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Lasiurus varius (Chiroptera: Vespertilionidae)

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Abstract: *Lasiurus varius* (Poeppig, 1835) is a vespertilionid bat commonly known as Chilean red bat or cinnamon red bat. *L. varius* is characterized by its deep reddish coloration without frosted appearance, and by the uropatagium covered with long hairs that extend beyond the trailing edge, which clearly distinguishes it from the other species in the genus. The distribution of this rare species is restricted to the southern parts of Argentina and Chile.

Key words: Argentina, Chile, Chilean red bat, insectivorous bat, Vespertilioninae

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Lasiurus varius (Poeppig, 1835)
Cinnamon Red Bat

Nycticeius, Raff. *Species prima* Poeppig [spelled Pöppig], 1830: Column 217.
N[*ysticeius*]. *varius* Poeppig, 1835:451, footnote. Type locality "Antuco," Biobío, Chile.
Nycticeus Pæpingii Lesson, 1836:324. Type locality "Chili;" based on "*Nycticejus prima species*," Poeppig, 1830.
Nycticejus Pæpingii: Lesson, 1842:22. Name combination.
A[*talapha*]. *varia*: W. Peters, 1861:153. Name combination.
Lasiurus varius: Fitzinger, 1870:411. First use of current name combination.
[*Atalapha noveboracensis*] Var. (*Atalapha varia*): Dobson, 1878. Name combination.
[*Atalapha* (*Atalapha*) *borealis*] *varia*: Trouessart, 1897:122. Name combination.
[*Lasiurus* (*Lasiurus*) *borealis*] *varius*: Trouessart, 1904:87. Name combination.

CONTEXT AND CONTENT. Order Chiroptera, suborder Yangochiroptera, family Vespertilionidae, subfamily Vespertioninae, tribe Lasiurini, genus *Lasiurus*, subgenus *Lasiurus*. Historically, *L. varius* has been considered a subspecies or synonym of the eastern red bat *L. borealis* (Dobson 1878 as var. *Atalapha varia*; Osgood 1943; Cabrera 1958; Hall and Jones 1961; Mann Fischer 1978; Shump and Shump 1982; Koopman 1993) with a very wide distribution from Canada to Tierra del Fuego. Baker et al. (1988) separated the western red bat *L. blossevillii* (type locality Montevideo, Uruguay) from *L. borealis* without mentioning *L. varius*, presumably considering it as a synonym for *L. borealis*. Osgood (1943) indicated that the name *varius* was available for the Chilean race of *L. borealis*. It has been recognized as a distinct species (*L. varius*) because of its particular and differentiable pattern of pelage color and with a distribution restricted to the southern parts of Argentina and Chile (Barquez 1987; Mares et al. 1995; Barquez et al. 1999; Simmons 2005; Gardner and Handley 2008; Díaz et al. 2011, 2016; Rodríguez-San Pedro and Allendes 2016). Molecular analysis supports its recognition as a valid species (Baird et al. 2015); however, Rodríguez-San Pedro and Allendes (2016) pointed out that some Chilean authors still use the name *L. borealis*, despite the evidence that it is a distinct species. Synonymy follows Gardner and Handley (2008). *L. varius* is monotypic.

