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RESEARCH ARTICLE

Redescription of *Myotis atacamensis* (Chiroptera: Vespertilionidae) with neotype designation

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ABSTRACT. *Myotis atacamensis* (Lataste, 1892) was described based on three syntypes from San Pedro de Atacama, Chile. The type series is lost. The original description was based on few external and cranial characters, and the diagnosis became obsolete and useless considering the current diversity of South American *Myotis*. Based on 12 specimens of *M. atacamensis* from southern Peru and northern Chile, we provide a morphological comparison with its South American congeners, designate a neotype, and provide a new diagnosis.

KEY WORDS. Atacama *Myotis*, desert habitat, Myotinae, neotype, taxonomy.

INTRODUCTION

Myotis Kaup, 1829 is the most speciose genus of mammal, with more than 140 species distributed worldwide (Moratelli et al. 2019a, MDD 2021). Currently, 22 South American species of *Myotis* are recognized, and ca. 40% of them were described or recognized in the last decade, demonstrating a considerable recent increase in the taxonomic knowledge of this genus (Moratelli and Wilson 2011, 2014, Moratelli et al. 2011, 2013, 2016, 2017, 2019b, Carrión-Bonilla and Cook 2020, Novaes et al. 2021a). However, many species described during the 19th and 20th centuries, such as *Myotis atacamensis* (Lataste, 1892), still have their taxonomic limits unresolved.

Myotis atacamensis occurs from southern Peru to central Chile, mostly in xeric habitats from lowlands to the western slope of the Andes (Ossa et al. 2017, Moratelli et al. 2019a, Rodríguez-San Pedro et al. 2020). Due to a relatively small distribution dependent on specific habitats that are under severe disruption by agricultural activity and expansion of wind farms, this species is classified as endangered on the IUCN Red List (Vargas-Rodríguez et al. 2016).

Myotis atacamensis was originally described as *Vespertilio atacamensis* Lataste, 1892 and transferred to *Myotis* by Trouessart (1904). Lataste's description was based on three syntypes collected in February 1885 from San Pedro de Atacama, Antofagasta, Chile, and deposited at the Museo Nacional de Historia Natural (Santiago, Chile). The syntypes were a mounted specimen (number 277), a skull (number 1007), and a fluid preserved specimen (number 276). According to LaVal (1973), these specimens are lost or, more probable, were destroyed. Since LaVal's publication, after almost 50 years, efforts to find the type were unsuccessful.

The South American *Myotis* is a taxonomic puzzle due to morphological similarity among species phylogenetically close. Consequently, there are cryptic species of *Myotis* and recent systematic reviews have demonstrated the existence of independent evolutionary lineages being treated as a unique species (Larsen et al. 2012, Carrión-Bonilla and Cook 2020, Novaes et al. 2021a, 2021b, 2021c). *Myotis atacamensis* is at the center of this debate, where populations from northern and central western Peru misidentified as *M. atacamensis* were recently described as a new species (Moratelli et al. 2019b). Furthermore, there is evidence of the existence of unidentified lineages in northern and central Chile, probably occurring in sympatry with *M. atacamensis* (Novaes et al. 2018). This scenario demonstrates the importance of name-bearing type to define the nominal taxon objectively, considering the nomenclatural dynamism that the *Myotis* is experiencing in the Neotropics.

In accordance with Article 75 of the International Code of Zoological Nomenclature (ICZN 1999), we designate a neotype for *M. atacamensis* and present a redescription of the species, including a morphological diagnosis based on current knowledge about the taxonomy of neotropical species of *Myotis*.

MATERIAL AND METHODS

The redescription is based on 12 specimens of *M. atacamensis* from southern Peru and northern Chile deposited in the following zoological collections: Field Museum of Natural History (FMNH, Chicago, USA), Museum of Vertebrate Zoology (MVZ, Berkeley, USA), Smithsonian National Museum of Natural History (USNM, Washington, D.C., USA), and Muséum d'Histoire Naturelle (MHNG, Geneva, Switzerland). The identification of specimens was made from morphological characters available in the literature (e.g., Lataste 1892, Miller and Allen 1928, LaVal 1973, Moratelli et al. 2019b).

