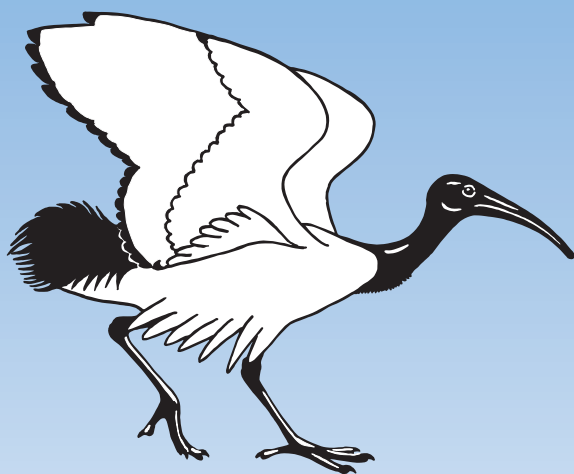


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CLUB ANNOUNCEMENTS

Our joint conference in 2023 is in partnership with the Oriental Bird Club, and will be held in collaboration with the Natural History Museum, Cromwell Road, London SW7 5BD, on Saturday 16 September 2023, in the museum's Flett Theatre. We are delighted that the keynote speech will be given by Dr Pamela Rasmussen on *Avian taxonomy in the era of citizen science*. Pam is the recently appointed lead taxonomist for *Birds of the world* at the Cornell Lab of Ornithology, and her long list of achievements includes co-authoring *Birds of South Asia: the Ripley guide* and 11 descriptions of new Asian bird species. In India, she was part of the team that rediscovered Forest Owlet *Athene blewitti*. Other talks will be as follows: Sayam Chowdhury *Can we still save the Masked Finfoot [Heliopais personatus]*; James Eaton *Successes and failures; how to find or fail in the quest for new and lost birds*; and Mike Edgecombe *Mongolia—birds and more in Asia's wild wilderness*. Doors will open at 10.00 h for a 10.30 h start. Tea and coffee will be available mid-morning and mid-afternoon. The conference will end at about 16.30 h.

Friends of the BOC

The BOC has since 2017 become an online organisation without a paying membership, but instead one that aspires to a supportive network of Friends who share its vision of ornithology—see: <http://boc-online.org/>. Anyone wishing to become a Friend of the BOC and support its development should pay UK£25.00 by standing order or online payment to the BOC bank account:

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Sort Code: 20-45-45
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Account name: The British Ornithologists' Club

Friends receive regular updates about Club events and are also eligible for discounts on the Club's Occasional Publications. It would assist our Treasurer, Richard Malin (e-mail: rmalin21@gmail.com), if you would kindly inform him if you intend becoming a Friend of the BOC.

The *Bulletin* and other BOC publications

Since volume 137 (2017), the *Bulletin* of the BOC has been an online journal, published quarterly, that is available to all readers without charge. Furthermore, it does not levy any publication charges (including for colour plates) on authors of papers and has a median publication time from receipt to publication of five to six months. Prospective authors are invited to contact the *Bulletin* editor, Guy Kirwan (GMKirwan@aol.com), to discuss future submissions or look at <http://boc-online.org/bulletin/bulletin-contributions>. Back numbers up to volume 136 (2016) are available via the Biodiversity Heritage Library website: www.biodiversitylibrary.org/bibliography/46639#/summary; vols. 132–136 are also available on the BOC website: <http://boc-online.org/>

BOC Occasional Publications are available from the BOC Office or online at info@boc-online.org. Future BOC-published checklists will be available from NHBS and as advised on the BOC website. As its online repository, the BOC uses the British Library Online Archive (in accordance with IZCN 1999, Art. 8.5.3.1).

Noteworthy bird records from south-west South Sudan game reserves

by Daniel M. Brooks, Jack Sutton, Laura A. Kurchez, Adrian Garside, Imran Ejotre, Matt Rice, Michelle L. Moeller, Robert J. Harris, Ivan De Klee & DeeAnn M. Reeder

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<http://zoobank.org/urn:lsid:zoobank.org:pub:93F849CC-D65C-49E8-A30E-E7797F5EF80F>

SUMMARY.—Avian camera trap image data from two game reserves in south-western South Sudan produced three new country records, four other range extensions, and one filled a distributional gap between north-west Ethiopia and eastern Central African Republic. The study took place at Bangangai (31 traps, January 2015–February 2016) and Bire Kpatuos Game Reserves (52 traps, September 2015–August 2017). A total of 40 species (18 families) was recorded, including two Near Threatened species of global conservation concern: Crowned Eagle *Stephanoaetus coronatus* and White-naped Pigeon *Columba albinucha*. The occurrence of Black Goshawk *Accipiter melanoleucus*, Grey-throated Rail *Canirallus oculus* and Nkulengu Rail *Himantornis haematopus* represent first records for South Sudan.

Ornithological studies and baseline biological inventories in present-day south-western South Sudan are sparse due to geographical remoteness, human disease (Ruiz-Postigo 2012) and conflict. Several avian inventories were produced for Bangangai Game Reserve (one of our study sites, see below) during July 1980–January 1983 (Hillman 1983, Hillman & Hillman 1983, 1986). These were compiled while the Hillmans were studying Lowland Bongo *Tragelaphus eurycerus* and other large mammals for the New York Zoological Society (now the Wildlife Conservation Society). Hillman (1983) compiled a list of avian species for the region including the records of Woodman (1936, 1952a,b), Cave & MacDonald (1955), Nikolaus (1979) and Traylor & Archer (1982), all of which were incorporated into the atlas of Sudan birds by Nikolaus (1987).

Given limited avian inventory work in south-western South Sudan during the last four decades, our objectives here are to document new country records and range extensions, as well as fill distributional gaps, resulting from camera trap images of birds as part of survey work in regional game reserves. Such information, which derives from studies focused on other taxa (especially large mammals), is useful for documenting rare avian species in poorly known regions (Brooks *et al.* 2018). Moreover, the methodology is valuable for very shy or cryptic species that might otherwise go unrecorded (O'Brien *et al.* 2003).

Methods

Study region.—This work was undertaken in Bangangai (171 km², centred on 04°57'N, 27°89'E; c.700 m) and Bire Kpatuos Game Reserves (70 km², 04°57'N, 27°87'E; c.700 m), in extreme south-west South Sudan, bordering Democratic Republic of the Congo (DRC) and Central African Republic (CAR) (Fig. 1), and which are separated by 32 km. Bangangai experiences greater levels of human activity associated with bushmeat harvesting due to proximity of the nearest town, Ezo, whereas Bire Kpatuos is more remote and buffered from



Figure 1. Maps showing locations of camera traps in the study sites at Bangangai (centred on 04°57'N, 27°89'E) and Bire Kpatuos (04°57'N, 27°87'E) Game Reserves, South Sudan.

human settlements by a non-native teak *Tectona grandis* forest concession (Ombina 2008); at the time of our field work it was a c.12 km-walk from the nearest main road. Habitat in both reserves is a mosaic of small patches of primary forest and larger areas of secondary forest surrounded by open savanna, probably created and maintained by annual human-started fires (Hillman 1983). Human communities no longer inhabit the reserves permanently but harvest resources in them. The dry season extends from late November to late April, with the wet season in May to mid November (Hillman 1983).

Camera trap surveys.— A total of 83 Bushnell HD ‘trophy cam’ were deployed, with GPS coordinates recorded manually using Garmin eTrex 10 Handheld GPS. Each camera trap was digitally recorded with a name assigned (e.g., ‘Camera Trap 01A’) and stamped with time and date; if a camera was deployed more than once it was renamed (e.g., if ‘Camera Trap 01A’ was redeployed it was renamed ‘Camera Trap 01B’). Thirty-one camera traps were initially deployed and/or redeployed in Bangangai between January 2015 and February 2016 (4,467 camera trap nights) and 52 camera traps were deployed in Bire Kpatuos from September 2015 to August 2017 (7,823 camera trap nights). Each camera trap had ‘camera mode’ selected and was formatted to take images with ‘widescreen’ to obtain as much information as possible. Cameras were set to trigger at ten-second intervals between each capture, with ‘night vision mode’ selected during nighttime.

Assessment.— All photos of birds were identified to species using Cave & MacDonald (1955), Stevenson & Fanshawe (2002), van Perlo (2002), Redman *et al.* (2009) and Sinclair & Ryan (2010). Numbers of capture events were tallied for each species. Categories of threat status follow BirdLife International (2022). Species records were compared with Hillman (1983). Significant range extensions were assessed via comparison with range maps in Snow (1978), Nikolaus (1987), Sinclair & Ryan (2010) and Billerman *et al.* (2022); the latter reference is continuously updated for the most current information.

Results

A total of 40 species representing 18 families was recorded (Table 1). Half ($n = 20$) of the records involved ≥ 4 camera trap events. Two of these, Crowned Eagle *Stephanoaetus coronatus* and White-naped Pigeon *Columba albinucha*, are classified as Near Threatened, the rest as Least Concern (Table 1). Thirty-one species (78%) were previously reported by Hillman (1983). Three species (Black Goshawk *Accipiter melanoleucus*, Grey-throated Rail *Canirallus oculus* and Nkulengu Rail *Himantornis haematopus*) are first records for South Sudan, four species (including Black Goshawk) represent range extensions, and one bridges a gap between north-west Ethiopia and eastern CAR (Table 1). With the exception of those shown in Fig. 2, photos of the significant records are not of publishable quality and therefore not included here.

Selected species accounts

WHITE-NAPED PIGEON *Columba albinucha*

Our six records of this Near Threatened species, all from Bangangai in March 2015 (except one on 6 April), are notable. While Hillman (1983) had previously recorded the species at Bangangai Game Reserve, Nikolaus (1989) noted that there are few sightings overall in the country.

TABLE 1

List of 40 species recorded by 83 camera traps in Bangangai Game Reserve (January 2015–February 2016) and Bire Kpatuos Game Reserve (September 2015–August 2017), South Sudan. # = total number of camera trap events. ¹ = new country record for South Sudan not recorded by Hillman (1983). ² = north-westerly range extension, ³ = north-easterly range extension; ⁴ = bridges gap between north-west Ethiopia and eastern Central African Republic (Snow 1978, Nikolaus 1987, Sinclair & Ryan 2010, Billerman *et al.* 2022). ⁵ = Near Threatened (BirdLife International 2022). Nomenclature and taxonomy follow Clements *et al.* (2021).

English name	Scientific name	#
NUMIDIDAE		
Helmeted Guineafowl	<i>Numida meleagris</i>	71
Crested Guineafowl	<i>Guttera pucherani</i>	186
PHASIANIDAE		
Stone Partridge	<i>Ptilopachus petrosus</i>	1
Latham's Francolin	<i>Peliperdix lathamii</i>	13
Heuglin's Spurfowl	<i>Pternistis icterorhynchus</i>	10
COLUMBIDAE		
White-naped Pigeon ⁵	<i>Columba albinucha</i>	6
Red-eyed Dove	<i>Streptopelia semitorquata</i>	39
Blue-spotted Wood Dove	<i>Turtur afer</i>	5
Tambourine Dove	<i>Turtur tympanistria</i>	6
African Green Pigeon	<i>Treron calvus</i>	42
MUSOPHAGIDAE		
Great Blue Turaco	<i>Corythaeola cristata</i>	62
Eastern Plantain-eater	<i>Crinifer zonurus</i>	2
RALLIDAE		
Grey-throated Rail ^{1,3}	<i>Canirallus oculus</i>	3
Nkulengu Rail ^{1,3}	<i>Himantornis haematopus</i>	8
CICONIIDAE		
African Openbill	<i>Anastomus lamelligerus</i>	1
Black Stork	<i>Ciconia nigra</i>	2
Abdim's Stork	<i>Ciconia abdimii</i>	5
Woolly-necked Stork	<i>Ciconia episcopus</i>	43
SCOPIIDAE		
Hamerkop	<i>Scopus umbretta</i>	6
ARDEIDAE		
Black-headed Heron	<i>Ardea melanocephala</i>	21
Striated Heron	<i>Butorides striata</i>	1
ACCIPITRIDAE		
European Honey Buzzard	<i>Pernis apivorus</i>	1
Palm-nut Vulture	<i>Gypohierax angolensis</i>	35
African Harrier-hawk	<i>Polyboroides typus</i>	12

African Goshawk	<i>Accipiter tachiro</i>	4
Black Goshawk ^{1,2}	<i>Accipiter melanoleucus</i>	1
Little Sparrowhawk ²	<i>Accipiter minullus</i>	1
Long-tailed Hawk	<i>Urotriorchis macrourus</i>	6
Crowned Eagle ^{4,5}	<i>Stephanoaetus coronatus</i>	14
STRIGIDAE		
African Wood Owl	<i>Strix woodfordii</i>	2
BUCEROTIDAE		
Black-casqued Hornbill	<i>Ceratogymna atrata</i>	8
Black-and-white-casqued Hornbill	<i>Bycanistes subcylindricus</i>	2
ALCEDINIDAE		
Blue-breasted Kingfisher	<i>Halcyon malimbica</i>	2
Woodland Kingfisher	<i>Halcyon senegalensis</i>	4
MEROPIIDAE		
Black-headed Bee-eater	<i>Merops breweri</i>	3
PYCNONOTIDAE		
Common Bulbul	<i>Pycnonotus barbatus</i>	2
TURDIDAE		
African Thrush	<i>Turdus pelios</i>	1
MUSCICAPIDAE		
Snowy-crowned Robin-chat	<i>Cossypha niveicapilla</i>	2
PLOCEIDAE		
Yellow-mantled Widowbird	<i>Euplectes macroura</i>	1
ESTRILDIDAE		
Magpie Mannikin	<i>Spermestes fringilloides</i>	1

GREY-THROATED RAIL *Canirallus oculeus*

Photographed in Bangangai on 24 May and 8 July 2015, at 17.32–18.52 h. These records, the first for South Sudan, extend the range c.150 km north-east (Snow 1978, Sinclair & Ryan 2010, Taylor 2020a). The nearest known record is from Medje, Rungu, DRC (02°23'N, 27°18'E; Schouteden 1963).

NKULENGU RAIL *Himantornis haematopus*

Five records at Bangangai and three at Bire Kpatuos, in all months except August–October. Activity peaked at dusk, with 62% ($n = 5$) of records during 18.10–18.50 h. These eight records are the first for South Sudan, and extend the range c.175 km north-east (Snow 1978, Taylor 2020b). The nearest known record is from Medje, Rungu, DRC (02°23'N, 27°18'E; Schouteden 1963).

BLACK GOSHAWK *Accipiter melanoleucus*

Photographed at Bangangai on 26 August 2015 at 11.08 h. This record is the first in South Sudan and extends the species' range c.150 km north-west (Snow 1978, Sinclair & Ryan 2010, Kemp & Kirwan 2020).



Figure 2. Camera trap voucher images of Long-tailed Hawk *Urotriorchis macrourus* (24 April 2015, above) and Crowned Eagle *Stephanoaetus coronatus* (19 February 2013, below) from Bire Kpatuos and Bangangai Game Reserves, respectively, South Sudan.

LITTLE SPARROWHAWK *Accipiter minullus*

Photographed at Bire Kpatuos on 8 October 2015, which extends the range c.40 km north-west (Snow 1978, Nikolaus 1987, Sinclair & Ryan 2010, Kemp & Marks 2020).

LONG-TAILED HAWK *Urotriorchis macrourus*

Two records, one each at Bire Kpatuos and Bangangai (Fig. 2) on 24 April and 28 August 2015, respectively. While Hillman (1983) recorded the species at Bangangai Game Reserve,

Nikolaus (1989) mentioned only a few sightings in the country, making these records notable.

CROWNED EAGLE *Stephanoaetus coronatus*

Nearly all records ($n = 13$) were from Bangangai ($n = 1$ at Bire Kpatuos), spanning 22 January–26 November 2015. The 14 records of this Near Threatened species (Fig. 2) bridge a range gap between north-west Ethiopia and eastern CAR (Kemp *et al.* 2020). Bowen (1926) recorded this species in north-west South Sudan at Bahr el Ghazal. Nikolaus (1987) reported it from the Imatong Mountains based on his own observations, and later (Nikolaus 1989) accepted other unreferenced records from elsewhere.

Discussion

Three species detected in this study represent new country records and four are range extensions, while another bridges a gap between eastern CAR and north-west Ethiopia (Table 1), reflecting the lack of survey work in South Sudan. Indeed, this landscape has been dubbed the 'African Pole of Inaccessibility' due to its remoteness, poor road access and persistent insecurity (Ondoua *et al.* 2017).

Many of the species in Table 1 are at the north-west or north-east limit of their geographic distributions. Indeed, our study sites are situated at the ecotone between Congo Basin forests and Sudan savanna to the north / north-east, along the border of South Sudan with DRC and CAR. The location of this belt in the Congo Basin ecoregion sets it apart from the rest of South Sudan, forming part of the zone of overlap with fauna and flora from Central and East Africa, and therefore harbours exceptional biodiversity. These game reserves are an important part of the watershed between the Nile and Congo Rivers.

Our discovery of Grey-throated and Nkulengu Rails, which were not reported by Hillman (1983), is likely to reflect the advantage of using camera traps to detect these shy species (O'Brien *et al.* 2003, Brooks *et al.* 2018). Indeed, relatively little is known about Nkulengu Rail, but our findings are concordant with Taylor (1998) that the species appears to be largely sedentary, occurring in all months except August–October, and is most active crepuscularly, with records during the period 18.10–18.50 h. Noteworthy natural history observations can be gleaned for other species as well. For example, that most White-naped Pigeons records were in March perhaps reflecting that the species visits masting trees during this period, despite moving over large areas otherwise (Gibbs *et al.* 2001).

Multiple records were made of two Near Threatened species, Crowned Eagle ($n = 14$ events) and White-naped Pigeon ($n = 6$). While the primary threat to these species is forest clearance (BirdLife International 2022), the number of records points to the healthy condition of forest in the reserves. Indeed, our work has demonstrated an increase in forest cover in both reserves between 1985 and 2011 (Kurpiers 2015) despite significant habitat loss elsewhere in the region (UNEP 2007). As evidenced by the exceptional mammal diversity documented by our camera trap study (Sutton 2020), these forests support several prey species of Crowned Eagle (e.g., Red-tailed Monkey *Cercopithecus ascanius* and other Cercopithecidae) for example.

For decades, civil conflict made these dense forests difficult to monitor. The reserves are now being managed via a partnership between the national wildlife service and Community Wildlife Ambassadors. This ensures a cooperative system of wildlife monitoring and law enforcement between the government and local communities, with support from Fauna & Flora International in partnership with Bucknell University. Recommended conservation actions today remain much the same as elucidated by Hillman (1983): maintain wildlife ranger presence in the reserves, manage illegal bushmeat hunting and timber extraction,

and manage fires within the reserves. To this list we would add engagement of surrounding communities, locally led species monitoring, and establishment of locally managed community conservancies.

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The overlooked nomenclatural history of the Fernando Po Mannikin *Spermestes bicolor poensis* (Fraser, 1843) (Estrildidae)

by Paul Smith

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SUMMARY.—Fernando Po Mannikin *Spermestes bicolor poensis* (Fraser, 1843) has had a relatively stable nomenclatural history since its formal scientific description. However, references in previous publications that have long been overlooked also clearly refer to this taxon. The Radiated Grosbeak of Latham (1783) on which the scientific name *Loxia lineata* J. F. Gmelin, 1789, is based, and the Pico grueso blanco y negro of Azara (1802), also refer to this taxon. *Loxia lineata* is a senior subjective synonym of *Amadina poensis* Fraser, 1843, but is a *nomen oblitum*. Thus, prevailing usage of the current name should be maintained.

Fernando Po Mannikin *Spermestes bicolor poensis* (Fraser, 1843) is a subspecies of the widespread African estrildid Black-and-white Mannikin *Spermestes bicolor* (Fraser, 1843) distributed from southern Cameroon and Bioko south to northern Angola, and east to southern Sudan, south-west Ethiopia and north-west Tanzania (Restall 1996, Payne 2020). It is locally common in tall-grass forest clearings, bushy marshes, forest edge and even cultivation (Kunkel 1965, Restall 1996, Borrow & Demey 2001, Payne 2020). English names follow Restall (1996).

Amadina poensis (type locality 'Clarence, Fernando Po') and *Amadina bicolor* (type locality 'Cape Palmas', Liberia) were described on the same page by Fraser (1843), who stated that the latter could be differentiated from the former 'in the absence, in the adult, of the white markings on the wings, rump, and sides'. *A. poensis* was described thus (original Latin first, followed by my translation):

AMADINA POENSIS. *Amad. nitide nigra, primariis guttatis, secundariis uropygio, plumisque lateribus albo-fasciatis; abdomine, tectricibus alarum inferioribus, crissoque albis; iridibus e corylofuscis; rostro caeruleo; tarsi nigris.*

Long. tot. 4 unc. ; rostri 3/8 ; alae, 2 ; caudae, 1 1/2 ; tarsi, 1/2.

(my translation) *AMADINA POENSIS.* *Brilliant black Amadina, primaries speckled, secondaries, rump and lateral feathers banded white: abdomen, underwing-coverts and crissum white; irides dark hazel; bill blue; tarsi black.*

Total length 4 inches [101.6 mm]; bill 3/8 [9.5 mm]; wing, 2 [50.8 mm]; tail, 1.5 [38.1 mm]; tarsus 0.5 [12.7 mm].

Fraser (1843) did not list any previous synonyms; nor did any of the subsequent major works dealing with the taxonomy of the West African avifauna (Sharpe 1890, Shelley & Sclater 1905, Bates 1930, Sclater 1930, Chapin 1954). However, there exist previous obscure references to this species in the scientific literature and at least one scientific binomial (now a *nomen oblitum*) that have been long overlooked and which are highlighted in this paper.

The 'Radiated Grosbeak' of Latham (1783: 156)

John Latham (1740–1837) was one of the earliest British avian taxonomists, publishing the seminal work *A general synopsis of birds* (Latham 1781–85) in three volumes. With Linnean binomials still not universally accepted at the time of its publication, Latham did not recognise their import and described his birds using only common names. Later, realising his error of judgement, he attempted to provide binomials for the species he had described in the *Synopsis* in his *Index ornithologicus* (Latham 1790). Unfortunately for Latham he was beaten to it by Johann Friedrich Gmelin (1748–1804) (Gmelin 1788), who thus appears as the author of many species that Latham described (see below). One of the species described by Latham (1783: 156) was the Radiated Grosbeak, the text for which is reproduced in full below.

78. RADIATED GR.[OSBEAK]

SIZE of a Linnet: length four inches. Bill stout, thick, white : head, neck, breast, lesser wing coverts, and tail, black : secondaries, sides of the body, and base half of the prime quills, striated black and white ; the end half of the last black; belly and vent white : tail three quarters of an inch in length : legs dusky.

In the living collection of her Grace the *Duchess Dowager of Portland*.

Although brief, this text shows obvious similarities to the much later description of *Amadina poensis* by Fraser (1843), including the clear agreement in body size and the mention of the diagnostic characteristic of the black-and-white markings on the wings and sides. No other bird matches this description.

Margaret Cavendish Bentinck (1715–85), Duchess of Portland, was the richest woman in Great Britain during her lifetime, owning the largest natural history collection in the country and had the stated aim of possessing 'every unknown species in the three kingdoms of nature described and published to the world' (Lightfoot 1768, Tobin 2016, Pelling 2019). That Latham based this on a cagebird in her collection means that he was probably unable to provide a type locality for it. This may have been key in this description becoming forgotten.

Loxia lineata of J. F. Gmelin (1789: 858)

The German taxonomist J. F. Gmelin was a student of Linnaeus (Kastner 1977) and edited the 13th edition of the *Systema naturae* of which the first volume (in two parts) dealt with birds (Gmelin 1788, 1789). He compiled descriptions in non-Linnean works and provided Linnean binomials for them where these did not already exist. Thus Latham's Radiated Grosbeak became *Loxia lineata* J. F. Gmelin, 1789, with the following derived entirely from Latham (1783):

AVES PASSERES. *Loxia*.

lineata. 79. L. nigra, hypochondriis, remigibus secundariis et a basi ad medium primoribus nigro alboque striatis, abdomine crissoque albis.

Radiated Grosbeak. *Lath. Syn.* II. I. p. 156. n. 78.

Magnitudo *linariae*; longitudo 4 pollicum; rostrum *album* ; pedes *atri*.

(my translation) AVES PASSERES. *Loxia*.

lineata. 79. Black *Loxia*, underparts, secondaries from the base to the middle of the primaries black striped with white, abdomen and undertail-coverts white.

Radiated Grosbeak. *Lath. Syn.* II. I. p. 156. n. 78.

Linnet sized; longitude 4 inches; bill *white*; feet *black*.

***Loxia lineata* of Latham (1790: 395)**

The introduction to *Index ornithologicus* (Latham 1790) expresses the author's displeasure at Gmelin's approach. However, in repeating the scientific name proposed by Gmelin (1789) Latham did respect the Linnean principle of priority. Note, however, how much of the detail included in Latham (1783) has been abbreviated. His text is as follows:

AVES PASSERES. *Loxia*.

85. *lineata*. L. nigra subtus alba, lateribus corporis basique remigum primorum albo nigroque transversim striatis.

Loxia lineata, *Gmel. Syst.* i. p. 858.

Radiated Grosbeak, *Lath. Syn.* iii. p. 156. 78.

Magnitudo *Linariae*. — 4 pollices longa. — *Rostrum* album.

(my translation) AVES PASSERIFORMES. *Loxia*.

85. *lineata*. Black *Loxia*, white below, sides of body and bases of primary remiges striped black and white transversely.

Loxia lineata, *Gmel. Syst.* i. p. 858.

Radiated Grosbeak, *Lath. Syn.* iii. p. 156. 78.

Linnet sized. — 4 inches long. — *Bill* white.

'No. CXXVII Pico grueso negro y blanco' of Azara (1802: 458)

Félix de Azara (1742–1821) was a Spanish engineer, soldier and naturalist working in Paraguay and the La Plata Basin (Beddall 1983). His three-volume *Apuntamientos para la historia natural de los páxaros del Paraguay y Río de la Plata* (1802–05) was one of the first systematic attempts to document the regional South American avifauna, but he too neglected to employ Linnean binomials (being greatly influenced by the French school embodied by Buffon). In an analogous situation to that of Latham and Gmelin, many of Azara's descriptions were subsequently published with Linnean names by Louis Jean-Pierre Vieillot (1748–1830) who had commissioned what was a rather unsatisfactory French translation of the Spanish original by Charles Nicolas Sigisbert Sonnini de Manoncourt (1751–1812) and published it as 'Azara (1809)'. Sonnini, who greatly under-estimated the true extent of avian biodiversity, annotated this work with a series of footnotes (see next section) which attempted (with varying degrees of success) to reconcile Azara's descriptions with known species. Azara's life and work is documented by Contreras (2010).

Azara's (1802) description 'No. CXXVII Pico grueso negro y blanco' is a remarkable text, for the clarity and detail provided that allows a clear identification as *Spermestes bicolor poensis* and the fact that it refers to an African cagebird in Argentina in the late 18th century. An important factor to note is that the inches used by Azara are those of the 'pied du roi de France' and are equivalent to 27.06 mm (not the standard 25.4 mm used by other authors cited here) and 'lines' are equivalent to 2.26 mm.

NÚM. CXXVII.

DEL NEGRO Y BLANCO.

Don Pablo Maíllos me lo trae en este momento, diciendo, que escribiendo en una casa de Buenos Ayres se le entró en el quarto, siendo el único que he visto: quizás se escapó de alguna jaula, y será de otro país.

Longitud 3 1/2 pulgadas: cola 1 1/6: braza 6. La cabeza y cuello enteros, la espalda, lomo, cobijas y cola, son negros profundos; y la rabadilla y costados del cuerpo á tiritas

negras y blancas, éstas más estrechas. Lo mismo es la barba superior de los remos, ménos el tercio de las puntas, que es solamente negro, como las piernas por fuera. De la clavícula á la cola y las tapadas blancas, ménos las inmediatas al encuentro del trozo exterior que son oscuras, como los remos debaxo; pero estos tienen la bordita blanca.

Remos 17 ó 18, el segundo, tercero y cuarto mayores, y no muy fuertes. Al cogerle se le cayéron algunas plumas de la cola; pero no es dudable que son 12, y con algun seno, segun dice Maillos. La cabeza y todo es de la familia. El pico celeste claro, largo 4 líneas, y el tarso aplomado. Ignoro si Buffon le ha descrito.

NUM. CXXVII.

THE BLACK AND WHITE.

Don Pablo Maillos brings it [the bird] to me now, saying that, whilst writing in a house in Buenos Aires it came into his room, this being the only one I have seen: perhaps it escaped from a cage and comes from another country.

Length 3 1/2 inches [94.7 mm]: tail 1 1/6 [31.6 mm]: wingspan 6 [162.4 mm]. The entire head and neck, the back, the mantle, coverts and tail are deep black; and the rump and sides of the body with black-and-white stripes, the latter narrower. The same goes for the upper vane of the flight feathers, except for the third closest to the tips, which is all black, like the outer part of the legs. From the breast bone to the tail and the underwing-coverts it is white, except those immediately adjacent to the wing bend in the outer section which are dark, as are the undersides of the flight feathers; but these have a slight white border.

Flight feathers 17 or 18, the second, third and fourth longest, and not very strong. Upon capture some of the tail feathers fell out; but there is no doubt that there are 12 in the set, according to what Maillos says. The head and everything are typical of the family. The bill is pale turquoise, length 4 lines [9.04 mm], and the tarsus is lead-coloured. I do not know if Buffon has described it.

'No. CXXVII Gros-bec noir et blanc' of Sonnini (in Azara 1809: 280)

The translation of Sonnini (in Azara 1809) is, with minor omissions, a faithful translation of Azara (1802) so I will not reproduce it here. However, it is the footnote to this description that is of particular interest:

Je trouve plusieurs rapports de conformité entre cet oiseau et *le gros-bec rayé* indiqué, plutôt que décrit, par Latham. *Loxia lineata*, syst. ornith. gen. 35, sp. 85.—Linn. *syst. nat. gen.* 109, sp. 79. Voyez mon édition des *Oeuvres* de Buffon, t. XLVII, pag. 97. On ignore dans quel pays vit ce *gros-bec*. (S.)

(my translation) I find several points of conformity between this bird and the Radiated Grosbeak indicated, rather than described, by Latham. *Loxia lineata*, syst. ornith. gen. 35, sp. 85.—Linn. *syst. nat. gen.* 109, sp. 79. See my edition of Buffon's *Oeuvres*, t. XLVII, pag. 97. We do not know in which country this grosbeak lives. (Sonnini)

I have been unable to consult a copy of the Dufart edition of the *Oeuvres* to which Sonnini refers. Sonnini omits mention of Latham (1783) and may not have been aware of it. His reference to the lack of 'description' of the species may concern the absence of a Linnean binomial or perhaps the brevity of the description. However, the suggestion that Azara's bird and Latham's Radiated Grosbeak are the same appears well founded.

Discussion

That all of these descriptions refer to the same taxon, Fernando Po Mannikin *Spermestes bicolor poensis* seems clear. The accuracy of the descriptions by the authors cited above is equal to, and, in at least one case more detailed than, that upon which the scientific name is based (Fraser 1843), and all accounts mention the diagnostic characteristics cited by Fraser (1843) and provide measurements that conform with this taxon.

Pereyra (1945) recognised this to be the case in his review of Azara's ornithological work published in Argentina. Two previous reviewers of Azara's work (Hartlaub 1847, Laubmann 1939) had surprisingly associated his description with White-bellied Seedeater *Sporophila leucoptera* (Vieillot, 1817), a bird that differs notably from the Pico grueso negro y blanco, most obviously because of clear differences in the colour of the bill and throat, as well as the wing and rump pattern. Furthermore, Azara (1802: 447) described the male *Sporophila leucoptera* as No. 123 Pico grueso pico trigueño, where the author's careful eye for detail is reaffirmed in the accuracy of that description and its quite different morphometrics. Vieillot (1817) based the scientific name for *Sporophila leucoptera* solely upon Azara's description.

I suggest that the fact Latham's (1783) work on the Radiated Grosbeak had been 'watered down' by the abbreviated description of Gmelin (1789) coupled with his own attempt to apply Linnean binomials to his description (Latham 1790) led to those descriptions being considered unidentifiable, whilst the later association of the same taxon with Azara—an author concerned with the Neotropical avifauna—meant that the possibility the species formed part of the African avifauna was not seriously considered by contemporary authors. Fraser's (1843) description then provided an apparently stable and consistently applicable name for the common Fernando Po Mannikin, and there was little nomenclatural attention paid to it from that point.

Loxia lineata J. F. Gmelin, 1789, is a senior synonym of *Amadina poensis* Fraser, 1843; however, it should be considered a *nomen oblitum* and prevailing usage maintained under Art. 23.9.1 of the Code (ICZN 1999). *Loxia lineata* J. F. Gmelin, 1789, has not been used as a valid name since 1899 and *Amadina poensis* Fraser, 1843, has been applied consistently for the taxon that bears the name since the date of its description.

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What is the northernmost breeding range of Fuegian Snipe *Gallinago stricklandii*?

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SUMMARY.—Fuegian Snipe *Gallinago stricklandii* is a poorly known wader found in southern Chile and south-west Argentina, but knowledge of its distribution is still incomplete. Historical records suggest a breeding range between 48°S and 56°S in the Patagonian fjords, however especially few data are available for the north of its presumed distribution. Here we report two records of Fuegian Snipe during the breeding season at 46°S and 48°S. We captured two individuals at Ventisquero Jorge Montt (48°19'S) in early December 2021 (late spring), both with a dry and shrivelled incubation patch, usually indicative of a recently completed incubation period. We also report a photo record and displays at the río Exploradores (46°19'S, 73°24'W). These findings suggest that the northern limit of the species' breeding range extends to at least 46°S.

The genus *Gallinago* comprises 18 species (Remsen *et al.* 2022), eight of which occur in the Neotropics. Species of this genus are almost ubiquitously poorly known (van Gils & Wiersma 1996), however Fuegian Snipe *G. stricklandii* is probably the least known of all (Ferrand 2006, van Gils *et al.* 2020). Information on many aspects of its natural history is very scarce, and even its distribution is not well known (Reynolds 1935, Kusch & Marín 2010, Matus 2018). Its known range during the breeding season extends throughout the remote southern channels and fjords of Chile and Argentina in southern Patagonia, including islands further from the mainland such as the archipelagos of Cape Horn, Staten Island, and Falkland/Malvinas Islands (Bennett 1926, Schmitt 2017, Woods 2017, Matus 2018), this last somewhat ambiguously and without evidence (*cf.* Woods 2017). Because records during the non-breeding season are scarce, it is unclear if the species undertakes partial migration (*cf.* Goodall *et al.* 1951, Kusch & Marín 2010).

Kusch & Marín (2010) compiled natural history and distributional records of the species (45 records between 1881 and 2010) and proposed a breeding season from September to February in the area south of the Golfo de Penas (48–56°S), and a non-breeding season from March to August, spent mainly in coastal areas between 36°S (north of the province of Concepción) and 48°S (Guayaneco archipelago). However, the species' status between 46°S to 50°S, an area of 444 km that includes the Northern Patagonian Icefield (NPI) and the northern edge of the Southern Patagonian Icefield (SPI), is uncertain because of the region's relative inaccessibility and low observer presence. There is a single record in this region, by Trimble (1943) at Puerto Huemules (47°30'S, 73°42'W; near Ventisquero Steffen, NPI) on 11 March 1939, which was classified as part of the post-breeding area by Kusch & Marín (2010).

Here we report two new northern localities for the Fuegian Snipe during the breeding season and discuss the need to explore the southern NPI to clarify the distribution limits of the species.

Field work and Methods

Parque La Tapera is a privately protected area of c.12,425 ha, located between 48°07'S and 48°18'S in Aysén region, 50 km south of Caleta Tortel and adjacent to Ventisquero Jorge Montt (Fig. 1). The area comprises mainly evergreen forests and peatlands (Luebert & Plissock 2017). The upper stratum of broadleaf evergreen forest is dominated by *Nothofagus betuloides*, generally associated with *Tepualia stipularis*, *Drimys winteri* and

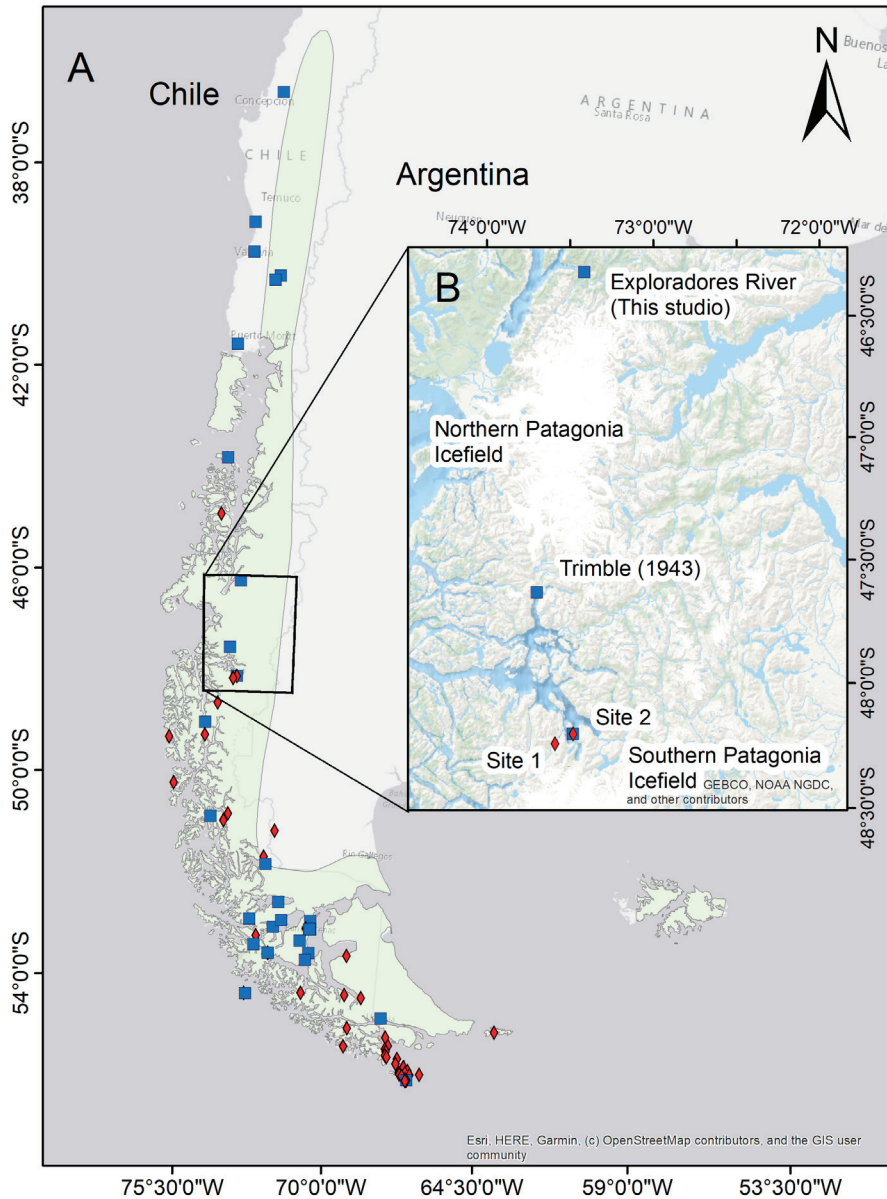


Figure 1. Distribution of Fuegian Snipe *Gallinago stricklandii* (olive) as proposed by IUCN overlain on (A) all localities mentioned for the species according to references in Kusch & Marín (2010; with various corrections based on original sources) and eBird (2022) with photo validation, and classified according to Kusch & Marín (2010) into non-breeding/migration (blue squares) and breeding (red diamonds). (B) Focus on records between 46° and 48°S, showing sites 1 and 2 in Parque La Tapera, and río Exploradores.

Raukaua laetevirens. In parts, *Pilgerodendron uviferum* dominates the tree layer. Other areas with poor drainage are covered by peatlands dominated by cushion plants (*Donatia fascicularis*, *Oreobolus obtusangulus* and *Astelia pumila*). In low, especially waterlogged areas, bogs are predominated by *Sphagnum magellanicum* and *Marsippospermum grandiflorum*.