Nomenclatural Notes. In their treatment of *Lasiurus borealis*, Shump and Shump (1982) recognized five subspecies of *L. borealis*, and considered the saline red bat *L. salinae* Thomas, 1902, as a synonym of *L. b. varius*. However, Shump and Shump (1982) did not include the type locality of *L. salinae* within the distribution of *L. b. varius*. Mares et al. (1995) tentatively recognized *L. salinae* as a distinct species after collecting specimens that were morphologically distinct (i.e., darker and browner) from *L. borealis* captured in the same mist net on the same night in the Catamarca Province of Argentina. However, Morales and Bickham (1995), in a restriction fragment analysis of the 12S RNA of *Lasiurus*, found that the single specimen of *L. salinae* examined (identified by Mares et al. 1995 as this taxon) had the same haplotype as specimens of *L. blossevillii* from Argentina. This led Barquez et al. (1999) to suggest the two are conspecific and the specimens of *L. salinae* represent a color morph of *L. blossevillii*. Gardner and Handley (2008) continued to recognize *L. salinae* as a distinct species, although Barquez et al. (1999) confirmed that the type of *L. borealis salinae* (BMNH [Natural History Museum, London] 2.2.5.39) is a specimen of *L. blossevillii*. Although *L. salinae* may be synonymous with *L. blossevillii*, the synonymy with *L. varius* has been rejected by the molecular analysis of Baird et al. (2015). Other common names of this species are Chilean red bat, southern red bat, and murciélago rojo peludo.

DIAGNOSIS

Lasiurus varius (Fig. 1) is distinguishable from all other species of the genus by its deep reddish coloration, lack of frosting on pelage, uropatagium that is fur-covered on the dorsal side with the hairs extending beyond the distal margin; in the other species of *Lasiurus* the margin of the uropatagium is almost naked, not densely furred. Geographically, *L. varius* is sympatric with only one species of the genus, the South American hoary bat *L. villosissimus* (Barquez 1987; Mares et al. 1995; Barquez et al. 1999; Galaz and Yáñez 2006; Iriarte 2008; Barquez and Díaz 2009; Muñoz and Yáñez 2009; Baird et al. 2015; Novaes et al. 2018). *L. villosissimus* can be distinguish from *L. varius* by its strong frosted appearance with dominant gray and yellowish colors, hairy wings, and larger body size with length of forearms 50–56 mm (Barquez et al. 1999; Galaz and Yáñez 2006; Gardner and Handley 2008; Barquez and Díaz 2009; Díaz et al. 2011, 2016). Although *L. varius* is similar in size to the southern red bat *L. blossevillii*, it is slightly larger (total length 105–118 mm versus 92–112 mm; forearm 39–42 mm versus 37–41 mm) and lacks the frosted appearance typical of *L. blossevillii* (Barquez et al. 1999; Barquez and Díaz 2009; Díaz et al. 2011, 2016).

Fig. 1.—*Lasiurus varius* from Los Rios Region, Southern Chile. Photo by Gonzalo Ossa.

GENERAL CHARACTERS

The general color of *Lasiurus varius* is deep reddish and it lacks frosting (white tips) on the pelage (Fig. 1); dorsal hairs are long, tricolored, with the bases black for about 2 mm, followed by a yellowish band that gradually darkens and terminates in the brilliant cinnamon red color that characterizes this species (Barquez et al. 1999). A yellow shoulder patch is present and more pronounced than in other species of *Lasiurus*; the forehead, throat, neck, and nape are pale yellow-orange; on the tricolored hairs of the venter the black band is wider and the yellow band almost disappears, being continued by a terminal cinnamon red band; the snout is short and black (Poepping 1835; Tamayo and Pérez D'Angello 1979; Barquez et al. 1999; Galaz and Yáñez 2006; Galaz et al. 2009). The ears are markedly separated, black, small, rounded, and fringed with hairs along the basal outer margin; the antitragus is high and tragus is one-third the height of the pinna; ears and lips are naked and blackish (Tamayo and Pérez D'Angello 1979; Barquez et al. 1999; Galaz

and Yáñez 2006; Galaz et al. 2009). Wings are long and narrow. The uropatagium is covered dorsally by long hairs that extend beyond the trailing edge and ventrally is covered with yellow-orange hairs on its basal one-third portion; these hairs extend to the humeral area of the plagiopatagium to the elbow, and the proximal one-half of the fifth metacarpal to the basal one-fourth of the metacarpal of the fourth digit (Tamayo and Pérez D'Angello 1979; Barquez et al. 1999). Wing membranes are unornamented and black (Handley 1996).

