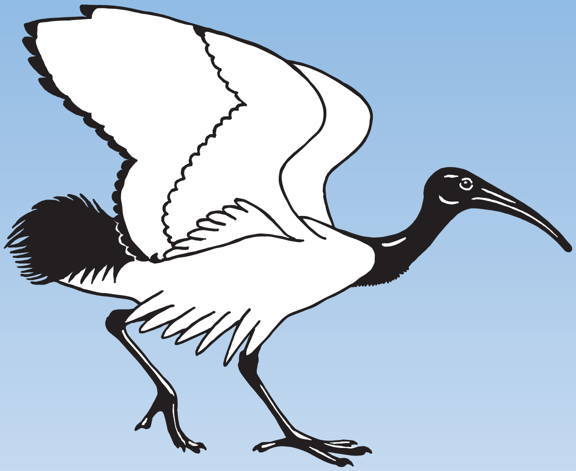
Bulletin of the British Ornithologists' Club



Volume 144 No. 4 (Online)
December 2024

ISSN 2513-9894 (Online)

Bulletin of the British Ornithologists' Club
ISSN 2513-9894 (Online)
Edited by Guy M. Kirwan

Volume 144 Number 4, pages 333–476

CONTENTS

Club Announcements 333

ALLPORT, G. & HOGG, J. W. T. Notable updates on the status of selected waders and African Skimmer *Rynchops flavirostris* in Mozambique 338

JOHNSON, O., BILLERMAN, S. M., HERNÁNDEZ-BAÑOS, B. E., LANE, D. F., RASMUSSEN, P. C., REMSEN, JR., J. V., WINKER, K. & CHESSER, R. T. Comments on the species limits of certain North American birds, part 1 367

VAN DORT, J. & JUÁREZ, R. Eye colour is geographically variable in Lesser Roadrunner *Geococcyx velox* (Wagner, 1836) 415

WHITNEY, B. M., SCHUNCK, F. & BICHINSKI, T. Documentation of the nest of the Greenish Tyrannulet *Phyllomyias virescens* 425

VAN GROUW, H., HERNÁNDEZ-ALONSO, G., MARTINS, N. F. & GILBERT, M. T. P. On the taxonomic status of Burmese Collared Dove *Streptopelia* (*decaocto*) *xanthocycla* 431

CROZARIOL, M. A. & TEIXEIRA, D. M. The nest of Buff-throated Purpletuft *Iodopleura pipra leucopygia* 445

PIACENTINI, V. Q., PRŶS-JONES, R. P. & PACHECO, J. F. On the identity of *Micrastur guerilla jugularis* Gurney, 1884, with lectotype designation 451

SILVA, F. R. R., BRISO, A. L. F., MARQUES, M. H. & SCHUNCK, F. First records of Greater Sand Plover *Anarhynchus leschenaultii* in South America 456

Index to Volume 144 (2024) 461

BOC Office
c/o Natural History Museum at Tring,
Akeman Street, Tring, Herts. HP23 6AP, UK
E-mail: info@boc-online.org
Tel. +44 (0)208 8764728 / 07919174898

Registered Charity No. 1169733

www.boc-online.org

Published by the British Ornithologists' Club
Typeset by Eng-Li Green, New Mexico, USA

Bulletin of the
BRITISH ORNITHOLOGISTS' CLUB

Vol. 144 No. 4 Published 4 December 2024

CLUB ANNOUNCEMENTS

The BOC's 2023 Annual Report and Accounts were published in September and have been submitted to the Charity Commission. The document is available to read/download via: https://boc-online.org/wp-content/uploads/BOC.AnnualReviewandAccounts2023.pdf.

As previously announced, the 1009th meeting of the Club was held in conjunction with the Linnean Society of London at Burlington House, Piccadilly, London W1J 0BF, on Monday 6 November 2023. Dr Will Smith (who had recently completed a D.Phil. at Oxford University's Edward Grey Institute) spoke on *Rock Doves and the process of 'extinction by hybridisation'*. The Rock Dove *Columba livia* is the wild form of the feral domestic pigeon and, following widespread hybridisation over many years, pure Rock Doves are now extinct across much of Europe. Will's work has focused on remote sites in Scotland and Ireland with Rock Dove populations that have experienced limited interbreeding with feral pigeons, providing both a case study to investigate the process of 'extinction by hybridisation' and a valuable natural comparison for those who study domestic pigeons in the laboratory.

The 1,012th meeting of the Club was held in conjunction with the Linnean Society of London and at their premises on Monday 20 May 2024. Dr Catherine Sheard, University of Aberdeen, spoke on *What can birds' nests teach us about evolution?* Following an introduction overviewing the diversity of birds' nests and the limitations to our current understanding of the reasons for this, she discussed her recent research in building up a detailed comparative database of nest traits of the world's birds. Analysis of this has been complicated by numerous factors, including within-species variability in nest structure and the non-independence of data points resulting from the varying closeness of species' relationships. At a macro level, it appears that the types and locations of nests that species build do not correlate with climate but, to some extent, do so with both body size and an index of flight ability. Focusing down more closely on subgroups such as passerines permitted certain conclusions, e.g. that cup-nesting species that nest in colder places build bigger nests, but were unsuccessful in wider attempts to explain bird diversity in terms of the structure of the nests they build.

The Avian Odyssey held on 21 September 2024 at the Natural History Museum, London, in conjunction with the regional bird clubs, and in association with and in support of the Natural History Museum's exhibition *Birds: brilliant and bizarre* was universally considered an outstanding success, covering in detail the many challenges facing birdlife worldwide. The YouTube recording is available: https://www.youtube.com/watch?v=ohl_dRJm3Eo&t=261s.

The Club is delighted to welcome Laura Vaughan-Hirsch as a trustee. Laura has an extensive background in biology education including a broad involvement in conservation and ecology. Since 2023 she has been White Stork Project Manager at the Knepp Wildland Foundation about which she spoke to the Club at its 1,011th meeting on 25 March 2024 (see https://www.youtube.com/watch?v=dsY-XU221sg).

Chris Storey, Chairman

BOOK REVIEW

Flint, P. & Richardson, C. 2024. *The birds of Cyprus: an annotated checklist*. BOC Checklist no. 28. British Ornithologists' Club, Tring. 524 pp, 32 plates with 65 colour photos and two colour maps; three black-and-white illustrations. UK£45 from the Natural History Book Service (http://www.nhbs.com).

Annual recording and publication of reports covering the status of birds on the island of Cyprus have been ongoing for more than 65 years. Over that period substantial changes in the status of many species occurring on the island have occurred, affecting especially the migrants for which the island is renowned. It has been more than 30 years since the second edition of this checklist appeared in 1992, so given the increase in birdwatching activity on the island, this third edition is both overdue and very welcome. Published records up to mid-March 2023 are considered here, with a few significant records as late as April 2024 included in an addendum.

ISSN-2513-9894
(Online)

The book's layout is much as one would expect. Introductory chapters cover history, geology, geography, climate, vegetation, and environmental changes and impacts. An overview of the avifauna provides broad outlines of the breeding birds, migration, changes in status, and conservation.

The bulk of the work comprises the individual species accounts. Each account includes local names, subspecies, distribution away from Cyprus, and a detailed review of status on the island. With so many species occurring principally as migrants, many accounts are dominated by details of arrivals / departures, peak movements and the like. However, there are also discussions of the wider ecology of species that breed on the island, with the endemic taxa in particular treated in greater detail. The insights presented within an optional comment section are frequently of special interest, with brief discussions of the reasons for the timing of migration, significant differences in status between spring and autumn, or the suspected reasons for significant changes in overall status. With so many migrants passing through the island, links to climate change or wholesale changes in populations on the European mainland and further afield are all too frequently implicated. Where merited, especially for the endemic species and subspecies, there is a discussion of taxonomic treatment. Summary totals for specimens held in museums around the world are also included.

A selection of attractive colour photos depicts various species, along with some of the more popular birding sites. There are four appendices, one of which presents biometric data from birds ringed in Cyprus and another is a birdwatching guide covering the sites of greatest interest.

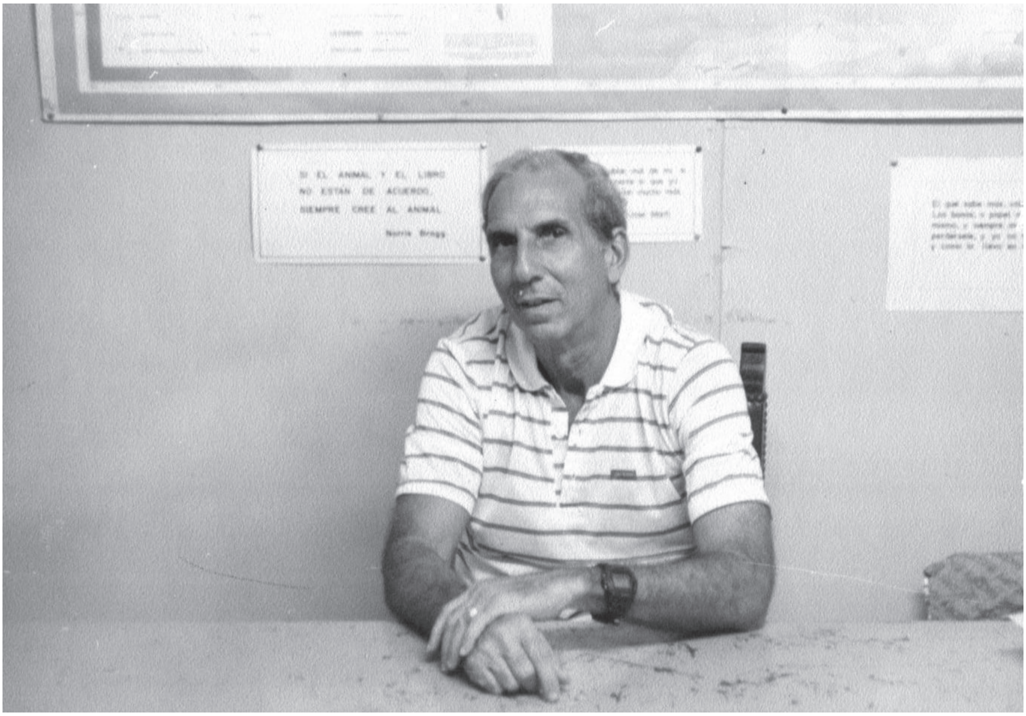
Overall, this is a comprehensive summary of current knowledge of the status of birds on the island of Cyprus. Anyone planning a visit, or with an interest in the island's avifauna, will surely want to have a copy.

Chris Bradshaw

OBITUARY

Orlando H. Garrido, 1931–2024

The outstanding Cuban naturalist Orlando Garrido, who passed away on 24 June 2024 at the age of 93, was an illustrious researcher, who served as guide to several generations of Cuban naturalists, ornithologists, herpetologists, ichthyologists and entomologists. His name is synonymous with Cuba and science, and he was foremost among the naturalists who inspired younger generations to study nature. A true legend, José Orlando Hilarión Ángel de Jesús Garrido was born on 1 March 1931, in La Habana. A charismatic man, he

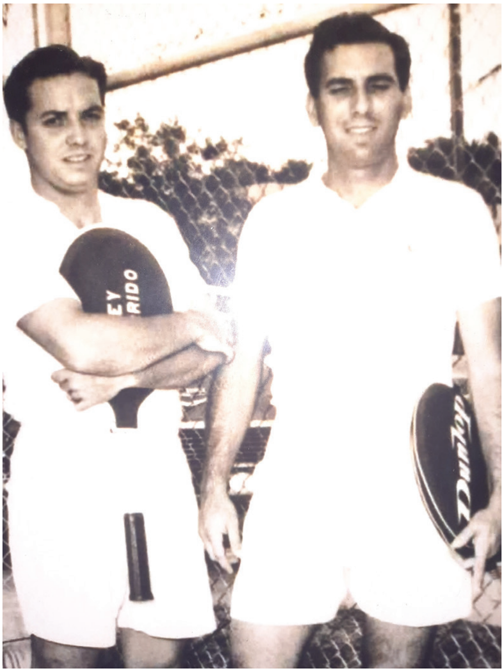


Orlando Garrido at the National Museum of Natural History of Cuba, La Habana (photographer unknown)

ISSN-2513-9894
(Online)

learned to read and write when he was seven years old; but graduated as a B.Sc. in 1948. Thereafter, he studied for a year at Havana Business Academy, where he learned typing and some English. He attended the University of Habana for a year before accepting a scholarship to the University of Miami, where he had an offer to join the tennis team. Between 1952 and 1956 he studied Natural Sciences and Business Administration, learning English, French, Portuguese and Italian in the process.

Orlando's introduction to sport was intercollegiate and interclub baseball, but from the age of 14 he was dedicated to tennis, twice becoming Cuba's national youth champion (under 18s), three-time junior champion (under 21s) and seven times senior champion in singles and doubles, the first in 1952 and the last in 1965. He also became a junior champion in Florida and during his four years he played in the University of Miami tennis team he broke the national record for most consecutive intercollegiate victories. During 1956–61 he was a fixture on the international tennis circuit, playing six times at Wimbledon, where in 1956 he reached the last 16 in the mixed doubles and the semi-finals of the main competition (but he retired to go and play in Germany). In both singles and doubles Orlando played against many Wimbledon champions.


Orlando (right) and his younger brother, Reynaldo Garrido, in their tennis days (photographer unknown)

Orlando played in ten Davis Cups. His best performance was in Montreal in 1959, with his younger brother Reynaldo (also Cuban national champion) as captain; they finally lost to Australia (eventual winners that year), whose team included the reigning Wimbledon champion Neale Frazer, Rod Laver, winner of two Grand Slams, and Roy Emerson, who held the then record for most Grand Slams. The same year his brother won the Canada Open, and Orlando reached the finals in singles and doubles. Over the years he beat the number one players of many countries, as well as several players ranked in the top ten from the USA and Australia. His sporting prowess was recognised in his absentia in 2002 'at the Hall of Fame of Cuban tennis' where he was awarded a plaque that he was able to collect only in 2004. In total Orlando visited 63 countries, 57 as a tennis player and six as a biologist.

According to Orlando he had three profiles: athlete, scientist and singer. The famous Cuban baritone Ramón Calzadilla, who was fond of snails and butterflies, nicknamed him 'the repentant baritone' (Orlando knew more than 100 zarzuelas, operettas and old songs). His family used to call him Caruso (in reference to Enrico Caruso the famous operatic tenor) and he really enjoyed to perform for friends and visitors alike.

His vocation for biology started in third grade, when his parents told him that they would buy him chickens in return for academic success. In time, he became the first in Cuba to raise laying hens (learning about it while he was in Dallas, Texas, during a tennis competition) and, based on crosses for several years, he obtained a domestic breed of chickens with a naked neck that laid as many eggs as the 'Leghorn' (average 250 eggs/year), dark eggs like 'creoles', and were immune to smallpox, but surprisingly nobody showed any interest in his results at the time.

In 1948 he started to make his first insect collection. Before entering the university, Orlando used to meet a group of prestigious Cuban zoologists in a coffee shop in Vedado, La Habana, every Friday night, which increased his knowledge and passion for nature.

In 1961, along with 12 colleagues, he founded the Cuban Museum of Natural Sciences, where he worked as a zoologist, creating the museum's first collections of birds, reptiles and amphibians; and he gave seminars and post-graduate courses in ornithology and herpetology for students from the university. Thereafter he worked at the Institute of Zoology for several years, than at a tourist center now called Marina Hemingway, and in 1986 he rejoined the new National Museum of Natural History of Cuba when it re-opened, where he worked until his 'retirement' in 2001.

Orlando faced several obstacles during his life, but most traumatic was when he was forced to resign as a curator from the national museum in 2001. However, life had to go on and he kept researching from home until the end of his life.

ISSN-2513-9894 (Online)

It is said that behind every great man is a great woman, and this was true of Orlando too. His wife since 1963, Gloria Agüero, worked with Orlando from 1965 to 1969. She travelled to the field with him during some of his early trips and, according to Orlando, in 54 years she never interfered in his professional affairs, enabling him to be entirely devoted to his research. I had the privilege to be his friend and colleague for more than 40 years, and by happy coincidence always lived near him. We liked to visit each other frequently, to chat about new ideas or a new project, including one of his dream research projects on hutias. In later years, he was always talking about the loose ends (*cabos sueltos*) in his research, and several times he regretted that he was not 20 years younger with time to sort out all his unfinished business.

Garrido was a real party animal and he loved to be the centre of attention, mostly chatting and always with a joke. His sense of humour was as legendary as his devotion to natural history; he could have been a comedian. One colleague described Orlando as a kid in an old man's body. He was simply unique. All his work colleagues or students have stories about Orlando and we really were lucky to work with him. With his perpetually shining eyes and ready smile, we all knew he was planning something mischievous. All in all, Orlando loved his life until the last minute, despite that it started to change when his dear wife Gloria died. He missed her very much; she used to tell me that as he got old he became like a small baby for her, trying to take care of him.

Orlando Garrido in later life, with one of the captive hutias he was studying (Arturo Kirkconnell)

Orlando always admired J. Gundlach (keeping a huge portrait of him at home) and the eminent German naturalist's famous motto 'I am a humble servant of Science', a role that Orlando also 'fulfilled'. The Cuban national hero José Martí (1853–95) wrote: 'Who knows more, is worth more. To know is to have. The coin melts, but knowledge does not. Bonds, or paper money, are worth more or less, or nothing, however knowledge is always worth the same, and always a lot. A rich man needs his coins to live, and if they are lost, he no longer has means to live. An educated man lives by his knowledge, and since he carries it within himself it is not lost, and his existence is easy and secure.' Orlando agreed and claimed I am a 'millionaire', because he preserved his father's legacy (his father said the only thing I can leave you is my house and my honesty), and he had the satisfaction of keeping both. But he also remarked that, if during his sporting days, tennis players had been paid as they are now, he would have earned three million dollars.

Orlando's contribution to our knowledge of Cuban biodiversity was unparalleled. Nicknamed the Field Marshal (Mariscal de Campo), he published a total of 305 papers and several books. *Catálogo de las aves de Cuba* (1975), co-authored by Florentino Garcia Montaña, was for decades the 'official' reference for professional ornithologists and students in Cuba. He was also the author of 172 new taxa, among them 21 new subspecies of birds, 91 new taxa of reptiles (47 of them new species), 58 new species of insects and a new species of coral reef fish, *Acanthemblemaria cubana*. In addition, he reported 46 new records of vagrant birds for Cuba and 29 new records for Cuba of fish. He also collected five new species of mammals in Cuba: *Mysateles auritus*, *M. sanfelipensis*, *M. meridionalis*, *M. arboricolus* and *Capromys garridoi*. Orlando could identify a new species of hutia by the shape of its faeces, and he estimated there were several cryptic species in this group awaiting description, but he was unable to publish them. It is hoped that his colleagues will finish this work. A total of 24 new species were dedicated to Orlando to honour his contributions, some of which had been collected by him, including scorpions, snails, insects, lizards and mammals.

Orlando was a scientific advisor to the Rare Center for Tropical Conservation based in Philadelphia, USA, a Corresponding Fellow of the American Ornithologists' Union, and an Honorary Member of the Cuban Zoological Society and the Linnaean Society of New York.

An amazing human being, open and helpful to everybody, he always gave a friendly hand, although it was not always reciprocated. I always believed that he never received all of the recognition he deserved, which is something that troubles those that worked closely with him.

The last time I saw Orlando was in a park near his house where he used to observe Cuban Blackbird *Ptiloxena atroviolacea* breeding behaviour, just a month before he died. It took him a few seconds to recognise me, but afterwards we talked for a while and before I left, I gave him the biggest hug and kissed him like my father. As I walked away, I told my oldest brother that I felt it would be the last time, and very sadly it was.

It was a blessing to have worked with him for so long, although I feel a twinge of sadness that he could not enjoy the second edition of our field guide to the birds of Cuba, a project of which he was truly proud.

An unmatched naturalist, Orlando, thank you for bestowing your huge knowledge and enormous legacy. Rest in peace Field Marshal.

Orlando is survived by two sons—Orlando Garrido Jr (60), who is married and lives in Mexico with his wife and two daughters, and Alexander Garrido (54), who lives in Miami.

Arturo Kirkconnell, with help from Orlando Garrido Jr

CORRIGENDUM

In *Bull. Brit. Orn. Cl*. 144: 207, it was suggested by Kit Hustler that the authors (Mandiwana-Neudani *et al*.) of two papers published in 2019 on Afrotropical francolins could be charged with 'nomenclatural harvesting'. However, none of the major components of 'nomenclatural harvesting', namely (1) introduction of new nomina based on (2) studies (usually molecular-phylogenetic) conducted by others and (3) on specimens not studied by the 'harvester/s', is applicable to the studies at issue here. We wish to apologise unreservedly to all four authors, T. Mandiwana-Neudani, R. Bowie, T. Crowe and R. Little, for this assertion, which was unquestionably incorrect and should not have been published.

The Hon. Editor

REFEREES

I am grateful to the following, who have reviewed manuscripts submitted to the Bulletin during the last year (those who refereed more than one manuscript are denoted by an asterisk in parentheses): Norbert Bahr (*), Bas van Balen, Louis Bevier, Shawn Billerman, Murray Bruce, Jennifer Cahill, Terry Chesser, Marco Crozariol (*), Paul Doniol-Valcroze, Robert J. Dowsett, Will Duckworth, Paul Dufour, Guy Dutson, Knut Eisermann, Andy Elliott (*), Paul van Els, Renate van den Elzen, Clem Fisher, Daniel Gibson, Luiz P. Gonzaga, Michel Gosselin, Phil Gregory, Hein van Grouw, Carlos Gussoni, Olivier Hamerlynck, Doug Harebottle, Julian P. Hume, Ulf Johansson, Oliver Komar, Alex Lees, Chris Lyal (*), Manuel Marín, Miguel Marini, Miguel Matta, Gerald Mayr, Jason Mobley, Andre E. Moncrieff, Richard Noske, Fernando Pacheco, Michael Patten, Bob Payne, Irene Pellegrino, Vítor Piacentini, Thane Pratt, Robert Prŷs-Jones (*), Pamela Rasmussen, Frank Rheindt (*), Andy Richford, Phil Round (*), Roger Safford, Manuel Schweizer, Iain Stenhouse, Fernando Costa Straube, Ryan Terrill, Colin Trainor, Andrew Vallely, Paola Velásquez, Philippe Verbelen, David R. Wells, Iain Woxvold and Mark Young.—The Hon. Editor

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:

Barclays Bank, 16 High Street, Holt, NR25 6BQ, Norfolk
Sort Code: 20-45-45
Account number: 53092003
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).

Notable updates on the status of selected waders and African Skimmer *Rynchops flavirostris* in Mozambique

by Gary Allport & James W. T. Hogg

Received 13 December 2023; revised 22 September 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:97E48362-6A20-4356-B0DF-1F5BB8899760

Summary.—The status in Mozambique of all waders (Charadriidae, Dromadidae, Glareolidae, Haematopodidae, Scolopacidae, Turnicidae) is reviewed covering records up to June 2024. Significant updates are presented for 18 rare or vagrant species, four additional species of IUCN Near Threatened status and eight others of interest. The first documented national records of African Oystercatcher *Haematopus moquini*, Madagascar Pratincole *Glareola ocularis*, Pacific Golden Plover *Pluvialis fulva*, Caspian Plover *Charadrius asiaticus*, Great Knot *Calidris tenuirostris*, Broad-billed Sandpiper *C. falcinellus* and Common Redshank *Tringa totanus* are reported. No documented records of Long-toed Stint *Calidris subminuta* or Spotted Redshank *Tringa erythropus* were found. Among Near Threatened species, numbers of Red Knot *Calidris canutus* and Eurasian Curlew *Numenius arquata* have declined recently in Mozambique, those of Great Snipe *Gallinago media* may be stable but warrant further survey, whilst numbers of Bar-tailed Godwit *Limosa lapponica* and Curlew Sandpiper *C. ferruginea* (the latter globally Vulnerable) are probably stable. A record of a possible Steppe Curlew *N. a. suschkini* is reported from Maputo province. Internationally important counts are reported at seven sites for Chestnut-banded Plover *Charadrius pallidus*, Bar-tailed Godwit, Tibetan Sandplover *C. atrifrons*, Crab Plover *Dromas ardeola* and Curlew Sandpiper, as well as for African Skimmer *Rynchops flavirostris* whose status we also reviewed. Further surveys of wetlands are a high priority, particularly on the coasts of central and northern Mozambique, and of major freshwater wetlands throughout the country.

Mozambique stretches along 2,700 km of the Indian Ocean coast in south-east Africa, with numerous estuaries and low-lying brackish and freshwater wetlands in the coastal plains. These form wintering areas for many Palearctic migrant wading birds, as well as habitats for Afrotropical migrants and residents in multiple families (Charadriidae, Dromadidae, Glareolidae, Haematopodidae, Scolopacidae, Turnicidae). Of the 74 species of waders known from the southern African subregion (*sensu* Hockey *et al*. 2005, i.e. Africa south of a line running east to west from the Cuene River in Namibia, along the northern Zimbabwe border and the Zambesi River in Mozambique) 56 have been recorded in Mozambique (Peacock 2016, this work).

Hockey *et al*. (1986) reviewed records of rare and vagrant scolopacids in southern Africa, including from Mozambique, and Hockey *et al*. (2005) updated and summarised status of all wader species. Since then, there has been increasing interest in Mozambique by field ornithologists, many of them visiting from South Africa, with a focus on sites in the southern African subregion (Hockey *et al*. 2005). With increasing access to high-quality identification aids (e.g. Peacock 2016), ease of documentation with digital photography and the sharing of observations via citizen science tools such as BirdLasser and eBird, many new sightings have been reported, among them interesting new records of waders.

ISSN-2513-9894 (Online)

We reviewed existing information on all waders in Mozambique plus African Skimmer *Rynchops flavirostris* due to its ecological affiliation. We present accounts for all species with significant updates to status including those at risk (IUCN Red List categories Near Threatened to Critically Endangered), rare and vagrant waders in Mozambique and, in some cases, the wider subregion. We have treated records pre-2005, which were also covered in prior texts up to and including Hockey *et al*. (2005), as historical, and records between January 2005 and May 2024 as recent. We sought to evaluate the extent to which a species' status has either changed or become better understood in the light of recent data, and have included details for all those species we considered to be of interest.

Methods

Species were selected for inclusion based on the following criteria: (1) Red List status of Near Threatened or a higher category of threat (BirdLife International 2024); (2) rarity in terms of national or regional records; and (3) other species with a notable update in status based on recent records. Thirty species met one or other of these criteria (Table 1) in one or other of three groups: (i) rare and vagrant species, (ii) Near Threatened species not covered by the first category, and (iii) additional species of interest. Species accounts are presented in taxonomic order within each of these groups.

We aimed to determine the veracity of records based on available evidence and we highlight all those that are documented. For rarities, we consider as documented a field observation (involving one or more individuals) that has met one or more of the following criteria: accepted by a rarities committee, with details made available; or reviewed and published in a journal, with details provided to establish the identification; or records based on museum specimens. Similarly, sightings mentioned in the Recent Reports section of *Bulletin of the African Bird Club* and records submitted to publicly accessible citizen science platforms (eBird, SABAP2; see below) if evidenced with a photograph or sound-recording are also treated as documented. Rarity reports without evidence, i.e. if the above criteria are not met, are considered undocumented, even if citizen science records have been accepted by platform reviewers or published in a journal. We have attempted to include all significant undocumented records in our review, but in the case of first national records we make recommendations for future treatment.

To minimise observer bias, particularly where individual birds were reported by many observers at one locality over a short period of time, we have tried to account for observer effort. One 'record/month' (as shown in Table 1) from eBird (Auer *et al*. 2024) or SABAP2 (Brooks & Ryan 2024) is defined as one or more entries in a calendar month, per year, per site. For example, Sharp-tailed Sandpiper was reported in 34 eBird checklists, but many of these are 'duplicate' records on the same day or within a few days of each other. Thus, the 34 eBird checklists at the same location in 12 different months over five years are treated in Table 1 as 12 record/months.

The main body of new information is from observations mostly in southern Mozambique (south of the Rio Save) across the range of coastal sites outlined in Allport (2018a); 24 visits to the Vilanculos Coastal Wildlife Sanctuary which is better known, and hereafter referred to, as San Sebastian (see Appendix 1 for detail of locations) during April 2018–August 2021 (see Appendix 1 of Allport *et al*. 2022 for details of dates and observers); and a shorebird survey of the Great Bazaruto Key Biodiversity Area comprising Bazaruto National Park and the abutting coastal wetlands of Bartolomeu Dias to the north and San Sebastian to the south (Wildlife Conservation Society *et al*. 2021) on 24 November–4 December 2023 (Ryan *et al*. submitted).

ISSN-2513-9894
(Online)

TABLE 1

Status and records from main sources for species covered in this paper. Red List status from BirdLife International (2024): LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered. To minimise observer bias, particularly where individual birds were reported by many observers at one locality over a short period of time, we have tried to account for observer effort to eliminate or reduce spatial and temporal bias in reporting. One 'record/month' from eBird (Auer *et al*. 2024) or SABAP2 (Brooks & Ryan 2024) is defined as one or more entries in a calendar month, per year, per site, e.g., Curlew Sandpiper is recorded on >930 eBird checklists between 2005 and June 2024, which becomes 123 'record/months' (see main text). eBird data prior to 2005 in parentheses.

Species	**Red List Status**	**Rationale for inclusion**	**eBird record/ months**	**SABAP2 record/ months**
		Species covered in this review		
		Rare and vagrant species		
African Oystercatcher *Haematopus moquini*	LC	National rarity	13	0
Eurasian Oystercatcher *Haematopus ostralegus*	NT	Regular but scarce visitor	22	6
Madagascar Pratincole *Glareola ocularis*	NT	National rarity	1	1
Pacific Golden Plover *Pluvialis fulva*	LC	Regional rarity	3	1
Chestnut-banded Plover *Charadrius pallidus*	LC	Scarce and local	27 (4)	6
Caspian Plover *Charadrius asiaticus*	LC	National rarity	5	2
Black-tailed Godwit *Limosa limosa*	NT	National rarity	1	0
Great Knot *Calidris tenuirostris*	EN	Continental rarity	2	1
Red Knot *Calidris canutus*	NT	Nationally scarce	14	3
Broad-billed Sandpiper *Calidris falcinellus*	VU	National rarity	1	1
Sharp-tailed Sandpiper *Calidris acuminata*	VU	Continental rarity	12	0
Long-toed Stint *Calidris subminuta*	LC	Continental rarity	0	0
Red-necked Stint *Calidris ruficollis*	NT	Continental rarity	1	0
White-rumped Sandpiper *Calidris fuscicollis*	VU	Continental rarity	4	1
Pectoral Sandpiper *Calidris melanotos*	LC	Regional rarity	13	5
Green Sandpiper *Tringa ochropus*	LC	Nationally scarce	9	4
Common Redshank *Tringa totanus*	LC	Regional rarity	4	1
Spotted Redshank *Tringa erythropus*	LC	Regional rarity	0	0
		Globally and Near Threatened species		
Grey Plover *Pluvialis squatarola*	VU	Fairly common visitor	103 (7)	70
Eurasian Curlew *Numenius arquata*	NT	Scarce visitor	41 (3)	12
Bar-tailed Godwit *Limosa lapponica*	NT	Locally common visitor	74 (7)	45
Curlew Sandpiper *Calidris ferruginea*	VU	Common visitor	123 (7)	74
Great Snipe *Gallinago media*	NT	Local visitor	10	7
		Other species of interest		
Tibetan Sand Plover *Charadrius atrifrons*	LC	Regular but scarce visitor	77 (5)	44
Long-toed Lapwing *Vanellus crassirostris*	LC	Local resident	44	27
Crab Plover *Dromas ardeola*	LC	Local visitor	52 (6)	27
Terek Sandpiper *Xenus cinereus*	LC	Fairly common visitor	103 (10)	59

ISSN-2513-9894 (Online)

Black-rumped Buttonquail *Turnix nanus*	LC	Scarce resident	27 (1)	24
Bronze-winged Courser *Rhinoptilus chalcopterus*	LC	Scarce resident	15 (1)	7
Temminck's Courser *Cursorius temminckii*	LC	Rare resident	49	34
African Skimmer *Rynchops flavirostris*	LC	Rare resident	34 (2)	15

Until recently there had been generally poor access to and coverage of freshwater and brackish wetlands in Mozambique, but two sites near Maputo have now been studied quite intensively: Macaneta (>400 site visits; Allport 2018b, Allport 2021) and the wetlands at Bela Vista (>96 visits since October 2020).

Bird records from Mozambique have not been consistently captured, reviewed and published so, in order to undertake a thorough review, we have drawn information from all recently published and grey literature. We reference data from the Southern African Bird Atlas Project 2 (SABAP2), where observers use a mobile phone app and website (https://www.birdlasser.com/) or atlas cards to submit records (Brooks & Ryan 2024). Note that data gathering for SABAP2 commenced in 2007, so we consider all these data as recent. Records in the eBird database are cited as Auer *et al*. (2024). Specific eBird checklists are referenced by the checklist number, e.g. S1234567 and can be accessed via the eBird website using the URL syntax https://ebird.org/checklist/S... Both datasets are published periodically and can be accessed via the Global Biodiversity Information Facility (GBIF). Records for species of interest were identified by opening the relevant dataset in GBIF, with additional records not yet captured by the latter being accessed via the eBird website. Most eBird data were collected post-2005; for information, we show record/month totals for species prior to 2005 in Table 1. Many observers use both eBird and SABAP2/BirdLasser, so care was taken to account for duplicated records.

The atlas of the birds of Mozambique (Parker 1999, 2005) is a major source of information on the nation's avifauna; Parker (1999) covered the territory south of the Save River and Parker (2005) treated the provinces of Manica, Sofala and Tete. Thus, the atlas covered all southern Mozambique along with the relatively small area of Tete province north of the Zambezi and therefore outside the southern African subregion *sensu* Hockey *et al*. (2005). The avifauna of the rest of northern Mozambique is yet to be covered by a major study.

With respect to Hockey *et al*. (1986), it is not clear from their text what information was reviewed for each record, including the first records for Mozambique of Long-toed Stint *Calidris subminuta*, Red-necked Stint *C. ruficollis* and Broad-billed Sandpiper *C. falcinellus*. The original rarities submissions were retained by the Southern African Rarities Committee and transferred to BirdLife South Africa when the latter assumed support for the committee in the 1990s. A portion of the files including the Mozambique wader records reviewed by Hockey *et al*. (1986) was lost during an office relocation and, as a result, details for several species are no longer available (H. Smit-Robinson *in litt*. 2021). Since the details were lost, we were unable to interrogate these reports in light of updated knowledge and the records are now effectively undocumented.

We consider Parker (1999, 2005) and Hockey *et al*. (2005) as the last consolidated information for the region's waders, thus records pre-dating those publications are referred to here as historical, as are any pre-2005 records we found not included in those texts. Some historical data may have been overlooked including 'new' data made available as notebooks have been digitised via citizen science platforms. Records since 2005 are referred to as recent.

We checked high site counts against the Ramsar 1% threshold site population criterion for the relevant subpopulations of the species concerned, sourcing threshold data via the

ISSN-2513-9894
(Online)

Critical Sites Network tool (Critical Sites 2023); site counts that exceed the criterion are flagged below. However, we do not present a full review of all site counts of international importance because some regularly occurring species not covered here will meet this criterion at certain sites. Therefore, this paper should not be considered a complete review of all known internationally important waterbird sites in Mozambique.

Rare and vagrant waders

AFRICAN OYSTERCATCHER *Haematopus moquini* Least Concern
A bird noted by de Boer & Bento (1999) close to three European Oystercatchers *H. ostralegus* at Ilha da Inhaca in December 1996 was apparently the first record for Mozambique (Parker 1999), although any supporting details are unpublished to our knowledge. There have been 12 further records since, eight of them documented (Table 2, Fig. 1) most in May–August and as far north as San Sebastian.

Endemic to coastal southern Africa, from Namibia to Eastern Cape, South Africa (Hockey *et al*. 2005). Adults are sedentary but on the west coast juveniles travel 1,000–2,000 km north to central Namibia/southern Angola; on the east coast, movements from Eastern Cape to KwaZulu-Natal mostly remain within the breeding range (Underhill *et al*. 1999, Hockey *et al*. 2003, 2005, Hockey & Kirwan 2020). Of 11 birds photographed two (involving three birds) at San Sebastian showed features of adults (M. Buckham, S142833045), four together at Ponta da Macaneta were immature, albeit probably not in their

TABLE 2
Records of African Oystercatcher *Haematopus moquini* in Mozambique.

Date	Count	Locality	Source	Supporting evidence
December 1996	1	Ilha da Inhaca	de Boer & Bento (1999)	
July 2012	1	San Sebastian	Read *et al*. (2014); A. Lund *in litt*. (2023)	
12 August 2012	1	Rio Limpopo mouth	observer unknown; sa-rarebirdnews@googlegroups.com in *Bull. Afr. Bird Cl*. 20: 100	
13 June 2014	1 (imm)	Ponta Malongane	A. Joubert *per* T. Hardaker in *Bull. Afr. Bird Cl*. 21: 244	Photographed (Fig. 1)
30 July 2015	1	Inhambane	K. Williams, S26164376	
First week May 2017	4	Pomene	observer unknown; T. Hardaker in *Bull. Afr. Bird Cl*. 24: 241	
5 July 2020	1	South of Ilha da Inhaca	G. Pollard, S71472770; GA, T. Hardaker & E. Marais in *Bull. Afr. Bird Cl*. 28: 108	Photographed
14 May 2021	1 (1st-y)	Ponta da Macaneta	A. Delegencio, S110291802	Photographed
13 August 2022–29 January 2023	3–5	San Sebastian	N. Perrins S117026972; T. Hardaker in *Bull. Afr. Bird Cl*. 30: 117	Photographed
19 June 2023	4 (all imm)	Ponta da Macaneta	E. Marais *in litt*. (2023), S. Liebert & JH, S142075233	Photographed
26 June 2023	(2 ad, 1 imm)	San Sebastian	M. Buckham *in litt*. (2023), S142833045	Photographed
25 November 2023–1 January 2024	1 (ad)	San Sebastian	JH, A. McLean, C. Dorse, S156130241; Ryan *et al*. (submitted); C. Dednam *in litt*. (2023), S157854234, E. le Roux *in litt*. (2024)	Photographed
29 May 2024	3 (imm)	Dunes de Dovela	T. Bruneau *in litt*. (2024), S178007383	Photographed

Figure 1. African Oystercatcher *Haematopus moquini* at Ponta Malongane on 13 June 2014, the first documented record of the species in Mozambique (© A. Joubert)

first year (E. Marais *in litt*. 2023; S. Liebert & JH, S142075233) and one at Macaneta was a juvenile following the ageing criteria of Peacock (2016). The southern Mozambique coastline predominately comprises sandy beaches and muddy estuaries, and thus is not ideal for a species that prefers rocky habitats (Hockey *et al*. 2005). However, breeding productivity has increased since 1980, to some extent following the invasion of rocky shores by alien Mediterranean mussel *Mytilus galloprovincialis*, which has now also spread east and is apparently partially responsible for the population increase and perhaps spread in range (Brown & Hockey 2007, Brown *et al*. 2019). Further records are thus more likely in Mozambique.

EURASIAN OYSTERCATCHER *Haematopus ostralegus* Near Threatened

A rare non-breeding Palearctic summer migrant to southern Mozambique with groups of five to six recorded at Ilha do Bazaruto in several years, and three at Inhaca in December 1996 (Parker 1999, de Boer & Bento 1999). There is a historical sighting at Maputo on 4 June 1957, but with no further details (Hockey *et al*. 2005).

Since 1996, it has been reported in small numbers (<10) near-annually and many records have been documented photographically at Beira, Ilha de Benguerra, Ilha de Magaruque (Bazaruto archipelago), Inhambane, Quirimbas, Rio Savanne, San Sebastian and Vilankulos (Hockey *et al*. 2005, Auer *et al*. 2024, Brooks & Ryan 2024; T. Hardaker in *Bull. Afr. Bird Cl*. 9: 147, 16: 107, 19: 104, 20: 225, 25: 242, 27: 112, M. Wilson in *Bull. Afr. Bird Cl*. 17: 121, E. Marais in *Bull. Afr. Bird Cl*. 22: 244, GA & T. Hardaker in *Bull. Afr. Bird Cl*. 26: 113, 27: 270, GA & D. Gilroy in *Bull. Afr. Bird Cl*. 26: 240, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 28: 257–258, GA, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 112, JH & T. Hardaker in *Bull. Afr. Bird. Cl*. 29: 249, T. Hardaker in *Bull. Afr. Bird Cl*. 30: 117; C. Read *in litt*. 2022). At San Sebastian there were at least 25 observations during 2005–24, in all months except August (Auer *et al*. 2024; C. Read *in litt*. 2022) with a max. 18 on 13 February 2020 (C. Read, E. Marais & A. McLean, S65037134). There is one record from northernmost Mozambique: two at Afungi Peninsula on 2 November 2014 (B. Abi Jummaa, S40280559). The southernmost recent records are from mudflats at the north end of Maputo Bay: one on 9 June 2013 (GA, S14375371), two on 16 May 2016 (GA, S94918989), one on 9 June 2019 (GA, S94919094), one at Ponta da Macaneta on 23 March 2021 (G. Rowan, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 28: 258) and two at Maputo on 29 March–2 April 2023 (JH, S132109057).

In southern Africa *H. ostralegus* is a rare but annual non-breeding visitor with <20 birds per annum, mostly in December–March, but with records in all months (Peacock 2016). Based on the observations reported here, the species is a very uncommon but regular and local visitor, most frequent in the boreal winter.

MADAGASCAR PRATINCOLE *Glareola ocularis* Near Threatened

Britton (1977) noted that a supposed record at the Zambezi Delta was erroneous and had been already discounted by Benson (1971). One photographed at the Quirimbas archipelago on 30 September–1 October 2010 (D. Hoddinott in *Bull. Afr. Bird Cl*. 18: 101) is apparently the

ISSN-2513-9894
(Online)

first documented record for Mozambique. There is a subsequent record at Mahate, north of Pemba, on 9 September 2014 (D. McKenzie, S68312772; Brooks & Ryan 2024); however, the single photograph in support is not conclusively identifiable to species and no additional information on this bird is in the public domain.

During the austral winter non-breeders are concentrated at key sites in East Africa, with thousands at specific coastal sites in Tanzania and Kenya (Delany *et al*. 2009). One reached the Eastern Cape of South Africa in 2005 and 2007, details of which only came to light in 2020 as the first record for southern Africa (Peacock 2020). The species' range is often said to include northern Mozambique (Delany *et al*. 2009, Maclean & Kirwan 2020) with a possible migrant population of <5,000 birds visiting Tanzania and Mozambique (Delany *et al*. 2009). The species was not mentioned by Clancey (1996) or Parker (1999, 2005), although their coverage did not extend sufficiently far north to include likely passage or wintering areas. Authors of major texts seem, not unreasonably, to have assumed that as the species breeds south of Mozambique and winters to the north that it must occur regularly, at least on passage. Similar assumptions have been made for other species, e.g., Pearl-breasted Swallow *Hirundo dimidiata* (Allport *et al*. 2021), where no evidence is available to support mapped but presumed distributions in Mozambique. The low observer coverage in the likely area of occurrence has probably led to the lack of records from what is possibly a brief passage period, with perhaps very few or no resident birds. Any future records of the species in Mozambique should be documented.

PACIFIC GOLDEN PLOVER *Pluvialis fulva* Least Concern

No records mentioned for southern Mozambique by Parker (1999), however an observation at Ilha dos Portugueses off Ilha da Inhaca, in February 1987 was mentioned in Parker (2005) but no details were given by the observers (Nilsson & Shubin 1998).

Figure 2. First-year Pacific Golden Plover *Pluvialis fulva*, Ponta da Barra, Inhambane, Mozambique, 21 October 2007; note short primary projection and longer tertials, which distinguish it from American Golden Plover *P. dominica*; first documented record for Mozambique (© M. Booysen)

ISSN-2513-9894 (Online)

TABLE 3
Records (all involving single birds) of Pacific Golden Plover *Pluvialis fulva* in Mozambique.

Date	**Locality**	**Source**	**Supporting evidence**
February 1987	Ilha dos Portugueses / Ilha da Inhaca	Nilsson & Shubin (1998), Parker (2005)	
9 December 2007	Rio Zambezi mouth	P. Collins, G. Graham, J. Graham & N. du Preez in *Bull. Afr. Bird Cl.* 15: 274	
21 October 2007	Ponta da Barra	M. Booysen *in litt.* (2021)	Photographed (Fig. 2)
20 January–18 April 2008	Ponta da Barra	E. Marais *in litt.* (2019), M. Booysen *in litt.* (2021)	
20 March 2015	Ponta da Barra	M. Booysen *in litt.* (2021), GA in *Bull. Afr. Bird Cl.* 22: 244	
10 December 2016	Rio Maria	E. Marais *in litt.* (2022), T. Hardaker & GA in *Bull. Afr. Bird Cl.* 24: 108	
8–17 December 2009	Quirimbas archipelago	Borghesio & Gagliardi (2011)	
14 September 2021	Bela Vista wetlands	JH, S94640883; GA, JH & T. Hardaker in *Bull. Afr. Bird Cl.* 29: 112	Photographed
21 March 2022	San Sebastian	A. McLean, S105831544; JH & T. Hardaker in *Bull. Afr. Bird Cl.* 29: 249	Photographed
25 November 2023	San Sebastian	JH, A. McLean, C. Dorse, S156130241; Ryan *et al.* (submitted)	Photographed

There have been a further nine reports (Table 3) in Mozambique, all in September–April (four with supporting evidence) indicating that it is a vagrant to the country. Three or four *P. fulva* are typically recorded in southern Africa annually (Peacock 2016) and in Mozambique the species is possibly overlooked given low observer coverage and the potential for confusion with Grey Plover *P. squatarola*, which is superficially similar in non-breeding plumage.

CHESTNUT-BANDED PLOVER *Charadrius pallidus* Least Concern
Reported as common and breeding at Beira by Clancey (1996) but the nesting event may have been an opportunistic response to unusual local conditions as there have been no further breeding records in Mozambique (Parker 2005). Recorded on five occasions, singly or in pairs, in February, May, September and December around Bazaruto and Inhambane (Parker 1999) and it was noted further south at Bela Vista by Clancey (1996) and at Lagoa Xinguti, Maputo Special Reserve (date unknown, but prior to 1999; Parker & de Boer 2000).

More recently, observed infrequently at Xai-Xai, Ilha de Magaruque (Bazaruto archipelago), Beira and at Rio Savanne, in groups of <10 (C. Read *in litt.* 2021; Auer *et al.* 2024, Brooks & Ryan 2024) and with greater frequency in the Tofo and Inhambane area (eight records) and at San Sebastian (13 records), with larger counts of 15 on 6 August 2018 at San Sebastian (GA, S47777348) and 32 on 11 November 2019 at Tofo (J. York, S62237498). A notable inland record involved 12 at Lago Cuduhi on 17 November 2023 (JH, T. Bruneau, B. Cholley, S154625689). No further records in the far south of Mozambique until September 2021, when JH found three at Bela Vista. Since then it has been observed (by JH pers. obs., S. Liebert, T. & A.-M. Moore & T. Taimo) several times at Bela Vista and Salinas Zacharia with some significant counts (Table 4): 129 on 2 September 2022 and 141 on 24 June 2023 at Bela Vista were exceptional, and the latter exceeds the Ramsar 1% threshold of 130 birds

ISSN-2513-9894
(Online)

TABLE 4

Summary of recent records of Chestnut-banded Plover *Charadrius pallidus* in Maputo province, Mozambique.

Date (month/year)	Locality	No. observations	Max. count	Sources
September 2021	Bela Vista	3	13 (11 ad, 2 juv)	JH, S94640883, S94966022
September 2021	Salinas Zacharia	1	7	JH, S94922121
May 2022	Salinas Zacharia	2	3	JH, S111568895, T. & A. M. Moore *in litt.* 2022, S111719717
June 2022	Salinas Zacharia	1	3	S. Liebert *in litt.* 2022, S111856953
July 2022	Bela Vista	2	5	JH, S114450691, S115479584
August 2022	Bela Vista	2	6	JH & T. Moore *in litt.* (2022), S116651106. JH, S117195417
September 2022	Bela Vista	1	129	JH, S117940575
June 2023	Bela Vista	1	141	JH, T. & A. M. Moore & P. Vrooman *in litt.* (2023), S142521066
July 2023	Bela Vista	1	76	JH, S143991455
August 2023	Bela Vista	3	64	JH, S146402181. JH, A. Taas & H. Costa *in litt.* (2023), S147035923. JH, S147766229
September 2023	Bela Vista	2	50	JH, S149766796, S150251934
November 2023	Bela Vista	1	1	JH, S154893270

for the southern Africa population (*pallidus*), making the site internationally important for the species (Critical Sites 2023). Surveys of the Great Bazaruto Key Biodiversity Area in November–December 2023 found >400 individuals in the Bartolomeu Dias area (Ryan *et al*. submitted), well above the Ramsar 1% criterion. There are extensive saltpans at Nova Mambone, unsurveyed at least in recent times, which may hold significant numbers of the species.

In southern Africa *C. p. pallidus* is considered resident, partially migratory and nomadic, moving in response to drying of inland habitats (Simmons *et al*. 2007, Wiersma *et al*. 2020) with some evidence of opportunistic breeding (Delany *et al*. 2009). The species is often found in (hyper-)saline habitats, some of which hold large numbers of Greater *Phoenicopterus roseus* and Lesser Flamingos *Phoeniconaias minor*, both of which are presumed to move to the coast of Mozambique from Botswana (Parker 1999, Hockey *et al*. 2005) and Chestnut-banded Plovers in southern Mozambique may have similar origins. There are no reports proving the species nests in Mozambique, although it has been recorded in small numbers in all months. Larger numbers are observed in August–November, which does suggest post-breeding dispersal. In Mozambique, the species is thus a local and generally uncommon non-breeding visitor. Further observer effort is needed in Inharrime province, especially at Nova Mambone.

CASPIAN PLOVER *Charadrius asiaticus* Least Concern

Very poorly known in Mozambique: four published but undocumented records by Rosa Pinto, from Maputo (Clancey 1996, Parker 1999), Albufeira Cahorra Bassa in November 1992 (S. Edwards in Parker 2005), the Rio Save in Zinave National Park in October 1997 (Parker 1999) and the Rio Urema floodplain in August 1999 (R. Cassidy in Parker 2005). Three records were mapped in Hockey *et al*. (2005) but without details.

Recent reports involve singles at Salinas Zacharia on 12 April 2011 (GA, S97106345, description provided) and Benga, Tete province on 30 October 2013 (D. McKenzie *in litt.*

ISSN-2513-9894
(Online)

Figure 3. Caspian Plover *Charadrius asiaticus*, Gorongosa National Park, Mozambique, 23 October 2016; the first documented country record (© Z. Pohlen)

2013; Brooks & Ryan 2024). A flock of 36 at Gorongosa National Park on 17 October 2016 (Z. Pohlen & C. Gesmundo *in litt*. 2016; S33982187; Fig. 3) was the first record supported by a photograph and was followed by a series of observations, mostly of 1–2 birds, until 16 November 2016. Finally, one at Macaneta on 4–25 February 2024 (JH & S. Jones, S160628994, T. & A. M. Moore, S161197293, JH, S162839291).

Mostly spends the non-breeding season north and west of Mozambique in Zambia, northern Namibia, Botswana, western Zimbabwe and north-west South Africa (Hockey *et al*. 2005). A very rare vagrant to Mozambique in August–April and any future observations should be reported with full details.

