

## THE VOICES OF THE HIGH-ANDEAN *METRIOPELIA* GROUND-DOVES

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**Resumen.** – Las voces de las palomitas altoandinas *Metriopelia*. – Las cuatro especies actualmente reconocidas de *Metriopelia* han sido frecuentemente consideradas mudas. De las cuatro especies, Palomita Cordillerana (*M. melanopectera*), Palomita Dorada (*M. aymara*), Palomita Moteada (*M. ceciliae*), y Palomita Ojo Desnudo (*M. morenoi*) sólo ha sido grabado el canto de *M. melanopectera*. Presentamos la primera evidencia de producción vocal en *M. ceciliae* y *M. morenoi*, y comentamos sobre la presencia de vocalizaciones en *M. aymara*. Todas las *Metriopelia* vocalizan. Sus características acústicas altamente inusuales para palomas Neotropicales (modulación rápida de frecuencia, banda ancha y frecuencia fundamental alta) pueden estar vinculadas a los ambientes yermos que habitan. Los datos de nidificación, plumaje y vocalizaciones son consistentes con tratamientos taxonómicos previos ubicando a *M. ceciliae* y *M. morenoi* en el género *Gymnopenia*.

**Abstract.** – The four currently recognized species of *Metriopelia* ground-doves, Black-winged Ground-Dove (*M. melanopectera*), Golden-spotted Ground-Dove (*M. aymara*), Bare-faced Ground-Dove (*M. ceciliae*), and Bare-eyed Ground-Dove (*M. morenoi*) have frequently been considered silent. So far, vocalizations have been recorded only for *M. melanopectera*. We provide the first evidence of vocal sound production in *M. ceciliae* and *M. morenoi*, and comment on the presence of vocalizations in *M. aymara*. All *Metriopelia* species vocalize. Their very unusual acoustic features for Neotropical doves (rapid frequency modulation, broad-band, and high emphasized frequency) can be easily linked to the barren environments they inhabit. Nesting, plumage, and vocal data is consistent with former taxonomic treatments placing *M. ceciliae* and *M. morenoi* in the genus *Gymnopenia*. Accepted 12 April 2011.

**Key words:** Acoustic adaptation, high Andes, communication, *Gymnopenia*, *Leptophaps*, *Metriopelia*, voices.

### INTRODUCTION

The high-Andean *Metriopelia* doves, Black-winged Ground-Dove (*M. melanopectera*), Golden-spotted Ground-Dove (*M. aymara*), Bare-faced Ground-Dove (*M. ceciliae*), and Bare-eyed Ground-Dove (*M. morenoi*) are mostly silent dwellers of rocky areas, usually

detected through their noisy wingbeats when flushed. Of the four species, the song has been tape-recorded only for the wide ranging *M. melanopectera* (Hardy *et al.* 1989, Fjeldsã & Krabbe 1990). Although closely related to *Columbina* spp. (Peters 1937, Goodwin 1957, Pereira *et al.* 2007), which are known for their conspicuous voices, members of *Metriopelia*

are not as vocal and have frequently been considered silent (Fjelds  & Krabbe 1990, Jaramillo 2003).

Although all four species are currently included in the genus *Metriopelia* (Peters 1937; Goodwin 1959, 1983; Remsen *et al.* 2010) different taxonomic groupings have been proposed. The differences in shape, plumage, and bare parts led to their treatment in three separate genera comprising *Metriopelia melanoptera*, *Leptophaps aymara*, *Gymnopelia ceciliae*, and *G. morenoi* (Hellmayr & Conover 1942); however, in a two-genera treatment, the two *Gymnopelia* species were kept together while *M. melanoptera* and *M. aymara* were grouped in a reduced genus *Metriopelia* (Salvadori 1893) based on their pointed wings, black tail, and wing adornments (white shoulders in *melanoptera*, chestnut flight-feather barbs and golden spots in *aymara*).