The skull of *L. varius* is robust and the rostrum is short and wide. The nasals and the anterior portion of the palate are strongly invaginated so that the incisors of each side are separated by a wide gap (Fig. 2); the braincase is elevated and almost rounded with a ratio of 1.7 for the total length/braincase width. The median anterior margin of the palate is aligned with the small premolars and extends posteriorly beyond M3; the hamular process of the pterygoids extends to the height of the glenoid fossae. The caudal spine of the palate is well developed in *L. varius*, whereas in *L. blossevillii* it is undifferentiated (Barquez et al. 1999). The sagittal crest is normally reduced, although in some specimens it is evident toward the anterior part of the braincase. The lambdoid crests are slightly developed and the paraoccipital process is small but sharp. The zygomatic arches are thin and the tympanic bullae are well developed, but barely cover one-half of the cochlea (Barquez et al. 1999; Galaz and Yáñez 2006; Giménez and Giannini 2011).

Ranges of external measurements (mm, *n* =; 7) for adult specimens from Neuquén and Río Negro provinces, Argentina (Barquez et al. 1999) were: total length, 105.0–118.0; tail length, 44.0–58.0; length of hind foot, 6.0–10.0; ear length, 9.0–13.9; forearm length, 39.9–42.1. Body masses for two individuals were 9.5 and 11.0 g (Barquez et al. 1999). Means (and range) of external measurements (g or mm) for two females from Chubut Province, Argentina (Giménez et al. 2012) were: body mass, 11.3 (10.1–12.4); total length, 112.5 (104–121); head–body length, 59 (53–65); tail length, 53.5 (51–56); ear length, 13.5 (13–14); length of tragus from medial notch to tip, 6.5 (6–7); forearm length, 40.7 (40.3–41.6); length of hind foot with nail, 7.1 (6.8–7.3); length of hind foot without nail, 5.9 (5.9–5.9); length of ulna, 19.7 (19.5–20.0); thumb length, 6.7 (6.4–7.0); length of fifth finger, 56 (55–57); wingspan 300.5 (296–305); length of extended wing, 133.5 (129–138); length of third finger, 85.5 (82–89). For *L. varius* in Chile, Gantz and Martínez (2000) provided a total length range of 106–113 mm and mean body mass of 9.1 g; Mann Fischer (1978) reported the following ranges for external measures (mm): total length 106–113, tail length 57–58, and forearm length 36–42; Osgood (1943) indicated a forearm length of 36–42 mm. Mean measurements (mm ± *SD*) for 27 specimens, four females and 23 males, respectively, from four different regions in Chile (Biobío, Los Ríos, Los Lagos, and Metropolitana) were: body mass, 11.7 ± 1.8, 11.4 ± 2.0; total length, 105.8 ± 5.2, 105.4 ± 5.3; forearm length, 40.8 ± 1.3, 40.7 ± 1.3; tragus length, 4.5 ± 0.6, 4.6 ± 0.6; ear length, 10.0 ± 0.6, 10.0 ± 0.5; and length of the fifth finger, 49.5 ± 2.8, 49.4 ± 2.7 (G. Ossa, in litt.). Measurements (mm) for a male collected in San Gregorio (Chile) were: head–body length, 49; tail length, 46; length of hind foot, 7.5; forearm length, 37.5; tibia length, 18; metacarpal length of the third digit, 42; length of first phalange of the third digit, 18; length of second phalange of the third digit,

Fig. 2.—Dorsal, ventral, and lateral views of skull and lateral view of mandible of an adult male of *Lasiurus varius* (CML [Colección de Mamíferos Lillo, Universidad Nacional de Tucumán] 10856) from Parque Nacional Nahuel Huapi. 10 km al O de Villa Traful, Arroyo Media Luna, sobre ruta 65, Los Lagos Department, Neuquén Province, Argentina. Greatest length of skull is 13.38 mm. Photo by Pablo Gaudioso used with permission.

