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Abrocoma schistacea (Rodentia: Abrocomidae)

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Abstract: *Abrocoma schistacea* Thomas, 1921 is an abrocomid rodent commonly known as the Sierra del Tontal chinchilla rat. This medium-sized chinchilla rat is a rock specialist that inhabits the pre-Andean foothills of southern San Juan Province (Argentina) within an elevation range of 1,100–2,900 m. Its saxicolous specializations include padded feet with leathery tubercles on the pads. Incisors are large and orthodont; molariform teeth appear broad. *A. schistacea* is a creosotebush dietary specialist that can be distinguished from other chinchilla rats by living in groups of 3–4 individuals. This species is categorized as of low conservation concern in Argentina but is currently listed as "Data Deficient" by the International Union for Conservation of Nature and Natural Resources.

Key words: Argentina, Hystricognathi, rock specialist, rodent, San Juan, Sanjuanina chinchilla rat, trophic specialist

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Abrocoma Waterhouse, 1837

Abrocoma Waterhouse, 1837:30. Type species *Abrocoma bennettii* Waterhouse, fixed by Tate (1935:384).
Habrocoma Wagner, 1842:5. Unjustified emendation of *Abrocoma* Waterhouse, 1837.

CONTEXT AND CONTENT. Order Rodentia, suborder Hystricomorpha, infraorder Hystricognathi, family Abrocomidae. The family Abrocomidae (Rodentia: Hystricognathi) contains 2 genera, *Abrocoma* Waterhouse, 1837 with 8 species (*A. bennettii* Waterhouse, 1837, *A. boliviensis* Glanz and Anderson, 1990, *A. budini* Thomas, 1920, *A. cinerea* Thomas, 1919, *A. famatina* Thomas, 1920, *A. schistacea* Thomas, 1921, *A. uspallata* Braun and Mares, 2002, and *A. vaccarum* Thomas, 1921—Patton et al. 2015) and *Cuscomys* Emmons, 1999 with 2 species (*C. ashaninka* Emmons, 1999 and *C. oblativus* Eaton, 1916—Patton et al. 2015). The species *C. oblativus* was formerly classified as *A. oblativus* but has been reassigned (Emmons 1999). *C. oblativus* was considered likely extinct by Thomas (1920), it was only known from remains found in 1912, buried alongside humans in ancient Inca tombs at the Machu Picchu ruins (Woods and Kilpatrick 2005; Pacheco et al. 2008). However, photos of a rodent taken at the ruins in late 2009 appear to be images of *C. oblativus* (Castillo 2009). A key to the 8 currently recognized species of *Abrocoma* follows (modified from Patton et al. 2015):

1. Body size medium (head and body length about 175 mm); tail proportionately long (about 81% head and body length); dorsal color dark brown; ventral color pale (whitish); mastoid islands distinctly small (< 16% of mastoid breadth) . . . . . *Abrocoma boliviensis*
   Body size medium to large; tail not long (< 75% head and body length); dorsal color dark to pale (grayish); ventral color drab (dark grayish) to pale; mastoid islands medium to large (> 20% of mastoid breadth) 2
2. Body size large (head and body length > 200 mm); tail moderately long (about 71% head and body length); hind foot > 32 mm; dorsal and ventral color dark (brownish); interorbital region broad (breadth > 8 mm);

Fig. 1.—Adult male *Abrocoma schistacea* from El Leoncito National Park (San Juan Province, Argentina). Photograph by Paula Taraborelli (2006).

mastoid bullae small (width < 23% condylobasilar length) . . . . . *Abrocoma bennettii*
Body size large to medium (head and body length < 200 mm); tail moderate in length (60–70% head and body length) or short (< 55%); hind foot length shorter (< 31 mm); dorsal color paler brownish-gray to gray; ventral color dark to pale gray; interorbital region narrow to medium (breadth < 7.8 mm); mastoid bullae medium to large (width > 27% of condylobasilar length) 3

3. Dorsal color pale gray; tail very short (35–42% head and body length); tail weakly bicolored above and below; interorbital region broad (breadth > 7.5 mm); mastoid bullae inflated (width > 27% of condylobasilar length) . . . . . *Abrocoma cinerea*
Dorsal color gray with brownish overtones; tail of medium proportions (53–68% head and body length); tail moderately to strongly bicolored; interorbital region narrow (breadth < 7.0 mm); mastoid bullae moderately to well inflated (width 25–29% of condylobasilar length) 4

