90; $n = 22$); length of hind foot, 22.27 (21–25; $n = 22$); and length of ear, 16.00 (14–19; $n = 22$ —Sikes et al. 1997). Mean body mass (g; parenthetical range and n , adult males and females, respectively) was: 18.22 (10–25; $n = 49$), 21.72 (13–31; $n = 47$ —Pearson et al. 1987). Cranial measurements (mm; mean with parenthetical range and n) were: length of incisive foramen, 5.25 (4.72–6.04; $n = 22$); length of maxillary toothrow, 3.60 (3.33–3.88; $n = 22$); bullar length, 3.61 (3.10–4.09; $n = 22$); bullar breadth, 4.12 (3.75–4.40; $n = 22$); nasal breadth, 2.54 (2.20–2.88; $n = 21$); height of mandible, 5.54 (4.92–6.44; $n = 20$ —Sikes et al. 1997).

Variation among 3 adult age groups and between sexes was not significant for 18 cranial and 4 external measurements for samples from Argentina (Sikes et al. 1997). At a site in Río Negro Province, however, adult females were found to be significantly larger than adult males in some external measurements (length of head and body, length of tail, and body mass), but no significant differences were found for greatest length of skull and length of upper toothrow (Pearson et al. 1987).

DISTRIBUTION

Eligmodontia morgani occurs in the western Patagonian region of Argentina and adjacent Chile (Fig. 3). In