BLACK-TAILED GODWIT *Limosa limosa* Near Threatened

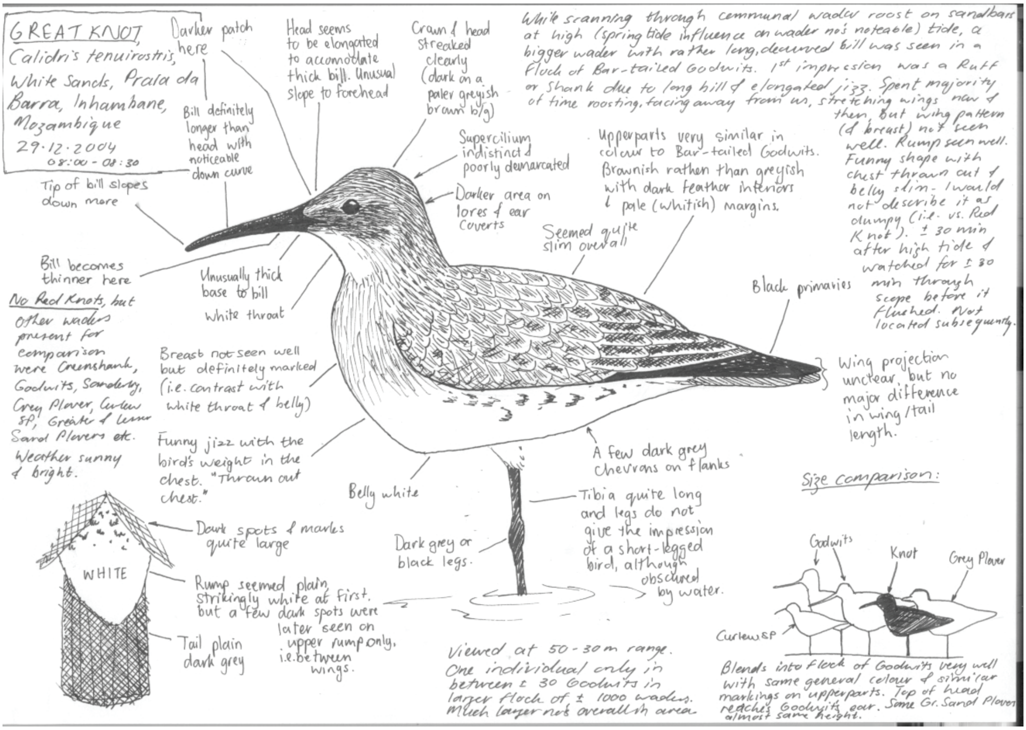
Just two records: two birds seen on the Urema floodplain, probably within Gorongosa National Park, in August 1999 (Parker 2005) and one at Rio Sungwe in Gorongosa National Park on 24–25 November 2017, which was the first documented record (Z. Pohlen & C. Gesmundo, S41369625; Pohlen *et al*. 2020).

Forty-three records were reported in southern Africa by Hockey *et al*. (1986) prior to 1984, with all but one at inland wetlands in eastern and southern South Africa. Apparently increasing, Peacock (2016) noted that more recently there have been 5–10 records annually in the southern African subregion. It is a vagrant to Mozambique but is probably under-recorded due to a lack of coverage of inland freshwater wetlands.

GREAT KNOT *Calidris tenuirostris* Endangered

The first record in Mozambique, and the second for the subregion, was at Ponta da Barra on 29 December 2004. This record was presented by Peacock (2016) and his field notes, which we consider to establish the identification, appear in Fig. 4. The same locality subsequently hosted a series of records, with three on 20 September 2008 (M. Booysen *in litt*. 2008; photo at https://groups.google.com/g/sa-rarebirdnews/c/1fDa3ThihC8/m/5fxIkRZ0gHEJ), one on

ISSN-2513-9894 (Online)



GREAT KNOT,
Calidris tenuirostris,
White Sands, Praia da
Barra, Inhambane,
Mozambique
29·12·2004
08:00 - 08:30

While scanning through communal wader roost on sandbars at high (spring tide influence on wader no's noteable) tide, a bigger wader with rather long, decurved bill was seen in a flock of Bar-tailed Godwits. 1st impression was a Ruff or Shank due to long bill & elongated jizz. Spent majority of time roosting, facing away from us, stretching wings now & then, but wing pattern (& breast) not seen well. Rump seen well. Funny shape with chest thrown out & belly slim - I would not describe it as dumpy (i.e. vs. Red Knot). ± 30 min after high tide & watched for ± 30 min through scope before it flushed. Not located subsequently.

No Red Knots, but other waders present for comparison were Greenshank, Godwits, Sanderling, Grey Plover, Curlew sp, Greater & Lesser Sand Plovers etc.

Weather sunny & bright.

Viewed at 50-30 m range. One individual only in between ± 30 Godwits in larger flock of ± 1000 waders. Much larger no's overall in area.

Blends into flock of Godwits very well with same general colour & similar markings on upperparts. Top of head reaches Godwit's ear. Some Gr. Sand Plover almost same height.

Figure 4. Field notes and sketches by Faansie Peacock (reproduced with permission from Peacock 2016) of Great Knot *Calidris tenuirostris*, Ponta da Barra, Mozambique, 29 December 2004; the first record for Mozambique and second for southern Africa (© F. Peacock)

Figure 5. One of two Great Knots *Calidris tenuirostris*, Ponta da Barra, Mozambique, 6 March 2015 (© M. Booysen)

ISSN-2513-9894
(Online)

30 April 2014 (E. Marais *in litt*. 2014, S94982808; documented) and two on 6–21 March 2015 (M. Booysen *in litt*. 2020; Fig. 5). After a gap of eight years, one was at San Sebastian on 18 December 2023 (E. Marais, S167296521, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 31: 117).

Breeds in north-east Siberia (Lappo *et al*. 2012) and winters mainly in coastal South-East Asia and Australia but also west to South Asia and Arabia (van Gils *et al*. 2020a). It is a vagrant to Africa with records in Morocco, Djibouti and Uganda, but the first sub-Saharan record was at West Coast National Park, South Africa in December 2000 and (presumably) the same bird returned in March–April 2002 and October 2002–March 2003 (Cohen & Winter 2003). The relatively small Arabian and western Indian Ocean population (2,000–5,000 birds) is recognised as separate (Delany *et al*. 2009). The series of records at Ponta da Barra of, presumably, at least four birds probably returning to use this locality is remarkable, especially given the paucity of records further north in Africa; it may be that birds in Mozambique are from the Arabian wintering population.

RED KNOT *Calidris canutus* Near Threatened

The first record involved a bird shot at Maputo on 30 August 1969; it had been ringed at Dungeness, Kent, UK, confirming that nominate *C. c. canutus* occurs in southern Africa (Clancey 1996). Subsequently, several counts of up to 135 were made at Maputo and Ilha da Inhaca during 1975–78 (Vittery 1989). Few details were given of these records or those by Herdam (1994), but they were cited by Parker (1999), who reported presence at Maputo in groups of up to 80 birds in June, September, November and December, from 1977 to 1983. Parker (2005) mentioned a sighting of *c*.10 at San Sebastian in March 2003 (D. Pietersen) but the record was not included by Read *et al*. (2014).

More recently, one at Pomene on 30 September–6 October 2017 (Cizek 2017) and eight records at San Sebastian, in March 2013, January 2014, September 2019, June 2020, May 2021, June 2021, April 2023 and November 2023 (C. Read *in litt*. 2023; Auer *et al*. 2024); the largest count was 13 on 11 May 2021 (N. Perrins, S88193202). Further south, one at Ilha da Inhaca on 28 June 2018 (A. Parkes, S63751684) and in Maputo Bay one on 24 November 2013, eight on 20 August 2016, one on 18–19 September 2018 (GA; first photographic record, S48604712) and one at Macaneta on 15 November 2021 (D. Minney, S76271793, GA, T. Hardaker & E. Marais in *Bull. Afr. Bird Cl*. 28: 108). Up to three in Maputo Bay on 7 January–29 March 2023 (S. Liebert, S125617146, JH, S125764911, S129580117) and 2–6 on 13 March–11 April 2024 (JH, S164593049, S168096645).

Migrants of the nominate race stage in the Wadden Sea, then travel non-stop to coasts of West Africa and from there some reach southern Africa arriving from October (Delany *et al*. 2009). There is an almost complete absence of records on the east coast of Africa, e.g., five sight records reported by Stevenson & Fanshawe (2020), with an additional two records in Tanzania (N. Baker *in litt*. 2023). In southern Africa it is a fairly common migrant to a few key sites on the west coast of South Africa but is sporadic further east (Peacock 2016). With little evidence for migration south along the East African coast, it seems likely that birds in Mozambique have moved east and north around the Cape of Good Hope. The species was an uncommon visitor to southern Africa in the late 19th and early 20th centuries (Vincent 1952 cited in Summers *et al*. 2011) with a notable increase in the 1970s and 1980s, when *c*.12,500 were recorded at several sites in the region (Summers *et al*. 2011). In the 1970s to mid-1980s it was more frequent and numerous in Mozambique (Hockey *et al*. 2005) than at present and the historic high counts coincided with a peak in records in South Africa. It has been postulated that birds arrived in South Africa as a large population (500,000 birds at that time) spilled south from preferred wintering sites in West Africa; evidently, some made it to Mozambique. Since then there has been a sharp reduction in numbers wintering in West Africa, in turn in South Africa (Summers *et al*. 2011) and thus Mozambique. Red Knot is now a scarce visitor to southern Mozambique in the boreal winter.

BROAD-BILLED SANDPIPER *Calidris falcinellus* Vulnerable

The map in Hockey *et al*. (1986) showed two records at Ilha da Inhaca, and Hockey *et al*. (2005) also mapped two locations, Ilha da Inhaca and one slightly further north in Maputo Bay. Neither account cited sources and the original material pertaining to these records, probably held by the Southern African Rarities Committee, has unfortunately been lost. One record on Ilha da Inhaca was subsequently noted by de Boer & Bento (1999) as being from Berruti & Sinclair (1983) but the latter does not serve to substantiate the record. This source was not cited by Hockey *et al*. (1986) and neither record was noted by Clancey (1996). Two Broad-billed Sandpipers were reported at Ponta da Barra on 16 January 2006 (M. Booysen in *Bull. Afr. Bird Cl*. 13: 227) but this record has been subsequently withdrawn by the observer (M. Booysen *in litt*. 2021). There are thus no documented historical records.

Two recent records are both documented. Two photographed on 4 March 2022 at Lagoa Muangane, San Sebastian (E. Marais & G. Skead *in litt*. 2022, S150787572, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 249; Fig. 6) is the first documented record for Mozambique. Thereafter there was a series of photographically documented observations at Bela Vista where up to six were present on 10–29 March 2022 (all JH, S104538387, S105349756, S105524744, S105754940, S105820742), which appears to be the highest count ever in southern Africa (JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 249, T. Hardaker *in litt*. 2022).

A vagrant in southern Africa with 34 records in September–February up to 1984, with most bird/months in January (Hockey *et al*. 1986). Records were on the west coast, notably Namibia and Langebaan Lagoon, and in the east, with a cluster of 16 records at Richards Bay, KwaZulu-Natal. The historical reports in Mozambique established the notion that Broad-billed Sandpiper occurs regularly in the country and the most recent specialist work

Figure 6. Broad-billed Sandpipers *Calidris falcinellus*, Lagoa Muangane, San Sebastian, Inhambane, Mozambique, 4 March 2022; the first documented country record (© P. Scholtz)

ISSN-2513-9894 (Online)

(Peacock 2016) showed a significant coastal range for the species in Maputo and Inhambane provinces, apparently based on the small number of undocumented records. However, the two recent records demonstrate that the species does occur in Mozambique but is extremely rare; future records should be documented.

SHARP-TAILED SANDPIPER *Calidris acuminata* Vulnerable

The first record for continental Africa was a bird at Macaneta, Mozambique on 4 and 18 February 2018, which was joined by a second on 2–21 March, with one remaining until 16 April 2018 (Allport 2018b). Subsequently there have been further records, all singles at the same locality, on 21 February 2019–20 April 2019, 16 October 2019–13 February 2020 (O. Hamerlynck *in litt*. 2019 and 2020; JH, S64411469; Allport 2021), 21–22 February 2021 (Z. Hamerlynck *in litt*. 2021; JH, S82070701) and 5–10 April 2023 (E. Marais *in litt*. 2023, S133786901). All were adults and the photographs suggest only two birds were involved, one of which appears to have been recorded at the site during five of the six non-breeding seasons.

Breeds in Arctic Siberia, winters in Australasia and is widely recorded as a vagrant to North America, Europe, Central Asia, the Indian Ocean islands and Madagascar (Mlodinow *et al*. 2024). There is some evidence that the breeding range is extending west in Siberia, which may make vagrancy to Africa more likely (Allport 2018b). Subsequently, there has been a record at Banc d’Arguin, Mauritania, the second locality in continental Africa, on 2 December 2018 (Gnep *et al*. 2021).

LONG-TOED STINT *Calidris subminuta* Least Concern

One was reported at Maputo in February 1977 (Hockey *et al*. 1986, 2005). Remarkably, it was reported alongside the Red-necked Stint *C. ruficollis* in February 1977 (see below), and was said to have been observed at close quarters, enabling the long toes to be seen (Hockey *et al*. 1986). Nevertheless, the observer has subsequently withdrawn the record in light of more recent information, as Least Sandpiper *C. minutilla* could not be excluded (A. Vittery *in litt*. 2015). The original material relating to the record, probably held by the Southern African Rarities Committee, has been lost.

A scarce migrant in the Middle East, presumably involving very small numbers en route to wintering grounds in East Africa (Eriksen & Victor 2013) where it is regular but rare in November–May (Urban *et al*. 1986, Stevenson & Fanshawe 2020). Perhaps surprisingly, there have been just four records in southern Africa (Hockey *et al*. 2005, Peacock 2016), including the now retracted record from Maputo. In the absence of documentation and of support by the original observer, the species should now be excluded from the list of birds of Mozambique.

RED-NECKED STINT *Calidris ruficollis* Near Threatened

An historical record in Mozambique, in the austral summer of 1977, involving a single seen regularly on the beach at Costa do Sol, Maputo (Hockey *et al*. 1986), has subsequently been withdrawn by the observer (A. Vittery *in litt*. 2015; Allport 2016). The original material relating to this record, probably held by the Southern African Rarities Committee, has been lost.

The only record anywhere in southern Africa since 1994 was a single at a man-made, temporary wetland on the outskirts of Maputo on 9 September 2015, where it remained until at least 28 September 2015, and was seen by many observers (Allport 2016). It was an adult completing moult into non-breeding plumage, but field identification was straightforward based on structure and vocalisations, following Sinclair & Nicholls (1976), Grant & Jonsson

ISSN-2513-9894 (Online)

(1984) and Bakewell (2014). There have been several suspected Red-necked Stints in Mozambique and South Africa since 2015 but none has been established beyond doubt.

An annual visitor to Africa in small numbers, with records in Somalia (Ash & Miskell 1998) and Kenya (Finch & Turner 1989). It is a vagrant in southern Africa, with the first record in Durban, KwaZulu-Natal, in November 1963 (Hockey *et al*. 1986), after which it was near-annual, with 26 records up to 1994, most from the Durban area and Berg River estuary, Western Cape, in August–April, the majority in October. Most involved birds in partial or full breeding plumage, so confusion with Little Stint *C. minuta* was less likely (Hockey *et al*. 2005). It seems remarkable that the species was regular in the region from 1963 to 1994 but so rare since. There is no evidence of a major change in the species' breeding range, although its distribution is still not well known (Lappo *et al*. 2012). However, monitoring in the non-breeding range at sites in Australia suggests a long-term decline in the north-east Siberian breeding population (Straw 2002) driven by wetland loss in the Yellow Sea (Studds *et al*. 2017) and the change in status in southern Africa may be symptomatic of this trend.

WHITE-RUMPED SANDPIPER *Calidris fuscicollis* Vulnerable

Three recent records. The first was photographed at Macaneta and was present intermittently during 22 September–19 October 2018 (Allport 2020), the second at Bela Vista on 25 March–6 April 2022 (JH, T. & A. M. Moore, S105524744, S105754940, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 249; documented) and the third at Salinas Zacharia, Matola, on 28 September 2022 (JH & T. Moore, S119552454, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 30: 117; documented). The latter was the 37th record for southern Africa (T. Hardaker *in litt*. 2022, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 30: 117).

A frequent vagrant to northern Europe (Lees & Gilroy 2022) but just three southern African records were mentioned by Hockey *et al*. (1986). Since then there have been >35 documented records in the subregion, a marked increase probably due to observer awareness (Allport 2020). It is a rare vagrant in Mozambique but increased observer effort is likely to produce more sightings.

PECTORAL SANDPIPER *Calidris melanotos* Least Concern

The first record was at a freshwater flood near Maputo on 14 January 2017 (Allport 2018c; S33711100) and was followed by a series of records at Macaneta; 1–2, 20 February–31 March 2018; one, 10 November 2018–23 January 2019; two, 6–21 March 2019; one, 29 September 2019; one, 12 March 2021; and 1–2, 30 August–24 September 2022 (Allport 2018b, 2021; JH pers. obs., JH in *Bull. Afr. Bird Cl*. 30: 117). In addition, singles were at Rio Savanne near Beira on 7 December 2019 (E. Marais, S94973254) and Bela Vista, Maputo province, in April 2022 (JH, S106588752). All birds aged in the field or from photographs were adults.

Breeds in tundra of North America and north-east Siberia and winters mostly in South America, but is a regular visitor to Africa, with records in 23 countries (Urban *et al*. 1986, Hockey *et al*. 1986). Considered possibly a 'pseudo-vagrant' (Gilroy & Lees 2003) apparently on intentional, regular passage to wintering quarters in Africa (Lees & Gilroy 2004, 2022). Regular in southern Africa with up to five each winter. Peak arrival is later than most other migrant waders in the region, suggesting that they slowly move south through the continent (Allport 2018b). Given the regular reports in South Africa, the first record for Mozambique was long expected and presumably reflects the previous lack of observer coverage of suitable wetlands (Allport 2018b).

The series of records at Macaneta may involve a small number of returning birds but it is notable that there were no long-staying birds in the 2019–20 season, in line with a dearth of records elsewhere in southern Africa the same boreal winter (T. Hardaker *in litt*. 2020),

ISSN-2513-9894
(Online)

perhaps reflecting a link to transatlantic vagrancy. There were 44 records in the UK in 2019, the lowest annual total since 1997, with the mean annual total being 126 during 2010–19 (White & Kehoe 2021). Whilst these data apply only to a single year it may suggest a stronger link between annual transatlantic vagrancy and boreal winter occurrence in Africa than was postulated by Lees & Gilroy (2004, 2022).

GREEN SANDPIPER *Tringa ochropus* Least Concern

The first records involved specimens taken near Beira by Sheppard, on 29 January 1907 (Hockey *et al*. 1986) and 16 February 1910 (Ditsong National Museum of Natural History, Pretoria; formerly the Transvaal Museum). It was reported as common around Beira by Sheppard (1909 cited in Hockey *et al*. 1986). Clancey (1996) reported birds at Gorongosa, Parker (1999) one from Bazaruto in January 1989, with five in central Mozambique in November, December and January (Parker 2005). Hockey *et al*. (1986) mentioned other early records in Mozambique, but the mapped locations and numbers are unclear.

Recently, in Gorongosa National Park there was one on 29 November 2015 and two on 9 December 2015 (H. Ware Carlisle & J. Carlisle *in litt*. 2015, S26224987), with ten reports of 1–3 birds during 8 October–11 December 2016 (Z. Pohlen & C. Gesmundo, S32650529; Brooks & Ryan 2024) and one on 5–12 December 2017 (GA, T. Hardaker & M. Mason in *Bull. Afr. Bird Cl*. 25: 99). Elsewhere, two on 9 November 1996 (K. Groenendijk *in litt*. 2023, S17658207) and present (but not counted) on 8 February 1997 (K. Groenendijk *in litt*. 2023, S17667489) at Lago Chivanene, Inhambane (which site has been surveyed regularly in the last decade, without further records). One was at a roadside pool near the Rio Buzi on 1 December 2022 (JH & T. Bruneau, S123281185, JH in *Bull. Afr. Bird Cl*. 30: 117). Several of these records were documented.

A widespread migrant in East Africa (Britton 1980). Hockey *et al*. (1986) noted 86 records in southern Africa, mostly in wet grassland areas of Zimbabwe. In Mozambique there are very few records south of the Rio Save, despite more frequent reports at similar latitudes in South Africa. The inland region south of the Save is sandy and flat and largely lacks the wooded streams this species prefers (unlike neighbouring South Africa) and is thus probably unsuitable (V. Parker *in litt*. 2022). It is a rare visitor to Mozambique in the austral summer, albeit probably under-reported.

COMMON REDSHANK *Tringa totanus* Least Concern

Historical records in Mozambique unclear. Parker (2005) noted that a report from Beira (Winterbottom 1936) was subsequently retracted (Benson 1936), although it seems to have been included in Hockey *et al*. (2005) and perhaps also by Peacock (2016).

Subsequently, recorded as follows: singles at Ilha do Bazaruto on 4 November 1997 (K. Groenendijk, S1766796), Maputo on 12 March 2006 (R. Grey in Hockey *et al*. 2005 and *Bull. Afr. Bird Cl*. 14: 101), Barra on 19 April 2008 (M. Booysen *in litt*. 2021; the first to be documented, see Fig. 7), Panda/Chacane Wetlands on 5 November 2009 (M. Booysen *in litt*. 2021, T. Hardaker in *Bull. Afr. Bird Cl*. 17: 121) and San Sebastian

Figure 7. Common Redshank *Tringa totanus*, Ponta da Barra, Inhambane, Mozambique, 19 April 2008; the first documented country record (© M. Booysen)

ISSN-2513-9894 (Online)

Peninsula on 5 July 2022 (E. Marais, S150769750; documented), 10 April (E. Marais, S150769567; documented) and 15 June 2023 (C. Read, S143119501; documented), the last three all probably the same bird.

An uncommon migrant in East Africa with no records south of Dar es Salaam, Tanzania (Britton 1980) and rare in southern Africa; Hockey *et al*. (1986) found 56 records prior to 1984. As the 1936 record was retracted, there are seven records involving five individuals, two of them documented, indicating that it is a very rare vagrant in Mozambique.

SPOTTED REDSHANK *Tringa erythropus* Least Concern

One reportedly observed at Ilha da Inhaca (de Boer & Bento 1999) but, like the Broad-billed Sandpiper, this record seems to have stemmed from an unsupported report in Berruti & Sinclair (1983)—see above. No further information is apparently available (Parker 1999). Hockey *et al*. (2005) and Peacock (2016) reported a record at Bazaruto on 23 December 2002 and, whilst Hockey *et al*. (2005) provided details of the observer, no further information was given. Like other rarities from this period, any paperwork has been lost (H. Smit-Robinson *in litt*. 2021). Since neither of the reported sightings were documented or their details reviewed, we recommend the species is not included in the Mozambique list, meaning any future records should be documented and reported.

The limit of the non-breeding range is southern Tanzania (Britton 1980). Hockey *et al*. (1986) confirmed only one southern African record, a specimen from Marondera, Zimbabwe on 20 January 1979 (Worsley-Worswick 1980).

Globally threatened and Near Threatened species

GREY PLOVER *Pluvialis squatarola* Vulnerable

Parker (1999) reported *P. squatarola* to be a common non-breeding Palearctic migrant, usually in small groups but occasionally hundreds together. Notable counts included 800 in November 1978 at Ilha da Inhaca (A. Vittery in de Boer & Bento 1999), 900 there in January 1996 (W. F. de Boer in Parker 1999) and 1,221 in January 1996 at the Bazaruto archipelago (Köhler & Köhler 1996, Parker 1999). The estimated population in southern Mozambique was 10,000 birds. Reported as less common in central Mozambique with an estimated 1,000 birds (Parker 2005), although a group of 2,000 was reported at the Zambezi estuary in October 1999 (Bento 2000).

More recently, the species has been reported in all months at many locations widely spread along the coast. In the north 1,284 were at the Quirimbas archipelago in December 2009 (Borghesio & Gagliardi 2011), whilst further south the largest numbers have been at the San Sebastian Peninsula with 13 counts in excess of 500 birds, and as many as 750–1,400 during September–April (Auer *et al*. 2024). In the Great Bazaruto Key Biodiversity Area, 2,840 were present in November–December 2023 (Ryan *et al*. in prep.). Further south maxima of 150 at Pomene, 440 at Ponta da Barra and 360 in Maputo Bay (Auer *et al*. 2024). The Ramsar 1% site criterion is 900 individuals (Critical Sites 2023) so historical data suggest Ilha da Inhaca and the Zambezi estuary both qualified, and more recently the Quirimbas archipelago and Great Bazaruto Key Biodiversity Area have proven internationally important. The current overwintering population is probably smaller than the 11,000 summed by Parker (1999, 2005) but regular counts at San Sebastian do not suggest a significant decline is ongoing so Parker's totals were perhaps overestimates.

EURASIAN CURLEW *Numenius arquata* Near Threatened

Historically, found at a small number of sites in coastal southern Mozambique during the boreal winter, with a population estimated at *c.*250 birds by Parker (1999); there were, however, no published counts to underpin this estimate. The max. published single count was of 48 at Ilha da Inhaca in January in 1989 (Nilsson & Shubin 1998) but most observations at this and other sites have involved much smaller numbers since.

Recent records at San Sebastian where up to ten were observed in August–March during 2008–23 (Read *et al*. 2014, Auer *et al*. 2024; C. Read *in litt*. 2023) suggest some regularly overwinter there. The most regular wintering location is in the estuarine confluence of the Rios Tembe, Umbuluzi and Matola in south-west Maputo Bay, where up to 12 were regularly recorded in September–March 2012–23 at a high-tide roost on saltpans at Salinas Zacharia (Auer *et al*. 2024).

Three subspecies of *N. arquata* breeding across the temperate Palearctic, all of which winter in Africa in significant numbers. The nominate breeds in Europe to the Urals and is a relatively short-distance migrant to north-west Africa and the Mediterranean (Delany *et al*. 2009). The eastern subspecies *orientalis* breeds from southern Siberia to north-east China and winters in coastal sub-Saharan Africa, Madagascar, and from the south Caspian Sea through the northern tropics east to Indonesia. This subspecies became more numerous in eastern and central Europe during the 20th century, and its migration routes now extend further west (Smit & Piersma 1989). A little-known third taxon *suschkini* was described from a specimen collected in Senegal (Neuman 1929); evidence suggests that it breeds in the south Urals and Kazakhstan—hence the vernacular name Steppe Curlew—but the wintering range is unknown, aside from the type locality (Engelmoer & Roselaar 1998, Delany *et al*. 2009).

Birds from the eastern and western subspecies are visually distinct morphologically. Nominate *arquata* and *suschkini* are smaller than *orientalis* with less sexual dimorphism in size; *arquata* usually has barred axillaries and a dark-streaked lower rump and uppertail-coverts, whereas *suschkini* has white axillaries and a paler uppertail (Engelmoer & Roselaar

Figure 8. Seven Eurasian Curlews *Numenius arquata*, Salinas Zacharia, Mozambique, 12 January 2012, including at least two birds with strong supercilia and crown-stripes, and the bird on left also has white uppertail-coverts, features thought to be characteristic of *N. a. suschkini* (Gary Allport)

ISSN-2513-9894 (Online)

1998). It is reported that Steppe Curlew has a more distinct head pattern, with a strongly marked supercilium and crown-stripe, akin to Whimbrel *N. phaeopus* (Köhler *et al*. 2012). Eastern *orientalis* has an on average longer bill and tarsus, with white axillaries, pale uppertail-coverts, and is highly sexually dimorphic in size (Engelmoer & Roselaar 1998). Discrimination of *suschkini* has been considered uncertain (Köhler *et al*. 2012) but recent range-wide genetic studies revealed three distinct breeding populations corresponding to the established subspecies, with the affinity of Steppe Curlew found to be closer to European populations (Tan *et al*. 2019).

N. a. orientalis is an uncommon but regular non-breeding migrant to coastal sites in southern Africa; there have been no definite records of nominate *arquata* in the subregion (Hockey *et al*. 2005). The population is estimated at probably fewer than 1,000 birds (Hockey *et al*. 2005, Delany *et al*. 2009). In South Africa and Namibia *c*.500 have been estimated, despite a count of 1,370 at Langebaan Lagoon (Summers *et al*. 1987, Taylor *et al*. 2015). Zwartkops Estuary is the only other site of significance with *c*.60. Confidence in the current regional population estimate is low and the estimate for southern Mozambique, south of the Zambezi, is now thought likely to be 100 birds or fewer.

The birds in Maputo Bay and at San Sebastian have included regular records of *orientalis*, however, on 12 January 2012 two birds among a group of nine had strong supercilia and crown-stripes (GA & R. Hughes; Fig. 8), features considered characteristic of *suschkini* (Köhler *et al*. 2012). The significance of the record was not appreciated at the time so no photographs were taken of the birds in flight, but images of them at rest show the crown feature and suggest that at least one had a pale uppertail (Fig. 8). Were these birds to be *suschkini* it would represent a potentially important indication of the taxon's non-breeding range.

BAR-TAILED GODWIT *Limosa lapponica* Near Threatened

Parker (1999) thought it was an uncommon non-breeding Palearctic migrant to southern Mozambique in the austral summer, estimating the national population at >7,000. It was found singly or in flocks of up to ten, but occasionally in larger flocks. Parker (2005) noted just one record from central Mozambique at Rio Savanne in December 1999. An exceptional 5,523 were estimated on the Bazaruto archipelago in January 1998 (Köhler & Köhler 1999), but this was based, in part, on extrapolation. Nevertheless, it was the largest concentration reported in southern Africa and suggested a population exceeding the Ramsar 1% population threshold for international importance of 1,200 birds (Delany *et al*. 2009).

More recently, Borghesio & Gagliardi (2011) reported 309 at the Quirimbas archipelago on 8–17 December 2009, including 280 on Ilha do Ibo. It has been found regularly on the coast from Ilha da Inhaca, Costa do Sol (Maputo), Maxixe/Inhambane/Tofo/Barra, San Sebastian, Vilankulos and the Bazaruto archipelago (Auer *et al*. 2024). Further north, it has been reported at Mecufi, Mocimba de Praia and the Quirimbas archipelago. There are records in all months except June and July, usually in groups <100. Counts in excess of 100 are available in November, December, February, March and May, with recent maxima of: 160 on 7 August 2016, 600 on 14 February 2020 and 900 on 11 May 2021 at San Sebastian (C. Read *in litt*. 2023; Auer *et al*. 2024), and 650 on 5 April 2018 at Barra (GA, S44357155). A survey of the Great Bazaruto Key Biodiversity Area in November–December 2023 found >3,000 (Ryan *et al*. submitted), confirming the area remains internationally important for the species. Including the area from Maxixe/Inhambane/Tofo/Barra north to San Sebastian, Vilankulos and the Bazaruto archipelago, it seems reasonable that the population in Mozambique is still 7,000 birds or more. Following Bom *et al*. (2022) the subspecies is expected to be *L. l. yamalensis*.

ISSN-2513-9894 (Online)

CURLEW SANDPIPER *Calidris ferruginea* Vulnerable

In southern and central Mozambique, the species was considered a common non-breeding Palearctic migrant by Parker (1999, 2005), who reported high counts of 4,410 in January 1997 at Bazaruto (P. & U. Köhler), >2,000 in January 1997 at Ilha da Inhaca (F. de Boer), >800 in January 1998 in Maputo (C. Bento), >1,050 in October 1999 at Chinde at the mouth of the Zambezi (Bento 2000) and >450 in October 1999 at the Rio Buzi mouth (Parker 2005). The estimated populations in southern and central Mozambique were >20,000 and >10,000 respectively (Parker 1999, 2005).

More recently, it has been reported on >920 eBird checklists for Mozambique (116 record/months, Table 1) and, aside from those at Quirimbas (see below), there are no records of significant numbers north of Beira. This must reflect observer coverage and it is possible that large numbers do use coastal wetlands in central and northern Mozambique. A notable count was 2,045 at the Quirimbas archipelago, including 1,167 on Ilha do Ibo, during 8–17 December 2009 (Borghesio & Gagliardi 2011). In southern Mozambique it is regularly seen on tidal flats or at roost sites in numbers >400 birds. Recent maxima include 1,200 on 9 September 2018 at Costa do Sol in Maputo (GA & B. Briggs, S48393994), and >1,480 on 8 December 2022 (JH, S123625345) and >3,500 on 24 January 2024 at Bela Vista (JH & T. Moore, S159669921). Surveys of the Great Bazaruto Key Biodiversity Area on 24–30 November 2023 counted 5,980 (Ryan *et al*. submitted) principally at San Sebastian and the Bazaruto archipelago, exceeding the Ramsar 1% criterion of 4,000 birds (Critical Sites 2023).

Most of the peak counts are in September in southern Mozambique, linked to significant arrivals of migrating birds, with further high counts in February and March prior to northbound migration. These indicate that birds either arrive in large groups, disperse locally, then re-aggregate pre-departure, or that they are en route to wintering grounds further south or inland. There are, however, no records of major concentrations south of Mozambique (Hockey *et al*. 2005, Auer *et al*. 2024). The exceptional count at Bela Vista in January mirrored unprecedented numbers of other waterbirds at the site at the time, suggesting local foraging conditions were especially favourable.

Currently, only one area is known to be internationally important for the species but it is likely that the wider Maputo Bay population exceeds the threshold on an annual basis and other sites further north may also qualify, especially during passage. Like Parker (1999, 2005), we consider the species to be a common visitor. It seems reasonable to suppose that central and southern Mozambique continue to host 30,000 birds, but significantly more could be found at as yet unsurveyed or poorly known coastal sites, such as the delta of the Zambezi.

GREAT SNIPE *Gallinago media* Near Threatened

In central Mozambique a regular migrant to a restricted area of marshlands, probably in small numbers, but a rarity elsewhere (Parker 2005). Mostly recorded at Rio Savanne, with records in the adjacent Rio Pungwe Valley to Tica and Lagoa de Ura (Clancey 1996). There are *c*.40 recent records in this area (Auer *et al*. 2024, Brooks & Ryan 2024) mostly in December ($n = 9$), January ($n = 5$) and February ($n = 7$) but until April at least. Most records have involved singles, but up to 4–6 occasionally, in a relatively small area of accessible wet grassland between Beira and the Zambezi delta.

There are no records north of the Zambezi, almost certainly reflecting lack of observer effort, but there are a few records of singles at sites to the south including Gorongosa National Park (Clancey 1996) and Lagoa Muangane, San Sebastian, on 8 November 2022 (C. Read, D. Gilroy *in litt*. 2023). There is also a pre-1920 record at Marracuene (Rosa Pinto in

Hockey *et al*. 1986) and one at nearby Macaneta on 21 March 2019 (Allport 2021; S54065409, photograph).

Intra-African movements are driven by rainfall and the local condition of temporary wetlands in the winter quarters (Lindström *et al*. 2016). Birds breeding in the east of its range migrate south along the Nile Valley to the Ethiopian plateau, arriving in August–September, with large numbers staying until the grasslands dry out in October, whereafter they move south following the rains (Massoli-Novelli 1988, van Gils *et al*. 2020b). One at Rio Savanne on 17 August 2011 was thought to have arrived recently (E. Marais *in litt*. 2021, S95007594), which perhaps suggests that at least some on the eastern flyway choose not to stage in Ethiopia but make their way directly further south. 2011 was a 'wet' year in Ethiopia with heavy summer rains (Teferi Taye *et al*. 2021) so this bird was not driven further south by lack of suitable habitat.

The species has declined over its entire breeding range since 1850 (Hockey *et al*. 2005) and is thought to be still undergoing a moderately rapid decrease, owing primarily to breeding habitat loss and degradation, as well as hunting pressure. It almost meets the requirements for listing as a threatened species but is currently considered Near Threatened (BirdLife International 2023). The decline in numbers is evident from historical records in southern Africa; a fairly common visitor in the austral summer as far south as eastern South Africa during 1850–1900 it is now restricted to a fairly narrow band across northern Namibia, Botswana, Zimbabwe and Mozambique (Hockey *et al*. 2005). Great Snipe is a secretive bird, so the details above are no more than suggestive that the Zambezi Valley and delta in Mozambique is a significant wintering area (Parker 1999). The area warrants a dedicated survey.

Other species of interest

TIBETAN SAND PLOVER *Charadrius atrifrons* Least Concern

Clancey (1996) reported only two records but Parker (1999, 2005) mentioned 16 in southern Mozambique, and one in central Mozambique, noting that similarity with Greater Sand Plover *C. leschenaultii* may result in misidentification and under-reporting. A notable count was 456 at the Bazaruto archipelago in January 1998 (Köhler & Köhler in Parker 1999).

Since then improvements in identification information, optics and observer numbers mean that the species has been recorded more frequently and in increased numbers (Peacock 2016). Recent high counts include: 1,600 on 5 April 2018 at Ponta da Barra (GA, S44357155), and at San Sebastian, 2,170 on 13 February 2020 (A. McLean, C. Read & E. Marais, S65237428), 2,150 on 11 May 2021, 2,400 on 16 May 2021 (N. Perrins, S88193202, S88587216) and 1,052 on 26 May 2021 (E. Marais, S96557649). Systematic counts on 24–30 November 2023 found >4,000 in the Great Bazaruto Key Biodiversity Area (Ryan *et al*. submitted). There are several counts of >500 in the Ponta da Barra and San Sebastian areas (Auer *et al*. 2024) and it is regularly recorded in Maputo Bay, usually 10–15 with one record of 35 (Auer *et al*. 2024). Several high counts at Barra, San Sebastian and the Great Bazaruto KBA exceed the Ramsar 1% criteria of 1,300, confirming the global significance of the Mozambique coast. The species is a regular and locally common Palearctic migrant visitor.

LONG-TOED LAPWING *Vanellus crassirostris* Least Concern

Previously recorded in central Mozambique with 19 observations in March–June, August, September, November and December (Parker 2005), seven pairs in the Zambezi floodplain (Bento 2000) and 20 birds at Lagoa de Ura (Parker 2005). Only two records were mentioned

ISSN-2513-9894 (Online)

by Parker (1999) in the south of the country; at Incoluane (Clancey 1996) and two were reported at a small marsh near San Sebastian (Parker 1999).

More recently, in central Mozambique it is now known to be a fairly common year-round resident at Gorongosa National Park, with counts of up to 50 in all months except February–March (when the park is closed to visitors as rainfall impedes access). Also recorded at Rio Savanne, and on several occasions further north in wetlands around the Zambezi coutadas (Auer *et al*. 2024, Brooks & Ryan 2024). In southern Mozambique there have been regular records at San Sebastian (Read *et al*. 2014; C. Read *in litt*. 2023), the Vilankulos area and at Coconut Bay Lagoas. The latter held birds in August–December, one pair bred, and there was a high count of eight on 8 December 2020 (G. Rowan *in litt*. 2020). In the far south it has been recorded at Macaneta (twice), Maputo National Park (>4 times), and near Zitundo–Ponta Do Ouro (twice). Overall, it is now known to have a resident breeding population at Gorongosa National Park, and elsewhere moves to suitable habitat depending on local water levels. There are still many parts of Mozambique with suitable habitat and few observers, e.g., Banhine National Park, with many inaccessible swamps inland of the coast. It is patchy but widespread in the country, less frequent in the south, as a wet-season immigrant and local breeder.

TEREK SANDPIPER *Xenus cinereus* Least Concern

In central and southern Mozambique, it was considered by Parker (1999, 2005) to be an uncommon and local Palearctic migrant to estuaries and especially mangroves on coasts and occasionally inland, typically in groups of *c*.20 from October to April. Notable sites were Beira harbour (max. 160), Bazaruto (max. 450) and Ilha da Inhaca, the latter usually holding *c*.500 but with an exceptional count of 3,200 in November 1976 (Waltner & Sinclair 1981, Hockey *et al*. 2005). The total number in Mozambique was estimated to exceed 2,000 birds, more than twice that for the rest of the southern African coast (Hockey *et al*. 2005).

A more recent status assessment suggests a slightly larger population with records of small groups at most sites visited on the Mozambique coast and occasional inland records (Auer *et al*. 2024, Brooks & Ryan 2024). High counts included 415 at the Quirimbas archipelago in December 2009 (Borghesi & Gagliardi 2011), 115 at San Sebastian on 12 February 2020 (C. Read & E. Marais *in litt*. 2023), 456 at Inhambane seafront on 6 April 2018 (GA, S45443319), 145 on 30 August 2017 (GA, S38901399) and 180 on 24 March 2024 (JH, T. Moore & D. Moore, S165687838) at Salinas Zacharia, 185 at Costa do Sol, Maputo on 2 September 2017 (GA, S38950631) and 548 in the Bartolomeu Dias area on 1–3 December 2023 (Ryan *et al*. submitted). These records suggest that *c*.1,500 birds are present at the main sites in winter, so the national population is likely to exceed 3,000 and the species is a fairly common non-breeding Palearctic visitor to coastal wetlands.

BLACK-RUMPED BUTTONQUAIL *Turnix nanus* Least Concern

Reported to be an uncommon resident in damp grasslands of southern and central Mozambique (Parker 1999, 2005) occurring singly or in pairs, with four records in southern Mozambique and five records in central Mozambique, the latter clustered north of Beira on the coastal plain.

More recently, observed regularly but not commonly in both central and southern regions. The majority of records are from the Rio Savanne floodplain north of Beira, an area visited regularly by southern African birders searching for regionally range-restricted wet grassland species using organised flushes; there have been >35 records involving up to six birds in January–March, June–August and October–December (Auer *et al*. 2024, Brooks & Ryan 2024). There are two records in the far north (Quiterajo and Niassa Hunting Block A,

ISSN-2513-9894 (Online)

in Cabo Delgado province) and several widely spread records in central Mozambique, all at relatively well-watched sites including Mt. Gorongosa, Gorongosa National Park and the Zambezi coutadas. In southern Mozambique it has been found at Rio Govuro floodplains, Rio Save woodlands, Lago Dongane (Dunes de Dovela), Chacane wetlands, Funhalouro, Massingir, Limpopo floodplains, Maputo National Park and the Zitundo–Ponta do Ouro area (Auer *et al*. 2024, Brooks & Ryan 2024). It is now recorded regularly, albeit locally and in small numbers. The pattern is confounded by observers specifically targeting the species at known sites; although a secretive and hard-to-see bird, it seems to be more abundant and widespread than previously thought. It is best considered an uncommon and local resident.

CRAB PLOVER *Dromas ardeola* Least Concern

Parker (1999) reported it to be an uncommon non-breeding visitor to the south coast in the austral summer (November–April) with notable records at Bazaruto, a flock of 70 at San Sebastian in March 1995, 40 at Ilha da Inhaca in January 1998 (de Boer & Bento 1999), one at Rio Savanne in December 1999 (Parker 2005) and also reported at Beira (Britton 1967).

More recently, the species has been recorded in all months. At San Sebastian it is regularly recorded during the austral summer in flocks of 50–250, with high counts of 344 on 13 February 2020, 250 on 12 February 2020 and 245 on 2 March 2020 (Read *et al*. 2014, Auer *et al*. 2024, Brooks & Ryan 2024; C. Read *in litt*. 2023). In northern Mozambique, 1,400 were seen on 8–17 December 2009, including 1,250 at a single roost, on Ilha Sengar, Quirimbas archipelago (Borghesi & Gagliardi 2011). The 1% Ramsar Convention threshold for the species is 700 (Delaney *et al*. 2009), making the archipelago internationally important. Elsewhere it has been recorded regularly at Barra, Bazaruto archipelago, Ilha da Inhaca (1–8 on 14–18 April 2024; M. Krzychylkiewicz & G. Armstrong, S168529218, S169127948, S169129007), Inhambane/Tofo area, Inhassoro, Mocimba de Praia, Palma, Pemba, Pomene, Quirimbas, Rio Maria and Vilankulos (Hockey *et al*. 2005, Zest for Birds in *Bull. Afr. Bird Cl*. 9: 69, A. Buys, B. McGaw & M. Booysen in *Bull. Afr. Bird Cl*. 13: 227, J. Glendinning & R. Grey in *Bull. Afr. Bird Cl*. 14: 101, M. Booysen in *Bull. Afr. Bird Cl*. 15: 274, E. Marais in *Bull. Afr. Bird Cl*. 16: 107, T. Hardaker in *Bull. Afr. Bird Cl*. 16: 236, 17: 121, 23: 239, 27: 113 & 30: 117, T. Hardaker & S. Overmeyer in *Bull. Afr. Bird Cl*. 18: 235, sa-rarebirdnews@googlegroups.com in *Bull. Afr. Bird Cl*. 20: 225, T. Hardaker & A. Ridley in *Bull. Afr. Bird Cl*. 22: 106, GA in *Bull. Afr. Bird Cl*. 22: 244, GA & T. Hardaker in *Bull. Afr. Bird Cl*. 24: 109, 26: 113, 27: 270, D. Gilroy & C. Read in *Bull. Afr. Bird Cl*. 26: 240, GA, T. Hardaker & M. Mason in *Bull. Afr. Bird Cl*. 25: 9, GA, E. Marais, J. R. Nicolau & C. Cohen *per* T. Hardaker in *Bull. Afr. Bird Cl*. 25: 242, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 248, GA, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 112; Auer *et al*. 2024, Brooks & Ryan 2024). The species is a patchy but locally common non-breeding visitor to Mozambique and, with at least one site qualifying as internationally important, total numbers are probably significant at a population level.

BRONZE-WINGED COURSER *Rhinoptilus chalcopterus* Least Concern

Parker (1999, 2005) thought the species an uncommon summer breeding resident of savanna and woodland in southern and central Mozambique, with most observations along the Rio Limpopo in woodland, and in dry woodland from Banhine National Park to Zinave National Park, with a similar status north of the Rio Save where present around Gorongosa, Sena and Tete.

More recently, there have been scattered records in the austral summer in Niassa and Tete provinces, Chimanimani National Park, Mt. Gorongosa and the Zambezi coutadas. Most records are from Gorongosa National Park where the species is seen regularly (many game drives return to camp after sunset, facilitating observations; R. Lusinga pers. comm.).

ISSN-2513-9894 (Online)

In southern Mozambique there are far fewer records; one at Tofo on 5 September 2013 (G. Mclean, S15194317), one recently dead on the tideline at Costa do Sol on 29 September 2018 (GA pers. obs.), four near Manhica on 15 April 2021 (A. Delegencio, S89743035) and one at Dunes de Dovela on 27 March 2023 (T. Bruneau, S131973666). Overall, the paucity of records suggests *R. chalcopterus* is uncommon. However, it is a nocturnal species of dry woodland (Peacock 2016) adept at hiding by day, so the lack of records away from a few sites may reflect the need for nocturnal surveys of suitable habitat.

TEMMINCK'S COURSER *Cursorius temminckii* Least Concern

An uncommon breeding resident of grassland and savanna in southern Mozambique, where it was found singly or in pairs (Parker 1999), with a similar pattern of occurrence in central Mozambique (Parker 2005).

More recently it has been recorded in all months except April and October, suggesting year-round occurrence, in singles or as pairs. Often seen around the Coconut Bay Lagoas, with a max. there of five on 4 November 2011 (T. Bruneau, S75810922). In Maputo province it is regular in small numbers (up to 12) on burnt grassland around Zitundo–Ponta do Ouro (JH pers. obs.). North of the Rio Save the species has been seen frequently at the Rio Savanne floodplain, in Gorongosa National Park, at a farm between Gorongosa National Park and the Zimbabwe border, and once at Pemba in the far north (Auer *et al*. 2024, Brooks & Ryan 2024). It is thus an uncommon and local resident.

AFRICAN SKIMMER *Rynchops flavirostris* Least Concern

Parker (2005) found it to be an uncommon breeding intra-African migrant in central Mozambique, seen in all months except January and March, at the Rio Zambezi, Albufeira Cahorra Bassa, the Rio Urema floodplain and Rio Save. A flock of *c*.300 on the Rio Zambezi in November 1999 was notable (A. Sutherland & J. Rossouw in Parker 2005). It was reported in 1968 at Lagoa de Ura, Tica (Clancey 1996, Hockey *et al*. 2005). In southern Mozambique, five were seen in June 1996 at the Rio Save, Zinave National Park (Parker 1999); it had been collected there previously (Clancey 1996). There were historical records at Ilha da Inhaca in 1958 and Zinave National Park in 1967 (Hockey *et al*. 2005).

More recently, it has been recorded on ten or more occasions in far northern Mozambique on the Rio Rovuma in Niassa Reserve, Cabo Delgado province, during 2012–21, with up to six in June, July and September–November (Auer *et al*. 2024, Brooks & Ryan 2024) and four at Pemba on 31 October 2018 (D. Coleman, S57422680). In central Mozambique it has been found regularly at Gorongosa National Park in May, June and September–December in apparently increasing numbers, with a recent max. of 300 on 25 October 2023 (M. Ortner, S153267508). This exceeds the Ramsar 1% criterion threshold of 100 birds (Critical Sites 2023). It has been seen on the Zambezi near Sena, Mungari Camp (Zambezi coutadas) and near Chemba, and at Rio Savanne (Auer *et al*. 2024, Brooks & Ryan 2024). In southern Mozambique it is still decidedly uncommon, with singles at Ilha Linene (San Sebastian) on 13 January 2014 (T. Hardaker in *Bull. Afr. Bird Cl*. 21: 243), Bilene on 17 June 2017 (T. Hardaker *in Bull. Afr. Bird Cl*. 24: 241), San Sebastian on 25 January 2021 (D. Gilroy, S80453344) and 4 October 2021 (A. McLean *in litt*. 2021) and Lagoa Muangane on 12 December 2021 (E. Marais, S99024242, GA, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 112). Present at Zinave National Park on 7 April 2022 (G. Rowan *in litt*. 2022) and 1–2 were seen on six occasions at Salinas Zacharia, Matola, during 22 May–10 October 2022 (T. & A. M. Moore, S111470412, JH, S112507464, J. R. Nicolau, S120529807, JH & T. Hardaker in *Bull. Afr. Bird Cl*. 29: 249).

ISSN-2513-9894 (Online)

In South Africa, the species bred at St. Lucia until 1943, but was considered extinct as a breeding bird by Hockey *et al*. (2005). However, it returned to breed in Kruger National Park in 2023 (A. Riley *in litt*. 2023). The population in Mozambique was reportedly declining along the Zambezi, due to the effects of the Kariba and Cahorra Bassa dams on the river (Bento 2000). It probably is still an uncommon breeder along the Zambezi and may nest around Gorongosa National Park. Trends are difficult to discern but recent increases in Gorongosa are encouraging. In the south, there is a paucity of recent data from around Zinave National Park where it may also breed, but the species appears to be a very uncommon and erratic visitor on the Rio Save and elsewhere in southern Mozambique, albeit perhaps increasing slightly.

Discussion

Despite continued and increasing ornithological efforts in Mozambique, participation and record-keeping continues to be mainly an international effort—greater participation and ownership by a Mozambican constituency is a high priority. As evident from other recent reports from Mozambique, it is clear that there is strong bias in coverage by skilled ornithologists towards the south of the country with a corresponding dearth of information from most areas north of the Zambezi. The status of key coastal and inland wetlands in the northern provinces is poorly known. Even basic surveys of these areas are likely to reveal further sites of importance for waders and are a high priority to improve our knowledge. Similarly, more detailed and coordinated surveys of the difficult-to-access wetland systems in Maputo Bay, the Zambezi and Save River deltas, as well as inland freshwater wetlands, some of which are highly temporal, would further enhance our understanding of species such as Great Snipe, as well as identifying potential Key Biodiversity Areas.