17.5; length of metacarpal of the fourth digit, 39.5; length of first phalange of the fourth digit, 12; length of second phalange of the fourth digit, 11.5; length of metacarpal of the fifth digit, 37.5; length of first phalange of the fifth digit, 7.52; length of second phalange of the fifth digit, 8.5; total length of skull, 13.4 (Tamayo and Pérez D'Angello 1979).

Range of skull measurements (mm) of seven adult specimens, unless designated otherwise, from Neuquén and Río Negro provinces, Argentina (Barquez et al. 1999) were: condylobasal length, 12.2–12.9; least interorbital breadth, 5.9–6.1; zygomatic breadth, 9.6–9.8; greatest length of skull, 12.8–13.4; postorbital constriction, 4.3–4.7; breadth of braincase, 7.5–8.0; length of maxillary toothrow, 4.5–4.7; palatal length, 5.3–5.9 (n =; 6); mastoid breadth, 7.0–8.2; length of mandibular toothrow, 5.3–5.4; length of mandible, 9.7–10.0; width across canines, 5.0–5.4; width across molars, 6.1–6.5. Mean cranial measurements (mm; ± *SD* and parenthetical range) of five adult specimens from the same provinces (Giménez and Giannini 2011) were: condylobasal length, 12.91 ± 0.08 (12.85–13.04); zygomatic breadth, 9.67 ± 0.18 (9.49–9.93); height of braincase, 5.85 ± 0.16 (5.62–6.06); mastoid breadth, 7.92 ± 0.11 (7.77–8.04); maximum external width between left and right upper molars, 6.26 ± 0.23 (5.93–6.55); length of maxillary toothrow, from the anterior margin of the canine to the posterior margin of the last molar, 4.66 ± 0.08 (4.57–4.79); postorbital constriction, 4.66 ± 0.09 (4.52–4.74); length of rostrum, 2.67 ± 0.10 (2.54–2.82); upper canine length, 2.18 ± 0.32 (1.62–2.41); length of upper third premolar, 1.37 ± 0.16 (1.16–1.51); mandible body height at lower third premolar, 1.42 ± 0.12 (1.26–1.59); lower canine length, 2.02 ± 0.17 (1.83–2.22); length of mandibular toothrow, from the anterior margin of the canine to the posterior margin of the last molar, 5.37 ± 0.06 (2.74–5.45); coronoid process height, 2.92 ± 0.26 (2.74–3.39).

Cranial measurements (mm) of a female from Chubut Province, Argentina (Giménez et al. 2012) were: condylobasal length, 13.32; zygomatic breadth, 9.77; height of braincase, 5.74; cranial width, 8.14; palate width between lingual edge of upper third molars, 6.65; upper toothrow length (from the anterior margin of the canine to the posterior margin of the last molar), 4.73; lower toothrow length, 4.76; postorbital constriction, 3.18; rostrum length, 5.69; palatal length, 2.29; upper canine length, 5.36; lower canine length, 1.52; width between upper canines, 9.91; third upper premolar length, 1.45; mandible height, 5.43; coronoid height, 3.17 (the mandible length of 2.08 was erroneously indicated).

For *L. varius* in Chile, Mann Fischer (1978) provided the following range of measurements (mm): total length of skull, 11.9–12.7; basal length of skull, 11.5–11.8; zygomatic width, 8.6–9.2. Cranial measurements (mm), some not conventional but explained by Tamayo and Pérez D'Angello (1979) in their article, for a male collected in San Gregorio (Chile) were: total length of skull, 13.4; condylobasal length, 11; palatal length, 5.5, postpalatal length, 5.7; postmolar length, 9; mandibular length, 8.5; tympanic bulla length, 3.7; frontal breadth, 4.7; braincase breadth, 7.8; rostrum breadth, 5; palatal breadth, 6.6; mandibular breadth (taken as the maximum width of the mandible between the outermost point of the inferior border of each hemimandible), 7.5; upper toothrow length, 4.5; lower toothrow length, 5.3.