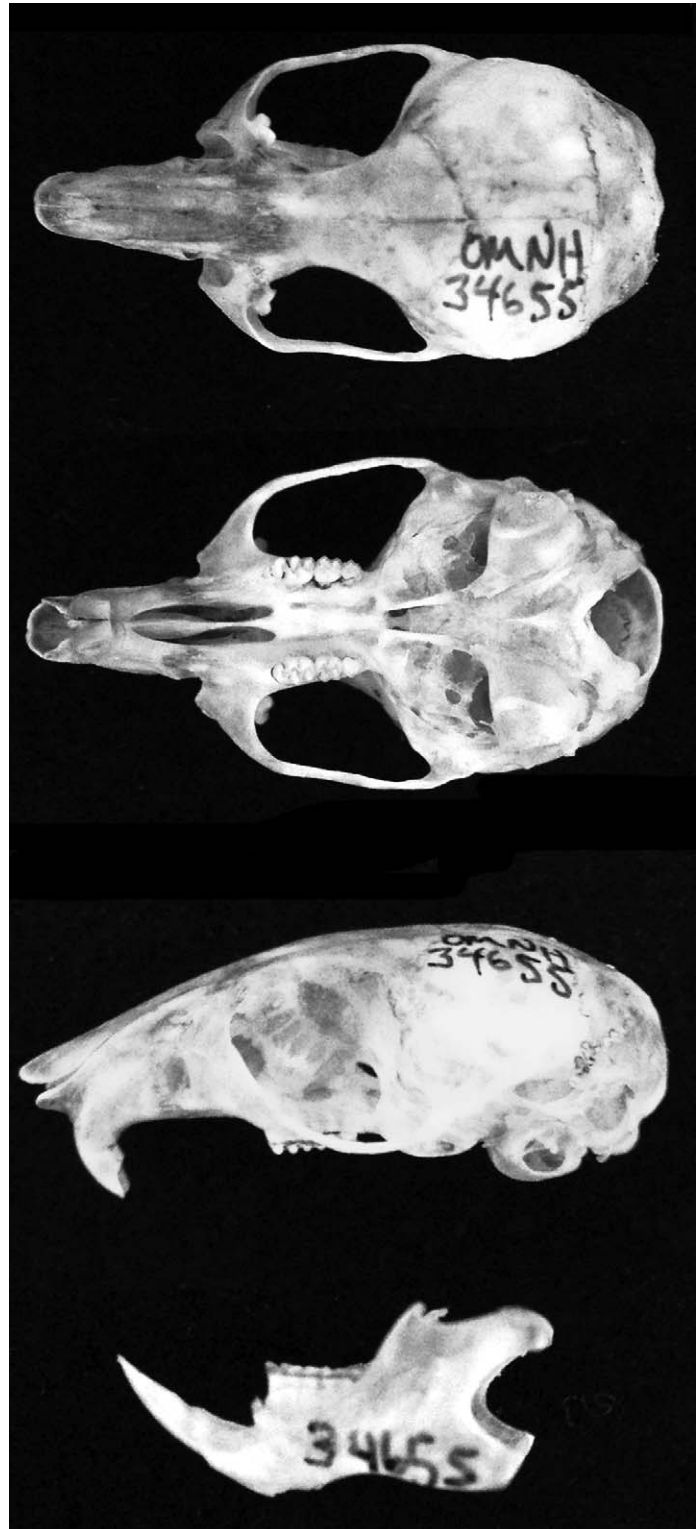


Fig. 2.—Dorsal, ventral, and lateral views of skull and lateral view of mandible of an adult female *Eligmodontia morgani* (Sam Noble Oklahoma Museum of Natural History [OMNH] 34655) from 11 km NW jct hwy 63 and 237, along 63, Neuquén Province, Argentina. Greatest length of skull is 24.30 mm. Photograph by M. A. Mares, used by permission.

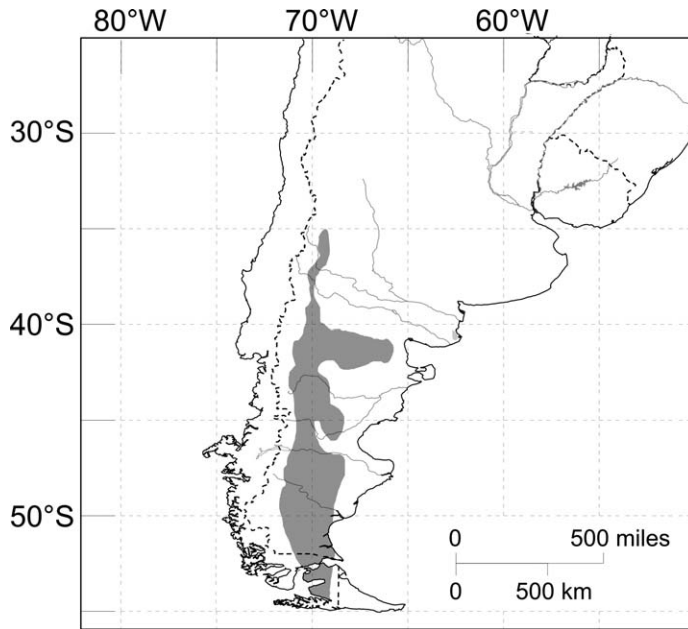


Fig. 3.—Geographic distribution of *Eligmodontia morgani* (approximate [from NatureServe 2007; Ojeda and Pardiñas 2008]).

Argentina, the species ranges from central Mendoza through Neuquén, western Río Negro, and western Chubut provinces south to northwestern Santa Cruz Province at elevations between 800 and 1,250 m (Monjeau et al. 1997; Musser and Carleton 2005; Mares et al. 2008). In Chile, *E. morgani* is known from the region of La Araucanía and reaches its southern limit in central Magallanes (Pedreros and Valenzuela 2000) and occurs at elevations between sea level (Hershkovitz 1962; Mares 1977) and 1,280 m (Greer 1965). *E. morgani* occurs primarily in the Extra-Andean Occidental biozone (Hillyard et al. 1997).

FOSSIL RECORD

Fossil remains assignable to the genus *Eligmodontia* are known from the late Pliocene and Pleistocene (Ensenadense, Bonaerense, Lujanense, and Platense) of Argentina. No fossils of *Eligmodontia morgani* are known (Pardiñas et al. 2002).