Between 2016 and 2021 VR explored Parque La Tapera while conducting wildlife inventory surveys, during which he recorded Fuegian Snipe twice: once in summer 2017 (17 January; 48°14'S, 73°35'W) when an individual was seen at the edge of a stream (hereafter site 1) and secondly (48°12'S, 73°28'W) in late summer 2021 (23 March; interpreted as a winter record *sensu* Kusch & Marín 2010), when one was observed in a shrubby, boggy meadow (site 2). The records were *c.*10 km apart (Fig. 1b). In both cases the birds were seen for *c.*30 minutes, during which time chicks / juveniles were searched for, without success. A new expedition to the area, involving five researchers, was made on 5–8 December 2021 with the aim of evaluating the species' breeding status in the area, employing diurnal and nocturnal surveys, the latter to detect displays (Reynolds 1935). To increase the probability of detection, aerial display vocalisations were broadcast using a loudspeaker. The vocalisations used are available at <https://www.xeno-canto.org/XC730172> and were recorded at Isla Carlos III, Magallanes region, Chile. Efforts were focused on the sites of the previous records, especially site 1 as it was made during the breeding period. When searching open areas, the participants walked in a line to flush birds, advancing in parallel, and sometimes separated into two groups to cover more ground. Edges of watercourses were walked in zigzag lines to increase detectability.

Results and Discussion

On 5 December 2021, an adult was observed, mist-netted and banded at site 1, *c.*300 m from the 2017 sighting. At night, aerial displays of at least two individuals were heard between 22.30 h and 04.00 h south-west of the capture point. Next day, the search area was extended further south in areas of potentially suitable habitat, but without additional sightings. On 7 December 2021, the first area was revisited, and two adults were found together (less than 2 m apart) in the vegetation, and <100 m from the first capture. When they were trapped with mist-nets, it was found that they were the already banded bird and a second individual, possibly a pair given their proximity. Although they could not be sexed (absence of cloacal protuberance), when comparing plumage and size, one was observably darker and larger than the other (Table 1, Fig. 2e). A wrinkled and somewhat dry brood patch was visible in both individuals, indicative of a recently completed incubation period. These observations are consistent with records of adults seen with chicks on islands further south in November–December (Kusch & Marín 2010). During the afternoon and evening of 7 December we surveyed site 2, and at 22.44 h we heard a territorial display in response to playback, thus potentially confirming use of this area too during the breeding period. Next day we extended the search around site 2, but did not encounter more individuals. The aerial display sound consists of two interspersed modulated elements (XC690989) with a duration of three seconds, a min. frequency of 874 Hz and a max. 2,488 Hz (frequency peak 2,067 Hz; Fig. 3). Compared to Magellanic Snipe *G. magellanica* from Magallanes (*cf.* Miller *et al.* 2020), the recording of *G. stricklandii* lacks harmonics, and has two modulated elements, one of longer duration than the other (0.07 vs. 0.185 seconds).

In terms of habitat characteristics, site 1 corresponds to an azonal vegetation community of broadleaf evergreen forest, riparian forest dominated by the deciduous species *Nothofagus antarctica*, and shrubs such as *Ribes magellanicum*, *Escallonia alpina*, *Berberis microphylla* and *B. ilicifolia*. The herbaceous stratum is largely dominated by the exotic grass *Holcus lanatus*, a biological legacy of the area's cattle-raising past. Other abundant species

TABLE 1
Measurements and additional data from banded individuals of Fuegian Snipe *Gallinago stricklandii* at Parque La Tapera, Aysén region, Chile, in December 2021.

	Individual 1	Individual 2
Capture date	5 December 2021	6 December 2021
Mass (g)	220	240
Cloacal protuberance	0	0
Incubation patch	Dry and wrinkled	Dry and wrinkled
Wing (mm)	144	141
Tail (mm)	57	51
Bill length (mm)	72.5	76.7
Tarsus (mm)	37.9	38.1
Age	Adult	Adult
Sex	Indeterminate	Indeterminate

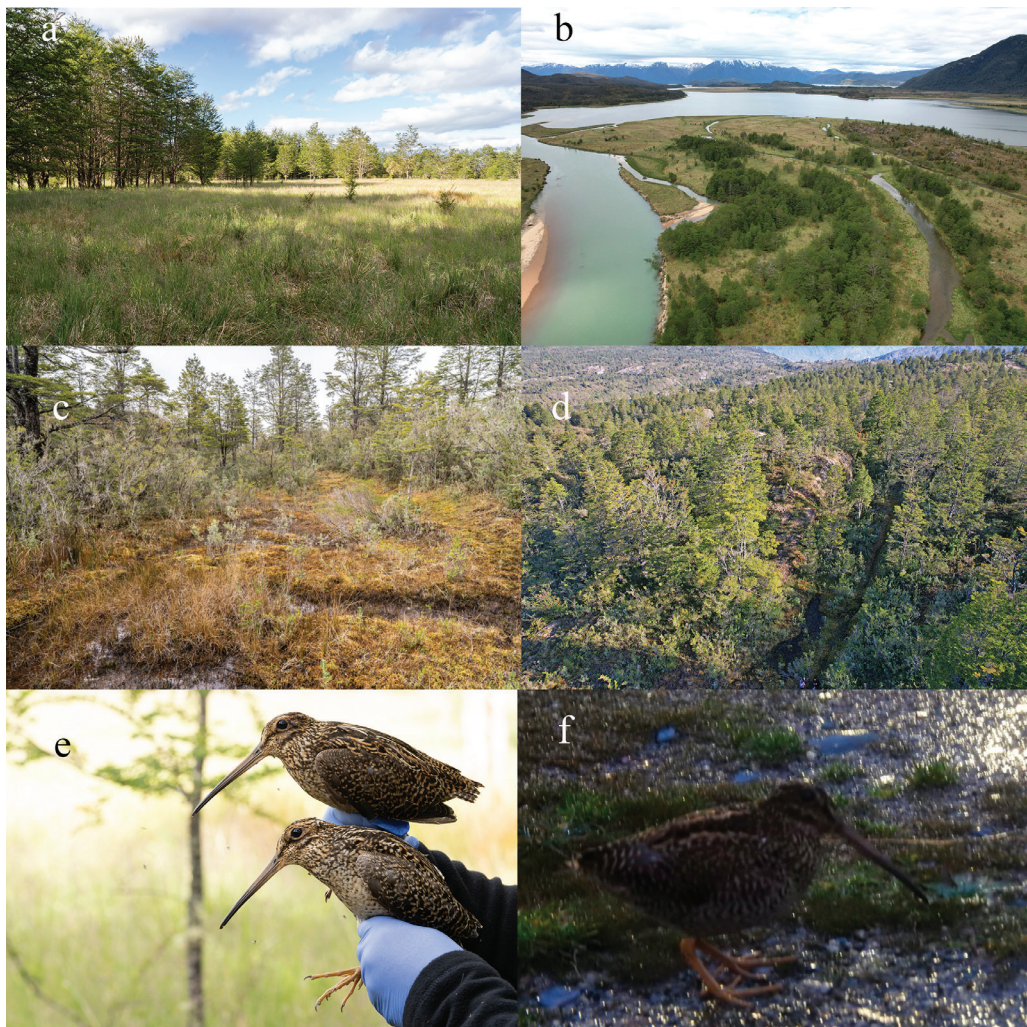


Figure 2. (a) Terrestrial and (b) aerial views of the vegetation at site 1 in Parque La Tapera, Aysén region, Chile; (c–d) vegetation at site 2; (e) two Fuegian Snipes *Gallinago stricklandii* trapped at site 1; and (f) Fuegian Snipe at the río Exploradores.

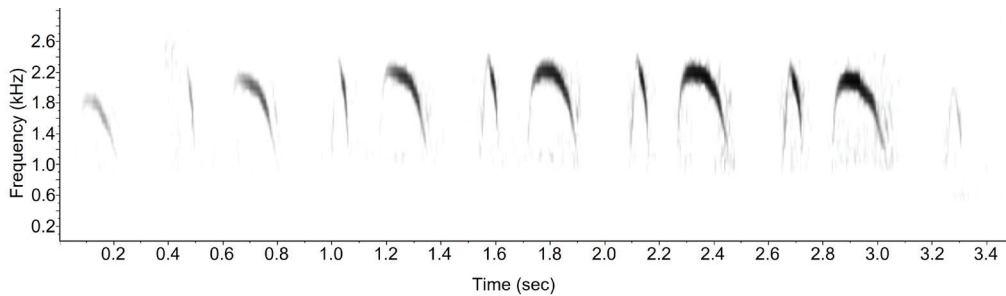


Figure 3. Sonogram of Fuegian Snipe *Gallinago stricklandii* aerial display recorded in Parque La Tapera, Aysén region, Chile; available at <https://www.xeno-canto.org/> (XC690989).

are *Marsippospermum grandiflorum* and the fern *Blechnum penna-marina*. On the other hand, site 2 corresponds to arborescent thicket dominated by *Nothofagus betuloides*, associated with *Drimys winteri* and *Pilgerodendron uviferum*. The most abundant shrubs are *Gaultheria mucronata*, *Berberis ilicifolia* and *B. microphylla*, and the herbaceous layer includes *Gunnera magellanica* and *Marsippospermum grandiflorum* (Fig. 2a–d). The ground is waterlogged year-round and freezes in winter. The habitat differs in composition and structure from areas further south where the species has been recorded using mainly sphagnum bogs (Schlatter 2004, Kusch & Marín 2010, Schmitt 2017), and to a lesser extent evergreen forest, meadows and swamps (Kusch & Marín 2010). On Isla Carlos III (53°39'S, 72°16'W), where the species has been recorded in both summer and winter, records are from pulvinus bogs and *Sphagnum* mosses protected by coastal forest (S. Saiter pers. comm.) Although searches of continental peatlands in the Aysén region are few, recent efforts have been unsuccessful (Raimilla 2021), supporting the hypothesis that at these latitudes the species would use fjord areas (Kusch & Marín 2010), at least in summer.

There is also a record on 28 March 2022, 209 km north of La Tapera and 148 km north of Trimble's (1943) record. A Fuegian Snipe was photographed by DT (Fig. 2f) at dusk in the delta of the río Exploradores (46°19'S, 73°24'W), at the southern edge of the NPI, with displays heard by DT in December and January. *Sensu* Kusch & Marín (2010), this would be classed as a winter record, however display suggests the bird was defending a breeding territory. A similar situation could apply to Trimble's (1943) record 148 km north of our records and on a similar date (11 March), as well as that in Parque La Tapera on 23 March 2021 (see above) and another in Archipiélago Almirantazgo on 3 March 2020 (Arredondo *et al.* 2022), suggesting a greater permanence in the breeding area than previously supposed (February; Kusch & Marín 2010).

Our records of presence and displays of Fuegian Snipe during the breeding season in Parque La Tapera during three reproductive periods (2017–18, 2020–21 and 2021–22) and Bahía Exploradores in 2022, suggest that the species' breeding range extends north of 48°S, *contra* Kusch & Marín (2010), to at least 46°S. Indeed, there are historical records north of 46°S during the breeding period or very close to its end: Archipiélago De Los Chonos, Aysén (45°S, 74°W; Hellmayr 1932) in January 1858 (361 km north of our records), Puerto Huemules (47°38'S, 73°42'W; Trimble 1943), near the Steffen Glacier, on 11 March 1939 (68 km north of our records) and the recent record at the río Exploradores (this study). These suggest that the northern boundary of the breeding range extends to 45°S. Although migratory movements are still unresolved and the species' wintering areas are unclear, as evidenced in Fig. 1, the presence of apparently resident populations in the south of its range, e.g., on Isla Carlos III (S. Saiter pers. comm.), suggest that the geographical classification of Kusch & Marín (2010) may not be appropriate.

Finally, use of playback was a key tool in confirming the species' presence and we strongly encourage its use in future surveys. For this possible new breeding population there are currently few evident threats, although predation by the introduced American Mink *Neovison vison* (Schmitt 2017) is an expanding and worrying one. Additional threats are still unknown, as are those it may face in its still imprecisely known wintering range.

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Square-tailed Saw-wing *Psalidoprocne nitens* in the Democratic Republic of the Congo: identity and taxonomic status

by Lincoln D. C. Fishpool

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<http://zoobank.org/urn:lsid:zoobank.org:pub:1C559CFF-A38B-4285-A829-16F1E8661CE4>

SUMMARY.—The race *centralis* Neumann, 1904, of Square-tailed Saw-wing *Psalidoprocne nitens* is currently considered both to be poorly differentiated morphologically from the nominate subspecies and restricted to a limited area of north-eastern Democratic Republic of the Congo, being replaced elsewhere in the country by nominate *nitens*. Such views are mistaken. Study of specimens confirms assessments of earlier publications, in Dutch and French, that *centralis* occurs throughout the forest zone of northern and central DR Congo—to which region it is confined—whereas the nominate is known only from the coastal far west of the country. Moreover, the plumage of *centralis* is glossy dark bottle green, whereas that of nominate *nitens* is blackish with a dull oily green gloss. This difference was the justification for the initial recognition of *centralis* but has been almost entirely overlooked since the publication of the original description. Combined with the commonly reported contrast in throat colour and a previously unrecorded difference between the plumages of immatures, *centralis* is hence more distinct morphologically than previously appreciated. Further, a recent genetic analysis, involving samples from specimens shown by this study to have been *centralis*, demonstrated a divergence of c.4% from nominate *nitens*. In combination, these findings argue for the elevation of *centralis* to species rank.

Square-tailed Saw-wing *Psalidoprocne nitens* (Cassin, 1857) is a swallow of the African forest zone, occurring from Guinea in West Africa to north-eastern Democratic Republic of the Congo (hereafter DR Congo) and south to north-west Angola and far western DR Congo. The prevailing taxonomic treatment (e.g. Urban & Keith 1992, Turner 2004, 2020, Dickinson & Christidis 2014, del Hoyo & Collar 2016) is that this extensive range is occupied by the nominate subspecies (of which *nigra* Reichenow, 1921, is a synonym) except for north-eastern DR Congo, where it is replaced by *centralis* Neumann, 1904, from which it is considered separable only by a difference in throat colour. Such an assessment of *centralis* is, in fact, inaccurate in two important respects, a consequence, at least in part, of ignorance or oversight of earlier literature not in English. This paper seeks to highlight and correct these misapprehensions and to reassess the status of *centralis*, informed by the results of the molecular study by Barrow *et al.* (2016) and prompted by the outcome of a brief comparison of plumages by M. S. L. Mills and C. Cohen (pers. comm. 2019).

Neumann (1904) described *centralis* from specimens collected at Kitima, Ituri River, Ituri Province, north-east DR Congo. His succinct type description, in German, distinguished it from ‘the generally monochrome and matt-glossy *Psalidoprocne nitens nitens* by a stronger green sheen on the back and underparts, and by a clear blue sheen on the wing-coverts and uppertail-coverts. The wings and tail feathers are also dark steel matt blue’ (my translation).

However, doubt was soon cast on its validity by Ogilvie-Grant (1910: 410), who considered that a second specimen, from near Fort Beni, Semliki Valley, Nord-Kivu

Province, DR Congo, was 'indistinguishable' from nominate material from Cameroon and Gabon. Gyldenstolpe (1924: 230–231), with four further specimens to hand, went a stage further and explicitly relegated *centralis* to a synonym, despite acknowledging that he did not have access to any material from West Africa. He considered that *centralis* was 'most probably based on immature specimens' of *nitens*. Although Sclater (1930: 587) did not go as far as synonymisation, he nonetheless viewed *centralis* as 'doubtfully separable' from the nominate.

The first person explicitly to endorse *centralis* as a valid taxon and to treat it in any detail appears to have been Chapin (1953: 776–778). Despite this, he made no mention of differences between the two forms in the colour and intensity of the gloss on the plumage, with the exception of the throat, which in nominate *nitens* was 'always dull gray-brown', whereas it was 'glossy black' in adult *centralis*. All subsequent descriptions of *centralis* appear to have relied solely upon Chapin's account. Thus, White (1961), Mackworth-Praed & Grant (1973), Turner & Rose (1989), Urban & Keith (1992) and Turner (2004, 2020) all stated the sole morphological discriminant to be throat colour—essentially, unglossed, grey-brown in nominate vs. blackish brown, slightly glossed green in *centralis*. Additionally, Mackworth-Praed & Grant (1973) reported that the subspecies differed in leg colour—dark grey to blackish in nominate, brown in *centralis*—but did not claim this to be a distinguishing feature.

The account by Chapin (1953) of the ranges of the two forms in DR Congo has been equally influential. He restricted the occurrence of *centralis* to 'northeastern Congo, eastward to the Semliki [River], but not yet known from west of Angu on the Uelle River or Stanleyville on the Congo [River]'. Of nominate *nitens*, he wrote that 'although...known from the Gaboon [= Gabon] and Landana [= Cabinda, Angola], the only exact locality for it in the Lower Congo is at Ganda Sundi'. The wording here, coupled with the more general statement that the species ranged 'from Sierra Leone to the Semliki Valley', seems to have led others to infer that nominate *nitens* extended across north-western and north-central DR Congo to meet *centralis* in the north-east of the country.

Thus, Mackworth-Praed & Grant (1973), Urban & Keith (1992), Turner (2004, 2020), Dickinson & Christidis (2014), del Hoyo & Collar (2016) and Gill *et al.* (2023) all also restrict the range of *centralis* to north-east DR Congo. Urban & Keith (1992) described its range as 'NE Zaire [= DR Congo] from Tshuapa to Semliki Valley' which is somewhat misleading since Tshuapa is in the central west of the country. It is possible that the mention of Tshuapa derived from Hall & Moreau (1970), whose map of *nitens* (races not distinguished) showed two localities in this province. With the exception of Mackworth-Praed & Grant (1973), who stated that *nitens* ranged only to 'the Lower Congo' and accordingly mapped the two forms as disjunct, these authors all correspondingly reported nominate *nitens* to be present across the remainder of northern DR Congo and, in the cases of Urban & Keith (1992), Turner (2004, 2020) and del Hoyo & Collar (2016), depicted their ranges as unbroken. By contrast, Turner & Rose (1989) reported *centralis* to be present in 'northern and eastern parts' of the country with *nitens* known only from the extreme west, as did Clements *et al.* (2022), who, while reporting the range of *centralis* to be 'Tshuapa to Semliki Valley', considered this to be 'n.w. D.R. Congo'.

In fact, as Schouteden (1955, 1957) made clear, first in Dutch and then in French, the only DR Congo records of nominate *nitens* were from the Mayumbe [= Mayombe], Kongo Central [= Bas-Congo, Lower Congo], in the coastal far west—the Ganda Sundi specimens mentioned by Chapin (1953)—while all other records across the main forest zone referred to *centralis*. Indeed, all subsequent material collected from these areas has also been identified as *centralis* (Schouteden 1961, 1962, 1963a,b, 1969, Prigogine 1971, 1978, 1984). The map in

Schouteden (1955) showed *centralis* from two localities in Tshuapa (simplified from nine listed sites, all in close proximity) and was perhaps the source of the records shown by Hall & Moreau (1970).

One consequence of these misrepresentations of distribution in the current literature can be seen in the work of Barrow *et al.* (2016). Their genetic study of the genus *Psalidoprocne* included samples from four specimens of *nitens sensu lato*, one each from Côte d'Ivoire and Liberia and two from DR Congo. The authors stated that they were unable to obtain samples of *centralis*, which they thought, on the authority of Urban & Keith (1992) and Turner (2004), to be confined to the north-east of the country. They therefore attributed three of their samples to nominate *nitens*—the two from Upper Guinea and one from a locality in what was Equateur Province (now within Tshuapa Province) in western DR Congo. The fourth sample they left undiagnosed ('*nitens* ?'), presumably because the source of it, Kivu (now Sud-Kivu) Province in eastern DR Congo, fell outside the range of either taxon as described by Urban & Keith (1992) and Turner (2004).

Methods

The morphological characters by which *centralis* differs from nominate *nitens* were re-assessed by examination of 64 nominate specimens and 70 (putative) *centralis*. The latter were all collected in DR Congo (current names of provinces of origin and number of specimens: Équateur $n = 3$, Sud-Ubangi $n = 1$, Tshuapa $n = 13$, Haut-Uélé $n = 1$, Bas-Uélé $n = 2$, Tshopo $n = 6$, Ituri $n = 8$, Nord-Kivu $n = 7$ and Sud-Kivu $n = 29$) while the *nitens* specimens came from Sierra Leone ($n = 4$), Liberia ($n = 18$), Ghana ($n = 2$), Nigeria ($n = 1$), Cameroon ($n = 34$), Equatorial Guinea ($n = 1$), Gabon ($n = 2$) and Angola (Cabinda) ($n = 2$). This material is held in the Natural History Museum, Tring (NHMUK) (59 nominate, three *centralis*), the Royal Museum for Central Africa, Tervuren (RMCA) (five nominate, 57 *centralis*) and the Royal Belgian Institute of Natural Sciences, Brussels (RBINS) (ten *centralis*).

In addition to an assessment of plumage and bare parts, measurements were taken of length of folded wing (unflattened chord) using a ruler with a perpendicular stop at zero, length of bill (to skull), width of bill at the distal end of the nares, and length of tail, from the tip of the outermost rectrix to the point of insertion, using callipers accurate to 0.1 mm. Tarsal length was not measured.

Mensural data were analysed for statistically significant differences using Student's *t* tests. Where appropriate, effect sizes were assessed using Cohen's *d*.

To inform assessment of taxonomic rank, the scoring system offered by Tobias *et al.* (2010) was used. In this, an exceptional character difference (radically different coloration, pattern, size or sound) scores 4, a major character (pronounced difference in body part colour or pattern, measurement or sound) 3, medium character (clear difference, e.g. a distinct hue rather than different colour) 2, and minor character (weak difference, e.g. a change in shade) 1. Scores are also given on the basis of geographical relationship: allopatry 0, broad hybrid zone 1, narrow hybrid zone 2 and parapatry 3. A threshold of 7 is set to afford species status, such that it cannot be triggered by minor characters alone, and only three plumage characters, two vocal characters, two non-covarying biometric characters (assessed for effect size using Cohen's *d* where 0.2–2 is minor, 2–5 medium and 5–10 major) and one behavioural or ecological character (allowed 1) may be counted. Molecular data are not included within this system.

Results

Almost the entire plumage of adult nominate *nitens* is, as described in the literature (e.g. Bannerman 1939, Turner & Rose 1989, Urban & Keith 1992, Turner 2004, 2020), dark brown to blackish, washed with a dull, dark oily green gloss. The exceptions are the lores which, from the bill base to the leading rim of the orbit and extending a little way both above and below the eye, are matt black, and the chin and throat, which are unglossed greyish brown and hence somewhat paler than the rest of the plumage (Figs. 1a–c, 2). The underside of the flight feathers is also unglossed while, dorsally, the sheen on the remiges is confined to the leading edges. The gloss varies in intensity somewhat, appearing inconspicuous in younger birds (see below) as well as in skins in poor condition and, while nowhere pronounced, it is usually most obvious on the dorsal surface (Figs. 1a, 2). The bill is black, the eyes are brown and the legs and feet are black, dark grey or dark brown (label data from 30 specimens).

Adult males ($n = 33$) and females ($n = 22$) are identical in plumage except that the leading edge of the outer primaries in the male is modified such that the terminal portions of the barbs on the anterior vane form short, bare, spine-like projections, flexed inwards—towards the body—and downwards, giving the wing its eponymous saw (Fig. 3). Females lack this modification and the anterior vane of the outer primary is therefore slightly broader than in males. There are statistically significant differences in sizes between adult males and females in all parameters measured: wing and tail lengths are longer in males while bill length and width are smaller (Tables 1, 2a). Comparisons between taxa were therefore disaggregated by sex.

The plumage of immature *nitens* ($n = 9$) differs mainly in the colour of the underparts, which are dark matt brown throughout. They thus lack the grey tones of the chin and throat of the adult but are similarly unglossed or, at most, only faintly so (Fig. 2). Adult feathering seems to be attained progressively, as a number of otherwise apparently mature birds show more or less extensive brown patches, particularly on the belly, resulting in an uneven, mottled appearance. Feather tracts elsewhere on young birds show much the same faint greenish gloss as adults. Other characters of immatures include yellow gape flanges (which seem to be persistent and remain visible on skins), notably shorter tails in some specimens (relative to the values in Table 1) and, in males, unmodified outer primaries. The legs and feet are also paler; label data report them as being 'pale brown', 'grey-brown' and 'flesh colour' as well as 'greyish' and 'blackish tinged'. Mensural data for the nine specimens adjudged immature by the combination of some or all of these characters, not all of which were so designated on their labels, were omitted from the morphometric analysis presented in Table 1.

Examination of the DR Congo material confirmed that specimens from throughout the interior forest zone of the country shared the same plumage characteristics as those from Ituri and Uélé, the areas from where *centralis* has been generally considered to be confined. All interior DR Congo birds were therefore analysed together as *centralis*, separable morphologically from material taken elsewhere.

The plumage of adult *centralis* differs from that of adult nominate in two ways. First, the chin and throat are the same colour as the rest of the feathering which is—except for the black lores—therefore uniform throughout. Second, because of the appreciably greater gloss, the entire plumage appears dark bottle green (Figs. 1a–c and, lower specimens, Figs. 2, 4). Otherwise, the two forms are similar, including in colours of the bare parts and in size, and size differences between adult males ($n = 38$) and females ($n = 18$) where, again, females have bigger bills (Tables 1, 2a,b). Statistically significant differences (at 5%) were



Figure 1a–c. Dorsal, ventral and lateral views, respectively, of Square-tailed Saw-wing *Psalidoprocne nitens centralis* (left two) and *P. n. nitens* (right two). Male *centralis* (far left) and female (second left) from Ndomo, Ituri, DR Congo; nominate *nitens*, both females, from (far right) Belabo, Cameroon, (second right) from Inang, Cameroon. Plumage of *centralis*, including the throat, with evident green gloss; in *nitens*, except for matt grey chin and throat, it is blackish and only faintly glossed. RMCA, Tervuren specimens, registration numbers (left to right) 126107, 126108, 75-56-A-46 and 123191 (L. D. C. Fishpool)



TABLE 1

Measurements (mm) of male and female Square-tailed Saw-wing *Psalidoprocne nitens* taxa. Bill width measured at distal end of nares. For other measuring techniques see text. SD = standard deviation.

Taxon	Sex	Parameter	Wing	Tail	Bill length	Bill width
<i>nitens</i>	Male	Mean	96.125	54.575	6.32	2.56
		Range	88–103	51.5–59.6	5.4–7.6	1.9–3.2
		SD (±)	2.97	2.08	0.49	0.27
		<i>n</i>	32	32	31	29
	Female	Mean	86.82	48.98	6.81	2.84
		Range	83–92	46.1–53.7	6.1–7.6	2.2–4.5
		SD (±)	2.26	2.2	0.39	0.44
		<i>n</i>	22	22	22	22
<i>centralis</i>	Male	Mean	95.83	53.99	6.02	2.44
		Range	85–101	48.3–57.8	5.4–6.9	2.0–3.1
		SD (±)	3.28	2.02	0.465	0.255
		<i>n</i>	36	38	34	33
	Female	Mean	88.72	50.69	6.7	2.77
		Range	84–92	46.3–56.4	6.1–7.5	2.4–3.2
		SD (±)	2.32	2.64	0.39	0.28
		<i>n</i>	18	18	17	17



Figure 2. Ventral view of adult male (below) and unsexed immature Square-tailed Saw-wing *Psalidoprocne nitens nitens*, both from Mt. Nimba, Liberia. Underparts of immature, including chin and throat, are uniformly brown and mostly matt whereas in the adult, chin and throat are matt grey while breast and belly are blackish with a weak green gloss. NHMUK, Tring specimens, registration numbers 1977.20.798 (above) and 1977.20.815 (L. D. C. Fishpool, © Trustees of the Natural History Museum, London)

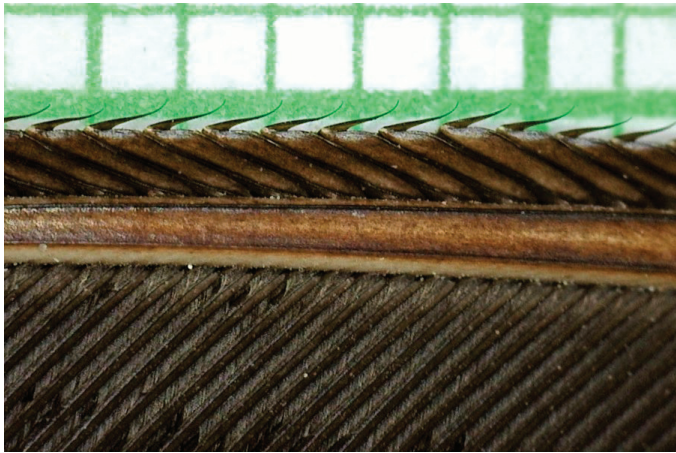


Figure 3. Ventral view of part of the outer primary from the right wing of an adult male Square-tailed Saw-wing *Psalidoprocne nitens nitens* showing part of the 'saw', the modification to the leading edge of the outer vane; scale in mm (L. D. C. Fishpool, © Trustees of the Natural History Museum, London)



Figure 4. Ventral view of adult male (below) and immature female Square-tailed Saw-wing *Psalidoprocne nitens centralis*, from 'near Angu' and '40 miles north-west of Fort Beni', DR Congo, respectively. Although slightly less glossy, the immature is similar in colour to the adult. The vestige of a pale gape flange at the base of the left side of the bill on the immature can just be seen (top left). NHMUK, Tring specimens, registration numbers 1906.12.23.1609 (above) and 1911.12.23.1307 (L. D. C. Fishpool, © Trustees of the Natural History Museum, London)

found between the taxa, in males for bill length and, in females, for both wing and tail lengths (Tables 1, 2b). Label data on bare part colours of adults are lacking.

Immature *centralis* ($n = 12$) are duller, less glossed than adults, particularly below, and so appear darker, but are essentially similar in colour (Fig. 4). Like the nominate, *centralis* also shows yellow gape flanges (Fig. 4), shorter tails and unmodified outer primaries in males. Label data of one immature *centralis* stated the bill to be black, the iris dark hazel and the feet brown. The 12 specimens considered immature by this study were excluded from the morphometric analysis (Table 1).

Applying the methodology of Tobias *et al.* (2010) described above, the morphological differences between *centralis* and *nitens* were scored as follows: plumage of adult glossy dark bottle green overall vs. dark blackish brown glossed dull green, except throat (3); chin

TABLE 2

Results of student *t*-test comparisons for lengths of wing, tail and bill plus width of bill at the distal end of the nares of Square-tailed Saw-wing *Psalidoprocne nitens*, between **a.** the sexes, separately by subspecies and **b.** nominate *nitens* and *centralis*, separately by sex. Effect size statistics (Cohen's *d*) given only for comparisons between *nitens* and *centralis* with a significant *p*-value: see text. **Emboldened, italicised *p*-values indicate the result is significant at $p < 0.01$. Italicised *p*-values indicate the result is significant at $p < 0.05$ but not at $p < 0.01$.** Remainder not significant.

		Statistic	Wing	Tail	Bill length	Bill width
a	males vs. females					
	<i>nitens</i>	<i>t</i> -value	12.418	9.494	-3.931	-2.732
		<i>p</i> -value	<0.001	<0.001	>0.001	0.009
	<i>centralis</i>	<i>t</i> -value	8.206	5.156	-5.182	-4.262
		<i>p</i> -value	<0.001	<0.001	<0.001	<0.001
	b	<i>nitens</i> vs. <i>centralis</i>				
males		<i>t</i> -value	0.382	1.192	2.543	1.893
		<i>p</i> -value	0.703	0.237	0.013	0.063
		Cohen's <i>d</i>			0.627	
females		<i>t</i> -value	-2.619	-2.241	0.902	0.533
		<i>p</i> -value	0.012	0.031	0.373	0.597
		Cohen's <i>d</i>	0.829	0.683		

and throat glossed green vs. unglossed grey-brown (2); underparts of immatures dark green (shewn variably developed) vs. dark matt brown (2). Total 7.

Three statistically significant size differences, mentioned above, were found between nominate *nitens* and *centralis*—longer bill length in male *nitens* and longer wing and tail in female *centralis* (Table 1, 2b). In each case the effect size of these differences ranks as minor under the Tobias criteria, thereby attracting scores of 1. However, since wing and tail lengths are unlikely to be independent of each other, only one of these can be retained. Although a combined score of 2 is therefore possible, the fact that these differences are not consistent between the sexes makes it seem improbable that they are truly informative, particularly given the extensive overlap between taxa in the ranges of measurements in all cases (Tables 1, 2b). In consequence, no score is awarded.

Little can be said with regard to voice. Although there are few recordings available on online platforms (e.g. xeno-canto.org and macaulaylibrary.org) these do, since they originate from Mt. Hoyo, DR Congo, include two of *centralis* (Macaulay Library ML 1433, ML 1434). Preliminary analysis of sonograms reveals some differences between its calls and those of the nominate; these are however relatively minor while the small sample sizes of both mean that no firm conclusions can be drawn. Moreover, since vocalisations within the genus as a whole are relatively homogeneous, such that differences between currently recognised *Psalidoprocne* species are poorly understood, it is likely that the results of more detailed comparisons of *centralis* with nominate would be uninformative as to status (P. Boesman *in litt.* 2022). No ecological differences are known.

As described below, the two forms appear to be separated by the Congo and Ubangi Rivers and are therefore allopatric. I have seen no indication in the material examined of intergrades or hybrids nor any mention of such a possibility in the literature. The geographic relationship score is hence 0. The overall score is therefore 7.

Discussion

In his description of *centralis* Neumann (1904) referred only to the type, collected by W. Ansorge on 25 May 1899, at Kitima Station, Ituri River, Ituri Province, DR Congo. LeCroy (2003) has pointed out that this skin, now in the American Museum of Natural History (AMNH), New York, was in fact one of three males taken by Ansorge on that date, all from Kitima—01°18'N, 27°55'E (Chapin 1954: 682)—and all part of the same collection received by AMNH. It seems likely therefore that they would therefore have all been examined by Neumann. Since Neumann (1904) did not mention the additional specimens, in order to remove any ambiguity, LeCroy (2003) designated as lectotype the specimen (AMNH 560915) identified as the type by Neumann on the label.

As reported above, the type description of *centralis* stated that the wing- and tail-coverts and the flight feathers showed obvious blue tones (Neumann 1904), an interpretation which would, it is fair to assume, have been based upon these three specimens. This coloration was disputed by Gyldenstolpe (1924: 231) who, with the partial exception of one of the four specimens from Ituri at his disposal—which showed 'a very slight bluish gloss on the wing-coverts, not on the upper tail-coverts'—otherwise noted that 'in the remaining specimens there is no bluish gloss at all'. I am in agreement with Gyldenstolpe's view: under good artificial lighting and in both ambient indoor daylight and full sunlight beside a window, these feather tracts appear to me, in all specimens examined and allowing for variation in intensity, to be glossed the same colour green as the body feathers.

Such interpretations may vary with observer. P. Sweet (*in litt.* 2022) informs me that he found the lectotype of *centralis* to show 'a slight blue sheen in the coverts and rump' from a particular angle, and he considered other specimens to be similar. A colleague to whom he showed these specimens found them to be 'more blue than green' overall, implying some subjectivity in the eye of the beholder. Three people who I consulted at NHMUK saw the specimens there as green, although one felt that the wing-coverts on one specimen could be construed as bluish. Such variation between observers may also explain why Chapin (1953) described the throat of adult *centralis* as 'glossy black' while I find these feathers to be glossed the same green as the rest of the plumage (Fig. 1b).

This phenomenon could, moreover, be the reason why the purplish-blue wash on the central tail feathers of the nominate form, reported by Bannerman (1939) and repeated by Turner & Rose (1989) and Urban & Keith (1992), is not evident to me. Here too, under both artificial light and sunlight, the colour of the gloss appears to me to be uniform with the rest of the plumage. These observations reinforce the belief that a spectrophotometric analysis of the plumage of these taxa, and indeed of other members of the genus, would be a potentially fruitful area of future study.

The single specimen of *centralis* that Ogilvie-Grant (1910) had at his disposal (from near Fort Beni, Nord-Kivu, NHMUK 1906.12.23.1609) and which he considered 'typical'—although on what basis is not clear, since there is no indication that he had seen the type—and 'indistinguishable from examples from Cameroon and Gaboon' (i.e., nominate *nitens*), proves on further examination to be an immature (Fig. 4). Thus, this specimen is relatively dull-plumaged and shows evidence of a gape flange, while its feet are described on the label as brown. The difference in body colour between it and the *nitens* material Ogilvie-Grant examined was therefore less pronounced than had he been comparing

adults. Complicating the situation further was his belief that the ‘sooty brown throat’ of *nitens* was ‘no doubt a sign of immaturity’. He therefore inferred that he was comparing immature *nitens* with adult *centralis*, when in fact the reverse was true. Gyldenstolpe (1924), citing Ogilvie-Grant (1910), asserted that ‘...*centralis* is most probably based on immature specimens of *Psalidoprocne nitens* Cassin, of which it becomes a synonym’. The label data of the Fort Beni specimen are very probably the source of the statement by Mackworth-Praed & Grant (1973) that the legs and feet of (by implication, adult) *centralis* are brown; since the specimen is immature, this explains the colour difference between it and the legs and feet of the adult nominate reported by Mackworth-Praed & Grant (1973).

The difference in the strength of the green gloss between adult *centralis* and nominate has been disregarded or overlooked ever since the original description. Gyldenstolpe (1924), although quoting most of this description in the original German, did not comment on the colour contrast, presumably because, as he acknowledged, he had no nominate material with which to compare his *centralis* specimens. Nor did Chapin (1953) mention it; he reported only the difference in throat colour—which, equally, was not mentioned by Neumann (1904)—and because, as indicated above, almost all subsequent authors appear to have relied solely upon Chapin (1953) for their understanding of *centralis*, the very feature which prompted Neumann (1904) to describe it has, ironically, never since been mentioned.

The bottle-green gloss of *centralis* appears to me to match closely that of the long-tailed Fanti Saw-wing *P. obscura*, the range of which overlaps extensively with nominate *nitens*. Indeed, the contrast in the language used by Urban & Keith (1992) to describe the plumage of nominate *nitens* (‘dark blackish brown glossed with dull green’) with that of *obscura* (‘glossy dark bottle green’), captures perfectly how *nitens* differs from *centralis*.

It is notable that, while the colour of the underparts of immature *nitens* differs from that of the adult, in immature *centralis*, apart from the strength of the sheen, it does not (*cf.* upper specimens Figs. 2 and 4). This difference does not appear to have been reported previously.

The modification to the leading edge of the outer primary in adult males (Fig. 3) provides a means of sexing and ageing specimens independent of label data, a means which, judging by the number of unsexed adult specimens and mismatches found in this study, is somewhat overlooked.

The range of *centralis* described by Chapin (1953), reported above, echoed closely what he had written 30 years previously: that it was found ‘in the forested parts of Ituri and southern Uelle districts’ (Chapin 1923). This may have informed Boetticher (1943)—the paper cites no references—who reported *centralis* to be restricted to ‘Uelle, Ituri und Semliki’ and whose map of *nitens*, which distinguished between the races, showed the nominate to be present across much of western DR Congo and extensively contiguous with *centralis*. Since Chapin (1953) in turn cited but did not comment on Boetticher (1943), it is possible that Chapin did believe that nominate *nitens* was present in north-western and central parts of DR Congo; he was evidently unaware of the holdings of RMCA, details of which began to be published shortly afterwards (Schouteden 1955).

Current evidence indicates *centralis* to be confined to the east and south of the Congo and Ubangi Rivers and is therefore endemic to DR Congo. To the west, nominate *nitens* is considered to be distributed continuously across the Lower Guinea forest zone (Turner & Rose 1989, Urban & Keith 1992, Turner 2004, 2020, del Hoyo & Collar 2016). Both Central African Republic (CAR) and Republic of Congo, which border the Ubangi and Congo Rivers to the west, are relatively poorly studied ornithologically, and there appear to be few specimens of *nitens* in collections from these countries. Although I have not personally been able to examine material from either, Patrick Bousès, Muséum national d’Histoire naturelle (MNHN), Paris and Nate Rice, Academy of Natural Sciences at Drexel

University, Philadelphia (ANSP), have kindly assessed specimens in their care on my behalf. In particular, the former confirms that a specimen (MNHN-ZO-MO-1989-572) from La Maboké (03°54'N, 17°50'E), CAR—mentioned by Germain & Cornet (1994) but without subspecific determination—and the latter, that two (ANSP 160268, 160269) from Oka (03°35'S, 15°15'E), Republic of Congo, as well as a third (ANSP 122654) from Berbérati (04°16'N, 15°47'E), CAR, are nominate *nitens*—the last already published as such by Stone (1936: 587)—identifications which appear to me to be correct on the basis of photographs. La Maboké and Oka are, respectively, some 90 km west of the Ubangi River and 60 km north-west of the Congo River. Since the two localities—the former within 100 km of Bangui, the latter equally close to Brazzaville—span much of the latitudinal extent of suitable habitat, the assessment that *nitens* occurs throughout the Lower Guinea forest zone appears correct. Although the distribution map of *nitens* in Borrow & Demey (2014) left blank a large expanse of east-central Republic of Congo, covering much of the distance between these two sites, this is thought to reflect a lack of information rather than genuine absence. In summary, the evidence suggests that *centralis* and *nitens* are narrowly allopatric, separated by the Congo and Ubangi Rivers.