DISTRIBUTION

Lasiurus varius is known from central and southern Chile, and southern Argentina (Fig. 3; Redford and Eisenberg 1992; Barquez et al. 1999; Gardner and Handley 2008). In Chile, *L. varius* was reported from Ovalle, Coquimbo (30°34′S) to Tierra del Fuego (54°7′S) (Koopman 1967; Rau and Yañez 1979; Tamayo and Pérez D'Angello 1979; Rodríguez-San Pedro and Allendes 2016). In Argentina, it is distributed from Chos Malal, Neuquén Province (37°22′S), south to Los Glaciares National Park, Santa Cruz Province (50°6′S—Barquez 1987; Mares et al. 1995; Barquez et al. 2013; Udrizar Sauthier et al. 2013; Díaz et al. 2017). *L. varius* is distributed in the forests and open steppe areas of the Patagonia (Barquez et al. 1999, 2013; Udrizar Sauthier et al. 2013). Gardner and Handley (2008) indicated the presence of *L. varius* in the Argentine part of Tierra

Fig. 3.—Geographic distribution of *Lasiurus varius*. The star indicates the type locality: Antuco, Biobío, Chile. Map drawn by M. Mónica Díaz.

del Fuego, citing Dabbene (1902) who mentioned the presence of *Atalapha borealis* in Ushuaia (Tierra del Fuego, Argentina) and suggested that it was probably imported by some ship; no voucher specimens are known from this area.

Tamayo and Pérez D'Angello (1979) postulated the following hypotheses to explain the presence of *L. varius* south of the Strait of Magellan: a) the species is resident of the region but has not been observed; b) it is not a resident and collected specimens correspond to passive or accidental transportation; c) it performs regular seasonal movements to the south during the warmer season; d) it does not perform regular seasonal movements to the south, but in the warmer season it occasionally expands its distributional area. To date, none of these hypotheses have been rejected. Fossils for *L. varius* are not known.

FORM AND FUNCTION

Form.—The dental formula of *Lasiurus varius* is I 1/3, C 1/1, P 2/2, M 3/3, total 32. Upper incisor is triangular and inclined inward, its internal face is furrowed, and its base is in contact with the upper margin of the cingulum of the canine; the canines are long and sharply pointed; the P1 is small, rounded, and displaced to the lingual side of the toothrow so that the canine and P2 are in contact with one another, and P1 is not visible in lateral view. P2 is well developed and unicuspidate. M1 and M2 are well developed; the cusps form a "W," the protocone is elevated and sharpened, and the hypocone absent; M3 has only two commissures. The lower inner incisors are trilobed, while the others are bilobed; the incisors form a continuous row that completely fills the space between the canines; p1 is small (p2 is more than twice as large as p1), and both have small paraconids and metaconids; trigonid of m1 and m2 is about the same size as the talonid; the talonid of m3 is much larger than the trigonid because the hypoconid and entoconid are closer to each other, and the protoconid and metaconid are well separated (Barquez et al. 1999). The p3 and the lower canines are comparatively longer than in *L. blossevillii* (Giménez and Giannini 2011).

According to Mann Fischer (1978), this species has an extraordinarily long third finger, and an equally long and narrow dactylopatagium, which favors fast flight speeds and allows travel of long distances. This long third digit creates difficulty in the complete flexing of the wing at rest. However, the advanced elasticity of the patagial membranes combined with a unique mechanisms of passive flexion of the forearm over the arm, based on muscles that extend between the distal end of the humerus and the carpus, acting like ligaments automatically flex the hand when the forearm is folded.

According to Kunz (1982), bats that use external roosts, including *L. borealis*, *L. varius*, and the North American hoary bat *L. cinereus*, have typically thick, long, woolly pelage and probably benefit from increased insulation. Male individuals of *L. varius* have more pronounced coloration tones than females (Rodríguez-San Pedro et al. 2014).