Geographic variation is poorly understood in the genus, with *M. melanoptera* ranging from the northern to the southern Andes (ssp. *melanoptera* in Peru, Bolivia, Chile and Argentina, ssp. *saturation* in Ecuador and Colombia), and the monotypic *M. aymara* ranging from Peru to Argentina (Hellmayr & Conover 1942). Both “*Gymnopelia*” species (*M. morenoi* and *M. ceciliae*) are characterized by a large naked area around the eyes, short rounded wings, and white-tipped tails (Goodwin 1959, Baptista *et al.* 1997, Areta 2010), and are considered sister species (Johnson 2004). *Metriopelia ceciliae* ranges from Peru to northern Argentina and is considered polytypic (ssp. *ceciliae* and *obsoleta* in Peru, and *gymnops* in southern Peru, northern Chile, Bolivia, and northwest Argentina) (Hellmayr & Conover 1942, Narosky 1988, Abadie 1991, Mazar Barnett *et al.* 1998, Pearman 2001); whilst the monotypic *M. morenoi* is endemic to northwest Argentina with no known geographic overlap with *M. ceciliae* (Sharpe 1902, Dinelli 1929, Zotta 1944, Haene 1996, Areta 2010).

In this contribution, we present the first evidence of vocal sounds by both *M. ceciliae* and *M. morenoi*, discuss the differences with the vocalizations of *M. melanoptera*, and mention the presence of vocalizations in *M. aymara*. We discuss possible explanations for their remarkable acoustic features, and the taxonomic implications of the differences in their vocalizations.

## METHODS

We obtained recordings of three of the four species of *Metriopelia* ground-doves in different localities in Argentina (all our recordings are described in Results). JIA recorded *M. morenoi* with a Telinga Universal Parabola, Sennheiser ME-62 microphone and Marantz PMD-222 tape recorder, and a Canon S3IS video camera, and *M. melanoptera* with a Sennheiser ME-67 microphone and Marantz PMD-222 tape recorder, and a Telinga Universal Parabola and a Marantz PMD-661 recorder. DM recorded *M. ceciliae* with a Sennheiser ME-66 microphone and Sony TCM-5000EV tape recorder. All our recordings were deposited in the Macaulay Library of Natural Sounds, Ithaca, New York. Sound features were quantified by measurement of MAX = maximum frequency, MIN = minimum frequency, ENF = emphasized frequency, BAND = bandwidth based on spectrograms in Figures 1–3, and obtained with Raven Pro 1.3 (Cornell Lab of Ornithology, Bioacoustics Research Program) using window size 1024, hop 512, overlap 50, Nyquist frequency = 22,050 kHz, and sampling = 16 bits. Spectrograms shown were built using Syrinx 2.6h (John Burt, www.syrinxpc.com). We obtained body mass data for *M. melanoptera*, *M. aymara*, and *M. ceciliae* from Dunning (2008), and from Camperi & Darrieu (2004) for *M. morenoi*. Data on spectral features and weight were tabulated to allow for a comparison with data presented in Tubaro & Mahler

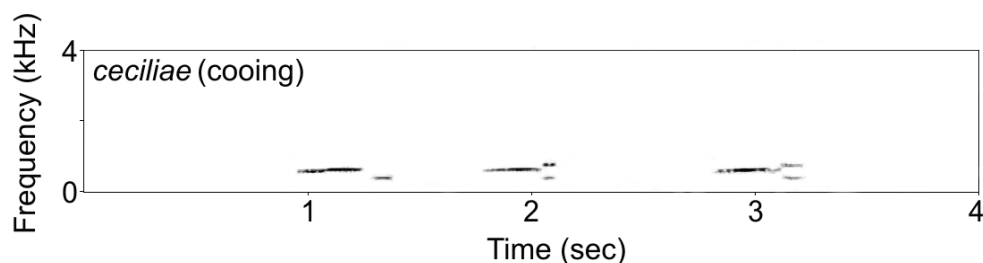


FIG. 1. Spectrogram of the “cooing” of the Bare-faced Ground-Dove (*Metriopelia ceciliae gymnops*). Recorded by DM on 9 September 2004, Yavi, Jujuy, Argentina.

(1998). We revised the on-line sound databases of Xeno-Canto ([www.xeno-canto.org](http://www.xeno-canto.org)) and the Macaulay Library of Natural Sounds (<http://macaulaylibrary.org>).