Acknowledgements

JH especially thanks Sarah Love, Georgina & Harriet Hogg who have cheerfully engaged in wader watching over the past few years; family holidays would not be the same without a visit to a mudflat, saltpan or sandbar. GA thanks Emma Brigham, Louis, Jude & Toby Allport for tolerating early morning disappearances. We are immensely grateful to Prof. Peter Ryan for sharing recent count data from San Sebastian, Bazaruto and Bartolomeu Dias; the high counts reaffirmed our opinion of the global significance of the Mozambican coastline for migrant shorebirds. Roeland Bom and other authors cited in the text shared their work from journals behind paywalls. Trevor Hardaker reported rare sightings via the *Bulletin of the African Bird Club* and the Southern Africa Rare Bird Google Group (sa-rarebirdnews@googlegroups.com). Thanks to birders who shared their details of sightings and those that responded helpfully to queries concerning eBird records: Maans Booysen, Dave Gilroy, Alan Vittery, Kees Groenendijk, Etienne Marais, Mike Buckham, Ian Sinclair and Andre Joubert. Other birders provided excellent company in the field: Albert McLean, Cliff Dorse, Carlos Bento, Carlos Serra, Barnaby Briggs, Ross Hughes, Justin Rhys Nicolau, Olivier & Zev Hamerlynck, Antonio Delegencio, Chris Milligan, the late H. Dean Pittman, Etienne Marais, Adam Riley, Gary Rowan, Tom & Anne Marie Moore, Samuel Liebert, Torres Taimo, Danilo Nhantumbo, Christine Read, Niall Perrins, Dave Minney, Sam Jones and many others. Additionally, thanks to all birders who submitted their observations to citizen science platforms (eBird and SABAP2/BirdLasser) and those that have posted photos of rare waders on social media; these records and documentation have been invaluable during the preparation of this review.

References:

Allport, G. 2016. First documented record of Red-necked Stint *Calidris ruficollis* for Mozambique. *Bull. Afr. Bird Cl.* 23: 91–94.

Allport, G. 2018a. Notable recent records of terns, gulls and skuas in southern Mozambique including the first country records of Black Tern *Chlidonias niger*. *Bull. Brit. Orn. Cl.* 138: 100–115.

Allport, G. 2018b. First records of Sharp-tailed Sandpiper *Calidris acuminata* for Mozambique and continental Africa, and additional records of Pectoral Sandpiper *C. melanotos* in Mozambique, with comments on identification and patterns of occurrence. *Bull. Brit. Orn. Cl.* 138: 307–317.

Allport, G. 2018c. First record of Pectoral Sandpiper *Calidris melanotos* for Mozambique. *Bull. Afr. Bird Cl.* 25: 73–74.

Allport, G. 2020. First record of White-rumped Sandpiper *Calidris fuscicollis* for Mozambique. *Bull. Afr. Bird Cl*. 27: 240–245.

Allport, G. 2021. Birds and birding 2013–2020 at Macaneta, southern Mozambique. *Afrotrop. Bird Biol*. 1: 1–30.

Allport, G., Del, D., Hamerlynck, O. & Hamerlynck, Z. 2021. Update on status and records of Blue Swallow *Hirundo atrocaerulea* and other hirundines from Mozambique. *Bull. Brit. Orn. Cl*. 141: 142–155.

Allport, G., Gilroy, D. & Read, C. 2022. The status and distribution of three species of *Sternula* terns on the eastern coast of Africa and in the western Indian Ocean, with two species new for Mozambique. *Bull. Brit. Orn. Cl*. 142: 190–208.

Ash, J. S. & Miskell, J. E. 1998. *Birds of Somalia*. Pica Press, Robertsbridge.

Auer, T., Barker, S., Barry, J., Charnoky, M., Curtis, J., Davies, I., Davis, C., Downie, I., Fink, D., Fredericks, T., Ganger, J., Gerbracht, J., Hanks, C., Hochachka, W., Iliff, M., Imani, J., Jordan, A., Levatich, T., Ligocki, S., Long, M. T., Morris, W., Morrow, S., Oldham, L., Padilla Obregon, F., Robinson, O., Rodewald, A., Ruiz-Gutierrez, V., Schloss, M., Smith, A., Smith, J., Stillman, A., Strimas-Mackey, M., Sullivan, B., Weber, D., Wolf, H. & Wood, C. 2024. EOD – eBird Observation Dataset. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.15468/aomfnb (accessed via GBIF.org on 16 September 2024).

Bakewell, D. 2014. Mainland Penang, 11 January 2014. https://digdeep1962.wordpress.com/2014/01/13/mainland-penang-11-january-2014/ (accessed 23 September 2021).

Benson, C. W. 1936. The waders found at Beira. *Ostrich* 7: 116–119.

Benson, C. W. 1971. The occurrence of the Madagascar Pratincole in the South Africa sub-region. *Bull. Brit. Orn. Cl*. 91: 262–263.

Bento, C. M. 2000. Wetland bird survey of the Zambezi Delta, vol. 2: technical review. Chapter 5: Wetland birds. Pp. 213–232 and 259 *in* Timberlake, J. (ed.) *Biodiversity of the Zambezi Basin wetlands*. Biodiversity Foundation for Africa & the Zambezi Society, Harare.

Berruti, A. & Sinclair, J. C. 1983. *Where to watch birds in Southern Africa*. Struik, Cape Town.

BirdLife International. 2023. Species factsheet: *Gallinago media*. http://www.birdlife.org (accessed 3 April 2023).

BirdLife International. 2024. IUCN Red List for birds. http://www.birdlife.org (accessed 29 October 2024).

de Boer, W. F. & Bento, C. M. 1999. *Birds of lnhaca Island, Mozambique*. BirdLife South Africa/Avian Demography Unit, Johannesburg.

Bom, R. A., Conklin, J. R., Verkuil, Y. I., Alves, J. A., de Fouw, J., Dekinga, A., Hassell, C. J., Klaassen, R. H. G., Kwarteng, A. Y., Rakhimberdiev, E., Rocha, A., ten Horn, J., Tibbitts, T. L., Tomkovich, P. S., Victor, R. & Piersma, T. 2022. Central-West Siberian-breeding Bar-tailed Godwits (*Limosa lapponica*) segregate in two morphologically distinct flyway populations. *Ibis* 164: 468–485.

Borghesio, L. & Gagliardi, A. 2011. A waterbird survey on the coast of Quirimbas National Park, northern Mozambique. *Bull. Afr. Bird Cl*. 18: 61–67.

Britton, P. L. 1967. Some records from Mozambique. *Ostrich* 38: 46–47.

Britton, P. L. 1977. The Madagascar Pratincole *Glareola ocularis* in Africa. *Scopus* 1: 94–97.

Britton, P. (ed.) 1980. *Birds of East Africa*. East Africa Natural History Society, Nairobi.

Brooks, M. & Ryan, P. 2024. Southern African Bird Atlas Project 2. Version 1.70. FitzPatrick Institute of African Ornithology, Cape Town. https://doi.org/10.2989/00306525.2022.2125097 (accessed via GBIF.org on 16 September 2024).

Brown, M. & Hockey, P. A. R. 2007. The status and distribution of African Black Oystercatchers *Haematopus moquini* in KwaZulu-Natal, South Africa. *Ostrich* 78: 93–96.

Brown, M., Arendse, B., Mels, B. & Lee, A. T. K. 2019. Bucking the trend: the African Black Oystercatcher as a recent conservation success story. *Ostrich* 90: 327–333.

Cizek, A. 2017. Interesting records from Pomene, Inhambane Province, Mozambique. *Honeyguide* 68: 14–20.

Clancey, P. A. 1996. *The birds of southern Mozambique*. African Bird Books, Westville.

Cohen, C. & Winter, D. 2003. Great Knot *Calidris tenuirostris*: a new species for sub-Saharan Africa. *Bull. Afr. Bird Cl*. 10: 120–121.

Critical Sites. 2023. http://criticalsites.wetlands.org (accessed 25 March 2023).

Delany, S., Scott, D., Dodman, T. & Stroud, D. (eds.) 2009. *An atlas of wader populations in Africa and western Eurasia*. Wetlands International, Wageningen.

Engelmoer, M. & Roselaar, C. S. 1998. *Geographical variation in waders*. Springer, Dordrecht.

Eriksen, J. & Victor, R. 2013. *Oman bird list: the official list of the birds of the Sultanate of Oman*. Seventh edn. Sultan Qaboos University, Muscat.

Finch, B. W. & Turner, D. A. 1989. A second Kenya record of the Red-necked Stint *Calidris ruficollis*. *Scopus* 13: 120–121.

Gilroy, J. J. & Lees, A. C. 2003. Vagrancy theories: are autumn vagrants really reverse migrants? *Brit. Birds* 96: 427–438.

van Gils, J., Wiersma, P. & Kirwan, G. M. & Sharpe, C. J. 2020a. Great Knot *Calidris tenuirostris*, version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.grekno.01 (accessed 25 March 2023).

ISSN-2513-9894 (Online)

van Gils, J., Wiersma, P., Kirwan, G. M. & Sharpe, C. J. 2020b. Great Snipe *Gallinago media*, version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.gresni1.01 (accessed 25 March 2023).

Gnep, B., Kotlarz, J. & ten Horn, J. 2021. First record of Sharp-tailed Sandpiper for Mauritania. *Bull. Afr. Bird Cl*. 28: 78–79.

Grant, P. J. & Jonsson, L. 1984. Identification of stints and peeps. *Brit. Birds* 77: 293–315.

Herdam, H. 1994. Beobachtungen zur Vogelwelt von Mozambique. *Orn. Jahresb. Mus. Heineanum* 12: 1–60.

Hockey, P. & Kirwan, G. M. 2020. African Oystercatcher *Haematopus moquini*, version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.afroys1.01 (accessed 25 March 2023).

Hockey, P. A. R., Brooke, R. K., Cooper, J., Sinclair, J. C. & Tree, A. J. 1986. Rare and vagrant scolopacid waders in southern Africa. *Ostrich* 57: 37–55.

Hockey, P. A. R., Leseberg, A. & Loewenthal, D. 2003. Dispersal and migration of juvenile African Black Oystercatchers *Haematopus moquini*. *Ibis* 145: E114–E123.

Hockey, P. A. R., Dean, W. R. J. & Ryan, P. G. (eds.) 2005. *Roberts—birds of southern Africa*. Seventh edn. Trustees of the John Voelcker Bird Book Fund, Cape Town.

Köhler, P. & Köhler, U. 1996. The Bazaruto archipelago, Mozambique, a site of potential international importance for Palearctic waterbirds. *Ostrich* 67: 165–167.

Köhler, P. & Köhler, U. 1999. Extension of the known non-breeding range of the Bar-tailed Godwit in southern Africa: a major wintering site in Mozambique. *Vogelwarte* 40: 142–144.

Köhler, P., Lachmann, L. & Urazaliyev, R. 2012. *Numenius* species and subspecies in west Kazakhstan. *Wader Study Group Bull*. 120: 1–10.

Lappo, E. G., Tomkovich, P. S. & Syroechkovskiy, E. 2012. *Atlas of the breeding waders in the Russian Arctic*. UF Ofsetnaya Pechat, Moscow.

Lees, A. C. & Gilroy, J. J. 2004. Pectoral Sandpipers in Europe: vagrancy patterns and the influx of 2003. *Brit. Birds* 97: 638–646.

Lees, A. C. & Gilroy, J. J. 2022. *Vagrancy in birds*. Bloomsbury, London.

Lindström, Å., Alerstam, T., Bahlenberg, P., Ekblom, R., Fox, J. W., Råghall, J. & Klaassen, R. H. G. 2016. The migration of the great snipe *Gallinago media*: intriguing variations on a grand theme. *J. Avian Biol*. 47: 321–334.

Maclean, G. L. & Kirwan, G. M. 2020. Madagascar Pratincole *Glareola ocularis*, version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.madpra1.01 (accessed 25 March 2023).

Massoli-Novelli, R. 1988. Status and habitat of Great Snipe in Ethiopia and its movements in Africa. Pp. 12–15 *in* Havet, P. & Hirons, G. (eds.) *Proceedings of the Third European Woodcock and Snipe Workshop, Paris, France, 14–16 October 1986*. International Waterfowl & Wetland Research Bureau, Slimbridge.

Mlodinow, S. G., Kirwan, G. M., van Gils, J. & Wiersma, P. 2024. Sharp-tailed Sandpiper (*Calidris acuminata*), version 2.0. *In* Keeney, B. K. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.shtsan.02 (accessed 28 September 2024).

Neumann, O. 1929. Ueber Rassen des Grossen Brachvogels. *Orn. Monatsb*. 37: 76–78.

Nilsson, P. & Shubin, A. 1998. Waders on the southern Mozambique coast. *Intern. Wader Stud*. 10: 444–447.

Parker, V. 1999. *The atlas of the birds of Sul do Save, southern Mozambique*. Avian Demography Unit, Cape Town & Endangered Wildlife Trust, Johannesburg.

Parker, V. 2005. *The atlas of the birds of central Mozambique*. Endangered Wildlife Trust, Johannesburg & Avian Demography Unit, Cape Town.

Parker, V. & de Boer, W. F. 2000. *Birds of Maputo Special Reserve*. Avian Demography Unit, Cape Town & Endangered Wildlife Trust, Johannesburg.

Peacock, F. 2016. *Chamberlain's waders*. Pavo Publishing, Cape Town.

Peacock, F. 2020. Better late than never; first record of Madagascar Pratincole in South Africa. *Afr. BirdLife* 8(5): 50–52.

Pohlen, Z., Gesmundo, C. & Denlinger, J. 2020. First documented record of Black-tailed Godwit *Limosa limosa* for Mozambique. *Bull. Afr. Bird Cl*. 27: 252–253.

Read, C., Tarboton, W. R., Davies, G. B. P., Anderson, M. D. & Anderson, T. A. 2014. An annotated checklist of birds of the Vilanculos Coastal Wildlife Sanctuary, southern Mozambique. *Orn. Observ*. 5: 370–408.

Ryan, P. G., Dorse, C., Gilroy, D., Hogg, J., McLean, A., Read, C., Trotzuk, E. & Allport, G. submitted. A baseline survey of coastal birds in the Greater Bazaruto region, central Mozambique. *Ostrich*.

Sheppard, D. A. 1909. A list of, and notes on, birds collected and observed in the district of Beira, Portuguese South East Africa. *J. S. Afr. Orn. Union* 5: 24–49.

Simmons, R., Baker, N., Braby, R., Dodman, T., Nasirwa, O., Tyler, S., Versfeld, W., Wearne, K. & Wheeler, M. 2007. The Chestnut-banded Plover is an overlooked globally Near Threatened species. *Bird Conserv. Intern*. 17: 283–293.

Sinclair, J. C. & Nicholls, G. H. 1976. Red-necked Stint identification. *Bokmakierie* 28: 58–60.

ISSN-2513-9894
(Online)

Smit, C. J. & Piersma, T. 1989. Numbers, midwinter distribution, and migration of wader populations using the East Atlantic flyway. Pp. 24–63 *in* Boyd, H. & Pirot, J.-Y. (eds.) *Flyways and reserve networks for water birds: developed from papers presented at the third meeting of the Conference of contracting Parties to the Ramsar Convention, Regina, Saskatchewan, Canada, 28–29 May 1987*. IWRB Spec. Publ. 9. International Waterfowl & Wetland Research Bureau, Slimbridge.

Stevenson, T. & Fanshawe, J. 2020. *Birds of East Africa; Kenya, Tanzania, Uganda, Rwanda and Burundi*. Second edn. Helm, London.

Straw, P. 2002. Red-necked Stint and Curlew Sandpiper – longer term population trends. *The Tattler* 31: 2.

Studds, C. E., Kendall, B. E., Murray, N. J., Wilson, H. B., Rogers D. I., Clemens, R. S., Gosbell, K., Hassell, C. J., Jessop, R., Melville, D. S., Milton, D. A., Minton, C. D. T., Possingham, H. P., Riegen, A. C., Straw, P., Woehler, E. J. & Fuller, R. A. 2017. Rapid population decline in migratory shorebirds relying on Yellow Sea tidal mudflats as stopover sites. *Nat. Comm*. 8: 14895.

Summers, R. W., Underhill, L. G., Pearson, D. J. & Scott, D. A. 1987. Wader migration systems in southern and eastern Africa and western Asia. *Wader Study Group Bull*. 49: 15–34.

Summers, R. W., Underhill, L. G. & Waltner, M. 2011. The dispersion of red knots *Calidris canutus* in Africa—is southern Africa a buffer for West Africa? *Afr. J. Mar. Sci*. 33: 203–208.

Tan, H. Z., Ng, E. Y. X., Tang, Q., Allport, G. A., Jansen, J. F. J., Tomkovich, P. S. & Rheindt, F. E. 2019. Population genomics of two congeneric Palaearctic shorebirds reveals differential impacts of Quaternary climate oscillations across habitat types. *Sci. Rep*. 9: 18172.

Taylor, M. R., Peacock, F. & Wanless, R. M. (eds.) 2015. *The Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland*. BirdLife South Africa, Johannesburg.

Teferi Taye, M., Dyer, E., Charles, K. J. & Hirons, L. C. 2021. Potential predictability of the Ethiopian summer rains: understanding local variations and their implications for water management decisions. *Sci. Total Environ*. 755: 142604.

Underhill, L. G., Tree, A. J., Oschadleus, H. D. & Parker, V. 1999. *Review of ring recoveries of waterbirds in southern Africa*. Avian Demography Unit, Univ. of Cape Town.

Urban, E. K., Fry, C. H. & Keith, S. (eds.) 1986. *The birds of Africa*, vol. 2. Academic Press, London.

Vincent, J. 1952. *A checklist of the birds of South Africa*. South African Ornithological Society, Cape Town.

Vittery, A. 1989. Knots in southern Mozambique. *Wader Study Group Bull*. 55: 17.

Waltner, M. & Sinclair, J. C. 1981. Distribution, biometrics and moult of the Terek Sandpiper *Xenus cinereus* in southern Africa. Pp. 233–266 *in* Cooper, J. (ed.) *Proceedings of the Symposium on Birds of the Sea and Shore, Cape Town 1979*. African Seabird Group, Cape Town.

Wildlife Conservation Society, Government of Mozambique & USAID. 2021. *Key Biodiversity Areas (KBAs) identified in Mozambique: factsheets*, vol. 2. USAID/SPEED+, Maputo.

White, S. & Kehoe, C. 2021. Report on scarce migrant birds in Britain in 2019. Part 1: non-passerines. *Brit. Birds* 14: 374–396.

Wiersma, P., Kirwan, G. M. & Boesman, P. F. D. 2020. Chestnut-banded Plover *Charadrius pallidus*, version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.chbplo1.01 (accessed 25 March 2023).

Winterbottom, J. M. 1936. Notes on birds around Beira in 1935. *Ostrich* 7: 32–38.

Worsley-Worswick, P. V. 1980. The Spotted Redshank in Africa south of the equator. *Ostrich* 51: 251–252.

Addresses: Gary Allport, BirdLife International, The David Attenborough Building, Pembroke Street, Cambridge, CB2 3QZ, UK, e-mail: Gary.Allport@birdlife.org. James Hogg, c/o Scarth Wood Farm, Swainby, Northallerton, North Yorks. DL6 3DJ, UK, e-mail: jwthogg@googlemail.com

Appendix 1. Gazetteer of locations mentioned in the text.

Location	**Grid reference** (approximately centred on)	**Location**	**Grid reference** (approximately centred on)
Albufeira Cahorra Bassa	15°35′08.4″S, 32°42′19.6″E	Afungi Peninsula	10°48′15.8″S, 40°33′16.8″E
Banhine National Park	22°47′47.5″S, 32°53′06.3″E	Bartolomeu Dias area	21°11′52.0″S, 35°06′05.7″E
Bazaruto archipelago	21°41′03.5″S, 35°28′10.5″E	Bela Vista wetlands	26°19′16.5″S, 32°41′13.8″E
Beira	19°48′33.0″S, 34°51′29.8″E	Bilene	25°17′02.0″S, 33°15′23.7″E
Benguerra Island/Ilha de Santo Antonio	21°51′58.3″S, 35°26′24.2″E	Chacane wetland	24°21′24.7″S, 34°55′58.9″E
Cabo Delgado	12°20′17.6″S, 39°26′04.1″E	Chemba	17°09′39.5″S, 34°53′30.0″E
Chimanimani National Park	19°47′34.4″S, 33°05′22.9″E	Chinde	18°34′33.6″S, 36°27′51.7″E
Coconut Bay Lagoas	23°58′17.3″S, 35°28′03.9″E	Dunes de Dovela / Lago Dongane	24°25′45.6″S, 35°13′04.2″E

ISSN-2513-9894 (Online)

Funhalouro	23°07′17.9″S, 34°24′11.4″E	Gorongosa National Park	18°50′11.9″S, 34°29′44.3″E
Ilha da Inhaca	26°01′25.3″S, 32°55′42.1″E	Ilha do Ibo	02°20′14.8″S, 40°35′59.6″E
Ilha Linene (Lunene)	22°08′52.0″S, 35°31′27.8″E	Ilha de Magaruque	21°58′15.8″S, 35°25′34.1″E
Incoluane	25°04′00.0″S, 32°56′00.0″E	Inhambane/Tofo area	23°50′44.3″S, 35°27′25.2″E
Inhassoro	21°33′23.2″S, 35°10′56.5″E	Lago Cuduhi	24°21′23.6″S, 34°57′26.8″E
Lagoa Muangane (San Sebastian)	22°16′55.4″S, 35°27′25.6″E	Lagoa de Ura	19°42′35.9″S, 34°19′52.1″E
Lagoa Xinguti (Maputo National Park)	26°30′37.5″S, 32°48′23.9″E	Limpopo floodplains	24°49′38.0″S, 33°34′47.0″E
Macaneta	25°43′50.4″S, 32°42′36.5″E	Mahate	12°31′17.8″S, 40°25′57.3″E
Manhica	25°23′43.7″S, 32°47′53.9″E	Maputo/Costa do Sol	25°55′44.2″S, 32°38′04.9″E
Marracuene	25°44′18.8″S, 32°40′22.7″E	Maputo National Park	26°24′18.9″S, 32°49′12.3″E
Massingir	23°55′26.6″S, 32°09′57.5″E	Maxixe	23°51′47.3″S, 35°21′03.2″E
Mecufi	13°20′31.0″S, 40°32′46.7″E	Mocimboa de Praia	11°21′15.3″S, 40°21′34.2″E
Nova Mambone	20°59′26.7″S, 35°01′21.0″E	Mount Gorongosa/Serra da Gorongosa	18°25′06.6″S, 34°06′36.0″E
Niassa/Niassa Hunting Block A	11°40′23.2″S, 38°17′27.7″E	Palma	10°46′29.8″S, 40°28′50.7″E
Panda	24°03′46.3″S, 34°43′40.1″E	Pemba	12°58′23.3″S, 40°31′10.2″E
Pomene	22°57′56.8″S, 35°33′07.0″E	Ponta da Barra	23°47′27.9″S, 35°31′14.0″E
Ponta da Macaneta	25°52′19.3″S, 32°45′00.9″E	Ponta Malongane	26°47′28.2″S, 32°53′22.1″E
Quirimbas archipelago	12°25′45.4″S, 40°36′11.9″E	Quiterajo	11°45′03.9″S, 40°26′32.5″E
Rio Buzi	19°55′54.8″S, 33°49′08.6″E	Rio Buzi mouth	19°53′04.1″S, 34°45′27.6″E
Rio Govuro floodplains	21°24′44.4″S, 35°04′16.9″E	Rio Limpopo woodlands	23°01′12.7″S, 32°04′43.2″E
Rio Limpopo mouth	25°12′13.9″S, 33°30′49.6″E	Rio Maria	19°46′57.8″S, 34°57′23.9″E
Rio Pungwe Valley	19°36′17.8″S, 34°36′56.0″E	Rio Rovuma	11°10′37.6″S, 39°01′11.1″E
Rio Savanne	19°44′29.4″S, 35°01′25.8″E	Salinas Zacharia	25°58′57.8″S, 32°26′48.9″E
San Sebastian Peninsula	22°05′58.4″S, 35°28′41.5″E	Rio Save/Rio Save woodlands	21°08′17.2″S, 34°32′31.5″E
Sena	17°27′08.6″S, 35°01′55.9″E	Tete province	16°08′40.9″S, 33°35′42.2″E
Vilankulos	22°00′17.5″S, 35°19′27.6″E	Xai-Xai	25°07′01.8″S, 33°44′04.3″E
Zambezi Coutadas	18°14′21.5″S, 35°34′25.1″E	Zinave National Park	21°43′24.4″S, 33°34′51.4″E
Zitundo–Ponta Do Ouro	26°39′34.4″S, 32°48′16.5″E		

ISSN-2513-9894
(Online)

Comments on the species limits of certain North American birds, part 1

by Oscar Johnson, Shawn M. Billerman, Blanca E. Hernández-Baños, Daniel F. Lane, Pamela C. Rasmussen, J. V. Remsen, Jr., Kevin Winker & R. Terry Chesser

Received 25 March 2024; revised 25 October 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:9FE9C2A8-6B09-42BC-92AD-C9C06276FA57

Summary.—Although species limits of North American birds are relatively well delineated, discrepancies among global lists identify species complexes that are subject to differences of opinion. As part of our work with the North American Classification Committee (NACC) of the American Ornithological Society, here we assess species limits in 11 such species complexes of North American birds: Spruce Grouse *Canachites canadensis*, Band-tailed Pigeon *Patagioenas fasciata*, Antillean Mango *Anthracothorax dominicus*, Greenish Puffleg *Haplophaedia aureliae*, Black Oystercatcher *Haematopus bachmani*, Hook-billed Kite *Chondrohierax uncinatus*, Sharp-shinned Hawk *Accipiter striatus*, Elegant Trogon *Trogon elegans*, American Three-toed Woodpecker *Picoides dorsalis*, Golden-olive Woodpecker *Colaptes rubiginosus* and Olive-throated Parakeet *Eupsittula nana*. We update information on the taxonomic history of these species, and recommend revised taxonomic treatments by using published works, analysis of museum specimens and citizen/community science databases. This work can provide a foundation for future taxonomic research in these species complexes.

Although species limits of North American birds are among the best delineated of any animal group, they are nevertheless subject to differences of opinion due to inadequate data and differing interpretations of the available information. Such borderline cases have resulted in numerous discrepancies in taxonomic treatment by different authorities. As part of our work with the North American Classification Committee (AOS-NACC, or NACC) of the American Ornithological Society, which maintains the Checklist of North American birds (https://checklist.americanornithology.org/), here we assess species limits in 11 species complexes that are treated differently by at least one of the major global avian checklists.

This effort was coordinated with the activities of the Working Group on Avian Checklists (WGAC) of the International Ornithologists' Union (https://www.internationalornithology.org/working-group-avian-checklists), who are reconciling incongruences among global avian checklists to produce a unified checklist. As part of this effort, NACC is addressing taxonomic discrepancies among global checklists pertaining to bird species occurring primarily in North America. These discrepancies, and the resulting proposals written for consideration by NACC, primarily concern taxonomic issues for which there is limited published information. The proposals, therefore, are in many cases the best available synthesis of taxonomic work on these species complexes at this time. For cases in which the complex is distributed in both North and South America, proposals were submitted also to the South American Classification Committee (SACC; Remsen *et al*. 2023; https://www.museum.lsu.edu/~Remsen/SACCBaseline.htm). All taxonomic treatments suggested here follow the Biological Species Concept (Mayr 1942). We intend these accounts to serve as a

ISSN-2513-9894 (Online)

foundation for future research on these species complexes, and as such have included in each account a section outlining possible next steps.

This publication is based on NACC proposals that were based primarily on original research by the proposal authors (i.e., on data otherwise largely unpublished) and summaries of historical taxonomic treatments. The primary author of each taxonomic treatment is listed under that species account, but all authors of this manuscript contributed to all species accounts. As signalled by the ‘part 1’ designation, we plan to publish other compilations of proposals and synopses for additional taxonomic issues for which more work is needed, to inspire future research on these species.

Accounts are provided in taxonomic order according to the current AOS checklist (Chesser *et al*. 2024). The proposal number and voting results (passed/did not pass) of each taxonomic proposal are included, along with our views on potentially fruitful avenues of research for the group. These views are frequently informed by comments provided by members of NACC and SACC. Full results and committee member comments on each proposal can be found at the NACC and SACC websites. Future authors can peruse these committee member comments for additional insights into the relevant taxonomic issues.

We made frequent use of citizen science (also known as community science) databases for qualitative analysis of plumage and vocalisations. References to catalogue numbers for specific vocalisations or photographs from Xeno-canto (XC; https://xeno-canto.org/) and Macaulay Library (ML; https://macaulaylibrary.org/) are provided and can be accessed at those websites. We also examined specimens of taxa under consideration in the following collections: Florida Museum of Natural History (UF), Gainesville; Louisiana State University Museum of Natural Science (LSUMZ), Baton Rouge; Museo de Historia Natural “Javier Prado” Universidad Nacional Mayor de San Marcos (MUSM), Lima; and National Museum of Natural History (USNM), Washington, DC.

SPRUCE GROUSE *Canachites canadensis*

Background.—Based on NACC proposal 2022-C-17 ‘Treat *Canachites franklinii* as a separate species from *Canachites canadensis* (Spruce Grouse)’, which did not pass. Proposal author: PCR.

Until 1955, *Canachites canadensis* (Linnaeus, 1758) and *C. franklinii* (Douglas, 1829) were considered separate species based on plumage and structural differences, e.g., the obvious large white spots on the uppertail-coverts and usual lack of a chestnut terminal tail-band in the *franklinii* group, coupled with its nearly truncate-tipped and broader rectrices than in the *canadensis* group, which lacks the white uppertail-covert spots, usually has a distinct chestnut terminal tail-band, and has narrower, rounder-tipped rectrices (Ridgway & Friedmann 1941). Rand (1948) stated that the zone in which intermediates occur is very narrow and that intergradation seemed not to be common even there. Brooks & Swarth (1925) stated ‘Franklin and Spruce grouse are reported as occurring together at the headwaters of the Parsnip and the Big Salmon rivers [the former at least in eastern British Columbia] (F. K. Vreeland, MS)’, which could be taken to suggest sympatry. However, since the 30th supplement of the *Check-list* in 1955, Spruce Grouse has been considered to comprise a single polytypic species (AOU 1955), based on the rationale that intergradation occurs between the *canadensis* and *franklinii* groups (Jewett *et al*. 1953). A note in Jewett *et al*. (1953: 203) stated that ‘There is now abundant evidence that the Franklin grouse is a race of the spruce grouse rather than a distinct species as has always been maintained in the literature. Intergradation between these supposedly distinct species takes place chiefly in north-central British Columbia and western Alberta [see Fig. 1], but tendencies toward chestnut tail tips seem to appear occasionally almost anywhere within the range of

ISSN-2513-9894 (Online)

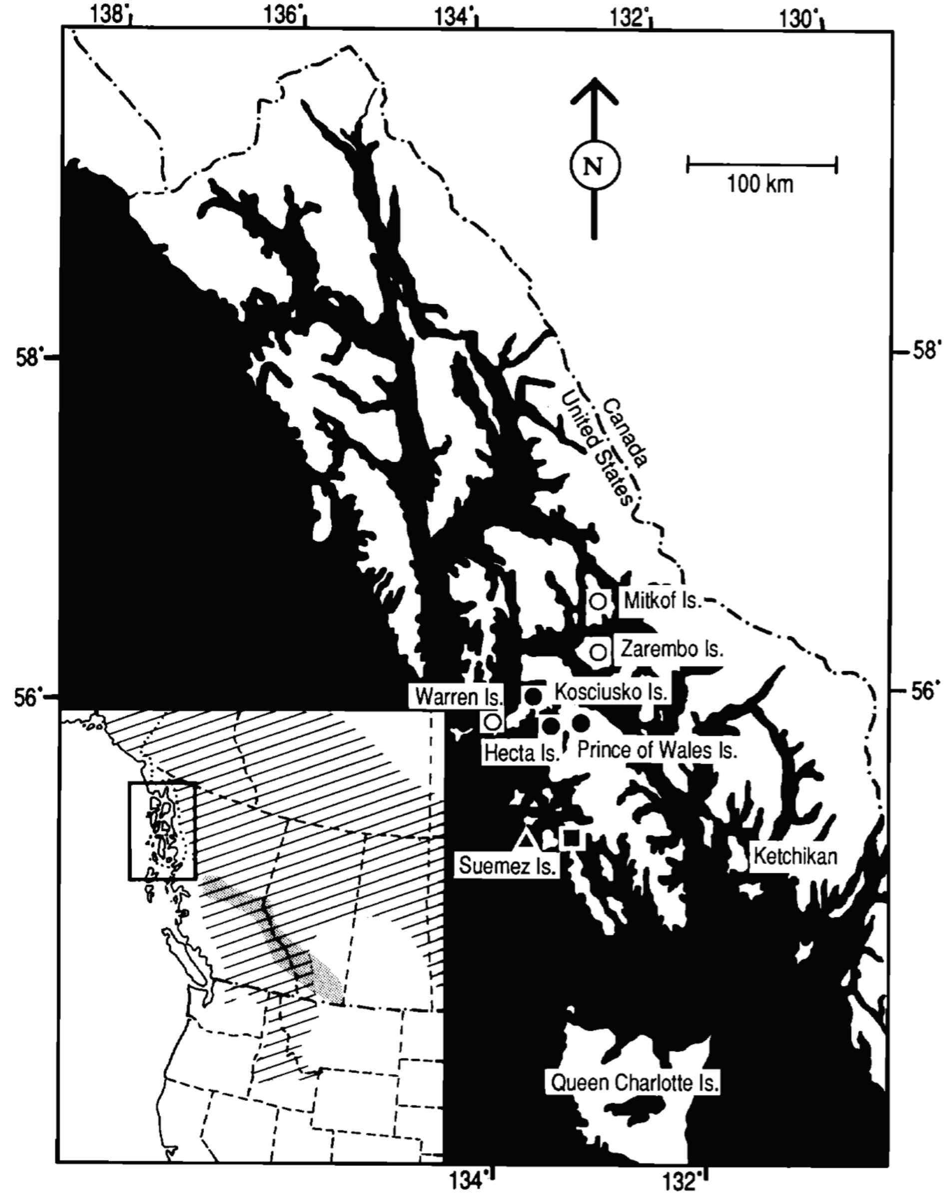


Figure 1. Map showing the distribution of the Spruce Grouse *Canachites canadensis* in western Canada and Alaska, including the range of *C. c. isleibi* and zone of intergradation between the *canadensis* and *franklinii* subspecies groups (inset). Symbols: solid dot = specimen record; open dot = sight record; triangle = bones; square = nest. Adapted from Dickerman & Gustafson (1996). Reproduced by permission from *Western Birds* 27: 41–47, 1996.

franklinii. A large series of specimens in the U.S. National Museum (USNM) shows complete intergradation in all characters between *franklinii* and *canadensis*.'

This variation is not mentioned in Ridgway & Friedmann (1946), which would have been based on much the same USNM material, and these authors (presumably Friedmann, Ridgway being by then deceased) did not indicate uncertainty as to species status of the *franklinii* group, although RTC noted that the identifications of several birds as hybrids were made later, in the early 1950s. Furthermore, Short (1967) stated that in many respects the differences between *C. canadensis sensu lato* and Siberian Grouse *Falcipennis falcipennis* (now known not to form a monophyletic group with *Canachites*; Persons *et al*. 2016) are no greater than those between the *canadensis* and *franklinii* groups, and Short (1967) even suggested that *F. falcipennis* might prove to be conspecific with these.

For comparison, it should be noted that Jewett *et al*. (1953) gave a similar though less detailed note regarding Dusky *Dendragapus obscurus* and Sooty Grouse *D. fuliginosus*: 'We have found that the characteristics of the blue grouse of the Pacific Coastal region intergrade completely with those of the Rocky Mountain region and so can see no reason for maintaining them as distinct species. The area of intergradation is in the mountains of northern Okanogan County.' The AOU had previously (AOU 1944) lumped the *D. fuliginosus* group within the *D. obscurus* group in the 19th Supplement, following Peters (1936: 28) without comment, but at that time continued to maintain *C. franklinii* as a species, as did Peters (1936). The split between *D. obscurus* and *D. fuliginosus* enacted in Banks *et al*. (2006) followed a detailed analysis of the phylogeography of the genus (Barrowclough *et al*. 2004), but no such comprehensive analysis has been produced for *Canachites*.

New information.—Gutierrez *et al*. (2000) sequenced five mitochondrial genes (cyt-b, CO-III, ATPase-6, ATPase-8 and ND2) for a phylogenetic study of species and well-differentiated subspecies in the subfamily Tetraoninae. They found 1% sequence divergence between the *franklinii* and *canadensis* groups, and, noting that this is greater than between any species of prairie grouse *Tympanuchus*, they considered that *Canachites* constitutes two species rather than a species with two subspecies groups (they also considered *Dendragapus* to comprise two species). Drovetski (2001) considered his genetic analyses to support the specific status of *C. c. franklinii* as much as for several other taxa of grouse that have been variously treated as species or subspecies, but almost all of which are now treated as species (except Attwater Prairie Chicken *Tympanuchus* [*cupido*] *attwateri*). Barry & Tallmon (2010) found what they considered to be significant genetic variation in mtDNA and nuclear microsatellites between the insular south-eastern Alaska population *C. c. isleibi* on Prince of Wales Island in the Alexander Archipelago (on morphology considered to be a member of the *franklinii* group; see Fig. 2) and both the *franklinii* and *canadensis* groups. They also found *C. c. franklinii* and *C. c. canadensis* to be more closely related to each other than either is to *C. c. isleibi*. This may have been either because their *C. c. franklinii* samples originated from the hybrid zone in British Columbia, or due to incipient divergence of the insular *C. c. isleibi*. However, the apparently intermediate phenotype of *C. c. isleibi* (Fig. 2) also suggests introgression and not necessarily valid subspecific status, which would be consistent with its geographic position near the hybrid zone.

Spruce Grouse was split by del Hoyo & Collar (2014) into *Falcipennis canadensis* and *F. franklinii*, citing 'all-dark *vs* broad orange-buff tips of rectrices (3); bold white (*vs* all-dark) tips of elongate uppertail-coverts (3); thin broken *vs* strong continuous white line across breast (1); broader rectrices (effect size based on published data[163] 1.67; score 1); possession of wing-clap territorial display *vs* none[163] (3); moreover, long zone of hybridisation occurs at boundary, where two taxa inhabit different habitat (*C. c. franklinii* in montane conifers, *C. c. canadensis* in taiga[163]) (2).' Reference 163 is the *Birds of North America* (BNA) account (Boag & Schroeder 1992). The noticeably darker, blacker central underparts of male *franklinii*, apparent in some photographs (e.g., ML 263068381 and ML 184617751) were illustrated in the plate in del Hoyo & Collar (2014) and seem to be obliquely indicated in these authors' character list by the 'thin broken *vs* strong continuous white line across breast'.

Note also that males of the *canadensis* group often nearly lack chestnut tail tips even in the far east of their range; this can readily be seen in photos (e.g., ML 102027511) with

Figure 2. Watercolour by Mike Ramos showing the upperparts of males of three subspecies of Spruce Grouse *Canachites canadensis*. Left, *C. c. canadensis*. Based on two adults, Museum of Southwestern Biology (MSB) 880, from Thomas Lake, 30 miles north-east of Ely, St. Louis Co., Minnesota, 19 December 1924, and MSB 679, from mile 50 along Richardson Highway, 150 miles north-east of Anchorage, Alaska, 3 September 1961. Middle, *C. c. isleibi*. Based on American Museum of Natural History (AMNH) 830554, an adult, and 830555, an immature, both from Kosciusko Island, about 50 miles south-east of Ketchikan, Alaska, in autumn 1991. Right, *C. c. franklinii*. Based on two adults, Univ. of Washington Burke Museum (UWBM) 36214, from Skull and Crossbones Ridge, Okanogan Co., Washington, November 1981, and UWBM 50206, from Freezeout Ridge, 9 miles west and 7.5 miles north of Conconully, Okanogan Co., Washington, 27 August 1987. Adapted from Dickerman & Gustafson (1996). Reproduced by permission from *Western Birds* 27: 41–47, 1996.

different amounts of chestnut on the two sides of the tail (presumably from different feather generations). Feather wear might account for some of the variation in the amount of chestnut on the tail tips (see, e.g., ML 159178181). A photo of a male from Michigan (ML 383073331) shows small but obvious whitish spots on the uppertail-coverts, but this could represent natural variation within the *canadensis* group rather than intergradation with the *franklinii* group.

RTC examined and photographed some of the extensive USNM series (photos of select specimens shown in Fig. 3) and considered that, at first glance, the interpretation of Jewett *et al*. (1953) seems justified. It does not seem to uphold Rand's (1948) report of a very narrow hybrid zone in which hybridisation is uncommon.

It is well established that southern *C. c. franklinii* populations usually give a double wing-clap as part of the flight display when descending to the perch, and this initially would appear to support species status for this taxon, but according to Schroeder *et al*. (2021), northern populations of *C. c. franklinii* do not wing-clap. This difference, however, is not mentioned in the original *BNA* account (Boag & Schroeder 1992) cited by del Hoyo & Collar (2014), and it appears to remain unpublished except as included in Schroeder *et*

ISSN-2513-9894
(Online)

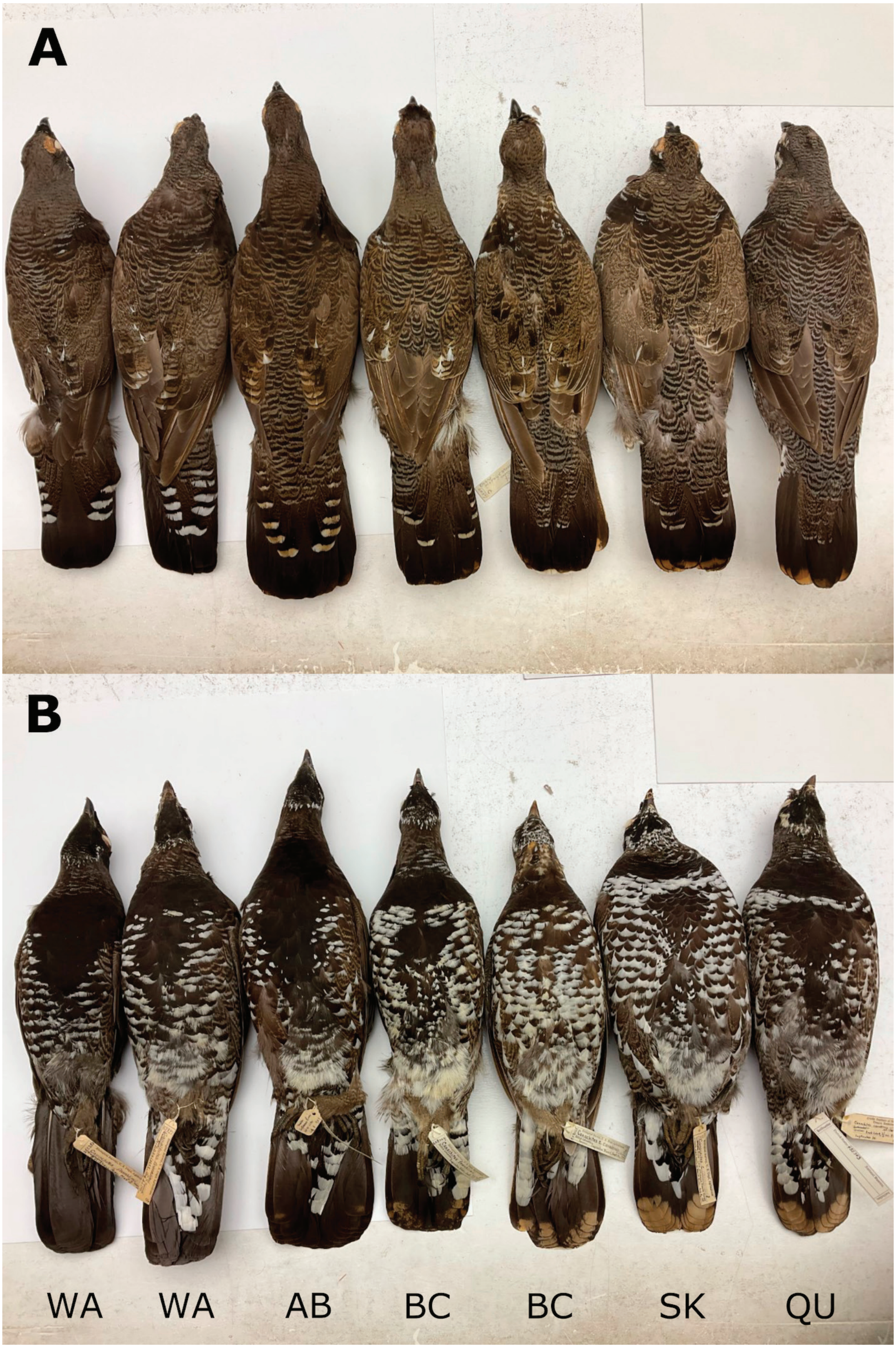


Figure 3. (A) dorsal and (B) ventral photos of select *Canachites* specimens housed at the National Museum of Natural History, Washington, DC, highlighting variation from west to east across North America. WA = Washington (USNM 285383 and USNM 271897), AB = Alberta (USNM 229737), BC = British Columbia (USNM 208064 and USNM 208065), SK = Saskatchewan (USNM 283443), QU = Quebec (USNM 458343) (R. Terry Chesser)

ISSN-2513-9894
(Online)

al. (2021). Birds from the zone of intergradation have been noted to give either single wing-claps or to wing-clap in flights between trees (Schroeder *et al*. 2021).

As for other potential mechanisms for reproductive isolation, there does not appear to be any true song in Spruce Grouse, although the cackle of females can be considered a song (Schroeder *et al*. 2021), and other vocalisations mainly consist of clucks, chick calls, incidental wing noise, male wing-whirrs, stomps, short bouts of drumming, and the double wing-clap of southern *C. c. franklinii*. Reports of a very low-pitched hooting song appear mistaken (Schroeder *et al*. 2021).

Subsequent treatments.—In an initial vote, the WGAC voted to treat Franklin's Grouse as a separate species, so the issue was subsequently addressed by NACC. A follow-up vote by WGAC considering the information in the NACC proposal led to a reversal of the consensus to split *franklinii*. NACC has recognised *Dendragapus obscurus* and *D. fuliginosus* as separate species since 2006 (Banks *et al.* 2006); this treatment, in addition to recognition of three species of *Tympanuchus*, with their low genetic divergences (Galla & Johnson 2015), could be used to argue that *Canachites* should be treated as two species; however, the displays and vocalisations differ substantially among the three taxa treated as species in *Tympanuchus* and also between the two taxa treated as species in *Centrocercus*. Further, a comprehensive phylogeographic analysis (Barrowclough *et al*. 2004) was available for the Blue Grouse complex, whereas no such analysis exists for the Spruce Grouse complex.

Recommendation.—Given the seemingly extensive introgression over a large area suggested by plumage (including the putative subspecies *C. c. isleibi*) and by the observed variation in the wing-clapping display of *C. c. franklinii*, at this time there is not a convincing case to be made that *Canachites* should be accorded the same two-species treatment as *Dendragapus*. We thus recommend that *C. c. franklinii* be maintained as a subspecies of *C. canadensis* for now, but we hope that a comprehensive analysis will soon clarify the picture.

Next steps.—Critical to sorting out species limits in this group is a quantitative analysis of the contact zone between the *franklinii* and *canadensis* groups, to test for assortative mating and the degree of gene flow. This should incorporate analysis of DNA and plumage data, and variation in the wing-clapping display. Committee members were not convinced by comparisons to Dusky and Sooty Grouse, which have differently coloured air sacs on their necks, slightly different songs, and different downy young plumages, all supporting two-species status in that group, whereas similar data are lacking for *Canachites*.

BAND-TAILED PIGEON *Patagioenas fasciata*

Background.—Based on NACC proposal 2022-B-12 'Treat *Patagioenas albilinea* as a separate species from *P. fasciata* (Band-tailed Pigeon)', which did not pass. Proposal author: RTC.

Patagioenas fasciata (Say, 1823) is a widespread species occurring from western Canada south to north-western Argentina. Formerly placed in *Columba*, it consists of two groups (AOU 1998): *P. fasciata*, distributed from Canada south to northern Nicaragua, and *P. albilinea* (Bonaparte, 1854) in highlands from Costa Rica to Argentina. Many sources, such as the IOC (International Ornithological Congress) list (Gill *et al*. 2022) and Howard & Moore (1991), recognise subspecies *monilis*, *fasciata* and *vioscae* (an isolated subspecies in Baja California Sur) within the *fasciata* group, although others, such as Clements *et al*. (2022), separate two additional Central American subspecies from the somewhat variable *fasciata*: *letonai* of Honduras and El Salvador and *parva* of Nicaragua. Three subspecies are consistently included in the *albilinea* group: *crissalis* of Costa Rica and Panama, *roraimae* of southern Venezuela and adjacent Guyana, and *albilinea* from Colombia to Argentina.

The two groups were formerly considered separate species, e.g., by Ridgway (1916) and even Peters (1937), although the latter remarked that 'Perhaps *C. fasciata*, *C. albilinea*,

ISSN-2513-9894 (Online)

and *C. araucana* (Lesson & Garnot, 1827) should be regarded as conspecific.' Hellmayr & Conover (1942) treated the *fasciata* and *albilinea* groups as a single species (*C. fasciata*) with the following explanation: 'The *C. albilinea* group is clearly conspecific with *C. fasciata*, the Costa Rican form being, as far as coloration is concerned, in a way intermediate to the northern races.' Most subsequent sources (e.g., Goodwin 1983, Sibley & Monroe 1990, Gibbs *et al*. 2001, and various regional guides and global lists) have treated Band-tailed Pigeon as a single species; however, del Hoyo & Collar (2014) considered the groups as separate species based on the following evidence:

> [*P. albilinea* is] usually considered conspecific with *P. fasciata*, but [is] separable at species level on account of all yellow *vs* black-tipped yellow bill (2); darker grey underparts generally, with no shading to white on belly (3); wing-coverts as dark grey as mantle, not paler grey with whitish fringes, resulting in a distinct wingband in flight (2); gloss of nape and mantle green *vs* bronze (ns1). Subspecies *crissalis* somewhat intermediate, with undertail-coverts pale greyish-white, wing-coverts intermediate, and occasionally dusky tip to culmen.

Band-tailed Pigeon is currently considered a single species by Dickinson & Remsen (2013), Clements *et al*. (2022) and Gill *et al*. (2022), as well as by NACC and SACC. NACC recently considered a proposal not because of new data, but because the difference in taxonomic treatment brought this issue before WGAC.

Morphology.—Size seems to show only minor variation within *P. fasciata* (Keppie & Braun 2020), despite apparent differences in some of the specimen photos (Figs. 4–6), and is not mentioned in the del Hoyo & Collar (2014) analysis as differing between the two groups. However, plumage varies geographically, with the darkest subspecies in South America (*albilinea* and the similarly dark *roraimae*), somewhat paler subspecies in Costa Rica and Panama (*crissalis*), and still paler, although variable, subspecies to the north (*fasciata* and *monilis*). The subspecies in Baja California Sur (*vioscae*) has the palest plumage, to the extent that the band on the tail is faint or (more often) lacking. Such variation is evident in the photos of mostly male specimens shown in Fig. 4.

The dark vinaceous coloration of *P. f. albilinea* contrasts with the purplish hue of *P. f. crissalis* and the lighter purplish-and-white coloration of subspecies *fasciata* and *monilis*. The variability within *P. f. fasciata* is also evident, especially in the pale individual from Honduras ('*letonai*'), as is the slightly darker colour of *P. f. monilis*. The same patterns are noticeable in the colour of the pileum in Fig. 4B. The green vs. bronze mantle gloss is also conspicuous, although birds from Costa Rica again appear somewhat intermediate. The seemingly discrete difference between the solid yellow bill of the *albilinea* group and the yellow bill with a black tip of the *fasciata* group can be seen in Fig. 4C.

