

SHORT NOTE

# Acoustic surveys reveal new record of the rare Smoky Bat *Amorphochilus schnablii* (Chiroptera, Furipteridae) in Chile after 71 years

Muestreos acústicos revelan un nuevo registro del raro Murciélago Ahumado *Amorphochilus schnablii* (Chiroptera, Furipteridae) en Chile después de 71 años

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## ABSTRACT

The Smoky Bat, *Amorphochilus schnablii*, is a poorly known furipterid bat species endemic to the west coast of Ecuador, Peru, and the extreme north of Chile. The occurrence of this species in Chile has been limited to a single report from the year 1950, in the locality of Cuya in the Camarones valley, Arica, and Parinacota region. Based on acoustic surveys, we report here a new record of *A. schnablii* for the Camarones valley filling a gap of 71 years with no records. We also present a description of its echolocation calls.

**Keywords:** Arica and Parinacota region, Atacama Desert, coastal valleys, echolocation calls

## RESUMEN

El murciélago ahumado, *Amorphochilus schnablii*, es una especie de murciélago furiptérico poco conocida, endémica de la costa oeste de Ecuador, Perú y el extremo norte de Chile. La ocurrencia de esta especie en Chile se ha limitado a un solo reporte del año 1950, en la localidad de Cuya, en el valle de Camarones, región de Arica y Parinacota. Basado en muestreos acústicos, reportamos un nuevo registro de *A. schnablii* para el valle de Camarones, llenando una brecha de 71 años sin datos. Presentamos además una descripción de sus llamadas de ecolocalización.

**Palabras clave:** Arica y Parinacota, Desierto de Atacama, llamados de ecolocalización, valles costeros.

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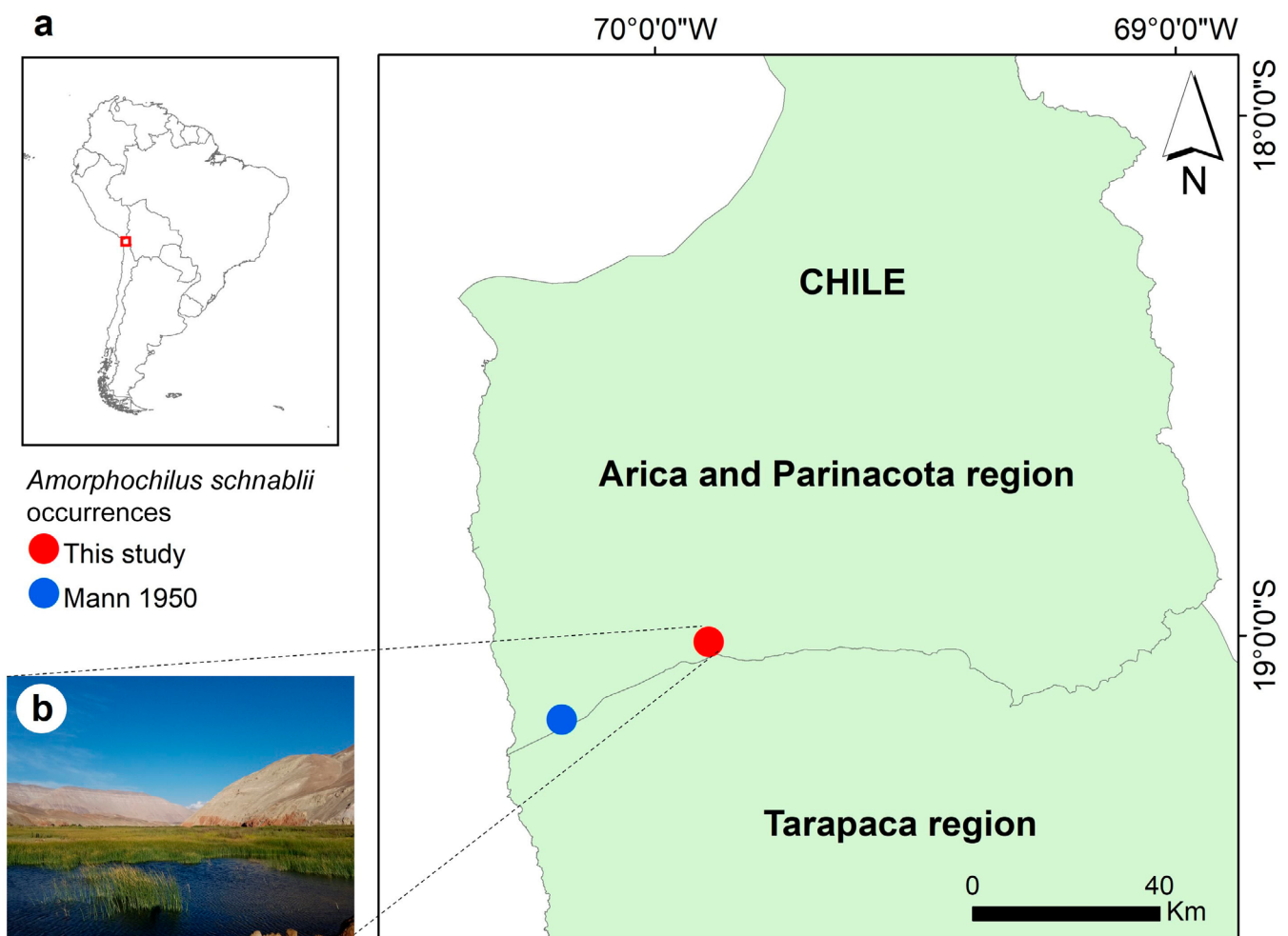
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*Amorphochilus* is a monotypic genus of small bats (forearm 36-37 mm), with an exclusively neotropical distribution, where it is known only from a narrow strip on the west coast in central and southern Ecuador, Peru, and northwestern Chile. Its only species *Amorphochilus schnablii* (Peters, 1877), is an insectivorous bat with a preference for dipterans and lepidopterans (Mann 1978, Ibáñez 1985). It is found in arid regions and cultivated areas; it is a cave-dweller and known to roost in culverts, sugar mills, irrigation tunnels, and abandoned buildings in urban and rural areas (Cláudio 2019), where it forms monospecific colonies of up to 300 individuals of both sexes (Ibáñez 1985).