Comparative analyses were based on 368 specimens from seven South American *Myotis* species deposited in 12 zoological collections from Argentina, Switzerland, and United States (Appendix 1). Species selected for comparisons include those that occur in the western Andes and Southern Cone: *M. albescens* (É. Geoffroy, 1806), *M. bakeri* Moratelli, Novaes, Carrión-Bonilla & Wilson, 2019, *M. chiloensis* (Waterhouse, 1840), *M. dinellii* Thomas, 1902, *M. keaysi* J.A. Allen, 1914, *M. oxyotus* (Peters, 1866), and *M. riparius* Handley, 1960.

Qualitative morphological comparisons follow the external and cranial characters described by Moratelli et al. (2011, 2013) and Novaes et al. (2021a). External measurements, including the head-body length (HB), tail length (TL), hind foot length (HF), ear length (EL), and body mass (BM), were recorded from skin labels, and reported to the nearest millimeter and to the nearest gram. Cranial and other external dimensions were taken using digital calipers accurate to 0.01 mm, including: forearm length (FA), third metacarpal length (3MC), length of dorsal hair (LDF), length of ventral hair (LVF), greatest length of skull (GLS), condylocanine length (CCL), condylobasal length (CBL), condylo-incisive length (CIL), basal length (BAL), zygomatic breadth (ZB), mastoid breadth (MAB), braincase breadth (BCB), interorbital breadth (IOB), postorbital breadth (POB), breadth across canines (BAC), breadth across molars (BAM), maxillary toothrow length (MTL), length of the upper molars (M1–3), mandibular length (MAL), and mandibular toothrow length (MAN). These measurements are described in detail by Novaes et al. (2021b). Capitalized color nomenclature follows Ridgway (1912).

The designation of the neotype was made considering specimen preservation, biogeographic context, and the access to museum in a global context, following all directives from Article 75 of ICZN (1999).

TAXONONY

Myotis atacamensis (Lataste, 1892)

Atacama *Myotis* – vernacular name.
Vespertilio atacamensis Lataste, 1892: 79.
Myotis chiloensis atacamensis: Miller and Allen, 1928: 192.
Myotis nigricans nicholsoni Sanborn, 1941: 382.

Neotype. Adult female (USNM 391786; Figs 1–5) collected by W. Mann and S. Mann on January 1944. The skin and skeleton are complete, and skull is partially damaged but in good condition. The neotype is deposited in the National Museum of Natural History, Washington, D.C., USA.

New type-locality. Near Minimini, Tarapacá, Chile (19°10'S, 69°41'W; elevation 1,800 m), inside Atacama desert.

Diagnosis. Small size (FA 30.6–34.1 mm; GLS 12.6–13.6); dorsal fur long (7–9 mm), silky, and tricolored, with dark-brown bases (near Bone Brown), pale yellowish middle portions (near Pale Olive-Buff), and yellowish-brown tips (near Light Ochraceous Buff); dorsal surface of the uropatagium covered by dense fur extending just beyond the knees; presence of a fringe of sparse hairs on the distal border of the uropatagium; plagiopatagium connected to the feet by a broad band of membrane. Sagittal crest usually absent; elongated and narrow skull; braincase remarkably inflated and high in profile; braincase roof formed by the parietal bone is straight; forehead steeply sloping in lateral view; narrow and short rostrum; posterior region of the braincase rounded and quite projected beyond the limit of the occipital condyles; mastoid processes narrow.

Description and comparisons. Dental formula is I 2/3, C 1/1, PM 3/3, M 3/3 (2x) = 38, and the teeth are small. Skull small (measurements in Table 1); forehead steeply sloping with inflated

Table 1. External and craniodental measurements of *Myotis atacamensis* from Chile and Peru.