Wetmore (1968), however, noted that bill colour in one of two adult female specimens from Panama (i.e., subspecies *crissalis*, and the only two specimens for which soft parts colours were available) was 'honey yellow, with the tip of the culmen dusky neutral gray' and a grey or dark grey (perhaps even black) bill tip is also noticeable in many photos of *P. f. crissalis* from Costa Rica in the Macaulay Library (many of these are juveniles but some are adults). See, for example, ML 369692871, ML 376900401 and ML 252378571. A dark tip is also visible in photos of several birds from South America, such as an adult (ML 272622831) from Colombia (*P. f. albilinea*).

It is difficult to get a good handle on the variation in contrast of the wing-coverts from Fig. 4C.; these are said to be paler with whitish edgings in the *fasciata* group, creating a band in flight, and to contrast with the darker back and scapulars, but the contrast shows

ISSN-2513-9894 (Online)

Figure 4. (A) Ventral, (B) dorsal and (C) lateral photos of specimens of Band-tailed Pigeon *Patagioenas fasciata* housed at the Louisiana State University Museum of Natural Science (LSUMZ), Baton Rouge, highlighting plumage variation across the distribution of the species. Arranged from left to right are one *albilinea* (Peru; LSUMZ 87230), two *crissalis* (Costa Rica; LSUMZ 63633 and 32187), four *fasciata* (Honduras; Guatemala; two from San Luis Potosí, Mexico; LSUMZ 29022, 65500, 16757 and 10898) and one *monilis* (Oregon; LSUMZ 7996). Note that the rightmost Costa Rican specimen is a female, which tend to be slightly duller than males (© Nicholas A. Mason)

up better in Fig. 5C. The del Hoyo & Collar (2014) analysis notes that this character, too, is intermediate in *P. f. crissalis*.

Vocalisations.—The typical song differs between the *fasciata* and *albilinea* groups but is largely consistent within them, as noted by Boesman (2015) in his comparison of their vocalisations (https://birdsoftheworld.org/bow/ornith-notes/JN100041). Nevertheless, it is worth exploring variation in songs, particularly in the *crissalis* group.

The song of the *fasciata* group typically consists of 1–2 introductory notes followed by a series of double (bisyllabic or two-note) elements. The pace of the song varies individually, as does the interval between the two notes of each element, but the first note always reaches higher frequency and is shorter than the second, with a quicker rise and fall. This can be seen in the sonogram in Fig. 7A.

The two-note elements have been described as 'a deep, owl-like *whoo-whooo*' (Dunn & Alderfer 2017) and the entire song as 'a deep, slightly hoarse *huh whur* or *wh'hoo*, repeated 3–4×, rarely up to 13× or more, often preceded by a deep *grrrr* and at times followed by a moaning *whorr*, longer series may end with an abrupt *wu't*' (Howell & Webb 1995). The first note reaches a higher peak frequency than does any part of the song of *P. f. albilinea* (Boesman 2015). This song occurs in more northerly populations as well as in birds recorded in the southern part of the distribution in Nicaragua (ML 250647291), Honduras (ML 83901331, XC323712), El Salvador (ML 110064321), Guatemala (ML 211589), Chiapas (XC 334727 and XC 221351) and Oaxaca (ML 153844591 and XC 623976). A recording of subspecies *vioscae* (XC 21480), although largely in the background and somewhat faint, appears also to consist of the typical two-note elements. Individuals of the *fasciata* group also call during display flights, giving a 'grating call' (Dunn & Alderfer 2017).

The song of the *albilinea* group typically consists of an introductory note followed by a series of deep long notes, described as 'deep, mellow cooing, *co' oooh, co' oooh* ...' (Hilty 2003) repeated from two to many times. Schulenberg *et al*. (2007) described this song as 'a low coo with introductory note rising, but other long notes falling: *Woo uh-wooh uh-wooh*.' Boesman (2015) described these elements as monosyllables, but mentioned one exception from Santa Marta, Colombia (XC 236033), that includes a brief 'hiccup' before every note. Although it is not clear whether the two-part descriptions of the elements of the song indicate the presence of a 'hiccup' or simply relate to the rising and falling parts of a monosyllable, the 'hiccup' is present in several additional recordings (e.g., ML 258965901 and ML 257237 from Colombia; ML 129476 from Ecuador). On average, the series of notes given by the *albilinea* group are longer and are delivered more slowly than are those of the *fasciata* group (Boesman 2015). An example, again from Boesman (2015), of the song with monosyllabic elements is shown in Fig. 7B, and one of *P. f. albilinea* with bisyllabic elements in Fig. 7C. Individuals of this group also give a buzzy display-flight call, described as a 'chirping *dzurr*' (Fjeldså & Krabbe 1990).

Seven songs of *crissalis* are available on the Macaulay and Xeno-canto websites. Three consist of the low-pitched series of notes typical of *P. f. albilinea*, described as '*c' cooo c' cooo*' or '*cooOOO cooOOO*' by Stiles & Skutch (1989) and '*co-oooh co-oooh*' by Ridgely & Gwynne (1989). This applies to XC 274341 and ML 165872 from Costa Rica and to ML 172548421 from Panama. Recording XC 274681 is a faster and burrier call but still within the range of variation of the *albilinea* group. The other recording from Costa Rica (ML 51184), however, consists of a partial series of two-note elements that appear to be more similar to those of the *fasciata* group than to the *albilinea* group (although the pace is slower than is typical in the *fasciata* group), and in which the emphatic long note is especially similar to the long notes of some *P. f. fasciata*. The other two recordings from Panama (ML 302869 and ML 302873) sound quite different from either of these: these songs consist of a series of three-note

ISSN-2513-9894 (Online)

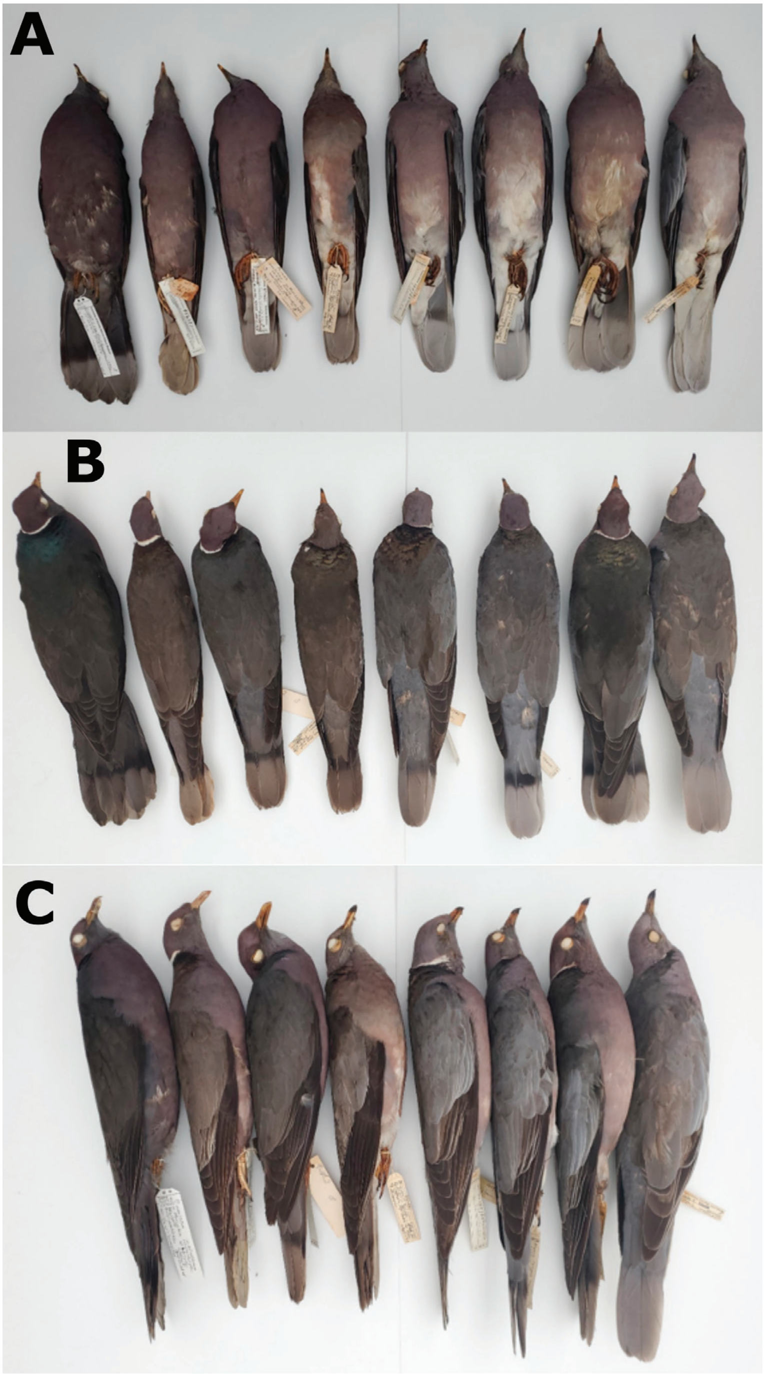


Figure 5. (A) Ventral, (B) dorsal and (C) lateral photos of male specimens of Band-tailed Pigeon *Patagioenas fasciata* at the National Museum of Natural History, Washington, DC. These are also arranged from left to right in roughly south–north order, from *roraimae* to *monilis*, except that this series includes the isolated subspecies *vioscae* at the far right. Included are one *roraimae* from Guyana (USNM 650546), two *crissalis* from Panama (USNM 456382, 470621), three *fasciata* from Guatemala (USNM 396560), Sonora, Mexico (USNM 120760) and Arizona (USNM 299725), one *monilis* from Washington (USNM 365386), and one *vioscae* from Baja California Sur (USNM 203161); note especially the near lack of a tail-band in the specimen of *vioscae* (© Chris Milensky)

Figure 6. Six specimens of Band-tailed Pigeon *Patagioenas fasciata* from the University of Florida (UF) collection, from left to right showing two from Oaxaca, Mexico (UF 4429, 37587): one ostensibly from Guatemala although the locality is not certain (UF 9060), two from Honduras (UF 4430, 4431; these are *letonai*, if recognised), and one from New Mexico (UF 52967). All are males except the middle two birds, which were not sexed. Note the variability within *letonai* here and in comparison with the skin from LSUMZ in Fig. 4, which illustrates why many, including Hellmayr & Conover (1942), consider this a 'questionable race' (© Andy Kratter)

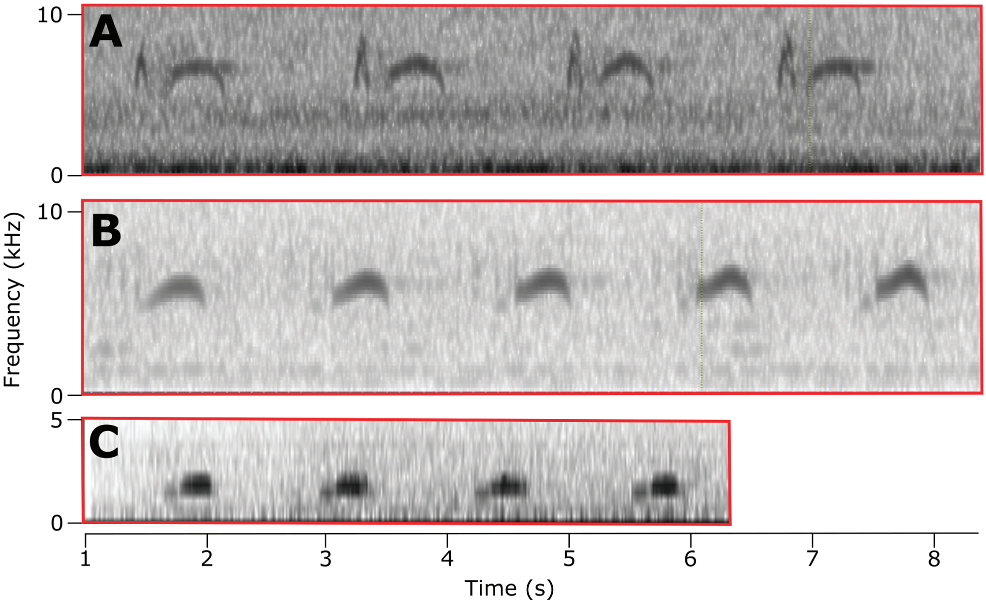


Figure 7. Three sonograms of the primary song of Band-tailed Pigeon *Patagioenas fasciata* showing vocal variation within the species. (A) A bisyllabic song from the northern *fasciata* group (Boesman 2015), (B) a monosyllabic song from the southern *albilinea* group (Boesman 2015), and (C) an example of the *albilinea* group with bisyllabic elements (i.e., with the 'hiccup') from Colombia (XC 529591).

elements, the second note shorter than the rest, and third note lower and longer, the shorter notes recalling in their brevity the clipped first note of *P. f. fasciata* songs (especially in the last song of ML 302869, in which the first note has a quick rise and fall). These two recordings were made at the same time on the same date by P. Boesman, who put the ID certainty at 80%, presumably because of the unusual nature of the songs compared to those of the *albilinea* group. However, multi-note elements in the pattern 'short-shorter-long' have been noted in other songs of *P. f. crissalis* from Chiriquí, which were described by R. Ward in Ridgely (1976) as '*look for paw-paw*', supporting the identification of these recordings.

Recommendation.—Populations of *P. fasciata* from Nicaragua north to Canada (the *fasciata* group) and in South America (subspecies *albilinea*, and presumably subspecies *roraimae*, which is similarly dark-plumaged but whose voice is apparently unrecorded) appear to differ consistently and diagnosably in morphology and vocalisations, although subspecies *crissalis* of Costa Rica and Panama is intermediate. That *P. f. crissalis* is intermediate in plumage between the *fasciata* and *albilinea* groups seems clear, and it is also intermediate, albeit to a much lesser extent, in the colour of the bill tip; that is, most birds have the all-yellow bill typical of the *albilinea* group, but some have a dusky bill tip. Only seven recordings of *P. f. crissalis* are available: four feature vocalisations that sound like those of the *albilinea* group, but songs in the three other recordings differ from those of both groups and in some characters appear to be more like those of the *fasciata* group. These latter recordings were made in both Costa Rica and Panama, and birds with dusky bill tips also occur in both countries, indicating that these intermediate character states are not restricted to a narrow zone but apparently occur more widely in the range of *P. f. crissalis*.

In our view this information, taken together, raises sufficient doubt concerning species status of the *albilinea* group to recommend that it not be separated from the *fasciata* group, pending further investigation. It is possible that *P.* (*f.*) *fasciata* and *P.* (*f.*) *albilinea* are separate species, but too many questions remain unanswered to endorse species status at this time.

Next steps.—Additional sampling and analyses of vocalisations of *P. f. crissalis*, and genomic data encompassing *P. f. crissalis* and populations to the north and south would be especially helpful in determining the taxonomic status of *P. f. albilinea*. Quantification of phenotypic, vocal and genomic differences among populations is of high priority. Committee members raised concerns about the apparent intermediacy of subspecies *crissalis* in Costa Rica and Panama, and the apparent high degree of plumage variation in *P. f. letonai* and *P. f. parva* of Honduras, El Salvador and Nicaragua. Studies of subspecies *letonai*, *parva* and especially *crissalis* would be of particular interest to species limits in the group. Differences in vocalisations are important in species recognition in Columbidae, and these data are lacking from many populations of *P. fasciata*. Analysis of the distinctive rapid shallow-fluttering display flights might also be informative.

ANTILLEAN MANGO *Anthracothorax dominicus*

Background.—Based on NACC proposal 2022-C-4 'Treat *Anthracothorax aurulentus* as a separate species from *A. dominicus* (Antillean Mango)', which passed. Proposal authors: OJ & BEHB.

Anthracothorax dominicus (Linnaeus, 1766) is a species with two fairly well-differentiated subspecies; *A. d. dominicus* of Hispaniola and *A. d. aurulentus* (Audebert & Vieillot, 1801) of Puerto Rico. Both sexes of these subspecies differ in colour pattern. Both taxa have the throat metallic green, but *A. d. dominicus* is otherwise wholly black ventrally whereas *A. d. aurulentus* has the flanks green and the belly fuscous-grey, with the black restricted to a patch on the chest (Kirwan *et al*. 2020). In females, *dominicus* has a purplish base to the tail, whereas in *A. d. aurulentus* this area is largely brownish grey (Kirwan *et al*. 2020). Unique

ISSN-2513-9894 (Online)

amongst *Anthracothorax*, females are pure white below, with only the young males having the black ventral stripe typical of continental species of *Anthracothorax* (Kirwan *et al*. 2020).

The two taxa were considered separate species (e.g., Ridgway 1911, Wetmore 1916, Cory 1918) until treated as a single species without comment by Peters (1945). Later authors have largely considered the two conspecific (AOU 1983, Raffaele 1989, Bond 1993, Raffaele *et al*. 1998, Dickinson 2003, Dickinson & Remsen 2013, Kirwan *et al*. 2020), although del Hoyo & Collar (2014) split the two (see below).

Under his account for *A. aurulentus*, Ridgway (1911) noted the following differences vs. *A. dominicus*: 'Similar to *A. dominicus* but decidedly smaller; adult male with black of under parts confined to chest and breast, and middle rectrices usually much more coppery bronze; adult female with basal portion of lateral rectrices light greyish, or partly so, instead of more than basal half wholly chestnut-rufous, black of subterminal portion brightly glossed with bluish green, and under parts more extensively and uniformly greyish, the sides without green spotting or inter-mixture.'

New evidence.—No recent publications. Del Hoyo & Collar (2014) considered *aurulentus* as a separate species from *dominicus* based on the following rationale:

> hitherto treated as conspecific with *A. dominicus*, but differs on account of (in male) blue-black not covering all of underparts below throat but just breast to mid-belly, with flanks green and lower central underparts to vent dark brownish-grey (3); (in male) central rectrices bronzy green *vs* glossy blackish-blue (2); (in female) outer tail dull brownish-grey, shading to darker subterminal tips and white tips *vs* violaceous-rufous, cutting sharply to blackish broad subterminal tips and white tips (3); markedly smaller size, although bill length virtually identical (effect size for wing –4.15, tail –5.63; score 3). Monotypic.

Although this account indicates that lateral rectrices of female *A. d. aurulentus* are pale greyish or greyish brown basally (Fig. 8), RTC noted that 50% of specimens of female *A. d. aurulentus* at USNM (ten of 20) showed purple (or occasionally chestnut) at the base of the rectrices—although, as noted by Ridgway (1911), never as extensively as in *A. d. dominicus* (Fig. 9).

Photos in Macaulay Library readily distinguish males of the taxa, especially ML 176320171, ML 176615901, ML 241371311 and ML 397356871 of male *A. d. dominicus*, and ML 184585191, ML 184585211, ML 287874871 and ML 303680591 of male *A. d. aurulentus*.

Figure 8. Tails of females of the two taxa in Antillean Mango *Anthracothorax dominicus*, showing the differences between *aurulentus* (left) and *dominicus* (right); note the more extensive chestnut coloration at the base of the tail in *dominicus* (Paul Donald, © Trustees of the Natural History Museum, London)

ISSN-2513-9894 (Online)

Figure 9. Three female Antillean Mango *Anthracothorax dominicus aurulentus* (USNM 238818, 231785 and 238281) showing some purple coloration at the base of the tail (R. Terry Chesser)

TABLE 1

Mensural measurements of two subspecies of *Anthracothorax dominicus*. Data from Arendt *et al*. (2004) and Kirwan *et al*. (2020). All measurements in mm except for mass.

Taxon	**Sex**	**Wing length**	**Tail length**	**Bill length**	**Tarsus length**	**Mass**
A. d. dominicus	Males	62–72 (64.8 ± 3.4, *n* = 3)	N/A	N/A	N/A	6.0–8.2 g
	Females	59–67 (64.0 ± 2.7, *n* = 10)	35.3–36.4 (35.9 ± 0.7, *n* = 3)	18.0–25.3 (24.0 ± 2.1, *n* = 3)	5.1–7.3 (6.2 ± 1.6, *n* = 3)	4.0–7.0 g
A. d. aurulentus	Males	57.3–69.0 (61.6 ± 2.0, *n* = 47)	22.7–36.4 (32.0 ± 3.7, *n* = 47)	21–27 (23.2 ± 1.4, *n* = 47)	2.3–7.3 (5.4 ± 1.0, *n* = 47)	4.8–7.2 g
	Females	50.7–63.5 (57.9 ± 2.5, *n* = 60)	22.9–34.7 (32.0 ± 2.0, *n* = 60)	20.8–27.3 (24.5 ± 1.3, *n* = 60)	4.4–7.3 (5.6 ± 0.7, *n* = 60)	4.0–6.4 g

Based on data from Arendt *et al*. (2004), Kirwan *et al*. (2020) listed some morphometric differences between *aurulentus* and *dominicus* (Table 1). They stated that '*aurulentus* has shorter wings and tail than nominate *dominicus*, but that bill length is comparable between the two taxa'. There is, however, some overlap in these measurements.

No genetic comparisons have been made between the two taxa, although given the plumage and morphometric differences, there are clearly some underlying genetic differences. McGuire *et al*. (2014) sampled *A. dominicus* but only Puerto Rican *A. d. aurulentus*; they did not include a sample of *A. d. dominicus*. That study found *A. dominicus* sister to *A. viridis* (Audebert & Vieillot, 1801) of Puerto Rico, and in turn sister to the *Eulampis* caribs of the eastern Caribbean (thus rendering *Anthracothorax* paraphyletic). This, unfortunately, provides no data on the species status of *A. d. dominicus* and *A. d. aurulentus*. However, mainland *Anthracothorax* of Central and South America (sister to the aforementioned clade) provide an interesting comparison. The four species in that group all differ with respect to the relative extent of green and black coloration on the underparts, comparable to the differences between males of *A. d. dominicus* and *A. d. aurulentus*. However, the taxonomy of those *Anthracothorax* is not clear-cut, with some taxa having been considered conspecific in the recent past (e.g., Green-breasted Mango *A. prevostii* and Veraguas Mango *A. veraguensis*).

It appears that no other studies on the taxonomy of this group have been conducted, such as research on song or genetics. The two taxa, like others in the genus, appear to vocalise infrequently, if they vocalise at all (Kirwan *et al*. 2020). Thus, differences in plumage and average differences in morphometrics (described above) may be more relevant to species limits. WGAC recently considered this issue and voted to treat the two taxa as separate species. That decision was based on the differences in size and plumage described above.

Recommendation.—We recommend that *A. aurulentus* be considered a species separate from *A. dominicus*. Although more data would be desirable, the published plumage and morphometric data seem more consistent with species rank. Differences between the two taxa are consistent and diagnostic, and, more importantly, they are comparable to species-level differences in other taxa in the genus. The two taxa are clearly closely related and are (together) distinctive within the genus.

If considered as separate species, we recommend the following English names, used by del Hoyo & Collar (2014): Hispaniolan Mango for *dominicus* and Puerto Rican Mango for *aurulentus*. Ridgway (1911) and Cory (1918) used Haitian Mango and Porto Rican Mango, but the HBW names highlight the entire island on which *dominicus* is found and the Ridgway/Cory name for *aurulentus* is an outdated spelling variant.

Next steps.—This taxonomic change was enacted by NACC, in part because no data or explicit rationale were published to justify the prior change in their treatment as separate species. However, comparative genetic data are lacking for these taxa, and future work could focus on this topic. The differences in colour pattern between the two taxa are clear, but a study of relative genetic differences and quantification of plumage differences could provide additional data on species status. Although these taxa vocalise infrequently, any differences in displays or breeding behaviour could be quantified. Additionally, the variation in tail colour, especially in females, could be quantified to assess the degree of overlap in this trait.

GREENISH PUFFLEG *Haplophaedia aureliae*

Background.—Based on NACC proposal 2022-A-6 'Split *Haplophaedia assimilis* from Greenish Puffleg *H. aureliae*' and SACC proposal 923, both of which passed and reached the same conclusion regarding taxonomic treatment. Proposal authors: PCR, DFL & JVR.

Within the NACC region *Haplophaedia aureliae* (Bourcier & Mulsant, 1846) occurs only on a few mountains in eastern Panama (Cerros Pirre, Malí, and Tacarcuna) but is widely distributed on Andean slopes from Colombia south to northern Bolivia (e.g., Wolters 1975–82, Sibley & Monroe 1990, AOU 1998, Schulenberg *et al*. 2007). Numerous earlier sources (e.g., Simon 1921: 188, Peters 1945) treated *H. aureliae* as a single species, presumably leading to the current NACC treatment. However, since its inception, SACC has treated *H. aureliae sensu lato* as two species, Greenish Puffleg *H. aureliae* from eastern Panama at least through southern Ecuador, and Buff-thighed Puffleg *H. assimilis* (Elliot, 1876) of the eastern Andes of Peru and Bolivia. This was based largely on a comprehensive morphological analysis of the genus *Haplophaedia* by Schuchmann *et al*. (2000), which advocated reinstatement of species status for *H. assimilis* (including the subspecies *affinis*) in line with Cory (1919). In addition to treating *H. assimilis* as specifically distinct, Cory (1919) also regarded *H. floccus* (Nelson, 1912), *H. russata* (Gould, 1871) and *H. lugens* (Gould, 1852) as species; the first two of these have long been subsumed under *H. aureliae* by subsequent authors, whereas the latter is generally still considered specifically distinct. The two subspecies in the NACC region, *H. aureliae galindoi* Wetmore, 1967, of Cerro Pirre (in central Darién) and *H. aureliae floccus* of Cerro Tacarcuna and its spur Cerro Malí (eastern Darién) and adjacent Colombia, have been

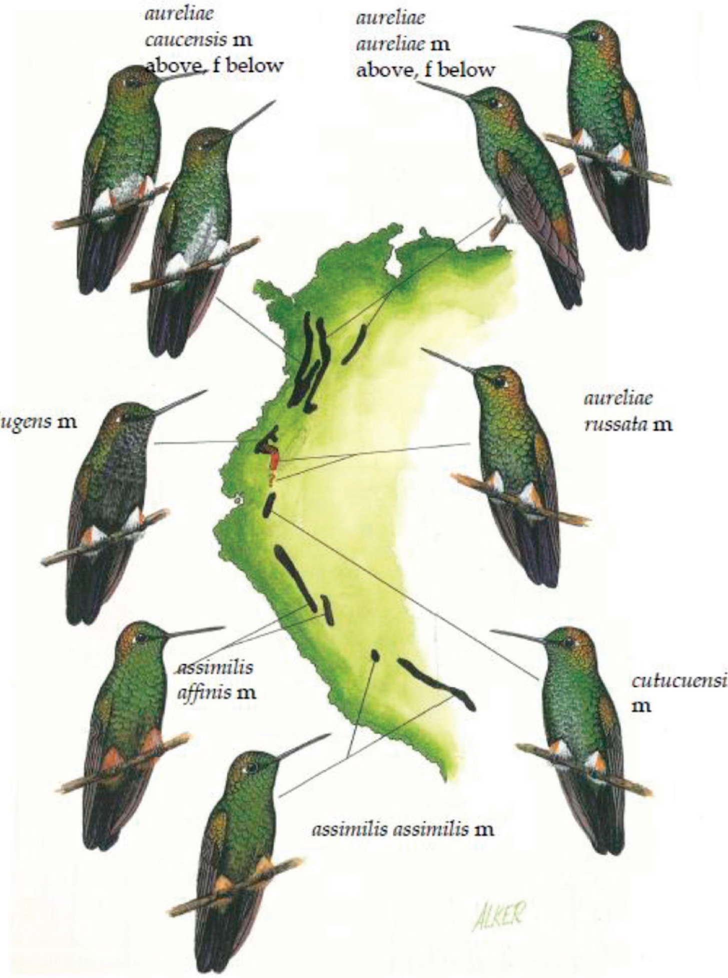


Figure 10. Plate 1 in Schuchmann *et al*. (2000), with labels added, showing the distribution of the South American taxa of *Haplophaedia*. Reproduced with permission from Karl-L. Schuchmann.

synonymised with *H. aureliae caucensis* (Simon, 1911) by some (including Heynen 1999a,b), but both were reinstated as subspecies in del Hoyo & Collar (2014).

Schuchmann *et al*. (2000) advocated specific status for both *H. assimilis* and *H. lugens*; their case for considering *H. assimilis* specifically distinct rested on its disjunct distribution, wholly buffy leg puffs vs. white or bicoloured puffs in *H. aureliae*, and the notably duller plumage of *H. aureliae* (the latter difference not being well shown in the illustrations accompanying the paper [reproduced here as Fig. 10], nor in del Hoyo & Collar 2014). Schulenberg *et al*. (2007), however, illustrated a white-puffed bird and did not mention *assimilis* or that (at least most; see below) Peruvian birds are buffy-puffed. *Haplophaedia assimilis* was treated as specifically distinct by Dickinson (2003), Gill & Wright (2006), Dickinson & Remsen (2013), Clements *et al*. (2021), Gill *et al*. (2021) and del Hoyo & Collar (2014), but not by NACC.

New information.—There does not appear to be significant new information bearing on the species status of *H. assimilis*, which has been universally accepted by the four major global checklists as well as by SACC. As far as we can determine, *H. assimilis* has not been

ISSN-2513-9894
(Online)

sequenced (although *H. aureliae* and *H. lugens* have and are moderately diverged; McGuire *et al*. 2014). However, on the SACC list (Remsen *et al*. 2023), the need for a proposal to assess the validity of this split is mentioned. In the absence of any formal analysis, it appears that the two-species treatment is primarily based on two plumage characters, the buff puffs (differing in tone between the two groups) and overall duller plumage that distinguish *H. assimilis* from the various forms of *H. aureliae*.

However, a series of photos of specimens at LSUMZ (Figs. 11–12) does not support the major phenotypic break between *H. aureliae* and *H. assimilis* across the Marañón Valley mapped by Schuchmann *et al*. (2000; Fig. 10). Rather than supporting the distributions of morphological characters and thus taxon boundaries outlined by Schuchmann *et al*. (2000), the most striking difference among the series (other than the distinctive *H. lugens*, generally considered a separate species) is between two individuals identified as *H. assimilis* (Fig. 11; the left two, with the buffy puffs and lack of white scaling below; LSUMZ 98142, 190722) and the two birds from San Martín, Peru (LSUMZ 81858, 173888; from the north of the range illustrated in Schuchmann *et al*.'s plate 1 [Fig. 10], the outlying Alto Mayo of San Martín), with white puffs and strong scaling, not matching either the plate or description in Schuchmann *et al*. (2000), especially as *H. assimilis affinis* is illustrated there as having the most rufescent puffs. Also, as noted by OJ, the specimen of *H. aureliae cutucuensis* (LSUMZ 169636) from north of the Marañón Valley in Cajamarca (at the southern end of the range of any *H. aureliae* taxon and the next one to the north of *H. assimilis affinis*), seems indistinguishable from the two from San Martín. In response to this conundrum, OJ photographed the entire LSUMZ series (Fig. 12), which shows all the northern Peruvian series (upper row) to be white-puffed and heavily scaled, unlike all the southern Peruvian and Bolivian *H. assimilis* (lower row).

When assembling information in preparation for revising *Birds of Peru* (Schulenberg *et al*. 2007) in 2009, DFL discovered that the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos (MUSM), had three specimens of *H.* '*aureliae*', all from San Martín, Peru: two from the Alto Mayo (LSUMZ 24931, 24934; collected in 2002 on the same expedition as the LSUMZ specimens depicted in Figs. 11–12) and one from near 'Pataz' in the far south-west of San Martín (USNM 18565; *c*.225 km from Alto Mayo; Fig. 13). The former two, in agreement with the LSUMZ series, were white-tufted and had extensive white scaling below. The latter, however, was buff-tufted and lacked scaling. On discussing this with lead author Tom Schulenberg, it became clear that the two taxa must turn over somewhere between the Mayo and Huayabamba drainages (the latter containing the type locality for *H. assimilis affinis*), and that white-tufted birds occur south of the Marañón, without evidence of introgression. In their Acknowledgments, Schuchmann *et al*. (2000) listed the museums where they examined the 149 specimens used in their study. Although LSUMZ is not among them, they listed and mapped a specimen examined from Ray-Urmaña (06°28′12″S, 77°21′0″W; the type locality of *H. assimilis affinis*; Peters 1945) and another from nearby Chirimoto (06°31′1″S, 77°24′0″W) but did not mention specimen numbers. Both specimens were from Amazonas, so presumably were typical *H. assimilis affinis*.

We propose that the LSUMZ specimens from Alto Mayo are not *H. assimilis affinis* as originally identified but instead represent *H. aureliae cutucuensis*, adding another mid-elevation east slope Andean taxon that crosses the Marañón biogeographic barrier for a short distance before its distribution ends to the south. Hence, the turnover between *H. aureliae cutucuensis* and *H. assimilis affinis* is farther south than shown on the map in Schuchmann *et al*. (2000) and suggests a parapatric or possibly sympatric distribution in this region. The seemingly strong difference between white-puffed and white-scaled *H. aureliae cutucuensis* and rufous-puffed *H. assimilis affinis* shows no sign of being a cline (Fig. 12).

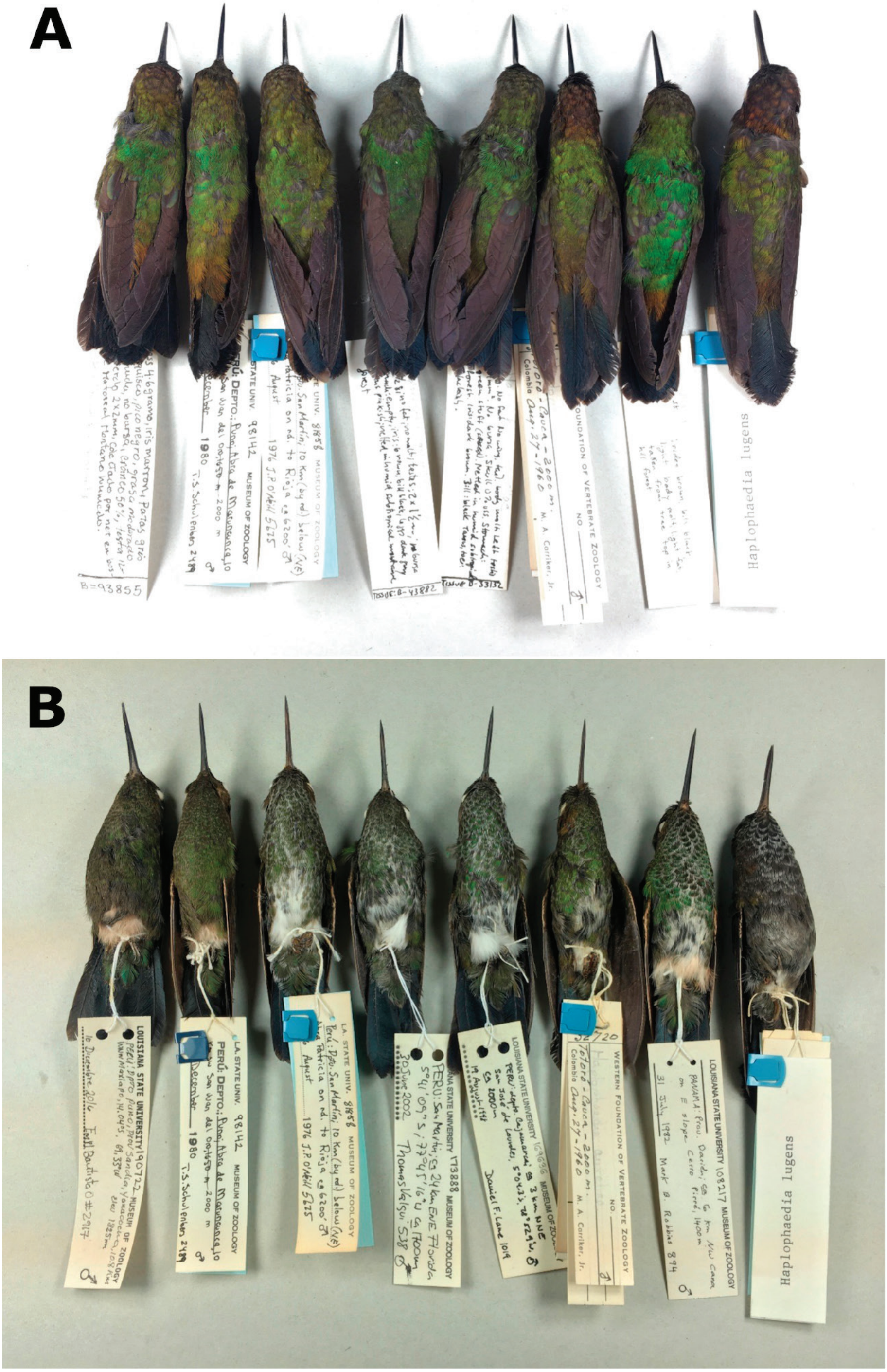


Figure 11. Photos of specimens of representative taxa in *Haplophaedia* housed at the Louisiana State University Museum of Natural Science, Baton Rouge in dorsal (A) and ventral (B) views. Taxa are arranged south (left) to north (right), except for *lugens* at the right end. From left to right are shown: two *affinis* (LSUMZ 190722, 98142), two also identified as *affinis* (LSUMZ 81858, 173888), one *cutucuensis* (LSUMZ 169636), *caucensis* (LSUMZ 32720), *floccus* (LSUMZ 108217) and *lugens* (LSUMZ 30510); we consider the two specimens from San Martín, Peru, to be *H. aureliae cutucuensis* (Oscar Johnson)

Figure 12. All specimens of Greenish Puffleg *Haplophaedia aureliae cutucuensis* (upper row) and Buff-thighed Puffleg *H. assimilis* (lower row) housed at the Louisiana State University Museum of Natural Science, Baton Rouge. Specimen numbers listed left to right. The blue arrow in the upper row denotes the Marañón Valley, with specimens left of the arrow from north of the Marañón (LSUMZ 172057, 172058, 169635, 172059 and 16936) and specimens to the right of it from south of the Marañón in Colán and the Alto Mayo (LSUMZ 87525, 81857, 81852, 173887, 173888, 173866 and 81858). Specimens in the lower row from left to right are: LSUMZ 190722, 98138, 98139, 98140, 98142, 98141, 90603, 90604 and 90605. Samples of *cutucuensis* from south of the Marañón Valley were originally thought to represent *affinis* (Oscar Johnson)

Further study is clearly needed in this complex. Regardless, no data support the NACC single-species position (a holdover from pre-2000 treatments); instead, the data indicate that the two taxa are best considered separate species.

ISSN-2513-9894 (Online)

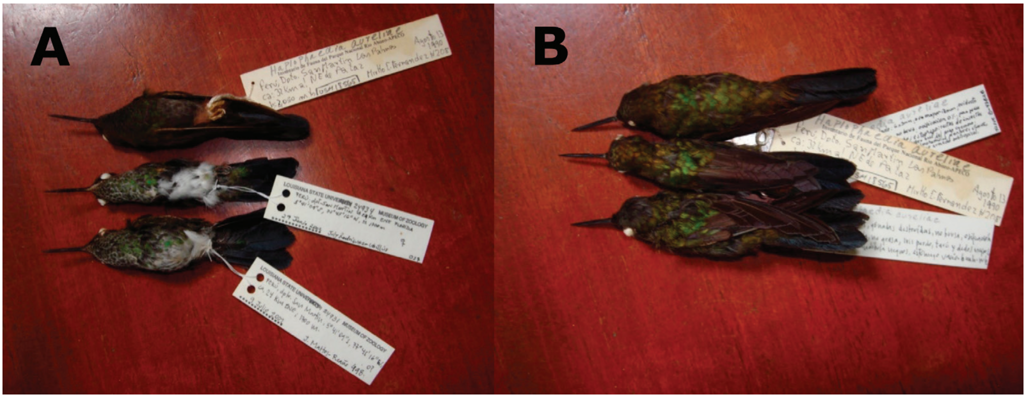


Figure 13. Peruvian specimens of *Haplophaedia* currently housed at the Museo de Historia Natural "Javier Prado" Universidad Nacional Mayor de San Marcos (MUSM) in ventral (A) and dorsal (B) views. In both photos the two lower individuals (LSUMZ 24934, 24931) are from the Alto Mayo, and the upper individual (MUSM 18565) is from 'Pataz' in San Martín, showing that these taxa turn over somewhere between the Mayo and Huayabamba drainages (Daniel F. Lane)

Recommendation.—Given that all major global lists and SACC have been following the Schuchmann *et al*. (2000) treatment for some two decades, and that there does not appear to be any published information that refutes it, we recommend following these sources. However, the published distributional ranges of *H. aureliae cutucuensis* and *H. assimilis affinis* (and thus the southern and northern limits of the two species, respectively) are incorrect.

Next steps.—Committee members generally agreed that the sharp break in phenotype over a short distance, with no sign of intergradation, indicates species rank for both taxa. Although the break between them is much further south than the species break proposed by Schuchmann *et al*. (2000), additional work is needed to determine the precise location of the turnover between *H. aureliae* and *H. assimilis*. Similar data where other taxa in *Haplophaedia* potentially come into contact would likewise be of interest. Quantification of any differences in songs, displays and genetics would elucidate the mechanics of reproductive isolation.

BLACK OYSTERCATCHER *Haematopus bachmani* and **BLACKISH OYSTERCATCHER** *H. ater*

Background.—Based on NACC proposal 2022-B-9 'Recognize *Haematopus bachmani* (Black Oystercatcher) as a subspecies of *H. ater* (Blackish Oystercatcher)' and SACC proposal 931, neither of which passed. Proposal author: KW.

Oystercatcher taxonomy has been an ongoing challenge due to morphological conservatism. The two general plumage types, black and pied, tend to correspond to rocky vs. soft shoreline specialisation, respectively (Jehl 1985, Hockey 1996). *Haematopus bachmani* Audubon, 1838, has been recognised as a species by the *Checklist* in every edition since the first. The ranges of *Haematopus bachmani* and *H. ater* Vieillot, 1825, are allopatric, so the most appropriate way to determine species limits is to infer them using the classic yardstick comparative method, which involves comparing phenotypic differences to those found between closely related species that are sympatric and therefore valid biological species (although it has been applied infrequently and not with the depth one might hope for; Murphy 1925, del Hoyo & Collar 2014). *Haematopus bachmani* occurs in parapatry with the more widespread American Oystercatcher *H. palliatus* Temminck, 1820, whereas *H. ater* and *H. palliatus* are broadly sympatric on the Pacific coast of South America, and both *H. ater* and *H. bachmani* hybridise with the pied species (Jehl 1978, 1985, Hockey 1996).

ISSN-2513-9894
(Online)

The taxonomic notes provided in the sixth and seventh editions of the AOU Check-list (AOU 1983, 1998) mentioned that some authors had considered *H. bachmani* and *H. palliatus* to be conspecific; there is a hybrid zone *c*.480 km wide in Baja California (Jehl 1985, CBRC 2007). Species status of *H. bachmani* and *H. ater* has not been evaluated by NACC in the past 40 years, and we have no evidence that it was before then, either.

Murphy (1925: 13–15) elaborated the differences and similarities between *H. ater* and *H. bachmani* thus: For *H. bachmani*: 'Juvenal birds closely resemble the young of *H. ater*, the feathers of the upper surface, breast, and flanks being edged with pale tawny brown. It is interesting that the down of chicks of this species is much darker than that of *H. ater* or of any other American form.' And for *H. ater*: 'Superficially resembling *H. bachmani*, *H. ater* is widely separated from all other oyster-catchers in the form of the bill, the excessive compression of which approaches that of *Rynchops*. The distinctive character of the bill is apparent even in chicks taken from the egg. Colour differences between *H. ater* and *H. bachmani* are much greater among downy young than among adults. The young of *ater* are relatively pale, only slightly darker, indeed, than those of *H. palliatus*, which they much resemble. The white area is confined to the breast, instead of covering the belly and flanks as in *palliatus*, but it is far more extensive than in *bachmani*.'

As Jehl (1985) remarked, although AOU (1983) and Murphy (1925) recognised *H. bachmani* and *H. palliatus* as separate species, most other authors at that time did not. For example, *bachmani* and *palliatus* were considered conspecific by Peters (1934), Friedmann *et al*. (1950) and Mayr & Short (1970)—all of these treated *bachmani* and *palliatus* as subspecies of Eurasian Oystercatcher *H. ostralegus* Linnaeus, 1758. This situation has changed, however, and most authorities now recognise *H. palliatus* and *H. bachmani* as separate species (see Avibase; https://avibase.bsc-eoc.org). Thus, Jehl's (1985) work appears to have influenced this issue.

Although Peters (1934) considered *H. palliatus* and *H. bachmani* as subspecies of *H. ostralegus*, he maintained *H. ater* as a separate species. This work did not provide any rationale behind its taxonomic decisions, but taxonomy could have been based on Murphy (1925) or been simply inertia. As Hockey (1996) related, allopatric black forms of *Haematopus* have been considered separate species, whereas pied forms are often considered subspecies.

In his study of the hybrid zone between *H. bachmani* and *H. palliatus*, Jehl (1985) found assortative mating, a stable (though 480 km-wide) hybrid zone (after late-19th and early-20th century disruption), and inferred selection against hybrids, leading him to conclude that the two are valid species. He surmised that the primary mechanism of reproductive isolation was likely postzygotic, focusing especially on predation on chicks of mixed pairs in which some would have plumage coloration inappropriate for their beach colour, i.e., through loss of crypsis. Given the high rates of chick predation in some oystercatcher species (60–85%; Hockey 1996), this selective mechanism seems plausible.

Haematopus ater also hybridises with *H. palliatus* in Argentina; Jehl (1978) described a single hybrid specimen between *ater* and Magellanic Oystercatcher *H. leucopodus* Garnot, 1826 (also a pied form) from Santa Cruz province. This *H. ater* × *H. leucopodus* hybrid is uncommon compared to *H. ater* × *H. palliatus* crossings, which he noted occur in this area of overlap 'with appreciable frequency' (Jehl 1978: 346). Both the *bachmani* × *palliatus* and *ater* × *palliatus* hybrid zones should be revisited with population genetics studies to determine the degrees of introgression (given clearly incomplete reproductive isolating mechanisms).

New information.—Remarkably little modern work is available on *Haematopus* systematics or species limits. Using mtDNA (COI) barcoding, Hebert *et al*. (2004) found that the difference between *H. palliatus* and *H. bachmani* was remarkably low compared to other North American bird species-level differences, and they considered that this was

ISSN-2513-9894
(Online)

consistent with treating them as a single species. Senfeld *et al*. (2020) also examined mtDNA (2,835 bp) and found *H. palliatus*, *H. ater* and *H. bachmani* to be very closely related, with *H. bachmani* perhaps sister to the other two. This clade as a whole is distinct from the pied *H. leucopodus*. Del Hoyo & Collar (2014: 420) considered *H. bachmani* and *H. ater* as conspecific, stating that 'Race *bachmani* has normally been considered a separate species, but the two are almost identical in plumage and voice, apparently differing only in greater depth of bill of nominate *ater*. Two subspecies recognised.' It is worth contrasting this brief emphasis of similarities with Murphy's (1925) emphasis on differences quoted above.

Careful analysis of vocalisations is needed. Subjectively, listening to some of the recordings on Xeno-canto mirrors the mtDNA relationships: *H. bachmani*, *H. ater* and *H. palliatus* are similar, whereas *H. leucopodus* is different. It is perhaps no accident that these similarities and differences are reflected in the rates of hybridisation where the taxa overlap. Future work is also needed to rigorously quantify morphological similarities and differences. Murphy's (1925) evaluations disagree somewhat with del Hoyo & Collar's (2014) conclusions.

With neither appreciable song nor plumage differences between *H. ater* and *H. bachmani*, we suspect that neither assortative mating nor the putative postzygotic isolating mechanism of strong plumage colour selection favoured by Jehl (1985) would be very effective in preventing substantial hybridisation (especially given hybridisation of both with *H. palliatus*). There are, however, differences in bill morphology and downy plumage colour that might be targets of postzygotic selection in hybrids (Murphy 1925). We realise that such conjectures are rather unsatisfactory, but that is one of the acknowledged weaknesses of the Biological Species Concept when asking whether allopatric forms are 'different enough' to warrant recognition as species.

Taxonomy and nomenclature.—*H. ater* Vieillot, 1825, has priority over *H. bachmani* Audubon, 1838. See Murphy (1925) for discussion of the taxonomic history of *H. ater* and its priority for that taxon. Thus, if these two taxa are considered the same species, *H. bachmani* would become *H. ater bachmani*. Murphy's (1925) study of the two supports considering *bachmani* a valid subspecies if lumped with *H. ater*.

Recommendation.—Based on current evidence, especially the strikingly different phenotypes of both *H. bachmani* and *H. ater* vs. *H. palliatus* and the noteworthy levels of hybridisation with the latter pied form, these taxa should be considered a single biological species with two allopatric subspecies-level populations. It is especially compelling that the strikingly different phenotypes of *H. bachmani* and *H. palliatus* appear to be barely limiting hybridisation in a region of overlap to a level that only some authorities (us included) consider to be 'low enough' to be separate biological species. Given the remarkably close mtDNA relationships among *H. palliatus*, *H. bachmani* and *H. ater*, it seems likely that the phenotypic similarities between the latter pair (including vocalisations) would be insufficient to preclude more extensive hybridisation if the two were to come into contact.

Next steps.—Recent research is scant on relationships among *Haematopus* taxa, making this an area ripe for study. Committee members from NACC and SACC were opposed to the taxonomic treatment recommended in this proposal and raised concerns in particular regarding differences in vocalisations. Although data on vocalisations are unpublished, some SACC committee members and commentators noted diagnostic differences in vocalisations between *H. ater* and *H. bachmani* (DFL unpubl. obs.; P. Boesman and A. Jaramillo *in litt*. 2022), including differences in note shape, whether the introductory notes rise or fall in pitch, and in the length of the flight call notes. These potential differences could be the focus of a formal vocal analysis and playback experiments. Thorough quantification of how oystercatcher species limits are shaped by vocalisations, pied vs. all-black plumage, habitat (sandy vs. rocky shorelines), and bill shape and size is needed to improve our taxonomic treatments. These studies would benefit from a global analysis, given the apparent repeated evolution of pied vs. all-black plumage in oystercatchers. For *H. ater*, quantification of the degree of hybridisation with *H. palliatus* is of particular interest, as hybrids are thus far known only from Argentina (Jehl 1978), despite widespread sympatry. The bill structure differences and plumage differences in chicks noted by Murphy (1925) provide further support for maintaining *H. ater* and *H. bachmani* as separate species.

HOOK-BILLED KITE *Chondrohierax uncinatus*

Background.—Based on NACC proposal 2022-B-4 'Treat *Chondrohierax wilsonii* (Cuban Kite) as a species separate from *C. uncinatus* (Hook-billed Kite)' which passed. Proposal author: OJ.

Chondrohierax uncinatus (Temminck, 1822) is a widespread polytypic raptor that occurs from central Mexico to Argentina, with three subspecies currently recognised (Clements *et al*. 2021). The nominate is widespread throughout continental parts of its range. The two other widely recognised subspecies are *C. u. mirus* Friedmann, 1934, on Grenada and *C. u.*

Figure 14. Specimens of male *Chondrohierax* (USNM 453087, 383326) in ventral (A) and lateral (B) views, and of females (USNM 453097, 368480) in ventral (C), lateral (D) and dorsal (G) views, housed at the National Museum of Natural History, Washington, DC. Specimens of *Chondrohierax* in ventral (E) and lateral (F) views housed at Louisiana State University Museum of Natural Science, Baton Rouge. Although the bird on the left in E and F is labelled a male, it is possibly a female or subadult male based on plumage. In each photo, *C. wilsonii* is on the left, *uncinatus* is on the right (© Jacob Saucier: A–D and G, Marco Rêgo: E–F)

ISSN-2513-9894
(Online)

Figure 15. Hook-billed Kite *Chondrohierax uncinatus uncinatus* showing geographic variation in continental populations, in ventral (A), lateral (B) and dorsal (C) views. Two male *uncinatus* (darker bird from Mexico [USNM 144167], typical male from Colombia [USNM 383326]) on left, typical female *uncinatus* (USNM 368480) on right (© Jacob Saucier)

wilsonii (Cassin, 1847) in Cuba. Friedmann (1934) described, as subspecies, the populations from northern and central Mexico (somewhat darker; '*aquilonis*') and western Amazonia (larger bill and broader rectrices; '*immanis*'), but neither is generally recognised. The array of plumage variation within all taxa is confusing and includes strong sexual dimorphism, distinct juvenile plumages, and a dark/melanistic morph in both adults and juveniles. A white-bellied morph bears a strong resemblance to comparable plumages of some forest falcons (*Micrastur*), at least in juveniles. Additionally, individual variation is considerable, especially in bill size, with especially large-billed birds originally described as a separate species ('*megarhynchus*'; now considered a synonym of *uncinatus*; see Friedmann 1934, Hellmayr & Conover 1949).