To my knowledge, the specimens of nominate *nitens* from Ganda Sundi (04°52'S, 12°52'E), Kongo Central [= Lower Congo], in the coastal far west of DR Congo (Chapin 1953), remain the only ones from the country. Its continued presence in the region is implied by some relatively recent field observations (Ayer 2011, Liyandja *et al.* 2015).

At RMCA, I was able to examine the specimens that Barrow *et al.* (2016) sampled and can confirm that both are *centralis*. One originated from Boende (00°14'S, 20°50'E), Tshuapa District, Équateur Province (now Tshuapa Province). Material from this part of DR Congo had previously been attributed by Schoutedden (1961) to *centralis*. The second sample was said by Barrow *et al.* (2016) to have been collected at 'Kilungu', apparently an error for Kiliungu (03°07'S, 28°14'E), Kivu (now Sud-Kivu) Province, from where Prigogine (1984) reported a specimen of *centralis*. The catalogue number / sample reference of this specimen was given by Barrow *et al.* (2016) in their Table S1 as 77-44-A-18 while in their Figs. 2 and S1 it appeared as 77-14-A-18; the latter is correct.

Confirmation that these specimens, along with all others from interior DR Congo, are *centralis*, casts new light on the results of the genetic analysis presented by Barrow *et al.* (2016). Their study of sections of two mitochondrial genes (cyt B and ND2) found that *nitens* divided into two well-marked clades, one comprising material of the nominate from Liberia and Côte d'Ivoire, the second the two DR Congo—*centralis*—samples, between which the sequence divergence was some 4%. Although the study was limited in sample size and to mitochondrial DNA alone, this is nonetheless a conspicuous result. While they found the relationship between these lineages to be unresolved—maximum likelihood phylogenetic analysis placed nominate *nitens* as basal to all others; Bayesian analysis put *centralis* in this position, with poor support for either—both sets of results indicated *nitens sensu lato* was sister to all other *Psalidoprocne*, with a mean sequence divergence of 3.7%. It is striking that the size of the divergence between the *nitens* clades was comparable to that between them and those of the four other recognised *Psalidoprocne* species, samples of all of which were analysed by Barrow *et al.* (2016), and irrespective of the fact that some of the clades revealed by their study did not fully correspond with current taxonomic treatments.

Further genetic study is clearly required to resolve the relationship between the lineages of *nitens sensu lato* and this needs to include samples from Lower Guinea: the provenance of the *nitens* specimens sampled by Barrow *et al.* (2016)—Liberia and Côte d'Ivoire—means that populations from east of the Dahomey Gap have yet to be analysed. The possibility therefore remains that these could prove to be closer genetically to DR Congo material,

such that the discontinuity might fall between the Lower and Upper Guinea forest blocks. Nothing was found in specimens, however, to suggest that this might be so: no differences in plumage or bare-part coloration were apparent between those of nominate *nitens* from Lower and Upper Guinea. While there were some minor mensural differences, with the sample from Lower Guinea averaging somewhat larger, these were insufficient to invite further enquiry (data not shown). Despite this, it remains the case that genetic sequence data are needed for material from this region.

That caveat notwithstanding, the results of the existing genetic analysis, combined with the differences in morphological characters reported here, call for a re-evaluation of the taxonomic rank of *centralis*. With a total score of 7 under the Tobias criteria, the threshold of species recognition is reached. Given this, and reinforced by the striking, if preliminary, molecular evidence of Barrow *et al.* (2016), the case for elevation of *centralis* to species level seems sufficiently strong to warrant adoption. If so, the new taxonomic arrangement and geographical ranges would become:

WESTERN SQUARE-TAILED SAW-WING *Psalidoprocne nitens*

—Guinea to Ghana; south-east Nigeria east to Central African Republic and Republic of Congo and south to Cabinda (Angola) and extreme western DR Congo.

CONGO SQUARE-TAILED SAW-WING *Psalidoprocne centralis*

—northern and central DR Congo.

The identity of the population in Uíge Province, north-west Angola (Dean *et al.* 1988, Mills & Tebb 2015) is, in the absence of specimens or other evidence, unproven and therefore its placement uncertain. The Uíge record reported by Dean *et al.* (1988) was omitted from Dean (2000) and not mentioned by Mills & Tebb (2015). If, as seems most likely, it is attributable to *nitens*, it would be the only such population to occur south of the Congo River. That being so, pending further information, it is here left unassigned.

The English names offered reflect their relative distributions: although the modifier 'Eastern' is an obvious alternative for *centralis*, it does not sit comfortably with the specific epithet, while that suggested indicates that it is endemic to DR Congo.

There are unlikely to be any conservation implications arising from this split, should it be adopted, for although reliant on forest, both species have extensive distributions.

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Notable records of winter migrants for Goiás and Distrito Federal, central Brazil

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SUMMARY.—Bird migration patterns in the Cerrado region are still very poorly known, even in the best-studied areas of this biome. We present noteworthy records of five winter migrants in the Cerrado, including new records for the state of Goiás (Chilean Swallow *Tachycineta leucopyga*) and the Distrito Federal (Swallow-tailed Cotinga *Phibalura flavirostris*). The latter species' status, including temporal, in central Brazil is in chronic need of elucidation. Our records augment knowledge of the distribution and movements of these species outside their breeding areas, and some represent important range extensions.

The state of Goiás and the Distrito Federal in central Brazil lie at the heart of the Cerrado biome (or the morphoclimatic domain of the Cerrado), comprised by vast uplands once covered by a mosaic of a savanna-like vegetation and forests over a 1.5 million km² area (Ab'Saber 1977, 1983, Pinto 1994, Silva 1995a). Besides its remarkably heterogenous landscapes, the region has a tropical seasonal climate with well-marked dry and rainy periods, and average temperatures ranging from 20°C to 26°C (Nimer 1979, Ab'Saber 1983, 2003, Silva 1995a).

Avifaunal diversity in the Cerrado region was estimated at 837 species (Silva 1995a), although several additional taxa have been recorded since, suggesting even higher species richness. Of these, Silva (1995a) detected 46 non-breeders that he classified as migrants or altitudinal visitors, in three groups: from North America; from southern South America; and from elsewhere in Brazil, e.g., elevational migrants from austral regions that move lower in winter (Antas 1983, Silva 1995a,b). The latter comprise the least-known group, possibly due to their lower abundance and overlooked movements, as well as logistical factors such as the small numbers of researchers and limited access to some areas (Schunck *et al.* 2023).

Despite the efforts of several authors, major gaps in the understanding of these movements remain, including their dynamics and ecology (Somenzari *et al.* 2018). Elevational (or altitudinal) migration has been reported in Brazil since the 1800s and, principally in the last decades, copious observations have referred to this behaviour in different species, although few standardised studies have been published (Collar *et al.* 1992, Sick 1997, Alves 2007, Barçante *et al.* 2017, Schunck *et al.* 2023). These movements are generally attributed to climatic factors and the availability of food resources, some species migrating lower or inland to warmer climes in winter. Evidence for such migration comes mainly from the Atlantic Forest coastal mountains in south-east Brazil, but also from some upland plateaux in Amazonia (Willis 1988, Silva 1993, Aleixo & Galetti 1997, Bencke & Kindel 1999, Schunck *et al.* 2023).

Although mentioned by Schunck *et al.* (2023) as a potentially highly productive area for studies on seasonal elevational movements, most of the Cerrado, except in parts of south-east Brazil, lack observational data on this phenomenon. Patterns of migration in this landscape are still very poorly known, especially in Goiás and its environs (Silva 1995b,

Bagno & Rodrigues 1998). In recent years, however, with an increase in birdwatchers, a handful of new records of migrants have been published for the state, e.g., Olive-sided Flycatcher *Contopus cooperi* and Semipalmated Sandpiper *Calidris pusilla* (Pereira 2016, Pereira & Araújo 2019), as well for the Distrito Federal, e.g., Osprey *Pandion haliaetus* (see Faria 2008, Tubelis 2008).

Here, we report noteworthy records of five winter migrants for the Cerrado, including one new record for the state of Goiás and one for the Distrito Federal, together with remarks on ecology and natural history. We treat as ‘winter migrants’ species whose populations, or part of them, migrate between separate breeding and non-breeding ranges during the Southern Hemisphere winter, following the definition of migration presented by Somenzari *et al.* (2018). Two species reported here were not mentioned by these authors, but are tentatively included following other literature that has suggested their migratory behaviour. Data taken from online databases, i.e., WikiAves (WA; www.wikiaves.com.br), refer to the record’s observer followed by the voucher number.

SWALLOW-TAILED COTINGA *Phibalura flavirostris*

This conspicuous, fork-tailed cotingid is endemic to southern South America and is considered rare over most of its range. The nominate subspecies occurs in the Atlantic Forest of south-east and south Brazil, eastern Paraguay (no recent records) and north-east Argentina (Misiones); *P. f. boliviana*, however, is known only from the Andes in a tiny area of western Bolivia (del Hoyo *et al.* 2020). Whereas the latter is resident, *P. f. flavirostris* is often considered partially migratory, albeit its movements are poorly known (Snow 1982, Sick 1997, Bodrati & Cockle 2006, Kirwan 2008, Kirwan & Green 2011, Peixoto *et al.* 2013, del Hoyo *et al.* 2020). Records in central Brazil are particularly few and its status there virtually unknown, although it is often assumed to be a rare migrant (Kirwan 2008, Kirwan & Green 2011, del Hoyo *et al.* 2020). Nevertheless, it was not included in the review of migration by Somenzari *et al.* (2018).



Figure 1 (left). Swallow-tailed Cotinga *Phibalura flavirostris*, Santa Maria, Brasília, Distrito Federal, July 2021 (Edvaldo F. Júnior)

Figure 2 (right). Swallow-tailed Cotinga *Phibalura flavirostris* feeding on fruits of *Schefflera macrocarpa* (Araliaceae), Santa Maria, Brasília, Distrito Federal, July 2021 (Fernanda Fernandes)

On 19 July 2021, RM & ES saw a female *P. flavirostris* in a small gallery forest at Santa Maria, Brasília, Distrito Federal (16°02'S, 47°54'W; 1,120 m). RMS, ES & EFS returned in the morning of 20 July when the bird was photographed (Fig. 1). It was initially observed at 07.05 h and left the forest 11 times during the morning to feed on fruits of *Schefflera macrocarpa* (Araliaceae) in adjacent savanna (Fig. 2), as well as regularly taking small flies and bees via short flights from its elevated perch, prior to the last sighting at 11.15 h.

This is the first record of *P. flavirostris* for the Distrito Federal and the first in central Brazil since R. Parrini (*in litt.* 2020) saw a pair at Campo Limpo, Goiás, on 4 April 2004. We assume that it used the woodlot (<1.4 ha) to rest and to feed, given the profusion of fleshy fruits in the area. Other highly frugivorous winter migrants were present in the same patch, i.e., Eastern Slaty Thrush *Turdus subalaris* and Olivaceous Elaenia *Elaenia mesoleuca* (Antas & Valle 1987, Sick 1997).

Records of *P. flavirostris* in central Brazil are irregular and not all are in winter, suggesting that this species may be only an occasional visitor to the region, rather than a winter migrant with well-established routes and timings. It is notable that during the 20th century, a number of specimens of *P. flavirostris* were collected in south-central Goiás (Pinto 1944, Sick 1997, Snow 2004, Kirwan 2008, Gwynne *et al.* 2010, Kirwan & Green 2011), implying that, in the past, the species was less scarce inland, or perhaps even resident locally. EFS, during research on online platforms (e.g., www.vertnet.org, www.gbif.org) located ten specimens collected by J. Hidasi around Goiânia, Goiás, between 1955 and 1967, held at different institutions (Table 1). In sum, the precise status (former and current) of this species in central Brazil remains in need of clarification.

TABLE 1

Historical records of Swallow-tailed Cotinga *Phibalura flavirostris* for Goiás. Institution acronyms: MZUSP = Museu de Zoologia da Universidade de São Paulo; FMNH = Field Museum of Natural History, Chicago; LACM = Los Angeles County Natural History Museum; LSUMZ = Louisiana State University Museum of Zoology, Baton Rouge; MPEG = Museu Paraense Emílio Goeldi, Belém; MOG = Museu de Ornitologia de Goiânia.

Institution	Reg. no.	Locality	Date	Collector
MZUSP	27822	Fazenda Transwaal, Rio Verde, Goiás	14 May 1941	W. Garbe
MOG	446	Goiânia, Goiás	17 Apr 1955	J. Hidasi
MPEG	27166	Inhumas, Goiás	17 Oct 1962	J. Hidasi
MZUSP	51887	Inhumas, Goiás	20 Oct 1962	J. Hidasi
MPEG	19524	Goiânia, Goiás	2 Nov 1962	J. Hidasi
MPEG	21879	Goiânia, Goiás	19 Dec 1962	J. Hidasi
LACM	45462	Goiânia, Goiás	29 Dec 1963	J. Hidasi
LACM	45463	Goiânia, Goiás	29 Dec 1963	J. Hidasi
LSUMZ	32288	Goiânia, Goiás	29 Dec 1963	J. Hidasi
FMNH	344709	Goiânia, Goiás	17 Jan 1965	J. Hidasi
MZUSP	72276	Goiânia, Goiás	15 Nov 1967	J. Hidasi

WHITE-CRESTED ELAENIA *Elaenia albiceps chilensis*

One of the distinctive representatives of the difficult-to-identify genus *Elaenia*, given its conspicuous white coronal stripe and small bushy crest (Schulenberg 2020). Although its breeding range is centred on the Andes and southern South America, *E. a. chilensis* occurs

across much of the continent in the non-breeding period (Jiménez *et al.* 2016, Bravo *et al.* 2017, Schulenberg 2020).

This *Elaenia* seems to have been overlooked in central Brazil; the only historical record for Goiás is a specimen collected by J. Hidasi on 24 March 1958 on the right bank of the rio Araguaia, at Aragarças (MPEG 14143). Its presence in the Distrito Federal was mentioned but evidently not documented by Negret *et al.* (1984), Bagno & Marinho-Filho (2001) and Braz & Cavalcanti (2001). In recent years, however, the species has been found in various areas in Goiás and the Distrito Federal, whilst new records in neighbouring north-west Minas Gerais were recently reported by Alteff (2023).

JA observed one in gallery woodland of the rio Capivari, Abadiânia, Goiás, on 2 July 2019, and another in a forest patch at Goiânia, Goiás on 11 July 2019 (JA: WA3414774). On 11 and 15 August 2019, EFS saw at least two in the canopy of the same forest patch at Goiânia; both regularly gave a distinctive *fwee!* in response to playback. In 2021, JA & EFS observed singles with mixed-species flocks at Parque Estadual Altamiro de Moura Pacheco, Goianópolis, on 27 May and 15 June. One fed on the nectar of blooming *Combretum fruticosum* flowers with tanagers and orioles; its bill and throat were covered in reddish pollen. At least two were seen and heard on 8 and 16 July 2021 at Fazenda Lageado, Goiânia, showing their prominent white crests. The species was fairly common at Sítio Lavrinhas, Pirenópolis, Goiás, where EFS saw several between 2020 and 2022. On 19 July 2020, one was feeding on small fruits of *Miconia cuspidata* in a forest edge with *cerrado*, along with Helmeted Manakin *Antilophia galeata* and Green-winged Saltator *Saltator similis*. In 2021, the first individuals arrived by late April—two adults in gallery woodland on 18 April—and left in early October. In 2022, they were first seen on 16 April and became rare by 2 November, but some stayed until 27 November.

Like many of its congeners, White-crested *Elaenia* is easily overlooked, but it can be identified by its distinctive and incessant *feeeo!* call (Schulenberg 2020) and careful attention to some plumage features. In the Cerrado, it is mostly confused with Lesser *Elaenia* *E. chiriquensis* of more open areas, which has almost identical calls. They can be separated, however, by the overall greyer and duller plumage of White-crested, as well as by its visible perocular ring, two strong wingbars, and neat white V-shaped crest, which is more linear than in other *elaenias*. Our records reveal that the species is not uncommon in central Brazil in winter.

BLUE-BILLED BLACK TYRANT *Knipolegus cyanirostris*

Occurs over much of south and south-east Brazil, north-east Argentina, Paraguay and Uruguay, usually in humid forest borders and scrub (Ridgely & Tudor 1994, 2009, Sick 1997). Outside its breeding grounds in the south of the country, it is known in Brazil only from Mato Grosso do Sul, one record for southern Goiás, at Catalão (Faria *et al.* 2011) and a specimen collected at Planaltina, Distrito Federal (Tubelis 2009).

The species has been considered a winter migrant, or partial migrant, by several authors. Silva (1995a) referred to it as an altitudinal migrant in the Cerrado from south-east Brazil; Sick (1997) mentioned migratory behaviour in Espírito Santo and Rio de Janeiro, while Ridgely & Tudor (2009) and Faria *et al.* (2011) reported presumed migrants in Mato Grosso do Sul and Goiás (mentioned above). In Paraguay, Hayes *et al.* (1994) called it a 'rare migrant' to the Oriente, and Smith & Easley (2019) considered the species an 'uncommon winter visitor'. Farnsworth & Langham (2020) referred to it as an 'austral migrant', stating that populations breeding in the south migrate north as far as south-central Brazil during the austral winter. Despite this, Blue-billed Black Tyrant was not included in the review



Figure 3. Female Blue-billed Black Tyrant *Knipolegus cyanirostris*, Nerópolis, Goiás, August 2021 (Estevão F. Santos)

by Somenzari *et al.* (2018), but Schunck *et al.* (2023) listed it in their study of elevational migration in Brazil.

An adult female was photographed by EFS & BR at a semideciduous forest edge near Nerópolis, Goiás (16°25'S, 49°09'W; 860 m) on 2 August 2021 (Fig. 3). The bird was initially detected after playback of Ferruginous Pygmy Owl *Glaucidium brasilianum*, when it approached with a large flock of passerines. This is the second record for Goiás, extending its range north-west by *c.*230 km (from Catalão) and *c.*180 km west (from Planaltina, Distrito Federal). Interestingly, another female was seen in August 2022, in the nearby Parque Estadual Altamiro de Moura Pacheco, Goianópolis, foraging in similar habitat (G. Morais; WA4954568).

CHILEAN SWALLOW *Tachycineta leucopyga*

This swallow has one of the southernmost distributions in the family, occupying a large area in southern South America (Ridgely & Tudor 2009, Marion 2020). Birds in the far south of the range migrate in winter to northern Argentina, Bolivia, southern Brazil, and Uruguay (Schulenberg *et al.* 1982, Somenzari *et al.* 2018, Marion 2020).

On the cold, windy morning of 21 August 2020, one was observed by JA in a degraded pasture at Campus Samambaia, Universidade Federal de Goiás (16°36'S, 49°17'W; 700 m), in the urban area of Goiânia (Fig. 4). The bird perched on a tall branch and regularly flew around with a large flock of Blue-and-white Swallow *Pygochelidon cyanoleuca*, White-rumped Swallow *Tachycineta leucorrhoa* and Southern Rough-winged Swallow *Stelgidopteryx*



Figure 4. Chilean Swallow *Tachycineta leucopyga*, Universidade Federal de Goiás, Goiânia, Goiás, August 2020 (Jayrson Araújo)

ruficollis. It was identified by the clear lack of white marks on the forehead and lores, and its overall deep blue upperparts lacking greenish tones, which characters were listed by Belton (1985) and Marion (2020) as diagnostic of the species.

This is the first record of *T. leucopyga* for Goiás and one of the northernmost in South America, being hundreds of kilometres north-east of its regular wintering area in Brazil; and even c.600 km north-west of another unusual record made on 22 August 2020 in south-west Minas Gerais (J. F. Pacheco; WA3942021). Climate data from the Instituto Nacional de Meteorologia (www.inmet.gov.br) indicate that the lowest mean temperatures in the municipality of Rio Grande, in Rio Grande do Sul state—which region accounts for with the largest number of records of the species in Brazil on WikiAves—were in July and August 2020, which possibly precipitated movements further north.

BLACK-BACKED GROSBEAK *Pheucticus aureoventris*

Fairly common in dry scrubby vegetation on east Andean slopes from Argentina north to Venezuela, in Brazil it is an uncommon winter migrant in the dry season (Sick 1997), previously known only from Mato Grosso and Mato Grosso do Sul, but recent records have expanded its range to the Cerrado of Goiás and São Paulo, and even the fringes of Amazonia (Serpa *et al.* 2014, Brewer & de Juana 2018).

On 2 May 2020, JA observed a female in scrubby forest edge at Campus Samambaia, Universidade Federal de Goiás (16°36'S, 49°17'W; 700 m), in urban Goiânia, Goiás (Fig. 5). The bird was seen leaving its roost in a non-native bamboo thicket early in the morning, before flying to an exposed branch atop a small tree.

This is the second record for Goiás, and possibly the north-easternmost in Brazil, extending the species' previous distributional limit by c.230 km north-east from Rio Verde, south-west Goiás. It is also one of the few records outside Mato Grosso and Mato Grosso do Sul, where it is regularly recorded during the austral winter. Further observations outside its usual winter range may occur in the future, as suggested by Serpa *et al.* (2014), mainly due to the increase in suitable open habitat with deforestation.



Figure 5. Black-backed Grosbeak *Pheucticus aureoventris*, Universidade Federal de Goiás, Goiânia, Goiás, May 2020 (Jayrson Araújo)

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Towards a resolution of nomenclatural instability in the Helmeted Friarbird *Philemon buceroides* complex

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SUMMARY.—A trend to treat Queensland populations of Helmeted Friarbird *Philemon buceroides* (Swainson, 1838) *sensu lato* of Indonesia, Australia and Papua New Guinea as Hornbill Friarbird *P. yorki* Mathews, 1912, while consistent with >100 years of scientific name usage before 1975, and not without merit, has been poorly defended. Given the region's biogeography, rigorous assessment is needed of which of several taxa described from New Guinea and often treated as subspecies of *P. novaeguineae* (S. Müller, 1843) might be most closely related to *yorki*. This will be critical in establishing nomenclatural priority. Introduction of 'Hornbill Friarbird' evidently overlooks 'Helmeted Friarbird' having been associated almost exclusively with Queensland populations for >100 years. Clarifying relationships within and among Australian populations to each other and to those in Indonesia and Papua New Guinea will be a key starting point in eliminating legitimate, lingering dissatisfaction with the broader group's taxonomy and nomenclature.

Since 1975, Helmeted Friarbird *Philemon buceroides* (Swainson, 1838) *sensu lato* has often been considered a widespread, polytypic species comprising up to 11 subspecies across the Indo-Pacific in Indonesia, northern Australia and Papua New Guinea (Schodde 1975, Schodde *et al.* 1979, Schodde & Mason 1979, Christidis & Boles 2008, Dickinson & Christidis 2014, del Hoyo & Collar 2016, Clements *et al.* 2022, BirdLife Australia 2022; Fig. 1). It has been considered a member of what was long known as the Black-faced Friarbird *P. moluccensis* *s. l.* group comprising *P. buceroides* *s. l.* and several other *Philemon* species (Mayr 1944, Schodde & Mason 1999). The group's nomenclature is currently unsettled (e.g., Higgins *et al.* 2008, Gregory 2017, Eaton *et al.* 2021, Joseph 2021, Gill *et al.* 2023). This in turn reflects an old challenge in avian systematics: how many species are there among very closely related geographically isolated populations exhibiting low phenotypic diversity? This challenge is especially pertinent to birds such as the friarbirds discussed here and found in Indonesia's island archipelagos, Australia and New Guinea (for other examples see Parker 1982, Andersen *et al.* 2015, Rheindt *et al.* 2020, Johnstone *et al.* 2022, Ó Marcaigh *et al.* 2022, Wu *et al.* 2022).

Here I review key points in the nomenclatural history of *P. buceroides* *s. l.* My first aim is to understand the origins of the current nomenclatural flux. I then focus on the Australian populations because their position at the geographical centre of the group's distribution is a useful pivot from which to achieve a second aim of deriving key questions requiring research. Answers to these questions should help bring stability though improved understanding of relationships among the entire group.

Nomenclatural background

The type locality of *Philedon buceroides* Swainson, 1838, the earliest species-group name applicable to any populations considered part of this complex, was given by Swainson (1838) as New Holland, i.e., Australia. For nearly a century thereafter, Australian populations were

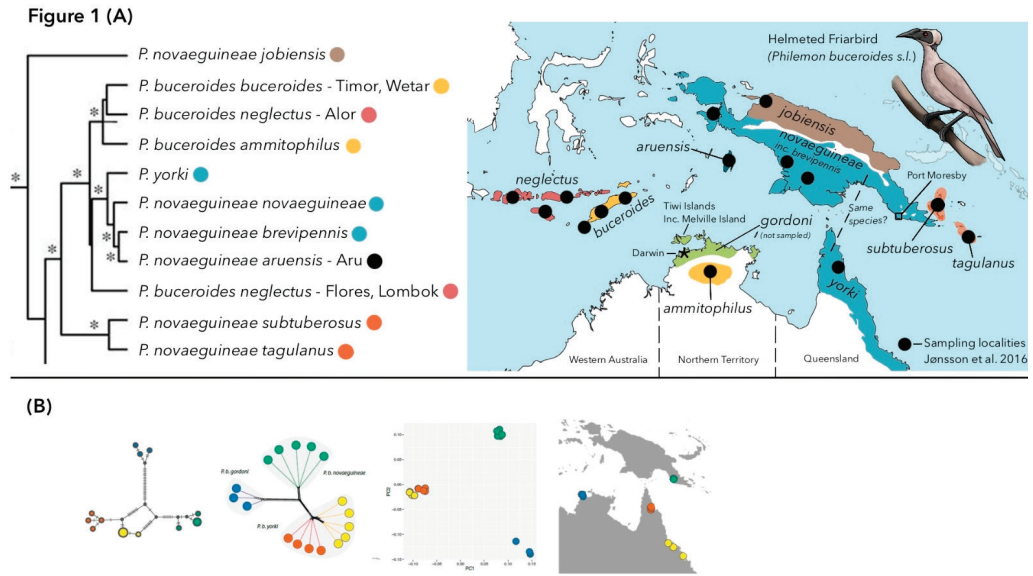


Figure 1. Distribution of the Helmeted Friarbird *Philemon buceroides sensu lato* complex and patterns in molecular data modified from (A) Jønsson *et al.* (2016; mtDNA) and (B) Peñalba *et al.* (2019; nuclear DNA). Colours in the map at the right in (A) summarise and match the initial phylogeographic structuring of the tree at the left (but note paraphyly among *P. b. neglectus* at left). Jønsson *et al.* (2016) adopted a three-species hypothesis in labelling their tree; epithets shown on the map in (A) follow Dickinson & Christidis (2014) where *brevipennis* was synonymised with *novaeguineae* as indicated. The dotted line highlights the need to clarify relationships among *yorki* and New Guinea taxa. Jønsson *et al.* (2016) listed a specimen held in the Naturalis Biodiversity Centre, Leiden, RMNH.AVES.75014, as *gordoni*; examination of the specimen and its locality data (<https://www.naturalis.nl/>) show it to be *ammitophilus* as here depicted in (A), *gordoni* being shown as not sampled in (A). The star shows the location of Darwin and the square in south-east New Guinea shows the approximate location of playback observations referred to in the text and Joseph (2021). Modified from Joseph (2021); prepared by Julian Teh.

known only from Queensland on the continent’s east coast (Fig. 1). After the spelling of *Philedon* was emended to *Philemon*, these Queensland populations were therefore known as *Philemon buceroides* (e.g., Gould 1865, Mathews 1912a,b, 1913). Swainson’s type locality was long ago shown to be in error (Hellmayr 1916). Jansen (2018) fixed it to Kupang Bay, Kupang, East Nusa Tenggara in present-day West Timor, Indonesia.

Linkage of the epithet *buceroides* to Lesser Sunda populations was thus cemented. Hellmayr (1916) also firmly aligned the epithet *yorki* Mathews, 1912, with Queensland populations. Mathews (1912b) named the coastal Northern Territory populations in central-north Australia (Fig. 1) then still known only from the Tiwi Islands (Fig. 1) as *P. buceroides gordoni* and Salomonsen (1967) followed this 55 years later. Hellmayr (1916) and Mathews (1927) implicitly assumed *gordoni* to be closely related to Queensland populations as indicated by their use of *P. yorki gordoni* (hereafter epithets alone will be used when feasible or necessary).

Therefore, for much of the 20th century after 1916, *P. buceroides* comprised several subspecies in the Lesser Sundas of Indonesia and the coastal Northern Territory population. After Hellmayr (1916; see above) and until 1975, Queensland populations were mostly known as *P. yorki*. Schodde (1975) and later reviews, albeit with reservations (Schodde & Mason 1999, Schodde *et al.* 1979), included *P. yorki* of Queensland and New Guinea Friarbird *P. novaeguineae* (Müller, 1843) and the latter’s various nominal subspecies in what became the broadly if not unanimously accepted view of *Philemon buceroides s. l.* as a

polytypic species widespread across Indonesia, northern Australia and Papua New Guinea (e.g., White & Bruce 1986, Coates & Bishop 1997, Higgins *et al.* 2008, Beehler & Pratt 2016, *cf.* Sibley & Monroe 1990; Fig. 1).

Given these foundations, current nomenclature of the three Australian subspecies can be further probed, and can be used to suggest a research pathway to improve understanding of the entire group.

A focus on Australian populations

Queensland populations.—Since Schodde (1975), *P. buceroides yoriki* has prevailed for Queensland populations (Higgins *et al.* 2001, 2008, Christidis & Boles 2008, Pizzey & Knight 2012, Menkhorst *et al.* 2017, 2019, BirdLife Australia 2022). Recent literature has seen reversion to *P. yoriki* at species rank (e.g., Gill & Wright 2006, Jønsson *et al.* 2016, Marki *et al.* 2017, Davies *et al.* 2022) sometimes with openly stated reservations (e.g., Gill *et al.* 2023) but I know of no explicitly argued defence.

Alternatively, some authors have treated Queensland populations as conspecific with, or at least more closely related to, New Guinean Friarbird *P. novaeguineae* by listing them as *P. novaeguineae yoriki* or *P. novaeguineae* (e.g., Mayr 1944, Keast 1961, Salomonsen 1967, Slater 1974, Sibley & Monroe 1990, MacDonald 1992, Gregory 2017). Note that the epithet *novaeguineae* (S. Müller, 1843) has priority over *yoriki* Mathews, 1912 (see Salomonsen 1967, Dickinson & Christidis 2014).

A key issue here is conspecificity of bird populations in New Guinea and north-east Queensland where *yoriki* occurs. This is a common pattern in Australo-Papuan biogeography (e.g., Schodde & Mason 1999, Beehler & Pratt 2016, Joseph *et al.* 2019). New Guinea populations of these friarbirds, however, may well comprise more than one species (Jønsson *et al.* 2016, Gregory 2017, Marki *et al.* 2017), which issue too requires more analysis and discussion. The question arises as to which New Guinea populations might be conspecific with, or at least most closely related to, Queensland populations (e.g., *cf.* *Ptiloris* riflebirds; see Beehler & Pratt 2016). Jønsson *et al.*'s (2016) mitochondrial DNA data (Fig. 1; essentially reanalysed in Marki *et al.* 2017) suggest southern New Guinea populations are most closely related to *yoriki*; so, too, do my anecdotal observations of responses of southern New Guinea birds to playback of *yoriki* reported in Joseph (2021; see Fig. 1). If *yoriki* was judged to be conspecific with those populations, Queensland birds would be known as *P. novaeguineae yoriki*.

The point here is *not* to deny merit in separating *yoriki* from *P. buceroides*; it is that the relationships of *yoriki* to all other populations within *P. buceroides s. l.* but especially to New Guinea populations and how many species they too comprise must be rigorously assessed. This will determine to which species the Queensland populations belong and thus their appropriate taxonomic name and rank. Analyses of data in Jønsson *et al.* (2016), Marki *et al.* (2017) and Peñalba *et al.* (2019) comprise an excellent foundation here (see Fig. 1) but are limited in their sampling of subspecies, populations and nucleotides.

Northern Territory populations.—These have had a turbulent taxonomic and nomenclatural history. There are coastal and inland populations (Fig. 1). I treat these separately but note the possibility of geographic and genetic connections between the two populations via riparian habitats (see also Schodde *et al.* 1979).

Excitement met the possibility in 1962 that what was then known as Melville Island Friarbird *Philemon gordonii* (e.g., Officer 1964) thought to occur only in the Tiwi Islands might also occur on the mainland in Darwin (Fig. 1). Officer (1968) eventually confirmed that *P. gordonii* had been recorded at two localities in Darwin. (Ornithological field work around Darwin in 1962 would have been much harder than now.)

Officer (1968, 1975) evidently overlooked Deignan's (1964) account of the 1948 expedition from the United States National Museum. Deignan had collected specimens in suburban Darwin and at Yirrkala c.600 km east of Darwin. Deignan reported these specimens as *Philemon moluccensis gordonii*. His use of *gordonii* indicated that he knew they were what had *until then* been known as Melville Island Friarbird *Philemon gordonii* (or *Philemon yorki gordonii*—see above). His use of *moluccensis* indicated that he treated *gordonii* as a subspecies of what was then considered another Indonesian species the Black-faced Friarbird *P. moluccensis*.

Concerning inland populations, Deignan had collected another friarbird of this group from sandstone escarpments of Arnhem Land near today's Kakadu National Park well inland from the more coastal habitat of *gordonii* (Fig. 1). This too he classified as Melville Island Friarbird *P. moluccensis gordonii*. In 1968, the British Museum's Harold Hall Expeditions collected more friarbirds from Arnhem Land's sandstone escarpments (Colston 1974). Parker (1971) concluded that the sandstone populations were not Melville Island Friarbirds but that they were *P. buceroides buceroides*, i.e., the same form of *P. buceroides* as on Timor and Savu. Indeed, he explicitly stated that two species were present in Northern Territory, coastal *P. gordonii* and *P. b. buceroides* of sandstone escarpments. Eventually, Schodde *et al.* (1979) named Arnhem Land populations *P. buceroides ammitophila*, so completing discovery and naming Australia's three component taxa in the complex. These taxa and *P. b. neglectus* form a trichotomy in Jönsson *et al.*'s (2016) findings (Fig. 1) so Parker's (1971) surprising hypothesis may be worth revisiting.

A nomenclatural note concerning the gender of the species-group epithet *ammitophila* is warranted. Although *ammitophila* was intended as a noun in apposition when published (R. Schodde pers. comm. 28 January 2023), its current use in masculine form *ammitophilus* evidently traces to Dickinson (2003) who changed it reasonably but without explicit comment. Reasons were later elaborated by David & Gosselin (2011) who, in turn, cited Liddell & Scott (1996): once Latinised, a compound species-group name derived from Greek and ending in *-phila*, such as *ammitophila*, is to be treated only as an adjective (ICZN 1999: Art. 31.2, 34.2) and does not fall under Art. 31.2.2.

Linkage of *P. yorki* to 'Hornbill' Friarbird.—Until the taxonomic revision of Schodde (1975), the English name "Helmeted Friarbird" had been applied mostly without qualifiers and in effect exclusively to Queensland populations of these friarbirds (e.g., Gould 1865, Mathews 1912a, 1913, 1925, 1927, the index to the first 50 years of *The Emu* [1901–50], Officer 1964, 1975).

Hornbill Friarbird was introduced by Gill & Wright (2006) as an English name for Queensland populations, which they also recognised as *Philemon yorki*, but they proffered no basis for either decision. Hornbill Friarbird has since entered popular usage (e.g., del Hoyo & Collar 2016, Gregory 2017, BirdLife Australia 2022, Clements *et al.* 2022, Davies *et al.* 2022). Reflecting the discussion above, Gill *et al.* (2023) noted that the species status of 'Hornbill Friarbird *P. yorki*' is dubious and they wisely called for more study. Officer (1975) gave the English name Sandstone Friarbird to what has been known mostly as *P. buceroides ammitophilus*.

Molecular data and relationships: a way ahead?

Jönsson *et al.* (2016; reanalysed in Marki *et al.* 2017) derived mitochondrial DNA data from *Philemon* friarbirds generally. Their primary purpose was not a thorough assessment of relationships within *P. buceroides s. l.*, so their data were understandably limited in sampling of individuals and populations. Nonetheless, their mtDNA data imply a close relationship between southern New Guinea and Queensland populations and, as noted,

raise the possibility of several species in New Guinea (Fig. 1). (Note, however, Joseph's 2021 corrected identification as *ammitophilus* of the Northern Territory sample cited by Jønsson *et al.* 2016 as *gordoni*; Fig. 1.) Eaton *et al.* (2021) have already used Jønsson *et al.*'s (2016) results to advocate recognition of Indonesian populations west of New Guinea as Tenggara Friarbird *P. buceroides*. In contrast, nuclear DNA data (Peñalba *et al.* 2019; Fig. 1), similarly derived for other purposes, might be seen as more suggestive of separate species rank for *yorki*, but I note the similarly limited sampling of New Guinea populations on which those data are based.

Lastly here, and pending improved understanding of character evolution in *Philemon* friarbirds generally, Schodde & Mason (1999) noted the possibility of *yorki* aligning with the Silver-crowned Friarbird *P. argenticeps* also of northern Australia (see Mayr 1944).

Conclusion

Clarification is needed of relationships among populations and subspecies of the entire *P. buceroides s. l.* group from Indonesia to Papua New Guinea (Eaton *et al.* 2021, Joseph 2021) and of course to other friarbirds such as *P. moluccensis s. l.* and *P. argenticeps*. Key questions are (1) whether the three Australian taxa should be recognised as one, two or three species, (2) to which other populations they are each most closely related in Indonesia, Papua New Guinea and within Australia, and (3) how many species are present in Indonesia, Australia and Papua New Guinea? These tasks require a robust phylogenetic framework with which to better understand character evolution and defend any separations of taxa at species rank in a taxonomic revision.

These questions are challenging and will require field, museum and laboratory work spanning states, territories, provinces and regencies in Australia, Indonesia and Papua New Guinea. Analysis of DNA and vocalisations as well as traditional and novel methods for scoring and analysing plumage and morphometric traits are needed. Notwithstanding the foundation provided by Jønsson *et al.* (2016) and Peñalba *et al.* (2019), thorough sampling across the entire geographical range of populations (e.g., improved sampling of *gordoni*, *yorki* and *jobiensis*), individuals and, for DNA work, nucleotides will be needed. This will surely entail study of DNA extracted from toe pads of older museum specimens. Only then would we achieve an understanding of patterns of relationships and present and past gene flow as sea levels have changed (see Peñalba *et al.* 2019) and move towards a stable taxonomy and nomenclature for these friarbirds.

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The provenance of the only known egg of the extinct Tristan Moorhen *Gallinula nesiotis*

by Alexander L. Bond & Douglas G. D. Russell

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SUMMARY.—Tristan Moorhen *Gallinula nesiotis* is a rail from Tristan da Cunha in the South Atlantic Ocean that probably went extinct around 1874. Here, we describe the only known egg of the species, its history, and confusion surrounding its attribution. It was probably collected by (or given to) Revd. W. F. Taylor sometime between 1851 and 1856, shipped aboard *HMS Frolic* in 1856, and presented as a gift to Lady Eliza Lucy Grey, wife of Cape Colony Governor Sir George Grey.

Tristan Moorhen *Gallinula nesiotis* was one of only three native landbirds on Tristan da Cunha until its extinction sometime in the mid to late 1870s (Bond *et al.* 2019). A flightless rail, its identity was often confused with that of Gough Moorhen *G. comeri*, which was introduced to Tristan in the 1950s and is now widespread (Richardson 1984, Groenenberg *et al.* 2008).

Very few specimens of Tristan Moorhen exist, including two skins at the Natural History Museum, Tring (NHMUK): the holotype (NHMUK 1861.9.16.1) received in 1861 (Sclater 1861, Beintema 1972) and another in 1864 from the Zoological Society of London (NHMUK 1864.7.30.1) (Sharpe 1894).

To our knowledge, there is just one extant egg ascribed to the species: NHMUK 1960.6.53 (Fig. 1). In their assessment of extinction probability, Bond *et al.* (2019) did not include this as there was uncertainty concerning the date of collection, which prompted further investigation. An egg was recorded as being brought back in 1856 by Captain M. S. Nolloth on *HMS Frolic* (Layard 1856, Nolloth 1856, Stone 2011) but was presumed to be lost (Bond *et al.* 2019).