Measurements	Neotype	Other specimens
	USNM 391786	Mean (Max–Min) N
HB	74.0	79.0 (74.0–85.0) 3
TL	34.0	37.5 (34.0–42.0) 3
HF	6.0	(6.0–7.0) 2
EL	14.0	(13.0–14.0) 2
BM	4.0	(3.8–4.0) 2
FA	31.3	32.2 (30.6–34.1) 3
3ML	29.4	30.4 (29.1–32.9) 3
LDF	8.2	7.7 (7.0–8.8) 3
LVF	6.3	6.3 (5.9–6.7) 3
GLS	12.8	12.9 (12.6–13.6) 8
CCL	11.1	11.2 (10.9–11.8) 8
CBL	11.6	11.9 (11.5–12.5) 8
CIL	11.8	12.0 (11.7–12.6) 8
BAL	10.8	10.8 (10.5–11.4) 8
ZB	–	6.7
MAB	6.5	6.5 (6.3–6.7) 6
BCB	6.3	6.2 (6.1–6.5) 7
IOB	3.6	3.7 (3.6–3.8) 8
POB	3.0	3.1 (3.0–3.2) 8
BAC	2.8	2.9 (2.8–3.0) 7
BAM	4.7	4.7 (4.6–4.9) 7
MTL	4.7	4.7 (4.4–5.1) 7
M1–3	2.7	2.7 (2.6–2.9) 7
MAL	8.9	8.8 (8.6–9.3) 5
MAN	5.0	4.9 (4.7–5.3) 7

Figures 1–3. Ventral (1), dorsal (2), and lateral (3) views of the skull, and lateral view of the mandible of the neotype of *Myotis atacamensis* (USNM 391786) from Atacama Desert, Tarapacá, Chile. Scale bar = 10 mm. Photos by Melissa Hawkins.

Figures 4–5. Dorsal (4) and ventral (5) views of the skin of the neotype of *Myotis atacamensis* (USNM 391786) from Atacama Desert, Tarapacá, Chile. Photos by Melissa Hawkins.

braincase; braincase roof is straight; mastoid processes narrow and poorly developed; rostrum narrow and comparatively short; the sagittal crest and lambdoidal crests are usually absent; and the occipital region is rounded and conspicuously projected beyond the posterior surfaces of the occipital condyles (Figs 1–3). The second upper premolar (P3) is a little smaller than the first upper premolar (P2), aligned in the toothrow and visible labially in all individuals (Figs 1–3).

Ears are moderate in size, but not reaching the nostrils when extended forward. The tragus is elongated, with a broad base and a narrower terminal half; the front edge is almost straight and the tip rounded. Membranes and ears are medi-

um-brown. Plagiopatagium is connected to the feet at the level of the toes by a broad band of membrane; a fringe of scattered hairs on the distal border of the uropatagium is present and visible only under magnification (although less evident than in *M. albescens*). Dorsal surface of the uropatagium barely furred, with hairs not extending beyond to the knees. Silky and long fur; dorsal hairs tricolored, with dark-brown bases (2/5 of total hair length), pale yellowish middle portions (2/5 of total hair length), and yellowish-brown tips (1/5 of total hair length), however, the contrast between tip and middle portion of the hair is quite subtle (Figs 6, 7). Ventral fur strongly bicolored, with Bone Brown bases (2/3 of total hair length) and Pallid Brownish Drab tips (1/3 of total hair length). The whitish-gray venter contrasts with the yellowish-brown dorsum (Figs 6, 7).

Myotis atacamensis differs from all South American congeners by the tricolored dorsal fur. In addition, considering either the assemblage of *Myotis* that occurs on the west side of the Andes (*M. albescens*, *M. bakeri*, *M. chiloensis*, *M. diminutus*, *M. oxyotus*, and *M. riparius*) or the taxa that occur in mountainous or open environments of the Southern Cone (*M. albescens*, *M. dinellii*, *M. keaysi*, *M. oxyotus*, and *M. riparius*), it can also be distinguished from all by the set of diagnostic traits reported above. Among them, *M. atacamensis* is externally closer to *M. bakeri*, from which it can be distinguished by slightly lighter dorsal fur (near Light Ochraceous Buff on the tips in *M. atacamensis* and near Buckthorn Brown on the tips in *M. bakeri*); presence of a fringe of hairs along the trailing edge of uropatagium (absent in *M. bakeri*); and narrower skull (e.g., POB < 3.5 in *M. atacamensis*, POB ≥ 3.5 in *M. bakeri*; see Moratelli et al. 2019b).