The intestines have a reduced length of 120 mm on average, which is a 3:1 proportion in relation to the total length of the body (Mann Fischer 1978). A highly vascularized "adipose tissue" mass is found on the interscapular dorsal area, as a metabolic reserve for hibernation (Mann Fischer 1978). Typically, female bats have two mammae but females of the genus *Lasiurus* have four (Hayssen et al. 1993).

Function.—Canals et al. (2005) estimated the size of the heart and lungs of several species of bats including *Lasiurus varius* from Chile (identified as *L. borealis*). They concluded that bats have the largest relative heart and lung size of all mammals, associated with the high energetic costs of flight. The heart mass of *L. varius* was estimated as 1.55 ± 0.27% of body mass, and the relative lung size as 0.064 ± 0.004 cm^3/g.

Studies of echolocation of insect-eating bats by Schnitzler and Kalko (2001) reported that bats hunting in open, uncluttered space, high above the ground or canopy and far from obstacles, are found mainly in four families and included the evening bats (family Vespertilionidae, genus *Lasiurus*). They indicated that these bats, when searching for insects, have no masking problem as long as the emitted signal does not overlap the returning insect echo. However, they often have the problem of rather small

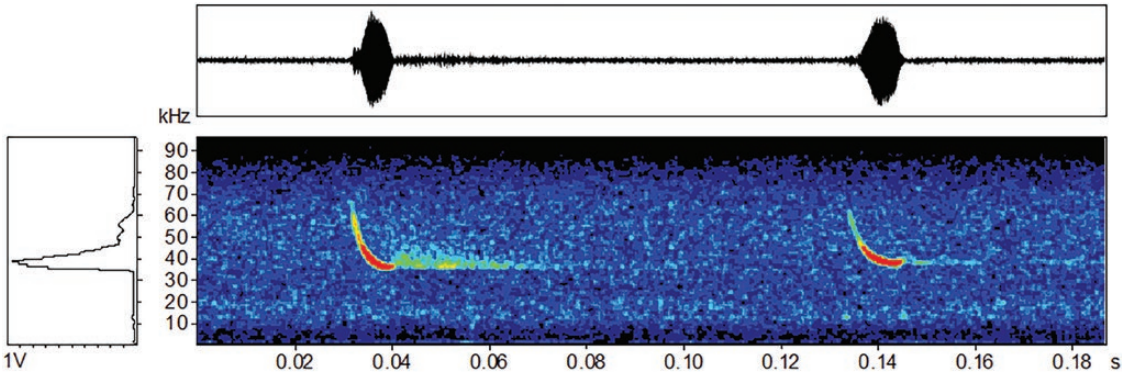

Fig. 4.—Sonogram of *Lasiurus varius* from the coast of the Biobío region, Central Chile. Y-axis represents frequencies (kHz) and X-axis represents time (s). Spectrogram was created using Avisoft SAS-Lab Pro V5.2.07 (Avisoft Bioacoustics, Berlin, Germany). Parameters were: fast Fourier transform length 256; frame size 100%; overlap 75%.

prey being sparsely distributed in a large space, requiring the coverage of a large search area to find an insect.

The echolocation calls of *L. varius* contain a single harmonic and are characterized by a downward frequency modulation at the beginning of the signal, followed by a narrowband quasi-constant frequency component (Ossa 2010; Ossa et al. 2010; Rodríguez-San Pedro and Simonetti 2013a, 2014). Search calls of 28 individuals from central Chile (Ossa et al. 2010; Rodríguez-San Pedro and Simonetti 2014) consisted of medium (7.6 ± 0.2 ms) broadband signals sweeping down between 52.2 ± 0.8 and 33.1 ± 0.3 kHz, with most energy at 36.4 ± 0.3 kHz (Fig. 4). Variations in search phase pulses according to the degree of clutter have been described (Rodríguez-San Pedro and Simonetti 2014).