FORM AND FUNCTION

Dental formula of *Eligmodontia morgani* is $i\ 1/1, c\ 0/0, p\ 0/0, m\ 3/3$, total 16 (Hershkovitz 1962). Upper incisors are opisthodont and ungrooved. Primary cusps are alternate, and the anteromedian flexus of M1 is absent or reduced to a shallow groove. Mesoloph–lophids (including mesostyle–stylids) and anterostyle–stylids are absent. Molars are bilevel crested and molar rows are parallel or slightly convergent posteriorly (Hershkovitz 1962).

The glans penis is short (mean length = 3.8 mm; mean diameter = 2.1 mm; $n = 3$) compared to other phyllotine rodents examined, lacks hooks on the lateral mounds, has relatively large recurved spines on the dorsal papilla and urethral flap, and has epidermal spines that are largest in the basal portion of the glans (Hooper and Musser 1964). The baculum is wide basally, the proximal margin convex and slightly emarginate, with a distinct terminal head, and lacks a keel; the medial digit is cone-shaped and the lateral digits are horn-shaped (Hooper and Musser 1964). Mean measurements (mm) of the baculum were: total length, 3.8; length of proximal bone, 2.8; length of medial digit, 1.0; length of lateral digit, 0.9 ($n = 3$ —Hooper and Musser 1964). Male accessory glands include the following (mm; length): 1 pair of large lateral preputials, 9.5; 1 pair of smaller medial preputials, 2.5; 1 pair of bulbourethral, 4.5; 1 pair of dorsal prostates, 3.0; 1 pair of lateral ventral prostates, 3.0; 1 pair of medial ventral prostates, 6.0; 1 pair of anterior prostates, 6.0; 1 pair of vesiculars, 9.0; and 1 pair of ampullary glands, 1.5 (Voss and Linzey 1981).

The unilocular–hemiglandular stomach is single chambered with a spacious corpus lined with cornified epithelium and an antrum lined with glandular epithelium; the bordering fold is an approximate line that bisects the stomach from the incisura angularis to the greater curvature (Carleton 1973). The specimens examined by Carleton (stomach morphology—1973) and Voss and Linzey (male accessory gland morphology—1981) represent 4 formalin-fixed specimens that were collected in Neuquén, Argentina, and were identified as *E. typus*, the only species in the genus at the time of their collection. No specific locality was given and no measurements were taken prior to fixation. Approximate measurements given after fixation were total length, 140–160 mm, and length of tail, 72–78 mm. The specimens appear to be *E. morgani* but are badly faded (P. Myers, in litt.).

The vertebral formula is 7 C, 13 T, 6 L, 25–26 Ca, total 51–52 (Steppan 1995). Number of mammary glands is 8 (Hershkovitz 1962; Pedreros and Venezuela 2000).

ONTOGENY AND REPRODUCTION

The reproductive season of *Eligmodontia morgani* in Argentina is documented to begin in October, spring in the Southern Hemisphere, and continues through late April (autumn), with the males and females returning to nonbreeding condition by May (Pearson et al. 1987). In Chile, the breeding season is documented from December through April (Kelt 1994). Breeding males (length of testes > 5.5 mm) are reported for October–January and April (Argentina—Pearson et al. 1987) and males with scrotal testes were captured in December and April in Chile (Kelt 1994). Pregnant females were captured between October and April (Greer 1965; Pearson et al. 1987; Kelt 1994; Saba

and de Lamo 1994) and lactating females were captured in October, January, and February (Pearson et al. 1987; Saba and de Lamo 1994). In Argentina, the number of fetuses ranged from 3 to 9 with a mean of 5.90 (Pearson et al. 1987; Saba and de Lamo 1994). Females with 6 and 8 embryos have been reported in Chile (Greer 1965). A “loose,” but significant, positive correlation ($r = +0.55$) was found between age and number of fetuses (Pearson et al. 1987). Progression of tooth wear was used to determine relative ages, a wearing away of 0.10 mm of molar cusps took approximately 6 weeks, and for each additional 6 weeks of age, mean number of fetuses increased by 0.66 (Pearson et al. 1987).