From *M. albescens*, *M. atacamensis* can be distinguished by the paler dorsal fur color (dorsal fur medium to dark brown on the bases [4/5 of the total fur length] and yellowish on the tips [1/5] in *M. albescens*, conveying a brownish general appearance to the dorsum; in contrast with bases and tips strongly contrasting and general yellowish appearance in *M. atacamensis*). Additionally, *M. albescens* have the throat yellowish, grading to whitish towards the abdomen and sides of the body, and a more globular braincase (see Moratelli and Oliveira 2011);

Figures 6–7. Details of tricolored dorsal fur (6) and bicolored ventral fur (7) of *Myotis atacamensis* (MVZ 116638).

whereas in *M. atacamensis* the entire venter, from the throat to the abdomen, is whitish-gray and the skull is narrower and the braincase is less globular.

Myotis atacamensis can be distinguished from *M. diminutus* and *M. oxyotus* by the dorsal fur paler and with strong contrast between bases and tips, and the ventral fur whitish-gray; whereas the dorsal fur is darker and slightly bicolored, and the ventral fur is yellowish in *M. diminutus* and *M. oxyotus*. *Myotis atacamensis* is smaller than *M. oxyotus* in virtually all external and cranial measurements (e.g., GLS 12.6–13.6 mm in *M. atacamensis*, 14.1–15.0 mm in *M. oxyotus*; POB 3.0–3.2 mm in *M. atacamensis*, 3.3–3.9 mm in *M. oxyotus*; MAL 8.6–9.3 mm in *M. atacamensis*, 9.9–11.2 mm in *M. oxyotus*), and tends to be smaller than *M. diminutus* in forearm length (FA 30.6–34.1 mm in *M. atacamensis*; 33.3–33.4 mm in *M. diminutus*), although there is an overlap with larger individuals of *M. atacamensis*, both in external and in cranial measurements (see Moratelli and Wilson 2011, 2015, Moratelli et al. 2013).

From *M. chiloensis*, it can be distinguished by the silky, brighter, and longer fur. *Myotis atacamensis* has dorsal fur with strong contrast between bases (blackish) and tips (yellowish), and whitish-gray venter; whereas in *M. chiloensis*, the fur is woolly and shorter; dorsal pelage with weak contrast between bases (dark brown) and tips (reddish-brown) and yellowish-brown venter (see Novaes et al. 2018). Beyond the very distinct dorsal and ventral fur colors, *M. atacamensis* can be distinguished from *M. chiloensis* by generally smaller size (FA 30.6–34.1 mm in *M. atacamensis*, 35.5–41.2 mm in *M. chiloensis*; GLS 12.6–13.6 mm in *M. atacamensis*, 13.8–15.3 mm in *M. chiloensis*).

In relation to *M. dinellii*, it can be distinguished by lighter dorsal fur (near Light Ochraceous Buff on the tips in *M. atacamensis* and from Buckthorn Brown to Dresden Brown on the tips in *M. dinellii*) and membranes (almost blackish in *M. dinellii*); shorter ears; general smaller size (FA 30.6–34.1 mm in *M. atacamensis*, 34.4–40.6 mm in *M. dinellii*; GLS 12.6–13.6 mm in *M. atacamensis*, 13.9–15.2 in *M. dinellii*); skull higher in lateral view, braincase more globose, and frontals conspicuously steeply sloping.

Myotis atacamensis can be distinguished from *M. keaysi* and *M. riparius* by its general smaller size (FA 30.6–34.1 mm in *M. atacamensis*, 38.5–43.4 mm in *M. keaysi*, 36.0–38.4 mm in *M. riparius*; GLS 12.6–13.6 mm in *M. atacamensis*, 13.9–14.7 mm in *M. keaysi*, 13.3–14.4 mm in *M. riparius*), paler, longer, and silky fur (shorter, woolly, and either brownish or reddish-brown in *M. keaysi* and *M. riparius*). In relation to skull morphology, it differs from *M. keaysi* and *M. riparius* by sagittal crest absent, mastoid process narrower and poorly developed, and shorter rostrum.