TABLE 2
Mensural data for three taxa of *Chondrohierax*. Data from Friedmann (1950). Means in parentheses, where available. Bill length is the length of the culmen from the cere. Toe length is the length of the middle toe without the claw. All measurements in mm.

Taxon	**Sex**	**Wing length**	**Tail length**	**Bill length**	**Tarsus length**	**Toe length**
C. u. uncinatus	Males (*n* = 26)	265–301 (285.8)	173–210 (191.1)	27.0–35.5 (31.3), one 42.0	32.0–37.0 (35.1)	28.0–35.0 (31.1)
	Females (*n* = 31)	268–321 (284.9)	191–228 (202.8)	28.0–37.0 (31.6), one 43.5	31.0–37.0 (33.8)	28.0–34.0 (30.9)
C. u. mirus	Males (*n* = 3)	250–265 (257)	165–182 (172.7)	28–32 (30)	30–38 (34.5)	25
	Females (*n* = 2)	269–270	180–183	30	41	31
C. wilsonii	Males (*n* = 2)	240–244	177–178	35.5–37.5	29–30	26–27
	Females (*n* = 2, including the lectotype)	251–262	181–188	35.0–38.5	28–30	28–29

Morphological differences among the three taxa were well described by Friedmann (1934, 1950) and are summarised here. In his key to *Chondrohierax*, Friedmann (1950) considered the main difference between *C. u. wilsonii* and the other taxa to be: 'upper mandible [*sic*] pale yellowish white, inclining to bluish horn at base; feathers of upperparts with concealed white bars on their bases'. Friedmann (1950) also mentioned the solidly tawny nuchal collar of female *uncinatus* in contrast to the 'white or pale buff [nuchal collar], barred with russet or chestnut' of female *wilsonii* (males have no nuchal collar), as well as the narrower barring below on *wilsonii*. Friedmann's other mainland subspecies ('*aquilonis*' and '*immanis*') were separated based largely on the saturation of the overall coloration (i.e., minor differences), so although individual variation is considerable, differences among continental populations are few. The mostly yellow bill and barred vs. unmarked nuchal collar seem to be the most consistent characters separating *C. u. wilsonii*. The rationale used by del Hoyo & Collar (2014) for considering *C. u. wilsonii* a separate species included the smaller size and larger bill, so we have included measurements from Friedmann (1950) for *C. u. uncinatus*, *C. u. mirus* and *C. u. wilsonii* in Table 2. These size differences seem minor and given that bill size especially is known to vary drastically among individuals within *C. u. uncinatus*, these differences are unlikely to be useful as species-level characters. Wing length does appear substantially shorter in *C. u. wilsonii* than in *C. u. uncinatus*, however.

Taxon *wilsonii* was described as a species by Cassin (1847) and considered as such by most authors (e.g., Peters 1931, Friedmann 1934, 1950, Bond 1940) until Amadon (1960) treated it as a subspecies of *C. uncinatus*. He cited considerable individual variation in bill size in *C. uncinatus* (i.e., Hellmayr & Conover's justification for treating *megarhynchus* as a synonym of *uncinatus*) to suggest that the difference in bill size between *C. u. wilsonii* and *C. u. uncinatus* was insufficient for species status. Friedmann (1934) also listed the concealed white barring on the back as a character for separating *C. u. wilsonii*, but Amadon (1960) noted that this can be present in immatures of *C. u. uncinatus*. Amadon (1960) also suggested that the mostly pale maxilla of *C. u. wilsonii* may not be a species-level character, because the pale colour of the mandible can extend onto the maxilla in some *C. u. uncinatus*. However, based on photographs of live birds, the pale coloration on the bill of *C. u. uncinatus* is largely restricted to the lower part of the cere, rather than the maxilla. Therefore, Amadon's (1960) primary justification for considering *wilsonii* a subspecies of *C. uncinatus* was that

ISSN-2513-9894 (Online)

Figure 16. Specimens of Hook-billed Kite *Chondrohierax uncinatus mirus* of Grenada in ventral (A), lateral (B) and dorsal (C) views. In each photo male (USNM 353659) on left, female (USNM 353658) on right (© Jacob Saucier)

differences in bill size and in the hidden white bases to the dorsal feathers were shown by other taxa of *Chondrohierax*, and that bill colour alone was insufficient to treat *C. u. wilsonii* as a separate species.

Later authors (e.g., AOU 1983, Howard & Moore 1991, Clements 2007, Clements *et al*. 2021) consistently treated *wilsonii* as a subspecies of *C. uncinatus* (following Amadon 1960),

ISSN-2513-9894 (Online)

until del Hoyo & Collar (2014), using the Tobias point system (Tobias *et al.* 2010), elevated *C. wilsonii* to species status with the following rationale: 'Until recently was considered conspecific with *C. uncinatus*, but trend now widespread to accept species status: differs on account of all-yellow bill (3); larger bill (at least 1); barred collar (2); smaller overall size (at least 1). Molecular evidence has been interpreted as supporting this split (Johnson *et al*. 2007).' Note, however, that the bill lengths of *wilsonii* and *uncinatus* overlap slightly (Table 2). The IOC list split *wilsonii* based on morphological differences and modest mtDNA divergence (Gill *et al*. 2022). See Kirwan & Kirkconnell (2022) for details of the taxonomic history of *wilsonii*.

New information.—Very little. Results from a genetic study (Johnson *et al*. 2007) were the basis for NACC proposal 2007-B-4 to split *wilsonii* from *C. uncinatus*, which did not pass (the vote was 5-5). To our knowledge, there has been no additional work on the genus relevant to taxonomy. No recordings of *wilsonii* are known, but the voice is described as 'whistles similar to Hook-billed Kite' (Kirwan *et al*. 2019). A single in-life photo has been published but is of too poor quality to assess the characters that distinguish these taxa (see p. 23: https://www.aba.org/birding_archive_files/v42n1p22.pdf), and at least one NACC member doubted whether this photo is correctly identified, suggesting it may instead represent a species of *Accipiter*.

Taxon *wilsonii* is Critically Endangered, or possibly extinct, with very few sightings in recent years, despite several focused surveys (Gallardo & Thorstrom 2019, BirdLife International 2021). It may now be restricted to a remnant population in the mountains of the far east of the island (Gallardo & Thorstrom 2019, Kirkconnell *et al*. 2020). Its declines are attributed to loss of habitat, loss of its main prey item (snails) and persecution due to the mistaken belief that it hunts gamebirds. Conservation status does not have any bearing on taxonomic decisions, but the lack of new data makes a decision on species status difficult. There are almost 40 specimens in collections worldwide (Kirkconnell *et al*. 2020), of which we have access to a small series, which combined with the detailed descriptions of Friedmann (1934, 1950; see above) can help with the analysis. Additional information can be found in the 2007 NACC proposal.

Jacob Saucier and Marco Rêgo graciously photographed some of the series of *Chondrohierax* housed at USNM and LSUMZ (Figs. 14–16). These include photos of *wilsonii*, *uncinatus* and *mirus*, although the USNM specimen of female *wilsonii* (USNM 453097) is unfortunately rather faded. In all photos, note the pale bill and narrower but more extensive barring below of *wilsonii* compared to *uncinatus*/*mirus*. The LSUMZ *wilsonii* specimen (LSUMZ 141440) is labelled as a male, but the brown dorsum, narrow tail bars and barred nuchal collar all suggest it is a female (or perhaps a subadult male). The USNM male *wilsonii* (USNM 453087) has an unbarred nuchal collar and is greyer above. From these photos, it appears that both sexes of *mirus* show an unbarred tawny nuchal collar, whereas this character is found only in females of *uncinatus*. The specimens of *wilsonii* that possess a nuchal collar have this area barred rather than unbarred tawny, although in the female USNM specimen this region is too faded to assess the original colour.

Johnson *et al*. (2007) sequenced just two mitochondrial genes, cyt-b and ND2 (so all the standard gene tree/species tree caveats apply) but found that *C. u. wilsonii* was sister to the remainder of *Chondrohierax* and 1.8–2.0% divergent, with a divergence time estimate of 400,000–1.25 million years. Both the phylogeny and haplotype network of Johnson *et al*. (2007) showed that the Grenada taxon *mirus* was largely undifferentiated at those loci from continental populations (*C. u. uncinatus*). Johnson *et al*. (2007) estimated migration rates between North and South American populations of *C. u. uncinatus*, but not between *C. u. uncinatus* and either of the insular taxa. However, within *C. u. uncinatus* they were

ISSN-2513-9894
(Online)

close to zero (albeit with broad confidence intervals), perhaps suggesting that there is low connectivity even within continental populations.

Recommendation.—The comparative genetic distances between *C. u. wilsonii* and *C. u. uncinatus/mirus* are borderline regarding species status, especially given that it is based on only two mitochondrial genes, so are not as informative as one would like. The morphological differences do seem quite pronounced for a raptor, however. The combination of the solid yellow bill of *C. u. wilsonii* and differences in the pattern of the nuchal collar and width and extent of the barring below, all afford *C. u. wilsonii* quite a different appearance. Furthermore, geographic variation within the remainder of the widely distributed *Chondrohierax* is minor; thus, *C. u. wilsonii* is the morphological outlier within the genus. We recommend that *wilsonii* be treated as a separate species from *C. uncinatus*. The English name of Hook-billed Kite could stay with *C. uncinatus*, given that *wilsonii* is a peripheral isolate. The name Cuban Kite, already used by BirdLife International and the IOC checklist, is appropriate for *C. wilsonii*.

Next steps.—Little is known of the natural history or vocalisations of *C. wilsonii*, which is unsurprising given its rarity. Future research could focus on locating remaining individuals and documenting as much of the species' natural history as possible to aid its conservation.

SHARP-SHINNED HAWK *Accipiter striatus*

Background.—Based on NACC proposal 2022-B-5 'Treat *Accipiter chionogaster* (White-breasted Hawk) as a separate species from *A. striatus* (Sharp-shinned Hawk)', which did not pass. Proposal author: SMB.

Accipiter striatus Vieillot, 1808, is a small raptor widespread throughout North America, Middle America, the Caribbean, and parts of South America. Most authorities recognise ten subspecies, which are usually divided into three main subspecies groups. Across this broad distribution and these taxa, variation in plumage, differences in ecology and possible differences in behaviour are extensive (Bildstein *et al*. 2020). Given this, Sharp-shinned Hawk as currently recognised on the *Checklist* has at times been treated as up to four species, although it is more typically regarded as comprising three or four groups: northern migratory *striatus* (which itself is sometimes divided into a northern migratory *velox* (A. Wilson, 1812) group and a Caribbean resident *striatus* group), white-breasted *chionogaster* (Kaup, 1852) of southern Middle America, and rufous-thighed *erythronemius* (Kaup, 1850) of South America. Of the four main global checklists, only Gill *et al*. (2022) recognises four species in the complex, including *A. striatus* (including the *velox* group), *A. chionogaster*, *A. ventralis* P. L. Sclater, 1866, of northern South America, and *A. erythronemius*, following the treatment of Ferguson-Lees & Christie (2005). The other major world checklists treat the complex as a single species.

New information.—Little new information sheds light on this complex. In comparing *A. s. chionogaster* to the 'northern' group, the main difference is in plumage of adults, with the *chionogaster* group having clean white underparts with some pale buff on the tibial feathers, compared to the rich rufous to orange barring on the underparts of northern birds. *A. s. chionogaster* tends also to be darker above, being described as 'sooty to fuscous black' vs. 'gray to grayish blue' (Bildstein *et al*. 2020). The juvenile plumage of *A. s. chionogaster* has similarly pale underparts and is very lightly streaked below compared to northern subspecies (Storer 1952).

Although *A. s. chionogaster* differs significantly in plumage from the widespread and migratory *A. s. velox* of North America, *A. s. suttoni* and *A. s. madrensis* of Mexico (mountains of Chihuahua, Sonora, south to Veracruz; and Sierra Madre del Sur in Guerrero and Oaxaca, respectively) are intermediate between *A. s. velox* and *A. s. chionogaster*. The underparts of

ISSN-2513-9894 (Online)

A. s. suttoni are paler than those of *A. s. velox*, and *A. s. madrensis* is paler than *A. s. suttoni*. This pattern suggests that *A. s. chionogaster* is just the pale extreme of a step cline (Storer 1952, Bildstein *et al*. 2020). Although the distribution of *A. s. chionogaster* is separated from *A. s. madrensis* by the Isthmus of Tehuantepec, an important biogeographic barrier, Storer (1952) suggested that the paleness of *A. s. madrensis* could be the result of introgression from *A. s. chionogaster*, which influenced his decision to consider *chionogaster* conspecific with *A. striatus*.

Subspecies *chionogaster* is similar in size to northern birds. Dickey & van Rossem (1938) reported that the only difference between *A. s. chionogaster* and northern *A. s. velox*, which is sympatric with *A. s. chionogaster* in winter, was the slightly longer bill and longer middle toe of *A. s. chionogaster* (Jenner 2010); northern *A. s. velox* and *A. s. chionogaster* overlap in wing and tail length (Storer 1952). In a supertree generated by Mindell *et al*. (2018), *A. s. chionogaster* was sister to the *striatus* group, with very short branch lengths. However, only three subspecies of *A. striatus* were sampled. In a recent study by Catanach *et al*. (2021), ultraconserved elements (UCEs) were used to study the systematics of Sharp-shinned Hawks, with a focus on Caribbean taxa. In addition to the island subspecies, this study included samples of some mainland taxa, including *chionogaster*, *velox*, *ventralis* (mountains from Venezuela to Bolivia) and *erythronemius*. They found that *A. s. chionogaster* was sister with strong support to *A. s. velox*, with these two sister to *A. s. ventralis*. These three were in turn sister to the clade of Caribbean taxa (Catanach *et al*. 2021). However, because Caribbean taxa were the focus, additional work is needed to further clarify relationships among the taxa from North, Middle and South America, especially to address the potential for gene flow among these phenotypically variable and geographically widespread groups.

Jenner (2010) described the vocalisations and various aspects of the life history of *A. s. chionogaster*, including its breeding biology and moult patterns. The post-juvenile moult (preformative moult of Howell *et al*. 2003) of *A. s. chionogaster* in Honduras and El Salvador was completed in most individuals before the breeding season in their second calendar year, meaning that birds acquired adult-like plumage prior to their first breeding season; the same moult in *A. s. velox* begins near the start of the breeding season in their second calendar year (Bildstein *et al*. 2020). The early progression of moult in *A. s. chionogaster* perhaps contributed to the higher proportion of first-year birds breeding compared to other taxa (Jenner 2010). The courtship display of *A. s. chionogaster* was described as similar to that of other *Accipiter*, although some birds rock back and forth in the air so that the white underparts seemed to be prominently displayed. If display of the white underparts is an important aspect of courtship, it could represent a potential pre-mating barrier (Jenner 2010). Courtship began in October, and the breeding season lasted for *c*.9 months in Honduras and El Salvador; importantly, courtship and pair formation at these two locations occur before most northern migrant Sharp-shinned Hawks (*velox* group) arrive in the area, suggesting temporal reproductive isolation between them (Jenner 2010).

Recommendation.—The Sharp-shinned Hawk complex is extremely variable in plumage and is widely distributed in North and South America. As others have recognised, the three to four groups may each represent distinct species (e.g., Sibley & Monroe 1990, Bierregaard 1994, Ferguson-Lees & Christie 2005, Gill *et al*. 2021). Differences in moult timing, potential differences in courtship displays, and the timing of breeding of *A. s. chionogaster* relative to the northern migrant *velox* group could all represent important species-level differences, although they are expected within a species with such a broad latitudinal distribution. However, to date, there are no phylogeographic, population-level studies of genetic diversity within mainland taxa that could shed important light on the status of not only *A. s. chionogaster*, but also the South American taxa.

ISSN-2513-9894
(Online)

Although we predict that additional data will show that *A. s. chionogaster* represents a separate biological species, we recommend it be maintained as a subspecies of Sharp-shinned Hawk for the time being, until additional data become available.

Next steps.—Genetic work with greater geographic sampling is needed to quantify genetic differences and degree of gene flow among continental taxa. Work is needed especially on describing variation in vocalisations (particularly the 'long call') and displays. Analyses of plumage variation are needed but should also be compared to the degree of intraspecific plumage variation in other *Accipiter*. There is a need for an analysis of the putative step clines in plumage, with adequate geographic sampling across the entirety of the cline.

ELEGANT TROGON *Trogon elegans*

Background.—Based on NACC proposal 2022-A-7 'Recognize *Trogon ambiguus* (Coppery-tailed Trogon) as a separate species from *T. elegans* (Elegant Trogon)', which did not pass. Proposal author: JVR.

Trogon elegans Gould, 1834, currently consists of two groups separated by a range gap in the Isthmus of Tehuantepec: the *ambiguus* Gould, 1835, group (Coppery-tailed) north of the Isthmus (south-east Arizona to south-west Mexico) and the *elegans* group (Guatemala to north-west Costa Rica). The two groups have long been known to differ in some key plumage features. Each group comprises two subspecies.

Ridgway (1911) treated the two groups as separate species. His key separated them by tail colour (coppery to golden in *T. e. ambiguus* and *T. e. goldmani*; greenish bronzy in *T. e. elegans*) and pattern of the lateral rectrices (vermiculated in *T. e. ambiguus* plus *goldmani*; barred in *T. e. elegans*). Cory (1919) followed Ridgway (1911). Peters (1945) lumped them into a single species without providing rationale (and we could not find anything published to support Peters' treatment). Eisenmann (1955) also treated them as conspecific. The AOU (1957) treated them as conspecific and called the combined species 'Coppery-tailed Trogon'. Mayr & Short (1970) treated it as an uncomplicated polytypic species (i.e., no concerns on species limits). On the other hand, Oberholser (1974) continued to treat *T. ambiguus* as a separate species, writing:

> This species is generally considered a subspecies of *Trogon elegans*. This treatment appears to have developed from the seeming intergradation evident when comparing female and immature birds, or those in transition plumage. Fully adult males of *Trogon ambiguus ambiguus* are entirely distinct in lacking the regular narrow black barring of the three outer tail feathers, which is so conspicuous and characteristic a feature of *T. elegans*, and which is very different from the mottled appearance of the same feathers in *T. ambiguus*. Examination of a large number of specimens shows no indication of intergradation in this respect. Even in the female of *T. elegans* the outer tail feathers are more numerously and regularly barred with black than are the same feathers in the adult female of *T. ambiguus*. Thus, it would seem to be more representative of the true relationships of these two birds to consider *T. ambiguus* a distinct species. Van Rossem has described the bird from n.w. Mexico as *Trogon elegans canescens*,[1] but the bird from e. Mexico, which race has occurred in extreme s. Texas, is the "Typical," or nominate form, *T. a. ambiguus*.

[1] *Bull. Mus. Comp. Zool.* 77 (Dec. 1934): 441 (San Javier, Sonora, Mexico).

The AOU (1983) treated them as conspecific, with only the statement: 'sometimes regarded as a separate species, *T. ambiguus*'. Howell & Webb (1995) also treated them as conspecific. The AOU (1998) treated them as conspecific but recognised the two groups: 'Notes.—Groups: *T. ambiguus* Gould, 1835 [Coppery-tailed Trogon] and *T. elegans* [Elegant Trogon].' Collar (2001) treated them as conspecific but mentioned the two groups. Dickinson & Remsen (2013) treated them as separate groups but also cited Oberholser (1974) as evidence for a possible return of species rank to the *ambiguus* group. Knowing that this was a data-free Peters (1945) lump followed uncritically by subsequent authorities, Dickinson & Remsen (2013) were tempted to reinstate *ambiguus* as a species but did not want to conflict with the current AOS treatment (*fide* JVR); also, with a substantial lowland gap between the two, Oberholser's (1974) point on lack of intermediates is nearly irrelevant.

New information.—Nothing really new. Del Hoyo & Collar (2014) treated them as separate species and outlined the well-known plumage differences between the two (see Fig. 17). These authors argued that *ambiguus* is:

> Usually considered conspecific with *T. elegans*, although for long recognised as distinctive: differs in its finer-grained vermiculations on wing panel (1); overall golden tone to green of breast, hindcrown and upperparts, the same gene presumably responsible also for uppertail being bronzy-coppery rather than yellowish blue-green (3); undertail pattern without close bold barring but instead with vague, incomplete vermiculations and with outer vane of outer rectrix all white, so that undertail looks almost entirely white (3).

Genetic data.—Monteros (1998) treated *T. e. elegans* and *T. e. ambiguus* as conspecific; although his GenBank accession suggests two individuals, they were not separated in the

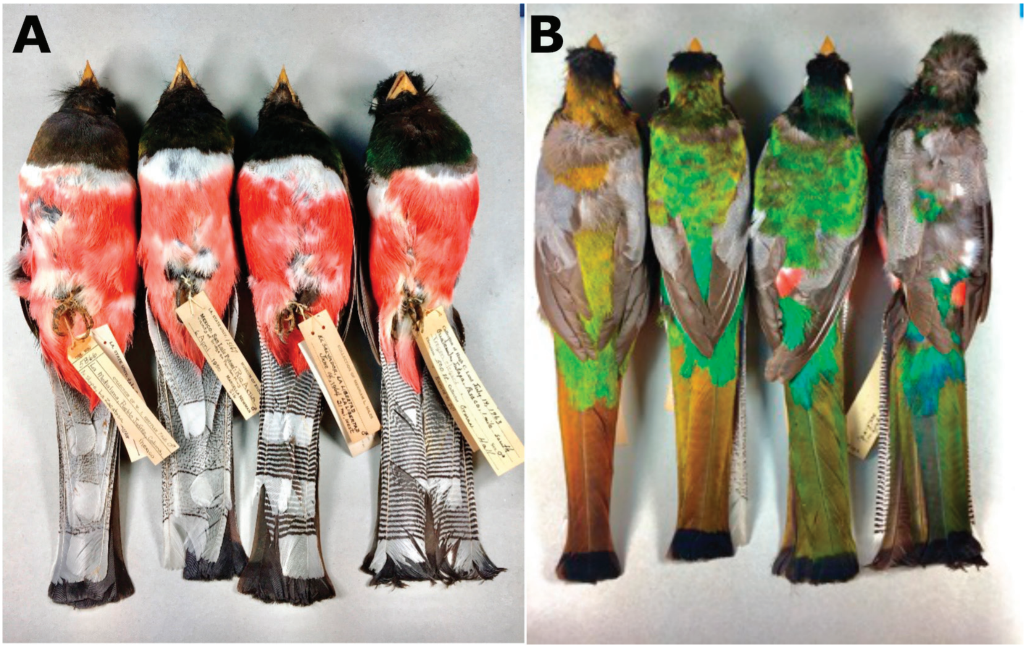


Figure 17. Male specimens of Elegant Trogon *Trogon elegans* in ventral (A) and dorsal (B) views. In each photo, the left two specimens are of *ambiguus*, and the right two are *elegans*; left to right: LSUMZ 40305, 15167, 50543 and 65719 (Oscar Johnson)

ISSN-2513-9894 (Online)

analysis and their origin was not given. Moyle (2005) included only one representative, a sample of *T. e. elegans* from El Salvador. DaCosta & Klicka (2008) included single samples from El Salvador and Mexico; unsurprisingly, they were sister taxa, and the genetic distance was small.

Voice.—No analysis has been published, but Xeno-canto has many recordings of the songs of both groups. Both share an unusually hoarse, somewhat frog-like repeated syllable that is much raspier and less mellow than those of other *Trogon* songs. However, they do suggest that a formal analysis would reveal that *T. e. ambiguus* has a faster delivery with more syllables than does *T. e. elegans*. A recording of *T. e. ambiguus* from Sonora (XC 450735), and one of *T. e. elegans* from Costa Rica (XC 6773) illustrate the potential differences that require quantification.

Discussion and Recommendation.—Trogon species limits are associated with vocal differences, not plumage differences. In fact, Dickens *et al*. (2021) showed specifically that the same set of plumage differences noted by del Hoyo & Collar (2014) above differ among the three Amazonian subspecies of *T. rufus* J. F. Gmelin, 1788, yet each of them intergrades wherever in contact. *T. rufus* being the sister lineage to *T. elegans*, inference based on the biology of closely related taxa (the 'yardstick method') indicates that these plumage characters are not meaningful in terms of barriers to free gene flow yet are considered positive evidence for treating two taxa as species by Tobias *et al*. (2010).

This is yet another case of an old decision to treat two distinctive taxa as conspecifics based solely on plumage similarities and virtually no explicit rationale. Further, an analysis of plumage characters in the sister lineage shows that these are not barriers to gene flow, whereas a perusal of online recordings of voices further hints that the decision to treat the two groups as conspecific was unjustified. Nevertheless, our recommendation is to maintain *ambiguus* as a subspecies of *T. elegans*, pending a formal analysis of voice.

Note on English names.—If *T. e. ambiguus* were to be elevated to species status, then the sensible names, consistent with NACC guidelines, would be to restrict Elegant Trogon to *T. elegans* and resuscitate Coppery-tailed Trogon for *T. ambiguus*, i.e., returning to the historical names for the species prior to their treatment as conspecific.

Next steps.—Most committee members considered a formal analysis of vocal differences to be critical to determining species limits in this group, especially to assess potential overlap in vocal characters between the two subspecies groups. An analysis of genetic variation within and between the two groups might be instructive, particularly if samples were obtained close to the Isthmus of Tehuantepec.

AMERICAN THREE-TOED WOODPECKER *Picoides dorsalis* and EURASIAN THREE-TOED WOODPECKER *P. tridactylus*

Background.—Based on NACC proposal 2023-C-3 'Treat American Three-toed Woodpecker *Picoides dorsalis* as a subspecies group of *P. tridactylus*', which did not pass. Proposal author: KW.

Adoption of the species limits advocated here would change *Picoides dorsalis* Baird, 1858 (American Three-toed Woodpecker) to a subspecies group of *Picoides tridactylus* (Linnaeus, 1758) (the English name for which is presently Eurasian Three-toed Woodpecker but which would thus be best rendered as Three-toed Woodpecker). This is how NACC treated this complex in the last four print editions of the *Checklist* (1931–98), only changing the English name after the fifth edition (deleting 'Northern' from Three-toed Woodpecker), then later treating *P. dorsalis* as a species (Banks *et al*. 2003). There are three North American subspecies: *dorsalis*, *fasciatus* and *bacatus*; all three would revert to being subspecies of *P.*

ISSN-2513-9894 (Online)

tridactylus sensu lato (e.g., AOU 1931–98, Peters 1948, Short 1982, Winkler *et al*. 1995, Winkler & Christie 2002).

In brief, prior to adoption of the Biological Species Concept (BSC), *dorsalis* (under the name *americanus*, which was subsequently synonymised with *dorsalis*, though see discussion in Tremblay *et al*. 2018) was often considered a species, and then it was generally treated as a subspecies of *P. tridactylus*. After AOU (1931), NACC treated it this way until Banks *et al*. (2003), who wrote:

> New World and Old World populations of Three-toed Woodpeckers are split on the basis of differences in mitochondrial DNA (Zink *et al*. 1995, 2002) and voice (Winkler & Short 1978, Short 1982). Ridgway (1914) considered New World and Old World populations to be separate species, and the merger of New World *dorsalis* into Old World *tridactylus* (e.g., AOU 1931, Peters 1948) was never explained.

The editorial style constraints of AOU (1931) and the 'Peters' *et al*. volumes generally (if not completely) precluded authors from explaining their treatments in detail. The implicit explanation, of course, was their recognition that phenotypic differences were, relatively speaking, more in line with subspecies treatment under the BSC. Concordance in this treatment was broad, and, basically, it is this phenotypic similarity, now quantified (del Hoyo & Collar 2014; see below) that brings us back to this issue today.

In contrast to Banks *et al*. (2003), Winkler & Short (1978) and Short (1982) noted vocal differences between North American and Eurasian birds but did not consider them sufficiently different to suggest these groups should be considered biological species. As Winkler & Short (1978: 16) wrote:

> The Call Note of Central European birds (Germany, Austria) is shaped like a broad arrowpoint, with the fundamental tone emphasised and possesses significant introductory and ending elements (fig. 3L, M, table 2; see Ruge 1975). Swedish birds have essentially the same calls. North American birds (New York) are different in all their measurable characters. Unfortunately, our recordings are insufficient for comparison of these geographical groups. This species, the only Holarctic woodpecker, would be an ideal subject for the study of geographical variation ...

In general, authors of monographs on woodpeckers operating without the editorial constraints of the AOU *Checklists* or the Peters volumes (e.g., Winkler & Short 1978, Short 1982, Winkler *et al*. 1995) considered the evidence to treat these taxa as one biological species sufficiently strong that they did not mention the possibility of a species-level split, despite repeated opportunities to do so.

Enter mtDNA. Analyses of and inference from three mtDNA datasets for these taxa have been published, and all three sets of authors recommended a species-level split. The first study (Zink *et al*. 1995) was a small sample (n = 9) using restriction fragment length polymorphisms (RFLPs) to compare Eurasian and North American populations, which found *c*.5.5% divergence. The second study (Zink *et al*. 2002) used more birds (n = 29), broader geographic sampling and 1,234 bp (from ND2, ND3, and cyt-*b*) and found 3.8% divergence. The third mtDNA dataset is that of Johnsen *et al*. (2010), who used mitochondrial COI barcode data (sampling details not published) to report a 3.7% COI divergence. (In addition, KW has access to a small as-yet unpublished mtDNA dataset indicating that between continents the birds are *c*.2.5% divergent in ND2 using Jukes-Cantor corrected *p*-distance (KW, Univ. of Alaska Museum, unpubl. data, 2023).

ISSN-2513-9894
(Online)

The mtDNA data are intriguing, and they played a prominent role in splitting these taxa. With genetic data available, Winkler & Christie (2002) also split the two groups into separate species. But that was a time when we were still relying on the powers of mtDNA to diagnose species limits, which most now know can be incorrect.

Plumage variation of the entire complex is rather pronounced, showing that there is quite a bit of variation occurring without much mtDNA variation to correspond with it; the continental clades show little if any structure (see Zink *et al*. 2022). Finally, as Winkler & Short (1978) noted, when *P. tridactylus* is treated as a single species, it is the only Holarctic woodpecker.

New information.—Currently, the world lists treat *P. dorsalis* either as a species (Dickinson & Remsen 2013, Clements *et al*. 2022) or as a subspecies group of *P. tridactylus* (del Hoyo & Collar 2014, Gill *et al*. 2022).

Between Winkler & Christie (2002) and del Hoyo & Collar (2014), the Tobias *et al*. (2010) method was applied to this taxonomic question and the two groups scored so low (*c*.2) that they were again considered conspecific. Del Hoyo and Collar (2014) discussed the situation thus:

> In recent decades North American subspecies commonly treated as forming a separate species (*P. dorsalis*) on basis of genetic evidence (Johnsen *et al*. 2010), but morphological differences involve merely narrower postocular stripe (1) and smaller size (according to published measurements, no more than 1); all-white outer tail feathers shared by East Asian subspecies *albidior* and *crissoleucus*, and notion of less white in forecrown not supported by specimen evidence. Distinctive form *funebris*, however, here allowed species status (see related note/s). Currently accepted subspecies designated according to coloration, but variation is clinal, birds becoming darker and larger from N to S; comprehensive revision based on genetic and biogeographical grounds required.

Note, however, that the del Hoyo & Collar (2014) treatment effectively ignores genetic differences: genetic data do not form part of the Tobias *et al*. (2010) scoring methodology. Although the mtDNA data are equivocal, they are intriguing. Study of the nuclear genome is warranted (and likely forthcoming).

Recommendation.—Although it is likely that a proposal to split these taxa today based on current information would not pass and that single-species status is probably warranted, we recommend maintaining the two-species treatment for now. The phenotypic evidence alone suggests single-species treatment, but the mtDNA data indicate that substantial divergence has occurred. However, until we possess nuclear data, it would be premature to make another change based essentially on different opinions about a body of evidence that has not really changed much. In other words, it would be better to eventually make one change if clearly needed and not risk having to reverse a change if the future nuclear data (and perhaps that much-needed comparative work on voice across the range) do end up supporting the current taxonomic treatment.

Next steps.—As noted in the proposal, more comprehensive genomic work on the complex is needed, as well as a quantitative analysis of vocal differences. Committee members noted possible vocal differences, including the drumming of *dorsalis* diminishing near the end instead of ending abruptly and the *pik* notes sounding higher-pitched, and European birds having a lower-pitched, richer call. This is supported by the vocal differences between the two groups noted by Winkler & Short (1978), although they had recordings from only a few localities. Unfortunately, vocal data appear to be lacking for most of the eastern Palearctic taxa.

GOLDEN-OLIVE WOODPECKER *Colaptes rubiginosus*

Background.—Based on NACC proposal 2023-C-4 'Treat *Colaptes aeruginosus* as a separate species from Golden-olive Woodpecker *C. rubiginosus*', which did not pass. Proposal author: RTC. Additional information added post-proposal by DFL & OJ.

Colaptes rubiginosus (Swainson, 1820) is currently treated by NACC and SACC as a highly polytypic species ranging from north-east Mexico south to north-west Argentina. Under this classification, *C. r. aeruginosus* (Malherbe, 1862) is the northernmost subspecies, distributed from Nuevo León and Tamaulipas south to central Veracruz. The main plumage differences between *C. r. aeruginosus* and the geographically closest subspecies of *C. rubiginosus* (*C. r. yucatanensis* S. Cabot, 1844, which is found from southern Mexico to Panama) are the extent of the red supercilium on the male, which extends only from the nape to behind or above the eye in *C. r. aeruginosus* but from the nape to the bill in *C. r. rubiginosus*; the rear ear-coverts, which are plain in *C. r. aeruginosus* but barred in *C. r. rubiginosus*; the shape of the barring on the underparts, which is wavy or scale-shaped in *C. r. aeruginosus* but straight in *C. r. rubiginosus*; and the proportionately longer tail of *C. r. aeruginosus*.

Standard taxonomic references from the first half of the 20th century, e.g., Ridgway (1914), Cory (1919) and Peters (1948), considered the current NACC species *C. rubiginosus* to consist of more than one species but had different views of species limits. Ridgway (1914) considered *C. rubiginosus sensu lato* to consist of four species: *C. aeruginosus*, *C. rubiginosus*, *C. chrysogaster* (von Berlepsch & Sztolcman, 1902) of Peru, and *C. gularis* (Hargitt, 1889) of Colombia. Cory (1919) merged *gularis* into *C. rubiginosus* and thus recognised only three species: *C. aeruginosus*, *C. rubiginosus* and *C. chrysogaster*. Peters (1948) further merged *chrysogaster* into *C. rubiginosus* and thus recognised only two species: *C. aeruginosus* and *C. rubiginosus*. The latter two were first considered conspecific by Baptista (1978), who identified intermediates in the vicinity of Xalapa and Córdoba in central Veracruz. Short (1982) followed Baptista (1978) in treating *aeruginosus* as a subspecies of *C. rubiginosus*, noting that the differences between the two fall within the scope of variation shown by the other 17 subspecies of *C. rubiginosus*. Short (1982) specifically mentioned subspecies *tucumanus* (Cabanis, 1883) of the southern Andes, as follows: '[*aeruginosus*] is judged to be no more distinct than other ones such as *tucumanus*, and it shares the sexual dimorphic pattern of other races of *rubiginosus*'. The latter statement is a reference to the closely related *C. auricularis* (Salvin & Godman, 1889), which is less sexually dimorphic in crown coloration. We note, however, that despite some plumage similarities, vocalisations between *C. auricularis* and *C. rubiginosus* are distinct.

Indeed, the plumage differences shown by *C. r. aeruginosus* represent only a small part of the variation within *C. rubiginosus*, and some of the characters that purportedly distinguish *C. r. aeruginosus* from the rest of *C. rubiginosus* are highly variable within *C. rubiginosus*. For example, the extent of the red on the head varies from a rather short supercilium in *C. r. paraquensis* (Phelps & Phelps Jr., 1948) and *C. r. guianae* (Hellmayr, 1918), in addition to *C. r. aeruginosus*, to covering most or all of the head in subspecies such as *C. r. gularis*; the rear ear-coverts are also variable. Other characters that differ among subspecies of *C. rubiginosus* include ventral coloration and the extent and colour of the ventral barring. The shape of the barring, however, does appear to distinguish *aeruginosus* from other subspecies of *C. rubiginosus*, and is the only qualitative feature mentioned by Ridgway (1914) in his key to the complex. Ridgway (1914) distinguished *C. aeruginosus* by the 'Chest and breast irregularly barred or squamate; larger (wing averaging more than 130; tail more than 85)' whereas *C. rubiginosus* was characterised by the 'Chest and breast regularly barred; smaller

ISSN-2513-9894 (Online)

(wing averaging less than 130; tail less than 80).' Many of these differences are shown in Fig. 18.

AOU (1983, 1998) treated *aeruginosus* as conspecific with *C. rubiginosus*, presumably following Short (1982), but the two taxa were tentatively considered species by Howell & Webb (1995) based on differences in plumage and voice, the latter characterised as:

> *rubiginosus*—'A sharp, slightly explosive *kee'ah* or *k'yaah*, recalling a flicker, and a rapid, shrill, churring rattle'.
> *aeruginosus*—'A sharp, nasal, squirrel-like *kyow'n* or *chey-ey*, at times repeated in short series, and a steady series of sharp *weeyk!* or *wheeir* notes, 10/4–6 s, suggesting Squirrel Cuckoo [*Piaya cayana*] song; also a low, short, guttural chatter, audible at close range. Voice thus quite different from Golden-olive Woodpecker [*rubiginosus*].'

Howell & Webb's (1995) taxonomic note on a potential split read as follows: 'Distinct vocalizations and plumage differences suggest specific status for Bronze-winged [*aeruginosus*] and Golden-olive [*rubiginosus*] woodpeckers. Field studies are needed to investigate the extent of intergradation (if any?) in cen Ver.', apparently overlooking the findings of Baptista (1978). Accordingly, their text and distribution maps indicated that the range of *C. r. aeruginosus* extends south to central Veracruz and that the range of the adjacent subspecies of *C. rubiginosus* extends north to central Veracruz.

New information.—As part of a study of the genera *Piculus* and *Colaptes*, Moore *et al*. (2011) sequenced four individuals of *C. r. rubiginosus sensu lato*, two from Mexico and two from Peru, for three mitochondrial genes (cyt b, COI, 12S rRNA), and found with high support that the Mexican and Peruvian individuals were not sisters: the Peruvian birds were sister to Black-necked Woodpecker *C. atricollis* (Malherbe, 1850) whereas the Mexican birds were sister to *C. auricularis*.

Moore *et al*. (2011) did not identify their samples to subspecies and described their samples from Mexico simply as belonging 'to a Mexican subspecies of *rubiginosus*'. However, based on collecting localities, their Mexican samples (from the Sierra de Santa Marta in southern Veracruz) would be *C. r. yucatanensis* and their Peruvian samples (from Lambayeque) would be *C. r. rubripileus* (Salvadori & Festa, 1900). They concluded their paper by stating the following: 'Genetic analyses based on extensive taxon sampling of *C. rubiginosus*, *C. auricularis* and *C. atricollis* that includes the many subspecies of *C. rubiginosus* and the two disjunct subspecies of *C. atricollis* are required to clarify these relationships.'

Gill & Wright (2006) split *C. r. aeruginosus*, as suggested by both Monroe & Sibley (1997) and Howell & Webb (1995), and this split was maintained in subsequent versions of the IOC world bird list. In a later edition of the IOC list, Gill & Donsker evidently assumed that Moore *et al*.'s (2011) Mexican samples were referable to *C. r. aeruginosus* and consequently that their study bolstered the case for treating *aeruginosus* as a species separate from *C. rubiginosus* (e.g., as in Gill *et al*. 2021), retaining all other subspecies, including *C. r. yucatanensis*, in *C. rubiginosus*. The note on the IOC list is as follows: '*C. aeruginosus*, previously treated as a ssp. of *C. rubiginosus*, is sister to *C. auricularis*; *C. rubiginosus* is sister to *C. atricollis* (Moore *et al*. 2011).'

Although both Mexican samples used by Moore *et al*. (2011) are Field Museum tissues, only one of them is vouchered there (FMNH 343228); the other (FMNH 395799) is at UNAM (as UNAM 7788). Ben Marks kindly provided photos of the vouchers and the identifications have now been confirmed as *C. r. yucatanensis* rather than *C. r. aeruginosus*, meaning that the IOC's note suggesting treatment of *C. r. aeruginosus* as a separate species was based on

Figure 18. Males of eight subspecies of Golden-olive Woodpecker *Colaptes rubiginosus* in ventral (A), dorsal (B) and lateral (C) views. From left to right are specimens of the following subspecies: *aeruginosus* from north-east Mexico (USNM 158576), *yucatanensis* from southern Mexico (USNM 371719), *guianae* from Guyana (USNM 626803), *gularis* = '*pacificus*' from western Colombia (USNM 436350), *buenavistae* from eastern Colombia (USNM 368967), *chrysogaster* from central Peru (USNM 159795), *canipileus* from Bolivia (USNM 264920) and *tucumanus* from north-west Argentina (USNM 645718). Unfortunately, USNM lacks several distinctive subspecies, such as *paraquensis* and *viridissimus*, so photos of these taxa are not included here (R. Terry Chesser)

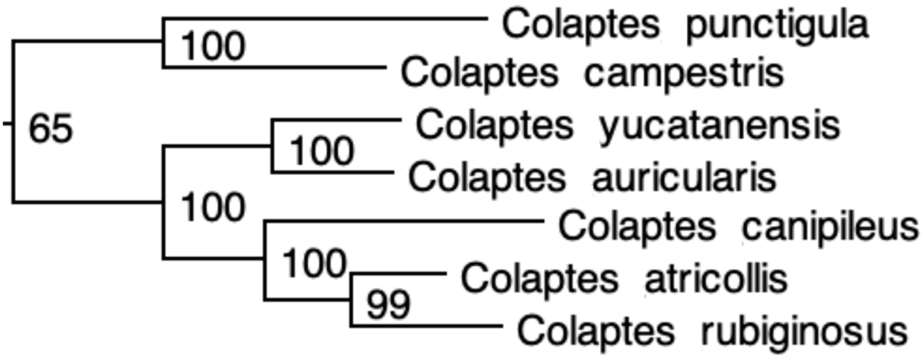


Figure 19. Excerpt of a woodpecker supertree showing relationships among taxa in *Colaptes*. Phylogeny based on data from Dufort (2016) and visualised in Dendroscope 3.8.3 (Huson & Scornavacca 2012). Numbers to the right of the nodes are bootstrap values.

inaccurate assumptions, as the genetic data were from *C. r. yucatanensis* and *C. r. rubripileus*; data from *C. r. aeruginosus* are lacking.

Dufort (2016) published a woodpecker supertree, using sequences from GenBank, that apparently (we could not find a list of samples used in this paper) included Moore *et al*.'s samples and identified them as *C. yucatanensis*, because there is a terminal taxon labelled with this name in the same position as in the Moore tree (as sister to Grey-crowned Woodpecker *C. auricularis*; Fig. 19). Two other terminal taxa in the Dufort tree are also part of *C. rubiginosus*, i.e., '*Colaptes canipileus*' and '*Colaptes rubiginosus*.' These two taxa are not sister to *yucatanensis*, nor do they form a monophyletic group themselves; instead, they are successive sisters to *C. atricollis* (Fig. 19).

We searched GenBank for sequences of *C. rubiginosus* and found that the only records for this species, other than the Moore *et al*. (2011) sequences from Mexico and Peru, are from Guyana, suggesting that the taxon labelled '*Colaptes canipileus*' in the Dufort tree actually represents Moore *et al*.'s samples of subspecies *C. r. rubripileus* (*C. r. canipileus* [d'Orbigny, 1840] occurs in southern Peru and Bolivia rather than north-western Peru) and that the taxon labelled '*Colaptes rubiginosus*' represents samples from Guyana, which would be either subspecies *C. r. guianae* (Hellmayr, 1918) or *C. r. nigriceps* (Blake, 1941).

Of note is the fact that none of the subspecies that form separate lineages in the Moore *et al*. (2011) or Dufort (2016) studies (*yucatanensis*, *rubripileus* and *guianae*/*nigriceps*) correspond to the subspecies formerly considered species by Ridgway, Cory or Peters, namely *aeruginosus*, *chrysogaster* and *gularis*. Instead, all taxa sampled for mtDNA were considered conspecific with *C. rubiginosus* by these references, and their distinctive mtDNA lineages provide an indication of the complexity of variation in this species.

More recently, Shakya *et al*. (2017) published a phylogeny of most species of woodpeckers based on both mtDNA and nuclear introns. Unfortunately, they only included a single tissue of *C. rubiginosus*, a sample from Guyana.

Del Hoyo & Collar (2014) also considered *C. r. aeruginosus* as a separate species from *C. rubiginosus*, using the same division as Gill *et al.* (2021), but based their decision on plumage and the vocal descriptions in Howell & Webb (1995):

> Until recently treated as subspecies of *C. rubiginosus*, but differs in male's red supercilium extending from nape to above eye *vs* extending from nape to bill (2); rear ear-coverts clear *vs* barred (1); bars on underparts more scale-shaped (1); wings and tail longer (effect size for tail *vs C. r. yucatanensis* 3.63; score 2); wholly different

ISSN-2513-9894
(Online)

song (deliberate slow-paced series of c. 6 typical picoid high-pitched calls, "kwi, kwi, kwi, kwi, kwi, kwi" *vs* protracted rising rattling trill), extensive playback experiments yielding frenzied response from own taxon, no response from other taxon (Howell & Webb 1995, Howell *in litt*. 2013b) (4).

As noted above, the extent of the red supercilium and the barring on the ear-coverts are variable within *C. rubiginosus* and should not be considered diagnostic differences vs. *C. r. aeruginosus*.

The vocal data are much more convincing than the genetics or morphology, at least based on current sampling. The difference in what some authors call 'songs' and others term 'long calls' seems clear, although the sample size for *C. r. aeruginosus* is not large (we found eight independent recordings on Xeno-canto and Macaulay). There are no recordings of some subspecies of *C. rubiginosus*, but variations of the 'rattle' call can be heard in many parts of its range (based on a spot-check of Xeno-canto and Macaulay), including from *C. r. yucatanensis*. We suspect that the slow rising series of notes in a recording of *C. r. aeruginosus* from Tamaulipas (XC 227966) is homologous to the 'rattle' call in *C. r. rubiginosus*, which if confirmed would be a large vocal difference from the rest of the *C. rubiginosus* complex. There are also several vocal samples labelled *C. r. aeruginosus* from Veracruz (mostly from around Xalapa), but there is only one recording from the southern half of the state where *C. r. yucatanensis* occurs. That is of an individual not seen when recorded but later identified as *C. rubiginosus*. The call of this individual, from Orizaba, *c*.80 km south of Xalapa, included the rattle (see XC 305868). Nevertheless, conclusions drawn from such low sample sizes are perilous, and the degree of intergradation where the two forms meet (as in Baptista 1978) remains to be investigated. That Moore *et al*.'s (2011) samples from southern Veracruz might contain mtDNA from *C. r. aeruginosus* (mitochondrial introgression being one possible explanation of their genetic results) suggests that the degree of intergradation may be a significant question.

The vocal differences alluded to above are just one of several cases of vocal divergence in the *C. rubiginosus* complex. Based on our observations (DFL), there may be as many as four vocal groups that might represent distinct species, but how these align with genetic differences is unclear. These other groups are based on the common vocalisations besides the rattle song: *aeruginosus* (see descriptions above), a clear-voiced group in Middle America that gives a descending *keer!*, a grating-voiced group in the north-west Andes south to the Pacific coast of Peru, and a group from the eastern slope of the Andes, the Guiana Shield, and Trinidad & Tobago that gives a rising *kree?*

***Summary and Recommendation*.**—When we first looked into this potential species split, we expected to recommend that it be adopted due to the aggregate weight of the vocal and genetic differences, added to the earlier species recognition of *aeruginosus* by Ridgway, Cory, and Peters. This was in spite of drawbacks to each individual dataset: the relative lack of vocal sampling in the northern part of the range of *C. r. yucatanensis*, the lack of nuclear genetic data and the limited sampling within *C. rubiginosus*, and the morphological variation within *C. rubiginosus*.

Now that we know that there are no genetic data for *C. r. aeruginosus*, that the three subspecies of *C. rubiginosus* sampled to date form different mitochondrial lineages, and that none of the other species recognised by Ridgway or Cory have been sampled, the situation is more complex than it first appeared. It is likely that *C. rubiginosus* consists of more than one species, but how many and how the various subspecies should be apportioned is unclear. Moreover, a simple separation of *C. aeruginosus* from all other subspecies of *C. rubiginosus* would still leave a paraphyletic *C. rubiginosus*.

This is a vexing issue. An argument can be made for recognising *C. aeruginosus* based on the vocal differences and the prior recognition by Ridgway, Cory, and Peters, irrespective of the complications inherent in the genetic data and the complex situation in the rest of the distribution. That is to say that Short (1982), based on consistent differences in the characters identified by Ridgway (shape of the ventral barring and size) and despite the phenotypic variability in many other characters, should not have lumped *C. aeruginosus*, and that the vocal differences provide sufficient rationale to return it to species status. This is tempting but we are reminded of recent cases in which intermediacy in vocalisations (or other phenotypic characters) has been found upon deeper investigation of what seemed to be consistently different characters in proposed species splits (e.g., *Patagioenas fasciata*; see above). In this respect, the extent of intergradation between the *rubiginosus* group and *C. r. aeruginosus* in central Veracruz (Baptista 1978) needs to be investigated: are additional recordings or specimens now available from this area? Or have details of the playback trials noted in del Hoyo & Collar (2014) been published or otherwise made available? Such information might be sufficient to recommend recognising *C. aeruginosus* as a species.

Ultimately, there are too many uncertainties for us to recommend that we treat *C. aeruginosus* as a separate species from *C. rubiginosus* without further information of the type mentioned above or pending a more complete study of genetic and phenotypic variation within *C. rubiginosus* (involving, at a minimum, genetic data for *aeruginosus*).

If this taxonomic treatment is adopted, then we suggest the English name Bronze-winged Woodpecker for *C. aeruginosus*. It was the name used by the AOU (1983, 1998) for the *aeruginosus* group and is also in use for *C. aeruginosus* (e.g., IOC list). If *C. aeruginosus* is split, Golden-olive Woodpecker would be retained for the much more widespread *C. rubiginosus*, pending further splits within that species.

Next steps.—Because multiple species are likely involved, this complex requires a thorough study of geographic variation in vocalisations and plumage, better sampling for genetic data, and assessment of putative contact zones and levels of intergradation between subspecies. Data from Baptista (1978) suggest intergradation in central Veracruz, but the extent of this zone of introgression has not been quantified. In particular, quantification of vocal differences between *C. r. aeruginosus* and *C. r. yucatanensis* would be informative regarding species limits. Genetic data are also suggestive of multiple species in the group, as indicated by the paraphyly found by Moore *et al*. (2011) and Dufort (2016), but these studies were confounded by problems with the identification of samples (an issue clarified here) and, presumably, lack of nuclear data for most samples of *C. rubiginosus*. Moreover, many taxa were unsampled in those studies, and future work could focus on broader genetic sampling of more taxa.