Juveniles appear in the population in January and their proportion increases through May (Pearson et al. 1987). Juveniles of both sexes reach sexual maturity at 6–8 weeks of age; females born in midspring were pregnant or lactating by the start of summer (mid-January—Pearson et al. 1987). Most individuals born in the spring do not survive the breeding season; however, individuals that overwinter breed at the beginning of the new breeding season but are unlikely to survive through the summer (Pearson et al. 1987).

ECOLOGY

Population characteristics.—The relative abundance of *Eligmodontia morgani* is highest in grassland habitat and lowest in bushy habitat (Trejo et al. 2005); the species' preferred microhabitat is open steppe and lowland piedmont (Corley et al. 1995; Pearson 1995; Travaini et al. 1997; Lozada and Guthmann 1998; Lozada et al. 2000). Abundance in steppe habitat ranges from 0.4 individuals/ha (spring) to 3.5 individuals/ha (autumn) and reflects trap success percentages—2% in spring and 13% in autumn (Pearson et al. 1987). Relative abundance as measured by trap success (% of total trap nights) in 6 habitats was: steppe, 5.6; bunchgrass, 1.1; bare ground, 0.8; shrubs, 0.6; rocks, 0.5; and weeds, 0.3 (Pearson 1995). Densities ranged from about 5 individuals/ha to about 35 individuals/ha at sites in Neuquén Province, Argentina (Corley et al. 1995).

Populations of *E. morgani* increased markedly in areas after disturbances. In areas before burning, *E. morgani* was 3% of the total prey items of *Tyto alba* (barn owls) as calculated from pellets, but postburn, *E. morgani* accounted for > 50% of prey items in barn owl pellets and was trapped at > 60% frequency of occurrence (Sahores and Trejo 2004). Eighteen months after a volcanic eruption covered areas with ash, populations of *E. morgani* increased in response to significant increases in plant growth and cover (Saba and de Lamo 1994).

Longevity is < 1 year (Guthmann et al. 1997) and individuals rarely live more than 9 months (Pearson et al. 1987). Sex ratios were nearly 1:1 irrespective of age group or season of capture in an Argentine steppe community

(Pearson et al. 1987); however, at a postdisturbance (volcanic eruption) site, the sex ratio was 3:2 (males to females) for adults and 8:1 for juveniles (Saba and de Lamo 1994).

Space use.—*Eligmodontia morgani* occupies sandy soils and open grassy regions of the semiarid steppe habitat of western Patagonia (Pearson et al. 1987; Kelt 1994; Guthmann et al. 1997; Hillyard et al. 1997; Lozada et al. 2001). It is considered to inhabit more mesic habitats as compared to the other species of *Eligmodontia* (Hillyard et al. 1997). The vegetation of the region is characterized by low shrubs and grasses. Shrubs common in the semiarid steppe are *Acaena splendens* (abrojo), *Berberis heterophylla* (calafate), *Colliguaya integerrima* (duraznillo), *Mulinum spinosum* (yerba negra), *Lycium* (yaullín), *Stillingia patagonica* (mata torcida), *Senecio bracteolatus* (charcao), *Senecio flaginoides* (charcao), *Senecio neaei* (coirón pluma), *Baccharis linearis* (romerillo), *Discaria articulata* (chacay), *Nassauvia glomerulosa* (cola de piche), and *Adesmia volckmannii* (mata espinosa), and grasses common to the area are typical bunchgrasses such as *Stipa speciosa* (coirón amarillo), *Stipa humilis* (coirón amargo), *Poa lanuginosa* (pasta hilo), *Festuca argentina* (coirón de huecú), and *Poa ligularis* (coirón poa—Pearson et al. 1987; Saba and de Lamo 1994; Trejo and Guthmann 2003; Trejo et al. 2005). In Chile, presence of *E. morgani* is negatively correlated with presence of trees in a region (Kelt 1996) and it is less frequently found in shrubland with bunchgrasses (Kelt 1994). Microhabitat selection by *E. morgani* is correlated with low bunchgrass cover, high proportion of bare ground, and low cover of spiny bushes (Lozada et al. 2000). Nests are constructed by cutting holes at the bases of bunchgrass (Lozada and Guthmann 1998).