4. Hind feet long (> 30 mm); mastoid islands large (> 23% of mastoid breadth) 5
Hind feet shorter (< 30 mm, on average); mastoid islands medium (< 23% of mastoid breadth) 6

5. Body size large (head and body length about 200 mm); dorsal color darker (brownish gray); tail moderately bicolored; maxillary toothrow proportionately short (< 22% condylobasilar length); posterior border of palate pointed; upper incisors large and broad . . . . . *Abrocoma budini*
Body size medium (head and body length < 180 mm); dorsal color paler (grayish brown); tail strongly bicolored; maxillary toothrow proportionately long (24% of condylobasilar length); posterior border of palate rounded; upper incisors small and narrow . . . . . *Abrocoma uspallata*

6. Tail relatively short (< 53% head and body length, on average); upper incisors small and narrow; bullar inflation great (width > 28% condylobasilar length). *Abrocoma famatina*
Tail relatively long (> 58% head and body length); upper incisors large and broad; bullar inflation medium (width < 27% condylobasilar length) 7

7. Dorsal color grayish drab; mesopterygoid fossa wide; upper incisors orthodont . . . . . *Abrocoma schistacea*
Dorsal color gray; mesopterygoid fossa narrow; upper incisors opisthodont . . . . . *Abrocoma vaccarum*

Abrocoma schistacea Thomas, 1921
Sierra del Tontal Chinchilla Rat

Abrocoma schistacea Thomas, 1921:216. Type locality "Los Sombreros, Sierra Tontal, Alt. 2700m," San Juan Province, Argentina.

Abrocoma cinerea schistacea: Ellerman, 1940:155. Name combination.

Context and Content. Context same as genus. *Abrocoma schistacea* is monotypic (Braun and Mares 2002). *A. cinerea*, *A. budini*, *A. famatina*, *A. schistacea*, *A. uspallata*, and *A. vaccarum* comprise the *cinerea* complex (Patton et al. 2015).

Nomenclatural Notes. The holotype specimen (BMNH [British Museum of Natural History] specimen 21.6.21.11; skin and skull; adult female) was obtained by E. Budin, field number 1296, on 29 January 1921 (Braun and Mares 2002). *Abrocoma schistacea* was considered a subspecies of *A. cinerea* by Ellerman (1940), and Braun and Mares (2002) recognized it as a distinct morphospecies based on size. *A. schistacea* has a greater total length, tail length, and hind foot length than *A. cinerea* (Braun and Mares 2002). *A. schistacea* is also commonly called Sanjuanina chinchilla rat.

DIAGNOSIS

Abrocoma schistacea is distinguished from other species of chinchilla rats that occur in its general distribution range because it is restricted to southern San Juan Province and by a combination of characters including size, pelage coloration, and morphological characters (Braun and Mares 2002; Taraborelli et al. 2011). *A. schistacea* lacks the drab throat patch that is present in *A. budini* (Catamarqueña chinchilla rat) and *A. famatina* (Famatina chinchilla rat—Thomas 1921). Here, we present a rudimentary key developed for differentiating the species most likely to be confused with *A. schistacea*.

1. Body size large, total length > 300 mm; head and body length > 190 mm; tail length > 120 mm; skull length > 48 mm . . . . . *Abrocoma budini* (Budini's chinchilla rat)
Body size medium, total length < 300 mm; head and body length < 190 mm; tail length < 120 mm; skull length < 48 mm . . .2

2. Tail length < 50% of head and body length; tail length < 30% of total length. Interorbital breadth > 7 mm and length of diastema 13.9 ± 1.1 mm . . . . . *Abrocoma cinerea* (Jujeña chinchilla rat)
Tail length > 50% of head and body length; tail length > 30% of total length. Interorbital breadth < 7 mm and length of diastema < 13.9 mm 3

3. Tail length < 90 mm. White to very pale orange incisors . . . . . *Abrocoma vaccarum* (Mendocina chinchilla rat)
Tail length > 90 mm. Orange incisors. 4

4. Incisors are large and orthodont; molariform teeth appear broad. Hypoflexus appears to have a slightly narrower breadth. Mean condylobasal length is 45.4 ± 2.4 mm; and length of maxillary toothrow > 9.6 mm . . . . . *Abrocoma schistacea* (Sierra del Tontal chinchilla rat)