In Chile, *A. schnablii* is one of the least known bat species and one of the most difficult to find. This species is listed as

Vulnerable by the IUCN (Velazco *et al.* 2015) and by the Chilean legislation (Decreto Supremo N° 6/2017, MMA) because of a population decline, estimated to be more than 30 % over the past three generations, which is suspected from an observed shrinkage in distribution and information on habitat destruction and degradation. Although the known distribution of *A. schnablii* in Chile includes the coastal strip from the Arica and Parinacota region to the Loa River in the Tarapacá region (Galaz *et al.* 2020) its presence is based on a single report made by Mann (1950), from the locality of Cuya, in the Camarones valley, Arica and Parinacota region. Here, we report a new record of *A. schnablii* from the locality of Camarones, also in the Camarones valley, after 71 years since the first and only published a report in the country, confirming the occurrence

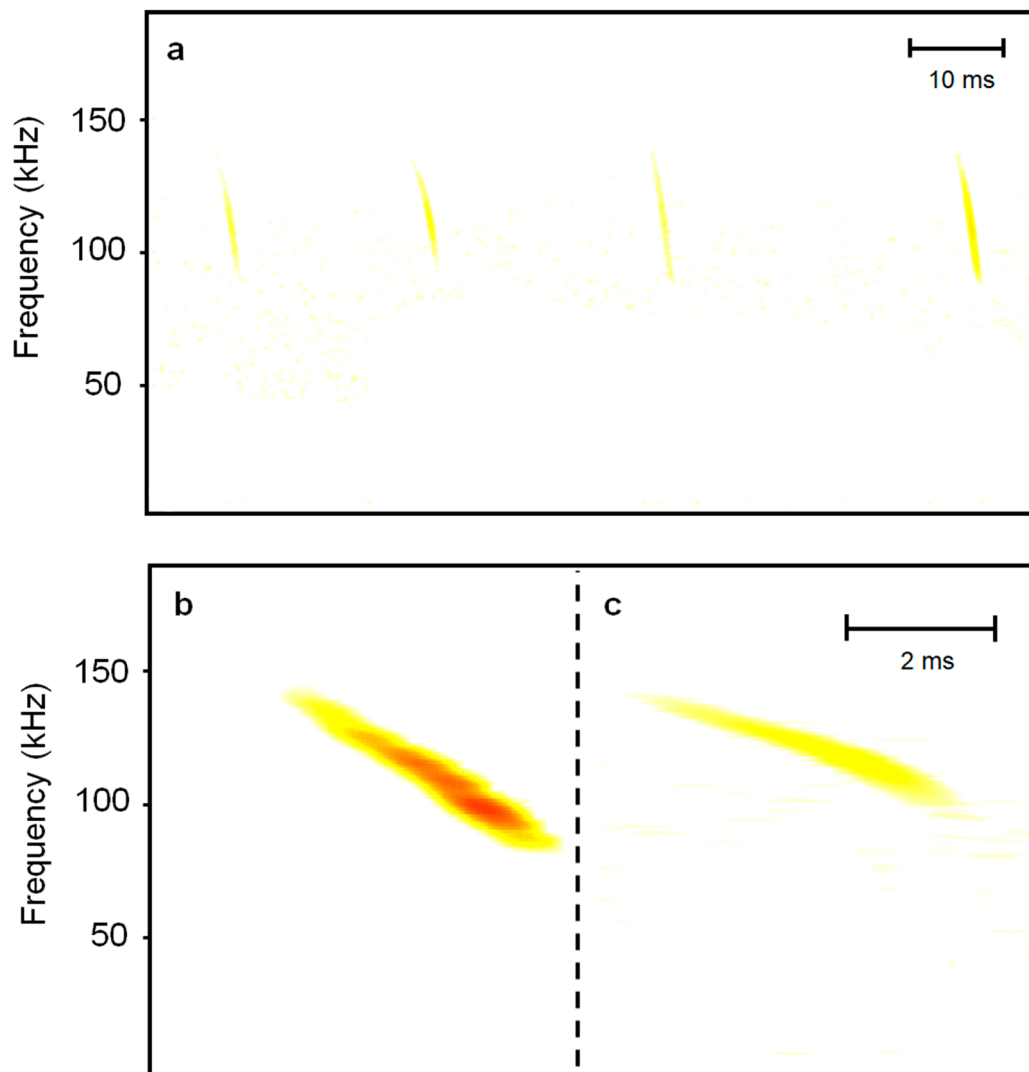


**Figure 1.** Geographical location of the Arica and Parinacota region, northern Chile, and records of the Smoky bat. **a.** Distribution map of records for *Amorphochilus schnablii* from Mann (1950) and the new record reported in the present study. **b.** Ambient where the echolocation calls were recorded in the Camarones valley.

of the species in the extreme north of Chile. We also present the description of the echolocation calls of the species.