The specimen

The surviving egg measures 49.6 × 33.5 mm, which is nearly identical to biometrics of Gough Moorhen eggs (49.0–54.9 × 34.1–37.2 mm; $n = 12$) (Watkins & Furness 1986), being only marginally more slender. The only markings on the egg are the determination ('*Gallinula nesiotis*' in an unknown hand) and registration number (in the hand of Shane Parker) in black ink, and reference to Oates (1901) in red type ('Cat 1.9'), referring to where it is figured (Vol. 1, Pl. IX, Fig. 7).



Figure 1. Egg of the Tristan Moorhen *Gallinula nesiotis* held at the Natural History Museum, Tring (NHMUK 1960.6.53) (Jonathan Jackson, © Trustees of the Natural History Museum)

It is accompanied by a handwritten note of uncertain authorship that states: 'Egg of an almost wingless bird from Tristan de Acunha near [?] described in Earle's New Zealand, p. 366 1832' (Fig. 2). Augustus Earle (1793–1838) was a painter who was abandoned on Tristan da Cunha in March–November 1824 when the ship *Duke of Gloucester* inexplicably left without him. The note references the following description of birds witnessed by Earle (1832: 366):

'Besides our albatross, the dogs caught some small birds, about the size of our partridge, but their gait was something like that of the penguin. The male is of a glossy black, with a bright red, hard crest on the top of the head. The hen is brown. They stand erect, and have long yellow legs, with which they run very fast; their wings are small and useless for flying, but they are armed with sharp spurs for defence, and also, I imagine, for assisting them in climbing, as they are found generally among the rocks. The name they give this bird here, is simply "cock," its only note being a noise very much resembling the repetition of that word. Its flesh is plump, fat, and excellent eating.'

Earle clearly mistook juveniles for females, but it is otherwise an accurate description of the Tristan Moorhen subsequently described by Sclater (1861).

At a time when the species was undescribed the note was, we believe, purely an aide memoire, merely indicating the species that laid the egg was probably the same as that described by Earle. However, it was interpreted by Oates (1901) as indicating that Earle personally collected the egg during the eight-month period he was on Tristan da Cunha (26 March–29 November 1824).

There are several reasons this is unlikely. Firstly, on Gough the closely related Gough Moorhen lays during September–March (Watkins & Furness 1986); on Tristan the birds probably bred between December and March (Taylor 2020), meaning the timing of Earle's sojourn was not optimal for collecting eggs and there is no evidence to suggest he collected any specimens beyond this rather ambiguous handwritten note. He could, of course, have been given the egg by one of the island's residents but, given the evidence mentioned below, this too seems unlikely.

Secondly, Earle is not mentioned as an ornithological collector of prominence by Sharpe (1906) nor have we been able to find any records of specimens collected by him in the 28 volumes of the *Catalogue of birds in the British Museum* (1874–90) or the *Catalogue of eggs in the British Museum* (1901–12). Lastly, Earle is primarily known as an artist and, whilst several of his artworks survive from his period on Tristan da Cunha, to our knowledge he is not known to have collected natural history or other material (e.g., ethnography). Earle apparently returned to England in 1830 and Hackforth-Jones (1980) noted his desire to capitalise on his travels via his publications (Earle 1830, 1832). Although Earle mentioned the moorhen's existence (Earle 1832), others had done so previously (Lambert 1811,

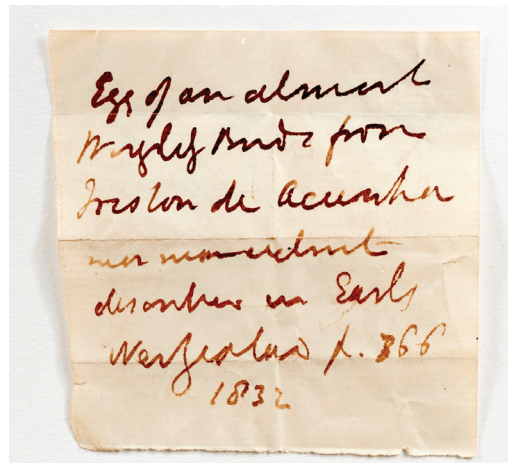


Figure 2. Handwritten note with the Tristan Moorhen *Gallinula nesiotis* egg, which reads 'Egg of an almost wingless bird from Tristan de Acunha near [?] described in Earle's New Zealand, p. 366 1832' (Jonathan Jackson, © Trustees of the Natural History Museum)

Purdy 1816, Carmichael 1819) and there is no evidence that Earle sold or freely passed on any objects from his travels.

The reverse of the same note has, in a different hand (Fig. 3): 'With care. An egg for Lady Grey from W. Taylor'. Lady Eliza Lucy Grey (née Spencer; 1822–98) was the wife of Sir George Grey (1812–98), Governor of Cape Colony in present-day South Africa and Namibia during 1854–61 (Anon. 1966). W. Taylor is Revd. William F. Taylor, the first missionary on Tristan da Cunha, who served the island from 9 February 1851 to 15[?] October 1857 (Faustini n.d.). Taylor was not a noted naturalist, but he did overlap with visits from both *HMS Frolic*, which returned with several natural history objects (Layard 1856, Nolloth 1856), and *HMS Herald* with naturalist John MacGillivray (MacGillivray 1852), and he met parties from both vessels

coming ashore (Faustini n.d.). This origin was presumed by Bourne & David (1981), however they did not elaborate on their reasoning or evidence beyond the existence of the aforementioned handwritten note (which is contradicted on the reverse).

Another potential origin is captive birds housed at the Zoological Society of London. At least two live shipments of Tristan Moorhens were received: the first in 1861 consisted of five individuals, two of which were predated in Cape Town, and two died en route and were preserved (including the holotype). The survivor was housed at London Zoo and presented to NHMUK on its death (the second specimen mentioned above) (Bourne & David 1981). The second shipment in 1869 via *HMS Telegraph* and E. L. Layard in Cape Town comprised three birds (Bourne & David 1981), but these are likely to have been Gough Moorhens as *HMS Telegraph* did not call at Tristan (Layard 1869, Brooke 1979, Faustini n.d.). The sex of the one surviving bird was not recorded, but it could have laid infertile eggs in captivity.

Of the hypotheses above, the second seems most plausible and would match with a simple misinterpretation of the reference to Earle. The *HMS Frolic* is recorded as having returned with an egg along with other natural history collections (Layard 1856). It visited Tristan between 18 and 22 March 1856 (Faustini n.d.) during the tenure of Revd. Taylor and on the authority of Governor Grey (Nolloth 1856). The reason for the gift to Lady Grey is unknown.

Discussion

The Tristan Moorhen egg's registration number (NHMUK 1960.6.53) places it in an aggregate of egg specimens 'Found during a revision of the collection in 1960'. In the 1950s, the Natural History Museum egg collections were returned to South Kensington, London, from their wartime storage at Tring, motivated by the death of the voluntary curator of eggs, William Edwin Glegg (1878–1952). In 1960, the first substantial re-curation and re-cataloguing of the collection since Glegg's death was undertaken by Shane Alwyne Parker (1943–92) who had recently joined the museum at the age of 16. This 'revision' was in preparation for the proposed move of the bird collections to Tring, and in light of the forthcoming Harold Hall Australian expeditions (1962–70). The series includes many

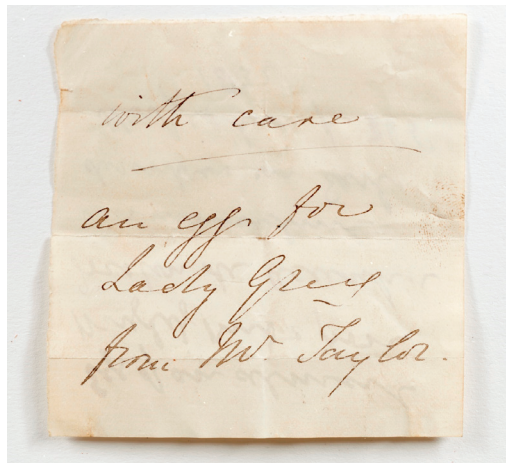


Figure 3. The reverse of the same note as in Fig. 2, which reads 'With care. An egg for Lady Grey from W. Taylor' (Jonathan Jackson, © Trustees of the Natural History Museum)

specimens of historical and scientific importance which, for one reason or another, had either not been officially assigned registration numbers in the past or where the original number had become unclear. It includes material from many important collections presented in the 1800s and early 1900s, including those of Gould, Salvin & Godman, Hume, and Seth-Smith. Thus, the registration number does not, in any way, reflect a mid-20th century acquisition. It aimed to improve the cataloguing of formerly overlooked material but, in many cases, unintentionally added to confusion. The understandable inexperience of Parker and a lack of direct oversight led to some curatorial uncertainties which remain to this day. As such, we are unsure how or when it was acquired by the Natural History Museum.

The date of collection of the Tristan Moorhen egg is still uncertain, but most likely it was during Revd. Taylor's time on Tristan before the departure of *HMS Frolic*, between February 1851 and March 1856. Because it pre-dates other definitive specimens, it does not affect the predictions of Bond *et al.* (2019) in terms of the Tristan Moorhen's extinction, estimated to be around 1874.

Acknowledgements

We are indebted to library staff at the Royal Society for the Protection of Birds and the Natural History Museum who helped track down sources relating to 19th century ornithological records from Tristan da Cunha. Numerous sources were also available on the Biodiversity Heritage Library website (<https://www.biodiversitylibrary.org/>). We also thank J. Jackson (NHM Photo Unit) for his expert photography. We appreciate input from Mark Small and Martin Stervander that improved this manuscript.

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Noteworthy records of birds from Pando including two new species for Bolivia

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SUMMARY.—Pando, the northernmost department of Bolivia, is mostly covered in Amazonian forest but has only recently started to be surveyed avifaunally. Here, we describe findings made during six expeditions in 2018–22, including two species new for Bolivia (Bonaparte's Parakeet *Pyrrhura lucianii* and Acre Tody-Tyrant *Hemitriccus cohnhafti*), four species new for Pando (Black-capped Tinamou *Crypturellus atricapillus*, Least Grebe *Tachybaptus dominicanus*, Broad-winged Hawk *Buteo platypterus*, Scarlet Tanager *Piranga olivacea*), a subspecies new for Bolivia (White-bellied Parrot *Pionopsitta leucogaster xanthurus*), a subspecies new for Pando (Crested Becard *Pachyrhamphus validus validus*) and the first departmental record of a doradito (*Pseudocolopteryx* sp.). Additionally, we document extensions to the known distributions of several other taxa, several of which are evidently benefitting from deforestation.

Pando is the northernmost department of Bolivia at c.10°S. Of all Bolivia's departments, it has the highest mean daily temperature of 32°C, and an annual rainfall of about 1,800 mm. Pando still boasts vast areas of Amazonian forest, including *terra firme*, *várzea* and patches of stunted forest on poorly drained soils (Tobias & Seddon 2007). Access to many areas is hindered by a lack of roads or by roads becoming impassable during the rainy season, which broadly coincides with the boreal winter. Lack of access has meant that Pando is relatively poorly known from an ornithological standpoint, even compared to other Bolivian departments. Only recently have ornithologists started to fully elucidate the avifauna of Pando (e.g. Alverson *et al.* 2000, Alverson 2003, Moskovits *et al.* 2003, Tobias & Seddon 2007, Martínez 2021, Aponte *et al.* 2022), which has resulted in expansions to the known range of several species, including Common Ground Dove *Columbina passerina* (Aponte *et al.* 2022), Ocellated Woodcreeper *Xiphorhynchus ocellatus* (Tobias & Seddon 2007), Chestnut-throated Spinetail *Synallaxis cherriei* (Tobias & Seddon 2007), Rufous Twistwing *Cnipodectes superrufus* (Lane *et al.* 2007, Tobias & Seddon 2007), White-cheeked Tody-Tyrant *Poecilatriccus albifacies* (Tobias & Seddon 2007), Sulphur-rumped Flycatcher *Myiobius barbatus* (Tobias & Seddon 2007) and Pale-bellied Mourner *Rhytipterna immunda* (Tobias & Seddon 2007), as well as multiple new departmental records (e.g., Tobias & Seddon 2007, Martínez 2021, Aponte *et al.* 2022). Several species known from neighbouring Amazonian Brazil and Peru have yet to be found in Pando, which in part may reflect natural distributional limits, but in most cases is probably indicative of how little field work has been done there.

Human encroachment in Pando is increasing, resulting in the area between Cobija and Puerto Rico now being cleared mainly for cattle farming. Many areas are selectively logged, legally or illegally, by local communities and international companies alike, so that only commercially viable trees such as Brazil nut *Bertholletia excelsa* and rubber *Hevea brasiliensis* are left as overstorey trees, with an understorey of second growth or early-successional *Guadua* bamboo.

TW & JTW visited Pando six times during a five-year period (2018–22), recording the birds seen, photographed and sound-recorded. The first expedition was on 18 July–3 August 2018, during which they visited mainly central-west and eastern Pando. The second, on 8 August–3 September 2019, was focused on central and western Pando. The third, on 19–29 August 2021, covered eastern Pando, and the fourth, on 29 September–22 October 2021, visited central and western Pando. The fifth, on 18 September–18 October 2022, covered western, central and eastern Pando, and the final expedition, during the rainy season, on 14–20 December 2022, visited western Pando alone.

Here, we document records of two species new for Bolivia (Bonaparte's Parakeet *Pyrrhura lucianii*, Acre Tody-Tyrant *Hemitriccus cohnhaffti*), four species new for the department of Pando (Black-capped Tinamou *Crypturellus atricapillus*, Least Grebe *Tachybaptus dominicanus*, Broad-winged Hawk *Buteo platypterus*, Scarlet Tanager *Piranga olivacea*), a subspecies new for Bolivia (White-bellied Parrot *Pionopsitta leucogaster xanthurus*), a subspecies new for Pando (Crested Becard *Pachyramphus validus validus*) and the first departmental record of a doradito (*Pseudocolopteryx* sp.). We also document extensions to the known distributions of several other taxa. Several of these involve species apparently benefitting from deforestation (White-tailed Hawk *Geranoaetus albicaudatus*, Burrowing Owl *Athene cunicularia*, Crested Caracara *Caracara plancus*, White-browed Meadowlark *Leistes superciliaris*, Saffron Finch *Sicalis flaveola*).

Notable is that, despite a lack of conspicuous current biogeographic barriers, several species apparently occur only in the western (*Crypturellus atricapillus*, Black-faced Cotinga *Coniotoptilon mcilhennyi*, *Cnipodectes superrufus*, Ihering's Antwren *Myrmotherula iheringi*) or eastern halves of Pando (*Pyrrhura lucianii*, Yellow-throated Flycatcher *Conopias parvus*, Green Oropendola *Psarocolius viridis*), or are represented by different subspecies in the east and west (*Pionites leucogaster*), or apparently possess disjunct populations in different parts of Pando (Manu Antbird *Cercomacra manu*). This seems to indicate that at least in the past a barrier to gene flow may have existed.

Study sites

TW & JTW visited multiple sites more than once; brief descriptions of these are given below. Often, no formal name is available for these sites, in which case we have chosen a name based on a local village or logging concession. Other sites are mentioned in the species accounts by their geographical coordinates.

1. Extrema, Nicolás Suárez province (11°27'10.08"S, 69°15'31.32"W). In 2018 this site, near the military outpost of Extrema, held riparian forest along the Tahuamanu River, and away from the river's floodplain had trees more than c.50 years old, with a *Guadua* bamboo understorey including large tracts that had collapsed. The site held typical species such as Peruvian Recurvebill *Syndactyla ucayalae*, Bamboo Antshrike *Cymbilaimus sanctaemariae* and White-lined Antbird *Myrmoborus lophotes*. In 2020, all trees with a diameter >30 cm were removed and the area became drier, although extensive bamboo was still present. For a further characterisation of the area, see Tobias & Seddon (2007).

2. Soberanía, Nicolás Suárez province (11°26'56.57"S, 69°15'24.14"W). Just north-east of Extrema. Tall *terra firme* forest with little *Guadua* bamboo and some *igapó*, which has been selectively logged.

3. San Miguel de Machineri, Nicolás Suárez province (10°58'35.76"S, 69°29'13.20"W). An indigenous village in far north-west Pando. The area was more or less protected against logging until 2020, when the entire area was logged, save a few commercially interesting trees including Brazil nut. Close to the Acre River, a large *Guadua* bamboo tract was present at least until late 2022.

4. Sagusa, Nicolás Suárez province (10°55'41.88"S, 68°3'39.60"W). A large lumber concession that is selectively logged every 20 years. This site was well protected until 2020 because it was possible to remove temporary bridges used by loggers, and it formerly held good numbers of larger mammals including Giant Armadillo *Priodontes maximus*. However, new regulations permit settlement inside the concession, which has led to a recent decline in forest quality and biodiversity due to hunting. The site is characterised by both *terra firme* (with bamboo understorey in parts) and riparian forest with much *Heliconia*. Many stumps are present, possibly due to logging or past fires.

5. Maderera, Nicolás Suárez province (11°10'31.44"S, 69°24'47.52"W). Part of a concession owned by the IMAPA company, which has several logging concessions south-east of Cobija and Porvenir. In general, this site comprises *terra firme* forest, but interspersed with *igapó* and tracts of *Guadua* bamboo (which was flowering in October 2021). Forest is selectively logged every 20 years and until recently was relatively intact, but like Sagusa new regulations have allowed settlers to colonise the concession, resulting in a rapid decline in forest quality and wildlife.

6. Reserva Nacional de Vida Silvestre Amazónica Manuripi, Manuripi province. A large protected area with several settlements within its borders, especially along Ruta 16, which traverses the park and runs south to the Madre de Dios River, but none in the east of the reserve. Much intact forest remains, but protective measures do not seem effective; at many sites emergent trees have been removed and hunting is commonplace. We explored several sites within the reserve boundaries, covering many different habitats, including oxbow lakes lined by grassy marshes and extensive stands of *Mauritia flexuosa*, and the *Tessaria* and *Gynerium*-dominated banks of the Madre de Dios.

7. Santa Rosa del Abuná, Abuná province (10°33'30.6"S, 67°27'4.68"W). Originally characterised by a mix of *várzea* and *terra firme*, but is being rapidly cleared for farmland. It previously also held a large tract of *Guadua* bamboo, which was burned down in 2022. Also visited by Tobias & Seddon (2007).

8. Orquídea del Manu, Abuná province (10°37'54.84"S, 66°43'0.84"W). Located in central Pando along the Manu River. There is a small harbour, after which the site is named, from where Brazil nuts used to be shipped to Riberalta. There are extensive cattle farms, and west of Orquídea del Manu there is a large logging concession, but despite this the site still has extensive forest, mainly due to its remoteness.

9. Nueva Esperanza, Federico Román province (10°04'32.52"S, 65°21'47.52"W). A provincial capital in eastern Pando. In the past there was a community sawmill which is no longer in operation. The immediate vicinity of the town has suffered greatly from gold prospecting. Further west forest is still tall and dense with many rubber and Brazil nut trees, but selective logging occurs and emergent trees have been largely removed. Locally, there are dense patches of an unknown bamboo species. Also visited by Tobias & Seddon (2007).

10. Selva Negra, Federico Román province (10°08'55.32"S, 66°20'57.12"W). A logging concession reasonably protected against hunting, dogs, settlements, and illegal logging. Once every 20 years the tallest trees are harvested, otherwise the forest is more or less undisturbed. Brazil nuts are generally the only emergents and the only trees with abundant epiphytes. Many small creeks are lined by *Heliconia*-dominated thickets.

11. Los Indios, Federico Román province (10°28'46.56"S, 65°36'30.24"W). The easternmost sawmill with a nearby settlement for local workers; still surrounded by tall forest where commercially useful trees are selectively logged every 20 years. Brazil nut trees are virtually the sole remaining emergents. See Tobias & Seddon (2007) and Moskovits *et al.* (2003) for additional information.

Species accounts

We follow the taxonomy of Dickinson & Remsen (2013) and Dickinson & Christidis (2014). Where localities are not indicated by geographical coordinates, these are identical to the coordinates mentioned in the site descriptions above (see also Fig. 1). Recordings are indicated by a ML number (and recordist, if not our own), which refers to the catalogue number under which the recording is deposited at Macaulay Library and can be accessed via the following URL, followed by the catalogue number, excluding the letters ML, e.g. www.macaulaylibrary.org/asset/502296431). Recordings were made with an Olympus LS-P4 recorder and Røde VideoMic Pro microphone. Sonograms were produced using Luscinia software (Lachlan 2007), setting max. frequency to 3 kHz, using a high pass threshold of 1 kHz, and noise removal between 1 and 3 kHz, lowering the dynamic range until sonograms were clean. eBird records are indicated by their checklist S number (and observers, if not our own), and can be accessed via the following URL, followed by the checklist number, e.g., www.ebird.org/checklist/S111309212.

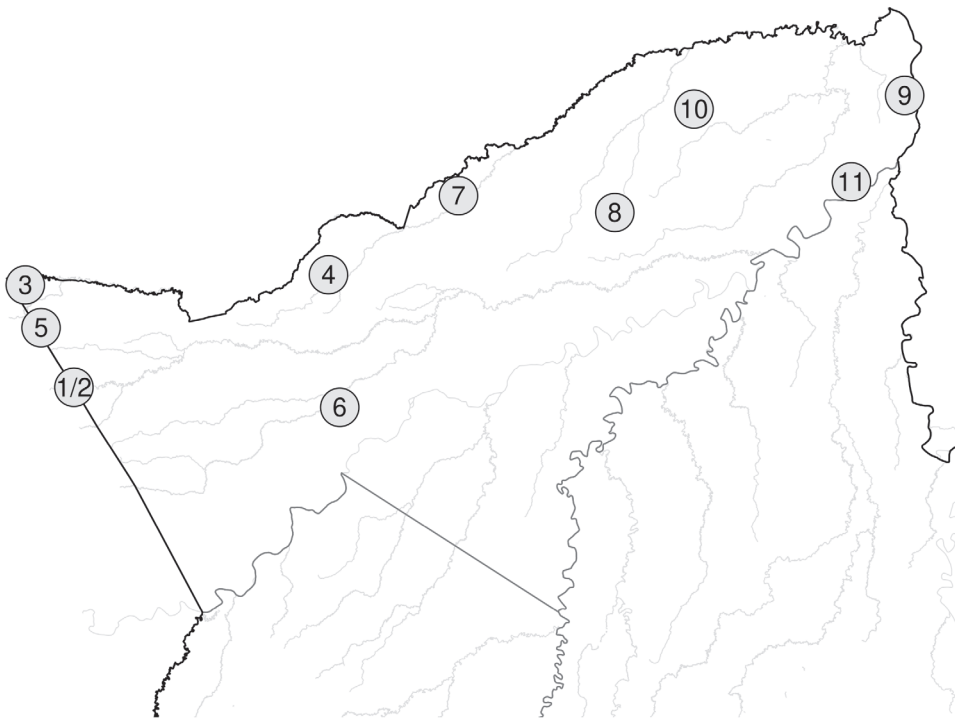


Figure 1. Frequently visited survey sites in Pando, Bolivia, during six expeditions in 2018–22. Numbers refer to sites mentioned in the text. Sites 1 (Extrema) and 2 (Soberanía) are in close proximity to each other.

BLACK-CAPPED TINAMOU *Crypturellus atrocapillus*

Herzog *et al.* (2016) listed this species (subspecies *garleppi*) as occurring mainly in lower Yungas and Amazonian foothill forest from La Paz to Santa Cruz. They suggested that nominate *atrocapillus* may reach western La Paz from its known range in central and southern Peru. We identified the species by voice (ML 502296431) at a locality in north-west Pando, near Extrema, but never saw any individual there, so are unable to determine the subspecies based on morphology. Although subspecies *atrocapillus* may differ vocally

from *garleppi* (Cabot *et al.* 2020), we are unable to detect any consistent differences between available recordings of both subspecies, and thus tentatively assign our observations to *garleppi*, which occurs in nearby Acre, Brazil. Black-capped Tinamou is known to occur <5 km away from our locality in Peru, making occurrence in Pando unsurprising. However, despite considerable effort, we did not locate the species elsewhere in Pando.

LEAST GREBE *Tachybaptus dominicanus*

First recorded in Reserva Nacional de Vida Silvestre Amazónica Manuripi on 23 July 2018, when we saw eight individuals on a pond (12°08'45.60"S, 68°36'59.76"W). Notoriously opportunistic and can turn up anywhere (Rutt *et al.* 2019). Given abundant records in south-west Amazonia (e.g., E. Rasi, S111309212; A. Wiebe, S48745095), the species was expected to occur in Pando. Birds were also observed at the same locality on 25 and 26 July and 23 August 2019, indicating a potentially persistent population. In January and May 2022, the species was photographed on a pond near Cobija, representing a second locality in Pando (S. Sanguenza Farah, ML 414011111). The species probably breeds locally in Pando but has been overlooked until now.

ASH-COLOURED CUCKOO *Coccyua cinerea*

Rarely reported from the Bolivian lowlands. Herzog *et al.* (2016) noted just one record in Pando, although there is at least one other record (J. A. Tobias, S64959133). We observed the species four times at three localities in Pando: on 29 and 30 August 2019 at Sagusa (ML 178321451), on 24 August 2021 on the road to Puerto 26 de Junio (10°23'52.90"S, 65°31'55.29"W; ML 367453401) and on 18 September 2022 in Reserva Nacional de Vida Silvestre Amazónica Manuripi (11°27'7.20"S, 67°30'54.36"W; ML 506161191). All of these dates fall within the putative periods of wintering and migration of this austral migrant, and indicate that the range in Pando reaches north beyond that modelled in Herzog *et al.* (2016). The species probably occurs uncommonly but regularly throughout Pando, as indicated by our records, and those from adjacent regions in Brazil and Peru bordering Pando (A. De Luca, S3933325; J. van Dort, S12243008; F. Schneider, S59835706; E. Patrial *et al.*, S91970502).

WHITE-TAILED HAWK *Geranoaetus albicaudatus*

Few records in Pando until 2016, all from the deforested Cobija area. We recorded the species more widely throughout the department, but mainly in the north-west, e.g., near Bolpebra, 11°08'50.64"S, 69°19'38.28"W, on 14 August 2019, and 10°56'49.56"S, 69°33'56.88"W, on 8 October 2021; three at Extrema, 11°27'10.8"S, 69°15'31.32"W, on 18 October 2021 (ML 388785521); near San Pedro, 10°57'12.96"S, 69°26'38.76"W, on 30 September 2022; and near Mukden, 11°10'14.52"S, 68°56'22.2"W, on 18 December 2022. However, we also saw the species in central Pando, near Santa Rosa del Abuná (10°33'30.6"S, 67°27'5.04"W) on 6 October 2021, and on the banks of the Tahuamanu River near Puerto Rico (11°07'14.16"S, 67°36'17.64"W) on 20 October 2021. Clearly, the species is swift to invade newly deforested areas and can be expected to occur more widely throughout the department in the future.

BROAD-WINGED HAWK *Buteo platypterus*

We photographed (ML 496982591) an adult light morph in north-east Pando (10°05'13.2"S, 65°26'32.28"W) on 16 October 2022, which appears to be the first documented record in the department. Although our record possibly refers to a passage migrant, TW & JTW have recorded the species in November, December and January in Beni and Santa Cruz, suggesting that *B. platypterus* may be a regular, albeit uncommon, wintering species or

passage migrant throughout Bolivian Amazonia. It also occurs regularly but uncommonly in adjacent Peru and Brazil in December–February (eBird 2023), indicating that the species' winter range includes much of south-west Amazonia.

BURROWING OWL *Athene cunicularia*

We (and others, e.g., S. Carvajal, S95939992; J. C. Gilarde Olivar, S95945299, S137601925) have documented the species at scattered localities throughout Pando. It was not mentioned for these areas by Herzog *et al.* (2016), and most records, including ours, are post-2015. We recorded the species in at least 11 localities, including in south-west (12°08'45.60"S, 68°36'59.76"W), central (10°54'1.08"S, 67°35'55.32"W) and easternmost Pando (10°04'32.52"S, 65°21'47.52"W). As in neighbouring countries (Rutt *et al.* 2017), the species appears to be spreading rapidly with deforestation and urbanisation (hence its occurrence, e.g., in Riberalta). Many of our new localities are small (often <1 ha) and isolated clearcuts surrounded by forest, indicative of the species' dispersal capabilities.

BLACK-THROATED TROGON *Trogon rufus*

Poorly known in Bolivia (Herzog *et al.* 2016), mainly from north-east Pando (e.g., Moskovits *et al.* 2003, Martínez 2021). We recorded the species at 10°15'46.08"S, 66°17'47.40"W near Selva Negra in east-central Pando (ML 386039041), which is a new locality.

BROWN-BANDED PUFFBIRD *Notharchus ordii*

Herzog *et al.* (2016) considered *N. ordii* to be a rare resident across most of Pando and northern Beni, *contra* Moskovits *et al.* (2003), who found it relatively common at Caimán in north-east Pando, and Tobias & Seddon (2007) indicated it was locally common by voice, also in north-east Pando. We documented it at seven widely scattered localities across Pando between 1 August 2018 and 19 December 2022 (Table 1; e.g., ML 110621981). Taken with previous records (Moskovits *et al.* 2003, Tobias & Seddon 2007), we conclude that the species may not be as rare as previously thought. Furthermore, our observations indicate that the species is not restricted to north-east Pando but is more widespread across the eastern half of the department.

TABLE 1

Records of Brown-banded Puffbird *Notharchus ordii* in Pando between August 2018 and December 2022, including coordinates and observation dates.

Selva Negra	10°12'17.28"S, 66°21'13.68"W	1 August 2021
East of El Tigre	10°13'29.64"S, 65°23'47.04"W	26 August 2021
Arca de Israel	10°15'14.76"S, 65°19'28.56"W	12 October 2022
Orquídea del Manu	10°37'54.84"S, 66°43'0.84"W	10 April 2021
North-west of Esperanza	10°00'13.68"S, 65°27'11.88"W	17 October 2022
Manuripi east	11°24'8.28"S, 67°22'46.56"W	19 December 2022

COLLARED PUFFBIRD *Bucco capensis*

A poorly known species in Bolivia, with only two records in easternmost Pando (Moskovits *et al.* 2003, Tobias & Seddon 2007). However, given its presence in the Peruvian Amazon, Herzog *et al.* (2016) predicted that the species should occur throughout Pando, which seems correct as we documented a pair in central Pando at Reserva Nacional de Vida Silvestre Amazónica Manuripi (11°28'19.56"S, 67°25'44.04"W) on 11 August 2019 (ML 177596851). Also, in far eastern Pando, we found it at two additional sites: north of Los Indios

(10°18'42.12"S, 65°33'23.04"W; ML 370695861) and west of Arca de Israel (10°15'14.76"S, 65°19'28.56"W; ML 500029541).

YELLOW-BILLED NUNBIRD *Monasa flavirostris*

Rare and local in north-west Bolivia, where recorded exclusively in Pando (Herzog *et al.* 2016). We found the species at three additional localities within this small area: near Extrema (16–17 October 2021; ML 522341651), near Soberanía (22 September 2022; ML 502974751) and near San Miguel de Machineri (1 October 2022; ML 496015601). Generally, in south-west Amazonia it occurs in areas with much bamboo (Guilherme & Santos 2009), but at Extrema and San Miguel de Machineri we found the species in canopy trees with bamboo in the understorey, although the birds were never actually seen in bamboo, and at Soberanía very little to no bamboo was present.

CRESTED CARACARA *Caracara plancus*

Few substantiated records of this opportunist from Pando. We found the species at several sites, mostly in easternmost and western Pando (Table 2), and mostly associated with recent deforestation, including areas that in theory should be protected such as Reserva Nacional de Vida Silvestre Amazónica Manuripi.

TABLE 2
Records of Crested Caracara *Caracara plancus* in Pando during 2018–22, including coordinates and observation dates.

Reserva Manuripi	10°30'46.08"S, 66°10'41.52"W	23 July 2018
RN13	11°10'8.04"S, 68°04'4.8"W	18 December 2022
Road to Bolpebra	11°08'50.64"S, 69°19'38.28"W	14 August 2019
Arca de Israel	10°15'10.8"S, 65°20'0.24"W	24 August 2021
East of El Tigre	10°13'29.64"S, 65°23'47.04"W	27 August 2021
North of Sta Rosa del Abuná	10°33'30.6"S, 67°27'4.68"W	5 October 2021
Bolpebra	11°01'52.68"S, 69°27'25.92"W	10 July 2021
South of Mukden	11°15'16.92"S, 69°01'42.6"W	18 December 2022

WHITE-BELLIED PARROT *Pionites leucogaster*

Relatively common throughout Pando. Only the black-legged subspecies (*P. l. xanthomerius*) is known in Bolivia (Herzog *et al.* 2016). In western Pando, we observed birds showing the diagnostic features typical of *xanthomerius* (black tarsi and feet, green rectrices) at multiple locations (e.g., San Miguel de Machineri; Bolpebra, 11°01'52.68"S, 69°27'25.92"W; Sagusa). However, the situation in central and eastern Pando is more complex. At two sites in eastern Pando, near Los Indios, we



Figure 2. White-bellied Parrot *Pionites leucogaster*, showing the flesh-coloured feet and yellow tail typical of *P. l. xanthurus*, near Los Indios, eastern Pando, Bolivia October 2022 (Jacob & Tini Wijpkema)

observed birds with yellow rectrices and flesh-colored tarsi and feet typical of *P. l. xanthurus* (Fig. 2), which occurs in nearby Acre and Rondônia, Brazil. At Selva Negra (10°15'46.08"S, 66°17'47.4"W) we observed birds with dark feet but yellow tails, i.e., mixed characters of subspecies *xanthomerius* and *xanthurus* (ML 386372731). In east-central Pando, at Orquídea del Manu, birds of both morphotypes were photographed side by side (ML 519881041). There thus appears to be a morphological transition from *xanthurus* in the east to *xanthomerius* in the west, probably with a zone of intergradation between them in central Pando. Intergradation between *xanthomerius* and *xanthurus* has been reported near the Juruá River, Brazil (Collar *et al.* 2020), and White-bellied Parrot and the closely related Black-headed Parrot *P. melanogaster* hybridise (Novaes 1991), making this hypothesis plausible.

BONAPARTE'S PARAKEET *Pyrrhura lucianii*

Herzog *et al.* (2016) noted that Santarem Parakeet *P. amazonum pallescens* (erroneously referred to as *P. a. snethlagae* therein; see Gaban-Lima & Raposo 2016) has disjunct populations in Bolivia, in Pando and in Santa Cruz/Beni. However, we observed birds showing characters consistent with Bonaparte's Parakeet at Selva Negra (10°08'55.32"S, 66°20'57.12"W) on 31 July 2018; broad dark chevrons on chest and lack of blue on the forehead were apparent in photographs (Fig. 3), unlike the otherwise similar Santarem Parakeet. We subsequently photographed Bonaparte's Parakeet at multiple localities in central and eastern Pando, including around Nueva Esperanza (20 August 2021), east of Tigre (10°13'29.64"S, 65°23'47.04"W; 26 August 2021), near Selva Negra (10°15'46.08"S,



Figure 3. Bonaparte's Parakeet *Pyrrhura lucianii*, showing diagnostic broad dark chest chevrons and chestnut forehead, near Los Indios, eastern Pando, Bolivia, October 2022 (Jacob & Tini Wijpkema)

66°17'47.4"W; 30 August 2021), Orquídea del Manu (3 October 2021), Tahuamanu River (11°07'13.8"S, 67°36'17.64"W; 19 October 2021), Sagusa (4 October 2022), south-west of Los Indios (10 October 2022), north-west of Nueva Esperanza (10°00'12.384"S, 65°35'0.366"W; 13 October 2022), and north of Los Indios (10°18'42.12"S, 65°33'23.04"W; 17 October 2022). Additionally, Moskovits *et al.* (2003) reported *P. picta* at Manoa, which probably refers to Bonaparte's Parakeet.

We have never observed Santarem Parakeet in Pando, and previous observations of this species there (Martínez 2021, eBird 2023), which to our knowledge are not documented photographically, probably all involve Bonaparte's Parakeet, which occurs in adjacent Acre, Brazil. In contrast, *P. amazonum pallescens* appears to be restricted to the area south and east of the Madeira River, whereas Bonaparte's occurs west and north of it, including in Pando. Broad sympatry in Pando does not seem likely. Populations in south-east Beni and Santa Cruz refer to *P. a. pallescens*, as the holotype (LSUMZ-B136840) and a paratype (LSUMZ-B136841) of what was described as *P. snethlagae* by Joseph in 2002 (but see Gaban-Lima & Raposo 2016) were collected there. Bonaparte's Parakeet may overlap with Rose-fronted Parakeet *P. roseifrons* in central Pando but no substantiated records or specimens of the latter are available; and the precise range limits of these two species in Pando demand clarification.

BLACK-FACED COTINGA *Conioptilon mcilhennyi*

Rare and local in north-west Bolivia, with few records (Herzog *et al.* 2016). We recorded this range-restricted species at several new sites, mostly within its known range in western Pando (Table 3), but also in west-central Pando at Sagusa (ML 201694811), mainly in *igapó*. We agree with Aponte *et al.* (2022) that the species appears to be continuously distributed within its small Bolivian range.

TABLE 3

Records of Black-faced Cotinga *Conioptilon mcilhennyi* in Pando during 2018–22, including coordinates and observation dates.

RN16 Manuripi	11°19'28.2"S, 68°44'18.6"W	23 July 2018
North of Mukden	11°04'15.24"S, 69°6'25.56"W	17 August 2019
North of Sagusa	10°55'41.88"S, 68°3'39.6"W	1 September 2019
Machineri	10°57'15.84"S, 69°28'9.84"W	10 October 2021
Maderera	11°10'31.44" S, 69°24'47.52"W	13 October 2021
North of Extrema	11°22'15.24"S, 69°12'28.08"W	14 October 2021
South-east of Sagusa	10°52'56.64"S, 67°45'59.76"W	6 October 2022

CRESTED BECARD *Pachyramphus validus*

Subspecies *P. v. audax* is rare to uncommon in winter in the Amazonian lowlands of Bolivia adjacent to the Andes, with occasional records further north (Herzog *et al.* 2016). We observed Crested Becard twice on 15 October



Figure 4. Male Crested Becard *Pachyramphus validus*, near Nueva Esperanza, eastern Pando, Bolivia, October 2022, showing buffy underparts consistent with *P. v. validus* (Jacob & Tini Wijpkema)

2022 at two localities in north-east Pando in the vicinity of Nueva Esperanza: 10°05'13.2"S, 65°26'32.28"W (male) and 10°02'2.04"S, 65°25'41.16"W (female). Thus, the species also occurs during the austral spring in Bolivia's lowlands. Photographs of the female do not permit conclusive subspecific identification (ML 506801411), but the male we photographed (Fig. 4) had pale buffy underparts in accord with *P. v. validus*. The latter is an austral migrant from south-east Brazil, normally occurring only in south-east Bolivia (mainly in Santa Cruz); our record is the first for Pando. Possibly, this subspecies occurs more widely in the region during the austral winter, or perhaps our record involved an accidental overshoot.

RUFOUS TWISTWING *Cnipodectes superrufus*

Soon after its discovery to science (Lane *et al.* 2007), Rufous Twistwing was found in Bolivia at Extrema, north-west Pando (Tobias & Seddon 2007). We found it at another locality in this area, near San Miguel de Machineri (10°57'15.84"S, 69°28'9.84"W; ML 496021911), within the species' modelled range in Pando (Herzog *et al.* 2016) but c.60 km from the first site in Bolivia.

SNETHLAGE'S TODY-TYRANT *Hemitriccus minor*

We recorded this species in south-central Pando at 11°26'43.8"S, 67°22'30"W just west of route 13 in the east of Reserva Nacional de Vida Silvestre Amazónica Manuripi, on 11 August 2019, some distance from its known distribution in Bolivia (Moskovits *et al.* 2003, Herzog *et al.* 2016). Our sound-recordings (ML 177598681; Fig. 5) indicate 9–13 notes per song bout, unlike the usual 35–70 notes of nominate *minor* or *H. m. snethlagae* (Clock 2020); the latter is assumed to occur in eastern Bolivia (Dickinson & Christidis 2014). However, song length may vary and depend on the bird's state of agitation, and is thus not entirely diagnostic for subspecific identification (B. M. Whitney *in litt.* 2023). Additionally, our bird frequently also uttered single *tic* calls, which are not thought to be given by *H. m. pallens* but are thought to pertain to a new vocal type of *Hemitriccus* (*minor*?) throughout western Amazonia (B. M. Whitney *in litt.* 2023), including west of the Madeira River in Brazil (and could conceivably occur in Pando). We therefore tentatively identify our record as *H. minor*, but we acknowledge that further study of vocalisations of *H. minor* and vocally similar taxa in western Amazonia is necessary.