Incisors are small, narrow, short, and opisthodont; molariform teeth do not appear unusually broad. Hypoflexus appears to have a wide breadth. Mean condylobasal length < 44 mm; and length of maxillary toothrow < 9.6 mm . . 5

5. Pre-Andean foothills species; inhabiting an altitudinal range of 1,800–2,000 m . . . . . *Abrocoma uspallata* (Uspallata chinchilla rat)
Andean foothills species; inhabiting an altitude > 3,500 m . . . . . .*Abrocoma famatina* (Famatina chinchilla rat)

GENERAL CHARACTERS

Abrocoma schistacea (Fig. 1) is a saxicolous species, with a medium-sized body (mean mass ± *SE* = 174.11 ± 10.12 g, *n* = 9—Taraborelli et al. 2011). Dorsal coloration of *A. schistacea* is grayish drab, slightly darker along the midline. Hairs of venter are grayish basally for most of their length; venter similar to, but paler than, dorsum. Dorsal surface of tail is similar to the midline of the dorsum; tail is white below. Whitish hairs surround the perianal region. Forefeet and hind feet are covered with whitish hairs. Sternal gland is covered with hairs that are white to their bases, and it appears as a distinct patch on venter (Braun and Mares 2002; Taraborelli et al. 2011).

Mean measurements (mm ± *SE*) from Taraborelli et al. (2011) and Braun and Mares (2002), respectively, for mixed sexes of *A. schistacea* were: total length 263.56 ± 4.11 (*n* = 9), 290.4 ± 21.2 (*n* = 8); head and body length 161.56 ± 2.06 (*n* = 9), 182.9 ± 14.1 (*n* = 8); tail length 101.3 ± 2.58 (*n* = 10), 107.5 ± 9.8 (*n* = 8); hind foot length 27.91 ± 0.64 (*n* = 10), 27.9 ± 1.7 (*n* = 8); ear length 25.60 ± 1.21 (*n* = 10), 24.6 ± 1.5 (*n* = 8). Mean ratio of tail length to head and body length is 63.14 ± 1.60% and that of tail length to total length is 38.64 ± 0.61% (*n* = 9—Taraborelli et al. 2011).

Mean cranial measurements (mm ± *SE*—Braun and Mares 2002) for mixed sexes of *A. schistacea* were: zygomatic breadth 22.9 ± 1.3 (*n* = 12), breadth of braincase 18.6 ± 1.1 (*n* = 12), palatilar length 20.6 ± 1.7 (*n* = 12), width of bullae 12 ± 0.6 (*n* = 4), and length of mandible 33.3 ± 2.3 (*n* = 4). Nasals are slightly wider at midlength and taper posteriorly. Dorsal edge of zygoma is slanted outward, so that medial edge is easily visible in dorsal view and anterior ascending maxillary portion of zygoma is thin. Zygomatic arches are expanded. Frontals are noticeably constricted. Mastoid islands are of medium size (< 23% but > 20% of mastoid breadth). Posterior border of palate is rounded. Mesopterygoid fossae are wide. Bullae are slightly inflated (Braun and Mares 2002; Fig. 2).

DISTRIBUTION

Members of the family Abrocomidae are endemic to South America and are distributed from southern Peru across the northwestern tip of Chile southward to central Argentina (Mares and Ojeda 1982; Braun and Mares 2002; Fig. 3). Within the genus *Abrocoma*, *A. bennettii* is restricted to the western slopes of the Andes in Chile (Braun and Mares 1996), *A. boliviensis* is found only in Bolivia, and the remaining species occur in Argentina.