On February 13 and 15, 2021, during a rapid bat diversity assessment using ultrasound acoustic devices, four Smoky Bat echolocation call sequences containing 24 pulses were recorded on the Camarones valley (19° 0' South 69°53' West) (Fig. 1a). The recording location was at 651 m altitude, in a small waterbody located in an open area with herbaceous vegetation composed by *Schoenoplectus pungens* (Vahl) Palla, *Typha domingensis* Pers., and *Tessaria* sp., surrounded by large areas of no vegetation and cliffs

walls (Fig. 1b). Echolocation calls were recorded using an automatic ultrasound recorder Song Meter SM4BAT FS with an external omnidirectional SMM-U1 ultrasonic microphone (Wildlife Acoustics, Inc., Maynard, MA, USA), placed at 4.5 m above ground level and programmed to record bat activity from sunset to sunrise (11 hours) for three consecutive nights. Recordings were conducted using a sampling frequency of 384 kHz. From each echolocation sequence, only search-phase pulses with a good signal-to-noise ratio were chosen and described. Each pulse was manually identified and assigned to *A. schnablii* after comparing the parameters of our recorded calls



**Figure 2.** Sonogram of echolocation calls of *Amorphochilus schnablii* **a.** A typical pulse sequence was recorded in the Camarones valley, Arica, and Parinacota region, Chile. **b.** A single pulse emitted by smoky bats in Peru (courtesy of Joaquin Ugarte) **c.** A single pulse emitted by smoky bats in Chile (right panel, this study). Spectrograms were generated on BatSound 2.1 software (Pettersson Elektronik AB, Upsala, Sweden), with a Hanning window type, frame overlap of 99%, and 512 FFT size.