OLIVE-THROATED PARAKEET *Eupsittula nana*

Background.—Based on NACC proposal 2023-A-15 'Treat *Eupsittula astec* as a separate species from Olive-throated Parakeet *E. nana*', which did not pass. Proposal author: SMB.

The genus *Eupsittula*, as currently recognised, comprises five species of medium-sized green parakeets that vary primarily in the amounts of brownish olive on the underparts and red/orange on the face. They are distributed from Mexico south through Central America and South America to Bolivia and extreme northern Argentina, with *Eupsittula nana* (Vigors, 1830) also occurring on Jamaica. Although currently treated as a single species by most global checklists, *E. nana* historically was often considered two separate species, with *E. nana sensu stricto* restricted to Jamaica, and *E. astec* (Souancé, 1857) in eastern Mexico and Central America from central Tamaulipas to western Panama.

ISSN-2513-9894
(Online)

E. nana was described as *Psittacara nana*, and *E. astec* was described as a separate species, *Conurus astec*, albeit prior to the adoption of the BSC. In distinguishing *E. astec* from *E. nana*, Souancé (1857) noted the latter's longer tail, darker coloration, larger and entirely pale bill, and the entirely bare cere. The two taxa were considered distinct species by most subsequent authors, including Ridgway (1916), who noted that *E. nana* had a much larger and relatively deeper bill than all other *Eupsittula*, although he also noted that its plumage was very similar in coloration to that of *E. astec*. Cory (1918) considered the two separate species, as did Peters (1937) and Friedmann *et al*. (1950).

Bond (1945) was the first to mention that the two might better be considered as conspecific (although he still maintained them as separate species). Following Bond (1945), Marien & Koopman (1951) also believed that the two were probably better treated as conspecific using a yardstick assessment and comparing them to other parakeets (although they did not explicitly make a taxonomic recommendation). They noted that *E. n. nana* and *E. n. astec* are more like each other than sympatric members of what they called the subgenus *Eupsittula*, and that there is more variation within some species, e.g., Golden-capped Parakeet *Aratinga auricapillus* (Kuhl, 1820), than there is between *E. n. nana* and *E. n. astec*. It is worth noting, however, that most of their comparisons were between members of what is now recognised as *Aratinga*, or even between a member of *Eupsittula* and *Aratinga*, e.g., comparisons between Brown-throated Parakeet *E. pertinax* (Linnaeus, 1758) and Sun Parakeet *A. solstitialis* (Linnaeus, 1758), or within *A. auricapillus*, so these comparisons may not be as relevant given what we now know about relationships (Remsen *et al*. 2013, Provost *et al*. 2018). Marien & Koopman (1951) mentioned that *E. n. nana* is larger than *E. n. astec*, and that *E. n. nana* usually lacks the yellow feathering around the cere that is present in *E. n. astec*, although some birds can show some yellow feathering. Forshaw (1973) was the first author to definitively consider the two as conspecific, although Parkes (1976) continued to treat *E. astec* as a species in his discussion of the taxon *E. astec melloni* (Twomey, 1950). The sixth edition of the AOU *Check-list* listed the two taxa as conspecific (AOU 1983) and most global checklists have followed this approach, including Clements (Clements *et al*. 2021), Howard & Moore (Dickinson & Remsen 2013) and IOC (Gill *et al*. 2022). Del Hoyo & Collar (2014), using the scoring methodology for species delimitation of Tobias *et al*. (2010), considered the two taxa to be species: '[*nana*] differs in its darker, browner breast and lower underparts (2); darker (royal- *vs* turquoise- = 1) and much more extensive (= 1) blue with broader black fringes (= 1) in flight-feathers (total = 3); larger size, with effect size on bill 6.91 and on tail 3.97 (score 3)' (del Hoyo & Collar 2014). Howell & Webb (1995) also treated the two taxa as separate species, although they did not provide their rationale.

Vocally, the two taxa seem very similar. Collar *et al*. (2020) mentioned that there are no described vocal differences between *nana* and *astec*. There appear to be no other mentions of vocal differences (or lack thereof) in other publications. In listening to a small selection of recordings in Macaulay Library, the two do possibly seem different, with *astec* seemingly sounding slightly higher-pitched and faster than *nana*. Some example recordings of the two are: *nana* (ML 358958021, ML 164604) and *astec* (ML 82419181, ML 10334).

New information.—The only relatively new information is a study of the phylogeography of *E. nana* to understand the nature of a population on Hispaniola (Latta *et al*. 2010). Using mtDNA sequence data, Latta *et al*. (2010) found that *E. n. nana* and *E. n. astec* had 1.73–1.88% sequence divergence and were reciprocally monophyletic based on a sample of 16 individuals (Fig. 20). Birds from Hispaniola were included in the *E. n. nana* clade, and did not differ from those on Jamaica, and the authors suggested they represent an introduced population (Latta *et al*. 2010). Based on the degree of genetic divergence and reciprocal monophyly shown in the mtDNA sequences, together with morphological differences,

ISSN-2513-9894 (Online)

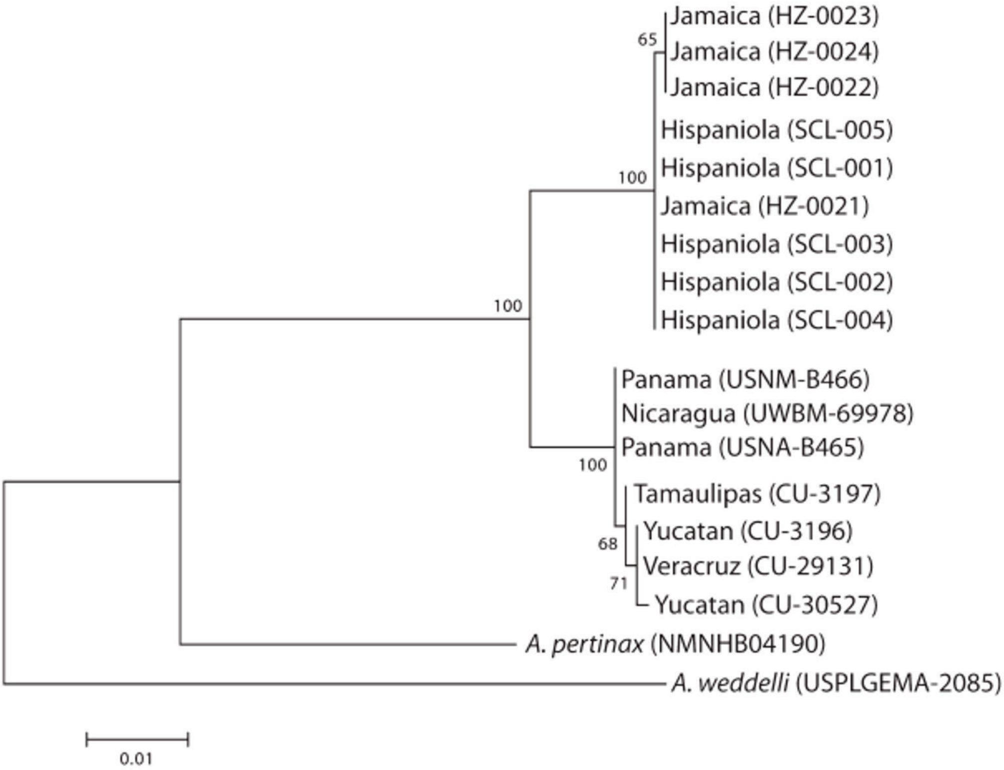


Figure 20. Neighbour-joining tree (constructed in MEGA 4.1; Kumar *et al*. 2008) showing relationships between the island and mainland populations of Olive-throated Parakeet *Eupsittula nana*. Values at nodes denote relative percent support from 2000 bootstrap iterations. Adapted from Latta *et al*. (2010); reproduced with permission from the *Caribbean Journal of Science*.

Latta *et al*. (2010) considered that *nana* and *astec* represent phylogenetic species but did not comment on the potential for reproductive isolation. However, Latta *et al*. (2010) noted that the genetic divergence was similar to that between some currently recognised species of *Aratinga*. Ferraroni (2015) analysed plumage and osteological characters in these taxa and found that the orange feathers on the nares and the brown-olive versus dark brown-olive underparts were diagnostic of the two taxa, and recommended raising both to species rank under the Phylogenetic Species Concept.

Recommendation.–Assessing the species status of insular taxa is a perpetual problem in systematics, and the case of these two *Eupsittula* parakeets, *nana* and *astec*, is no exception. The two were described as separate species and maintained as such by many authorities until the 1970s. In its first treatment of the group, the AOU (1983) treated them as a single species, and most global authorities have followed this. However, the two have diverged in plumage, morphometrics (especially the 'much larger and relatively deeper' bill of *E. n. nana*; Ridgway 1916) and genetics (Latta *et al.* 2010), albeit not very strongly. Based on these differences, del Hoyo & Collar (2014) considered the two taxa to be separate species. The two appear to be sister (Latta *et al*. 2010), although no phylogeny has included all *Eupsittula* taxa together, so technically there is still a remote possibility that *E. n. astec* or *E. n. nana* could each be more closely related to another species. Given the morphological differences and genetic divergence (although studied using only one gene of mtDNA), the recommendation is to treat *astec* as a separate species from *E. nana*, as the original merger

ISSN-2513-9894
(Online)

of the taxa was not entirely well justified and seems to be based partly on comparisons of differences between species in different genera. If two species are recognised, then the names previously used for these taxa are recommended: Aztec Parakeet for *Eupsittula astec* and Jamaican Parakeet for *Eupsittula nana*.

Next steps.–Although some committee members thought that these likely represent separate species, others believed that a comprehensive study of vocal, structural and genetic data is needed. Others felt that, even with the known variation within each taxon and the degree of divergence in song, morphology and genetics, these represent differences more typical of parrot taxa treated as subspecies. Based on phenotype, it is possible albeit unlikely that these taxa are more closely related to other species of *Eupsittula* than to each other; a genetic study that includes both taxa, along with other species in the genus, is needed. Analyses of morphological differences—especially bill and body size, extent of yellow on the head, and extent of streaking on the throat—would be informative, in particular assessing the extent of intra- versus inter-taxon variation and placing this in the context of interspecific morphological differences between other species pairs of parakeets in the Arini. Therefore, NACC continues to treat the two taxa as subspecies of the same species at this time.

Acknowledgements

We thank the following committee members of both NACC and SACC for their insightful commentary on the taxonomic proposals that form the basis of this publication: Kevin J. Burns, Carla Cicero, Jon L. Dunn, Rosa Alicia Jiménez, Andrew W. Kratter, Nicholas A. Mason, Alvaro Jaramillo and J. I. Areta. Many thanks to Paul Donald, Andy Kratter, Nicholas A. Mason, Chris Milensky, Marco Rêgo and Jacob Saucier for providing photos for use in the figures. Gary Stiles proffered advice on an earlier draft of the *Haplophaedia* proposal. Thanks also to Frederik Brammer for tracking down a copy of Amadon (1960), to Ben Marks for information on *Colaptes* tissues and specimens at the FMNH, and to Michael Patten and Neal Woodman for helpful comments on an earlier draft. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the US government.

References:

Amadon, D. 1960. Notes on the genus *Chondrohierax*. *Novedades Colombianas* 1: 237–238.

American Ornithologists' Union (AOU). 1931. *Check-list of North American birds*. Fourth edn. American Ornithologists' Union, Lancaster, PA.

American Ornithologists' Union (AOU). 1944. Nineteenth supplement to the American Ornithologists' Union *Check-list of North American birds*. *Auk* 61: 441–464.

American Ornithologists' Union (AOU). 1955. Thirtieth supplement to the American Ornithologists' Union *Check-list of North American birds*. *Auk* 72: 292–295.

American Ornithologists' Union (AOU). 1957. *Check-list of North American birds*. Fifth edn. American Ornithologists' Union, Baltimore, MD.

American Ornithologists' Union (AOU). 1983. *Check-list of North American birds*. Sixth edn. American Ornithologists' Union, Lawrence, KS.

American Ornithologists' Union (AOU). 1998. *Check-list of North American birds*. Seventh edn. American Ornithologists' Union, Washington, DC.

Arendt, W. J., Faaborg, J., Wallace, G. E. & Garrido, O. H. 2004. Biometrics of birds throughout the greater Caribbean basin. *Proc. West Found. Vert. Zool*. 8: 1–33.

Banks, R. C., Cicero, C., Dunn, J. L., Kratter, A. W., Rasmussen, P. C., Remsen, J. V., Rising, J. D. & Stotz, D. F. 2003. Forty-fourth supplement to the American Ornithologists' Union *Check-list of North American birds*. *Auk* 120: 923–931.

Banks, R. C., Cicero, C., Dunn, J. L., Kratter, A. W., Rasmussen, P. C., Remsen, J. V., Rising, J. D. & Stotz, D. F. 2006. Forty-seventh supplement to the American Ornithologists' Union *Check-list of North American birds*. *Auk* 123: 926–936.

Baptista, L. F. 1978. A revision of the Mexican *Piculus* (Picidae) complex. *Wilson Bull*. 90: 159–181.

Barrowclough, G. F., Groth, J. G., Mertz, L. A. & Gutierrez, R. J. 2004. Phylogeographic structure, gene flow and species status in blue grouse (*Dendragapus obscurus*). *Mol. Ecol*. 13: 1911–1922.

Barry, P. D. & Tallman, D. A. 2010. Genetic differentiation of a subspecies of Spruce Grouse (*Falcipennis canadensis*) in an endemism hotspot. *Auk* 127: 617–625.

ISSN-2513-9894 (Online)

Bierregaard, R. O. 1994. White-breasted Hawk (*Accipiter chionogaster*). *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Handbook of the birds of the world Alive*. Lynx Edicions, Barcelona. http://birdsoftheworld.org/hbw/species/shshaw3/1.0 (accessed 13 December 2021).

Bildstein, K. L., Meyer, K. D., White, C. M., Marks, J. S. & Kirwan, G. M. 2020. Sharp-shinned Hawk (*Accipiter striatus*), version 1.0. *In* Billerman, S. M., Keeney, B. K., Rodewald, P. G. & Schulenberg, T. S. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. http://doi.org/10.2173/bow.shsaw.01 (accessed 13 December 2021).

BirdLife International. 2021. Species factsheet: *Chondrohierax wilsonii*. http://www.birdlife.org (accessed 12 July 2021).

Boag, D. A. & Schroeder, M. A. 1992. Spruce Grouse (*Falcipennis canadensis*), version 1.5. *In* Poole, A. F., Stettenheim, P. R. & Gill, F. B. (eds.) *The birds of North America*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bna.5 (accessed 25 March 2022).

Boesman, P. 2015. Voice comparison of the Southern and Northern Band-tailed Pigeons. HBW Alive Ornithological Note 41. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Handbook of the birds of the world Alive*. Lynx Edicions, Barcelona. https://doi.org/10.2173/bow-on.100041 (accessed 5 February 2022).

Bond, J. 1940. *Check-list of birds of the West Indies*. Acad. Nat. Sci. Philadelphia.

Bond, J. 1945. *Check-list of birds of the West Indies*. Acad. Nat. Sci. Philadelphia.

Bond, J. 1993. *A field guide to the birds of the West Indies*. Fifth edn. Houghton Mifflin, Boston & New York.

Brooks, A. & Swarth, H. S. 1925. *A distributional list of the birds of British Columbia*. Pacific Coast Avifauna No. 17. Cooper Ornithological Club, Berkeley, CA.

Cassin, J. 1847. The description of a new rapacious bird in the Museum of the Academy of Natural Sciences of Philadelphia. *Ann. Mag. Nat. Hist*. 20: 356.

Catanach, T. A., Halley, M. R., Allen, J. M., Johnson, J. A., Thorstrom, R., Palhano, S., Poor Thunder, C., Gallardo, J. C. & Weckstein, J. D. 2021. Systematics and conservation of an endemic radiation of *Accipiter* hawks in the Caribbean islands. *Ornithology* 138(3): ukab041.

California Bird Records Committee (CBRC). 2007. Rare birds of California. Western Field Ornithologists, Camarillo, CA. wfopublications.org/Rare_Birds (accessed 23 September 2024).

Chesser, R. T., Billerman, S. M., Burns, K. J., Cicero, C., Dunn, J. L., Hernández-Baños, B. E., Jiménez, R. A., Johnson, O., Kratter, A. W., Mason, N. A., Rasmussen, P. C. & Remsen, J. V. 2024. *Checklist of North American birds*. American Ornithological Society. https://checklist.americanornithology.org/taxa/.

Clements, J. F. 2007. *Clements checklist of birds of the world*. Cornell Univ. Press, Ithaca, NY.

Clements, J. F., Schulenberg T. S., Iliff, M. J., Billerman, S. M., Fredericks, T. A., Gerbracht, J. A., Lepage, D., Sullivan, B. L. & Wood, C. L. 2021. The eBird/Clements checklist of birds of the world: v2021. https://www.birds.cornell.edu/clementschecklist/download/.

Clements, J. F., Schulenberg, T. S., Iliff, M. J., Fredericks, T. A., Gerbracht, J. A., Lepage, D., Sullivan, B. L. & Wood, C. L. 2022. The eBird/Clements checklist of birds of the world: v2022. https://www.birds.cornell.edu/clementschecklist/download/.

Collar, N. J. 2001. Family Trogonidae (trogons). Pp. 80–129 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 6. Lynx Edicions, Barcelona.

Collar, N. J., del Hoyo, J., Boesman, P. F. D. & Kirwan, G. M. 2020. Olive-throated Parakeet (*Eupsittula nana*), version 1.0. *In* Billerman, S. M., Keeney, B. K., Rodewald, P. G. & Schulenberg, T. S. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.oltpar1.01 (accessed 5 February 2022).

Cory, C. B. 1918. Catalogue of birds of the Americas and the adjacent islands, pt. 2(1). *Field Mus. Nat. Hist. Zool. Ser*. 13(1): 1–315.

Cory, C. B. 1919. Catalogue of birds of the Americas and the adjacent islands, pt. 2(2). *Field Mus. Nat. Hist. Zool. Ser*. 13(2): 1–607.

DaCosta, J. M. & Klicka, J. 2008. The Great American Interchange in birds: a phylogenetic perspective with the genus *Trogon*. *Mol. Ecol*. 17: 1328–1343.

Dickens, J. K., Bitton, P. P., Bravo, G. A. & Silveira, L. F. 2021. Species limits, patterns of secondary contact and a new species in the *Trogon rufus* complex (Aves: Trogonidae). *Zool. J. Linn. Soc*. 193: 499–540.

Dickerman, R. W. & Gustafson, J. 1996. The Prince of Wales Spruce Grouse: a new subspecies from southeastern Alaska. *Western Birds* 27: 41–47.

Dickey, D. R. & van Rossem, A. J. 1938. The birds of El Salvador. *Field Mus. Nat. Hist. Zool. Ser*. 23: 1–23.

Dickinson, E. C. (ed.). 2003. *The Howard and Moore complete checklist of the birds of the world*. Third edn. Christopher Helm, London.

Dickinson, E. C. & Remsen, J. V. (eds.) 2013. *The Howard and Moore complete checklist of the birds of the world*, vol. 1. Fourth edn. Aves Press, Eastbourne.

Drovetski, S. 2001. Molecular evolution, biogeography, and morphological radiation of grouse (Tetraoninae). Ph.D. thesis. Univ. of Washington.

Dufort, M. J. 2016. An augmented supermatrix phylogeny of the avian family Picidae reveals uncertainty deep in the family tree. *Mol. Phylo. & Evol*. 94: 313–326.

Dunn, J. L. & Alderfer, J. 2017. *Field guide to North American birds*. Seventh edn. National Geographic, Washington, DC.

Eisenmann, E. 1955. *The species of Middle American birds*. Linnaean Society of New York.

Ferraroni, A. 2015. Taxonomy and phylogeny of *Aratinga* Spix, 1824 (Aves: Psittacidae). Ph.D. thesis. Univ. São Paulo.

Ferguson-Lees, J. & Christie, D. 2005. *Raptors of the world*. Princeton Univ. Press.

Fjeldså, J. & Krabbe, N. 1990. *Birds of the high Andes*. Zool. Mus., Univ. of Copenhagen & Apollo Books, Svendborg.

Friedmann, H. 1934. The hawks of the genus *Chondrohierax*. *J. Wash. Acad. Sci*. 24: 310–318.

Friedmann, H. 1950. The birds of North and Middle America, pt. 11. *Bull. US Natl. Mus*. 50: 1–793.

Friedmann, H., Griscom, L. & Moore, R. T. 1950. Distributional check-list of the birds of Mexico, pt. 1. *Pacific Coast Avifauna* 29.

Galla, S. J. & Johnson, J. A. 2015. Differential introgression and effective size of marker type influence phylogenetic inference of a recently divergent avian group (Phasianidae: *Tympanuchus*). *Mol. Phylo. & Evol*. 84: 1–13.

Gallardo, J. C. & Thorstrom, R. 2019. Status and conservation of the raptors in the West Indies: a review. *Carib. Natur*. 2: 90–134.

Gibbs, D., Barnes, E. & Cox, J. 2001. *Pigeons and doves: a guide to the pigeons and doves of the world*. Yale Univ. Press, New Haven, CT.

Gill, F. B. & Wright, M. 2006. *Birds of the world. Recommended English names*. Princeton Univ. Press.

Gill, F., Donsker, D. & Rasmussen, P. (eds.) 2021. IOC world bird list (v 11.2). https://doi.org/10.14344/IOC.ML.11.2.

Gill, F., Donsker, D. & Rasmussen, P. (eds.) 2022. IOC world bird list (v 12.2). https://doi.org/10.14344/IOC.ML.12.2.

Goodwin, D. 1983. *Pigeons and doves of the world*. Third edn. Cornell Univ. Press, Ithaca, NY.

Gutierrez, R. J., Barrowclough, G. F. & Groth, J. G. 2000. A classification of the grouse (Aves: Tetraoninae) based on mitochondrial DNA sequences. *Wildl. Biol*. 6: 205–211.

Hebert, P. D. N., Stoeckle, M. Y., Zemlak, T. S. & Francis, C. M. 2004. Identification of birds through DNA barcodes. *PLoS Biol*. 2(10): e312.

Hellmayr, C. E. & Conover, B. 1942. Catalogue of birds of the Americas and the adjacent islands, pt. 1(1). *Field Mus. Zool. Ser.* 13(1): 1–636.

Hellmayr, C. E. & Conover, B. 1949. Catalogue of birds of the Americas and the adjacent islands, pt. 1(4). *Field Mus. Nat. Hist. Zool. Ser.* 13(4): 1–358.

Heynen, I. 1999a. Greenish Puffleg. P. 643 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 5. Lynx Edicions, Barcelona.

Heynen, I. 1999b. Buff-thighed Puffleg. P. 643 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 5. Lynx Edicions, Barcelona.

Hilty, S. L. 2003. *Birds of Venezuela*. Princeton Univ. Press.

Hockey, P. A. R. 1996. Family Haematopodidae (oystercatchers). Pp. 308–325 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 3. Lynx Edicions, Barcelona.

Howard, R. & Moore, A. 1991. *A complete checklist of the birds of the world*. First edn. Academic Press, London.

Howell, S. N. G. & Webb, S. 1995. *A guide to the birds of Mexico and northern Central America*. Oxford Univ. Press, New York.

Howell, S. N. G., Corben, C., Pyle, P. & Rogers, D. I. 2003. The first basic problem: a review of molt and plumage homologies. *Condor* 105: 635–653.

del Hoyo, J. & Collar, N. J. 2014. *HBW and BirdLife International illustrated checklist of the birds of the world*, vol. 1. Lynx Edicions, Barcelona.

Huson, D. H. & Scornavacca, C. 2012. Dendroscope 3: an interactive tool for rooted phylogenetic trees and networks. *Syst. Biol*. 61: 1061–1067.

Jehl, J. R. 1978. A new hybrid oystercatcher from South America, *Haematopus leucopodus* × *H. ater*. *Condor* 80: 344–346.

Jehl, J. R. 1985. Hybridization and evolution of oystercatchers on the Pacific coast of Baja California. *Orn. Monogr*. 36: 484–504.

Jenner, T. 2010. Life history of the White-breasted Hawk (*Accipiter chionogaster*). *Orn. Neotrop*. 21: 157–180.

Jewett, S. G., Taylor, W. P., Shaw, W. T. & Aldrich, J. W. 1953. *Birds of Washington state*. Univ. of Washington Press, Seattle.

Johnsen, A., Rindal, E., Ericson, P. G. P., Zuccon, D., Kerr, K. C. R., Stoeckle, M. Y. & Lifjeld, J. T. 2010. DNA barcoding of Scandinavian birds reveals divergent lineages in trans-Atlantic species. *J. Orn*. 151: 565–578.

Johnson, J. A., Thorstrom, R. & Mindell, D. P. 2007. Systematics and conservation of the Hook-billed Kite including the island taxa from Cuba and Grenada. *Anim. Conserv*. 10: 349–359.

Keppie, D. M. & Braun, C. E. 2020. Band-tailed Pigeon (*Patagioenas fasciata*), version 1.0. *In* Poole, A. F. & Gill, F. B. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.batpig1.01 (accessed 5 February 2022).

Kirkconnell, A., Kirwan, G. M., Garrido, O. H., Mitchell, A. D. & Wiley, J. W. 2020. *The birds of Cuba: an annotated checklist*. BOC Checklist No. 26. British Ornithologists' Club, Tring.

Kirwan, G. M. & Kirkconnell, A. 2022. *Cymindis Wilsonii* Cassin, 1847 (= Cuban Kite *Chondrohierax wilsonii*): original description, types, collector, and type locality. *Orn. Neotrop*. 33: 161–165.

Kirwan, G. M., Levesque, A., Oberle, M. & Sharpe, C. J. 2019. *Birds of the West Indies*. Lynx Edicions, Barcelona.

Kirwan, G. M., del Hoyo, J., Schuchmann, K.-L., Collar, N. & Boesman, P. F. D. 2020. Antillean Mango (*Anthracothorax dominicus*), version 2.0. *In* Billerman, S. M., Keeney, B. K. & Schulenberg, T. S. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.antman1.02 (accessed 24 February 2022).

Kumar, S., Nei, M., Dudley, J. &. Tamura, K. 2008. MEGA: A biologist-centric software for evolutionary analysis of DNA and protein sequences. *Brief Bioinform.* 9: 299–306.

Latta, S. C., Townsend, A. K. & Lovette, I. J. 2010. The origins of the recently discovered Hispaniolan Olive-throated Parakeet: a phylogeographic perspective on a conservation conundrum. *Carib. J. Sci*. 46: 143–149.

Marien, D. & Koopman, K. F. 1955. The relationships of the West Indian species of *Aratinga* (Aves, Psittacidae). *Amer. Mus. Novit*. 1712: 1–20.

Mayr, E. & Short, L. L. 1970. Species taxa of North American birds. *Publ. Nuttall Orn. Cl*. 9: 1–127.

McGuire, J. A., Witt, C. C., Remsen, J. V., Corl, A., Rabosky, D. L., Altshuler, D. L. & Dudley, R. 2014. Molecular phylogenetics and the diversification of hummingbirds. *Curr. Biol*. 24: 910–916.

Mindell, D. P., Fuchs, J. & Johnson, J. A. 2018. Phylogeny, taxonomy, and geographic diversity of diurnal raptors: Falconiformes, Accipitriformes, and Cathartiformes. Pp. 3–32 *in* Sarasola, J. H., Grande, J. M. & Negro, J. J. (eds.) *Birds of prey: biology and conservation in the XXI century*. Springer, Cham.

Monroe, B. L. & Sibley, C. G. 1997. *A world checklist of birds*. Yale Univ. Press, New Haven, CT.

Monteros, A. E. D. L. 1998. Phylogenetic relationships among the trogons. *Auk* 115: 937–954.

Moore, W. S., Overton, L. C. & Miglia, K. J. 2011. Mitochondrial DNA based phylogeny of the woodpecker genera *Colaptes* and *Piculus*, and implications for the history of woodpecker diversification in South America. *Mol. Phylo. & Evol*. 58: 76–84.

Moyle, R. G. 2005. Phylogeny and biogeographical history of Trogoniformes, a pantropical bird order. *Biol. J. Linn. Soc*. 84: 725–738.

Murphy, R. C. 1925. Notes on certain species and races of oyster-catchers. *Amer. Mus. Novit*. 194: 1–15.

Mayr, E. 1942. *Systematics and the origin of species*. Columbia Univ. Press, New York.

Oberholser, H. C. 1974. *The bird life of Texas*. Univ. of Texas Press, Austin.

Parkes, K. C. 1976. The status of *Aratinga astec melloni* Twomey. *Bull. Brit. Orn. Cl*. 96: 13–15.

Persons, N. W., Hosner, P. A., Meiklejohn, K. A., Braun, E. L. & Kimball, R. T. 2016. Sorting out relationships among the grouse and ptarmigan using intron, mitochondrial, and ultra-conserved element sequences. *Mol. Phylo. & Evol*. 98: 123–132.

Peters, J. L. 1931. *Check-list of the birds of the world*, vol. 1. Mus. Comp. Zool., Cambridge, MA.

Peters, J. L. 1934. *Check-list of the birds of the world*, vol. 2. Harvard Univ. Press, Cambridge, MA.

Peters, J. L. 1937. *Check-list of the birds of the world*, vol. 3. Harvard Univ. Press, Cambridge, MA.

Peters, J. L. 1945. *Check-list of the birds of the world*, vol. 5. Harvard Univ. Press, Cambridge, MA.

Peters, J. L. 1948. *Check-list of the birds of the world*, vol. 6. Harvard Univ. Press, Cambridge, MA.

Provost, K. L., Joseph, L. & Smith, B. T. 2018. Resolving a phylogenetic hypothesis for parrots: implications from systematics to conservation. *Emu* 118: 7–21.

Raffaele, H. A. 1989. *A guide to the birds of Puerto Rico and the Virgin Islands*. Princeton Univ. Press.

Raffaele, H. A., Wiley, J., Garrido, O., Keith, A. & Raffaele, J. 1998. *A guide to the birds of the West Indies*. Princeton Univ. Press.

Rand, A. L. 1948. Glaciation, an isolating factor in speciation. *Evolution* 2: 314–321.

Remsen, J. V., Schirtzinger, E. E., Ferraroni, A., Silveira, L. F. & Wright, T. F. 2013. DNA-sequence data require revision of the parrot genus *Aratinga* (Aves: Psittacidae). *Zootaxa* 3641: 296–300.

Remsen, J. V., Areta, J. I., Bonaccorso, E., Claramunt, S., Del-Rio, G., Jaramillo, A., Lane, D. F., Robbins, M. B., Stiles, F. G. & Zimmer, K. J. 2023. A classification of the bird species of South America. Version 11 July. http://www.museum.lsu.edu/~Remsen/SACCBaseline.htm.

Ridgely, R. S. 1976. *A guide to the birds of Panama*. Princeton Univ. Press.

Ridgely, R. S. & Gwynne, J. A. 1992. *A guide to the birds of Panama: with Costa Rica, Nicaragua, and Honduras*. Princeton Univ. Press.

Ridgway, R. 1911. The birds of North and Middle America, pt. 5. *Bull. US Natl. Mus*. 50: 1–859.

Ridgway, R. 1914. The birds of North and Middle America, pt. 6. *Bull. US Natl. Mus*. 50: 1–882.

Ridgway, R. 1916. The birds of North and Middle America, pt. 7. *Bull. US Natl. Mus*. 50: 1–543.

Ridgway, R. & Friedmann, H. 1946. The birds of North and Middle America, pt. 10. *Bull. US Natl. Mus*. 50: 1–484.

ISSN-2513-9894
(Online)

Schroeder, M. A., Blomberg, E. J., Boag, D. A., Pyle, P. & Patten, M. A. 2021. Spruce Grouse (*Canachites canadensis*), version 1.1. *In* Rodewald, P. G. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.sprgro.01.1 (accessed 5 February 2022).

Schuchmann, K.-L., Weller, A.-A. & Heynen, I. 2000. Biogeography and taxonomy of the Andean hummingbird genus *Haplophaedia* Simon (Aves: Trochilidae), with the description of a new subspecies from southern Ecuador. *Orn. Anz*. 39: 17–42.

Schulenberg, T. S., Stotz, D. F., Lane, D. F., O'Neill, J. P. & Parker, T. A. 2007. *Birds of Peru*. Princeton Univ. Press.

Senfeld, T., Shannon, T. J., van Grouw, H., Paijmans, D. M., Tavares, E. S., Baker, A. J., Lees, A. C. & Collinson, J. M. 2020. Taxonomic status of the extinct Canary Islands Oystercatcher *Haematopus meadewaldoi*. *Ibis* 162: 1068–1074.

Shakya, S. B., Fuchs, J., Pons, J.-M. & Sheldon, F. H. 2017. Tapping the woodpecker tree for evolutionary insight. *Mol. Phylo. & Evol*. 116: 182–191.

Short, L. L. 1967. A review of the genera of grouse (Aves, Tetraoninae). *Amer. Mus. Novit*. 2289: 1–39.

Short, L. L. 1982. *Woodpeckers of the world*. Monogr. Ser. No. 4. Delaware Mus. Nat. Hist., Greenville.

Sibley, C. G. & Monroe, B. L. 1990. *Distribution and taxonomy of birds of the world*. Yale Univ. Press, New Haven, CT.

Sibley, C. G. & Monroe, B. L. 1993. *A world checklist of birds*. Yale Univ. Press, New Haven, CT & London.

Simon, E. L. 1921. *Histoire naturelle des Trochilidae (synopsis et catalogue)*. Encyclopédie Roret, Paris.

Souancé, M. C. 1857. Travaux inédits. Descriptions de trois nouvelles espèces de perroquets. *Rev. Mag. Zool*. 2: 97–98.

Stiles, F. G. & Skutch, A. F. 1989. *A guide to the birds of Costa Rica*. Cornell Univ. Press, Ithaca, NY.

Storer, R. W. 1952. Variation in the resident Sharp-shinned Hawks of Mexico. *Condor* 54: 283–289.

Tobias, J. A., Seddon, N., Spottiswoode, C. N., Pilgrim, J. D., Fishpool, L. D. C. & Collar, N. J. 2010. Quantitative criteria for species delimitation. *Ibis* 152: 724–746.

Tremblay, J. A., Leonard, D. L. & Imbeau, L. 2018. American Three-toed Woodpecker (*Picoides dorsalis*), version 2.0. *In* Rodewald, P. G. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.attwoo1.01 (accessed 31 January 2023).

Vigors, N. A. 1830. Notice on some new species of birds. *Zool. J*. 5: 273–275.

Wetmore, A. 1916. The birds of Vieques Island, Puerto Rico. *Auk* 33: 403–419.

Winkler, H. & Christie, D. A. 2002. Family Picidae (woodpeckers). Pp. 296–555 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 7. Lynx Edicions, Barcelona.

Winkler, H. & Short, L. L. 1978. A comparative analysis of acoustical signals in pied woodpeckers (Aves, *Picoides*). *Bull. Amer. Mus. Nat. Hist*. 160: 1–110.

Winkler, H., Christie, D. A. & Nurney, D. 1995. *Woodpeckers: a guide to the woodpeckers of the world*. Houghton Mifflin, Boston.

Wolters, H. E. 1975–82. *Die Vogelarten der Erde*. Paul Parey, Hamburg & Berlin.

Zink, R. M., Rohwer, S., Andreev, A. V. & Dittmann, D. L. 1995. Trans-Beringia comparisons of mitochondrial DNA differentiation in birds. *Condor* 97: 639–649.

Zink, R. M., Rohwer, S., Drovetski, S., Blackwell-Rago, R. C. & Farrell, S. L. 2002. Holarctic phylogeography and species limits of three-toed woodpeckers. *Condor* 104: 167–170.

Addresses: Oscar Johnson, Dept. of Biological Sciences, Univ. of Texas at El Paso, El Paso, TX 79968, USA; current address: Dept. of Biological Sciences, Florida Gulf Coast Univ., Fort Myers, FL 33965, USA, e-mail: ojohnson@fgcu.edu. Shawn M. Billerman, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, NY 14850, USA. Blanca E. Hernández-Baños, Dept. de Biología Evolutiva, Facultad de Ciencias, Museo de Zoología, Univ. Nacional Autónoma de México, Apartado Postal 70-399, Ciudad de México, México. Daniel F. Lane, Museum of Natural Science and Dept. Biological Sciences, Louisiana State University, Foster Hall 119, Baton Rouge, LA 70803, USA. Pamela C. Rasmussen, Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, NY 14850, USA. J. V. Remsen, Jr., Museum of Natural Science and Dept. Biological Sciences, Louisiana State University, Foster Hall 119, Baton Rouge, LA 70803, USA. Kevin Winker, Univ. of Alaska Museum, 907 Yukon Drive, Fairbanks, AK 99775-6960, USA. R. Terry Chesser, US Geological Survey, Eastern Ecological Science Center, 12100 Beech Forest Road, Laurel, MD 20708, USA; and Dept. of Vertebrate Zoology, National Museum of Natural History, MRC-116, Smithsonian Institution, P.O. Box 37012, Washington, DC 20013-7012, USA.

ISSN-2513-9894 (Online)

Eye colour is geographically variable in Lesser Roadrunner *Geococcyx velox* (Wagner, 1836)

by John van Dort & Roselvy Juárez

Received 12 April 2024; revised 26 June 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:CE900DD8-17F9-4426-9278-468B54F5EE0D

Summary.—All modern avian world taxonomies currently treat Lesser Roadrunner *Geococcyx velox* as monotypic. Since its description in 1836, however, five subspecies have been described based on tail pattern and underparts colour. These features were later found to be subject to individual and seasonal variation, and in the late 1990s the species was reclassified as monotypic. Here we present a previously overlooked diagnosable character that separates three geographic populations. We evaluated 1,400 photos archived in Macaulay Library and found consistent differences in iris colour, and no evidence of clinal connectivity, suggestive of divergence. We describe sectoral heterochromia for populations of Lesser Roadrunner in Yucatán and Honduras east to Nicaragua, a potential adaptation to foraging in tropical open habitats.

Lesser Roadrunner *Geococcyx velox* is a terrestrial cuckoo with a long graduated tail, buff underparts, and rufous-brown upperparts streaked and spotted white (Moore 1934). It occurs from north-western Mexico south to central Nicaragua, with a disjunct population in the northern Yucatán Peninsula (Peters 1940, Sibley & Monroe 1990). Several roadrunner taxa were first collected and named in the early 19th century; Wagner (1836) was the first to resolve the relationships of these taxa, such as *Cuculus viaticus* M. H. C. Lichtenstein, 1830, *Geococcyx variegata* Wagler, 1831, and *Saurothera marginata* Raub, 1832. Wagner made a comparison separating the smaller species from the larger species already described by Lesson (1829), although he mistakenly thought that Lesser Roadrunner lacks a postocular apterium, an oversight that Hellmayr, who examined Wagner's holotype from 'Mexico', attributed to a skilful covering up of this naked skin with nearby feathering by the taxidermist, who probably thought it was a deficiency in the specimen (Hellmayr 1913). Wagner's description of *Cuculus velox* (1836), based on a specimen from Mexico (Fig. 1) was followed by Hartlaub's description of *Geococcyx affinis* (1844) from Guatemala. Shelley (1891) grouped Wagner's Mexican bird with *Geococcyx mexicanus* (= *G. californianus*) but, as Hellmayr (1913) demonstrated, phenotypically it corresponds to Hartlaub's Guatemalan *affinis*.

Hellmayr recognised the possibility that a larger series of specimens might show Guatemalan populations of Lesser Roadrunner to be separable from Mexican populations, which Moore (1934) subsequently set out to demonstrate. In particular, Moore observed regional variation in tail pattern, noting differences in the size of the white tail spots and the presence or absence and width of a subterminal dark bar on the outer rectrix (Moore 1934). Using these characters, he described two new subspecies—*longisignum* from Honduras and northern Nicaragua, which lacked the subterminal tail bar on the outer rectrix, and *melanchima* of western Mexico, from Sonora to the Isthmus of Tehuantepec, with a broad subterminal tail bar, in addition to nominate *velox*, and the already described *affinis*, both of which possess a subterminal tail bar of intermediate width. This was followed a year later by the description by Carriker & Meyer de Schauensee (1935) of a fifth subspecies with paler

ISSN-2513-9894
(Online)

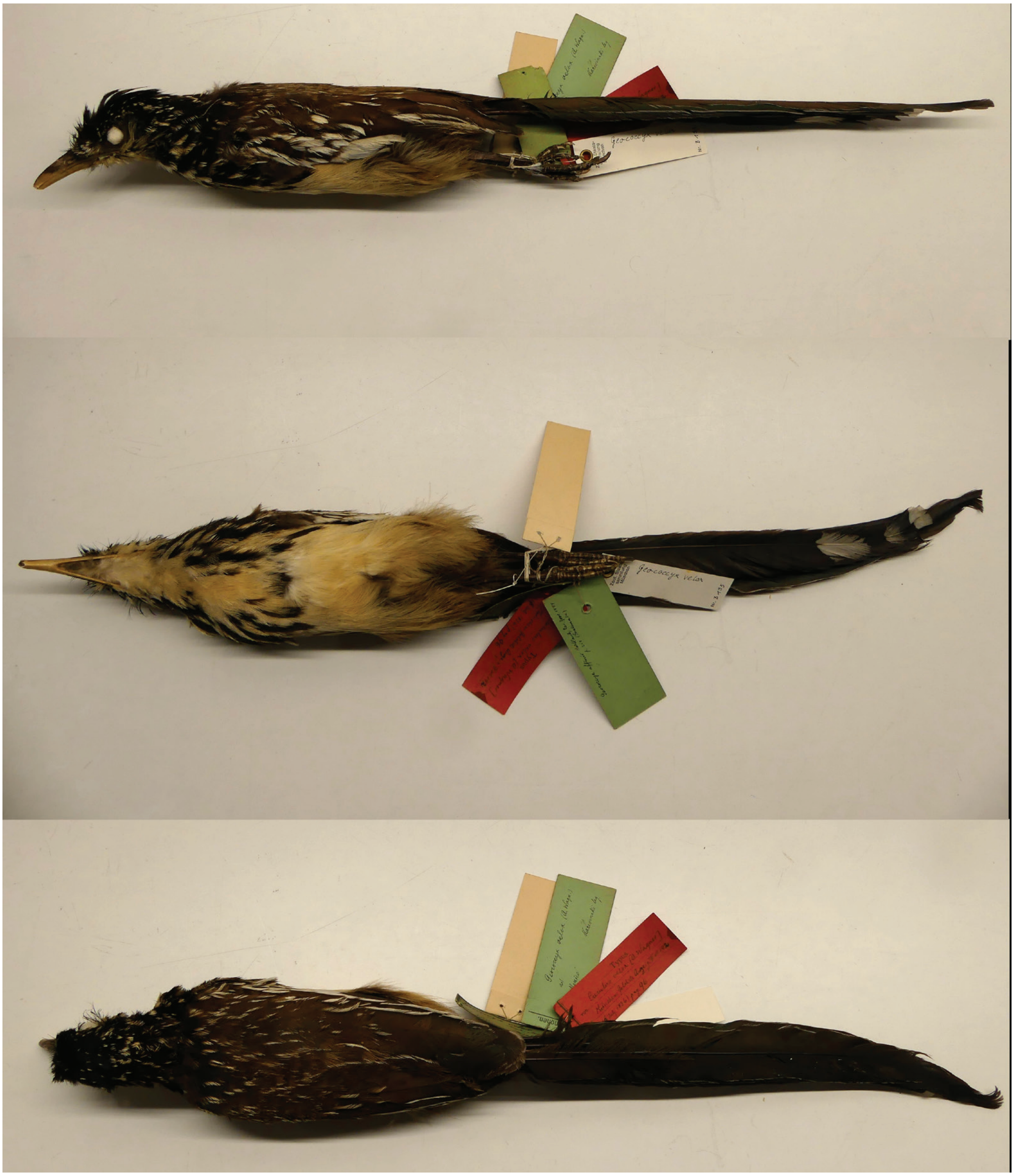


Figure 1. Holotype of Lesser Roadrunner *Geococcyx velox* (Wagner, 1836) collected by Karwinski somewhere near the city of Mexico (precise location unknown), Zoologische Staatssammlung München (ZSM B135); note the strongly discoloured outer rectrix, rendering the black subterminal bar inseparable from the proximal part of the feather (© Guy M. Kirwan)

underparts—*pallidus*—from eastern Guatemala and the Yucatán Peninsula. See Fig. 2 for a map with distributions and type localities for these subspecies. For more than 50 years, this taxonomic arrangement was widely accepted (e.g., Dickey & van Rossem 1938, Peters 1940, Monroe 1968), albeit not universally (e.g. Paynter 1955). Payne (1997, 2005) was first to treat the species as monotypic, arguing that described differences between the subspecies were largely due to individual and seasonal variation, with much overlap between them. This treatment is currently followed by all four global checklists of birds (Dickinson & Remsen 2013, del Hoyo & Collar 2014, Clements *et al*. 2023, Gill *et al*. 2024).

ISSN-2513-9894
(Online)

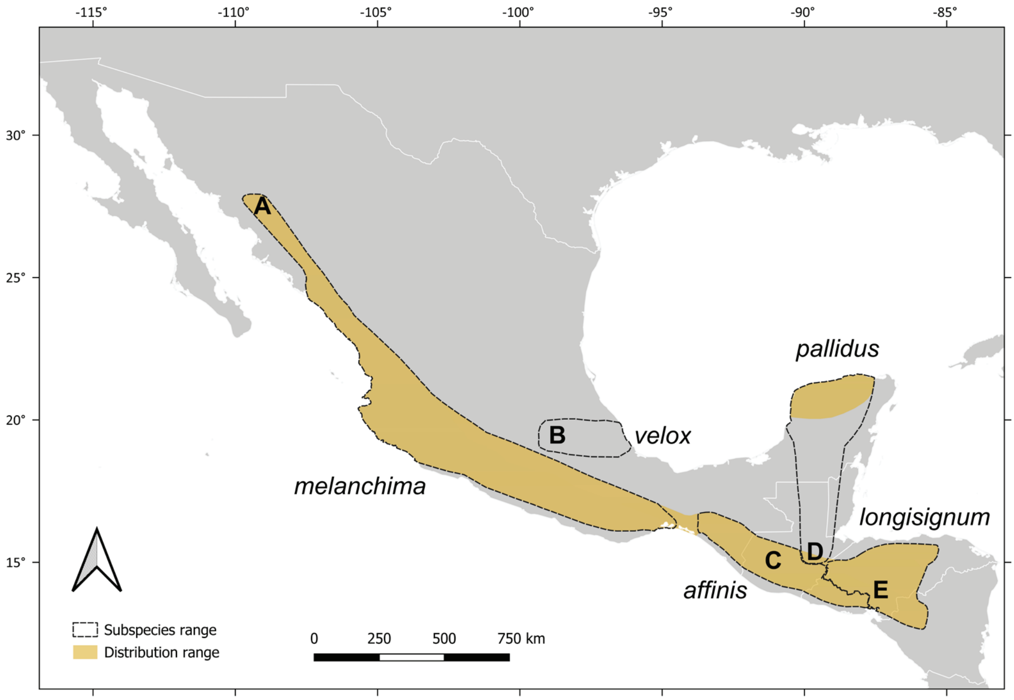


Figure 2. Distribution of Lesser Roadrunner *Geococcyx velox* from BirdLife International & Handbook of the Birds of the World (2022), with ranges of named subspecies currently in synonymy and their type localities per Peters (1940). A: Guirocoba (= Huirocoba), Sonora, Mexico (‘*melanchima*’); B: ‘outskirts of Mexico City’, Distrito Federal, Mexico (‘*velox*’); C: ‘Guatemala’ (‘*affinis*’); D = Gualán, Zacapa (Motagua Valley), Guatemala (‘*pallidus*’); D: ‘Comayabuela’ (= Comayaguela), Francisco Morazán, Honduras (‘*longisignum*’).

Few phylogenetic analyses using molecular characters have hypothesised the evolutionary relationships among cuckoos. The first studies screened a limited set of molecular loci and taxa, and their main contribution was to provide inferences concerning higher-level relationships among the Cuculiformes (Aragón *et al*. 1999, Johnson *et al*. 2000). The most comprehensive study used a larger mtDNA dataset of all extant cuckoos, providing a deeper understanding of relationships at species level (Sorensen & Payne 2005). Although other analyses of the cuckoos have relied partially or entirely on morphological data, apart from a dissertation on the phylogeny of coccyzines, iris colour has not been used explicitly to assess relationships in the Cuculiformes (Hughes 1997, Payne 1997, Sorensen & Payne 2005).

Reviewing our own photographs of Lesser Roadrunner taken in Honduras and comparing them to images archived in the Macaulay Library, Cornell Lab of Ornithology, we noticed that some adults possess a pale ring around the pupil, while others do not. Furthermore, in those individuals with a pale peripupillary ring, its shape differs from that of Greater Roadrunner *Geococcyx californianus*, i.e., it is incomplete. Remarkably, this has largely escaped attention in field guides and other references, which either fail to mention differences in iris colour among Lesser Roadrunner populations, or incorrectly characterise the iris as similar to that of Greater Roadrunner in either written descriptions or colour plates (e.g., Howell & Webb 1995, Payne 1997, Vallely & Dyer 2018). The iris colour in adult Lesser Roadrunner has been described as yellow to brown, with a silvery-whitish ring around the pupil (Ridgway 1916, Dickey & van Rossem 1938, Payne 2005).

Iris colour has rarely been used in taxonomic analyses of birds, mainly due to the difficulty of evaluating or measuring this character after a specimen has been prepared.

ISSN-2513-9894
(Online)

However, with the ongoing rise of digital photography and the quickly expanding capabilities of open-access digital libraries such as Macaulay Library, it is now possible to evaluate iris colour in photographs of live birds on a large scale, and to study this trait from a biogeographical perspective (e.g., Gutiérrez-Expósito 2019, Cardilini *et al*. 2022). Accordingly, we aimed to assess iris colour and pattern and tail pattern in Lesser Roadrunner using digital photographs, and to consider possible implications relative to the previously described taxa, as outlined above.

Methods

To evaluate eye colour and pattern from georeferenced photographs of Lesser Roadrunner, we reviewed all photographs archived in Macaulay Library prior to 1 January 2024. We excluded obvious identification errors, individuals that could not be unambiguously assigned to species in the area of range overlap with Greater Roadrunner, and individuals that were clearly juveniles based on pink gape flanges. We excluded juveniles because we assumed that the pale iris ring, in those populations that show it, is not present immediately post-hatching, analogous to the development of this feature in Greater Roadrunner, which takes up to 85 days (Muller 1971). Development of the pale iris ring in Lesser Roadrunner, however, has not been studied. From each image included in this study, we gathered metadata such as Macaulay Library reference number, country, department/state, date, and coordinates.

To evaluate eye colour and pattern, we classified individuals as pale-eyed (with a narrow pale peripupillary ring); intermediate (ring still visible but darker); dark-eyed (no ring visible); and invisible (Fig. 3). For pale-eyed and intermediate individuals, we noted whether the pale ring was complete, incomplete, or invisible.