Home-range size in *E. morgani* is not correlated with reproductive condition and same-sex home-range overlap is small (Lozada et al. 2001). Mean home ranges (in m²) for males and females, respectively, for 3 reproductive stages were: subadult, 558, 437; nonreproductive, 521, 636; and reproductive, 426, 603 (Lozada et al. 2001). Mean home-range overlaps (in m²) for males and females, respectively, for 2 reproductive stages were: nonreproductive, 45, 25; and reproductive, 5, 16 (Lozada et al. 2001).

Diet.—*Eligmodontia morgani* has been reported to be a granivore (Lozada et al. 2000, 2001) but also is known to consume insects (Kelt 1994). An examination of stomach contents found that it is primarily a granivore (Pearson et al. 1987). Stomach contents consisted of seeds of *Berberis heterophylla* and *Prosopis* and vegetation of *Mulinum spinosum*, *Acaena*, and *Lycium*; grasses were absent. Animals in captivity consumed seeds of *Stillingia* and legs of the common black desert beetles. *E. morgani* does not cache food (Lozada and Guthmann 1998).

Diseases and parasites.—Parasites reported from *Eligmodontia morgani* include a sucking louse (*Hoplopleura*

reducta—Castro et al. 1990; Durden and Musser 1994), a chigger (*Andalgalomacanis xanthopyga*—Goff and Gettinger 1995), a flea (*Tiamastus*—Sanchez et al. 2009), and the larvae of a tick (*Ixodes sigelos*—Sanchez et al. 2010). Antibodies for hantavirus pulmonary syndrome (HPS) were not detected in *E. morgani* from Río Negro Province, Argentina (Cantoni et al. 2001).

Interspecific interactions.—*Eligmodontia morgani* often is captured with *Abrothrix olivaceus* (olive-colored akodont), which includes *A. xanthorhinus* as a synonym (Pearson et al. 1987; Corley et al. 1995; Kelt 1996; Lozada and Guthmann 1998; Lozada et al. 2000; Pillado and Trejo 2000; Trejo et al. 2005). Other species often found in habitats with *E. morgani* are *Lestodelphys halli* (Patagonian opossum), *Thylamys pallidior* (white-bellied fat-tailed mouse opossum), *Phyllotis xanthopygus* (yellow-rumped pericote), *Reithrodon auritus* (hairy-soled conyrat), *Akodon iniscatus* (Patagonian akodont), *Ctenomys haigi* (Haig's tuco-tuco), *Ctenomys coyhaiquensis* (Coyhaique tuco-tuco), *Notiomys edwardsii* (Edward's long-clawed akodont), *Euneomys* (euneomys), *Microcavia australis* (southern mountain cavy), and *Lepus europaeus* (European hare—Pearson et al. 1987; Saba and de Lamo 1994; Corley et al. 1995; Kelt 1996; Lozada et al. 2000; Pillado and Trejo 2000). In moister regions of the distribution of *E. morgani*, *Abrothrix longipilis* (long-haired akodont), *Chelemys macronyx* (Andean long-clawed akodont), *Loxodontomys micropus* (southern pericote), *Irenomys tarsalis* (large-footed irenomys), and *Oligoryzomys longicaudatus* (long-tailed colilargo) are quite abundant (Corley et al. 1995; Kelt 1996; Lozada et al. 2000; Pillado and Trejo 2000; Sahores and Trejo 2004; Trejo et al. 2005). *E. morgani* has been found sympatric with *E. typus* at 2 localities in Chubut and Río Negro provinces, Argentina (Monjeau et al. 1997).