**Table 1.** Descriptive analysis (mean  $\pm$  SD) of the echolocation calls of *Amorphochilus schnablii* from Arica and Parinacota region, Chile. Echolocation calls of the species from Peru are also included.

Acoustic parameter	This study (Chile)	Falcão <i>et al.</i> (2015) (Peru)	Ugarte-Núñez (2020) (Peru)
Duration (ms)	3.0 $\pm$ 0.5	4.4 $\pm$ 0.7	2.6 $\pm$ 0.7
Initial frequency (kHz)	132.4 $\pm$ 4.5	163.0 $\pm$ 4.8	138.9 $\pm$ 7.8
Final frequency (kHz)	91.7 $\pm$ 4.6	87.3 $\pm$ 9.5	78.8 $\pm$ 4.5
Bandwidth (kHz)	40.7 $\pm$ 4.1	123.7 $\pm$ 6.7	60.2 $\pm$ 10.6
Peak frequency (kHz)	112.9 $\pm$ 8.2	75.8 $\pm$ 10.6	99.7 $\pm$ 4.9
Interpulse interval (ms)	28.61 $\pm$ 5.33	-	32.1 $\pm$ 10.3

with reference calls of this species from Peru (Falcão *et al.* 2015, Ugarte-Núñez 2020). The higher frequency range and broadband pulses ranging from ca. 160 to 80 kHz, set the echolocation calls of *A. schnablii* apart from any other bat species occurring in the extreme north of Chile (Rodríguez-San Pedro *et al.* 2016, 2022a, b, Ossa *et al.* 2018), which allowed us to reliably assign the recorded calls to this species. The parameters used in the acoustic identification were duration, initial and final frequencies, bandwidth, peak frequency, and the interpulse interval.

Search calls emitted by the *A. schnablii* in our study site were characterized by short (< 3ms) single broadband downward frequency-modulated pulses sweeping from 132 to 92 kHz (Table 1; Fig. 2). This frequency range and the pulse shape are consistent with those reported for specimens from Peru (Falcão *et al.* 2015, Ugarte-Núñez 2020) supporting the identity of our recordings. The new record presented here is of great interest considering the rarity of the reports of this species in Chile. This record fills a gap of 71 years with no data on the species and constitutes the most updated information for the species in the country. The lack of records in the literature can be explained by several factors, including the few bat surveys conducted in the extreme north of the country (Ossa *et al.* 2016, 2017, 2018, Rodríguez-San Pedro *et al.* 2021, 2022a, b). In addition, the known roost sites for this species are rock crevices in hard-to-reach cliff walls in coastal valleys (Mann 1978), which makes the exploration and sighting of specimens difficult. However, *A. schnablii* seems to be a quite common bat species in southern Peru (Patron *et al.* 2001, Aragón and Aguirre 2014) where the bioclimatic conditions and landscape characteristics are similar to those found in the extreme north of Chile (Luebert and

Plischoff 2017). Thus, as sampling efforts began to increase in the region and complementary methods to inventory bats were used, this result was expectable. The recent findings of other bat species in the extreme north of Chile by acoustic detection such as *Promops davisoni* Thomas, 1921, *Nyctinomops aurispinosus* (Peale, 1848) (Ossa *et al.* 2018, Rodríguez-San Pedro *et al.* 2022a, b) along with this new record of *A. schnablii* reinforces the usefulness of the bioacoustics method in providing a more comprehensive assessment of bats in this little-explored zone, being a powerful tool for detecting uncommon species or difficult to capture with mist nets (MacSwiney *et al.* 2008).

## AUTHOR'S PARTICIPATION

All authors conducted the acoustic surveys. Additionally, CB and AR-SP analyzed the acoustic records and identified the species. CB and AR-SP wrote the document and prepared the images.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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