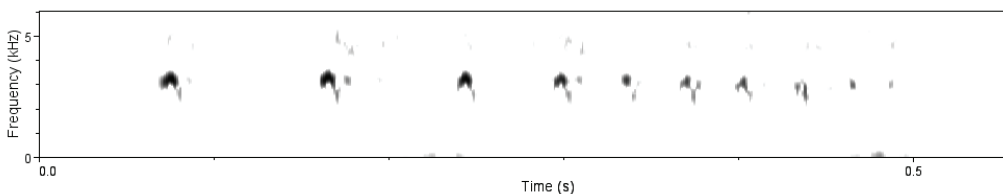


Figure 5. Song of Snethlage's Tody-Tyrant *Hemitriccus minor*, Reserva Nacional de Vida Silvestre Amazónica Manuripi, Pando, Bolivia, 11 August 2019.

ACRE TODY-TYRANT *Hemitriccus cohnhafti*

H. cohnhafti has a highly restricted range in south-west Amazonia, inhabiting *Guadua* bamboo thickets, second growth and forest edge. The species is poorly known ecologically, having been described only recently from Acre, Brazil (Zimmer *et al.* 2013), where it was first found in 2011, and subsequently was reported in Amazonian Peru (Harvey *et al.* 2014). It was assumed that the species also occurs in adjacent Bolivia (Herzog *et al.* 2014) but no evidence of this was available.



Figure 6. Acre Tody-Tyrant *Hemitriccus cohnhaffi*, San Miguel de Machineri, Pando, Bolivia, 30 September 2022, showing the distinctive ochraceous coloration restricted to the lores and supraloral region, and conspicuous wingbars typical of the species (Jacob & Tini Wijkema)



Figure 7. Habitat of Acre Tody-Tyrant *Hemitriccus cohnhaffi* at San Miguel de Machineri, Pando, Bolivia; note extensive and partly decaying *Guadua* with scattered young woody growth (Jacob & Tini Wijkema)

We found a singing individual on 25 September 2022 at 06.26 h near the Extrema military base, Municipio Bolpebra, Pando, at 11°25'34.2732"S, 69°15'32.9112"W (Figs. 6–7) in extensive but decaying *Guadua* bamboo with scattered secondary woody growth surrounded by riparian forest associated with the Tahuamanu River, <1 km from the border with Peru. During previous visits to the area by ourselves and others the species was not detected, however at the time of a survey in November 2004, which yielded three new species for Bolivia (Tobias & Seddon 2007), the species had not been described and was probably overlooked as a result (J. A. Tobias *in litt.* 2023). The species' current presence there may also be due to recent deforestation, as in 2018 the locality was characterised by intact forest with a bamboo understory. It seems to prefer extensive and perhaps partly decaying *Guadua* without a forest canopy (Harvey *et al.* 2014) and may opportunistically appear at sites with suitable early-succession, bamboo-dominated habitat. On 30 September 2022, we found the species between San Miguel de Machineri and Estancia Porta Atenda, near the floodplain of the Acre River, at 10°57'15.84"S, 69°28'9.84"W, at 08.07 h. The area was also characterised by extensive and decaying *Guadua* with scattered secondary woody growth, and is <1 km from the Brazilian border and c.60 km north-northeast of the first

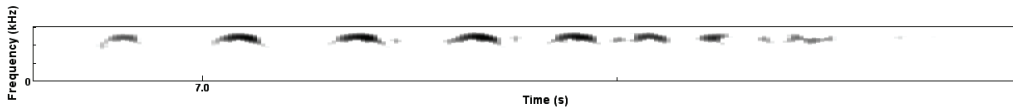


Figure 8. Song of Acre Tody-Tyrant *Hemitriccus cohnhafti*, San Miguel de Machineri, Pando, Bolivia, 25 September 2022.

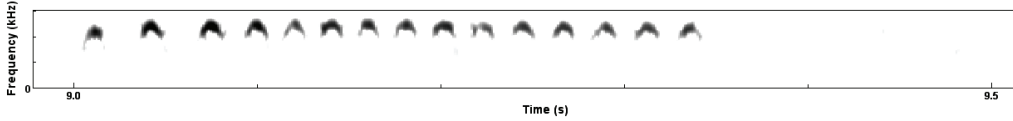


Figure 9. Song of Acre Tody-Tyrant *Hemitriccus cohnhafti*, Extrema, Pando, Bolivia, 25 September 2022; note the difference in number of notes between the two individuals in Figs. 8 and 9, with the individual from Extrema never uttering fewer than 12 notes, whereas the Machineri birds never gave more than eight notes.

locality. We observed the species here again on 1–2 October 2022, as singles and in pairs, but a previous visit in October 2021 did not yield the species.

Our recordings (Figs. 8–9, see also ML 500542021, ML 505920301, ML 505920311, ML 505920321, $n = 3$ individuals) indicate that the song of the individual near Extrema consists of 12–15 notes, excluding the lower-frequency introductory note, which is usually given directly preceding the song, but occasionally >1 second before it. Mean song duration was $c.0.3$ second (measured using *Luscinia*: Lachlan 2007). Previous analyses indicate a mean eight notes per song and a mean duration of 0.22 second (Zimmer *et al.* 2013). The two individuals sound-recorded at San Miguel de Machineri had different song characteristics, more in line with characters known in Acre, Brazil: 7–8 notes, frequently excluding the introductory note, lasting 0.24–0.27 second. Our recordings show greater overall similarity to known songs of *H. cohnhafti* than to those of the closely related and morphologically similar Yungas Tody-Tyrant *H. spodiops*, which has on average 33 notes in 0.64 second (Zimmer *et al.* 2013). Furthermore, our data indicate that there may be geographic variation in song structure of *H. cohnhafti*, which in suboscines may be indicative of population differentiation (Tobias *et al.* 2012), or the different recordings may involve birds exhibiting different levels of excitement. Peak frequency of our recordings does not exceed $c.2.3$ kHz, in line with previous findings and below the peak frequency of 2.9 kHz in *H. spodiops* (Zimmer *et al.* 2013). We did not use playback for the vocalisations here, so our recordings do not represent antagonistic songs, which are longer than natural songs (Zimmer *et al.* 2013). We did not record calls.

RIVER TYRANNULET *Serpophaga hypoleuca*

Few records in Pando, most from the north bank of the Madre de Dios River near Riberalta. We photographed two (a pair?) in riverside *Tessaria* scrub along the Madre de Dios ($11^{\circ}27'7.2''S$, $67^{\circ}30'54.36''W$; ML 506265181) in Reserva Nacional de Vida Silvestre Amazónica Manuripi, the first, to our knowledge for Manuripi province. Probably widespread (but uncommon and generally overlooked) in suitable habitat throughout Pando.

DORADITO SP. *Pseudocolopteryx* sp.

On 8 August 2019 we photographed (Fig. 10) a bird showing characteristics of a doradito (*Pseudocolopteryx* sp.) in *Tessaria* scrub on an island in the Madre de Dios River $c.7$ km north-east of Riberalta ($10^{\circ}54'33.12''S$, $66^{\circ}8'27.24''W$). No doraditos are known to occur in Pando, so our bird probably was an overshooting austral migrant. Pale wingbars eliminate

Subtropical Doradito *P. acutipennis*, which has inconspicuous buffy wingbars, and the bird also did not show the colourful crown or dark ear-coverts typical of female Crested Doradito *P. sclateri* (males have a crest), which species breeds in nearby Beni. This leaves Dinelli's *P. dinelliana* and Ticking Doraditos *P. citreola*, of which the latter should show extensive rufous-brown in the crown, which our bird did not. Furthermore, the bird in Fig. 10 has pale lores, a slight supercilium and a pale mandible. Dinelli's Doradito typically has pale lores or a faint supercilium, and female doraditos in general have pale mandibles (Pearman & Areta 2020), although this has never been definitely established for *P. dinelliana* to our knowledge. We tentatively identify our bird as Dinelli's Doradito, but further research is needed to determine if this species (or another) occurs more regularly as an austral winter visitor to the region. If our record does involve Dinelli's Doradito, it would represent the northernmost of the species.



Figure 10. Doradito *Pseudocolopteryx* sp., in *Tessaria* scrub on island in Madre de Dios River, eastern Pando, Bolivia, August 2019 (Jacob & Tini Wijpkema)

SULPHURY FLYCATCHER *Tyrannopsis sulphurea*

A rare to uncommon resident known in Bolivia from a few, scattered observations (e.g., Parker & Remsen 1987). We first found it in the western part of Reserva Nacional de Vida Silvestre Amazónica Manuripi in south-west Pando at 12°08'45.6''S, 68°36'59.76''W, on 26 July 2018 (ML 122344941). We also found it at three localities in north-easternmost Pando, from where it had not been previously reported: La Gran Cruz, 10°22'5.16''S, 65°23'50.64''W, on 24 August 2021 (ML 370280271); north of Los Indios, 10°18'42.12''S, 65°33'23.04''W, on 28 August 2021; and west of Esperanza, 10°05'13.2''S, 65°26'32.28''W, on 16 October 2022 (ML 509268621). Sulphury Flycatcher thus has a broader distribution in Pando than was known (Herzog *et al.* 2016). Parker & Remsen's (1987) hypothesis that the species is 'probably much more widespread than specimen records indicate' thus seems correct.

YELLOW-THROATED FLYCATCHER *Conopias parvus*

Hitherto known in Bolivia mainly from north-east Pando (Moskovits *et al.* 2003, Herzog *et al.* 2016; J. A. Tobias *in litt.* 2023). We photographed and sound-recorded two on 9 October 2022 south-west of Los Indios (10°30'40.68''S, 65°36'18''W; S121105431), establishing its presence in south-east Pando.

IHERING'S ANTWREN *Myrmotherula iheringi*

Rare and local, and in Bolivia known exclusively from western Pando (Herzog *et al.* 2016). We report an additional four localities, including the vicinity of Soberanía (11°50'56.4''S, 68°56'56.4''W; ML 177562491), north of Santa Rosa del Abuná (10°33'30.6''S, 67°27'4.68''W; ML 431875031), vicinity of San Miguel del Machineri (10°57'15.84''S, 69°28'9.84''W; ML 388589891) and near Maderera (11°10'31.44''S, 69°24'47.52''W). Our photographs show

the males had extensive black on the breast and belly, in accord with *M. i. oreni*, which occurs south of the Purus River and is the expected subspecies in Pando.

MANU ANTBIRD *Cercomacra manu*

Previously known from western Pando (Parker & Remsen 1987), we found the species at four localities in far north-east Pando within a 10 km² radius of Esperanza (22–23 August 2021, 10°04'32.52"S, 65°21'47.52"W; 29 August 2021, 10°18'42.12"S, 65°33'23.04"W; 15–16 October 2022, 10°05'13.2"S, 65°26'32.28"W; 17 October 2022, 10°08'11.76"S, 65°28'50.52"W, e.g., ML 364969031). Despite searching for the species in central Pando, we never found it there and the eastern population may be disjunct from that in western Pando, much like the various populations in eastern Amazonian Brazil are seemingly isolated (Zimmer *et al.* 1997, Beadle *et al.* 2003, Kirwan *et al.* 2015).

BROWN-RUMPED FOLIAGE-GLEANER *Automolus melanopezus*

Listed by Herzog *et al.* (2016) for the western third of Pando alone, with definitive records only from the far north-western part (e.g., Parker & Remsen 1987). We observed the species at Orquídea del Manu (10°37'54.84"S, 66°43'0.84"W) in east-central Pando on 3 October 2021, and subsequently photographed it north of Santa Rosa del Abuná (10°33'30.6"S, 67°27'4.68"W) in north-central Pando, on 4–5 October 2021 (ML 386464801). In Brazil, the species occurs east to north-east Acre (e.g., T. Melo, ML 201839161), and the species' eastern range boundary may be formed by the Madeira River. It may be a widespread but local resident in bamboo thickets throughout Pando.

WHITE-BROWED MEADOWLARK *Leistes superciliaris*

On 31 August 2021, we observed a *Leistes* meadowlark with a slight white supercilium on a river island in the Madre de Dios, Pando (10°52'15.61"S, 66°2'42.93"W; ML 538001481). The Madre de Dios forms the apparent northern boundary of the range of *L. superciliaris*, and our bird is phenotypically intermediate between White-browed and Red-breasted Meadowlark *L. militaris*, the latter being the expected species in the region. Parker & Remsen (1987) already noted that contact between *L. militaris* and *L. superciliaris* here was imminent. Several *Leistes* specimens from Pando at the Louisiana State University Museum of Natural Science, Baton Rouge (LSUMZ) were identified as *L. superciliaris* based on phenotype. However, some have the mitochondrial DNA of *militaris* (van Els *et al.* 2021, in prep.), indicating that phenotype and genotype are not completely congruent in *Leistes* from the region. This, in combination with our observation of a phenotypically intermediate bird, indicates that Pando is a possible hybrid zone between these two species.

GREEN OROPENDOLA *Psarocolius viridis*

In Bolivia known from only two localities in north-east Pando (Montambault 2002, Tobias & Seddon 2007). We observed the species at two additional localities in this region: east of Los Indios (10°26'54.6"S, 65°31'45.12"W; ML 367491901), where we also saw nests being constructed, and north-west of Esperanza (10°02'2.04"S, 65°25'41.16"W; ML 509054941).

SCARLET TANAGER *Piranga olivacea*

We photographed an immature male at Extrema, Pando (11°27'10.08"S, 69°15'31.32"W; ML 520569201) on 17 December 2022. To our knowledge, this record is the first in Pando. The species occurs sparingly during the boreal winter throughout southern Amazonia, including in neighbouring Acre, Brazil, and Peru, but is more common in the Andean foothills and subtropics (Herzog *et al.* 2016).

PEARLY-BREADED CONEBILL *Conirostrum margaritae*

On 9 August 2019, we photographed an all greyish-blue conebill with a slight supercilium on a *Cecropia*-dominated island in the Madre de Dios River (11°29'35.16"S, 67°29'31.56"W) in the eastern part of the Reserva Nacional de Vida Silvestre Amazónica Manuripi. Based on the pale undertail-coverts, we can rule out male Chestnut-vented Conebill *C. speciosum*, and the lack of greenish coloration on the flanks and upperparts discounts female Chestnut-vented Conebill. Pearly-breasted Conebill thus occurs west at least to central Pando, c.155 km south-west of the known (J. A. Tobias, S64958721) and modelled range for the species in Pando (Herzog *et al.* 2016).

SAFFRON FINCH *Sicalis flaveola*

We observed this species on traffic lights in Cobija on 3 October 2022. It appears to be established there (and in neighbouring Brazilian towns), as multiple records since 2015 indicate (e.g., H. Santa Cruz, S121915498; S. Mitten, S30974707). Saffron Finch is probably a local escapee from the cagebird trade, but may also have spread from Amazonian Peru, where it is widely established after escaping from captivity (eBird 2023).

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First record of Eurasian Hobby *Falco subbuteo* in South America

by Frederick Pallinger, Joacil Germano Soares & Fabio Schunck

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SUMMARY.—Eurasian Hobby *Falco subbuteo* migrates between its breeding grounds in Europe, parts of North Africa and East and South Asia, and non-breeding areas in Africa and Asia. It is a vagrant to many parts of the world, including North America and Australasia. A first-calendar-year individual was photographed aboard a boat near the São Pedro e São Paulo archipelago, off north-east Brazil, in December 2022, providing the first record of this species for South America.

Eurasian Hobby *Falco subbuteo* breeds in Europe, parts of North Africa and East and South Asia. Two subspecies are recognised, *F. s. subbuteo* and *F. s. streichi*. Most *F. s. subbuteo* migrate to central and southern Africa in winter, whereas others move to South and South-East Asia. *F. s. streichi* is resident in southern and eastern China, and possibly northern Myanmar and northern Indochina (Orta *et al.* 2020). Satellite-tracking data reveal that *F. subbuteo* can move at least 10,065 km during migration (Meyburg *et al.* 2011). There are many records of vagrants on oceanic islands, such as in the north-east Atlantic (e.g., the Azores; Costa *et al.* 2011, eBird 2023), Pacific (e.g., Mariana Islands, Guam, Pagan; Ferguson-Lees & Christie 2001, Wiles 2005) and Indian Oceans (e.g., Amsterdam Island; Jiguet *et al.* 2007; Cocos and Christmas Islands; James & McAllan 2014). There are also a few records for the Americas, in the Canadian provinces of British Columbia (September 2006) and Newfoundland (May 2004), and the US states of Washington (October 2001, November 2014), Massachusetts (May 2011) and Alaska (June 2003, May 2013) (Howell *et al.* 2014, eBird 2023). Eurasian Hobby was not mentioned by Whittaker *et al.* (2019) as a potential vagrant to Brazil based on vagrancy to St Helena, Ascension, or Tristan da Cunha.

On 29 December 2022, a young *F. subbuteo* (possibly female based on apparent size) was found alive on a small Brazilian vessel 955 km off Rio Grande do Norte, north-east Brazil, and c.0.5 km north-west of the São Pedro e São Paulo archipelago (00°55'6.09"N, 29°20'52.85"W; Fig. 1). The archipelago belongs to the state of Pernambuco and consists of a suite of rocky islets in the Atlantic Ocean, with the surrounding 200 nautical miles being Brazilian territory. The individual arrived flying low but was apparently physically weak and landed on the vessel, where it was captured and fed fish by the crew. It was probably taken to the Brazilian mainland (possibly Rio Grande do Norte) by the crew, where it was photographed in a residential setting (Fig. 2). We were unable to confirm the bird's fate, as the anonymous person who sent us the information and photographed the bird eventually ceased responding to our messages. Nonetheless, we requested the bird be delivered to the local environmental agency, if it was still in their possession.

Initially, the crew member sent JGS the images to identify, and he then contacted FP to confirm the identification. FP requested more details including the locality from the crew, which were provided, including the geographic coordinates mentioned above. Only after FP informed our anonymous correspondent that we planned to publish the record did he or she stop responding. We are confident that the details that were provided are genuine.

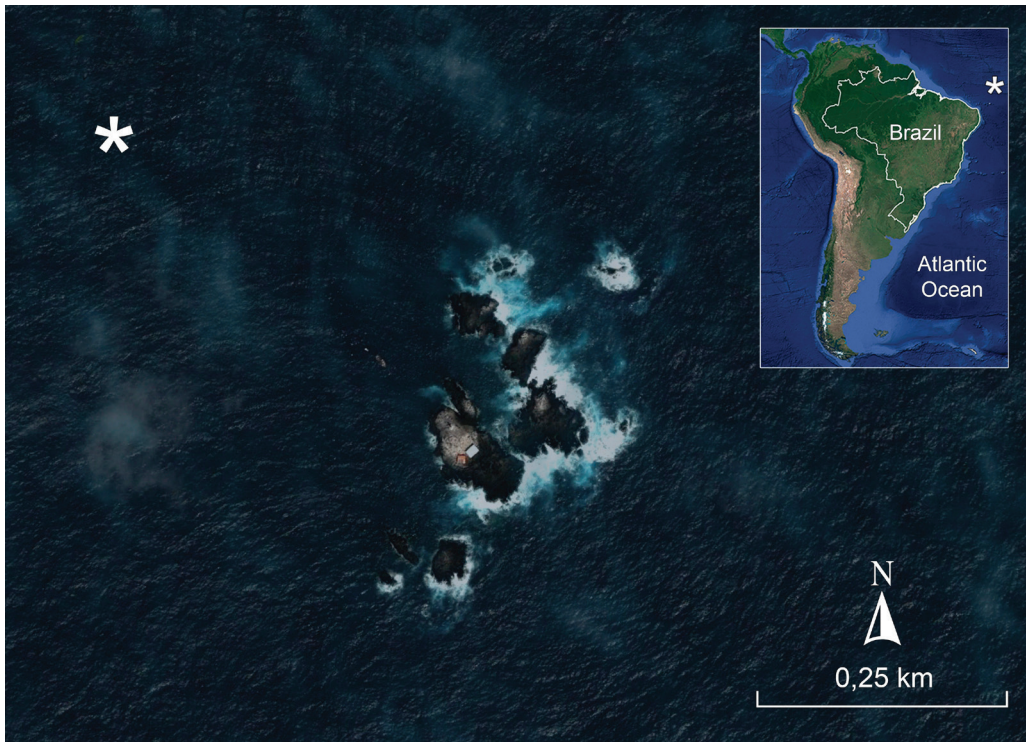


Figure 1. Location of the Eurasian Hobby *Falco subbuteo* record off the coast of Brazil. The asterisk on the map of South America (inset) indicates the location of the São Pedro e São Paulo archipelago. The asterisk in the image of the archipelago indicates the site of the record (Images Google Earth Pro / © 2023 Maxar Technologies)



Figure 2. Eurasian Hobby *Falco subbuteo* recorded near the São Pedro e São Paulo archipelago, Brazil, December 2022 (anonymous photographer; see text)

The photograph (Fig. 2) shows a first-calendar-year bird in worn plumage (Fig. 3C). We ruled out the possibility of a juvenile Amur Falcon *F. amurensis* (which has occurred on St Helena; Rowlands *et al.* 1998) or the same age Red-footed Falcon *F. vespertinus* (which species

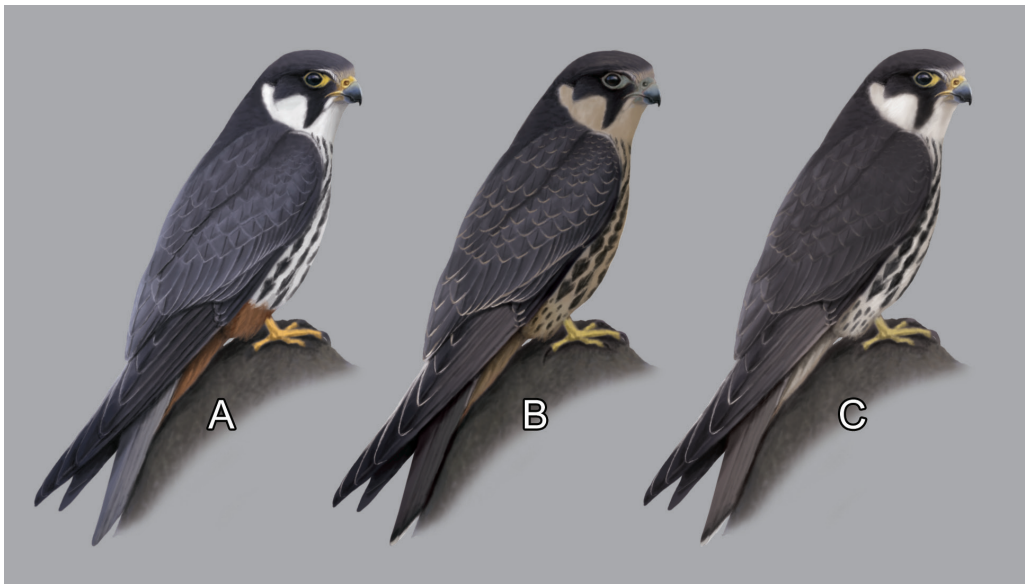


Figure 3. Plumages of Eurasian Hobby *Falco subbuteo*: (A) adult; (B) fledged young ('fresh' juvenile plumage); and (C) young with worn plumage, like the bird recorded near the São Pedro e São Paulo archipelago (Frederick Pallinger)

has wandered to North America; Howell *et al.* 2014) by lacking a yellow cere, having a paler forehead to mid-crown (Red-footed can be similar), generally less obvious pale fringes to the upperparts feathers, a longer and broader malar stripe, and perhaps on average paler yellow feet/tarsi (Small 1995, Ferguson-Lees & Christie 2001). We also eliminated a juvenile of the obviously larger Eleonora's Falcon *F. eleonora* which lacks a supraocular line, has a bluish periocular ring, and a long tail that usually extends slightly beyond the wingtips at rest (Ollé & Trabalon 2019).

This is the first record of Eurasian Hobby for South America and will now be assessed by the Brazilian Ornithological Records Committee. The possibility of the bird being a captive property of a crew member was eliminated, as work on the high seas in small boats does not usually permit the presence of 'pets' on board, and the crew was from Brazil, where the species does not occur.

Quite a number of landbird species from Eurasia have been recorded recently in Brazil, among them Corn Crake *Crex crex* on Fernando de Noronha (Burgos & Olmos 2013), Redwing *Turdus iliacus* on a vessel 150 km off the coast of Espírito Santo (Brito *et al.* 2013) and Common Redshank *Tringa totanus* on Ilha Comprida, southern São Paulo (Pacheco *et al.* 2021). The São Pedro e São Paulo archipelago is an important site for these vagrants, including Eurasian Kestrel *Falco tinnunculus* (Bencke *et al.* 2005). Most Eurasian Hobbies migrate to southern Africa, where they arrive mainly in November, but departure from Europe is principally in August / September and the first birds reach the southern third of Africa in October (Orta *et al.* 2020), thus an individual near the São Pedro e São Paulo archipelago in December was certainly lost, perhaps due to strong winds or storms, juvenile inexperience, or both. Other small falcons are also much prone to vagrancy, e.g., Amur Falcon, Eleonora's Falcon, Spotted Kestrel *F. moluccensis*, Oriental Hobby *F. severus* and others (Winkler *et al.* 2020).

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Remarks on the types of the New Guinea endemic *Otidiphaps Gould, 1870*

by Guy M. Kirwan & Hein van Grouw

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SUMMARY.—We detail the types and some other early specimens of the four taxa currently usually treated as subspecies of the New Guinea endemic, Pheasant Pigeon *Otidiphaps nobilis*. This material has been subject to a number of erroneous statements in the previous literature. In chronological order of description, *O. n. nobilis* Gould, 1870, was based on a single specimen of unknown provenance and collector, now at the Natural History Museum, Tring; *O. n. cervicalis* E. P. Ramsay, 1880, and its objective junior synonym *O. n. regalis* Salvin & Godman, 1880, were based on multiple syntypes taken in 1879 (several of them the same specimens), all held in Tring (despite being previously reported as such, two specimens in Sydney appear to have no name-bearing status); *O. n. insularis* Salvin and Godman, 1883, is known from the two syntypes, collected in 1882 and held in Tring, and just one other specimen, taken in 1896 and held in the American Museum of Natural History, New York; and *O. n. aruensis* Rothschild, 1928, was based on a specimen collected in June 1914, now in New York, although there is a significantly earlier specimen of this taxon in the Museum Heineanum Halberstadt.

Pheasant Pigeon *Otidiphaps nobilis* is a geographically widespread but rarely encountered species endemic to New Guinea, where it is present over hilly and montane regions of the mainland, as well as on the Aru Islands, the North-western (Raja Ampat) Islands, Geelvink Bay (Teluk Cenderawasih) Islands (Yapen) and the D'Entrecasteaux Archipelago (Fergusson Island) (Mayr 1941, Rand & Gilliard 1967, Beehler & Pratt 2016). It has usually (since Peters 1934, Mayr 1941) been considered to comprise four reasonably distinctive subspecies, but recently del Hoyo & Collar (2014) elected to treat all of them as species based on application of the Tobias *et al.* (2010) criteria. The present contribution analyses the type material pertaining to the four taxa (plus one synonym), which in several cases has been subject to a degree of confusion, doubt and erroneous statements in the literature.

GREEN-NAPED PHEASANT PIGEON

Otidiphaps nobilis Gould, 1870, *Annals and Magazine of Natural History* (4)5: 62. —‘Probably procured on some one of the islands of the Eastern Archipelago or in New Guinea.’ Distributed on Batanta, Waigeo and Yapen Islands, and the mountains of western New Guinea (Tamrau, Arfak, Fakfak, Kumawa, Wandammen, Weyland, Snow, Foja, and mountains on upper Mamberamo River, e.g., Van Rees) (Beehler & Pratt 2016). Reportedly absent from Salawati Island (Diamond 1985). Eastern extent of distribution remains to be determined, but presumably meets *O. n. cervicalis* in western Papua New Guinea (Beehler & Pratt 2016).

The holotype (Figs. 1–2, Table 1) is an adult (stated on the label to be from ‘Bransbore, New Guinea’) provided to Gould by a ‘Mr. James Gardner of Holborn [London]’ held at the Natural History Museum, Tring (NHMUK 1872.5.28.28) (Warren 1966). Salvadori (1882: 189) speculated it might have been taken on the island of Batanta, but his rationale is unclear.



Figure 1. Holotype of *Otidiphaps nobilis* Gould, 1870, NHMUK 1872.5.28.28 (Jonathan Jackson, © Trustees of the Natural History Museum, London)



Figure 2. Plate 53 in Gould (1871) of *Otidiphaps nobilis*, based on the holotype, the only specimen available to Gould at the time (Hein van Grouw, © Trustees of the Natural History Museum, London)

'Bransbore' is an enigma. In the original description Gould did not mention Bransbore, rather he specified that he did not know the specimen's collection locality, a point he underlined the next year (Gould 1871), at which time he pondered, obviously incorrectly, that it might have come from Gilolo (an old name for Halmahera). So, whether Gould later added the label with the supposed locality is unknown. Intriguingly, the English text on the label is a translation of an imperfectly transcribed Dutch text, in a different hand, on the reverse of the same label, and the supposed locality is spelled 'Bransbare'.

G. Chiozzi (*in litt.* 2022) reports that there was formerly a specimen of this taxon held in the Museo di Storia Naturale di Milano (MSNM). It came from the Count Turati collection (original no. 9311), having been purchased by the latter in 1870 from a certain Botto (possibly Domenico Botto of Genoa, a trader in silkworm eggs, who travelled to

TABLE 1

Type specimens of the various taxa of *Otidiphaps* Gould, 1870, including some material previously reported as having type status and specimens newly identified herein. For museum acronyms see main text.

Museum reg. no.	<i>Otidiphaps</i> taxa				
	<i>nobilis</i> Gould, 1870	<i>cervicalis</i> Ramsay, 1880	<i>regalis</i> Salvin & Godman, 1880	<i>aruensis</i> Rothschild, 1928	<i>insularis</i> Salvin & Godman, 1883
NHMUK 1872.5.28.28	Holotype				
AM A.9281		No type status			
AM A.9282		No type status			
NHMUK 1889.2.12.120		Syntype	Syntype		
NHMUK 1880.6.23.40		Syntype	Syntype		
NHMUK 1889.4.20.529		Syntype	Syntype		
NHMUK 1889.4.20.530		Syntype	Syntype		
AMNH 616495				Holotype	
NHMUK 1889.2.12.119					Syntype
NHMUK 1889.2.12.484					Syntype

Japan that same year) and was also of uncertain locality; the MSNM register reports that it was labelled ‘?N. Guinea’. Unfortunately, the specimen was destroyed during the Second World War (see further below, under *O. cervicalis*), but the parallels with Gould’s holotype are intriguing. A second specimen in the Turati collection (original number: 19640) was collected in 1879 on Waigeo and sold by A. A. Bruijn (Ternate) to Léon Laglaize in 1880. These two collectors are known to have exchanged specimens between them before sending material to Europe (Voisin & Voisin 2016: 44). This specimen eventually suffered the same fate as the previous one.

GREY-NAPED PHEASANT PIGEON

Otidiphaps nobilis var. *cervicalis* E. P. Ramsay¹, 1880, *Proceedings of the Linnean Society of New South Wales* 4: 470.—Goldie River [09°38’S, 147°25’E], New Guinea. The range of this taxon encompasses the mountains of eastern and south-eastern New Guinea (e.g., Adelbert, Saruwaged, Sepik-Ramu, Kuper), including the Huon Peninsula (Beehler & Pratt 2016).

This name is based on an unspecified number of syntypes (reportedly both males and females), of which two adult males said to have been collected in December 1879 by Carl Hunstein (1843–88), held in the Australian Museum, Sydney (AM A.9281 and AM A.9282) have generally been accepted to be part of the series (Longmore 1991). However, our research (with the assistance of L. R. Tsang, Collection Manager, Ornithology, Australian Museum) sheds considerable doubt on their assumed type status. Firstly, Ramsay (1880) gave no hint that the specimens he saw were collected by anyone other than the Scottish trader Andrew Goldie (1840–91). Although Hunstein later worked for Goldie, they apparently did not meet until late April 1879 and Hunstein, who had arrived in New Guinea in 1878, collected with another German, Capt. Edwin Redlich until the latter’s death in 1880 (Moore & Mullins 2012). Secondly, AM A.9281 and A.9282 were registered at AM only in December 1880 (the date recorded on their labels; L. R. Tsang *in litt.* 2023) and seem to have

¹ As noted by Dickinson (2006: 238), Bruce *et al.* (2016: 99) and Bruce (2023: 69, footnote 193), confusion between E. P. Ramsay and R. G. W. Ramsay is largely obviated by the belated recognition that the latter is most appropriately referred to as Wardlaw Ramsay; nevertheless, use of the initials for the present authority ensures that any lingering confusion is removed.

been the same specimens as purchased directly from Hunstein earlier in the same year, as recorded by Stephen & Buckland (1880: 11). L. R. Tsang (*in litt.* 2023) reports the evidence of a newspaper cutting, dated 11 September 1880, which strongly indicates that Hunstein may have collected them around late June of that year, and that he was still working with Redlich at the time. Thirdly, a juvenile *Otidiphaps* was evidently purchased from Hunstein concurrently (Stephen & Buckland 1880: 11), which fact would seem likely to have been mentioned by Ramsay if the specimen had been available to him for the original description. Finally, whereas Hunstein evidently recorded the sex of the specimens he collected, there is no indication from other material of this species taken by Goldie (see below) that he was so fastidious about noting such information, perhaps because his primary collecting interests had been botanical (Moore & Mullins 2012, Mullins 2012, Mullins & Bellamy 2012).

Edward Pierson Ramsay (1842–1916) was the first Australian-born curator of the Australian Museum and his tenure was notably successful, but it was nevertheless the case that he was not always careful in his descriptions of new birds—mistakes and inconsistencies in nomenclature were made, the material available to him was not always made clear, and the disposition of the relevant specimens went far beyond Sydney and is, as a result, frequently also subject to doubt (McAllan *et al.* 2005, McAllan 2016; W. Longmore *in litt.* 2023). In the present case, Ramsay was not specific as to how many specimens of the new taxon were available to him (and this may never become clear now), but in light of his claim to have examined both sexes, the fact that the two AM skins long assumed to be syntypes are both labelled as males, suggested that other material belonging to the original series must have existed, perhaps even at AM (W. Longmore *in litt.* 2023). It is clear from the first paragraph of Ramsay (1880: 464) that Goldie, who was present at the meeting at which the description of *O. cervicalis* was first read, brought a collection of birds (and other natural history items?) with him to Australia in late 1879, to which Ramsay evidently had initial access. Thereafter Goldie sent parts of this material elsewhere, as it is believed that the Australian Museum lacked funds to purchase the specimens at that time (W. Longmore *in litt.* 2023). Gould & Sharpe (1882: text accompanying Plate 61; see Fig. 3) stated that: ‘From the same collector [Goldie] Messrs. Salvin and Godman received the specimens from which they drew up their description of *O. regalis*; and it seems a great pity that some notice was not given before the despatch of the specimens to England to the effect that they had already been deposited with Mr. Ramsay for the purpose of description.’ Unfortunately, a retrospectively published (and edited) memoir of the years 1875 to 1879 by Goldie finishes in May of the last-named year (Moore & Mullins 2012).

Frederik DuCane Godman (1834–1919) received this box of birds from Goldie sometime in the first half of 1880, including the syntypes of what he and Osbert Salvin (1835–1898) would describe as *Otidiphaps regalis* (see below). Godman selected those specimens he wished to keep for his own collection and forwarded the rest (including one of the types of *regalis*) to the British Museum (BM, where they were received on 23 June 1880). Part of Godman’s private collection, including the other type specimen of *regalis*, was donated by him to the BM in 1889.

Two specimens (Fig. 4) of *Otidiphaps cervicalis* at the Natural History Museum, Tring (NHMUK 1889.2.12.120 and NHMUK 1880.6.23.40; see also below) were part of the batch received by Godman from Goldie in the early part of 1880, are labelled as being from Ramsay’s type locality, and thus possess very strong claims to be considered syntypes, having been almost certainly seen by Ramsay. Furthermore, two additional *cervicalis* specimens at NHMUK (Fig. 5) also received from Salvin and Godman in 1889 (NHMUK 1889.4.20.529 and NHMUK 1889.4.20.530) are also from Goldie and presumably stem from the same batch of material received from the latter in early 1880. They emanate from the



Figure 3. Plate 61 in Gould & Sharpe (1882) of *Otidiphaps regalis* Salvin & Godman, 1880, which name is a synonym of *O. nobilis cervicalis* E. P. Ramsay, 1880 (Hein van Grouw, © Trustees of the Natural History Museum, London)

relevant region of south-east New Guinea, in the environs of Port Moresby (where Goldie was based), and likewise appear candidates for syntype status of both *cervicalis* and its synonym *regalis* (Table 1). Pertinently, none of these four NHMUK skins is labelled as to sex, meaning that if Ramsay's original description is to be taken at its word at least one further specimen with syntype status could await identification. Indeed, there is a specimen of *cervicalis* (MV 46201) from Goldie held in Museums Victoria, Melbourne, which therefore bears investigation in this respect (see <https://collections.museumsvictoria.com.au/specimens/419843>); unfortunately, our attempts to contact the relevant curators have to date gone unanswered. Possibly, however, Ramsay merely assumed that one or more of the skins he saw was female, perhaps based on minor differences in plumage, without the sex being recorded on any of the labels?

Another very early specimen in the collection of Count Ercole Turati (1829–81) was mentioned by Salvadori (1882: 191). G. Chiozzi (*in litt.* 2022) has confirmed that, in fact, Turati had two specimens of *cervicalis* (original numbers: 19936 and 20269) that were subsequently held at MSNM, but both were destroyed by bombing in 1943 during the Second World War.

In a subsequent paper, Ramsay (1883: 16, 27) remarked on the species' unusual abundance in the region worked by Goldie and his collectors, among them Hunstein and Rolles. However, he also reported that this batch of Goldie material (whether or not any of it formed part of the 1879 consignment is unknown) had reached him via a dealer (Wilson of Mason Brothers) and that he had separately received some specimens directly from Hunstein. Furthermore, the comments concerning *Otidiphaps* are clearly linked to the latter material; it seems most likely that Ramsay's remarks were based on the specimens

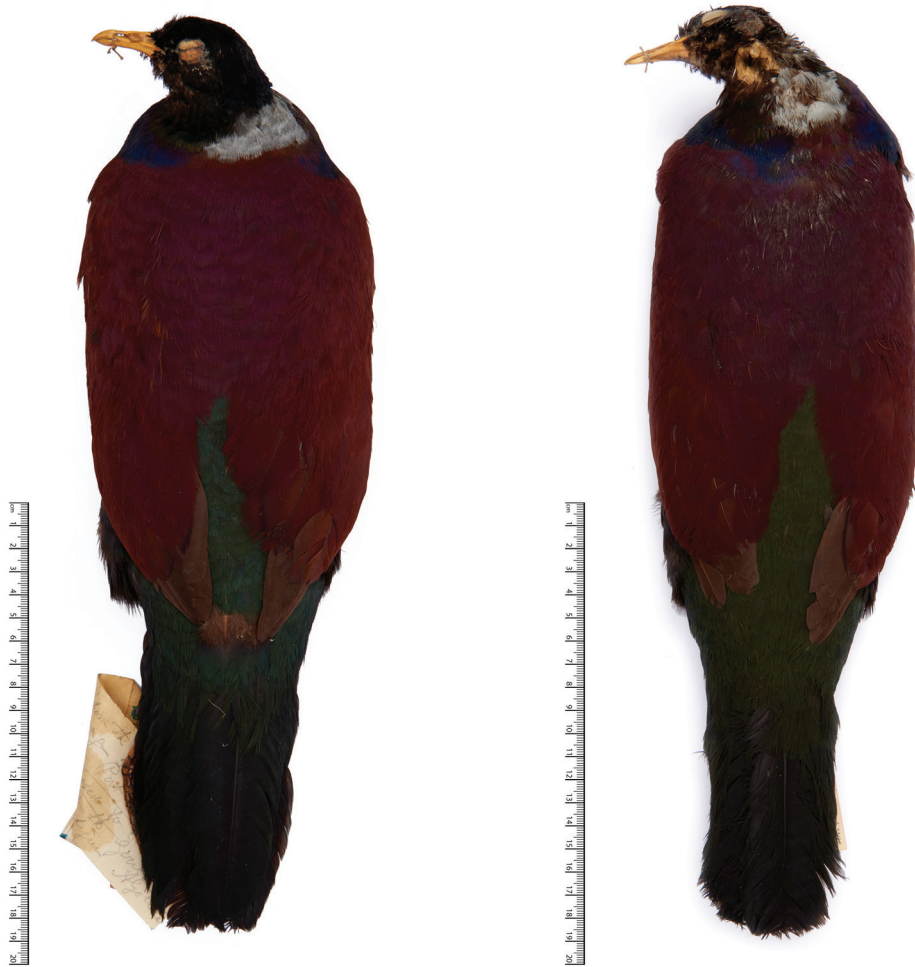


Figure 4. Syntypes of *Otidiphaps nobilis* var. *cervicalis* E. P. Ramsay, 1880, and *Otidiphaps regalis* Salvin & Godman, 1880, NHMUK 1889.2.12.120 (left) and NHMUK 1880.6.23.40. Both specimens were received by Godman from Goldie shortly after Ramsay had examined them. Salvin and Godman, unaware of Ramsay's publication, named the species again, kept one specimen for their own collection and passed the other to the British Museum in June 1880 (Jonathan Jackson, © Trustees of the Natural History Museum, London)

purchased in 1880 (Stephen & Buckland 1880: 11)—see above. It is apparent that Goldie relied on a reasonably extensive network for disposing of specimens; his arrangement with Ramsay commenced in 1877 (Mullins & Bellamy 2012) and, as he began to discover how lucrative birds could be, ornithological material was regularly sent to England and elsewhere in Australia (Sharpe 1906, Allingham 1924). Hunstein too had other avenues for disposing of specimens; according to Sharpe (1880: 231, 1906: 262), in September 1880 the British Museum purchased from the London dealers Edward Gerrard & Sons 43 specimens collected and supplied directly by Hunstein, and 15 others from Hunstein reached the BM via either Gustav Schneider (1867–1948) or his father, also Gustav Schneider (1834–1900), the Basel-based taxidermists (Sharpe 1906: 464).