## RESULTS

*Bare-faced Ground-Dove (Metriopelia ceciliae)*. This dove has been considered silent in the mainstream literature (Fjeldsâ & Krabbe 1990, Jaramillo 2003, Schulenberg *et al.* 2007) except for the report by Gifford (1941) who mentioned the existence of vocalizations in captive-breeding birds: “In perching and cooing *Gymnopelia* rises and lowers the tail slightly without spreading it. Indeed, in the mating season it keeps its tail in motion like a pipit. In doing this the tail is not moved far from a horizontal position.” (p. 242). However, he did not provide any description of this cooing. More recently, Brooks (2010) mentioned that in captive birds “A vocalization is often emitted when a male lands close to a female, perhaps to initiate courtship. The sound is a descending series of approximately 5–9 rapid staccatoed ‘hoots’, similar in pattern to the ‘laughing’ vocalization in domesticated barbary doves (*Streptopelia risoria*)” (p. 50). This report presumably belongs to the nominate subspecies.

On 9 September 2004, in the town of Yavi (Jujuy, Argentina), DM recorded the mechanical (flapping) sounds produced by two indi-

viduals that were apparently disputing a nesting site in a cliff along the Yavi river (Monteleone 2008). We later noticed that some dove voices were also tape-recorded inadvertently in this cut, presumably corresponding to *M. ceciliae*. This voice comprises a series of five similar ascending and later abruptly descending double-sounding cooing notes which became progressively more spaced “*cUup cUup cUup cUup cUup*” fading towards the end (Fig. 1, Table 1). These voices probably do not belong to the individuals which were initially recorded fighting.

On 26 October 2008, in the town of Putre (I Región, Chile), JIA heard an individual uttering a series of four soft and low pitched croaking notes “*crrúac crrúac crrúac crrúac*”, each note resembling the voice of the Croaking Ground-Dove (*Columbina cruzianá*) to the ear. The bird was sitting on the ground with a group of six other individuals, but it could not be tape-recorded. The next day, an attempt was made to tape-record the voices, but the doves did not vocalize. B. Knapton (*in litt.*) heard the doves singing regularly during the breeding season in this area and described the sound as “a Wo ow sound, like a growling wow, but with two syllables” adding that “it sounded like Croaking Ground Doves.” All these reports on vocalizations presumably belong to subspecies *gymnops* (Hellmayr & Conover 1942).

TABLE 1. Frequency measurements and body mass of all *Metriopelia* ground-doves based on spectrograms of recordings illustrated in Figs 1–3. MAX = maximum frequency, MIN = minimum frequency, ENF = emphasized frequency, and BAND = bandwidth.

	MAX (Hz)	MIN (Hz)	ENF (Hz)	BAND (Hz)	Body mass (g)
<i>Metriopelia ceciliae</i>					55,1
Cooing	779	260	560	519	
<i>Metriopelia morenoi</i>					58
High cooing	7743	640	905	7103	
Low cooing	1218	314	388	904	
Bark	1005	694	311	861	
Wreeeg call	8548	632	818	7916	
<i>Metriopelia aymara</i>	ND	ND	ND	ND	61,8
<i>Metriopelia melanoptera</i>					100
Song	2447	1223	1636	1224	
Piú call	3238	1133	2860	2105	

*Bare-eyed Ground-Dove* (*Metriopelia morenoi*). There is no mention of vocalizations of this dove in literature (Sharpe 1902, Narosky & Yzurieta 1985, de la Peña 1988, Fjeldså & Krabbe 1990) other than a superficial comment based on data presented in the present work (Areta 2010). On 7 June 2009, in a creek close to El Infiernillo (Tucumán, Argentina), JIA videotaped a group of vocalizing doves while they sought shelter and on 9 June 2009 the same birds were tape-recorded. Three vocalization types were recorded, which we call: “cooing”, “bark”, and “wreeeg”. First (cooing), while perched exposed on a boulder or foraging or simply sitting on the ground, a series of 3–5 soft and nasal “*cuEec cuEec cuEec*” notes was uttered with some delay after a slight rising of the tail without spreading it, and together with a minor head movement while keeping the beak closed (Figs 2A–B, Table 1). Based on the description of the cooing behavior in *M. ceciliae* (see above), this vocalization type might be the cooing of *M. morenoi*. We recorded variants of this voice, some deeper toned and louder than others, separating them in high cooing and low cooing types (Figs 2A and 2B, Table 1). Playback of the recorded vocalizations failed to gener-

ate any answer from the doves. It is worth mentioning that, to our ears, these vocalizations sounded deeper toned when we heard them from the distance; while the recordings seem to have a more nasal quality (perhaps due to differential attenuation of low frequency bands by the parabola). The second vocalization type (bark) was a faster and deeper sounding series of “*coo coo coo coo coo*”, uttered by other individuals, presumably as an answer to the previous voice (Fig. 2C, Table 1). The third voice (wreeeg) is a harsh “*wreeeg*”, emitted with fully stretched neck while opening the beak, which was uttered by four different individuals in response to each other before flying away (Fig. 2D, Table 1). In addition to these vocalizations, we also recorded the characteristic wing take-off sounds. All three vocalization types and accompanying behaviors can be accessed at <http://ibc.lynxeds.com>.