In addition to these characters aforementioned, *M. atacamensis* differs from all its South American congeners, excepts *M. albescens*, *M. levis* (I. Geoffroy, 1824), and *M. dinellii*, by the presence of a fringe of scattered hair on the distal edge of the uropatagium.

Distribution. It is known from western Peru to central Chile (Fig. 8). *Myotis atacamensis* is associated with arid and semi-arid formations in elevations from sea level to 3,475 m, where it inhabits xeric vegetational formations, as absolute deserts, desert scrublands, and sclerophyllous forest (Rodríguez-San Pedro et al. 2014, 2015, 2020, Moratelli et al. 2019a, 2019b).

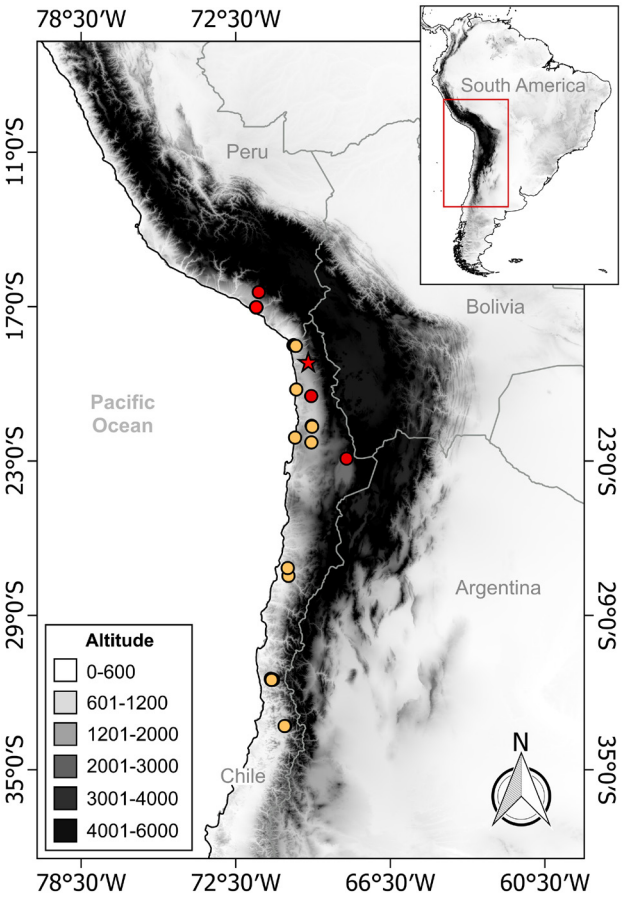

Figure 8. Occurrence of *Myotis atacamensis*, including the new type-locality (red star); records by museum specimens (red circles); and records obtained from the literature (yellow circles – Rodríguez-San Pedro et al. 2014, 2015, 2020).

DISCUSSION

Myotis atacamensis was described based on few external and cranial characters (Lataste 1892) and its original diagnosis became obsolete and useless considering the current diversity of South American *Myotis*. However, the information available in the original description, as well as the posterior refinements in the morphological description (e.g., Miller and Allen 1928, LaVal 1973, Moratelli et al. 2019b), are sufficient for the identification of the specimens. Based on few specimens, Miller and Allen (1928) considered *M. atacamensis* as a subspecies of *M. chiloensis*. This arrangement was followed by Osgood (1943) when analyzing

pale specimens from Coquimbo and Tarapaca, Chile, considering a wide overlap in size between these two taxa. However, according to LaVal (1973), the specimen from Coquimbo analyzed by Osgood is not *M. atacamensis*, but its identity has not yet been determined. Based on morphological comparisons from a large number of specimens examined, LaVal (1973) recognized *M. atacamensis* as a species distinct from *M. chiloensis* and provided a more detailed morphological description for the species.

LaVal (1973) indicated that the distribution of *M. atacamensis* extends from central Peru (near Lima) to northern Chile, and identified variation in size and shape of skull among *M. atacamensis* from central and southern Peru. Moratelli et al. (2019b) also found morphological differences between the northernmost forms from Peru and those in southern Peru and Chile, and recognized the northern population as a distinct species, described as *M. bakeri*.