Synonym:

Otidiphaps regalis Salvin and Godman, 1880, *Ibis* (4)4:364, Plate 11 (Fig. 6).—Owen Stanley Range, 30 miles inland of Port Moresby, eastern New Guinea. Apparently described



Figure 5. Probable syntypes of *Otidiphaps nobilis* var. *cervicalis* E. P. Ramsay, 1880, and *Otidiphaps regalis* Salvin & Godman, 1880, NHMUK 1889.4.20.529 (left) and NHMUK 1889.4.20.530; both specimens were sent to Godman by Goldie and probably formed part of the same batch as the specimens in Fig. 4 (Jonathan Jackson, © Trustees of the Natural History Museum, London)

without being aware of Ramsay's name *cervicalis*, Salvin & Godman (1880) were opaque as to the number of specimens they had before them of their new taxon, *regalis*, but Warren (1966) assumed (?) that it was just one, and therefore considered the adult collected in 1879 by Andrew Goldie (see above) and held at the Natural History Museum, Tring (NHMUK 1889.2.12.120) to be the holotype of this name (taking her lead from Salvadori 1893: 612). However, our research indicates that a second specimen, NHMUK 1880.6.23.40, was received by Godman at the same time (see above) and when accessioned to what was then the British Museum was also noted as being a type in the register book; thus there are certainly two (and probably four) syntypes of the name *regalis* (Figs. 4–5, Table 1).

Salvadori was swift (by contemporary standards) to alert Salvin and Godman to the perceived primacy of Ramsay's name *cervicalis*; see Letters, Announcements, etc. in *Ibis* 4(5): 178–179 (January 1881), wherein it was stated that copies of the latter's paper had still not reached England. The following year, in the third volume of his overview of the Papuan avifauna, Salvadori (1882: 190) drew further attention to the seniority of *cervicalis*.

He also made his views on the case clear to Ramsay himself, by letter (dated 30 December 1881) (McAllan *et al.* 2005: 71). Having first berated the unnecessary synonymy, Gould and Sharpe (1882), however, took a different view, opining (without foundation) that ‘it is therefore extremely probable that Messrs. Salvin and Godman actually published their description first’. This assertion, which was clearly Sharpe’s (rather than Gould’s), was made despite correctly noting that Ramsay’s paper had been read first at a meeting of the Linnean Society of New South Wales on 31 December 1879, although, as reported by Fletcher (1896), the relevant issue of its Proceedings did not appear until May 1880. Despite the lag, Ramsay’s name has precedence; the relevant part of the *Ibis* containing Salvin and Godman’s description of *regalis* is dated in July 1880, although Salvadori (1882) thought it was not published until October and it is possible that he had proof of this. Nevertheless, despite the point being moot, for issues in this serial Dickinson *et al.* (2011) advised ‘where exact dates are available they should be relied on, in all other cases the last day of the given month [in this case 31 July 1880] must be used’. Finally, it also bears mention that in other cases in which he *knew* others might work on the same material as him and seek to describe new taxa, Ramsay was sufficiently collegiate to take precautions to try and avoid this by making his intentions clear to the other parties (McAllan 2016: 32), thereby making Sharpe’s charges against him doubly unfair.



Figure 6. Plate 11 of *Otidiphaps regalis* Salvin & Godman, 1880, accompanying the original description and based on the specimens Godman received from Goldie in early June 1880, see also Figs. 4–5 (Hein van Grouw, © Trustees of the Natural History Museum, London)

BLACK-NAPED PHEASANT PIGEON

Otidiphaps insularis Salvin and Godman, 1883, *Proceedings of the Zoological Society of London* 1883: 33.—Fergusson Island. Endemic to a single island in the D’Entrecasteaux Archipelago (Beehler & Pratt 2016).

Salvin and Godman (1883) reported that Andrew Goldie collected two specimens (syntypes; see Fig. 7, Table 1) of this pigeon in the mountains above 2,000 ft. on Fergusson Island in 1882. Though the wording of the original description makes clear that two specimens were available to the describers, only one (NHMUK 1889.2.12.119) was listed as being at NHMUK by Salvadori (1893) and Warren (1966). It subsequently transpired that the second bird, the only other specimen of this taxon held at NHMUK, had lost its original Salvin & Godman label, probably before it was received by the British Museum, and therefore it was never registered as a type. The style of its preparation is identical to that of NHMUK 1889.2.12.119, and both specimens bear a similar small, square, paper tag with the number 2 written on it. Based on this, it is safe to assume that this is indeed the



Figure 7. Syntypes of *Otidiphaps insularis* Salvin & Godman, 1883, NHMUK 1889.2.12.119 (left) and NHMUK 1889.2.12.484 (Jonathan Jackson, © Trustees of the Natural History Museum, London)

second syntype, and it has been allocated the next available number in the original batch with which it arrived, 1889.2.12.484.

These are the only specimens apart from a female collected by Albert Stewart Meek (1871–1943) on Fergusson Island on 25 May 1896, held at the American Museum of Natural History, New York (AMNH 616494). This taxon was first seen in the field by scientists only in 2022 (Kirwan *et al.* 2023).

WHITE-NAPED PHEASANT PIGEON

Otidiphaps nobilis aruensis Rothschild, 1928, *Bulletin of the British Ornithologists' Club* 48: 88.—Aru Islands. This very poorly known taxon is endemic to the Aru group.

The holotype (Fig. 8, Table 1), an adult (said to be male) collected in June 1914 by Wilfred J. C. Frost (?1875–1957), and apparently received by Rothschild via the ornithologist and dealer William Frederick Henry Rosenberg (1868–1957), is held at the American Museum of Natural History, New York (AMNH 616495) (Greenway 1978). It is not known on which island Frost obtained the holotype, but he took another specimen of this taxon



Figure 8. Holotype of *Otidiphaps nobilis aruensis* Rothschild, 1928, AMNH 616495 (© Thomas Trombone, American Museum of Natural History, New York)



Figure 9. *Otidiphaps nobilis aruensis* specimen in the public exhibitions at Museum Heineanum Halberstadt; where and when it was collected is unknown, but it came to the museum before 1886 and was initially ascribed to *regalis* (and then to *cervicalis*) (© Rüdiger Becker, Museum Heineanum Halberstadt)

on the island of Kobroor [Kobruur] (06°14'S, 134°55'E) (AMNH 616497), and in May 1914 he was collecting at Golili (Frith & Beehler 1998: 531, Ellis 2010). Golili is listed by Beehler & Mandeville (2017: 214), but there is no information as to whether it is a locality on one of the main Aru Islands or a smaller island in the group (B. M. Beehler *in litt.* 2022).

Frost's specimen, however, was not the first. Heine & Reichenow (1886: 287) mentioned a male, which they ascribed to *cervicalis*, in the Museum Heineanum Halberstadt. Photographs of this bird (Fig. 9), which currently forms part of the museum's public exhibition, demonstrate that it is *aruensis*. Details concerning the specimen's provenance are unfortunately extremely poor. It was purchased from Dr Jean Guillaume Charles Eugene Rey (1838–1909) of Leipzig, but from where, when or whom he acquired the individual is unknown (his natural history dealership commenced operation in 1874); there is no reference to the Aru Islands on the original label. Very few expeditions visited the Aru Islands prior to the mid-1880s (see Frith & Beehler 1998: 531) and none seems an obvious source for the Halberstadt specimen, but six birds (of which only four survived the Second World War) acquired on a visit sometime during 1872 by J. T. Cockerell reached the Museum für Naturkunde, Berlin, via the dealer Gustav Frank (P. Eckhoff *in litt.* 2023). Rey identified the bird as *regalis*, perhaps influenced by Sharpe's text and the relevant plate (in Gould & Sharpe 1882; see above and Fig. 3), whereas this attribution was 'corrected' by Heine & Reichenow (1886) to *cervicalis*; all three of the persons concerned missed the opportunity to describe it as a new taxon.

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Leah Tsang of the Australian Museum (AM) kindly sent photographs of the labels of the two *Otidiphaps nobilis cervicalis* held in Sydney and helped determine their probable status. Wayne Longmore very helpfully discussed these same specimens at some length and we also thank Anthony Gill (AM) for other correspondence on this issue. Giorgio Chiozzi provided information concerning specimens formerly held in the Museo di Storia Naturale di Milano. Rüdiger Becker was similarly helpful concerning the specimen still present in the Museum Heineanum Halberstadt, and Pascal Eckhoff very promptly sent information concerning specimens in the Museum für Naturkunde, Berlin. Tom Trombone sent photos of the holotype of *O. n. aruensis* in New York. Bruce Beehler supplied some information pertaining to localities. We thank Clemency Fisher and Robert Prÿs-Jones for their referees' reports.

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Comments on the taxonomic status and disappearance of *Mimocichla rubripes eremita* Ridgway, 1905, with a substitute name, and notes on the type material of *M. coryi* Sharpe, 1902

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SUMMARY.—A population of the West Indian endemic Red-legged Thrush *Turdus plumbeus* formerly inhabited the Swan Islands (off northern Honduras), but is apparently extinct, having first and last been seen in 1887. Named *Mimocichla rubripes eremita* Ridgway, 1905, it fell into the synonymy of *T. p. rubripes*, found across the western two-thirds of Cuba. A recent check on seven Swan Islands specimens suggests that the validity of their subspecific status might be upheld for their apparently more extensive black throat, but further study is needed. The extinction of the population cannot be explained, but economic activity in the years from the 1850s to 1900s conceivably played a part. Meanwhile, Tristan Thrush *Nesocichla eremita* Gould, 1855, endemic to the archipelago of Tristan da Cunha, is nowadays also reassigned to *Turdus*. To resolve the resultant case of secondary homonymy, a substitute name for the Swan Islands population of *Turdus plumbeus* is offered.

‘The mystery surrounding the occurrence of this species in the Swan Islands has never been satisfactorily solved’ (Monroe 1968: 304)

The West Indian endemic Red-legged Thrush *Turdus plumbeus* (*sensu lato*) was long placed in the genus *Mimocichla* P. L. Sclater, 1859, on account of a handful of morphological characters, namely more rounded tail with white tips to the outer rectrices, pale-edged secondaries and wing-coverts, more slender bill, and short rictal bristles (Seebohm 1881). Molecular studies, however, have confirmed the species’ placement in *Turdus* Linnaeus, 1758, with its closest living relative apparently being the Jamaican endemic White-chinned Thrush *T. aurantius* (Voelker *et al.* 2007, Nylander *et al.* 2008). As a result, all four avian global checklists currently treat Red-legged Thrush in *Turdus* (Dickinson & Christidis 2014, del Hoyo & Collar 2016, Clements *et al.* 2022, Gill *et al.* 2022). The species is generally accepted to comprise six subspecies (Collar 2005), divided into western and eastern groups, the former in the northern Bahamas, Cuba and Cayman Brac (four subspecies), and the latter on Hispaniola, Puerto Rico and Dominica (two subspecies) (AOU 1998). More recently, however, given reasonably pronounced morphological variation and a deep genetic split between populations on Cuba and Hispaniola (Ricklefs & Bermingham 2008), some authorities have preferred to treat the complex as comprising three species: (1) *T. plumbeus* in the Bahamas; (2) *T. rubripes* in Cuba plus Cayman Brac; and (3) *T. ardosiaceus* on Hispaniola, Puerto Rico and Dominica (del Hoyo & Collar 2016, Kirwan *et al.* 2019).

Largely overlooked, however, is a series of specimens, mostly males, collected by C. H. Townsend between 4 February and 25 May 1887 on the Swan Islands, c.200 km off

Honduras and 325 km south-west of Grand Cayman (but still part of the West Indies faunal region, *contra* Raffaele *et al.* 1998) (Bond 1940, Monroe 1968, Kirwan *et al.* 2019). Townsend was not present throughout this period on the Swan Islands, as he visited Grand Cayman twice during it (15–16 March and 15–17 May 1887) (Ridgway 1887, Bradley 2000: 21). His material is held at the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM), including the adult male holotype (USNM 111219) (Deignan 1961), as well as at the Museum of Comparative Zoology, Cambridge, MA (MCZ) (Ridgway 1905, Monroe 1968) and the Senckenberg Naturmuseum, Frankfurt am Main (SMF). Monroe (1968: 304) stated that there were ten specimens, eight males and two unsexed, of which nine were at USNM and one (a male) at MCZ; Ridgway (1887: 575) also reported that Townsend collected ‘ten adults’ and Paynter (1956: 106) too mentioned the same figure but not their whereabouts. However, Ridgway (1907: 85) later specified that he had measured just seven specimens, which accords with the number seen by us at USNM (see below) and the total recorded in the Smithsonian Institution’s online database (<https://collections.nmnh.si.edu/search/birds/>). C. Milensky (*in litt.* 2023) reports that nine specimens were originally registered in USNM of which one, a male (as indicated by Monroe 1968), went to MCZ, and one, also male, was used in an exchange with Graf von Berlepsch. J. Trimble (*in litt.* 2023) confirms that a single male *Turdus plumbeus* from the Swan Islands is held at MCZ (MCZ.ORN.81102; formerly USNM 111225). The specimen (formerly USNM 112257) sent to Berlepsch, who bequeathed his 55,000 bird specimens to SMF (Roselaar 2003), is listed on the institution’s online database, registered as SMF 17384 (an adult male taken on 25 May 1887), but the database also documents a second specimen from the original series, SMF 17385 (an adult collected 6 March 1887; formerly USNM 111227). G. Mayr (*in litt.* 2023) confirms the presence of both specimens in the collection, and that SMF 17385 is unsexed. Thus Ridgway (1887) and Monroe (1968) were correct to report that there are ten specimens of this taxon. However, the other reportedly unsexed bird could only be USNM 111223, which in the USNM catalogue is registered as male (see below), so it is possible that nine of the ten specimens were male rather than eight.

Ridgway (1887) was initially unable to distinguish these Swan Island birds from Cuban specimens, but later determined that they differ from *rubripes* (the subspecies of Red-legged Thrush in western and central Cuba) in averaging larger and having shorter toes and more extensive white on the chin and malar area; consequently he recognised them as constituting a distinct taxon that he named *Mimocichla rubripes eremita* (Ridgway 1905, 1907).

During a stay of three weeks on the Swan Islands in January–February 1908, Lowe (1909) was unable to find the species. He speculated that the Red-legged Thrush was only a non-breeding visitor during the boreal winter and therefore questioned the taxonomic status of *eremita*. Hellmayr (1934), however, maintained it as valid, and the fact that Townsend collected a specimen as late as 25 May argues against Lowe’s hypothesis; moreover, there is no evidence that *Turdus plumbeus* makes regular cold-season movements of any sort, with fewer than a handful of reports that can be ascribed to (exclusively short-distance) vagrancy (Kirwan *et al.* 2019, Kirkconnell *et al.* 2020, Larsen 2020). Rather more plausibly, Paynter (1956) made the case for synonymising *eremita* on the grounds that it might have colonised the islands via hurricane-mediated dispersal and been extirpated due to ‘disturbance of the forest’. After Paynter, *eremita* was also listed in synonymy by Ripley (1964) and Monroe (1968). Throughout the last century, however, nobody disputed that the bird itself had been lost: of six post-Lowe ornithologist visitors listed by Paynter (1956) and Monroe (1968)—George Nelson in February–March and July 1912 and April 1913, Neal Wilson between September 1926 and April 1927, A. K.

Fisher in April 1929, Jean Delacour in October 1937, Rudyerd Boulton in January 1940, and Charles H. Blake in November 1958—none found Red-legged Thrush on the Swan Islands. In a survey of subsequent, largely unpublished visits, Kirwan *et al.* (2019) were unable to discover any modern sightings of Red-legged Thrush on the islands. Even its one-time occurrence there has not been consistently mentioned or accepted in recent specialist monographs and regional works. For example, Clement & Hathway (2000) stated only that subspecies *rubripes* ‘possibly [occurred] formerly on the Swan Islands’, while Raffaele *et al.* (1998) omitted all mention of the Swan Islands in the species’ range. (Although the last-named authors did not consider these islands to be part of the West Indies region, they nevertheless mentioned other ‘important’ Swan Islands’ populations, e.g., of Vitelline Warbler *Setophaga vitellina*.)

In May 2019, at GMK’s request and in ignorance of Ridgway’s original diagnosis, NJC examined and measured the specimens of *eremita* in the USNM 111219–111226 ($n = 7$, of which six are labelled as male and one, USNM 111223, is unsexed, this latter being included in the measured sample as it nests within it; the USNM register has it as male *vide* C. Milensky *in litt.* 2023) and compared them with the 18 male Red-legged Thrushes (taxon *rubripes*) in the same institution (Table 1). The claws were not measured, a difference in the white on chin and malar was not noticed (and is not apparent in Fig. 1), and a significantly larger size in *eremita* was not upheld. The only character that emerged as potentially diagnostic of Swan Islands birds was their apparently greater extent of black on the throat, although a slightly larger bill was also intimated (Table 1, Fig. 1). A difference in the size of an area of colour on the upper underparts of bird specimens is difficult to measure with any accuracy and may simply be attributable to preparation style, particularly in relation to how the head is positioned. In this case, however, the larger throat patch appears reasonably well supported (mean length 43.0 vs. 32.9 mm) and, with an effect size of 2.7, represents a medium character under the Tobias *et al.* (2010) criteria, thus potentially rendering *eremita* worthy of recognition, which we very tentatively give it. Independent scrutiny of all specimens of *eremita* would be a helpful step to resolve this uncertainty, while molecular work might establish the biogeographic origin of the Swan Islands’ birds as well as their level of genetic differentiation from other taxa.

Also bearing on this case is the fact that the synonymising of *eremita* with *rubripes*, readily accepted by all authorities after (but not including) Hellmayr (1934), produces an anomalous leapfrog arrangement involving the geographically intermediate subspecies *coryi* of Cayman Brac. While inspecting material of *Turdus plumbeus* in the Natural History Museum, Tring (NHMUK), GMK found five examples of *coryi* which proved to be the

TABLE 1

Biometric data (mean, standard deviation and range) for specimens in the National Museum of Natural History, Smithsonian Institution, Washington, DC, of *Turdus plumbeus eremita* and *T. p. rubripes*; all specimens used were labelled as males except USNM 111223, unsexed (but registered as male and within the mensural ranges of the labelled males). Measurements were taken with digital callipers accurate to 0.01 mm for bill (skull to tip), tarsus (tarsometatarsus from back of intertarsal joint to distal side of the joint-covering scute at the base of the longest toe), wing (curved), tail (from point of insertion to tip) and the extent of the black throat (from uppermost point on the lower chin to the lowest point on the upper breast).

	<i>n</i>	Bill	Tarsus	Wing	Tail	Throat
<i>T. p. eremita</i>	7	27.1 ± 0.9 26.1–28.9	36.4 ± 0.5 36–37	126.0 ± 3.5 120–129	114.0 ± 4.0 110–122	43.0 ± 3.6 38–49
<i>T. p. rubripes</i>	18	25.9 ± 1.5 22.5–27.3	36.5 ± 2.1 29–38	123.0 ± 4.1 114–128	111.0 ± 4.7 103–118	32.9 ± 3.9 25–40



Figure 1. Two randomly selected specimens of *Turdus plumbeus eremita* (left) and *T. p. rubripes* (right) in the National Museum of Natural History, Smithsonian Institution, Washington, DC, showing the slightly larger black area on the throat of *eremita* (N. J. Collar)

specimens used by Sharpe (1902) to describe the taxon¹, but which had gone unnoticed by Warren & Harrison (1971). Alongside specimens of *rubripes*, these five birds stand out by their larger bills (three adult males average 30.2 mm; cf. Table 1) and darker but more restricted cinnamon-chestnut bellies. Both these characters were noted by Ridgway (1907), and the belly difference was reported by Sharpe (1902), but other proffered diagnostic features are arguable and need a greater sample size. Nevertheless, the evident validity of *coryi* inevitably diminishes the likelihood that birds on the Swan Islands were conspecific with birds on Cuba. Moreover, animal endemism in the Swan Islands is seemingly well established, involving a hutia *Geocapromys thoracatus* (IUCN status Extinct: Turvey & Helgen 2018), a snake *Cubophis brooksi* (Critically Endangered: Townsend 2021), a gecko

¹ Sharpe (1902: 214) described 'Cory's Grey Thrush' from 'three adults and one young bird' sent to F. D. Godman by C. B. Cory and 'collected by Mr. C. J. Maynard'. However, the *Tring coryi* comprise five specimens, four adults (one with perhaps some very slight traces of immaturity on the crown and nape) and one young individual, of which the last was collected by C. P. Streator on 4 August 1888, not by Maynard, who was responsible for acquiring the other four in early April of the same year. (Bradley 2000: 20 reported Streator's dates in Cayman as 6 June to 3 August 1888, but his thrush is clearly dated 4th.) All were accessioned together, being registered as [NHMUK] 1891.1.25.21–25. That Sharpe had access to Streator's specimen is clearly evidenced by his mentioning features unique to it among the *Tring* series: 'triangular spots of orange at the end of the wing-coverts; the black throat-patch of the adults is represented by a mass of triangular black spots, extending to the base of the chin...the grey feathers of the underparts have black bars at the ends with a subterminal wash of cinnamon' (Figs. 2–3). In light of any evidence to the contrary, we consider that the most likely reason for the discrepancy in the number of specimens is a mere slip of the pen on Sharpe's part, and that all five individuals should be treated as syntypes of *Mimocichla coryi*.



Figures 2–3. Syntypes of *Turdus plumbeus coryi* held at the Natural History Museum, Tring, in lateral and ventral views, from top to bottom and left to right, respectively, NHMUK 1891.1.25.21 (male), 1891.1.25.23 (male), 1891.1.25.25 (female), 1891.1.25.22 (male), and 1891.1.25.24 (immature male); all but the last-mentioned specimen (collected by C. P. Streator on 4 August 1888) were taken by Charles J. Maynard between 3 and 9 April 1888 (G. M. Kirwan, © Trustees of the Natural History Museum, London)

Aristelliger nelsoni (Endangered: Townsend & Powell 2019), two lizards *Sphaerodactylus exsul* and *Norops nelsoni* (McCranie *et al.* 2017) and the Swan Islands Vitelline Warbler *Setophaga vitellina nelsoni* (Kirwan *et al.* 2019). These facts establish nothing, but they increase the plausibility of *eremita* being valid.

What caused the disappearance of the thrush from the Swan Islands must remain a matter of conjecture. The extinction and endangerment of the hutia and reptiles result from causes in the past half-century or so, whereas the thrush was uniquely recorded 136 years ago, in 1887. The only hints stem from an informal outline of the islands and their history by Weigel (1973). Occasional hurricanes, which he was unable to document before the 20th century, may have been pivotal. However, he also mentioned that a commercial guano company began operating in 1858, leading to 'large deposits of guano [being] mined from the island[s] in the late 1800's', and that in the early 1900s part of Great (or Big) Swan Island was leased for the planting of coconuts. Either or both of these enterprises might have impacted the wildlife of the islands, by removing areas of habitat or introducing alien species. The striking sex ratio bias towards males in the specimen sample (eight or nine of Townsend's original ten specimens were males and none was recorded as female; see above) reflects a common circumstance in declining and near-terminal insular populations, with two explanations potentially fitting the Swan Island case: first, greater female dispersal taking them into disadvantageous habitat if forest has been replaced by secondary formations, and, second, disproportionate predation of incubating females by alien predators (Donald 2007). Cats and rats are present now *vide* McCranie *et al.* (2017), but when they became established is not known. The fact that Townsend collected birds over a matter of months in 1887 (singles on 4, 17 and 19 February, four on 6 March, singles on 26 March, 14 April and 25 May: C. Milensky *in litt.* 2023, G. Mayr *in litt.* 2023) hints at their relative scarcity at the time.

Meanwhile, the loss of the taxon as a living entity has to be matched by the loss of its original name. *Nesocichla eremita* Gould, 1855, endemic to the Tristan da Cunha archipelago (Tristan da Cunha, Inaccessible and Nightingale Islands), was described on the basis of an adult collected by John MacGillivray (1821–67) during the voyage of *HMS Herald* in the second half of 1852 (Warren & Harrison 1971; [https://en.wikipedia.org/wiki/HMS_Herald_\(1824\)](https://en.wikipedia.org/wiki/HMS_Herald_(1824))). The holotype, NHMUK 1856.10.14.9, is held at the Natural History Museum, Tring (Warren & Harrison 1971). The genus *Nesocichla* Gould, 1855, was long maintained on the basis of its small rounded wings, large bill, and fairly long sturdy legs and feet (e.g., Rand 1955, Ripley 1964, Clement & Hathway 2000, Collar 2005), but multiple more recent genetic studies have agreed that the Tristan Thrush is nested within *Turdus* (Klicka *et al.* 2005, Voelker *et al.* 2007, Nylander *et al.* 2008), an arrangement which, like the subsuming of *Mimocichla*, is accepted by all the major global checklists of birds.

The current treatment of both *Nesocichla eremita* Gould, 1855, and *Mimocichla rubripes eremita* Ridgway, 1905, in *Turdus* results in an issue of secondary homonymy under which the latter, junior name is invalidated (ICZN 1999, Art. 53.3, 57.3, 59.1)². Because Ridgway's nomen lacks any junior synonyms it requires a new substitute name (Art. 60.3), which we expressly offer according to the provisions of Art. 13.1.3 and 16.1:

² An even earlier incarnation of *eremita* in this genus, *Turdus eremita* J. F. Gmelin, 1789, is now a synonym of *Monticola solitarius philippensis* (Seebohm 1881). In contrast to the case at the heart of this paper, *Turdus eremita* (Gould, 1855) should not be rejected in favour of Gmelin's nomen because these two names are no longer considered congeneric and secondary homonymy no longer exists (see Art. 59.2).

Turdus plumbeus perditus, nom. nov.

Etymology.—The new name is a reference to the taxon's evident extinction. The Latin *perditus* meaning lost or abandoned is derived from *perdere* to lose and is masculine, in agreement with the genus name (Art. 31.2).

Holotype.—This is the same as for Ridgway's original nomen (Recommendation 60A), namely the adult male collected on 4 February 1887 by C. H. Townsend at the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM 111219).

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Two new bird species for Bolivia

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SUMMARY.—We report two new species for Bolivia: Biscutate Swift *Streptoprocne biscutata* and Buckley's Forest Falcon *Micrastur buckleyi*, which brings the total number of birds known in Bolivia to 1,449. Additionally, we documented the first individuals of the 'caraguata' morph of Dark-throated Seedeater *Sporophila ruficollis*, indicating that it spends its non-breeding season in Bolivia, alongside typical *S. ruficollis*.

In recent decades, there has been a dramatic increase in knowledge of the Bolivian avifauna, progress reflected in the significant rise in the number of species known in the country between 1989 (1,274) (Remsen & Traylor 1989) and 2003 (1,398) (Hennessey *et al.* 2003). By 2016, 1,437 species had been registered (Herzog *et al.* 2016). Four years later, following such additions as Laughing Gull *Leucophaeus atricilla* (Brady *et al.* 2019), Common Ground Dove *Columbina passerina* and South American Painted Snipe *Nycticryphes semicollaris* (Aponte *et al.* 2022), and the description of Inti Tanager *Heliothraupis oneilli* to science (Lane *et al.* 2021), the number had reached 1,446 (Herzog 2021). Here, we present three new bird records (two species and one colour morph) for Bolivia, from dptos. Beni and Santa Cruz.

BISCUTATE SWIFT *Streptoprocne biscutata*

Found in eastern Brazil and northern Argentina, with one record in eastern Paraguay (Capper *et al.* 2001, Pearman *et al.* 2010, Pearman 2012, Bowe 2020), the species frequents waterfalls and caves for roosting and nesting, but forages over tropical evergreen and deciduous forests, mountainous areas, and scrublands (Chantler 2000, Pichorim 2002, Bowe 2020).

On 5 January 2023, GAP & CR observed three *S. biscutata* on the ground (Fig. 1) inside a humid cave in Reserva de Vida Silvestre Tucabaca, Santa Cruz (18°20'46.32"S, 59°33'2.01"W; 835 m), c.250 m from the rock paintings of Miserendino cave, with pools on the ground and a small amount of water falling from the ceiling. Another, dead, individual was nearby. Abundant excrement, probably from bats and the swifts, was visible inside the cave. Subsequently, on 21 March 2023, c.20 swifts were seen exiting the same cave (RSMS). Tucabaca protects a portion of Chiquitano Dry Forest, as well as *cerrado* vegetation with many endemic and threatened plant species. Near the cave is a waterfall with permanent water year-round. The area supports tree ferns of the genus *Cyathea*, abundant Myrtaceae, terrestrial ferns, and mosses.

Our photographs match Biscutate Swift *Streptoprocne biscutata*, particularly the 'white patch on the nape and chest, forming a broken white collar around its neck', which is the main characteristic differentiating it from the similar and partially sympatric White-collared Swift *S. zonaris* (Kirwan 2007). Our records are 510 km south-west of the nearest documented site in Brazil (E. Pennington *et al.*, <https://ebird.org/checklist/S120438283>), and thus the westernmost record ever, as well as the first in Bolivia. The area appears



Figure 1. Biscutate Swift *Streptoprocne biscutata*, Santiago de Chiquitos, Santa Cruz, Bolivia, January 2023; the first documented record for Bolivia (Germaine Alexander Parada)

very suitable for the species, but further work is needed to confirm or deny its regular presence there.

BUCKLEY'S FOREST FALCON *Micrastur buckleyi*

Locally common in far western Brazil, Amazonian Ecuador and Peru, with a single record in south-east Colombia (Hilty & Brown 1986, Whittaker 2001, Bierregaard *et al.* 2020), the species is present mainly in lowland forests, although it has been recorded up to 1,800 m in Ecuador (Robbins *et al.* 1987, Solano-Ugalde & Real-Jibaja 2010) and 1,350 m in Peru (Schulenberg *et al.* 2007). *M. buckleyi* is morphologically similar to Collared Forest Falcon *M. semitorquatus*, but has proportionately longer wings and a smaller bill (Whittaker 2001).

On 31 October 2022, MAM recorded a *M. buckleyi* in the Área Protegida y Reserva Natural Aquicuana (10°51'39.63"S, 65°58'24.15"W; 140 m), Beni. Initially, a *Micrastur* was heard giving a three-note song, which was recorded using the Birdnet app (Fig. 2). After three minutes, playback was used and the bird responded by flying into view and moving between trees (Fig. 3), before it eventually disappeared. The original recording was deposited on Xeno-canto (<https://xeno-canto.org/782173>), but was subsequently resampled using the Raven programme and the edited recording (volume increased and insect sounds removed) was deposited in Macaulay Library (<https://macaulaylibrary.org/asset/538470551>). It was made in a narrow strip of flooded forest on the alluvial plain of a white-water river adjoining flooded forest of white stagnant waters (Navarro 2011).

MAM's recording involves a territorial call, identical to that described by Whittaker (2001), typically consisting of two (EEOK, OOW) or three loud notes (EEOK, OOW, ... AW) (Fig. 2). This vocalisation is the easiest means of differentiating *M. buckleyi* from *M. semitorquatus* (Whittaker 2001, Schulenberg *et al.* 2007). This is the first record in Bolivia, c.390 km from documented records in Peru (F. Schneider, <https://ebird.org/checklist/S59580879>; A. Wiebe, <https://ebird.org/checklist/S48351775>). Possibly, the species will be

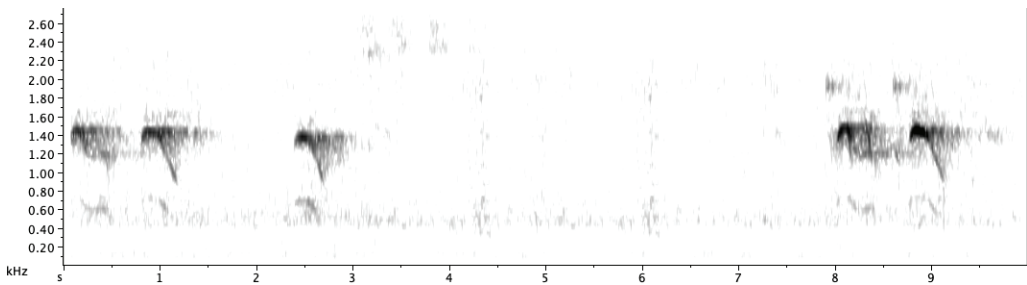


Figure 2. Sonogram of Buckley's Forest Falcon *Micrastur buckleyi*, with territorial song of three notes in the first part and, at eight seconds, a territorial song of two notes (spacing natural).



Figure 3. Buckley's Forest Falcon *Micrastur buckleyi*, Área Protegida y Reserva Natural Aquicuana, near Riberalta, Beni, Bolivia, October 2022; the first documented record for Bolivia (Pia Handke)

found at other sites in Bolivia, e.g., in dpto. Pando, as the species is easily overlooked except when vocalising.

DARK-THROATED SEEDEATER *Sporophila ruficollis* 'caraguata' morph

S. ruficollis is distinguished from other *Sporophila* in Bolivia by the male's black throat and moderately distinctive female plumage (Herzog *et al.* 2016, Jaramillo 2020). However, a colour morph dubbed 'caraguata' was described from Corrientes and Entre Ríos in north-east Argentina, with a black throat and nape, otherwise grey head, reddish-brown back, rump and ventral patches, and blackish wings and tail (Areta *et al.* 2011). *S. ruficollis* breeds in northern Argentina, parts of southern Brazil, Paraguay, western Uruguay and extreme south-east Bolivia, but moves north and west as far as central Brazil in the non-breeding season (Jaramillo 2020). In Bolivia, the nominate subspecies has been seen in La Paz, Santa Cruz and Beni, where it is considered fairly common in flooded savanna, lowland swamps, *cerrado*, and natural and artificial grasslands (Herzog *et al.* 2016).



Figure 4. Male and female Dark-throated Seedeater *Sporophila ruficollis* 'caraguata' morph, near Riberalta, Beni, Bolivia, October 2022 (Miguel Montenegro-Avila).

On 30 October 2022 in a grassland (11°09'57.3"S, 65°45'47.7"W; 152 m) 36 km south-east of Riberalta, Beni, MAM recorded a large flock of *c.*300 *S. ruficollis*, some of which had a grey crown, black neck and rufous back (Fig. 4), matching the 'caraguata' morph. Due to the overall numbers of *Sporophila* present (including some Double-collared Seedeater *S. caerulescens*), the precise number of the 'caraguata' morph could not be established. The presence of this morph in October along with 'normal' individuals of *S. ruficollis* indicates that they spend the winter together, and also suggests that it is migratory, as this record is 2,500 km from the breeding areas in north-east Argentina (Areta *et al.* 2011).

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Evidence from citizen science and museum specimens suggests species rank for *Erythrogenys [erythrogenys] imberbis* (Salvadori, 1889), ‘Red-eyed Scimitar Babbler’

by Alex J. Berryman, Peter Boesman & N. J. Collar

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SUMMARY.—Rusty-cheeked Scimitar Babbler *Erythrogenys erythrogenys* (Vigors, 1832) comprises two subspecies in the Himalaya (nominate and *ferrugilata*) and two more, disjunctly (with Spot-breasted Scimitar Babbler *E. mccllellandi* interposing), in Myanmar and Thailand (*imberbis* and *celata*). Prompted by the observation that these two populations appear to exhibit differences in eye colour, we use citizen science data (343 online photographs and >100 sound-recordings) and 66 museum specimens to evaluate potential differences in bare-part and plumage colour, morphometrics and vocalisations. We find that Thai-Burmese birds are distinguished from their Himalayan counterparts by their red vs. white irides, dark vs. pale bills, browner ear-coverts, typically grey vs. whitish lores and the absence of a white submoustachial spot. They also less frequently have white flecks on the eye-rim and are, on average, less heavily streaked on the breast. Thai-Burmese birds are further characterised by their smaller size with significantly shorter wings and tail, and divergent voice of females in duet (a mellow *peew* and burry *prreew* vs. a staccato *pip!*). Cumulatively these multiple differences, fully consistent in iris colour, size and female voice, and highly indicative in other features, point to a more appropriate treatment of the Thai-Burmese birds as a species, Red-eyed Scimitar Babbler *Erythrogenys imberbis* (Salvadori, 1889).

Scimitar babblers (genera *Pomatorhinus*, *Melanocichla* and *Erythrogenys* in the family Timaliidae) form a clade of distinctive semi-terrestrial passerines confined to dense forest understorey and edge habitats in tropical Asia, from north-east Pakistan east to eastern China and south to the Indonesian archipelago as far as Bali, with an introduced population east of Wallace’s Line on Lombok (Winkler *et al.* 2015, del Hoyo & Collar 2016, Fjeldså *et al.* 2020). The genus *Erythrogenys* is now generally regarded (BirdLife International 2022, Clements *et al.* 2022, Gill *et al.* 2022) as comprising six species, Large *E. hypoleucos*, Rusty-cheeked *E. erythrogenys*, Spot-breasted *E. mccllellandi*, Black-streaked *E. gravivox*, Grey-sided *E. swinhoei* and Black-necklaced Scimitar Babblers *E. erythrocnemis*, the latter five allopecies discriminated primarily through morphological evidence (Collar 2006) but backed subsequently by as yet incomplete molecular study (Reddy & Moyle 2011, Dai *et al.* 2020). However, this arrangement contains an anomalous circumstance in which one of the species, *E. mccllellandi* of the north-eastern Indian subcontinent south to western Myanmar, is geographically interposed between Himalayan and Thai-Burmese populations of another, *E. erythrogenys* (Fig. 1). These two disjunct populations of *E. erythrogenys* each consist of two subspecies (*sensu* BirdLife International 2022), nominate *erythrogenys* in the western Himalaya with *ferrugilata* (including the sometime recognised *haringtoni*) in the central and eastern Himalaya, and *imberbis* in eastern Myanmar with *celata* in north-west Thailand.