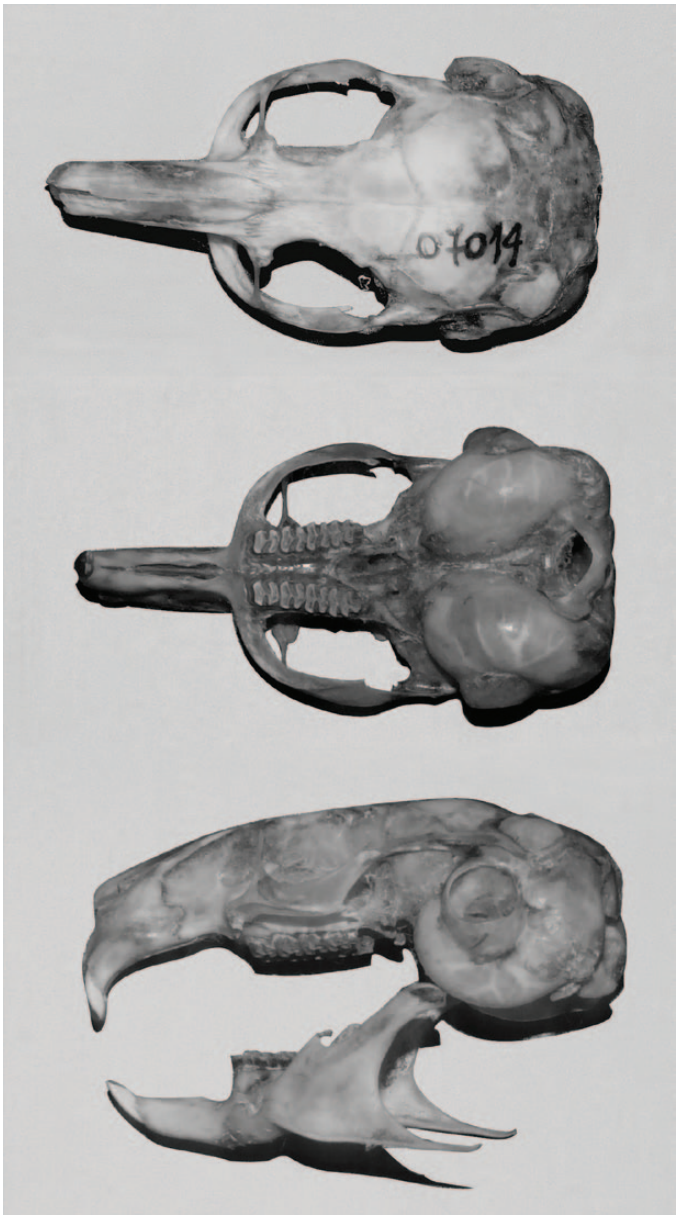

Fig. 2.—Dorsal, ventral, and lateral views of skull and lateral view of mandible of an adult male *Abrocoma schistacea* (Colección El Leoncito National Park, San Juan Province, Argentina; specimen 07014). Greatest length of skull is 50.7 mm.

Thomas (1921) restricted the distribution of *A. schistacea* to southern San Juan Province at Sierra Tontal in Leoncito National Park (2,700 m) and at Pedernal (1,200 m), sites separated by a distance of 51 km. Patton et al. (2015) indicates that it occurs at an elevation range of 1,100–2,900 m. Glanz and Anderson (1990) confirmed the presence of this species at Sierra Tontal. Taraborelli et al. (2011) recorded *A. schistacea* at Sierra de La Usina y Majaditas in Leoncito National Park, 15 km from Sierra Tontal, at 13 gulches between 2,115 and 2,884 m, and in latitudinal ranges of 31°45′24.3″–31°57′4″S and 69°13′28.5″–69°22′44.4″W. In the Sierras of southwestern San Juan Province, the climate is cold and dry, with broad temperature fluctuations between daytime and nightime as well as seasonal temperature fluctuations