Individuals of *E. morgani* are nocturnal and have the following predators: barn owls, *Bubo magellanicus* (Magellanic horned owls), *Bubo virginianus* (great horned owls), *Geranoaetus melanoleucus* (black-chested buzzard-eagles), *Buteo albigula* (white-throated hawks), *Buteo polyosoma* (red-backed hawks), and possibly *Falco sparverius* (American kestrels—Iriarte et al. 1990; Trejo and Guthmann 2003; Trejo et al. 2005, 2006a, 2006b; Trejo 2006; Santillán et al. 2009). *E. morgani* was a minor prey item of barn owls at some sites in Argentina (3.3% and 3.2%—Pillado and Trejo 2000; Sahores and Trejo 2004) and Chile (5.1%—Iriarte et al. 1990), but averaged 15.3% (6.7–31.6%) of the diet in northwestern Patagonia (Travaini et al. 1997). In Argentina, percent frequency of *E. morgani* in diets of owls varied seasonally and was highest in autumn, 8.8% and 4.2% (Pillado and Trejo 2000; Sahores and Trejo 2004). In postburn areas, *E. morgani* comprised > 52% of the diet of barn owls (Sahores and Trejo 2004). *E. morgani* represented 13% (7.7–18.5%) of the prey items of Magellanic horned owls (Monserrat et al. 2005) and was

consumed in a lower proportion than its estimated abundance (25.9% of total number of prey), suggesting that the owls prey on this species when it is abundant or easy to capture (Trejo et al. 2005). Magellanic horned owls selectively captured females, which were more common in open microhabitat, and smaller individuals between 5 and 20 g (Trejo and Guthmann 2003). Although prey of other species consumed by Magellanic horned owls was of larger mass than the same species consumed by barn owls, no body-size prey-size pattern was found for *E. morgani* (Trejo 2006). *E. morgani* was a minor prey item of great horned owls in Argentina (2.5%—Donázar et al. 1997) and Chile (3.7%—Iriarte et al. 1990); however, it was the main prey item (25.9% frequency of occurrence) and a significant component of the total biomass (13.7%) at a site in northwestern Patagonia (Trejo and Grigera 1998). *E. morgani* comprised between 0.8% (Monserrat et al. 2005) and 7.6% (Trejo et al. 2006a) of the diet of black-chested buzzard-eagles, 6.3% of the diet of red-backed hawks (Monserrat et al. 2005), and was a minor prey item of white-throated hawks (0.3%—Trejo et al. 2006b). Predatory birds were absent for 18 months from sites in Santa Cruz Province, Argentina, inhabited by *E. morgani* and impacted by volcanic eruption but were observed at 28 months posteruption (Saba and de Lamo 1994).

Eligmodontia morgani and 6 other species of cricetine rodents, combined as a single category, were generally significant prey items of carnivores based on frequency of occurrence in stomachs and feces, respectively, but comprised a low percentage of biomass (Novaro et al. 2000; Delibes et al. 2003): *Lycalopex culpaeus* (culpeo), 31.1, 9.4; *L. griseus* (South American gray fox), 26.2, 11.6; *Conepatus* (hog-nosed skunks), 0.6, 0.1; *Galictis cuja* (lesser grison), 5.9, 3.2; *Leopardus geoffroyi* (Geoffroy's cat), 58.2, no value given for feces; and *Puma concolor* (cougar), 26.0, 0.2. *E. morgani* was consumed by culpeos less than expected based on its relative abundance (1.4–7.3% food items), likely due to escape ability related to hind-limb length (Corley et al. 1995). In southern Chile, *E. morgani* was a minor component (0.1%) of the diet of Geoffroy's cats (Johnson and Franklin 1991).

To avoid predation, *E. morgani* runs fast in a zigzag pattern exhibiting a locomotor escape behavior that is intermediate between quadrupedal and saltatorial (Trejo et al. 2005) or by erratic hops (Corley et al. 1995).