*Golden-spotted Ground-Dove* (*Metriopelia aymara*). Although we neither recorded nor heard any vocalization in *M. aymara*, R. Straneck (*in litt.*) reports having heard its song, thus providing evidence that all four *Metriopelia* doves vocalize.

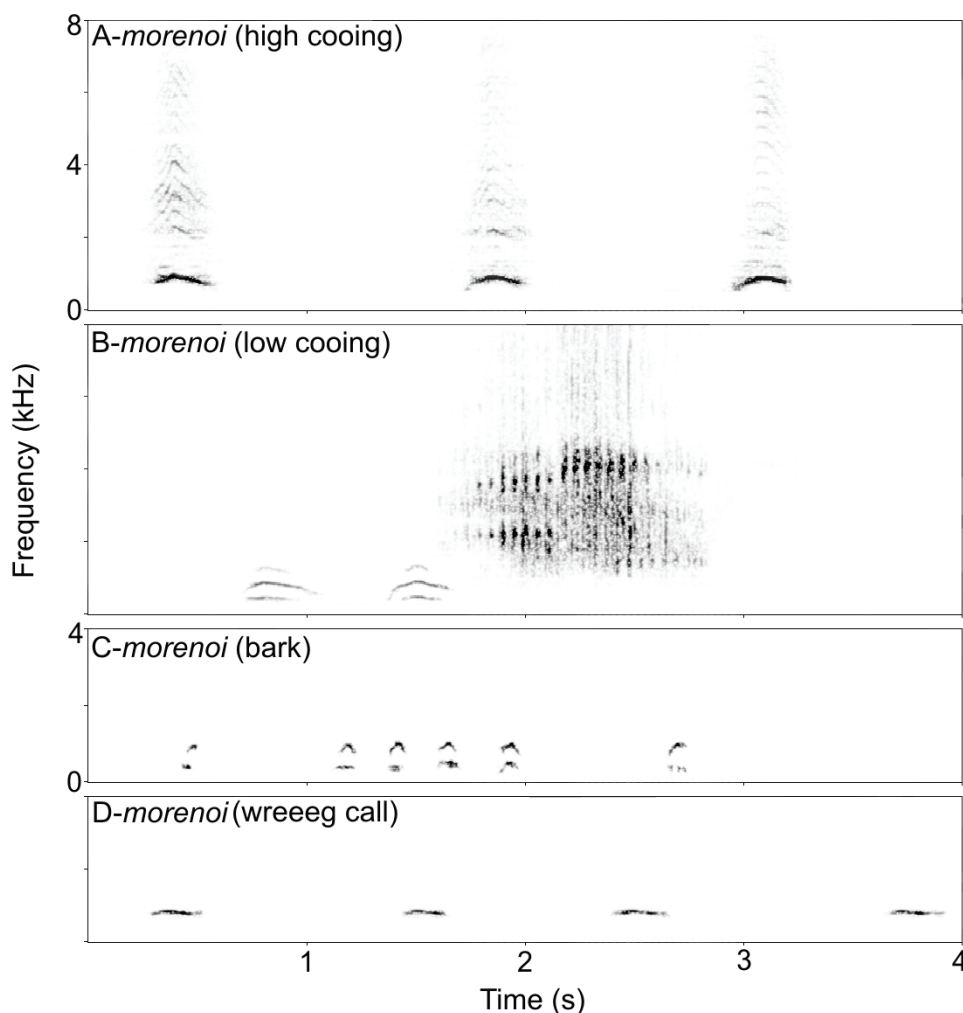


FIG. 2. Spectrograms of the presumed song and calls of the Bare-eyed Ground-Dove (*Metriopelia morenoi*). A) High “cooing” of single individual; B) low “cooing” of two individuals and wing beats; C) “bark” or series of accelerated coo notes, and D) “wreeeg” calls. Recorded by JIA on 9 (A–B) and 7 (C–D) June 2009, close to El Infiernillo, Tucumán, Argentina.