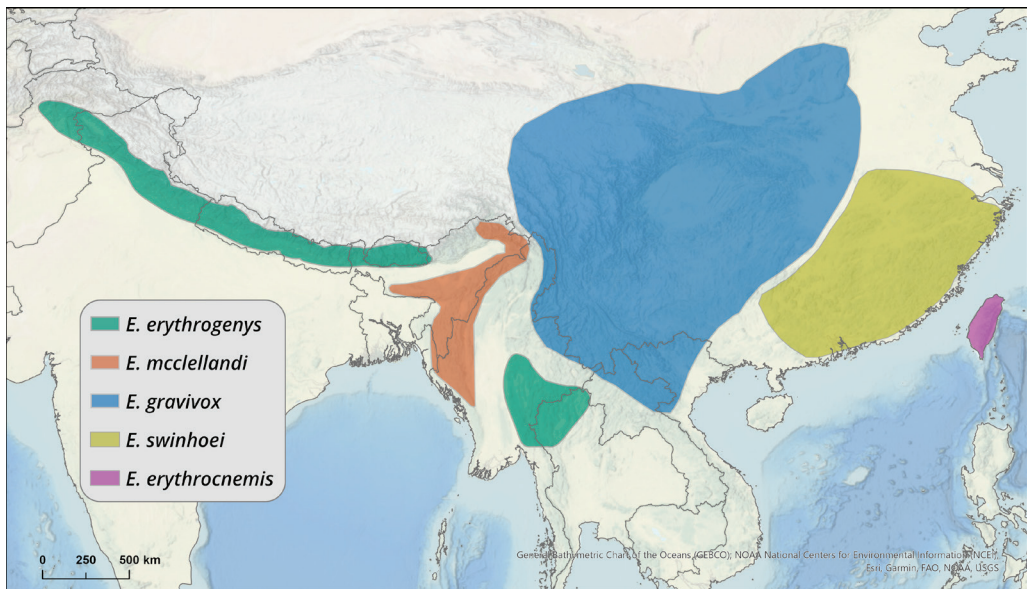


Figure 1. Distributions of five *Erythrogenys* species, at one time all considered conspecific, showing the interposition of *E. maclellandi* with respect to *E. erythrogenys*. Polygons are derived from maps provided by BirdLife International (2022), adapted to recent records (eBird 2023).

The circumstance in which subspecies of a species are distributed in a leapfrog pattern either side of a closely related species is unusual, and strongly suggests diverging evolutionary pathways that merit closer investigation. Nevertheless, the relationship between Himalayan *E. erythrogenys* and Thai-Burmese *E. erythrogenys* was not explored in the taxonomic revision of *Erythrogenys* by Collar (2006) and has not been since. However, appreciation that these two populations might differ more than previously realised was recently prompted by a review of photographs uploaded to the Macaulay Library (www.macaulaylibrary.org), which indicated a consistent difference in iris colour between Himalayan (white-eyed) and Thai-Burmese (red-eyed) birds. Further comparison quickly suggested other potentially significant morphological differences between these pairs of taxa, cumulatively implying a level of divergence too high to be compatible with the retention of the pairs, by whatever criteria, as conspecific. We therefore investigated the situation using as many lines of inquiry as were open to us, namely bare-part (eye and bill) colours, plumage patterns, morphometrics and vocalisations. This involved reference to publicly available photographs, museum specimens and sound-recordings.

Methods

Photographs.—An original sample of 1,345 photographs was downloaded from the Macaulay Library (= all photographs of *E. erythrogenys* uploaded by April 2023). One photograph was analysed from each labelled locality (selected as the first on the list acquired), thus eliminating the risk of duplication while maximising the geographic spread of birds included. This yielded a final sample of 343 images. Following an initial qualitative inspection of photographs, for each image the following was recorded: (1) iris colour; (2) presence of white flecks around the eye-rim (scored ‘absent’, ‘slight’ or ‘obvious’); (3) rear ear-covert colour; (4) lore colour; (5) presence of submoustachial spot; (6) presence of malar line; (7) breast streaking (scored ‘absent’, ‘slight’ or ‘obvious’); (8) bill colour (‘pale’ or ‘dark’). All images were analysed by a single author (AJB) to ensure consistency.

Museum specimens.—One of us (NJC) measured a total of 66 specimens (64 in NHMUK and two—both females of the subspecies *imberbis*, including the type—in MSNG; for museum acronyms see Acknowledgements). These broke down as 20 nominate *erythrogenys* (eight males, nine females, three unsexed) and 20 *ferrugilata* with *haringtoni* (five males, three females, 12 unsexed), representing 40 Himalayan individuals; and ten *imberbis* (five males, three females, two unsexed) and 16 labelled *celata* (two males, two females, 12 unsexed) although the subspecific identity of these birds is uncertain. The type localities of *imberbis* and *celata* are, respectively, Yado, Myanmar (Salvadori 1889), and Chiang Dao, Thailand (Deignan 1941), but it is unclear to us where the two taxa might meet or be divided. Of the 16 specimens labelled as *celata* at NHMUK, only eight are accompanied by a precise locality: either Kalaw, Mogok or Taunggyi. Without explanation, Deignan (1941) associated these localities with *celata* but suitable habitat in Kalaw is continuously linked to Yado (*imberbis*), thus introducing considerable confusion as to the identity of the NHMUK material. Moreover, the diagnosis of *celata* from *imberbis* relies principally on plumage tone (Deignan 1941), which to us appears inconstant in all taxa inspected. Given these uncertainties (including whether *celata* is a valid taxon at all—see Discussion), for all analysis we chose to combine *imberbis* and *celata* into a single Thai-Burmese entity.

Measurements were taken with digital callipers and involved bill from skull to tip, tarsus from the notch on the back of the intertarsal joint to distal base of longest toe, wing curved from carpal to tip, and tail from point of insertion to tip. The 40 Himalayan birds (20 *erythrogenys* and 20 *ferrugilata*; chosen randomly from a larger body of material) formed one sample for comparison and the 26 Thai-Burmese birds (representing all the available adult material of these taxa in the museums in question) formed the other. Student *t*-tests did not uncover statistically significant differences between sexes of either group. Consequently, and because a large proportion of the specimen material available to us was unsexed, we pooled male, female and unsexed birds in each sample.

Morphometric comparisons of Himalayan and Thai-Burmese populations were analysed using principal component analysis (PCA), and a PCA biplot was drawn using the ‘ggplot2’ package in R. For differences in individual biometric traits between populations we carried out Welch’s unpaired *t*-tests, applying a Bonferroni correction where the threshold for statistical significance is set at $p < 0.05/n_v$. The strength of differences was assessed using Cohen’s *d* statistic (see ‘Taxonomic evaluation’ below).

All specimens of *E. erythrogenys* at NHMUK (including those not measured) had their labels checked for iris colour annotation, of which 30 (25 Himalayan, five Thai-Burmese) possessed such data. For all 64 measured specimens at NHMUK, bill tone was also recorded.

Sound-recordings.—Rusty-cheeked Scimitar Babbler is a vocal species. The male’s song consists of typically 2–3 rich low-pitched whistles, often answered or preceded as a duet by the (presumed) female with a short single note (Roberts 1992), as in most other species in the genus. When agitated or alarmed, a grating chattered series is uttered (Ali & Ripley 1996). To evaluate these vocalisations, we accessed the sound-recordings available in the Macaulay Library (<https://www.macaulaylibrary.org/>) and Xeno-canto databases (<https://www.xeno-canto.org/>). We selected all relevant recordings from Nepal ($n = 12$), Bhutan ($n = 10$), Myanmar ($n = 3$) and Thailand ($n = 36$), and a subset ($n = 42$) of the best-quality recordings from India (see Appendix). One of us (PB) made sonograms of these using CoolEdit Pro (Blackman-Harris window at 1,024 band resolution for the sharpest image) and measured sound parameters manually using visual rulers for time and frequency on screen. Following qualitative assessment, six parameters were measured: duration and max. fundamental frequency of the female voice, total phrase duration, number of notes and max. fundamental frequency of the male song, and duration of the grating alarm notes.

Comparisons between Himalayan and Thai-Burmese populations were made using Welch's unpaired *t*-tests and Cohen's *d* statistic scoring as for biometric data.

Taxonomic evaluation.—As an aid to consistent taxonomic judgement, we used the system of scoring in Tobias *et al.* (2010), in which an exceptional character (radically different coloration, pattern, size or sound) scores 4, a major character (pronounced difference in body part colour or pattern, measurement or sound) 3, medium character (clear difference, e.g., a distinct hue rather than different colour) 2, and minor character (weak difference, e.g., a change in shade) 1; a threshold of 7 is set to allow species status, which cannot be triggered by minor characters alone, and only three plumage characters, two vocal characters, two non-covarying biometric characters (both these and vocal characters assessed for effect size using Cohen's *d* where 5–10 is major, 2–5 medium and 0.2–2 minor) and one behavioural or ecological character (allowed 1) may be counted.

Results

Eye colour.—In photographs, all Himalayan birds displayed pale irides, while all those from Thailand and Myanmar had dark red eyes (Table 1, Fig. 2). This pattern was mirrored by museum specimen labels: the irides of all Himalayan specimens ($n = 25$) for which the colour was noted were pale (variably 'pale straw yellow', 'pale yellow', 'yellowish white', etc.). Those of all Thai-Burmese specimens ($n = 5$, all from Myanmar) were variably crimson or dark brownish.

TABLE 1
Plumage and bare-part characters of birds in photographs ($n = 343$) of Rusty-cheeked Scimitar Babbler *Erythrogenys erythrogenys*, divided into Himalayan and Thai-Burmese populations. Values refer to percentages of photographs for which the character in question could be determined.

		% Himalayan ($n = 318$)	% Thai-Burmese ($n = 25$)
Iris colour	whitish	100	0
	dark red	0	100
Bill colour	pale	100	4
	dark	0	96
White eye spots around eye-rim	major	75	0
	minor	24	24
	absent	1	76
Rear ear-coverts	rufous/orange	100	0
	brownish orange	0	100
Lore colour	whitish	88	0
	pale grey	12	8
	grey/brownish grey	0	92
White submoustachial spot	present	100	4
	absent	0	96
Blackish malar line	present	100	28
	absent	0	72
Breast streaking	major	69	0
	minor	31	12
	absent	0	88



Figure 2. Comparison of Himalayan (left: © Yash Kothiala, ML 238443661) and Thai-Burmese (right: © Natthaphat Chotjuckdikul) Rusty-cheeked Scimitar Babblers *Erythrogenys erythrogenys*. Compared to Himalayan birds, the Thai-Burmese populations always exhibit a dark red iris, typically have a darker bill, browner ear-coverts, darker/greyer lores and less pronounced breast streaking and white eye-rim markings, and less frequently show a white submoustachial spot (not conspicuous on the Himalayan bird illustrated here) or a black malar line (see Table 1).

Bill colour.—In photographs, Himalayan birds were observed always to have a primarily pale straw-coloured bill (sometimes with a dark base, especially to the maxilla); in contrast, Thai-Burmese birds almost always (96%) had a dark grey bill, sometimes with a variably extensive pale tip. Among the 64 specimens measured at NHMUK, 33 of 40 Himalayan taxa had pale bills (seven could not be determined) while 20 of 24 Thai-Burmese taxa had dark bills (four indeterminate). Thus this material overwhelmingly supported the findings of the photographic research that the two populations exhibit differences in bill colour.

Plumage pattern.—Thai-Burmese birds exhibit a number of plumage differences from Himalayan ones, although there was often some variation (Table 1). Himalayan birds had a high propensity to exhibit white flecks on the eye-rim (99%), deep orange ear-coverts (100%), whitish to pale grey lores (100%), a white submoustachial spot (99%), a blackish malar line (100%) and some form of breast streaking (100%: 69% obvious, 31% slight). Conversely, Thai-Burmese birds infrequently showed white marks around the eye (24%: always slight), always had brownish-orange ear-coverts (100%) and rarely exhibited pale lores (8%), a white submoustachial spot (4%) or—hence Salvadori's (1889) name *imberbis* ('unbearded')—a blackish malar line (28%). Where they showed breast streaking (12%), it was always slight.

Morphometrics.—Himalayan birds were larger than Thai-Burmese birds in all variables measured (Table 2). The differences were most notable in wing and tail, where effect sizes of, respectively, 2.71 and 2.2 were recorded; both these values fall in the 'medium difference' classification of Tobias *et al.* (2010), and either of them triggers a score of 2. The PCA plot for morphometric data clearly separates Thai-Burmese birds from Himalayan ones along PC1, which accounted for 68.9% of variance (Fig. 3), while *erythrogenys* and *ferrugilata* were barely distinguished and did not differ statistically in any biometric parameter.

Vocalisations.—Recordings of duets in the Himalayan and Thai-Burmese populations were respectively 50% and 300% more frequent than male song alone. Female voice in both populations was only rarely recorded alone. The most conspicuous bioacoustic difference between Himalayan and Thai-Burmese populations is observed in the female vocalisation: in Himalayan birds, her contribution to the duet always consists of a stereotyped short emphatic staccato *pip!* (also transcribed as *kip* or *quip*: Ali & Ripley 1996) whereas Thai-

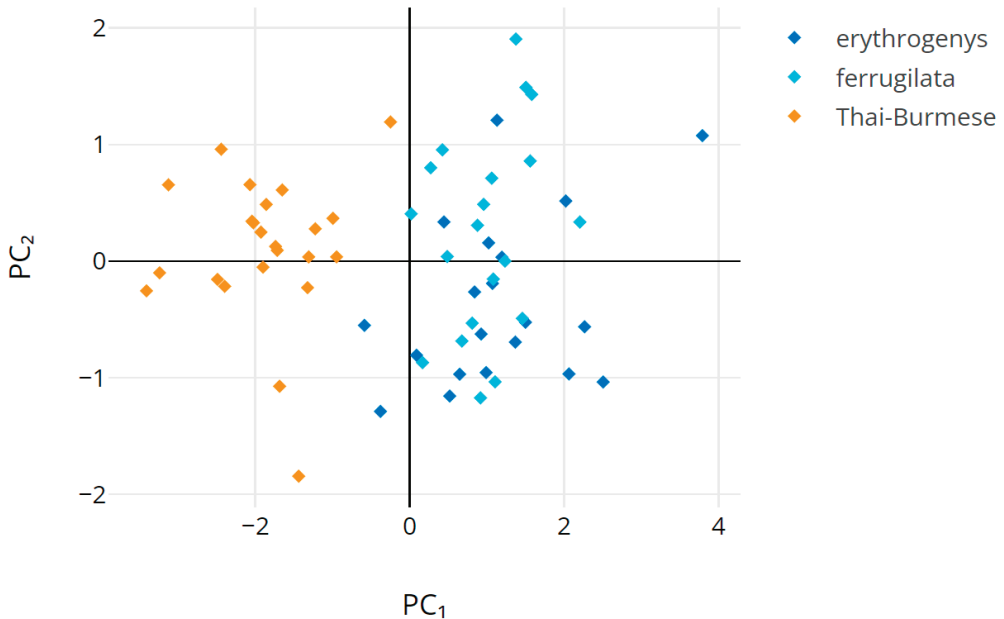


Figure 3. Principal component analysis (PCA) biplot for all morphometric parameters (length of bill, tarsus, wing and tail) showing differences in Himalayan (*erythrogenys* + *ferrugilata*) and Thai-Burmese (*imberbis/celata*) populations of Rusty-cheeked Scimitar Babbler *Erythrogenys erythrogenys*.

TABLE 2

Morphometrics of Rusty-cheeked Scimitar Babbler *Erythrogenys erythrogenys* comparing Himalayan nominate plus *ferrugilata* (including *haringtoni*) with Thai-Burmese *imberbis/celata*. See text for inclusion of *haringtoni* in *ferrugilata* and discussion on *celata*. Values in **bold** represent the mean of each character with standard deviation; parenthetic values are the range. All measurements in mm. ¹ = sample size 24, ² = sample size 25.

* Statistical significance at the threshold of <0.01 using Welch’s unpaired *t*-tests.

	Bill	Tarsus	Wing	Tail
<i>erythrogenys</i> (n = 20)	35.9 ± 2.1 (33–41)	37.4 ± 1.4 (35–41)	95.6 ± 3.8 (90–105)	104 ± 3.8 (96–108)
<i>ferrugilata</i> (n = 20)	35.7 ± 1.6 (34–39)	35.8 ± 0.9 (34–37)	93.1 ± 2.9 (88–98)	99 ± 3.9 (92–107)
Himalayan (<i>erythrogenys</i> + <i>ferrugilata</i>) (n = 40)	35.8 ± 1.9 (33–41)	36.6 ± 1.5 (34–41)	94.3 ± 3.7 (88–105)	101.4 ± 4.6 (92–108)
Thai-Burmese (<i>imberbis/celata</i> ; n = 26)	33.5 ± 1.4¹ (31–36)	35.2 ± 1.4² (32–38)	85.3 ± 3.0² (79–91)	91.1 ± 4.7¹ (82–100)
Himalayan vs. Thai-Burmese effect scores (Cohen’s <i>d</i>)	1.37*	0.95*	2.71*	2.20*

Burmese birds always emit one of two longer notes: a mellow *peew* or a very burry overslurred *prreeew* (also transcribed *creee*: Smythies 1986) (see Fig. 4). The Himalayan note is much shorter in duration than either Thai-Burmese vocalisation (effect size 5.29, Tobias score 3) and its max. frequency averages slightly higher, albeit with overlap (effect size 1.56, Tobias score 1; Table 3).

Male song in the two populations is very similar, but Thai-Burmese birds may exclusively sing one- or two-note songs (mean 1.90, median 2; n = 29) while Himalayan birds often sing longer, more modulated notes which sound disyllabic and quite often break up into three



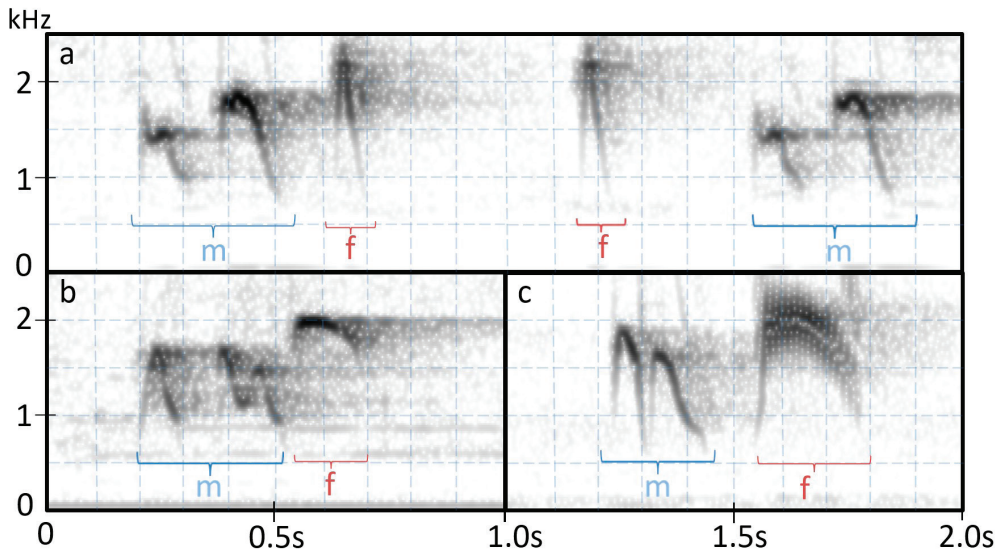


Figure 4. Sonograms of duets of Rusty-cheeked Scimitar Babbler *Erythrogenys erythrogenys* (m = male, f = female). a: Duet with female *pip!*, XC 472968, northern India, P. Boesman, b: Duet with female *peew*, XC 460633, Myanmar, T. Luijendijk, c: Duet with female *prreeew*, ML 51965381, Thailand, I. Davies.

TABLE 3

Measurements of sound parameters of Rusty-cheeked Scimitar Babbler *Erythrogenys erythrogenys*: note duration and max. fundamental frequency of female voice, phrase duration and max. fundamental frequency of male song. Calculation of effect sizes between the two populations for selected parameters. †Frequency of this vocalisation difficult to assess. * Statistical significance at the threshold of <0.01 using Welch’s unpaired *t*-tests.

		Range	Mean ± SD	Effect size	
Females	Note duration (seconds)	Himalayan <i>pip</i> (<i>n</i> = 33)	0.04–0.08	0.055 ± 0.012	–
		Thai-Burmese <i>peew</i> (<i>n</i> = 15)	0.16–0.22	0.187 ± 0.023	7.19 (<i>pip</i> vs. <i>peew</i>)*
		Thai-Burmese <i>prreeew</i> (<i>n</i> = 10)	0.15–0.30	0.230 ± 0.042	5.67 (<i>pip</i> vs. <i>prreeew</i>)*
		Thai-Burmese all (<i>n</i> = 25)	0.15–0.30	0.204 ± 0.038	5.29 (<i>pip</i> vs. both)*
	Max. frequency (Hz)	Himalayan <i>pip</i>	1,950–2,600	2,258 ± 161	–
Males	Phrase duration (seconds)	Thai-Burmese <i>peew</i>	1,900–2,200	2,051 ± 96	1.56 (<i>pip</i> vs. <i>peew</i>)*
		Thai-Burmese <i>prreeew</i> †	1,400–2,000	1,595 ± 281	2.90 (<i>pip</i> vs. <i>prreeew</i>)*
		Thai-Burmese all	1,400–2,200	1,868 ± 295	1.64 (<i>pip</i> vs. both)*
		Himalayan (<i>n</i> = 51)	0.17–0.51	0.302 ± 0.065	–
	Max. frequency (Hz)	Thai-Burmese (<i>n</i> = 29)	0.14–0.36	0.268 ± 0.058	0.47
Males	Max. frequency (Hz)	Himalayan	1,600–2,150	1,839 ± 132	–
		Thai-Burmese	1,750–2,380	2,023 ± 175	1.18

notes (mean 2.2, median 2, *n* = 51). As a result, phrase duration in Himalayan songs averages higher, and their max. frequency is seemingly also lower pitched (see Table 3). There exists, however, considerable overlap between the two populations and in no parameter of male song were the differences between the two populations statistically significant.



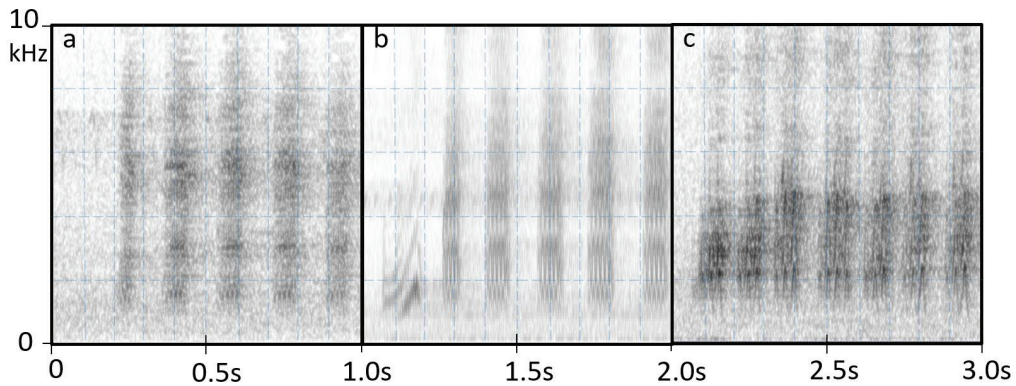


Figure 5. Sonograms of chatter call (first second) of Rusty-cheeked Scimitar Babbler *Erythrogenys erythrogenys*. a: Typical chatter call, XC 472969, northern India, P. Boesman, b: Chatter call with mellow introductory note, ML 543543, northern India, M. Medler, c. More grating chatter call with coarser oscillations, XC 348254, Thailand, G. Irving.

The chatter call notes of both populations are very similar with no difference in duration, but in Himalayan birds they may be more often introduced by a mellow rising note, and in Thai-Burmese birds they often sound more grating (reflected on sonograms by more articulated oscillations in all notes when zooming in) (Fig. 5).

Discussion

Using a combination of citizen science and museum datasets, we find divergence in several characters between Himalayan and Thai-Burmese populations of Rusty-cheeked Scimitar Babbler. Some of these differences have previously been noticed and illustrated, albeit without explicit taxonomic recommendation. For example, Lekagul & Round (1991), Robson (2002) and Treesucon & Limparungpatthanakij (2018) all illustrate (Thai-Burmese) Rusty-cheeked Scimitar Babbler with a brown or dark red iris, while Ali & Ripley (1983), Kazmierczak (2000), Rasmussen & Anderton (2005) and Grimmett *et al.* (2011) all show (Himalayan) birds with pale eyes. Similarly, Rasmussen & Anderton (2005) refer to the bill of Himalayan birds as ‘whitish-horn’ while Lekagul & Round (1991) described the bill of Thai birds as ‘brown’. However, some of the other differences outlined herein appear to have gone unnoticed in the literature, with illustrations in regional works exhibiting several inaccuracies. For example, Grimmett *et al.* (2011) showed (Himalayan) Rusty-cheeked Scimitar Babbler without white eye-rim markings or a pale submoustachial spot, despite virtually all (99% and 100% respectively) adults from this region exhibiting these features.

Among babblers in general, and *E. erythrogenys* in particular, duetting has been associated with pair-bonding and joint territorial defence (Collar & Robson 2007), so differences in duets between populations can be expected to be of taxonomic relevance. Indeed, the point was made in a brief but astute note by Rasmussen & Anderton (2005), who remarked that ‘female-type song-notes in N Thailand [are] longer than in Himalayas, and do not support conspecificity of all unspotted forms [i.e., of *E. erythrogenys*] to the exclusion of all spot-breasted forms [i.e., *E. erythrocnemis*]’. Here we validate that observation with more detailed analysis, and confirm the significant difference in the female-type contribution to the duet song of paired birds. Apparent differences in male song (in particular longer three-note songs being apparently confined to Himalayan birds) and chatter call require confirmation, with the (few) sound parameters measured here finding only minor (and statistically non-significant) divergence. Meanwhile, the existence of two clearly different

variants of the female song in the Thai-Burmese population (vs. a single one in the Himalayan population) is intriguing and also needs further study; it is unclear if these are linked to specific behavioural functions.

Reviewing the characters that distinguish Thai-Burmese from Himalayan populations of Rusty-cheeked Scimitar Babbler, using what has been called the ‘seven-point system’ in Tobias *et al.* (2010), we itemise the red vs. white iris (major difference, score 3); dark vs. pale bill (medium difference, score 2); near-complete absence vs. entirely consistent presence of a whitish submoustachial spot combined with greyish vs. white lores (medium, 2); smaller size (medium, 2); and vocal differences (one major, one minor, together 4), yielding a total score of 13, almost twice the number of points required to reach species rank. Under any system used to adjudicate taxonomic cases, we suggest that the differences in morphology and bioacoustics enumerated here are incompatible with Himalayan and Thai-Burmese populations of Rusty-cheeked Scimitar Babbler remaining conspecific. We therefore propose it be divided into two species as: (1) Himalayan Scimitar Babbler *E. erythrogegens* (Vigors, 1832) (including *ferrugilata*) and (2) Red-eyed Scimitar Babbler *E. imberbis* (Salvadori, 1889) (including *celata*, if recognised). Deignan (1941) diagnosed *celata* as distinct from *imberbis* by virtue of its paler orange plumage tone, darker grey lores, and red eye. This last distinction was based on the testimony of Baker (1922), who mistakenly asserted that ‘all [other] races of *erythrogegens* have the iris [pale]’; but, as noted above, all birds sampled from photographs and museum specimens in Myanmar (including many close to the type locality of *imberbis*) had not only red eyes but also grey lores (the latter feature somewhat variable: see Table 1), leaving only the paler plumage tone as diagnostic. However, in our experience this tone is variable in all Rusty-cheeked taxa, with birds generally becoming paler west to east, but with substantial overlap such that no individual can be reliably diagnosed on this feature alone. In the absence of clarity on the distributional limits of *celata*, and without Deignan’s original specimen material to hand, we stop short of recommending *celata* be synonymised with *imberbis*, but speculate that future work (including genetic investigation) may conclude that Red-eyed Scimitar Babbler is best considered monotypic.

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Appendix. List of recordings used for the sound analysis. Identification numbers per country (c = chatter, d = duet, f = female voice, m = male song)

Himalayan group: Bhutan: ML 164505 (m), ML 174685 (m), ML 204016331 (f), ML 227094321 (d), ML 484599531 (d), ML 485241321 (m), XC 115624 (c), XC 115626 (m), XC 6123229 (d), XC 64073 (m). **India:** ML 151370671 (d), ML 151374041 (d), ML 161779341 (m), ML 169430 (d), ML 173123471 (m), ML 173279491 (m), ML 173279491 (c), ML 175833481 (m), ML 290309421 (d), ML 313237731 (m), ML 326684801 (d), ML 326709951 (d), ML 387980761 (m), ML 492685641 (d), ML 550211361 (d), XC 105591 (d), XC 114403 (c), XC 115256 (d), XC 191156 (d), XC 191159 (m), XC 236796 (m), XC 320020 (d), XC 390039 (d), XC 407627 (d), XC 441161 (d), XC 472966 (d), XC 472667 (d), XC 472968 (d), XC 472969 (c), XC 506859 (d), XC 506910 (m), XC 511777 (d), XC 536009 (m), XC 547539 (d), XC 582843 (c), XC 585408 (m), XC 590263 (m), XC 70909 (c), XC 714355 (m), XC 743404 (f). **Nepal:** ML 448303741 (d), ML 448303981 (c), ML 484614411 (d), ML 507339691 (d), ML 515555001 (c), ML 522145281 (m), ML 529728451 (d), ML 545716971 (m), XC 488783 (c), XC 581887 (d), XC 777470 (d).

Thai-Burmese group: Myanmar: XC 460633 (d), XC 89838 (f). **Thailand:** ML 145648831 (d), ML 183107 (m), ML 183162 (c), ML 337659191 (c), ML 400312861 (m), ML 51965401 (d), ML 53421561 (d), ML 53421591 (f), ML 559419471 (d), XC 166413 (m), XC 189161 (d), XC 19847 (c), XC 209862 (c), XC 295201 (d), XC 295202 (d), XC 306810 (d), XC 306811 (m), XC 328309 (c), XC 348254 (c), XC 357472 (m), XC 464385 (d), XC 464540 (d), XC 531608 (m), XC 612258 (d), XC 625859 (c), XC 655653 (d), XC 696269 (d), XC 792466 (d).

Additional breeding data for Ceará Gnateater *Conopophaga cearae*, with a review of the breeding biology of the Conopophagidae

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SUMMARY. — We present data on the breeding biology of Ceará Gnateater *Conopophaga cearae* obtained during field work in the Serra de Baturité region, Ceará, Brazil, between 2017 and 2023: five nests, nine eggs, one nestling, one fledgling and a broken-wing display were documented. We also searched for specimens in two Brazilian ornithological collections, which resulted in an additional nest, two eggs and five specimens with evidence of breeding condition. Finally, we review available breeding data for the Conopophagidae, revealing that breeding biology information for the family is largely confined to two of the 11 currently recognised species.

The Conopophagidae is a small family of Neotropical birds that comprises two genera, *Pittasoma* and *Conopophaga*, and 11 species (Remsen *et al.* 2023) that inhabit the forest understorey from Costa Rica to northern Argentina (Greeney 2018, Winkler *et al.* 2020). The shared history between these genera is supported by molecular analysis (Rice 2005a,b, Moyle *et al.* 2009, Ohlson *et al.* 2013, Harvey *et al.* 2020), as well as similarities in morphology, bioacoustics and aspects of breeding (Rice 2005b).

In common with many bird taxa in the Neotropics, the breeding biology of the Conopophagidae is poorly known (Xiao *et al.* 2017, Greeney 2018) despite that basic information (e.g., nest and egg descriptions) exists for almost all species (Whitney 2003, Greeney 2018, del Hoyo *et al.* 2020, Lizarazo & Londoño 2022, Pereira *et al.* 2022). Recent studies have contributed by adding new data or improving existing information for the breeding biology of some of the family (e.g., Studer *et al.* 2019, Bodrati & Di Sallo 2020, Lizarazo & Londoño 2022, Pereira *et al.* 2022, Alarcón *et al.* 2023), although there are still many knowledge gaps, especially for the restricted-range species. Ceará Gnateater *Conopophaga cearae* represents one such gap, as there is, for example, no formal descriptions of the nest, eggs, nestling or fledgling (Greeney 2018, del Hoyo *et al.* 2020, Pereira *et al.* 2022). Formerly considered a subspecies of Rufous Gnateater *C. lineata* (Whitney 2003, Batalha-Filho *et al.* 2014), it is endemic to north-east Brazil, where it occurs in several disjunct populations, in northern Ceará (type locality, Serra de Baturité), Rio Grande do Norte, Alagoas and north-central Bahia (Chapada Diamantina), generally in humid regions and montane forests (*Brejos de altitude*) (Greeney 2018). Habitat loss and isolation of its populations are major threats to this species, which in Brazil is currently treated as Endangered (EN), with an Area of Occupancy estimated at just 144 km² (ICMBio 2018). Only recently its global conservation status was reclassified from Least Concern to Near Threatened (BirdLife International 2022), and it is listed as EN for the state of Ceará (Ceará 2022). This underscores the urgent need for life history data for this threatened and still poorly known endemic.

We provide the first descriptions of the nest, eggs, nestling, fledgling and 'broken-wing' distraction display for *C. cearae*. In addition, we present an updated review of the breeding biology of the Conopophagidae, to reflect what is known and to highlight characteristics shared between species.

Methods

All nests, eggs and young (nestling and fledgling) described here were found in the Serra de Baturité, Guaramiranga and Pacoti municipalities, Ceará, Brazil. The Serra de Baturité is an enclave of evergreen, montane forest within the semi-arid Caatinga biome. It encompasses approximately 20,000 ha of forest remnants (Bencke *et al.* 2006), with elevation averaging between 600 and 800 m but reaching 1,115 m at Pico Alto (Pinheiro & Silva 2017). The region is considered an Important Bird Area (IBA CE03) under BirdLife International criteria and one of the most biodiverse areas in north-east Brazil. It harbours both Amazonian and Atlantic Forest species, as well as endemics and endangered taxa (Bencke *et al.* 2006, Albano & Girão 2008).

We obtained data on active nests of *C. cearae* in the field, and searched for additional material (nests, eggs, young, or adults with gonad or brood-patch data recorded on the tags) in two Brazilian ornithological collections: Museu de História Natural do Ceará Prof. Dias da Rocha, Universidade Estadual do Ceará, Pacoti (MHNCE) and Museu Nacional, Universidade Federal do Rio de Janeiro (MN). Following Crozariol *et al.* (2016), for specimens without gonadal measurements, the representations (drawings) of the gonads on their labels were measured using callipers accurate to 0.01 mm.

Species taxonomy follows Greeney (2018) for nomenclature and distribution, which was used also to identify *C. cearae* specimens at MN that were still labelled *C. lineata*. Nests were classified according to Simon & Pacheco (2005) and the coloration of two eggs was compared to a standard colour guide (Smithe 1975). Some nests and eggs could not be measured or followed in the field, but one nest was collected, after it was abandoned by the adults, and is now at MHNCE.

To review breeding biology of the Conopophagidae, we searched Google Scholar, Scielo, Biodiversity Heritage Library and Web of Science using the keywords 'description', 'nest', 'eggs', 'nestlings', 'fledglings', 'incubation', 'breeding', 'gnateater', 'antpitta', 'Conopophaga' and 'Pittasoma' in English and Portuguese. We also searched specialised literature (e.g., Sick 1997, Whitney 2003, Greeney 2018, Winkler *et al.* 2020). Data were organised in six categories: (i) breeding period; (ii) nest architecture; (iii) eggs, clutch size and incubation period; (iv) nestling, fledgling and parental care; (v) reproductive success; and (vi) mating system. To better compare nests and eggs between genera, photographs of a Black-crowned Antpitta *Pittasoma michleri* nest and eggs at the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM) were obtained. These specimens constitute the main breeding data available for *Pittasoma*, but images of the nest and eggs were not presented in the original description (Wetmore 1972) and other sources that analysed this material (e.g., Greeney 2018). To compare measurements between species, we calculated the mean, standard deviation, range and sample size in R (R Core Team 2022). For each measurement, the respective sample included the values from each study; averages, isolated values presented separately for each object, or total ranges. For elliptical / oblong nests, in which diameters (internal and external) are usually measured at two perpendicular angles, we calculated the mean of these two values for the sample. Measurements are summarised in Table 1, and the data and scripts used are available for download at <https://github.com/OdilonVieira/conopophagidaeNesting>.

TABLE 1

Clutches and measurements of nests and eggs for some Conopophagidae spp.: ED = external diameter (mm); ID = internal diameter (mm); H = height (mm); D = depth (mm); HAG = height above ground (cm); L = length (mm); W = width (mm); FW = fresh weight (g); CS = clutch size (mean). Notation: mean (\pm standard deviation, range, sample size). Sources: 1 = Nehrkom (1899), 2 = von Ihering (1900), 3 = Oates & Reid (1903), 4 = Velho (1932), 5 = Frisch & Frisch (1964), 6 = Schönwetter (1967), 7 = Kreuger (1968 *apud* Greeney 2018), 8 = Wetmore (1972), 9 = Hilty (1975), 10 = Willis *et al.* (1983), 11 = Fraga & Narosky (1985), 12 = Straube (1989), 13 = Begazo & Valqui (1998), 14 = Alves *et al.* (2002), 15 = Dreyer (2002), 16 = Hillman & Hogan (2002), 17 = Whitney & Aponte (2006), 19 = Marini *et al.* (2007), 20 = Lima & Roper (2009), 21 = Leite *et al.* (2012), 22 = Lopes *et al.* (2013), 23 = Maurício *et al.* (2014), 25 = Stenzel & Souza (2014), 26 = Greeney (2018), 27 = Studer *et al.* (2019), 28 = Bodrati & Di Sallo (2020), 29 = Lizarazo & Londoño (2022), 30 = Pereira *et al.* (2022), 31 = Alarcón *et al.* (2023). (*) estimated by Greeney (2018). (**) statistics taken from source.

Species	Nest cup					Eggs				Source
	ED	ID	H	D	HAG	L	W	FW	CS	
<i>P. michleri</i>	200-240* (n = 1)	90 (n = 1)	-	60* (n = 1)	100 (n = 1)	31.75 (\pm 0.64, 31.3-32.2, n = 2)	23.25 (\pm 0.35, 23.0-23.5, n = 2)	-	2 (n = 1)	8, 26
<i>C. melanops</i>	123 (\pm 18.38, 110-136, n = 2)	64.53 (\pm 13.88, 55-85, n = 4)	83.67 (\pm 17.62, 65-100, n = 3)	43.2 (\pm 5.06, 37.8-50.0, n = 4)	87.84 (\pm 69.36, 20-265, n = 10)	22.24 (\pm 0.78, 21.0-23.1, n = 8)	17.05 (\pm 0.21, 16.8-17.5, n = 8)	3.4 (\pm 0.16, 3.21-3.6, n = 4)	1.99 (\pm 0.09, 1-2, n = 137)	2, 6, 12, 14, 17, 20, 25, 27
<i>C. aurita</i>	123 (n = 1)	66.5 (\pm 12.02, 58-75, n = 2)	96 (n = 1)	30 (\pm 2.83, 28-32, n = 2)	68 (\pm 16.97, 56-80, n = 2)	22.55 (\pm 0.49, 22.2-22.9, n = 2)	17.5 (n = 2)	-	1.5 (\pm 0.71, 1-2, n = 2)	17, 21
<i>C. peruviana</i>	89.12 (\pm 15.84, 68.0-102.5, n = 4)	59.38 (\pm 3.54, 55.0-62.5, n = 4)	65.67 (\pm 4.04, 62-70, n = 3)	38 (\pm 2.45, 35-40, n = 4)	52.5 (\pm 20.83, 30-84, n = 6)	21.14 (\pm 0.53, 20.5-21.9, n = 5)	16.3 (\pm 0.23, 16.1-16.7, n = 5)	2.93 (\pm 0.32, 2.7-3.3, n = 3)	2 (n = 19)	13, 15, 16, 26
<i>C. cearae</i>	100.52 (\pm 13.84, 85.0-111.6, n = 3)	65.2 (\pm 4.85, 60.0-69.6, n = 3)	74.5 (\pm 21.23, 50.0-87.5, n = 3)	44.33 (\pm 0.95, 43.65-45.0, n = 2)	42 (\pm 3.46, 40-46, n = 3)	21.65 (\pm 1.04, 20.0-22.8, n = 6)	17.32 (\pm 1.02, 16.0-18.05, n = 6)	-	1.83 (\pm 0.41, 1-2, n = 6)	this study
<i>C. roberti</i>	89.55 (\pm 14.78, 79.1-100.0, n = 2)	64.7 (\pm 7.5, 59.4-70.0, n = 2)	105 (n = 1)	42.8 (\pm 3.11, 40.6-45.0, n = 2)	39.9 (\pm 25.63, 15-75, n = 4)	20.43 (\pm 0.75, 20.0-21.3, n = 3)	17.07 (\pm 0.12, 17.0-17.2, n = 3)	3.1 (\pm 0.1, n = 23)**	2 (n = 18)	4, 17, 30
<i>C. lineata</i>	121 (\pm 17.07, 99-150, n = 9)	63.89 (\pm 5.84, 55-74, n = 9)	73 (\pm 18.92, 50-100, n = 6)	38.33 (\pm 8.96, 29-55, n = 9)	59.56 (\pm 48.16, 9-200, n = 16)	22.36 (\pm 0.88, 20-24, n = 32)	17.38 (\pm 0.52, 16.4-18.25, n = 32)	3.36 (\pm 0.38, 2.8-3.9, n = 10)	2.14 (\pm 0.6, 1-4, n = 35)	1-3, 5-7, 10, 11, 17, 19, 22, 23, 28
<i>C. castaneiceps</i>	112.31 (\pm 14.12, 91.75-122.15, n = 4)	62.85 (\pm 9.35, 50-70.6, n = 5)	75.97 (\pm 37.86, 50.8-131.0, n = 4)	44.83 (\pm 5.28, 39.1-49.5, n = 3)	69.6 (\pm 21.76, 50-100, n = 5)	22.5 (\pm 1.1, n = 3)**	17.9 (\pm 0.9, n = 3)**	3.9 (\pm 1.5, n = 3)**	2 (n = 5)	9, 29, 31
<i>C. ardesiaca</i>	90 (n = 1)	75 (n = 1)	85 (n = 1)	60 (n = 1)	110 (n = 1)	22.1 (\pm 1.13, 21.3-22.9, n = 2)	16 (\pm 0.85, 15.4-16.6, n = 2)	-	2 (n = 2)	18, 24



Results

The search of museum collections resulted in one nest, two eggs, at least five specimens of *C. cearae* in breeding condition and seven others with gonad drawings on their tags. The field work resulted in five nests, nine eggs (four of which were measured) and one nestling being discovered. All the nests presented here are of the type low cup / base, placed on tree branches or saplings in the understorey of forest remnants, open on top and close to the ground (Table 1). Constructed of dry leaves, twigs and other vegetable fibres, like a pile of debris, their exteriors were formed of larger leaves and thicker sticks, and interiors were lined with thin sticks or petioles. Eggs were ovoid, pale cream with a darker area concentrated near or on the larger pole. See below for details.