GENETICS

Cytogenetics.—Three karyomorphs with diploid numbers (2n) ranging from 32 to 34 chromosomes exist for *Eligmodontia morgani*; the fundamental number (FN) is 32 (Ortells et al. 1989; Kelt et al. 1991; Zambelli et al. 1992; Hillyard et al. 1997; Sikes et al. 1997; Tiranti 1997). Each karyomorph consists of 6 pairs of large acrocentric

autosomes and 8 pairs of medium-sized to small acrocentrics. There is a polymorphism in pair 7 and the presence of an additional chromosome in the $2n = 33$ and $2n = 34$ karyomorphs. In the $2n = 32$ karyotype, pair 7 is metacentric (Ortells et al. 1989; Kelt et al. 1991; Zambelli et al. 1992). In the $2n = 33$ karyomorph, pair 7 consists of a pair of acrocentric autosomes and the karyotype contains an additional single metacentric autosome (Ortells et al. 1989; Zambelli et al. 1992). The $2n = 34$ karyotype has an acrocentric pair 7 and an additional acrocentric autosomal pair (Zambelli et al. 1992; Tiranti 1997). The X chromosome is a medium-sized telocentric (Ortells et al. 1989) or acrocentric (Kelt et al. 1991; Zambelli et al. 1992); the Y chromosome is a small submetacentric (Kelt et al. 1991) or metacentric (Ortells et al. 1989; Zambelli et al. 1992). G-banding analysis of the $2n = 32$ and $2n = 34$ karyomorphs identified a relationship between the pair 7 chromosomes in the $2n = 32$ karyotype and 2 pairs of acrocentric chromosomes in the $2n = 34$ karyotype; 2 Robertsonian fusions have been proposed to explain the evolution of the 3 karyomorphs (Zambelli et al. 1992). C-banding analysis of the $2n = 32$ and $2n = 34$ karyomorphs showed identical C-bands in the pericentromeric region of autosomal pairs 1, 5–8, and 11–15, and in the sex chromosomes (Zambelli et al. 1992). C-banding of the $2n = 33$ karyomorph showed small amounts of centromeric heterochromatin in all autosomal pairs, except in pairs 11–15, which were characterized by conspicuous blocks of heterochromatin (Kelt et al. 1991). The Y chromosome is entirely heterochromatic and the X chromosome lacks a clear banding pattern (Kelt et al. 1991). Argyrophilic nucleolar organizer region (Ag-NOR) staining resulted in identical patterns for all 3 karyomorphs (Zambelli et al. 1992). Based on comparisons of banding patterns, *E. morgani* was proposed to be derived, along with *E. typus*, from northern forms based upon their longer chromosome arms (> 9% of the total karyotype) formed by tandem translocations (Spotorno et al. 1994).

Molecular genetics.—Examination of mitochondrial sequence data for *Eligmodontia morgani* from southern Argentina revealed 14 haplotypes that segregated into 3 lineages with divergence between haplotypes found to be $\leq 2.3\%$ (Hillyard et al. 1997). In a study of the interspecific relationships within *Eligmodontia*, samples of *E. morgani* formed 2 sister clades that had a percent sequence divergence of 1.773% (Mares et al. 2008). The divergence of *E. morgani* from other *Eligmodontia* species was suggested to have begun in the early Pleistocene or late Pliocene (Hillyard et al. 1997; Mares et al. 2008).

CONSERVATION

Because of its wide distribution and stable population trend, *Eligmodontia morgani* is rated as “Least Concern” on

the 2010 International Union for Conservation of Nature and Natural Resources *Red List of Threatened Species* (Ojeda and Pardiñas 2008). *E. morgani* is considered an abundant species and has no major threats.

ACKNOWLEDGMENTS

We thank R. Ojeda for the image of the live animal and P. Myers for examining the formalin-fixed specimens deposited in the University of Michigan Museum of Zoology.

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Associate Editor of this account was DAVID ZEGERS. Editor was MEREDITH J. HAMILTON.