*Black-winged Ground-Dove* (*Metriopelia melanoptera*). The song of *M. melanoptera* is a loud and ringing “*prreeeek chreee*” first ascending in a trill and then descending with a sharp note (Fig. 3, see also Fjeldså & Krabbe 1990), which JIA first heard and tape-recorded in Refugio San Antonio (Mendoza, Argentina).

Recordings from Farellones (Región Metropolitana, Chile, XC–16540 [Doug Knapp]) and upper Chuquibamba (Arequipa, Peru, XC–20134 [Niels Krabbe]) conform to this description. We performed two playback trials with voices of *M. melanoptera*: one in October 2008 in the Portillo valley (Región Metropolitana, Chile), and one in June 2009 in Tañ del

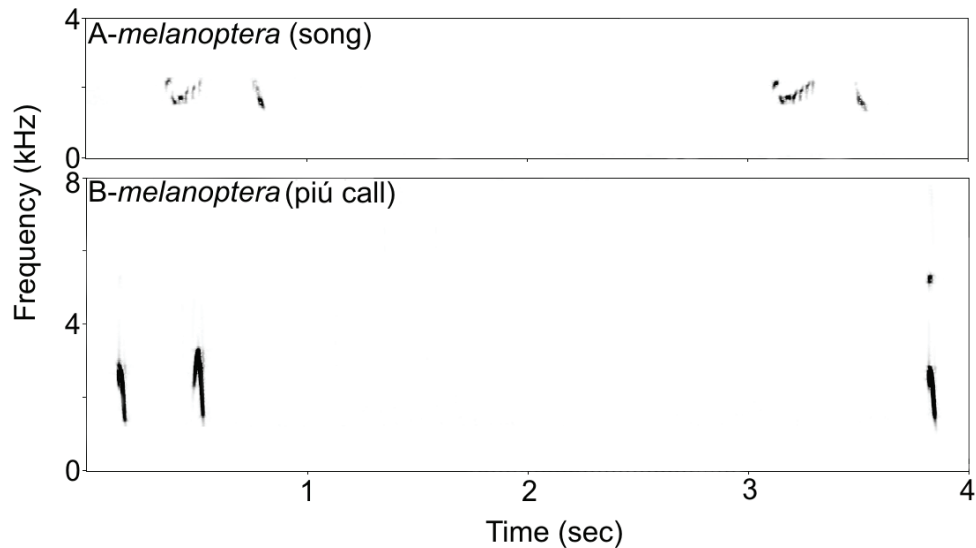


FIG. 3. Spectrograms of the song and call of the Black-winged Ground-Dove (*Metriopelia m. melanoptera*). A) Song, recorded by JIA on 10 December 2005, Refugio San Antonio, Mendoza, Argentina; B) “piú” calls, recorded by JIA on 26 November 2010, Parque Nacional El Leoncito, San Juan, Argentina.

Valle (Tucumán, Argentina). In the Portillo valley, the response to playback was an increase in the singing rate of an already singing presumed male, while in Tafi del Valle a group of five doves, involving two recently fledged juveniles, approached the speaker without vocalizing.

The “piú” call of *M. melanoptera* is a short “piú” (Fig. 3), reminiscent in quality to the calls of several oscine birds but unlike any Neotropical dove vocalization. The emission of the call is accompanied by an abrupt upward tilting of the tail above the horizontal. It was only heard and recorded twice by JIA at Parque Nacional El Leoncito (San Juan, Argentina). The first time, a bird that alighted nearby uttered this call and was answered back by a second individual before taking off. In the second instance, a group of five birds foraging on the ground began uttering this call as JIA approached them, and finally took off making the typical wing-noise.