It is possible that there is still a hidden diversity of *Myotis* in the lowland areas of central Chile. Novaes et al. (2018) demonstrated that individuals originally identified as *M. chiloensis* from Coquimbo and Limache do not fit morphometrically within populations of *M. chiloensis* from Argentina and southern Chile. These specimens were examined by us and, although they have the pale venter, cannot be identified as *M. atacamensis* due to the larger external and cranial size and distinct skull shape. Therefore, a taxonomic review of the *Myotis* from Chile is still needed.

The tricolored dorsal pelage of *M. atacamensis* is unique among its South American congeners, but may be less evident in specimens preserved in alcohol. It is possible that this may have driven the perception that the fur of this species is bicolored, as appears in studies by LaVal (1973) and Moratelli et al. (2019a, 2019b). However, the tricolored dorsal coloration pattern is an important diagnostic character for *M. atacamensis* and should be considered when examining specimens.

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RLMN and RM collected the data; RLMN designed the study, analyzed the data, and drafted the manuscript; RLMN, RKLV, DW, and RM contributed to the theoretical conception of the study and wrote the final version of the article.

Competing Interests

The authors have declared that no competing interests exist.

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APPENDIX

Appendix 1. Specimens examined and localities of occurrence for *Myotis* species deposited in the following biological collections: Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN, Buenos Aires, Argentina), Museo Miguel Lillo De Ciencias Naturales (CML, San Miguel de Tucumán, Argentina), Muséum d'Histoire Naturelle (MHNG, Geneva, Switzerland), American Museum of Natural History (AMNH, New York, USA), Carnegie Museum of Natural History (CM, Pittsburgh, USA), Field Museum of Natural History (FMNH, Chicago, USA), Museum of Natural History of the Kansas University (KU, Lawrence, USA), Museum of Natural Science, Louisiana State University (LSUMZ, Baton Rouge, USA), Museum of Vertebrate Zoology (MVZ, Berkeley, USA), Sam Noble Oklahoma Museum of Natural (OMNH, Norman, USA), Museum of Texas Tech University (TTU, Lubbock, TTU), and Smithsonian National Museum of Natural History (USNM, Washington D.C., USA).

Myotis albescens (N = 109): Argentina: Tucumán, La Cocha, Dique San Ignacio (OMNH 18877); Tucumán, Leales, Dique San Ignacio (OMNH 18878); Santiago del Estero, Pellegrini, Santo Domingo (OMNH 23772, 23773, 23774). Peru: Ayacucho, Río Apurimac, Hacienda Luisiana (LSUMZ 16621, 16622); Ayacucho, San José, Río Santa Rosa (LSUMZ 16623–16625); Cusco, Quispicanchi (FMNH 68471, 68473–68478); Huánuco, Leonicio Prado, 1 km S of Tingo Maria (CM 98854); Huánuco, Río Huallaga, ca. 4 km NE of Tingo Maria (LSUMZ 14265); Loreto, Río Curaray (AMNH 71643); Loreto, Maynas, Puerto Indiana, Amazon River (AMNH 73235, 73237, 73239, 73242); Loreto, Maynas, Orosa, Amazon River (AMNH 74018, 74019, 74021); Loreto, San Jacinto (KU 158160); Madre de Dios, Manú, Maskoitania, 13.4 km NW Atalaya, left bank of Rio Alto Madre de Dios (FMNH 174919, 174921); Madre de Dios, Manú, Quebrada Aguas Calientes, left bank, Rio Alto Madre de Dios, 2.75 km E of Shintuya (FMNH 170275); Madre de Dios, Mouth of Rio La Torre, south bank of Rio Tambopata (LSUMZ 24562); Madre de Dios, Pakitza (USNM 564391, 564392, 566560–566563); Pasco, Oxapampa (AMNH 230746–230748, 230750–230757); Pasco, San Juan (USNM 364442–364480); Pasco, unknown localities (AMNH 213428, 213430); Ucayali, Balta, Río Curanja (LSUMZ 12272, 12274–12279); Ucayali, Coronel Portillo, Yarinacocha (LSUMZ 12253, FMNH 62178–62188).