Museum specimens.—Three adult males taken in October to December at MHNCE had gonad measurements (MHNCE 200, 201, 341). Only MHNCE 341 was collected away from the Serra de Baturité (Itatira municipality). Two specimens with brood patches are held at MN, both males (MN 42745, MN 42746) collected at Chapada Diamantina, Ibicoara, Bahia, on 7 December 1995. Another seven specimens at MN have drawings on their tags indicating that the gonads were visible when prepared, but without measurements: MN 34554, 34555, 35001, 36378, 36938, 43276 and 43309, collected in February to July (see Table 2).

Nest 1.—A nest at MHNCE (480) was collected on 22 February 1994 at Sítio São José (04°13'57.78"S, 38°57'8.02"W), Batalha, Guaramiranga. It was 40 cm from the ground, with broad leaves at the base, many petioles of which the finest were in the lining, and some long bamboo leaves around the egg cup, on the edge and externally. It was supported by the

TABLE 2

Specimens of Ceará Gnateater *Conopophaga cearae* in Museu de História Natural Prof. Dias da Rocha, Universidade Estadual do Ceará, Pacoti (MHNCE) and Museu Nacional / Universidade Federal do Rio de Janeiro (MN) with information about gonad or brood patch (*measured from drawings on labels).

Voucher	Locality	Date	Sex	Skull	Brood patch (mm)	Gonad (mm)
MHNCE 200	Guaramiranga, Ceará	10 October 1987	Male	Ossified	-	3.0 × 2.8
MHNCE 201	Aratuba, Ceará	23 December 2005	Male	Ossified	-	7.0 × 2.5
MHNCE 341	Itatira, Ceará	24 January 2007	Male	Ossified	-	6.5 × 5.0
MN 34554	Guaramiranga, Serra de Baturité, Ceará	9 February 1986	Female	Ossified	-	* Ovary: 4.6 × 3.25
MN 34555	Guaramiranga, Serra de Baturité, Ceará	9 February 1986	Male	Ossified	-	* Testes: right, 2.85 × 1.68; left, 4.13 × 2.73
MN 35001	Fazenda Riachão, Quebrangulo, Alagoas	24 February 1987	Male	-	-	* Testes: right, 4.63 × 3.05; left, 5.43 × 3.47
MN 36378	Gama, Sítio São Luiz, Pacoti, Ceará	3 April 1989	Female	-	-	* Ovary: 5.0 × 3.63
MN 36938	Pacoti, Ceará	26 February 1990	Female	Ossified	-	* Ovary: 3.92 × 3.52
MN 42745	Chapada Diamantina, Ibicoara, Bahia	7 December 1995	Male	Ossified	20.0 × 18.6	* Testes: right, 8.70 × 5.69; left, 9.17 × 5.08
MN 42746	Chapada Diamantina, Ibicoara, Bahia	7 December 1995	Male	Semi-ossified	20 × 17	* Testes: right, 8.18 × 3.83; left, 8.14 × 3.43
MN 43276	Vale do Rio do Cabelo, João Pessoa, Paraíba	5 May 1997	Male	Ossified	-	* Testes: right, 4.0 × 2.47; left, 4.0 × 2.66
MN 43309	Vale do Rio do Cabelo, João Pessoa, Paraíba	2 July 1997	Female	Ossified	-	* Ovary: 3.88 × 3.47

fresh branches of a recently pruned tree and measured 111.6 mm (external diameter) and 50 mm (height). Two eggs in this nest were both Pale Pinkish Buff (Color 121D) but darker at the large pole (Robin Rufous, Color 340): MHNCE 495, 22.8 × 18.0 mm, and MHNCE 496, 21.7 × 18.0 mm.

Nest 2.—Parque das Trilhas (04°15'55"S, 38°55'55"W; 856 m), Guaramiranga, 6 February 2017, found by FN with one young (Fig. 1A) that fledged sometime prior to 20 February 2017 (no measurements taken).

Nest 3.—Hotel Remanso (04°14'35"S, 38°55'49"W; 812 m), Guaramiranga, 30 January 2019: also found by FN, it was c.60 mm in internal diameter, and held two eggs (Fig. 1B) one of which subsequently disappeared, whilst the other hatched on an unknown date, and the nestling was observed last on 10 February. On this date, the nestling (Fig. 1C) had its eyes open and appeared well grown and feathered, occupying almost the entire nest cavity, and was well camouflaged. Its bill was grey, darker at the tip and edges, paler at the base, with a yellowish-white rictus. A bare periophthalmic region contrasted with its dark brown plumage, albeit with irregular paler (ochre) stripes evident on the back and wing-coverts, giving the plumage a mottled appearance.

Nest 4.—RPPN Sítio Lagoa (04°12'20.4"S, 38°57'49.4"W; 923 m), Guaramiranga, 17 March 2020, found with two eggs at 06.40 h by MAC & OV (Fig. 1D). On 18–19 March the female was observed at the nest but the eggs disappeared four days later (on 23 March). The nest was then collected (MHNCE 470). It was sited 46 cm above ground, measured from the nest's upper edge, and had a large base of longer sticks that supported the cup between the branches of an unidentified shrub. Including the base of sticks, it measured 170 × 235 mm in diameter, and its height varied between 65 and 110 mm to the upper edge of the nest. The nest's cup measured 85.9 × 124.0 mm (external diameter), 64.25 × 74.95 mm (internal diameter) and 43.65 mm (depth in the centre). Materials were mainly sticks, dry leaves and petioles in the lining, with a layer of leaves and tree bark above the base of sticks. The nest was collected on a rainy day, when it weighed 158 g, but its dry weight (assessed on 29 May 2020) was 45 g. Several invertebrates were found among the nest materials, including diplopods, annelids and unidentified larvae. The eggs measured 22.64 × 18.05 mm and 21.75 × 17.85 mm, were ovoid, pale ivory or slightly pink in colour, with a darker, reddish (salmon-coloured) larger pole, in which were concentrated a few small, irregular and discrete, paler or darker speckles (Fig. 1D).

Nest 5.—RPPN Sítio Lagoa, Guaramiranga, 6 February 2022, found by FN while the male was incubating two eggs (Fig. 1 E–F); it was not visited again until 10 March, when the nest was empty.

Nest 6.—Queijo (04°16'30.02"S, 38°58'21.87"W; 956 m), Guaramiranga, 11 February 2022, found by FWP with two eggs (Fig. 1G). It was 40 cm above ground, sited in a shrub fork, surrounded by young branches. It measured 45 mm deep, 86 mm tall, 66 mm internal diameter and 85 mm external diameter; and was lined with thin petioles and twigs, darker than the exterior, which was constructed of large dry leaves (bamboo and other plants) around the cup, and sticks at the base. The eggs measured 20 × 16 and 21 × 16 mm, and were whitish, with brown spots concentrated at the larger pole.

Fledgling and 'broken-wing' display.—At Sítio Boa Vista (04°12'55"S, 38°54'00"W; 855 m), Pacoti, 2 January 2023, a fledgling was found by MAC, perched 1.5 m above ground on a horizontal branch. It was noticed due to the restless behaviour of an adult female nearby, which vocalised frequently and occasionally fluttered its wings while singing. The fledgling remained motionless and silent, permitting a photo to be taken (www.wikiaves.com.br/5236285). It eventually flew, still with evident difficulty. Its plumage was brown, mottled with irregular darker and paler stripes, a bare dark grey periophthalmic region,

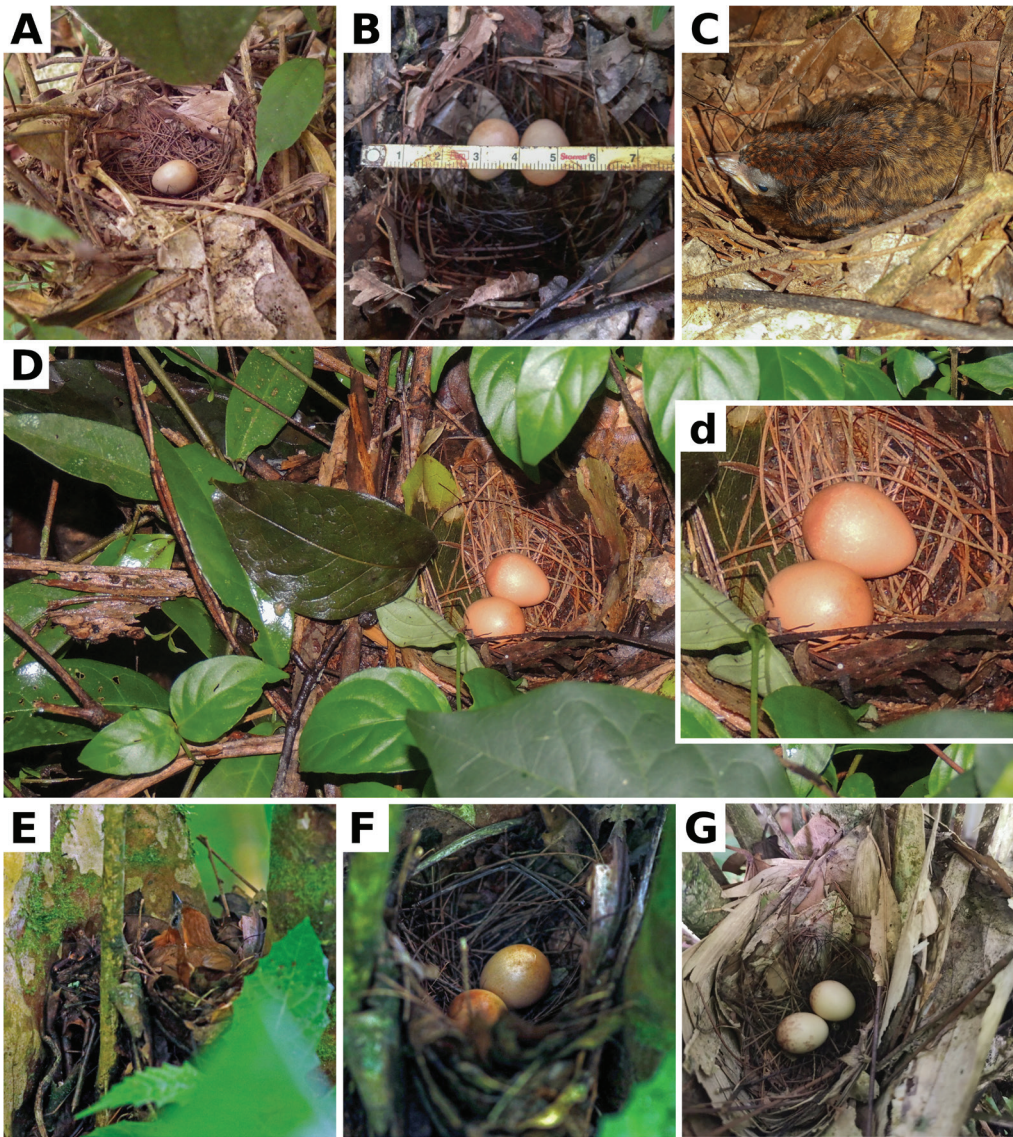


Figure 1. Breeding data for Ceará Gnateater *Conopophaga cearae* in the Serra de Baturité, Ceará, Brazil: (A) nest and egg at Parque das Trilhas, Guaramiranga, 6 February 2017; (B) nest and eggs at Hotel Remanso, Guaramiranga, 30 January 2019, and the nestling (C) on 10 February; (D) nest (now MHNCE 0470) and eggs (d) at RPPN Sítio Lagoa, Guaramiranga, 17 March 2020; (E–F) the other nest at RPPN Sítio Lagoa with male incubating, 6 February 2022; (G) nest and eggs at Queijo, Guaramiranga, 11 February 2022 (A–C, E–F: Fábio de Paiva Nunes; D: Odilon Vieira; G: Francisco Werlyson Pinheiro)

dark brown eyes and a yellowish gape. When it flew, the young gave two or three calls, whereupon the female approached, even more agitated. While MAC was searching for the young, the female landed on the ground in a clear area of a narrow trail, 6 m away, and performed a 'broken-wing' distraction display, wings drooping and body lowered, recalling a wounded animal, before starting to jump slowly on the ground away from where the juvenile was hiding silently. The display ceased immediately after MAC took just two steps towards the female.

Breeding biology of the Conopophagidae

Breeding period.—Reports of breeding (active nests, eggs, nestlings / fledglings, gonadal data and brood patches) for the Conopophagidae are sparse, with a few exceptions among species subject long-term studies: Hooded Gnateater *C. roberti* (Pereira *et al.* 2022), Black-cheeked Gnateater *C. melanops* (e.g., Studer *et al.* 2019) and *C. lineata* (e.g., Willis *et al.* 1983, Bodrati & Di Sallo 2020). For *C. lineata* reports are available from September to November in northern Argentina (e.g., Bodrati & Di Sallo 2020) and August–January in southern and south-east Brazil (Greeney 2018). Similarly, in southern and south-east Brazil, *C. melanops* nests from August to February (*C. m. melanops*; Greeney 2018) and September–June in north-east Brazil (*C. m. nigrifrons*; Studer *et al.* 2019; and at least January in *C. m. perspicillata*; Greeney 2018). For *C. roberti*, in northern (Pará) and north-eastern (Maranhão) Brazil, the season ranges from November to April (Whitney 2003, Pereira *et al.* 2022). Other species in northern and / or north-west South America nest apparently year-round, with reports from July–March or May, e.g., for Chestnut-belted Gnateater *C. aurita* (Oniki & Willis 1982, Tostain *et al.* 1992, Leite *et al.* 2012, Greeney 2018), Ash-throated Gnateater *C. peruviana* (Parker 1982, Dreyer 2002, Hillman & Hogan 2002, Greeney 2018) and Chestnut-crowned Gnateater *C. castaneiceps* (Hilty 1975, Greeney 2018, Lizarazo & Londoño 2022, Alarcón *et al.* 2023). The season for Slaty Gnateater *C. ardesiaca* lasts from June to November (Remsen 1984, Sánchez & Aponte 2006, Greeney 2018), with most of these records involving *C. a. ardesiaca* (Greeney 2018). For Black-bellied Gnateater *C. melanogaster*, there is only an observation of an inactive nest presumed to belong to this species in Amazonas, northern Brazil, in July (Greeney 2018). In the case of *Pittasoma*, active nests and observations of fledglings of Black-crowned Antpitta *P. m. michleri* are available from Panama in April and July (Karr 1971, Wetmore 1972). Our study found out that *C. cearae* breeds at least in December to March, possibly until April (see Fig. 2).

Nest architecture.—Nests of most species in the family have been formally described, except Rufous-crowned Antpitta *Pittasoma rufopileatum*, *Conopophaga melanogaster* and, until now, *C. cearae* (Greeney 2018, Winkler *et al.* 2020). However, Greeney (2018) commented on an unpublished report by B. M. Whitney of two large, inactive,

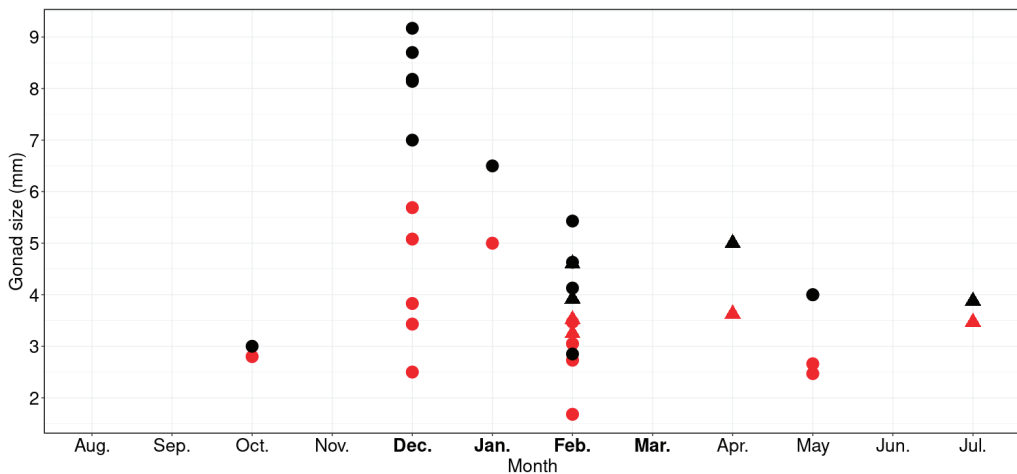


Figure 2. Gonad size of specimens of Ceará Gnateater *Conopophaga cearae* held in Museu de História Natural Prof. Dias da Rocha, Universidade Estadual do Ceará, Pacoti (MHNCE) and Museu Nacional / Universidade Federal do Rio de Janeiro (MN), testes (dots) and ovary (triangles), length (black) and width (red); in bold (December–March), the breeding period with evidence (nests, eggs, nestlings and brood patch).



Figure 3. Nest (A) and eggs (B) of Black-crowned Antpitta *Pittasoma michleri* collected by A. Wetmore and W. M. Perrygo on the upper Jaqué River, Panama, 14 April 1947, housed in the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM B40975) (© Jacob Saucier)

Conopophaga-like nests found in July on the Aripuanã River, Amazonas, Brazil, just 10 m from where a juvenile *C. melanogaster* was photographed. For the other nine species, nests were described using different terms (e.g., cup, bowl, semisphere, bulky or 'low / cup base' *sensu* Simon & Pacheco 2005), placed on a base of dry leaves and sticks, near the ground or >1.5 m above it as in *C. melanops* and *C. lineata* (Table 1). Nest materials can be dry leaves, rootlets, petioles, twigs, lichens, vegetable fibres and rhizomorphic fungi, lined with some of these same materials, e.g., dry leaves, twigs and grass stems (Greeney 2018; Figs. 1–3). Rhizomorphic fungi are mentioned as nest material of *C. ardesiaca* (Sánchez & Aponte 2006), *C. peruviana* (Greeney 2018), *C. castaneiceps* (Lizarazo & Londoño 2022), *C. aurita* (Tostain *et al.* 1992), *C. lineata* (Greeney 2018, Bodrati & Di Sallo 2020) and *C. melanops* (Sick 1957, Straube 1989), identified as *Marasmius* for the last three species. Conopophagidae nests are exposed or sometimes concealed by the surrounding vegetation, fixed to a diversity of substrates, such as palm trunks or leaves (Wetmore 1972, Whitney 2003), saplings (Dreyer 2002, Whitney 2003, Lopes *et al.* 2013, Lizarazo & Londoño 2022), shrubs (Snethlage 1935, Marini *et al.* 2007, Stenzel & Souza 2014), bamboo (Fraga & Narosky 1985, Sánchez & Aponte 2006), pteridophytes (Hilty 1975, Hillman & Hogan 2002, Leite *et al.* 2012, Maurício *et al.* 2013), epiphytic plants (Alarcón *et al.* 2023), bromeliads (Alves *et al.* 2002, Lizarazo & Londoño 2022, Pereira *et al.* 2022), heliconids (Straube 1989), broken tree trunks, liana accumulations, and fallen branches (Studer *et al.* 2019, Pereira *et al.* 2022). Measurements of nests are similar among almost all *Conopophaga* spp., with range overlap and close averages, mainly in internal diameter and depth. However, in the version of Lizarazo & Londoño (2022) available at the time of writing, two nests of *C. castaneiceps* were reported as being just 3.9 and 4.95 mm deep. Nevertheless, we have confirmed that this was a mistake and the correct measurements

were 39.1 and 49.5 mm, respectively (J. Lizarazo *in litt.* 2023), which perfectly align with the pattern otherwise observed in this genus.

Biparental partitioning of nestbuilding and maintenance have been reported in *Conopophaga*, including *C. roberti* (Whitney 2003, Pereira *et al.* 2022), *C. peruviana* (Greeney 2018) and *C. melanops* (Stenzel & Souza 2014), although Lima & Roper (2009) observed only males of the last-named species constructing the nest. The duration of nestbuilding varies among the few available reports: eight days for *C. roberti* in north-east Brazil (Pereira *et al.* 2022) and 4–5 (Stenzel & Souza 2014) or 14–20 days (Lima & Roper 2009) for *C. melanops* in south-east and southern Brazil, respectively. For *C. melanops* the nest cycle (egg-laying to fledging) ranged from 38–44 days in southern Brazil (three nests reported by Lima & Roper 2009) and a max. of 32 days in the north-east (two nests: Studer *et al.* 2019). For *C. roberti* (Pereira *et al.* 2022) the pair bond is maintained after a failed nesting attempt (also in *C. melanops*: Lima & Roper 2009), but nest reuse or pairs successfully raising two broods in a season have not been reported. Nest site selection is unknown for all species (Greeney 2018), but the habit of starting to build during rain has been reported for *C. melanops*, perhaps to facilitate the use of dry leaves in the nest (Stenzel & Souza 2014).

Eggs, clutch size and incubation period.—Until now, three species lacked egg descriptions: *Pittasoma rufopileatum*, *Conopophaga melanogaster* and *C. cearae*. However, Greeney (2018) commented on three eggs described by Kreuger (1968) from Bahia (without precise locality) as belonging to *C. l. lineata*, which possibly pertain to *C. cearae*. They measured 22.15–23.0 × 17.2–17.85 mm and were reddish cream with a few, small pale speckles, mostly at the large end (Greeney 2018). The eggs of the other species were variously described as ovoid, elliptical, conical, oval, or spheroidal. Measurements are quite similar, except *Pittasoma michleri*, which has the biggest eggs (c.10 mm longer than most *Conopophaga* spp., Table 1, Fig. 3). Egg fresh weight is rarely recorded (see Table 1) and, as it must vary with the embryo's development, would be even more difficult to compare. Coloration is usually pale, but can vary within species or clutches, ranging from near-white to cream-beige or buffy brown, with a few spots and a darker region at the large pole—sometimes referred to as the 'cap' or 'ring' (Greeney 2018).

Clutch size is most frequently reported as two (Table 1), with some cases of fewer or more (3–4) eggs or nestlings in a nest, all of the latter in *C. lineata* from south-east Brazil (Frisch & Frisch 1964, Marini *et al.* 2007, Maurício *et al.* 2013) to northern Argentina (Bodrati & Di Sallo 2020). The incubation period is known only for *C. melanops* and *C. lineata*, 17–18 days (Alves *et al.* 2002, Whitney 2003, Stenzel & Souza 2014, Studer *et al.* 2019) and 14 days (Whitney 2003), respectively, with contributions from both sexes, but males spend more time incubating diurnally than females, which are responsible for nocturnal incubation, as also reported for *C. peruviana* (Greeney 2018).

Nestling, fledgling and parental care.—Information exists regarding nestling development of some *Conopophaga*, e.g., *C. castaneiceps* (Hilty 1975, Lizarazo & Londoño 2022), *C. lineata* (Willis *et al.* 1983, Bodrati & Di Sallo 2020), *C. peruviana* (Hillman & Hogan 2002), *C. melanops* (Studer *et al.* 2019) and *C. roberti* (Pereira *et al.* 2022). Like other passerines nestlings hatch naked, with eyes closed and regions bordering (e.g., rictus) or inside the bill (e.g., inner surface and throat) brightly coloured (e.g., white, yellowish or orange), contrasting with the dark bill. Based on nestling development of *C. lineata* (Willis *et al.* 1983, Bodrati & Di Sallo 2020) and *C. castaneiceps* (Lizarazo & Londoño 2022), feather sheaths are visible at 3–4 days, start to open over the body at 6–7 days, and on the wings at 9–10 days; the eyes are open / half-open after 6–8 days; at 10–12 days plumage is well distributed on the body and head, and the eyes are completely open. Development in *C. roberti* is similar, except the eyes start to open at four days old, when feather sheaths are visible over the body

(Pereira *et al.* 2022). Similarly, in *C. peruviana* the contour feathers start to open in the first week, and they are rather well covered in overall downy plumage at 8–10 days (Greeney 2018).

Nestling period is known for *C. lineata* (Willis *et al.* 1983, Whitney 2003, Bodrati & Di Sallo 2020), *C. melanops* (Stenzel & Souza 2014, Studer *et al.* 2019), *C. roberti* (Pereira *et al.* 2022) and *C. castaneiceps* (Lizarazo & Londoño 2022), in all of these species being *c.*2 weeks or a little more. In *C. lineata*, *C. melanops* and *C. castaneiceps* both sexes contribute to nestling care (brooding and feeding) and nest maintenance (faecal sac removal and structural repairs), with the female primarily responsible for nocturnal brooding (Willis *et al.* 1983, Studer *et al.* 2019, Lizarazo & Londoño 2022). Nocturnal brooding by males has been reported only for *C. castaneiceps* (Lizarazo & Londoño 2022). Partitioning of parental care is known for *C. aurita* (Willis 1985), *C. peruviana* (Greeney 2018) and *C. roberti* (Pereira *et al.* 2022), but the difference in effort, if any, is unrecorded. Distraction displays may be given near active nests, such as ‘broken-wing’ displays, accompanied by alarm calls. Both *Pittasoma* (*P. michleri*: Wetmore 1972) and *Conopophaga* (many species: Schunck & Mix 2021) are reported to give displays that could be interpreted as distraction displays, but formal descriptions like those of Leite *et al.* (2012) and Schunck & Mix (2021) are scarce. Our observations of adult female *C. cearae* expand the occurrence of this behaviour in the family. As noted by Greeney (2018), at least in *C. aurita* the postocular feathers can be used during this behaviour (see Leite *et al.* 2012 for images).

Descriptions of fledglings or juveniles exist for *C. melanops*, *C. castaneiceps*, *C. ardesiaca*, *C. peruviana*, *C. lineata*, *C. roberti*, *Pittasoma rufopileatum* (see Greeney 2018, Bodrati & Di Sallo 2020, Lizarazo & Londoño 2022, Pereira *et al.* 2022) and now for *C. cearae*. Based on fledgling development of *C. castaneiceps* (Hilty 1975, Lizarazo & Londoño 2022), *C. lineata* (Willis *et al.* 1983) and *C. roberti* (Pereira *et al.* 2022), nestlings fledge smaller and lighter than adults (Willis *et al.* 1983, Lizarazo & Londoño 2022, Pereira *et al.* 2022), when still unable to undertake long-distance flights (Pereira *et al.* 2022), attaining near-adult size in *c.*2 weeks, but still with a short tail and small head and bill (Willis *et al.* 1983). The young may remain with its parents for *c.*45 days post-fledging (Hilty 1975, Willis *et al.* 1983) when the plumage is still streaked but the tail reaches full length (Willis *et al.* 1983). During this phase young occasionally try to forage on the ground independently until they reach complete independence, and then forage alone on the same home territory for up to another 80 days (Willis *et al.* 1983).

Reproductive success.—The few species with information about reproductive success, *C. melanops*, *C. lineata* and *C. roberti*, evidently experience low survival rates.

For *C. lineata* in the Atlantic Forest, Willis *et al.* (1983) reported one successful nest (at least one nestling fledged and survived until the end of the study) in four that were monitored (25%) in a 21-ha forest fragment in south-east Brazil (São Paulo), Marini *et al.* (2007) and Marini (2017) reported three successful nests of nine monitored (33%; survival rate 0.966 day⁻¹) in fragments of 50–200 ha also in south-east Brazil (Minas Gerais), and Bodrati & Di Sallo (2020) observed one successful nest among five monitored (20%) in a large protected area in northern Argentina (Misiones). For *C. melanops*, Stenzel & Souza (2014) noted three successful nests of 13 monitored (23.07%) in a human-modified forest fragment in south-east Brazil (Rio de Janeiro), Lima & Roper (2009) reported four successful nests of 18 monitored (22%; survival rate 0.966 d⁻¹) in a large protected area in south Brazil (Paraná), and Studer *et al.* (2019) 23 successful nests of 114 monitored (20.2%; survival rate 0.883 d⁻¹, Mayfield nest success 12.9%) in a 4,469 ha protected area in north-east Brazil (Pernambuco / Alagoas). For *C. roberti*, Pereira *et al.* (2022) witnessed nine successful nests among 22 monitored (40.9%) in a 3,500-ha protected area in north-east Brazil (Maranhão).

In these species, nest success is low mainly due to predation, desertion and environmental factors (Willis *et al.* 1983, Marini *et al.* 2007, Lima & Roper 2009, Stenzel & Souza 2014, Marini 2017, Studer *et al.* 2019, Bodrati & Di Sallo 2020, Pereira *et al.* 2022), but at least Willis *et al.* (1983) also mentioned infertile eggs. Total production of young is usually low, 0.36 per adult in *C. melanops* in south Brazil (Lima & Roper 2009) and 0.58 per adult female for *C. roberti* in north-east Brazil (Pereira *et al.* 2022). Studer *et al.* (2019) reported daily survival rates for *C. melanops* during the incubation and nestling periods in north-east Brazil (0.922 d⁻¹ and 0.958 d⁻¹), with predation the only cause of failure during the latter period.

Mating system.—*Conopophaga* are presumably monogamous, being frequently recorded in pairs year-round (Whitney 2003). *Pittasoma* are recorded in pairs too, at least when foraging (Krabbe & Schulenberg 2003). However, the specific mating system is still unknown for either genus. In *C. melanops* the pair bond may break after a nesting failure (Lima & Roper 2009). One or both pair members can disappear from the home territory, with no sign of predation, which Lima & Roper (2009) interpreted as territory / mate abandonment, suggesting that monogamy may not be permanent.

Discussion

The nest of *Conopophaga cearae* described here conforms to the basic pattern in this genus: a cup of dry leaves and twigs placed over a base of debris, relatively close to the ground, surrounded by leaves, but sometimes very exposed above. Measurements are similar to almost all other descriptions of, e.g., *C. castaneiceps*, *C. roberti*, *C. peruviana* and others (see Table 1). An open nest sited relatively close above ground seems to be the rule in Conopophagidae, perhaps related to their foraging habits (see Willis 1991), with some species known to follow ants and forage both on the ground and from perches (Willis 1985, Alves & Duarte 1996).

The eggs described here are similar to those reported by Greeney (2018) and described by R. Kreuger from Bahia, at least in size. However, this is the basic egg pattern in other *Conopophaga* that occur there (*C. melanops* and *C. lineata*), making it impossible to know (given the lack of precise locality) if these eggs really belonged to *C. cearae*, as Greeney (2018) supposed. Lizarazo & Londoño (2022) compared the egg pattern in some *Conopophaga* spp. based on field data for *C. castaneiceps* and literature for the other seven species. They reported extensive variation in egg coloration between species, from shells with scattered markings (*C. peruviana*, *C. lineata* and *C. aurita*) to intermediate (*C. ardesiaca* and *C. roberti*) or dense markings (*C. castaneiceps* and *C. melanops*). At least two factors challenge such comparisons. Firstly, the lack of standardisation in descriptions of eggs of Conopophagidae (as in nest measurements) makes some information subjective, e.g., egg coloration / shape and the density, distribution and shape of markings, especially without photographs or specimens in ornithological collections; secondly, egg coloration and shape can vary considerably within species / clutches, as already noted by Greeney (2018) for some *Conopophaga*. Indeed, our data document colour variation in *C. cearae* eggs, from more cinnamon to pale and whitish, with some profusely spotted at the large pole (see Fig. 1), despite localities being relatively close to each other.

Based on nestling development in other *Conopophaga*, the nestling of *C. cearae* found on 10 February 2019 (Fig. 1C) was probably 9–11 days old, suggesting that the nest was first found during the final days of the incubation period. Mottled plumages (streaked, spotted, 'V-shaped' markings) are also recorded in nestlings / fledglings of other *Conopophaga*, e.g., *C. lineata*, *C. peruviana*, *C. ardesiaca*, *C. roberti* and *C. castaneiceps* (see Greeney 2018, Bodrati & Di Sallo 2020, Pereira *et al.* 2022, Alarcón *et al.* 2023).

Almost all species tend to breed during the wet season or at the end of the dry season. Species with large ranges present some variation in season duration, e.g., *C. melanops* has a period of 100 days in southern Brazil (*C. m. melanops*; Lima & Roper 2009) but 269 days in north-east Brazil (*C. m. nigrifrons*; Studer *et al.* 2019). Lima & Roper (2009) noted that the short reproductive period at their study locality is uncommon among tropical species, and they struggled to identify a causal link between climate and breeding season in this population. They suggested that climate might not be the only factor providing cues for nesting, but that day length could be more important. Another difference between these two populations of *C. melanops* is nest-cycle interval, 41 days on average (Lima & Roper 2009) or a max. of 32 days (Studer *et al.* 2019). Studer *et al.* (2019) suggested that shorter nesting periods might be a response to high levels of nest predation pressure at their study locality, enabling adults to prolong post-fledging care and minimise predation. Nevertheless, the discrepancies between these two geographically distant *C. melanops* populations merit further study, including long-term or experimental approaches and larger samples.

C. cearae breeds during the wet season, December–March, as evidenced herein. The species' breeding period is probably longer, but more work is necessary to discover if the species could have a breeding period similar to *C. melanops* in north-east Brazil as reported by Studer *et al.* (2019).

Predation seems to be an important factor in the low reproductive success in *Conopophaga*, encompassing all stages of the nesting cycle, but abandonment and environmental conditions (e.g., rain and treefalls) are relevant too. The open nest relatively close to the ground may facilitate predation or abandonment in areas subject to much human disturbance, although Marini (2017) found little difference in nest success between closed and open-cup nests (22 species analysed, including *C. lineata*), or even between open-cup nests at different heights above ground or different distances from forest borders, but there is a tendency for reduced success in open-cup nests closer (<50 m) to borders. It is important to note that there is much variation in nest success among *Conopophaga* spp. (20–40%), possibly because of variation in sample sizes and environments, making comparison between studies difficult. Successful nests in *C. lineata* vary between 20–30% in small and large fragments in the southern and south-east Atlantic Forest, but sample sizes are small (4–9 nests in each study). Also in the Atlantic Forest, *C. melanops* exhibits little variation in breeding success between small and large fragments (20–23%), with greater but varied sample sizes (13–114 nests) across eastern Brazil. *C. roberti* is unique in having nest success of c.40% (albeit not higher than other understorey species in Marini 2017) in a large protected area and a reasonable sample of 22 nests (Pereira *et al.* 2022). Small sample sizes and studies conducted solely in small forest fragments or human-modified environments can bias reproductive success (Oniki 1979, Martin 1996). At least *C. lineata* appears to respond well to forest fragmentation, surviving in small fragments without significant changes in sex ratio (Dantas *et al.* 2009) or nesting capacity (Marini *et al.* 2007, Marini 2017) despite morphological alterations being reported (Anciães & Marini 2000, Dantas *et al.* 2009). However, in a small forest fragment, Willis *et al.* (1983) found three infertile eggs in two of four monitored nests of the species; inbreeding and insecticides used in nearby crop fields were hypothesised as possible causes. More data on reproductive success are needed for all *Conopophagidae*, to facilitate meaningful comparison between different geographical areas, environments and levels of habitat degradation.

Being dimorphic mainly in plumage, the presumed monogamy in *Conopophagidae* raises questions about the influence of this type of mating system on sexual selection and reproductive success in the group, as polygynous and lekking / promiscuous species tend to be more dimorphic than monogamous taxa in plumage, body mass and length of

wing and tail (Dunn *et al.* 2001). Recently, Gaiotti *et al.* (2020) reinforced the importance of testing assumptions regarding mating systems in Neotropical birds, to reveal any potential divergence among closely related genera, possibly due to different ecological pressures. They investigated the mating system of Araripe Manakin *Antilophia bokermanni*, a threatened bird endemic to north-east Brazil with clearly dichromatic plumage, finding evidence for polyandric females and males that defend territories and do not aggregate at display arenas (leks), a pattern atypical in Pipridae, where most species are polygynous and form leks (Gaiotti *et al.* 2020). There is no evidence for biparental care in this species; males do not incubate the eggs or provision the nestlings (Gaiotti *et al.* 2020). This is not the case for some Conopophagidae (see Nestling, fledgling and parental care), making monogamy a plausible assumption, but lack of genetic analysis could mask the existence of cryptic mating systems (see Johnson & Burley 1998, Pechacek *et al.* 2005). Thus, studies like Gaiotti *et al.* (2020) are necessary to know the real diversity of mating systems, which certainly will help to understand breeding dynamics in the group.

In comparing *Pittasoma* and *Conopophaga*, Greeney (2018) noted that the subelliptical eggs of *Pittasoma michleri* do not resemble the eggs of any *Conopophaga* or other antpittas (Myrmotheridae *sensu* Gaudin *et al.* 2021) in size or shape (Table 1, Fig. 3). Although the available data indicate that *Pittasoma* and *Conopophaga* at least share a type of 'cap' at the larger pole, the eggs of *P. michleri* are strongly marked with larger and darker brown markings at the larger pole, and small dark dots distributed over the rest of the pale shell (Fig. 3). In many *Conopophaga* this pattern tends to be more subtle, but there is variation between clutches even in those species with some eggs that are more densely marked (e.g., *C. castaneiceps*, *C. melanops* and *C. cearae*). More study is needed to assess variation in egg pattern in *Pittasoma*, as the only information available comes from a single clutch of *P. michleri* (Wetmore 1972; Fig. 3). Concerning nest architecture in these genera, *Conopophaga* have smaller nests than *P. michleri* (Table 1), but this seems directly proportional to differences in body size between the genera. In addition to similarities in materials used, both genera appear to prefer to construct their nests in areas with a natural accumulation of debris, enhancing nest camouflage and reducing nestbuilding effort compared to other types of understorey nests (e.g., suspended or enclosed). Nest architecture in the Conopophagidae is thus quite conservative.

In a global review of avian breeding biology (Xiao *et al.* 2017), Conopophagidae (not including *C. cearae*) appears as poorly known (six species) or partly known (four species), based on the three topics analysed by these authors (clutch size, incubation period and nestling period). Our review included more information about the family's breeding biology, and took into account differences in methodology, but most of the species could be classified as partly known according to our results. Only *Pittasoma rufopileatum* and *C. melanogaster* lack any basic breeding biology data, e.g., formal descriptions of nest, eggs and nestlings, but information for other species vary in quantity and quality. Most information summarised here pertained to two Atlantic Forest *Conopophaga* spp., *C. lineata* and *C. melanops*. Recent exceptions are studies by Lizarazo & Londoño (2022) for *C. castaneiceps* in Colombia and Pereira *et al.* (2022) for *C. roberti* in north-east Brazil. Nevertheless, breeding data for most species were the result of mainly casual encounters, and are thus not necessarily representative of the species concerned, making generalisations difficult.

The nest, egg, nestling, fledgling and 'broken-wing' distraction display of *C. cearae* described here fill a gap in knowledge of the species' life history, but much remains to be discovered about several other species in the family. In general, the breeding biology of the Conopophagidae can be considered still only partially known, despite some evidence of common patterns between most species in the family (e.g., nest and eggs, clutch size,

biparental care, etc.). However, focusing only on these aspects could mask the lack of data on other facets of breeding biology, such as overall period, incubation / nestling period, nest site selection, mating system, reproductive success, parental care, prey diversity, seasonality, and others. We encourage long-term studies of all Conopophagidae, especially the *Pittasoma* spp., given the chronic lack of breeding data for these two, and of *C. cearae*, due to its conservation status.

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