## DISCUSSION

Contrary to previous belief, all *Metriopelia* ground-doves vocalize. The vocalizations that we recorded of both “*Gymnopelia*” (*M. morenoi* and *M. ceciliae*) (Figs. 1–2) differ strikingly in structural features and are very soft in comparison to the relatively more audible song and call of *M. melanoptera* (Fig. 3). Unlike in *M. melanoptera*, playback trials with *M. morenoi* voices yielded no response from conspecific individuals. Thus, the scant information available hints at differences in the behavioral context of the known vocalizations of *M. melanoptera* and the “*Gymnopelia*” doves. Although reportedly vocal, the vocalizations of *M. aymara* (“*Leptophaps*”) remain unrecorded.

The diverse voices herein documented for *M. morenoi* and *M. ceciliae* and their gregarious behavior suggest that, contrary to what is widely believed, their vocal communication

could be complex and certainly involves several different calls, which could be used either in short-range or long-range communication. Due to our limited information, we cannot specify how the vocalization types of *Metriopelia* doves are related to the more classical terms used to describe doves voices, such as perch-coo, nest-coo, and bow-coo (de Kort & ten Cate 2004). It is possible that the “cooing” of *M. morenoi* and *M. ceciliae* and the song of *M. melanoptera* are equivalent to the perch-coo of other doves, while the calls of *M. morenoi* and *M. melanoptera* may be homologous as they were both uttered by groups of birds before taking off.

The open, high-altitude, thermically unstable, and windy habitats which these doves inhabit must have posed specific constraints to the evolution of their vocal signals. Open habitat birds tend to have higher-pitched, broad-band songs rich in rapid frequency modulations, while closed habitat birds tend to have lower-pitched, tonal songs with little frequency modulation (Morton 1975, Slabbekoorn 2004). Additionally, a ‘sound window’ (where sounds between 1–3 kHz are less attenuated with distance) exists in several habitat types for sounds broadcasted from ground-level to 1 m from the ground (Marten & Marler 1977). The “*Gymnopelia*” doves seem to make partial use of this ‘sound window’, since they sing either from the ground or perched on small boulders, and most energy of their songs is contained within 1–3 kHz or very close to the 1 kHz boundary. Also, the broad-band harmonic structure of the “cooing” of *M. morenoi* and the apparently rapidly modulated and broad-band “wreeeg” call are in accordance with the design features thought to permit longer reach of the voices in open-habitat species. Alternatively, some of these features might enhance short range communication (Wiley & Richards 1982); for example, the “wreeeg” call was uttered before flying by a

group of birds suggesting its use in short range communication. The song of *M. melanoptera* occurs within the ‘sound window’, has a broad-band frequency, is loud and rapidly modulated, and is apparently used for long-range communication.

In sum, *Metriopelia* ground-doves show very unusual acoustic features for Neotropical doves (rapid frequency modulation, broad-band, and high emphasized frequency) which fit the acoustic properties of their barren habitats. These features also occur in *Columbina cruziana*, an inhabitant of rocky and dry areas, but are lacking in the remaining *Columbina* species (pers. observ.; cf. Tubaro & Mahler 1998). Moreover, some calls of *M. morenoi* and *M. ceciliae* recall those of *C. cruziana*, and they are all known to have fairly large call repertoires (Trollope 1974, Baptista *et al.* 1997, present work), further suggesting that the acoustic features of *Gymnopelia* and those of the very distinctive *C. cruziana* (formerly placed in the monotypic genus *Eupelia*, Goodwin 1959) are specially suited for communication in rocky, windy, and arid areas.

Several differences exist in vocalizations, plumage features (see Introduction), and nesting behavior of *M. melanoptera* and the “*Gymnopelia*” (*M. morenoi* and *M. ceciliae*). While the nest of *M. melanoptera* is a cup placed within a bush or other plants (Salvador 1992, Baptista *et al.* 1997), those of *M. morenoi* and *M. ceciliae* are placed inside crevices, banks, or on the ground (Baptista *et al.* 1997), thus exceeding normal within-genus variation in Neotropical doves (Baptista *et al.* 1997). These natural history data suggest a considerable divergence between *Metriopelia* sensu stricto and the two “*Gymnopelia*” species, questioning their current systematic lumping under *Metriopelia*, yet no phylogenetic study has addressed their relationship (Johnson & Clayton 2000, Johnson 2004, Pereira *et al.* 2007).

Further fieldwork aimed at assessing the vocal repertoire, bioacoustic features, and

behavioral ecology of *Metriopelia* coupled with studies of the syringeal morphology will help to uncover the phylogeny and to understand their vocalizations and related behavioral traits.

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