Myotis atacamensis (N = 12). Chile: Tarapacá, Minimini (USNM 391786 [neotype]; 19°10'S, 69°41'W); Tarapacá, Iquique, Los Canchones (FMNH 23618; MHNG 1748-43, 1748-44, 1748-45, 1748-46; 20°27'00"S, 69°37'00"W). Peru: Arequipa, Chucarapi, Tambo Valley (MVZ 116638; FMNH 50783, 51063; 17°04'S, 71°43'W); Arequipa, Arequipa, Patasagua, 3 km W of Tiabaya (FMNH 49790, 49791, 49792; 16°27'S, 71°35'W).

Myotis bakeri (N = 4): Peru: Lambayeque, 12 km N of Olmos (LSUMZ 21306, 21307); Lima, 7 km SE of Chilca (MVZ 137906, 137907-holotype).

Myotis dinellii (N = 73): Argentina: Buenos Aires, General Guido, Canal 2 y Ruta 2 (MACN 15740); Catamarca (CM 42934–42937); Catamarca, Trancas, 50 km NO Catamarca Ciudad, Las Juntas, Estancia de los Figueroa (OMNH 18977–18979); Catamarca, Capayán, 6 km NW Chumbicha, Balneario El Caolin (OMNH 19366, 19367); Catamarca, Capayán, 1 km NW of Balneario by road, Chumbicha (OMNH 23777–23782); Catamarca, Ambato, Estancia Narvaez, 5.5 km N Las Chacritas on Ruta Provincial No. 1 (OMNH 27931); Catamarca, Ambato, 21.4 km S Humaya (OMNH 36211); Catamarca, Tinogasta, 36.7 km W Fiambalá by road (OMNH 34545); Catamarca, Tinogasta, 57 km W Fiambalá by road (OMNH 34547); Catamarca, El Alto, Bella Vista (OMNH 36208); Catamarca, Capayán, 5.2 km NW Chumbicha (OMNH 36209, 36210); Catamarca, Andalgalá, Pucará (OMNH 36212, 36213); Córdoba (USNM 142560–142562); Córdoba, San Javier (TTU 32524, 32525, 32528, 32529); Córdoba, Calamuchita (TTU 64334); Córdoba, Cruz del Eje (TTU 64335, 64336); Córdoba, Río Cuarto (TTU 64337–64345, 66489, 66490, 66491); Córdoba, Pocho (TTU 66483–6488); Mendoza (MVZ 150861); La Pampa, Pampa Central, Caleu (MACN 49.163, 49.165); La Rioja, San Blás de Los Sauces, 4 km SE de San Blas (CML 5439, 5444, 5448, 5449); Mendoza, La Valle, Reserva Telteca (OMNH 23783); Salta, Guachipas, 25 km SE La Viña (OMNH 36214, 36217); Salta, San Carlos, Los Sauces (OMNH 36215); San Juan, Sarmiento, Pedernal (OMNH 23786); San Luis, Ayacucho, Quebrada de López, San Francisco del Monte de Oro (OMNH 23787); Tucumán (CM 42938–42942); Tucumán, La Cocha, Dique San Inacio (AMNH 256987); Tucumán, Tafí Viejo, 5 km SW Siambón (OMNH 36216).

Myotis chiloensis (N = 48): Argentina: Chubut (MVZ 150842, 150847–150851, 150853–150858); Neuquen (MVZ 150862–150869, 150883, 150884, 150892, 150894–150898, 162181–162183); Rio Negro (MVZ 150902–150907, 150917, 150918, 150927, 150929, 152150, 152153, 154461). Chile: Valparaíso Region, Zapallar (USNM 391785); Valdivia, Rinihue (FMNH 23613, 23614); Chiloe Island, Chiloe (FMNH 24029 [neotype]).