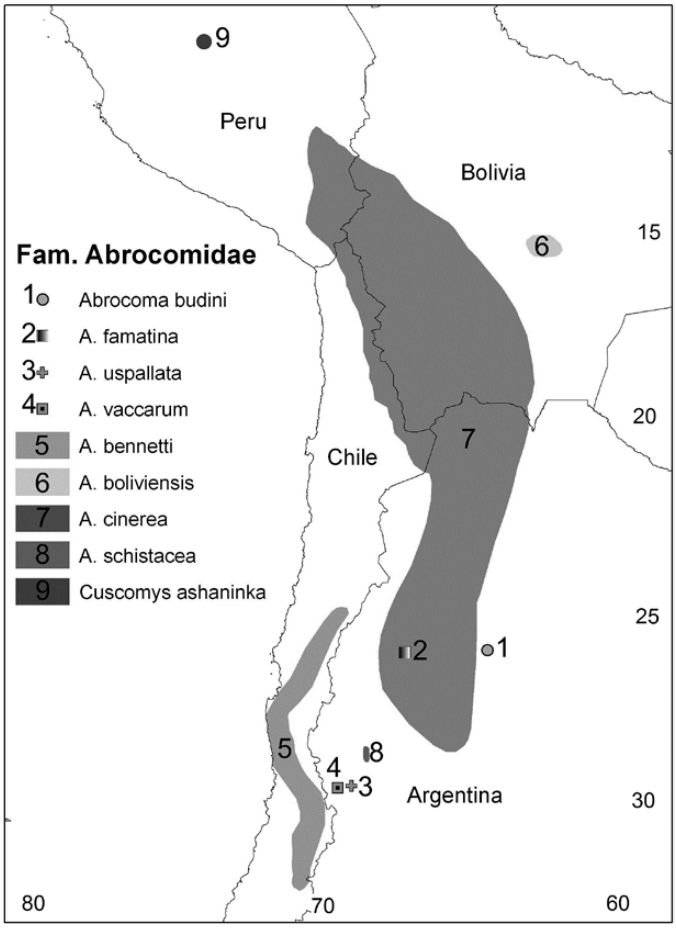

Fig. 3.—Geographic distribution of the family Abrocomidae and location of *Abrocoma schistacea* in Argentina (Patterson et al. 2007).

(mean annual temperature ± *SE* = 14.55 ± 5.65°C). Predominant winds are dry and warm from the northwest (ranging in velocity between 20 and 30 km/h at midday). Precipitation is in the form of snow or hail in winter (reaching 75 mm), and rainfall in summer is about 25 mm (Le Houérou 1999; Le Houérou et al. 1999; Márquez 1999). No fossils of *A. schistacea* are known.

FORM AND FUNCTION

Dental formula of *Abrocoma schistacea* is i 1/1, c 0/0, p 1/1, m 3/3, total 20. Incisors are broad, large, and orthodont (Fig. 2). Molariform teeth appear broad and hypoflexus appears to have a slightly narrower breadth (Braun and Mares 2002).

We recorded buccal epidermal denticles, or false teeth, in the midline of the mouth and a tongue with a horny pad in *A. schistacea*. Braun and Mares (1996) noted these false teeth in *A. vaccarum*. The larger, anteriorly positioned tooth appears to be bilobed and directed posteriorly. These false teeth are not preserved with the skull or other skeletal material but appear to be epidermally derived denticles that function as additional midline teeth (Braun and Mares 1996). The function of the anterior tooth seems to be to maintain food items on the tongue and push them forward against the rough palatal ridges and molariform teeth. The function of the posterior tooth seems to be food manipulation in the mouth (Braun and Mares 1996). Both teeth form a barrier to the forward movement of food in the mouth. This structure was not found in any of the skeletal specimens examined by Braun and Mares (1996) or by us, indicating that it is not preserved in skulls that have been cleaned. There is no information about these false teeth in other species of *Abrocoma*.

Abrocoma schistacea is adapted for a saxicolous existence. Some of its specializations are padded feet with leathery tubercles on the pads and claws reduced in size and length (Taraborelli et al. 2011). These footpads assist in traction on rock surfaces and protect the feet against impacts (Mares and Lacher 1987).

ONTOGENY AND REPRODUCTION

Abrocoma schistacea lives in social groups of 3–4 individuals, 1 male and 2 females or 2 males and 2 females (n = 3 groups—Taraborelli et al. 2011). No sexual dimorphism was detected by Taraborelli et al. (2011), who calculated a male body mass/female body mass of 1.03. *A. schistacea* could possess a polygynous mating system like other saxicolous rodents (Mares and Lacher 1987), but more studies are needed to determine the mating system in this specie and in the genus *Abrocoma*.

Other hystricognath rodents give birth to precocial young after a long gestation period. In captivity the gestation period of *A. cinerea* is 116 days, litter size averages 2.2 (range 1–3), and neonates weigh 22 g (Kleiman et al. 1979). Female *A. bennettii* give birth twice a year to litters that range from 1 to 6 (Mann 1978). These data are unknown for *A. schistacea*.