In respect of tail pattern, we used as reference an ink drawing made by J. L. Ridgway of the outer rectrices of the described subspecies reproduced as fig. 1 in Moore (1934). To facilitate comparisons, we followed this subdivision and classified all birds in which the tail pattern was visible as ‘broad tail bar’ for birds with a subterminal tail bar on the outer rectrix visibly broader than Moore’s intermediate category B; ‘thin tail bar’ for all birds matching Moore’s intermediate category or had a thinner but still complete subterminal tail bar; and ‘no tail bar’ for individuals with an incomplete or no subterminal tail bar, corresponding to Moore’s category C (Fig. 4). We did not attempt to evaluate other characters used to describe subspecies, such as overall plumage colour, the relative length of the white tip on the outer

Figure 3. Variation in eye colour and pattern in adult of Lesser Roadrunners *Geococcyx velox*; A: dark iris, Oaxaca, Mexico (© Dubi Shapiro; ML 474875311); B: intermediate peripupillary ring, La Paz, Honduras (© Franklin Aguilar; ML 122020681); C: pale peripupillary ring, Choluteca, Honduras (John van Dort; ML 178063861)

ISSN-2513-9894 (Online)

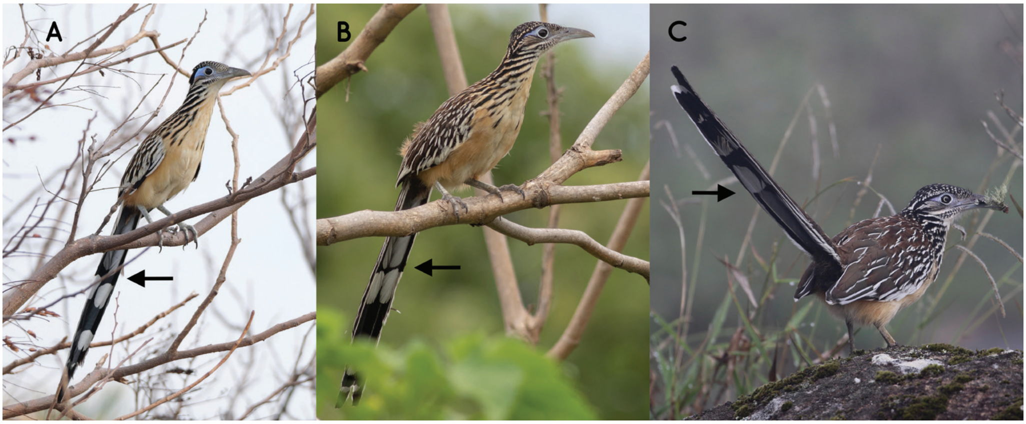


Figure 4. Variation in tail pattern in adult Lesser Roadrunner *Geococcyx velox*; A: broad subterminal bar on outer rectrix, Oaxaca, Mexico (© Micah Riegner; ML 616288095); B: thin subterminal bar on outer rectrix, Guatemala, Guatemala (© Francis Canto Jr.; ML 177836151); C: no subterminal bar on outer rectrix, Choluteca, Honduras (John van Dort; ML 178877761)

rectrix or contrast in the upperparts streaking, as these are more difficult to assess from photos as opposed to museum specimens.

To eliminate pseudo-replication, we then grouped images taken on the same day from the same location into a single observation, and assigned them a unique observation code. If more than one individual was photographed during a discrete observation, we assigned additional observation codes. For some locations, Macaulay Library contains photographs taken on multiple dates. Therefore, to address potential pseudo-replication, we consolidated such observations into a single georeferenced datapoint, even though this may have underestimated the number of individuals photographed at each location, unless clear differences in iris colour or tail pattern were evident between images. We then plotted the data using QGIS over the species' distribution *sensu* BirdLife International & Handbook of the Birds of the World (2022) and other literature (e.g., Howell & Webb 1995, Clements *et al*. 2023).

Results

We evaluated 1,400 images uploaded to Macaulay Library prior to 1 January 2024; of these, we discarded 18 images that were either of Greater Roadrunner or of uncertain identification, as well as 20 images of juveniles, for a total of 1,362 images, representing 659 single observations with a specific date and location. After consolidating the observations based on location in combination with eye colour and tail pattern, we studied at least 470 adults: 459 individuals with a unique location and 11 that showed an eye or tail pattern distinct from an individual already associated with the same locations.

Eye colour and pattern.—We were able to evaluate iris colour in 372 adults, i.e., 79% of the total sample (n = 470): 58% had all-dark eyes (n = 218), 38% had a pale ring in the iris (n = 140) and 4% possessed a ring of intermediate colour in the iris (n = 14). These groups sorted geographically (Fig. 5). We found that practically all adults in western populations, i.e., from Sonora, Mexico to western Honduras, are dark-eyed (Fig 6A). Eastern populations, in the northern Yucatán Peninsula, as well as east of the Honduran Depression to north-western Nicaragua, are pale-eyed (Fig. 6B). There is no overlap between pale-eyed and dark-eyed birds, although we did find occasional intermediate individuals throughout the range, especially where the two populations meet in western Honduras (Fig. 6C). One dark-

ISSN-2513-9894
(Online)

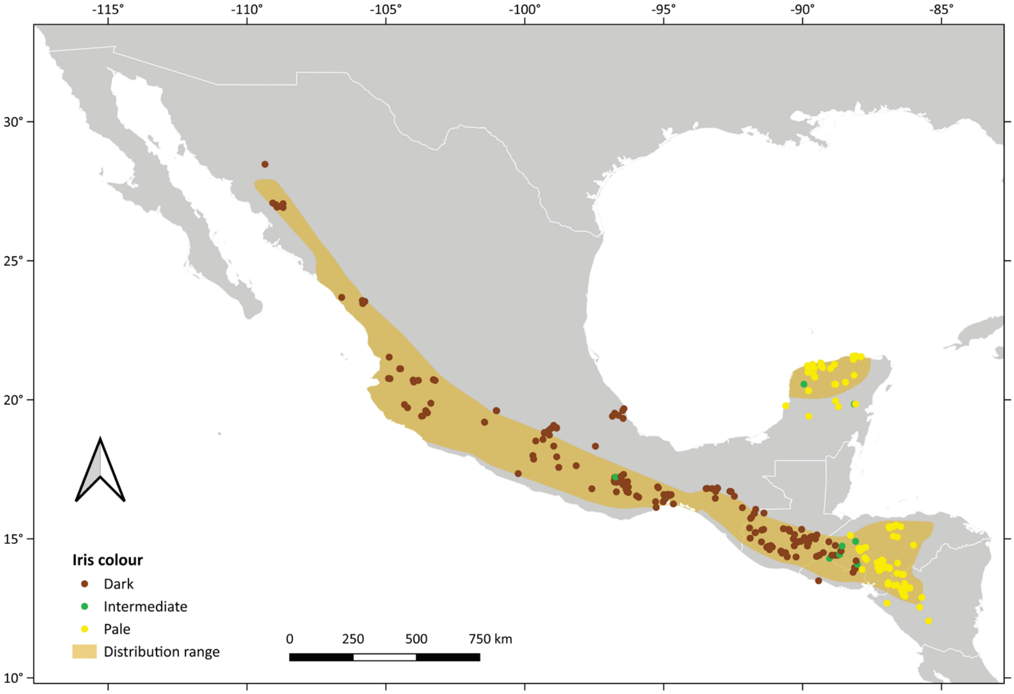


Figure 5: Regional variation in iris colour in Lesser Roadrunner *Geococcyx velox* from multimedia archived in Macaulay Library. Distribution from BirdLife International & Handbook of the Birds of the World (2022).

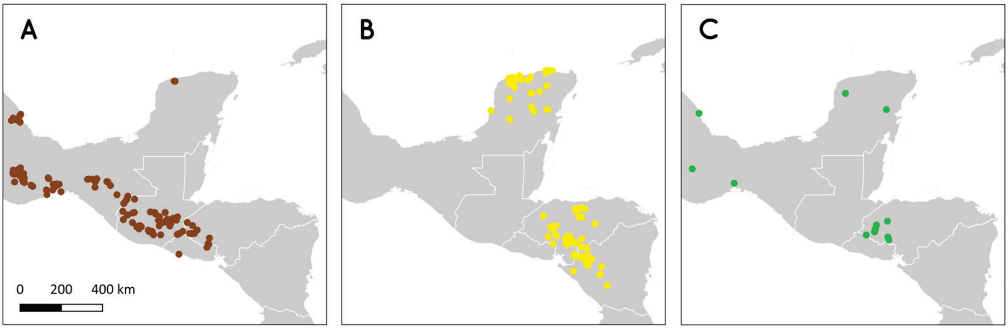


Figure 6. Detailed view of regional variation in Lesser Roadrunner *Geococcyx velox* iris colour showing (A) dark iris; (B) pale iris; and (C) intermediate iris.

eyed individual in the range of pale-eyed birds was photographed at the same location, near Mérida in northern Yucatan, across multiple years, but no pale-eyed individuals were found in the range of dark-eyed populations. For those adults in which the completeness of the peripupillary ring could be evaluated, we found that 99% with pale or intermediate irides had incomplete rings (*n* = 150). For the two individuals with a complete peripupillary ring, the pattern was similar to Greater Roadrunner, i.e., thinner in the lower frontal part.

Tail pattern.—We were able to evaluate this feature in 114 adults, i.e., 24% of all observations (*n* = 470): 48% had a broad subterminal bar on the outer rectrix (*n* = 55) and 31% a thin subterminal bar (*n* = 35), whilst this bar was absent on 21% (*n* = 24). Generally, western populations tend to have a broader subterminal bar on the outer rectrix compared to eastern populations, in which this bar is usually thinner or absent, although there was considerable regional overlap (Fig. 7).

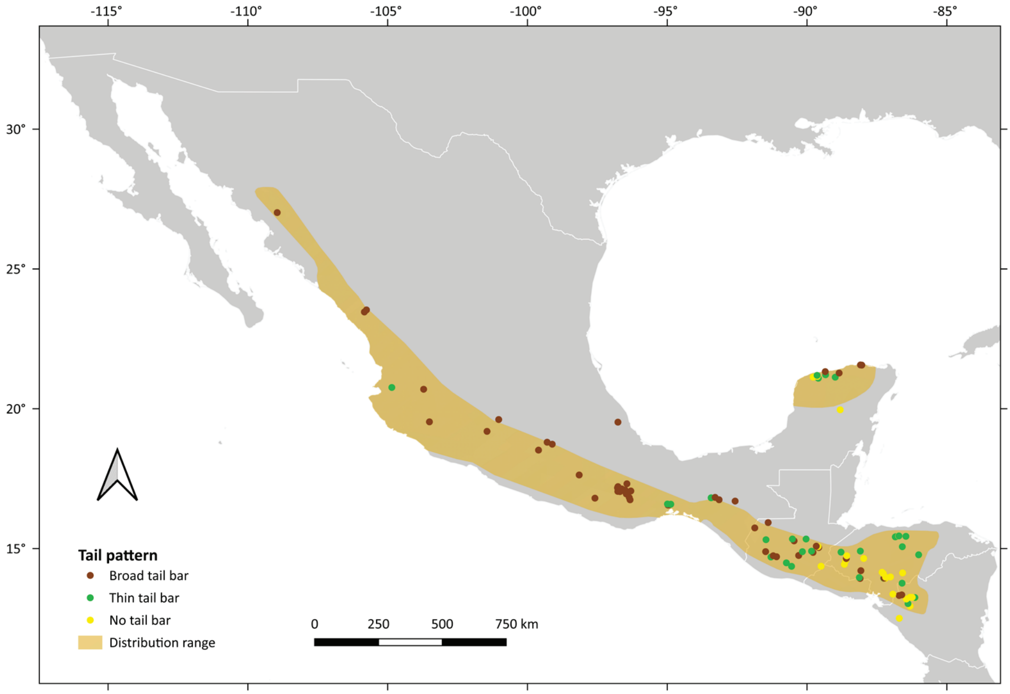


Figure 7. Regional variation in the pattern of the subterminal bar on the outer rectrix in Lesser Roadrunner *Geococcyx velox* from multimedia archived in the Macaulay Library. Distribution from BirdLife International & Handbook of the Birds of the World (2022).

Discussion

Earlier classifications of Lesser Roadrunner taxa were based primarily on tail pattern and underparts coloration (Moore 1934, Carriker & Meyer de Schauensee 1935). The last-named authors were early critics of Moore's emphasis on tail pattern, which they considered to be subject to individual variation, a finding corroborated since by many others (e.g., Blake 1950, Paynter 1955, Payne 2005, Howell 2010). Similarly, differences in underparts coloration were later interpreted as the result of seasonal variation, i.e., darker fresh plumage vs. paler worn plumage, and it was proposed to treat Lesser Roadrunner as monotypic (Payne 1997, 2005, Erritzøe *et al*. 2012).

Our results confirm Moore's finding that western populations tend to show a broader subterminal band on the outer rectrix, compared to eastern populations in which this band is thinner or absent. Nevertheless, we also found support for the contention of Blake and others that this character varies individually and that atypical birds occur throughout the range. We found variation in underparts colour to represent seasonal wear, as can be appreciated in photographs taken at the same location in different months (e.g., ML 120216781 showing a mix of fresh and worn plumage in October, and ML 612638988 in fresh plumage in December). However, pronounced regional differences in the iris colour of Lesser Roadrunner, especially the peripupillary ring, have not been described or considered taxonomically significant previously.

Our analysis demonstrates the existence of three groups: a dark-eyed group in north-western Mexico to western Honduras, and two pale-eyed groups: one in western Honduras to central Nicaragua, and one in the northern Yucatán Peninsula. The latter is

ISSN-2513-9894
(Online)

wholly allopatric, but the first two groups appear to be parapatric in western Honduras, with a narrow zone in the Honduran Depression where a few intermediates occur (Figs. 5–6). These distributions are suggestive of introgression and/or incomplete lineage sorting between two species, and merit further investigation (Helbig *et al*. 2002, Donegan 2018). A single dark-eyed individual in the range of the pale-eyed group in the Yucatán (Fig. 6A) suggests that, in this population, dark irides may be recessive to pale iris colour, as in domestic chickens (Smyth 1990, Corbett *et al*. 2024). Paynter (1955) correctly questioned whether *pallidus* is valid, since specimens from its purported range are extremely variable and inseparable from *affinis* in eastern Chiapas. He also considered noteworthy that the wide rainforest gap between populations in the northern Yucatán and in the Motagua Valley in Guatemala had not resulted in any visible plumage variation (Paynter 1955). Our findings, however, suggest that these populations do differ dramatically: Guatemalan populations are dark-eyed and Yucatán populations are pale-eyed.

The most comprehensive molecular phylogeny of the Cuculiformes using mtDNA sampled only a single Lesser Roadrunner specimen, from Nicaragua, i.e., from one of the pale-eyed groups, and work at finer scales remains to be done (Sorensen & Payne 2005). Compared with Greater Roadrunner, which typically has a complete pale ring around the pupil, the pale ring in those populations of Lesser Roadrunner that show it, is nearly always incomplete, with a dark area in the lower frontal part of the iris (sectoral heterochromia). The adaptive significance of this trait is untested, but we hypothesise that the position of the darker area, similar to that observed in other open-area foragers such as buttonquail (*Turnix*) and lapwings (*Vanellus*), facilitates foraging in open environments at tropical latitudes, where sun glare reflection may impede prey detection (Gutiérrez-Expósito 2019, Cardilini *et al*. 2022). Sectoral heterochromia, typical of eastern populations of Lesser Roadrunner, had not been described for this species or illustrated in field guides. The two recent cuckoo monographs describe iris colour in Lesser Roadrunner as yellow to brown with a silvery-white ring around the pupil, but do not describe this ring as incomplete, nor do they ascribe regional or taxonomic significance to this character (Payne 2005, Erritzøe *et al*. 2012). A lack of awareness of the regional significance of eye colour and pattern possibly led Erritzøe *et al*. (2012) to mislabel both photographs of Lesser Roadrunner with each other's locations; one of these photographs even shows a Greater Roadrunner. Most modern works incorrectly illustrate Lesser Roadrunner with the same iris colour and pattern as Greater Roadrunner, i.e., with a complete pale peripupillary ring (Howell & Webb 1995, Payne 1997, Vallely & Dyer 2018, Soberanes-González *et al*. 2020). Whilst the pale peripupillary ring in the iris of Greater Roadrunner has been described (Payne 2005, Erritzøe *et al*. 2012, Hughes 2020), we were unable to find mention of its uneven width, being generally thinner in the lower frontal area (radial asymmetry). A review of high-resolution photographs archived in Macaulay Library suggests that practically all Greater Roadrunners show a pale inner ring of uneven width, perhaps an adaptation to foraging on the ground in arid open environments.

Iris colour, especially when bright, plays an important role in social signalling to indicate age, sex and mate quality (Craig & Hulley 2004, Corbett *et al*. 2024). For Lesser Roadrunner populations that develop incomplete pale rings, this may be an example of intraspecific signalling, indicating age and sexual maturity in a taxon that otherwise does not differ between age classes (Corbett *et al*. 2024). On the other hand, for those populations whose irides are dark, iris colour may possess an interspecific signalling function, i.e., an isolating mechanism between dark-eyed Lesser and pale-eyed Greater Roadrunners, as in other closely related avian taxa with sympatric distributions, such as storks and gulls (Pierotti 1987, Rodríguez-Rodríguez & Negro 2021). eBird data show that in Mexico, the two

ISSN-2513-9894 (Online)

taxa are largely parapatric, but with extensive sympatry in Sonora, Sinaloa, Nayarit, Jalisco, Michoacán, Morelos and Puebla, *contra* Soberanes-González *et al*. (2020).

Our study highlights a previously undescribed diagnosable character in Lesser Roadrunner populations, calling into question current taxonomy and inviting further study along phenotypic and molecular lines. In many avian families, iris colour is a highly conserved trait, and for several cryptic species it has proven a useful predictor of taxonomic divisions at species rank, e.g., in boubous (Voelker *et al*. 2010), bulbuls (Shakya *et al*. 2019) and scrubwrens (Cake 2019). Similarly, in Cuculidae, recent mtDNA work separated members of the genus *Coccycua*—which have red eyes—from dark-eyed *Coccyzus* (Hughes 2006). We found no apparent clinal connectivity in iris colour for two parapatric populations of Lesser Roadrunner, suggesting that at least some of the groups we identified may be species.

Acknowledgments

We gratefully acknowledge the use of BirdLife International's range map, and thank the Macaulay Library at the Cornell Lab of Ornithology for making available the multimedia used in this study. We specifically thank Franklin Aguilar, Francis Canto Jr., Micah Riegner and Dubi Shapiro for permission to reproduce their photos, and Guy Kirwan for sharing his photos of the holotype. We are very grateful to Guy Kirwan and an anonymous reviewer whose comments helped us improve the manuscript. Finally, we are especially grateful to the hundreds of birders who uploaded their Lesser Roadrunner photos to the Macaulay Library—without them, this study would not have been possible.

References:

Aragón, S., Møller, A. P., Soler, J. J. & Soler, M. 1999. Molecular phylogeny of cuckoos supports a polyphyletic origin of brood parasitism. *J. Evol. Biol*. 12: 495–506.

BirdLife International & Handbook of the Birds of the World. 2022. Bird species distribution maps of the world. Version 2022.2. http://datazone.birdlife.org/species/requestdis (as of 2 February 2024).

Blake, E. R. 1950. Report on a collection of birds from Guerrero, Mexico. *Fieldiana Zool*. 31: 375–393.

Cake, M. 2019. Regional variation in iris colour of the White-browed Scrubwren *Sericornis frontalis* complex in digital photographs. *Austr. Field Orn*. 36: 148–153.

Cardilini, A. P., Lees, D., Roche, D., Dann, P. & Weston, M. A. 2022. Dark heterochromia in adult Masked Lapwings is universal, asymmetrical and possibly slightly sexually dimorphic. *J. Orn*. 163: 531–537.

Carriker, M. A. & Meyer de Schauensee, R. 1935. An annotated list of two collections of Guatemalan birds in the Academy of Natural Sciences of Philadelphia. *Proc. Acad. Nat. Sci. Philadelphia* 87: 411–455.

Clements, J. F., Rasmussen, P. C., Schulenberg, T. S., Iliff, M. J., Fredericks, T. A., Gerbracht, J. A., Lepage, D., Spencer, A., Billerman, S. M., Sullivan, B. L. & Wood, C. L. 2023. The eBird/Clements checklist of birds of the world: v2023. https://www.birds.cornell.edu/clementschecklist/download/ (accessed 2 February 2024).

Corbett, E. C., Brumfield, R. T. & Faircloth, B. C. 2024. The mechanistic, genetic and evolutionary causes of bird eye colour variation. *Ibis* 166: 560–589.

Craig, A. J. & Hulley, P. E. 2004. Iris colour in passerine birds: why be bright-eyed? *S. Afr. J. Sci*. 100: 584–588.

Dickey, D. R. & van Rossem, A. J. 1938. The birds of El Salvador. *Publ. Field Mus. Nat. Hist., Zool. Ser*. 23: 1–609.

Dickinson, E. C. & Remsen, J. V. (eds.) 2013. *The Howard and Moore complete checklist of the birds of the world*, vol. 1. Fourth edn. Aves Press, Eastbourne.

Donegan, T. M. 2018. What is a species? A new universal method to measure differentiation and assess the taxonomic rank of allopatric populations, using continuous variables. *ZooKeys* 757: 1–67.

Erritzøe, J., Mann, C. F., Brammer, F. & Fuller, R. A. 2012. *Cuckoos of the world*. Bloomsbury, London.

Gill, F., Donsker, D. & Rasmussen P. 2024. IOC world bird list, version 14.1. doi: 10.14344/IOC.ML.14.1.

Gutiérrez-Expósito, C. 2019. Asymmetric iris heterochromia in birds: the dark crescent of buttonquails. *J. Orn*. 160: 281–285.

Hartlaub, G. 1844. Description de sept oiseaux nouveaux de Guatemala. *Rev. Zool. Soc. Cuvierienne* 7: 214–216.

Helbig, A. J., Knox, A. G., Parkin, D. T., Sangster, G. & Collinson, M. 2002. Guidelines for assigning species rank. *Ibis* 144: 518–525.

Hellmayr, C. E. 1913. Critical notes on the types of little-known species of Neotropical birds. Part II. *Novit. Zool*. 20: 227–256.

Howell, S. N. G. & Webb, S. 1995. *A guide to the birds of Mexico and northern Central America*. Oxford Univ. Press, New York.

Howell, T. R. 2010. Thomas R. Howell's check-list of the birds of Nicaragua as of 1993. *Orn. Monogr*. 68: 1–108.

del Hoyo, J. & Collar, N. J. 2014. *HBW and BirdLife International illustrated checklist of the birds of the world*, vol. 1. Lynx Edicions, Barcelona.

Hughes, J. M. 1997. Systematics of New World cuckoos (Aves, Cuculidae) and the evolution of brood parasitism. Ph.D. thesis. Univ. of Toronto.

Hughes, J. M. 2006. Phylogeny of the cuckoo genus *Coccyzus* (Aves: Cuculidae): a test of monophyly. *Syst. Biodivers*. 4: 483–488.

Hughes, J. M. 2020. Greater Roadrunner (*Geococcyx californianus*), version 1.0. *In* Poole, A. F. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.greroa.01 (accessed 11 March 2024).

Johnson, K. P., Goodman, S. M. & Lanyon, S. M. 2000. A phylogenetic study of the Malagasy couas with insights into cuckoo relationships. *Mol. Phylo. & Evol*. 14: 436–444.

Monroe, B. L. 1968. *A distributional survey of the birds of Honduras*. Orn. Monogr. 7. American Ornithologists' Union, Washington, DC.

Moore, R. T. 1934. A review of the races of *Geococcyx velox*. *Trans. San Diego Soc. Nat. Hist*. 7: 455–470.

Muller, K. A. 1971. Physical and behavioral development of a roadrunner raised at the National Zoological Park. *Wilson Bull*. 83: 186–193.

Payne, R. B. 1997. Family Cuculidae (cuckoos). Pp. 508–607 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 4. Lynx Edicions, Barcelona.

Payne, R. B. 2005. *The cuckoos*. Oxford Univ. Press.

Paynter, R. A. 1955. The ornithogeography of the Yucatán Peninsula. *Peabody Mus. Nat. Hist. Bull*. 9: 1–347.

Peters, J. L. 1940. *Check-list of birds of the world*, vol. 4. Mus. Comp. Zool., Cambridge, MA.

Pierotti, R. 1987. Isolating mechanisms in seabirds. *Evolution* 41: 559–570.

Ridgway, R. 1916. The birds of North and Middle America, pt. VII. *Bull. US Natl. Mus*. 50.

Rodríguez-Rodríguez, E. J. & Negro, J. J. 2021. Integumentary colour allocation in the stork family (Ciconiidae) reveals short-range visual cues for species recognition. *Birds* 2: 138–146.

Shakya, S. B., Lim, H. C., Moyle, R. G., Rahman, M. A., Lakim, M. & Sheldon, F. H. 2019. A cryptic new species of bulbul from Borneo. *Bull. Brit. Orn. Cl*. 139: 46–55.

Shelley, G. E. 1891. *Catalogue of the birds in the British Museum*, vol. 19. Trustees of the Brit. Mus., London.

Sibley, C. G. & Monroe, B. L. 1990. *Distribution and taxonomy of birds of the world*. Yale Univ. Press, New Haven, CT.

Smyth, J. R. 1990. Genetics of plumage, skin, and eye pigmentation in chickens. Pp. 109–167 *in* Crawford, R. D. (ed.) *Poultry breeding and genetics*. Elsevier, Amsterdam.

Soberanes-González, C. A., Rodríguez-Flores, C. I., Arizmendi, M. C. & Schulenberg, T. S. 2020. Lesser Roadrunner (*Geococcyx velox*), version 1.0. *In* Schulenberg, T. S. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.lesroa1.01 (accessed 4 February 2024).

Sorensen, M. D. & Payne, R. B. 2005. A molecular genetic analysis of cuckoo phylogeny. Pp. 68–94 *in* Payne, R. B. (ed.) *The cuckoos*. Oxford Univ. Press.

Vallely, A. C. & Dyer, D. 2018. *Birds of Central America*. Princeton Univ. Press, Princeton, NJ & Oxford.

Voelker, G., Outlaw, R. K., Reddy, S., Tobler, M., Bates, J. M., Hackett, S. J., Kahindo, C., Marks, B. D., Kerbis Peterhans, J. C. & Gnoske, T. P. 2010. A new species of boubou (Malaconotidae: *Laniarius*) from the Albertine Rift. *Auk* 127: 678–689.

Wagner, A. 1836. Description du *Saurothera californiana*. *Gelehrte Anz. (München)* 3: col. 95–96.

Address: Centro Zamorano de Biodiversidad, Las Quebraditas, Santa Ana, FM 11101, Honduras, e-mails: john.vandort@gmail.com and roselvy.juarez@gmail.com

ISSN-2513-9894
(Online)

Documentation of the nest of the Greenish Tyrannulet *Phyllomyias virescens*

by Bret M. Whitney, Fabio Schunck & Tony Bichinski

Received 15 April 2024; revised 28 August 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:633ACDAB-6462-49C2-885E-F1406E6FB0D9

Summary.—Most species of the genus *Phyllomyias* either lack formal nest descriptions or their nests are little known, representing a significant knowledge gap among Neotropical tyrannids. Here we describe two nests of Greenish Tyrannulet *Phyllomyias virescens* in Brazil. The nests were open semi-spheres placed high in trees, quite different from the published nest description for this species as closed/spherical and sited low above the ground. Our data suggest that the single, previously described nest of Greenish Tyrannulet was misidentified.

As currently considered (e.g., Clements *et al*. 2023) the genus *Phyllomyias* comprises 14 species of small Neotropical forest tyrannids morphologically similar to the rather distantly related members of the genus *Phylloscartes*, with which they are often confused (Clay *et al*. 1998, Winkler 2020). The natural history of *Phyllomyias* is poorly known, particularly with respect to breeding, with three species (Plumbeous-crowned Tyrannulet *P. plumbeiceps*, Reiser's Tyrannulet *P. reiseri* and Urich's Tyrannulet *P. urichi*) lacking a nest description and two others (Sclater's Tyrannulet *P. sclateri* and Greenish Tyrannulet *P. virescens*) with only one published description each (Crozariol 2016a,b, Winkler *et al*. 2020). As far as is known, *Phyllomyias* nests are lichen-covered open bowls sited on the upperside of branches or in forks of branches near the tops of trees: Gonzaga & Castiglioni (2007) described such a nest of Planalto Tyrannulet *Phyllomyias fasciatus*, the type species of the genus, and photos of two nests of *P. reiseri* in Bahia, Brazil (e.g., Wikiaves 2415535 and 3681227) also conform to this pattern. Among currently recognised species in the genus, only Grey-capped Tyrannulet *P. griseocapilla* departs from this general description, having well-documented, closed, globular nests (Crozariol 2016a, Legal 2018).

Greenish Tyrannulet occurs in south-east and south Brazil, eastern Uruguay, eastern Paraguay and north-eastern Argentina (Sick 1997, Fitzpatrick 2020). The only nest reported was found in Argentina and was in a 1.5 m-tall bush growing on the bank of a small stream. It was 80 cm above the ground and constructed around a branch that hung vertically and served as a longitudinal axis, with other branches incorporated as structure for the walls of the nest, which was made entirely of moss. The nest was purse-shaped with an upper side entrance. Externally, it measured 40 cm tall, 10 cm wide and 3 cm in diameter (Castelino & Saibene 1989). As noted by Areta *et al*. (2021) in their description of nests of Rough-legged Tyrannulet *Phyllomyias burmeisteri*, this simple description did not provide documentation of adults at the nest or other data that could confirm identification of the species. Here we present the first documentation of the nest of Greenish Tyrannulet, which further suggests that the description of the nest in Argentina was based on a misidentification of (almost certainly) Mottle-cheeked Tyrannulet *Phylloscartes ventralis* as Greenish Tyrannulet.

On 6 December 2016, at *c*.14.00 h, BMW & FS heard the distinctive vocalisations of Greenish Tyrannulet and observed an adult (Fig. 1A; https://macaulaylibrary.org/asset/488851) carrying small pieces of lichen (Fig. 1B) to build a nest. Habitat at the site was mixed ombrophilous forest (22°41′24.31″S, 45°28′52.84″W; 1,525 m) in the public use

ISSN-2513-9894
(Online)

Figure 1. Adult Greenish Tyrannulet *Phyllomyias virescens* at N1; close to the nest (A), with small pieces of lichens to add to the nest (B) and settled in the nest (C) (Fabio Schunck). Video links in the text further document species identity and behaviours, including participation of both members of the pair in nest construction.

area of Campos do Jordão State Park—Horto Florestal, a reserve of 503 ha in the Serra da Mantiqueira, municipality of Campos do Jordão, eastern São Paulo, Brazil. This first nest (N1) was in a *Podocarpus lambertii* about 20 m tall at the forest edge, within a concentration of taller *Araucaria angustifolia* trees reaching heights of 25–30 m (Fig. 2). The nest was *c*.14 m above ground, on top of a branch about 7 cm in diameter and angled *c*.40° above the horizontal. It was an open semi-sphere or shallow cup with a low edge covered with lichens and was quite well camouflaged in the middle of a cluster of orchids (Orchidaceae), climbing ferns (*Microgramma* spp.) and mosses (Fig. 1C; https://macaulaylibrary.org/asset/488847). Both members of the pair participated in nest construction, and their behaviours indicated the nest was nearly complete. After taking lichens to the nest and working them into the nest rim, each of the adults spent 2–3 minutes forming the nest cup by shuffling in a circular arc, occasionally rearranging material in the rim or fine, grass-like fibres below the rim with the bill and settling briefly in the incubation position (https://macaulaylibrary.

ISSN-2513-9894
(Online)

Figure 2. Approximate location of the nest site (N1) of Greenish Tyrannulet *Phyllomyias virescens* (white ellipse) near Campos do Jordão, São Paulo, Brazil (Fabio Schunck)

Figure 3. Nest site (N2) of Greenish Tyrannulet *Phyllomyias virescens* (red circle) in Santa Catarina, Brazil (Tony Bichinski)

ISSN-2513-9894 (Online)

org/asset/488849, https://macaulaylibrary.org/asset/488850). This behaviour was repeated several times at 3–7-minute intervals until 16.00 h, when the authors left the site. FS returned 35 days later (10 January 2017). There was no sign of the nest or the birds, which was not unexpected given that the combined extremes ascribed to tyrannids for incubation (16 days) and fledging (17 days) is 33 days (Winkler *et al*. 2020).

A second nest (N2) was found by TB on the edge of a roughly 85-ha fragment of mixed ombrophilous forest (26°48′54″S, 51°34′16″W; 1,304 m) in the municipality of Água Doce, northern Santa Catarina state, Brazil. The site had a high diversity of trees of the family Lauraceae with emergent *Araucaria angustifolia* and a canopy height of *c*.13–15 m. On 1 October 2015, at about 09.30 h, an adult Greenish Tyrannulet was observed carrying material to construct a nest about 11 m above ground inside a cluster of small branches of an *Ocotea porosa* tree about 18.5 m tall (Fig. 3). The nest was an open semi-sphere (cup) composed of lichens, mosses and spider webs which the bird brought at intervals of 2–10 minutes, occasionally vocalising during the process. The material was placed after the bird settled inside the structure and rotated on the horizontal axis, arranging the edges and interior of the nest, which was judged to be in the final stages of construction. Activities were monitored until 11.00 h, when the bird stopped visiting the nest. No photographic or audio documentation was made at this nest (N2), and it was not possible to return to the site in the following days.

The two observed nests differ markedly from that described by Castelino & Saibene (1989) in at least three characteristics: tree height (20 m for N1 and 18.5 m for N2 vs. 1.5 m for the previously described nest); distance above ground (14 m for N1 and 11 m for N2 vs. 80 cm); and nest architecture (open semi-sphere/cup for N1 and N2 vs. closed/elongated/lateral according to Crozariol 2016a). Somewhat similar confusion has surrounded the nest of Grey-capped Tyrannulet, the first of which was described as cup-shaped (a semi-sphere) by Traylor (1977) and later nests as closed/spherical (Piato *et al*. 2015, Legal 2018). Recent studies (T. Bichinski & D. Buzzetti pers. obs.) indicate that Grey-capped Tyrannulet occupies abandoned nests of other birds, especially species that build closed nests, partially covering only the egg chamber. Due to the similarity of birds of the genus *Phyllomyias* to other syntopic tyrannids, such as Mottle-cheeked Tyrannulet, which builds a generally low (<4 m above ground), closed/spherical nest with moss (Narosky & Salvador 1998; see Fig. 4; BMW pers. obs.), the description published by Castelino & Saibene (1989) appears to involve an identification error. In other words, in the genus *Phyllomyias*—as currently defined (which will require significant revision; see Fig. 1 of Harvey *et al*. 2020 and the informative discussion in Areta *et al*. 2021)—only Grey-capped Tyrannulet uses closed, spherical nests (notwithstanding these being adapted nests of other species of birds).

Finally, we note that Areta *et al*. (2021) suspected that von Ihering's (1900) description of a nest attributed to *P. burmeisteri*, which they judged to closely match their descriptions of that species in several respects including specific nest-lining material, might actually pertain to *P. virescens* as a result of taxonomic confusion. However, exactly as is the case with the probably misidentified nest described by Castelino & Saibene (1989), lack of independently verifiable documentation of the adults involved prevents reliable identification among multiple syntopic species of these tyrannulets. As such, the burden of proof must (continue to) lie with clearly disproving von Ihering's (1900) description as pertaining to *P. burmeisteri* (or proving that the correct identification as *P. virescens*). This carries over to von Ihering's (1902) description of a different nest with an egg but, in this case, it may eventually be possible to confidently identify the species by matching his detailed description of the egg to one or the other of several small tyrannulets' eggs that are as yet undescribed.

Figure 4. Typical nest of Mottle-cheeked Tyrannulet *Phylloscartes ventralis*, consisting mostly of mosses in a closed/spherical and suspended architecture, with an adult perched at the opening feeding nestlings, Piraí do Sul, Paraná, Brazil (24°35'S, 49°47'W; 1,033 m) (Tony Bichinski)

Natural history studies, including those focused on breeding, are essential to obtain data on bird species that remain poorly known, such as Greenish Tyrannulet. Thus, it is necessary to invest in basic field studies of Neotropical birds to acquire data that expand existing knowledge and support conservation actions.

Acknowledgements

We thank: Kleber Evangelista Rodrigues for his help in the field during the second visit to Campos do Jordão; Fernando Costa Straube for his company in the field in Santa Catarina; Ricardo Garcia of the municipal herbarium of São Paulo for identifying plants; and Dione Seripierri, Viviane Neves dos Santos and the library team at the Museu de Zoologia da Universidade de São Paulo for help with references. Thanks to Marco Crozariol and an anonymous referee for helpful suggestions during the review process, and Guy Kirwan for copy-editing the final version.

References:

Areta, J. I., Mangini, G. G., Gandoy, F. A. & Pearman, M. 2021. Notes on the nesting of the Rough-legged Tyrannulet (*Phyllomyias burmeisteri*): phylogenetic comments and taxonomic tracking of natural history data. *Orn. Neotrop*. 32: 56–61.

Castelino, M. A. & Saibene, C. A. 1989. Nidificación de aves en Misiones. *Nuestras Aves* 20: 7–9.

Clay, R. P., Tobias, J. A., Lowen, J. C. & Beadle, D. 1998. Field identification of *Phylloscartes* and *Phyllomyias* tyrannulets in the Atlantic Forest region. *Cotinga* 10: 82–95.

Clements, J. F., Rasmussen, P. C., Schulenberg, T. S., Iliff, M. J., Fredericks, T. A., Gerbracht, J. A., Lepage, D., Spencer, A., Billerman, S. M., Sullivan, B. L. & Wood, C. L. 2023. The eBird/Clements checklist of birds of the world: v2023. https://www.birds.cornell.edu/clementschecklist/download/ (accessed 12 October 2023).

Crozariol, M. A. 2016a. Evolução da forma de nidificação da superfamília Tyrannoidea (Aves: Passeriformes) com base na fixação, arquitetura e composição dos ninhos. Ph.D. thesis. Universidade Federal do Rio de Janeiro and Museu Nacional.

Crozariol, M. A. 2016b. Espécies de aves com ninhos não descritos ou pouco conhecidos das famílias Tityridae, Platyrinchidae, Pipritidae, Pipromorphidae e Tyrannidae: um pedido de auxílio aos observadores de aves! *Atualidades Orn*. 189: 18–24.

Fitzpatrick, J. W. 2020. Greenish Tyrannulet (*Phyllomyias virescens*), version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.gretyr1.01 (accessed 12 October 2023).

Gonzaga, L. P. & Castiglioni, G. 2007. A nest of Planalto Tyrannulet *Phyllomyias fasciatus* in Brazil. *Cotinga* 28: 83.

Harvey, M. G., Bravo, G. A., Claramunt, S., Cuervo, A. M., Derryberry, G. E., Battilana, J., Seeholzer, G. F., McKay, J. S., O'Meara, B. C., Faircloth, B. C., Edwards, S. V., Pérez-Emán, J., Moyle, R. G., Sheldon, F. H., Aleixo, A., Smith, B. T., Chesser, R. T., Silveira, L. F., Cracraft, J., Brumfield, R. T. & Derryberry, E. P. 2020. The evolution of a tropical biodiversity hotspot. *Science* 370: 1343–1348.

von Ihering, H. 1900. Catálogo crítico-comparativo dos ninhos e ovos das aves do Brasil. *Rev. Mus. Paulista* 4: 191–300.

von Ihering, H. 1902. Contribuições ao conhecimento da ornitologia de São Paulo. *Rev. Mus. Paulista* 5: 261–329.

Legal, E. 2018. *Phyllomyias griseocapilla* Sclater, 1862 (piolhinho-serrano) (Aves, Tyrannidae): novas informações sobre a sua nidificação. *Acta Biol. Catarinense* 5: 5–12.

Narosky, T. & Salvador, S. 1998. *Nidificación de las aves argentinas (Tyrannidae)*. Asociación Ornitológica del Plata, Buenos Aires.

Piato, B. G., Carvalho, O. S. & Gussoni, C. O. A. 2015. First nesting data for Grey-capped Tyrannulet *Phyllomyias griseocapilla*. *Cotinga* 37: 125–126.

Sick, H. 1997. *Ornitologia brasileira*. Ed. Nova Fronteira, Rio de Janeiro.

Traylor, M. A. 1977. A classification of the tyrant flycatchers (Tyrannidae). *Bull. Mus. Comp. Zool*. 148: 128–184.

Winkler, D. W., Billerman, S. M. & Lovette, I. J. 2020. Tyrant flycatchers (Tyrannidae), version 1.0. *In* Billerman, S. M., Keeney, B. K., Rodewald, P. G. & Schulenberg, T. S. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.tyrann2.01 (accessed 14 April 2024).

Addresses: Bret M. Whitney, Museum of Natural Science, Louisiana State University, Murphy J. Foster Hall, 119 Dalrymple Drive, Baton Rouge, LA, 70803, USA, e-mail: ictinia@earthlink.net. Fabio Schunck, Brazilian Committee for Ornithological Records (CBRO) and Instituto Butantan, Av. Eugênio Bartolomai 386, 04785-040, São Paulo, SP, Brazil, e-mail: fabio_schunck@yahoo.com.br. Tony Bichinski, PSN A Foundation, Rua Flor de Lis 762, 85854-489, Foz do Iguaçu, PR, Brazil, e-mail: tonybichinski@yahoo.com.br

ISSN-2513-9894
(Online)

On the taxonomic status of Burmese Collared Dove *Streptopelia (decaocto) xanthocycla*

by Hein van Grouw, Germán Hernández-Alonso*, Nuno F. Martins & M. Thomas P. Gilbert*

Received 17 April 2024; revised 23 October 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:837F85CB-63A9-428D-8FBB-10E98FD5D9E6

Summary.—Although described as a subspecies of Eurasian Collared Dove *Streptopelia decaocto*, the isolated Burmese population *S. d. xanthocycla* is considered to be a species by some authors, based on presumed morphological differences between the two taxa. To resolve the issue, a whole-genome resequencing-based study was conducted. The results show that Burmese *xanthocycla* can indeed be considered a separate species, and therefore that Eurasian Collared Dove is monotypic. As no type material exists for the Burmese Collared Dove, a neotype is designated for *xanthocycla* to clarify its taxonomy.

> *'I do not for a moment think the bird will be found worthy of specific rank, ...'*
> Newman (1906: 324)

In the past, many different subspecies were described for Eurasian Collared Dove *Streptopelia decaocto* (van Grouw 2022), often based on vague and inconsistent morphological characteristics. All but one are nowadays generally synonymised under *S. d. decaocto* (Fig. 1). Only the population isolated in Myanmar (former Burma)[1]—*xanthocycla*—is still accepted as a distinctive subspecies different from populations in Europe and elsewhere in Asia (Baptista *et al*. 1997, Dickinson & Remsen 2013). Besides being slightly darker overall, it has a distinctive yellow instead of greyish-white orbital ring (Fig. 2). However, based on these differences, del Hoyo & Collar (2014) split Burmese Collared Dove as a species, despite the lack of any supporting molecular evidence.

Although Oates (1883: 293) already mentioned 'eyelids and skin of face yellow', prior to the early 20th century no one else had drawn attention to the fact that Burmese birds differed in this respect from Indian ones. It was Newman (1906) who fully recognised the difference, based on a live bird in London Zoological Gardens, which he described as a new subspecies of Eurasian Collared Dove, *Turtur decaocto xanthocyclus*, for its yellow orbital ring. In October 1896 the zoo had received three individuals, presumably from the Minbu and/or Mague districts of upper Burma. One, a male, survived almost ten years in the zoo but when, around 1904, Newman's attention was drawn to it, the other two had already died. Unfortunately, despite his request that the bird be preserved as a specimen after its death, the skin was not retained as, apparently, the cadaver was heavily damaged by rats post-mortem (Newman 1906), so the holotype of *xanthocycla* no longer exists.

Minor plumage differences between *decaocto* and *xanthocycla* exist, but some populations of the former (notably those in India and Sri Lanka) are generally darker than their European

---

* These authors contributed equally to the manuscript.

[1] The type locality is 'Minbu or Mague District in Upper Burma, situated on the Irawady about Lat. 20' (Newman 1906), but *xanthocycla* is endemic to the Irrawaddy Valley of central and southern Myanmar, where it occurs in the dry-zone lowlands, in scrub, cultivation and open country. Some authors (e.g. Gibbs *et al*. 2001, Dickinson & Remsen 2013) have also mentioned its presence in parts of China, but we have found no evidence for that, and presumed records seem to refer to nominate *decaocto* instead.

ISSN-2513-9894 (Online)

Figure 1 (left). Eurasian Collared Dove *Streptopelia decaocto*, South Holland, the Netherlands, 12 January 2021 (© Alois van Mingeroet)

Figure 2 (right). Burmese Collared Dove *Streptopelia xanthocycla*, Bagan, Mandalay District, Myanmar, 15 November 2013 (© Otto Samwald)

Figure 3. From left to right Eurasian Collared Dove *Streptopelia decaocto*, Sri Lanka (NHMUK 1946.28.232), Burmese Collared Dove *S. xanthocycla*, Myanmar (NHMUK 1948.80.3337) and Eurasian Collared Dove, Serbia (NHMUK 1969.3.1); although Sri Lankan (and Indian) Eurasian Collared Doves are slightly smaller than Burmese Collared Dove, their dark upperparts are almost identical, whilst European (and Chinese) Eurasian Collared Doves are paler than Burmese Collared Dove but they are similar in size or even larger (see Table 1) and the white tail tip can be even larger (Jonathan Jackson, © Trustees of the Natural History Museum, London)

counterparts, and thus look more like *xanthocycla* (Fig. 3). Also, *decaocto* can exhibit a slight yellowish hue to the orbital ring (Swinhoe 1870: 446; HvG pers. obs.). The tail of *xanthocycla* is considered longer than in *decaocto*, with the result that the outer rectrices were believed to show equivalently more white (del Hoyo & Collar 2014: 162). The *decaocto* specimens used in the comparison originated from north-east India (N. J. Collar *in litt*. 2024) and are indeed smaller and slightly shorter tailed, but Eurasian Collared Doves in China and Europe are similar in size to *xanthocycla* or even longer tailed. Tail length, therefore, in Burmese doves

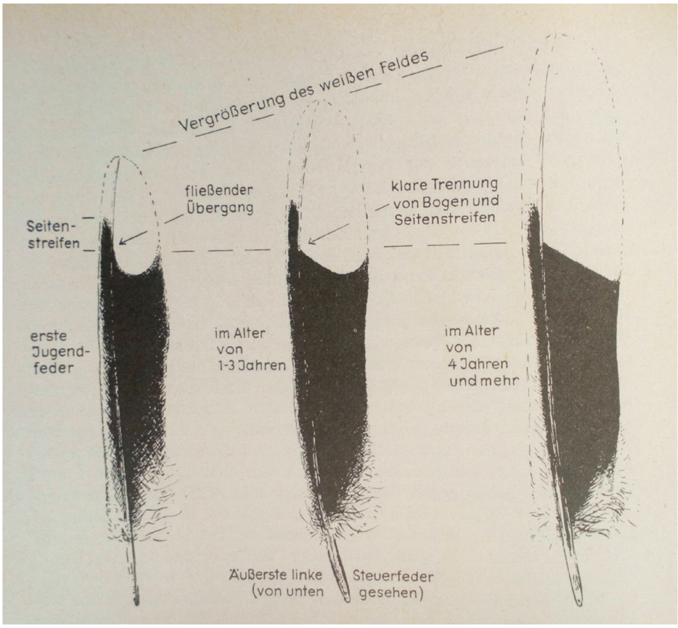


Figure 4. Fig. 1 in Lachner (1965), demonstrating the increase with age in the amount of white in the outer tail feathers in male Eurasian Collared Dove *Streptopelia decaocto*; in doves four years or older (right) the black in the outer web is strongly reduced whereas the white part and the feather as a whole have significantly increased in length (Hein van Grouw)

Figure 5. Outer tail feathers moulted in four successive years by a male Eurasian Collared Dove *Streptopelia decaocto*, hatched in 1998 and captive bred by HvG; the increase in length and the amount of white as the bird got older is clear (Hein van Grouw)

does not average longer than that of *decaocto* throughout its range (see Table 1). Also, in adult Eurasian Collared Doves, especially males, the tail grows longer over the first four years of life (Lachner 1965; HvG pers. obs.), so that males four years and older have significantly longer tails than those in their first to third years (Figs. 4–5). Also, it is the white tip that increases in length, resulting in the outer tail feathers showing equivalently more white as the

TABLE 1
Measurements of Burmese Collared Dove *Streptopelia xanthocycla* and different populations of Eurasian Collared Dove *S. decaocto*.

Reg. no.	Wing (mm)	Tail (mm)
Streptopelia xanthocycla **(Myanmar, males)**		
NHMUK 1948.80.3333 *	181	145
NHMUK 1948.80.3334	179	146
NHMUK 1948.80.3335	186	151 **
NHMUK 1948.80.3338	185	142
NHMUK 1948.80.3340	175	141
NHMUK 1948.80.3341	180	141
NHMUK 1908.5.30.33	181	142
Mean of seven adult males	**180**	**144**
Streptopelia decaocto **(Assam/Bengal, males)**		
NHMUK 1898.2.2.1508	175	130
NHMUK 1898.2.2.1509	171	137
NHMUK 1898.2.2.1510	169	137
NHMUK 1898.2.2.1511	177	135
NHMUK 1898.2.2.1513	168	130
NHMUK 1949.Whi.1.1877	168	134
NHMUK 1949.Whi.1.1878	177	134
Mean of seven adult males	**172**	**134**
Streptopelia decaocto **(China, males)**		
NHMUK 1908.1.2.46	179	142
NHMUK 1908.1.2.47	177	144
NHMUK 1908.1.2.51	180	135
NHMUK 1908.1.2.52	179	145
NHMUK 1889.3.2.105	185	151
NHMUK 1902.8.5.89	180	138
NHMUK 1907.12.17.414	181	144
Mean of seven adult males	**180**	**143**
Streptopelia decaocto **(Europe, males)**		
Bodenstein (1950) (Germany)	176–185	140–149
Korneisl-Ruckner (1957) (Serbia)	169–185	136.0–157.5
Niethammer (1962) (Germany)	172–184	130–153

* Neotype (Fig. 12).

** Probably a bird more than four years old and therefore with a significantly longer tail (see also Fig. 12).

Figure 6. The black-and-white tail pattern of Burmese Collared Dove *Streptopelia xanthocycla* (pictured) is identical to Eurasian Collared Dove *S. decaocto* (compare Figs. 4–5) and the increase in length and the amount of white with age appears to be also present in Burmese Collared Dove; from left to right, juvenile male (NHMUK 1948.80.3330), adult male presumably younger than four years (NHMUK 1948.80.3333, neotype, see Fig. 12), and adult male presumably at least four years old (NHMUK 1948.30.3335) (Jonathan Jackson, © Trustees of the Natural History Museum, London)

dove gets older. There is no reason to believe that the same is not true of *xanthocycla* (Fig. 6). So, if compared with nominate *decaocto* throughout its range, there is no significant difference in size or in the amount of white in the tail.

Song can differ among individual male *xanthocycla*, some of which have a two-note strophe of which the first is emphatic and clipped, and the second note falling and drawn-out, whilst others 'coo' a three-note strophe (https://birdfinding.info/burmese-collared-dove/, accessed 7 March 2024). The latter differs only slightly from the three-note strophe of *decaocto*, with the same rhythm and structure but higher pitched at the start, with the two following notes successively lower pitched, creating a greater cadence (del Hoyo & Collar 2014). Differences between individual *decaocto* males in the height of the notes and the speed of delivery are also not uncommon, and males with a two-note song are known (Slabbekoorn 1998; HvG pers. obs.). The typical call, more like a human cry, in flight is unique to Eurasian Collared Dove. None of the related *Streptopelia* species, or as far as we are aware any other pigeon species, calls in flight. Burmese doves, however, also call in flight (Smith 1943: 251) and their call

ISSN-2513-9894
(Online)

Figure 7. The only significant visible difference between Eurasian Collared Dove *Streptopelia decaocto* and Burmese Collared Dove *S. xanthocycla* is the latter's bright yellow orbital ring, which is clearly visible even at a distance; Bagan, Mandalay, Myanmar, 3 January 2017 (© Nick Athanas)

does not differ from *decaocto*. Overall, other than the bright yellow orbital ring (Fig. 7), morphological differences between them appear insignificant, and therefore a molecular study to clarify the taxonomy was necessary. The results are presented herein.