ONTOGENY AND REPRODUCTION

A pregnant female with two embryos was captured on 22 November 1979 and a juvenile at the end of February in Río Negro (Argentina—Barquez et al. 1999); pregnant females were collected in Neuquén (Argentina) on 3 December 1991 (Mares et al. 1995). One of us (GO) captured two pregnant females during November 2009 in Santiago, Chile and Mann Fischer (1978) reported males with descended and enlarged testes from central Chile during the months of August and September. Females of the genus *Lasiurus* have four mammae and generally give birth to more than two young (Barquez et al. 1999). *L. varius* has a wide discoidal placenta and typically gives birth to twins (Mann Fischer 1978; Galaz and Yañez 2009). Neonates of *Lasiurus* have fine hair at birth and open their eyes at 10–12 days (Hayssen et al. 1993).

ECOLOGY

Members of the genus *Lasiurus* typically roost among leaves in densely foliated tree canopies and usually are solitary or form small family groups (Kunz and Lumsden 2003). *L. varius* has been found in day roosts in trees and, less commonly, on rocks along the coast of Chile (Mann Fischer 1978). Rau and Yañez (1979) mentioned specimens from Parque Nacional "Torres de Paine" (Ultima Esperanza Province, XII Region) roosting in branches of a fruit tree; a specimen was captured as it roosted with two other bats of the same species, in a small artificial conifer forest near a road in Chile, about 30 m from the coast (Tamayo and Pérez D'Angello 1979). Although Rodríguez-San Pedro et al. (2014) considered *L. varius* as solitary, in National Park Los Glaciares, Argentina, a group of four individuals was reported from Santa Cruz Province roosting in an apple tree (*Malus domestica* Rosaceae—Díaz et al. 2017).

Giménez and Giannini (2011) state that in Argentina *L. varius* is endemic to the Patagonian temperate rainforest and adjacent areas of the Patagonian steppe, and allopatric with the other three species of the genus (the southern yellow bat *L. ega*, *L. villosissimus*, and *L. blossevillii*). However, in Chile this species was recorded to be sympatry with *L. villosissimus* at several localities (Galaz et al. 2009; Rodríguez-San Pedro and Simonetti 2013b). In Argentina, *L. varius* was collected with the southern big-eared brown bat *Histiotus magellanicus* and the Chilean myotis *Myotis chiloensis* in an area of Patagonian forest dominated by *Nothofagus pumilio*, *N. betuloides*, and *Drymis winteri* (Díaz et al. 2017). In Chile, it is associated with sclerophyllous forests in Central Chile; Valdivian temperate forests elsewhere, where it is often located in tree branches and hollow trunks, and in pine or eucalyptus plantations, or along vegetation edges, but also within the interior of the habitats (Rodríguez-San Pedro and Simonetti 2013b; Rodríguez-San Pedro et al. 2014). In the interior habitats of pine plantations, the high activity levels observed suggest that *L. varius* along with the small big-eared brown bat, *Histiotus montanus*, and the Chilean myotis not only pass through exotic plantations, but that they are active in these habitats commuting and feeding (Rodríguez-San Pedro and Simonetti 2013b).

The high activity of *L. varius* observed in local human settlements could be explained by its ability to fly in open spaces and its reliance on insects that accumulate around streetlights (Jung and Kalko 2010; Rodríguez-San Pedro and Simonetti 2013b). Medium-size fast-flying bats, such as those of the genus *Lasiurus*, typically fly back and forth in straight flight along rows of streetlights, patrol the street and dive toward insects in the light cone; this behavior is the most characteristic of bats that hunt near lights (Rydell 2006). *L. varius* is a fast-flying species with low maneuverability, expected to be clutter-sensitive (Schnitzler et al. 2003; Rodríguez-San Pedro and Simonetti 2014, 2015). In the clutter of plantations it uses service roads as flyways and adjusts its echolocation calls (Rodríguez-San Pedro and Simonetti 2014, 2015).