ECOLOGY

Fresh feces of *Abrocoma schistacea* are blackish brown and shiny, and deposited in latrines, which are black or reddish, and may have a crystalline appearance from urine. These deposits have a strong odor and can be used to locate individuals and social groups. Groups defecate on piles of boulders, and massive latrines could correspond to a social group or to a few individuals, suggesting long time use and fidelity to particular crevices (Taraborelli et al. 2011). Crevices inhabited by *A. schistacea* are located within walls of flagstones or piles of massive stone blocks. From our observations we think that the rocks provide the only reliable refuge from both predators and the deep winter cold and also serve as lookout posts for predator detection. The crevices used by *A. schistacea* are on the east hillsides, receiving sunlight in the morning. The orientation of burrow holes was most frequently northeasterly-easterly (mean angle of orientation 81°30′ ± 0°05′—Taraborelli et al. 2011). Mean values (± *SE*) for burrow features were: number of holes per burrow, 5.4 ± 0.5; diameter of burrow crevice, 8.4 ± 0.9 cm; depth of galleries, 29.5 ± 3.5 cm; height of burrow crevice from foot of hill, 5.8 ± 0.5 m; distance between burrows 127.4 ± 49.9 m; and distance from burrow to nearest vegetation, 3.7 ± 0.4 m. Plant species nearest to the burrows were shrubs such as *Gymnophyton* (yerba agria) and *Larrea* (jarilla—Taraborelli et al. 2011).

Abrocoma schistacea occurs in the piedmont habitat of the Monte desert biome, with typical desert shrubs, various cacti and herbs (Braun and Mares 2002). At El Leoncito, vegetative sampling (Taraborelli et al. 2011) revealed total plant cover of 23.31 ± 1.81% (*SE*). Plant cover was lower in summer (January 2007, 14.92 ± 2.83%) than in autumn (April 2006; 27.62 ± 2.85%) and spring (October 2006; 28.42 ± 3.42%). Species richness was higher in autumn (15 plant species) with more herbs than in other seasons of the year; richness was 10 species in spring and 11 in summer. In the areas inhabited by *A. schistacea*, plants classified as shrubs provided more ground cover (15.8 ± 1.26%) in relation to herbs (5.41 ± 0.66%) and cacti (1.25 ± 0.75%). The dominant vegetation comprised *Gymnophyton polycephalim* (Umbelliferae; 27.6%), *Larrea nitida* and *L. divaricata* (Zygophyllaceae; 20.7%—Taraborelli et al. 2011).

Abrocoma schistacea is herbivorous, with the frequency of creosotebush, *Larrea divaricata* and *L. nitida*, in the diet exceeding 80% during the summer and autumn seasons, which would classify *A. schistacea* as a creosotebush specialist. The ability to digest creosotebush, with its many tannins and resins (Mabry et al. 1977), is rare among mammals. *Gymnophyton*, *Stipa* (Gramminea), and *Bougainvillea* (Nyctaginaceae) appear to be avoided in the diet by this species. For *A. schistacea*, diversity in food availability was greater in autumn than in summer (Ha′ = 2.955; Hs′ = 2.245) and trophic niche breadth was narrower in autumn (0.29 ± 0.01 PSa; 0.61 ± 0.01 PSs), and the opposite occurred in summer (Taraborelli et al. 2011). In regard to seasonal variations within El Leoncito, our data concur with those expected from theory of Feinsinger et al. (1981), when the availability of resources is low, the width and the breadth of the trophic niche is bigger than with high availability of resources.

Taraborelli et al. (2011) recorded 15 footprints and 2 tail prints of *A. schistacea* very early in the morning in a sand footprint trap. Therefore, this species is potentially diurnal, with activity early in the morning. *A. cinerea*, the most researched species, is nocturnal (Glanz and Anderson 1990); *A. schistacea* is nocturnal and crepuscular, if not occasionally diurnal (Braun and Mares 1996).

CONSERVATION

Abrocoma schistacea has no direct threats. However, future scenarios of climate change could be potential threats for this species because it is a specialist that inhabits only the pre-Andean foothills of southern San Juan Province (Argentina). The Administration of National Parks of Argentina gives special value to *A. schistacea* because this species is endemic to the region where El Leoncito National Park is located. This species has been categorized as "Low Concern" (Ojeda 2012), but it is currently listed as "Data Deficient" by the International Union for Conservation of Nature and Natural Resources (International Union for Conservation of Nature and Natural Resources 2015). Concerning rarity, *A. schistacea* has low numbers of individuals (0.15 individuals per hectare—Taraborelli et al. 2011), restricted distributional range, and high degree of specialization. Protection of its populations should be taking place because of its low abundance, restricted and patchy distribution, and high degree of specialization.

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