Myotis keaysi (N = 43): Argentina: Tucumán, Burruyacú (CML 6177, 7600, 8938, 9839, MACN 16795, 16855, 16857, OMNH 23499, 36207, TTU 32588). Peru: Amazonas, ca. 20 km of La Peca by trail (LSUMZ 21488); Ayacucho, Puncu, ca. 30 km NE of Tambo (15688); Cusco, Cordillera Vilcabamba (AMNH 214371); Cusco, Cordillera Vilcabamba, west side (AMNH 233850, 233851, 233853, 233854, 233857, 236134); Cusco, Hacienda Cadena (FMNH 78686); Huánuco, Bosque Cutirragra, S of Huaylaspampa (LSUMZ 17898); Huánuco, Trail to Hacienda Paty below Carpish Pass (LSUMZ 18434); Huánuco, 7 km NW of Carpish Pass by road (AMNH 216117); Junín, Chanchamayo (FMNH 65751); Lambayeque, 16 km N and 25 km E of Olmos (MVZ 135620, 135621); Pasco, Santa Cruz, ca. 9 km SE of Oxapampa (LSUMZ 25907); Piura, Batan, on Zapalache-Carmen trail (LSUMZ 26898); Piura, 15 km E of Canch-

aque by road (LSUMZ 19213); Puno, Inca Mines (AMNH 15814); Puno, Inca Mines (AMNH 15814 [holotype]), Puno, Oconeque, 10 miles N of Limbani (MVZ 116050).

Myotis oxyotus (N = 19): Argentina: Tucumán, Tafí Viejo, 5 km SW Siambón (OMNH 36218). Peru: Ancash, 31 km E of Pariacoto by road (LSUMZ 22131); Cajamarca, Celendin, Hacienda Limón (FMNH 19969); Cusco, Iquente (USNM 195146); Cusco, Marcapata (FMNH 66375, 66376); Cusco, Santa Ana (USNM 194452, 194453, 195141, 195147, 195149); Cusco, 6 miles N of Paucartambo (MVZ 116008); Huancavelica, Rumicruz (AMNH 60598); Huánuco, Ambo (FMNH 24864–24866); Junín, Rio Palca, 15 Km W of San Ramon (USNM 507204); Lima, Bujama Baja, 95 km south of Lima by road (AMNH 216118); Lima, Huaros, Bosque de Zarate, San Bartolomé (FMNH 129208).

Myotis riparius (N = 41): Argentina: Corrientes, Capital, Laguna Paivas, Barrio Los Lomas (CML 2994); Formosa, Rio Porteno, km 64, a 5 km al sur de Estancia Sta. Catalina (OMHN 18889); Formosa, Río Bermejo, 10 millas al S de Cólonia km 503 (CML 5412); Formosa, Parque Nacional Pilcomayo (MACN 20881, 20895); Formosa, Jecc. Cassinera, R. Teuco (MACN 20938); Jujuy, Santa Bárbara, Laguna "La Brea", 25 km antes de Palma Sola, sobre Ruta 1 (OMNH 18890, 18891); Salta, San Martín, 6 km al W de Piquirenda Viejo (CML 3157); Tucumán, Burruyacú, Balneário Piedra Tendida, 6 km al O del El Cajón (CML 3155); Tucumán, Reserva Provincial Santa Ana (El Salton), Rio Chico (CML 3158). Peru: Ayacucho, San José, Río Santa Rosa (LSUMZ 16631); Cusco, Camisea, Armihuari (USNM 582875, 582876); Cusco, Camisea, San Martín-3 (USNM 582877, 582878); Cusco, Cordillera Vilcabamba (AMNH 233859, 233860); Cusco, Marcapata (FMNH 68479–68482); Cusco, Paucartambo, Consuelo (FMNH 174941); Cusco, Paucartambo, San Pedro (FMNH 172162); Cusco, Quispicanchi, Hacienda Cadena (FMNH 75150); Cusco, Ridge Camp (USNM 588040); Huánuco, Agua Caliente, Río Pachitea (FMNH 55400); Huánuco, Leoncio Prado (TTU 46348); Loreto, Río Curaray (AMNH 71645); Loreto, San Jacinto (KU 158162); Madre de Dios, Lago Sandoval, Río Madre de Dios (MVZ 157782); Madre de Dios, Manú, Maskoitania (FMNH 174933); Madre de Dios, Mouth of Rio La Torre, south bank of Rio Tambopata (LSUMZ 24561); Madre de Dios, Rio Tambopata, 30 km up from Mouth (USNM 530919); Pasco, Oxapampa, San Pablo (AMNH 230775–230777); Ucayali, Balta, Río Curanja (LSUMZ 12268–12271).