There are almost no studies about diet of *L. varius* but, according to Mann Fischer (1978) it feeds on voluminous prey such as nocturnal Lepidoptera and Coleoptera. Giménez and Giannini (2011) analyzed statistically the relationships between the use of space and resources by small and large species of *Lasiurus* that inhabit the South American Southern Cone. They predicted that the allopatric *L. blossevillii* and *L. varius* would show little differences in type of prey (e.g., proportion of small versus large or soft- versus hard-bodied insects), as these differences would be primarily due to local prey availability in the regions they inhabit.

The typical solitary behavior of species of *Lasiurus* and their tree roosting habits (Mann Fisher 1978) make their contact with humans and domestic animals infrequent; and could account for the uncommon submissions of *Lasiurus* for rabies diagnosis (de Mattos et al. 2000). In Chile, in 41 isolates of rabies virus from insectivorous bats characterize using eight anti-nucleoprotein monoclonal antibodies (N-Mabs) and nucleotide sequence analysis, only four were genetically associated with *Lasiurus* (Yung et al. 2002). Rabies lineages from other bat species have been found in genus *Lasiurus*, suggesting cross-species transmission, contrasting with a report from North America, where *Lasiurus*

are more likely to be donors than recipients of spillover (Escobar et al. 2015).

GENETICS

The karyotype of *Lasiurus varius* is unknown. The phylogenetic position of *L. varius* varies among loci examined; with *ND2* (NADH dehydrogenase 2) and *DBY* (dead box Y) it is well supported as sister to the clade containing the other species of red bat (as defined by Baird et al. 2015), whereas with *Cytb* it is sister to *L. blossevillii* with only strong maximum likelihood support, and with *ND1* it is sister to a clade containing *L. borealis*, Pfeiffer's red bat *L. pfeifferi*, and the Seminole bat *L. seminolus* with only strong Bayesian support (Baird et al. 2015). The phylogenetic position from the combined analysis of sequence data from these four loci strongly supports *L. varius* as sister to a clade containing the other species of red bats (Baird et al. 2015).

CONSERVATION

Lasiurus varius is considered as "Least Concern" by the International Union for Conservation of Nature and Natural Resources in the IUCN Red List of Threatened Species because of its wide distribution and presumed large population size (Solari 2018). In Chile, *L. varius* was evaluated in the 12° process of species classification as "Least Concern" (Ministerio de Medio Ambiente 2015). In Argentina, it was not evaluated and is considered as belonging to "Data Deficient" category (Díaz 2012).

REMARKS

Several authors have misinterpreted the red phase of some specimens and populations of *Lasiurus blossevilli* as corresponding to *Lasiurus varius* resulting in an erroneous and confusing interpretation of the general distribution of *L. varius* in some of the earlier publications. For example, Cabrera (1958) established that *L. varius* was found from southern Peru southward into Chile to the province of Valdivia, and in western Argentina, because of the inclusion of red phase specimens of *L. borealis* (Barquez et al. 1999). Anthony (1923:9) erroneously reported *L. varius* from Colombia but stating that: "Owing to lack of comparative material and the apparent confusion of earlier writers in dealing with the reddish South American Lasiuri, it is impossible to do more than adopt some such temporary expedient." Olrog (1959) mentioned specimens of *L. b. varius* from the provinces of Tucumán and Jujuy, in northwestern Argentina, which were re-identified as *L. b. blossevillii* in Barquez et al. (1999). Rodríguez-San Pedro and Allendes (2016) suggested that the reasons some authors (Mann Fischer 1978; Galaz and Yáñez 2006; Galaz et al. 2009) included northern Chile as part of the "potential" distribution of *L. varius*, was perhaps based on the fact that they considered *L. borealis* was a single species, broadly distributed from North America south to South America.

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