Methods

DNA extraction and quantification.—Three *Streptopelia decaocto xanthocycla* dry toepad samples from the Natural History Museum, Tring, were analysed. The samples date from between 1905 and 1936 and were collected in central Myanmar; NHMUK 1908.5.30.32, female, 30 December 1905, Monywa, Lower Chindwin (= Monywa District); NHMUK 1948.80.3335, male, 26 July 1936, Kondau (= Meiktila District); NHMUK 1948.80.3340, male, 6 February 1932, Shwebo (= Swebo District). For DNA extraction and preparation for sequencing, toepads were digested whole in a PCR-free laboratory dedicated to ancient DNA processing at the Globe Institute, Univ. of Copenhagen. We followed the extraction method described by Campos & Gilbert (2012). More specifically, we washed the samples with a 1 ml 7% diluted commercial-strength bleach solution, followed by washing with 1 ml 70% ethanol, and finally rinsing with two rounds of molecular-grade water. The samples were then submerged in 1 ml extraction buffer for overnight digestion at 56°C. Afterwards, DNA was recovered using a modified binding buffer and MinElute silica columns (Qiagen) and eluted in a final volume of 42 µl of EBT. Extract concentration was measured using a Qubit (ng/µl). An extraction blank was included to control for any possible contamination.

Genomic library building and sequencing.—Illumina libraries were constructed following the Santa-Cruz Single Stranded Reaction (SCR) protocol (Kapp *et al*. 2021) with a final volume of 42µl of EBT. Libraries were amplified using Q5U Hot Start High-Fidelity DNA Polymerase (New England Biolabs Inc). Amplified libraries were purified using MinElute silica columns (Qiagen), were eluted in 40µL of EBT, and quantified using the Qubit 2.0 Fluorometer (Thermo Fisher Scientific, Inc) and 2100 BioAnalyzer (Agilent). Finally, samples were sequenced on an

Illumina NovaSeq using 150bp PE sequencing at Novogene UK's commercial facility. The generated raw sequence reads have been deposited at the European Nucleotide Achieve (ENA) and can be accessed at Project ID PRJEB71607.

Dataset.—In addition to the three newly re-sequenced *xanthocycla* genomes, the final dataset included public available reference whole genomes of seven African Collared Doves *S. risoria*, seven Eurasian Collared Doves *S. decaocto* (for details see van Grouw *et al*. 2023), one Band-tailed Pigeon *Patagioenas fasciata* used as an outgroup (Murray *et al*. 2017) and (for mtDNA analyses) the whole mitochondrial genome of Oriental Turtle Dove *S. orientali*s (KY827037.1) (Table S1).

Data processing.—Whole-genome sequence reads were mapped to the *S. turtur* reference genome (bStrTur1.1; Dunn *et al*. 2021) using the BAM pipeline as implemented in PALEOMIX v.1.2.13.4 (Schubert *et al*. 2014). The different BAM pipeline steps include (1) trimming sequencing adapters using AdapterRemoval v.2.2.0 (Schubert *et al*. 2016) with default parameters; (2) alignment of the sequence reads to the reference genome using the backtrack algorithm in BWA v.0.7.17 (Li & Durbin 2009), disabling the use of a seed parameter, discarding unmapped reads, and applying a map quality filter of 30; (3) removing PCR duplicates using Picard MarkDuplicates (https://github.com/broadinstitute/picard), and (4) local realignment around indels using IndelRealigner module in GATK v.3.8.3 (McKenna *et al*. 2010).

To assess the substitution patterns and the level of DNA damage in the historical *xanthocycla* sequence reads mapDamage v.2.0.9 (Jónsson *et al*. 2013) was used with the default parameters. The sequences showed low levels of the cytosine deamination that is typical to ancient or historical DNA as a result of post-mortem damage, thus overall indicating good DNA preservation in the samples (Table S2).

Sex identification.—The biological sex of the *xanthocycla* specimens was confirmed by comparing the Z sex chromosome depth of coverage and the mean coverage of the autosomal chromosomes. If the Z sex chromosome depth of coverage was similar or higher than the mean coverage of the autosomal chromosomes the specimen was identified as male, but if the Z sex chromosome depth of coverage was approximately half the mean coverage of the autosomal chromosomes it was identified as female (Table S2).

Maximum likelihood phylogenetic analyses.—To explore the evolutionary relationships between *xanthocycla* and the other samples, two phylogenetic analyses were performed using the whole mitochondrial genome and nuclear genome sequences, respectively. To estimate the whole mitochondrial genome phylogeny, sequence reads were first mapped to the *S. decaocto* mitogenome (NC_037513.1) using PALEOMIX v.1.2.13.4 as described above. Then, the alignment files were used to generate consensus sequences per sample using the '-dofasta2' function in ANGSD v.0.937 (Korneliussen *et al*. 2014). All mitochondrial genome consensus sequences were aligned using the global pair iterative method as implemented in MAFFT v.7.515 (Katoh & Standley 2013). Finally, a maximum likelihood (ML) phylogeny was estimated under the GTR (generalised time reversible) + G model using RAxML-ng v.1.2.0 (Kozlov *et al*. 2019). The Oriental Turtle Dove mitochondrial genome was included as an outgroup in the analysis.

To infer a nuclear genome phylogeny, genomic consensus sequences were generated using ANGSD v.0.937 ('-dofasta2' function) and the *S. turtur* as reference genome. Subsequently, 1,000 non-overlapping random regions of 2,000 bp were selected from the reference genome using the '*random*' function in BEDTools v.2.30 (Quinlan & Hall 2010) to estimate 1,000 independent ML phylogenetic trees in RAxML-ng v.1.2.0 under the GTR+G evolutionary model. A species tree was inferred by summarising all the independent gene trees using ASTRAL-III (Zhang *et al*. 2018). The mitochondrial and nuclear genome phylogenetic trees were visualised using the Tree Of Life (iTOL) v4 online tool (Letunic & Bork 2019).

Dimensionality reduction analyses.—To explore population structure among the samples in the dataset and visualise their genetic distances, a principal components analysis (PCA) and a multidimensional scaling (MDS) analysis were performed on different genomic variant datasets. First, a single nucleotide polymorphism (SNP) dataset was created using ANGSD v.0.937 '-dohaplocall 1' function by randomly sampling one read per site and retaining the base that satisfies the implemented filter parameters (-minMinor 2, -maxMis 3, -minMapQ 30, -minQ 20, -uniqueOnly 1, -remove_bads 1, -only_proper_pairs 1, -skipTriallelic 1, -doMajorMinor 1). SNP sampling was restricted to scaffolds with more than 1 Mb length, and transitions were discarded to avoid incorporating noise derived from miscoding lesions caused by deamination of the DNA as typically found in historical samples. After applying a MAF filter to discard sites with a minor allele frequency below 0.01 using Plink v.1.9.0 (Chang *et al*. 2015), the final SNPs database contained 1,568,831 transversion sites. As next steps, the SNP dataset was used to estimate pairwise identity-by-state (IBS) genetic distances between all the samples excluding the outgroup. Subsequently the genetic distance matrix was used to estimate a MDS analysis with Plink v.1.9.0.

Genotype likelihoods were estimated to perform a PCA using ANGSD v.0.937 with the parameters -GL 2, -doGlf 2, -doMajorMinor 1, -doMaf 2, -doCounts 1, -SNP_pval 1e-6, -rmTrans 1, -minQ 20, -minmapq 30, -setMinDepth 3. Then, a covariance matrix was calculated using PCAngsd v.1.10 (Meisner & Albrechtsen 2018). Finally, the eigenvalues estimation and plotting were generated in R.

Estimated effective migration surface (EEMS).—The software EEMS (Petkova *et al*. 2016) was implemented to explore the population structure and gene flow patterns of *decaocto* and *xanthocycla* in the context of their geographic distribution, allowing us to detect potential barriers or corridors between populations. Sites with missing data were removed from the SNPs dataset. EEMS was implemented using the parameters: nIn-div = 10, nSites = 1,111,540, nDemes = 200, diploid = false, numMC-MCIter = 2,000,000, numBurnIter = 1,000,000, numThinIter = 9999. Finally, the results were visualised using the R package reemsplots2 (https://github.com/dipetkov/reemsplots2).

Weighted pairwise fixation index (F_{st}).—The genetic differentiation between *xanthocycla* and other *decaocto* populations was measured by estimating the weighted pairwise F_{st} in Plink v.1.9 using the previously generated SNPs dataset. Populations per geographic region were defined, each one including three samples: *xanthocycla* (BCD-01, BCD-02, BCD-03), Indian *decaocto* (ECD-01, ECD-02, ECD-03), Arabian *decaocto* (ECD-04, ECD-05, ECD-06) and Arabian *risoria* (ACD-10, ACD-11, ACD-12). The *risoria* samples (classified as the former subspecies *arabica* from the Arabian Peninsula) were included to measure their genetic differentiation from *decaocto* populations, due to the results obtained from the PCA and MDS (Figs. 5, S1) that suggest affinity between these two species.

Admixture analyses.—To test possible admixture between *decaocto* and *risoria* suggested by the observed population structure patterns in the PCA and MDS results (Fig. 8), as well as by the obtained weighted pairwise F_{st} values (Table 2), we implemented *D*-statistics tests and estimated admixture graphs using TreeMix v.1.13 (Pickrell & Pritchard 2012). *D*-statistics was implemented in ADMIXTOOLS v.7.0.2 (Patterson *et al*. 2012) using the SNPs dataset. The tests were conducted in the form *D* (*Patagioenas fasciata*, *risoria*; *decaocto*, *xanthocycla*) where *Patagioenas fasciata* was used as an outgroup and the *risoria* and *xanthocycla* samples were grouped into single populations. Each *decaocto* sample was tested independently. If the *D*-value is higher than 0, it indicates possible gene flow between *risoria* and *xanthocycla*, whilst *D*-values less than 0 indicate gene flow between *risoria* and *decaocto*. Deviations from 0 were considered statistically significant if Z-score was ≤-3 or ≥3. Z-score was estimated using weighted block jackknife procedure over 1 Mb blocks.

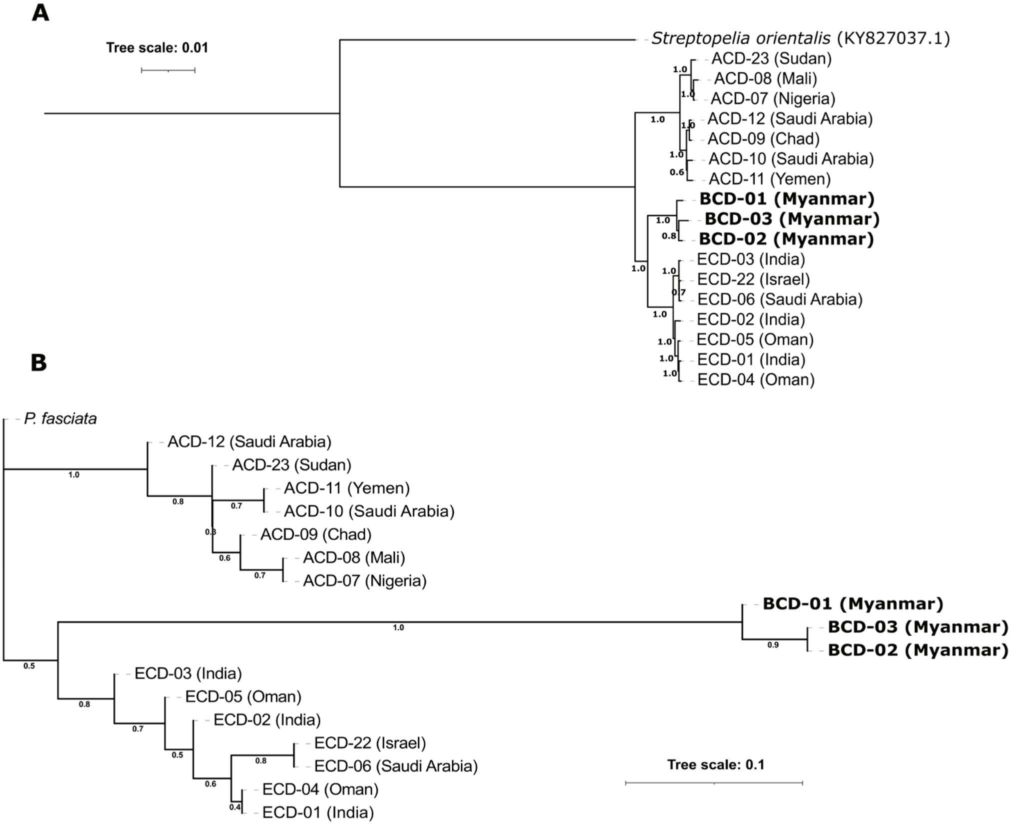


Figure 8. Estimated phylogenetic trees. (A) Maximum likelihood (ML) whole mitochondrial genome phylogeny. Oriental Turtle Dove *Streptopelia orientalis* was used as an outgroup. (B) Species tree based on 1,000 independent ML trees generated from random nuclear genome regions. Bootstrap values shown next to internal nodes. Burmese Collared Dove (BCD) *S. xanthocycla* samples in bold.

TABLE 2

Weighted pairwise F_{st} values. For an even comparison, three samples were used to define each population: (1) *Streptopelia xanthocycla*; (2) *S. decaocto* from India (ECD-01, ECD-02, ECD-03); (3) *S. decaocto* from the Arabian Peninsula (ECD-04, ECD-05, ECD-06); and (4) S. *risoria* from the Arabian Peninsula formerly classified as the *arabica* subspecies (ACD-10, ACD-11, ACD-12).

	xanthocycla	***decaocto* (India)**	***decaocto* (Arabia)**	***risoria* (Arabia)**
xanthocycla	/			
decaocto (India)	0.298259	/		
decaocto (Arabia)	0.298194	0.00691106	/	
risoria (Arabia)	0.378685	0.203463	0.204862	/

TreeMix admixture graphs were estimated using sites without missing data in our SNPs dataset. The *risoria* and *xanthocycla* samples were grouped into single populations whilst *decaocto* was grouped into populations based on their geographic origin (India, Arabia and Israel). The analyses were estimated for 0–2 migration events and grouping SNPs in windows of 500. Ten replicas were performed and those graphs with the best likelihoods were selected.

Results

We generated genome sequencing data from three historical *xanthocycla* samples to a mean depth of nuclear genome coverage spanning *c*.3.8–6.4X, yielding mitochondrial genome coverage between 363X and 498X (see Table S2). The phylogenetic analyses show that *xanthocycla* forms a monophyletic group sister to *decaocto*, whilst the *risoria* clade is sister to the other two, as expected (Fig. 8). Interestingly, the *xanthocycla* clade presents a long branch in the species tree, indicating clear divergence (Fig. 7B). On the other hand, the population structure observed in the PCA plot (Fig. 9) shows that *xanthocycla* is differentiated from *decaocto* along principal component (PC) 2, and *risoria* from *decaocto* and *xanthocycla* along PC1 which represents 22.1% of the total variation. The distance along the

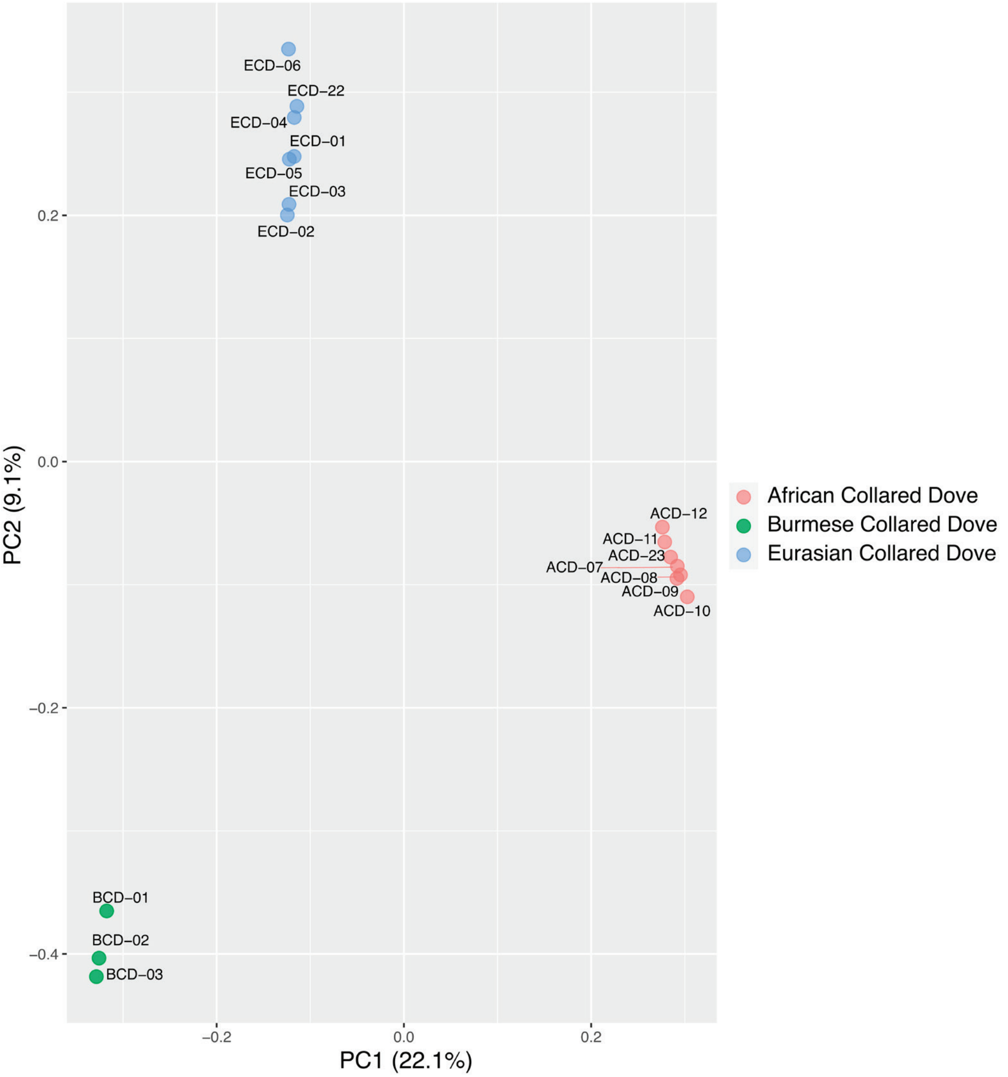


Figure 9. Principal component analysis (PCA) based on estimated genotype-likelihoods: the plot shows the population structure among African Collared Dove *Streptopelia risoria* (ACD), Eurasian Collared Dove *S. decaocto* (ECD) and Burmese Collared Dove *S. xanthocycla* (BCD). Principal component (PC) 1 explains 22.1% of the total variance in the dataset, whilst PC2 explains 9.1%.

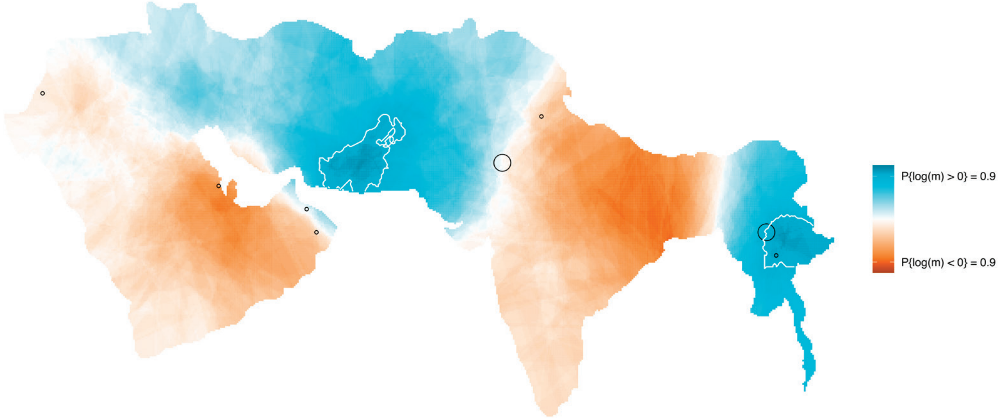


Figure 10. Effective migration rates estimated for Eurasian Collared Dove *Streptopelia decaocto* (ECD) and Burmese Collared Dove *S. xanthocycla* (BCD) populations. The plot represents the posterior log mean migration rate with the 95% confidence interval indicated by the polygons outlined white. Colours indicate higher migration rates than the average (blue), lower rates than the mean (orange), and in white the mean migration rate under a model of isolation by distance. Circles show the sample's geographic locations; small circles represent a single sample and big circles two samples per site.

PC1 between *decaocto* and *risoria* suggests that these two clusters are more closely related, possibly due to admixture. Similar patterns are observed in the MDS results (Fig. S1).

Effective migration rates estimated with EEMS suggest that *xanthocycla* is isolated from *decaocto* by a probable gene flow barrier in north-east India and Bangladesh (Fig. 10). The main biome in this region is tropical moist broadleaf forest, which potentially acts as a barrier between their populations. The same analysis suggests a gene flow corridor in southern Iran and Pakistan indicating probable connectivity between *decaocto* populations in Arabia and South Asia via the Gulf of Oman and Strait of Hormuz. The isolation of *xanthocycla* and genetic differentiation was later confirmed via the obtained weighted F_{st} values (Table 2). When *xanthocycla* was compared to *decaocto*, F_{st} was 0.29, indicating a high level of differentiation. When *decaocto* populations were compared to each other, F_{st} values obtained were low ($F_{st} = 0.006$) indicating a high level of gene flow. Unexpectedly, the F_{st} values obtained by comparing *decaocto* populations and *risoria* from Arabia were lower ($F_{st} = 0.2$) than when comparing *xanthocycla* and *decaocto*. This result agrees with the population structure observed in the PCA and MDS plots (Figs. 9 and S1), wherein *decaocto* seems closer to *risoria*.

Finally, we explored whether admixture between *decaocto* and *risoria* could explain these results. The *D*-statistics tests revealed clear signals of admixture between *risoria* and *decaocto* (Fig. 11A). When the *decaocto* samples from Arabia are tested, the admixture signals are stronger than the admixture signals obtained from *decaocto* in India. Similarly, the TreeMix graphs estimated for 1 and 2 migration edges (Fig. 11B–C) show stronger gene flow signals between *risoria* and *decaocto* from the Levant and Arabia, but also reveal a weaker signal between *risoria* and *decaocto* from India (Fig. 11C). We believe it is probable that admixture between *decaocto* and *risoria* occurred in Arabia, which both species inhabit, whilst the observed admixture signals in Indian *decaocto* can be explained by contact with Arabian Peninsula *decaocto*.

ISSN-2513-9894
(Online)

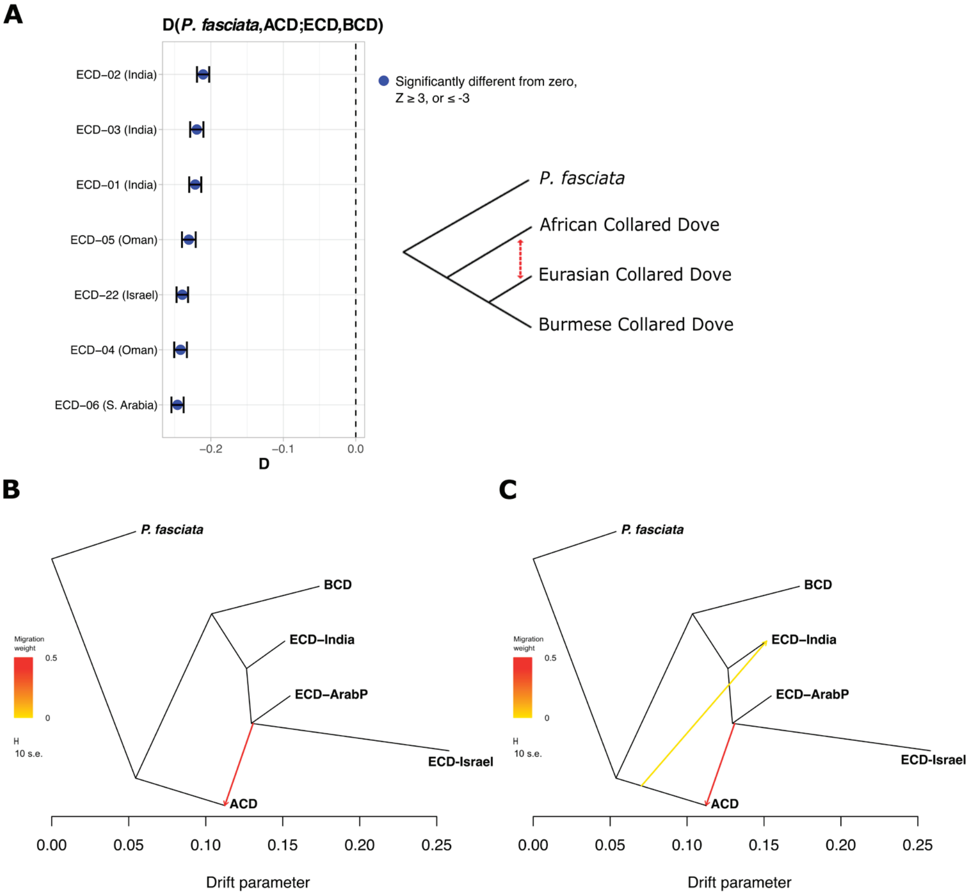


Figure 11. Admixture assessment between African Collared Dove *Streptopelia risoria* (ACD) and Eurasian Collared Dove *S. decaocto* (ECD). (A) *D*-statistics testing the tree topologies shown in Fig. 8. African Collared Dove and Burmese Collared Dove *S. xanthocycla* (BCD) samples were grouped in single populations. Band-tailed Pigeon *Patagioenas fasciata* was used as an outgroup. Horizontal bars represent the estimated three standard errors. Tests with Z-score >3 were considered statistically significant. (B–C) Admixture graphs estimated by TreeMix for one and two migration edges respectively. The arrows represent admixture events and the colours indicate the intensity of the estimated admixture. Eurasian Collared Dove samples were grouped into populations according to their geographic origin (India, Arabian Peninsula and Israel).

Conclusions and Discussion

Our molecular analysis indicates that, as a result of long isolation from Eurasian Collared Dove, Burmese Collared Dove is sufficiently differentiated to warrant consideration as a separate species. Both are sister to African Collared Dove. No admixture was identified between Eurasian and Burmese Collared Dove, probably because neither species occurs naturally in the other's range. Admixture between populations of African Collared Dove and Eurasian Collared Dove from the Arabian Peninsula has occurred (see van Grouw *et al*. 2023).

Like Eurasian Collared Dove, within its isolated range Burmese Collared Dove prefers open dry areas and human settlements. Currently, the only natural barrier separating them is the tropical moist broadleaf forests of north-east India and Bangladesh. If this forest is reduced then it is possible that Eurasian Collared Dove will expand into the range

ISSN-2513-9894 (Online)

Figure 12. Neotype of *Streptopelia xanthocycla*, NHMUK 1948.80.3333, male, 22 December 1936, Mandalay District, Burma, collected by H. C. Smith (Jonathan Jackson, © Trustees of the Natural History Museum, London)

of Burmese Collared Dove, given the former's propensity for opportunistic expansion. Furthermore, a possible future introduction of Eurasian Collared Dove into Myanmar by humans is quite likely. Examples of how invading Eurasian Collared Doves on the Canaries and in Florida have genetically diluted or even wiped out local populations of feral African Collared Dove (van Grouw 2022) offer little hope for Burmese Collared Dove under either scenario. Currently, Burmese Collared Dove is listed as Least Concern on the IUCN Red List (2024). Hybridisation with Eurasian Collared Dove, however, should be considered a serious threat in the future.

Given the threat of admixture with *decaocto* and the lack of any extant type material for *xanthocycla* (Newman 1906), a neotype for the latter is assigned herein (Fig. 12). Designation of a neotype is regulated under Art. 75.3 of the *International code of zoological nomenclature* (1999) which states that only if there is an exceptional need should a neotype be designated. The need for a neotype is the threat of admixture with *decaocto* in the future. By designating a neotype, we help to clarify the taxonomic status of Burmese Collared Dove (Art. 75.3.1). We have already mentioned the phenotypical (orbital ring colour) and genotypical characters differentiating *xanthocycla* from its closest relative *decaocto* (Art. 75.3.2 and 75.3.3). Because *xanthocycla* was described from a live bird that was not preserved as a specimen (Newman 1906), Art. 75.3.4 is satisfied. The neotype is of the same life stage and sex (Art. 75.3.5) as the lost holotype, is roughly from the same type locality (Art. 75.3.6) and is housed in NHMUK (Art. 75.3.7).

Based on the above, and to our knowledge, the conditions in Art. 75.3 of the *International code of zoological nomenclature* (1999) apply, and we assign neotype status to the following specimen: NHMUK 1948.30.3333, an adult male collected on 22 December 1936 in Mandalay District, Burma (= Myanmar), by H. C. Smith.

This results in the following sequence: *Streptopelia xanthocycla* (Newman, 1906). Type specimen NHMUK 1948.30.3333 (neotype designation herein). Synonym: *Turtur decaocto xanthocyclus* Newman, 1906.

Acknowledgements

We thank our reviewer for his very constructive comments that served to strengthen our manuscript. Alois van Mingeroet, Otto Samwald and Nick Athanas kindly provided photographs of live birds, and DNRF143 provided funding. GH-A was supported by a postdoctoral fellowship from the Sven och Lilly Lawskis fond för Naturvetenskaplig forskning.

References:

Baptista, L. F., Trail, P. W. & Horblit, H. M. 1997. Family Columbidae (pigeons and doves). Pp. 60–243 *in* del Hoyo, J., Elliott, A. & Sargatal. J. (eds.) 1997. *Handbook of the birds of the world*, vol. 4. Lynx Edicions, Barcelona.

Bodenstein, G. 1950. Die Türkentaube. *Orn. Mitt*. 9: 214–219.

Campos, P. F. & Gilbert, T. M. 2012. DNA extraction from formalin-fixed material. Pp. 81–85 *in* Shapiro, B., Barlow, A., Heintzman, P. D., Hofreiter, M., Paijmans, J. L. A. & Soares, A. E. R. (eds.) *Ancient DNA: methods and protocols*. Springer, New York.

Chang, C. C., Chow, C. C., Tellier, L. C., Vattikuti, S., Purcell, S. M. & Lee, J. J. 2015. Second-generation PLINK: rising to the challenge of larger and richer datasets. *Gigascience* 4: 7.

Dickinson, E. C. & Remsen, J. V. (eds.) 2013. *The Howard and Moore complete checklist of the birds of the world*, vol. 1. Fourth edn. Aves Press, Eastbourne.

Dunn, J. C., Hamer, K. C., Morris, A. J., Grice, P. V., Smith, M., Corton, C., Oliver, K., Skelton, J., Betteridge, E., Doucan, J., Quail, M. A., McCarthy, S. A., Uliano-Silva, M., Howe, K., Torrance, J., Chow, W., Pelan, S., Sims, Y., Challis, R., Threlfall, J., Mead, D. & Blaxter, M. 2021. The genome sequence of the European turtle dove, *Streptopelia turtur* Linnaeus 1758. *Wellcome Open Res*. 6: 191.

Gibbs, D., Barnes, E. & Cox, J. 2001. *Pigeons and doves: a guide to the pigeons and doves of the world.* Pica Press, Robertsbridge.

Goodwin, D. 1983. *Pigeons and doves of the world*. Third edn. Brit. Mus. (Nat. Hist.), London.

van Grouw, H. 2022. The colourful journey of the Eurasian Coloured Dove *Streptopelia decaocto*. *Bull. Brit. Orn. Cl*. 142: 166–191.

van Grouw, H., Hernández-Alonso, G., Cavill, E. & Gilbert, M. T. P. 2023. The Founding Feathers: the true ancestry of the domestic Barbary Dove. *Bull. Brit. Orn. Cl*. 143: 153–171.

Hartert, E. 1912–21. *Die Vögel der paläarktischen Fauna systematische Übersicht der in Europa, Nord-Asien und der Mittelmeerregion vorkommenden Vögel*. R. Friedländer & Sohn, Berlin.

del Hoyo, J. & Collar, N. J. 2014. *HBW and BirdLife International illustrated checklist of the birds of the world*, vol. 1. Lynx Edicions, Barcelona.

ICZN (International Commission for Zoological Nomenclature). 1999. *The international code of zoological nomenclature*. Fourth edn. International Trust for Zoological Nomenclature, London.

IUCN. 2024. The IUCN Red List of threatened species. Version 2023-1. https://www.iucnredlist.org/species/22727819/94962701 (accessed 7 March 2024).

Jónsson, H., Ginolhac, A., Schubert, M., Johnson P. L. F. & Orlando, L. 2013. Mapdamage2.0: fast approximate Bayesian estimates of ancient DNA damage parameters. *Bioinformatics* 29: 1682–1684.

Kapp, J. D., Green, R. E. & Shapiro, B. 2021. A fast and efficient single-stranded genomic library preparation method optimized for ancient DNA. *J. Heredity* 112: 241–249.

Katoh, K. & Standley, D. M. 2013. MAFFT multiple sequence alignment software version 7: improvements in performance and usability. *Mol. Biol. & Evol*. 30: 772–780.

Korneisl-Ruckner, R. 1957. Maße der Türkentaube in Jugoslawien gesammelt. *Larus* 9/10: 188–192.

Korneliussen, T. S., Albrechtsen, A. & Nielsen, R. 2014. ANGSD: analysis of next generation sequencing data. *BMC Bioinformatics* 15: 1–13.

Kozlov, A. M., Darriba, D., Flouri, T., Morel, B. & Stamatakis, A. 2019. RAxML-NG: a fast, scalable and user-friendly tool for maximum likelihood phylogenetic inference. *Bioinformatics* 35: 4453–4455.

Lachner, R. 1965. Untersuchungen an der Türkentaube, *Streptopelia decaocto*, über Alterskennzeichen, Geslechtsdimophismus und Mauser. *Die Vogelwelt* 86: 79–95.

Letunic, I. & Bork, P. 2019. Interactive Tree Of Life (iTOL) v4: recent updates and new developments. *Nucleic Acids Res*. 47(W1): W256–W259.

Li, H. & Durbin, R. 2009. Fast and accurate short read alignment with Burrows–Wheeler transform. *Bioinformatics* 25: 1754–1760.

McKenna, A., Hanna, M., Banks, E., Sivachenko, A., Cibulskis, K., Kernytsky, A., Garimela, K., Altshuler, D., Gabirel, S., Daly, M. & DePristo, M. A. 2010. The Genome Analysis Toolkit: a MapReduce framework for analyzing next-generation DNA sequencing data. *Genome Res*. 20: 1297–1303.

Meisner, J. & Albrechtsen, A. 2018. Inferring population structure and admixture proportions in low-depth NGS data. *Genetics* 210: 719–731.

Murray, G. G. R., Soares, A. E., Novak, B. J., Schaefer, N. K., Cahill, J. A., Baker, A. J., Demboski, J. R., Doll, A., Da Fonseca, R. R., Fulton, T. L., Gilbert, M. T. P., Heintzman, P. D., Letts, B., McIntosh, G., O'Connel, B. L., Peck, M., Pipes, M.-L., Rice, E. R., Santos, K. M., Sohrweide, A. G., Vohr, S. H., Corbett-Detig, R. B., Green, R. E. & Shapiro, B. 2017. Natural selection shaped the rise and fall of passenger pigeon genomic diversity. *Science* 358(6365): 951–954.

Niethammer, G. 1962. Ausbreitung und Merkmalsänderung. *Biol. Zentralblatt* 81: 67–73.

Newman, T. H. 1906. The Burmese Collared Turtle-dove. *Avicult. Mag*. 4: 321–326.

Oates, E. W. 1883. *A handbook to the birds of British Burmah, including those found in the adjoining state of Karennee*. R. H. Porter, London.

Patterson, N., Moorjani, P., Luo, Y., Mallick, S., Rohland, N., Zhan, Y., Genschoreck, T., Webster, T. & Reich, D. 2012. Ancient admixture in human history. *Genetics* 192: 1065–1093.

Petkova, D., Novembre, J. & Stephens, M. 2016. Visualizing spatial population structure with estimated effective migration surfaces. *Nature Genetics* 48: 94–100.

Pickrell, J. & Pritchard, J. 2012. Inference of population splits and mixtures from genome-wide allele frequency data. *PLoS Genetics* 8(11): e1002967.

Quinlan, A. R. & Hall, I. M. 2010. BEDTools: a flexible suite of utilities for comparing genomic features. *Bioinformatics* 26: 841–842.

Schubert, M., Ermini, L., Der Sarkissian, C., Jónsson, H., Ginolhac, A., Schaefer, R., Martin, D. M., Fernández, R., Kircher, M., McCue, M., Willerslev, E. & Orlando, L. 2014. Characterization of ancient and modern genomes by SNP detection and phylogenomic and metagenomic analysis using PALEOMIX. *Nature Protocols* 9: 1056–1082.

Schubert, M., Lindgreen, S. & Orlando, L. 2016. AdapterRemoval v2: rapid adapter trimming, identification, and read merging. *BMC Res. Notes* 9: 1–7.

Smith, H. C. 1943. *Notes on birds of Burma*. Liddell's, Simla.

Slabbekoorn, H. 1998. Perception of coo variation by the Collared Dove, a parameter analysis using playbacks in the field. Ph.D. thesis. Leiden Univ.

Swinhoe, R. 1870. Zoological notes of a journey from Canton to Peking and Calgang. *Proc. Zool. Soc. Lond*. 38: 427–451.

Zhang, C., Rabiee, M., Sayyari, E. & Mirarab, S. 2018. ASTRAL-III: polynomial time species tree reconstruction from partially resolved gene trees. *BMC Bioinformatics* 19: 153.

Addresses: Hein van Grouw, Bird Group, Dept. of Life Sciences, Natural History Museum, Akeman Street, Tring, Herts. HP23 6AP, UK, e-mail: h.van-grouw@nhm.ac.uk. Germán Hernández-Alonso, Human Evolution, Dept. of Organismal Biology, Uppsala University, SE-752 36 Uppsala, Sweden, e-mail: german.hernandez-alonso@uu.se. Nuno F. Martins, Center for Evolutionary Hologenomics, The Globe Institute, Univ. of Copenhagen, DK-1353 Copenhagen, Denmark, e-mail: nuno.martins@sund.ku.dk. M. Thomas P. Gilbert, Center for Evolutionary Hologenomics, The Globe Institute, Univ. of Copenhagen, DK-1353 Copenhagen, Denmark, e-mail: tgilbert@sund.ku.dk

Figure S1. Multidimensional scaling (MDS) plot to explore population structure among Burmese Collared Dove *Streptopelia xanthocycla* (BCD), Eurasian Collared Dove *S. decaocto* (ECD) and African Collared Dove *S. risoria* (ACD). MDS analysis was based on the SNPs dataset.

Figure S2. Extended TreeMix admixture graph and residual plots related to Fig. 7B–C. (A) TreeMix graph for 0 migration edges and its residual plot representing the residual fit from the estimated pairwise likelihoods. The scale bar indicates ten times the mean standard error. Higher values indicate close related pairs of populations that could have admixed but are not present in the best-fit modelled tree. (B–C) Residual plots of the TreeMix graph estimated for one and two migration edges.

ISSN-2513-9894 (Online)

The nest of Buff-throated Purpletuft *Iodopleura pipra leucopygia*

by Marco Aurélio Crozariol & Dante Martins Teixeira

Received 27 May 2024; revised 28 September 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:6D276334-26F0-4A83-BCB0-DE9E31F207F7

Summary.—Collected in Alagoas, north-east Brazil, in 1984, the sole nest of *Iodopleura pipra leucopygia* (Buff-throated Purpletuft) was not described at the time due to its being misidentified as belonging to White-browed Purpletuft *I. isabellae*. However, it was collected and deposited at the Museu Nacional, Universidade Federal do Rio de Janeiro, and its measurements and construction materials are described here. For the first time, the use of spider webs in the nest of Buff-throated Purpletuft *I. pipra* is indicated, and comparison with the few available descriptions of nests of congeners reveals that only this species is currently known to use lichens and bryophytes. The nest description presented here is the most detailed for any species of the genus *Iodopleura*.

Endemic to Brazil, Buff-throated Purpletuft *Iodopleura pipra* inhabits the Atlantic Forest and is globally threatened (BirdLife International 2023, Snow *et al*. 2024). Two subspecies are generally recognised: *I. p. pipra* (Lesson, 1831), which occurs from Paraná to Bahia, and *I. p. leucopygia* Salvin, 1885, confined to the Pernambuco Centre of Endemism (PCE), between Alagoas and Paraíba (Collar *et al*. 1992, Snow *et al*. 2024), although not all authors accept this delineation of their ranges, e.g., Dickinson & Christidis (2014) indicated a much wider distribution for *leucopygia*, extending south to north-east Minas Gerais and southern Bahia. Kirwan & Green (2011), however, suggested that the morphological evidence for recognising two subspecies is subject to some doubt (G. M. Kirwan *in litt*. 2024).

Although there are some descriptions of this species' nest (Willis & Oniki 1988, Mendonça & Gonzaga 2000, Whittaker & Kirwan 2008), all of them are from south-east Brazil, principally São Paulo and Rio de Janeiro, and pertain to *I. p. pipra*. The only nest found in the PCE was mentioned by Teixeira *et al*. (1987), who merely indicated that it agreed with the description of the nest of White-browed Purpletuft *I. isabellae* by Sick (1979). However, the nest was collected and deposited in the Museu Nacional (MN/Nest-52412), Universidade Federal do Rio de Janeiro. It is formally described here, 40 years after it was collected.

The nest (Fig. 1) was collected at Pedra Branca (09°15′S, 35°50′W), in the municipality of Murici, Alagoas, at 1,800 m, on 12 May 1984, two days after it was found (Teixeira *et al*. 1987). Initially thought to belong to White-browed Purpletuft *I. isabellae*, the authors subsequently corrected their error, indicating that they had rediscovered *I. p. leucopygia*, then known only from its two syntypes, erroneously believed to come from Guyana (Teixeira *et al*. 1990) and held in the Natural History Museum, Tring (Warren & Harrison 1971). Snow (1982: 41) was first to realise that these specimens are more likely to have originated in eastern Brazil, and that most specimens from the latter country supplied by the same dealer, H. Whitely Sr., might emanate from Bahia (although this likely reflects their point of shipment, rather than original locality; G. M. Kirwan *in litt*. 2024). Due to the original misidentification as *I. isabellae*, Teixeira *et al*. (1987) compared the nest only with the description of the latter

ISSN-2513-9894
(Online)

Figure 1. Nest of Buff-throated Purpletuft *Iodopleura pipra leucopygia* deposited in the Museu Nacional/UFRJ (MN/Nest-52412). Top: compared to the size of a female (MN 36379), which measured 10.5 cm (© Hipólito D. Xavier). Bottom: view of the nest from above (© Claydson P. de Assis)

species by Sick (1979), as noted by Whittaker & Kirwan (2008). As a result, the first formal description of the nest of *I. pipra* was by Willis & Oniki (1988).

The Alagoas nest was sited 15 m above ground and supported at the base, saddled in a horizontal fork. From above, the nest was oval-shaped with an external diameter of 47.65 × 38.67 mm and an internal diameter of 21.47 × 17.77 mm. Its external height varied according to the supporting branch, measuring 9.44 mm on one side, 3.86 mm on the other and, at a point where the material hugs the supporting branch, it measured 20 mm, as the material extends below it. The internal height was just 7.74 mm. The nest was sited exactly where the branch forked, being supported by three branches with diameters of 23.0, 22.5 and 17.25 mm. The nest wall was 8.2 mm thick on one side and 9.0 mm on the other.

Identification of the material used to construct the nest is not straightforward and it was not noted on the label whether the material was still alive or if it was already completely dry when collected. Externally, there are leafy foliose lichens and shrubby fruticose lichens, which were probably alive when the nest was active, as well as small pieces of dry leaves.

ISSN-2513-9894
(Online)

Figure 2. Nest of White-browed Purpletuft *Iodopleura isabellae* collected and reported by Sick (1979) and deposited in the Museu Paraense Emílio Goeldi, Belém (MPEG.NIO 055). Top: compared to the size of a female (MPEG 057196), which measured 12.3 cm. Bottom: from above, showing its oval shape and the supporting branch visible through the egg chamber (Marco A. Crozariol)

Lichens, when alive, should cover a greater surface area of the nest, and their colours are also lost after drying in a museum collection. The outermost layer conceals the material inside the construction, although the latter appears to be principally rootlets, thin leaf rachis and, especially, black filaments of (presumably) *Marasmius* sp. fungi, with fewer lichens and leaf fragments. It would be necessary to cut open the nest to discover if there is any other type of material different from that visible externally and internally, however it appears quite uniform in its construction, other than the greater use of lichens and leaf fragments on the outer wall. Due to its age, it is not easy to see spider webs in the nest, but they are present and are probably the principal material binding the nest together and fixing it to the supporting branch.

The nest described here, as well as that by Mendonça & Gonzaga (2000), can be classified as the 'low cup/fork' type (Simon & Pacheco 2005). Although measurements were not presented, Whittaker & Kirwan (2008) also indicated this classification for the nests they observed. It is important to highlight, however, that the nest described here was in a horizontal fork, a category not included in the system proposed by Simon & Pacheco (2005). Previously described nests of *I. pipra* were placed either on single branches or in forks involving up to four branches (Willis & Oniki 1988, Whittaker & Kirwan 2008), some not horizontal (Mendonça & Gonzaga 2000, Whittaker & Kirwan 2008). The same is true for the other species of *Iodopleura* (Sick 1979, Whittaker & Kirwan 2008, Ingels & Vinot 2010).

Only one prior description for *I. pipra* indicates the size of the nest, 25 mm in external diameter and 6 mm internal height, after the nestling fledged (Mendonça & Gonzaga 2000). Because nests are always high above ground, 10–25 m (Kirwan & Green 2011), acquiring measurements is difficult. The only measured nest, from Rio de Janeiro and belonging to *I. p. pipra*, is even smaller than that described here, which was carefully preserved in a box and does not appear to have undergone any changes in its size as a result. The description here is the most complete for any *Iodopleura*. The unique nest described for Dusky Purpletuft *I. fusca* included only an estimate of its size (Ingels & Vinot 2010), as in the nests of *I. isabellae* reported by Whittaker & Kirwan (2008). The sole exception is the nest of *I. isabellae* described by Sick (1979) which was collected and deposited at the Museu Paraense Emílio Goeldi, Belém (MPEG.NIO 055), where MAC examined it in March 2023. According to Sick (1979), this nest, which is also oval when viewed from above, measured 34 × 30 mm (external diameter), 10 and 13 mm (external height), *c*.10 mm (internal height) and had walls 3 and 5 mm thick at the rim (and thicker basally). Sick (1979) did not mention its internal diameter, which MAC measured as 38.0 × 28.5 mm. Like the Alagoas nest, the material in Sick's nest hugs the sides of the supporting branch, which was 20 mm in diameter (Sick 1979). Given that *I. pipra* measures 8.7–10.5 cm (Kirwan & Green 2011), the Alagoas nest's external diameter (average 4.3 cm) represents 40.1–49.4% of the bird's total length, while for *I. isabellae*, which is 11–13 cm (Kirwan & Green 2011), its nest is even smaller (2.5 cm; Sick 1979), or just *c*.18.5–22.7% of the bird's length.

Nest materials were previously also described, for the most part, based on field observations (Willis & Oniki 1988, Whittaker & Kirwan 2008). Willis & Oniki (1988) mentioned that 'nests were whitish, like the barely smaller twigs, but [with] slightly darker blotches – probably lichens', whilst Mendonça & Gonzaga (2000) confirmed that the nest is covered externally with lichens and mainly bryophytes, as well as plant fibres and *Marasmius* sp., all well bound together. Although no description clearly indicates that the bird uses live lichens, observations made by G. M. Kirwan in Ubatuba, São Paulo, of a nest under construction confirmed that the 'female collected fresh lichens' (Whittaker & Kirwan 2008). Lichens help both to camouflage the nest and 'mimic' the bird's plumage (Willis & Oniki 1988, Kirwan & Green 2011). Use of spider webs is indicated here for the first time for *I. pipra*. The nest of *I. isabellae* contains abundant spider webs (Sick 1979, Whittaker & Kirwan 2008), extending along the supporting branch up to 9 cm from the nest itself (Sick 1979). *I. fusca* also appears to use spider webs in nest construction (Ingels & Vinot 2010). *I. isabellae* has been observed using excrement in nest building (Whittaker & Kirwan 2008), which we did not identify in the Alagoas nest, if it is present. Sick (1979) also noted the use of *Marasmius* sp. in the nest of *I. isabellae*, especially internally. However, he drew attention to the possibility that this nest was not finished, as it lacked a lining, especially as it is possible to see the supporting branch through the egg chamber (Fig. 2). Based on our nest of *I. p. leucopygia*, there is no difference in the material used in the egg chamber.

Although *Iodopleura* nests are considered to be generally similar (Teixeira *et al*. 1987, Ingels & Vinot 2010), more detailed descriptions are needed. For example, there is no mention of the use of lichens for *I. fusca* or *I. isabellae*, although based on fig. 1 in Ingels & Vinot (2010) the nest of the first-named species may also contain them. The most complete description for *I. isabellae* (Sick 1979) may have involved an unfinished nest, as only the outer part contains spider webs. Sick (1979) mentioned that the construction materials were being analysed for future publication, but we have found only the mention of Cyanophyceae and Chlorophyceae algae in his subsequent works (Sick 1997: 657). These two families of algae occur in lichens (Büdel & Henssen 1983, Sanders & Masumoto 2021). Photographs of *I. isabellae* nests available on the WikiAves (2023) website (WA5056199, WA3428908, WA3412443) are pale grey externally and possibly lack lichens, in general agreement with Sick's (1979) description. Therefore, the use of lichens and bryophytes in nests is currently confirmed only for *I. pipra*.

Nests in collections are an important resource (Russell *et al*. 2013) and we recommend that (where possible) nests of this genus be collected and deposited in museums after the nestling leaves, to enable more detailed studies. Measurements and characteristics of the fresh nest should be noted on labels, permitting more robust future analyses and descriptions.

We provide the first formal description of the nest of the PCE population of *I. pipra*, providing an important addition to knowledge of this population and the genus *Iodopleura* in general.

Acknowledgements

MAC is grateful to the Fundação Cearense de Apoio ao Desenvolvimento Científico e Tecnológico (FUNCAP) for a research grant (n° 08340856/2023). We also thank Claydson Assis, Aline Ariela Passos and Hipólito Xavier for photos and information regarding the specimens in Museu Nacional/UFRJ and Guy Kirwan for his corrections and suggestions on the submitted manuscript.

References:

BirdLife International. 2023. *Iodopleura pipra*. IUCN Red List of Threatened Species 2023: e.T22700818A223485774 (accessed December 2023).

Büdel, B. & Henssen, A. 1983. *Chroococcidiopsis* (Cyanophyceae), a phycobiont in the lichen family Lichinaceae. *Phycologia* 22: 367–375.

Collar, N. J., Gonzaga, L. P., Krabbe, N., Madroño Nieto, A., Naranjo, L. C., Parker, T. A. & Wege, D. C. 1992. *Threatened birds of the Americas: the ICBP/IUCN Red Data book*. International Council for Bird Preservation, Cambridge, UK.

Dickinson, E. C. & Christidis, L. (eds.) 2014. *The Howard and Moore complete checklist of the birds of the world*, vol. 2. Fourth edn. Aves Press, Eastbourne.

Ingels, J. & Vinot, A. 2010. First nest of Dusky Purpletuft *Iodopleura fusca*, from French Guiana. *Bull. Brit. Orn. Cl*. 130: 71–72.

Kirwan, G. M. & Green, G. 2011. *Cotingas and manakins*. Christopher Helm, London.

Mendonça, E. C. & Gonzaga, L. P. 2000. Nidificação de *Iodopleura pipra* (Cotingidae) em Angra dos Reis, Rio de Janeiro. Pp. 172–173 *in* VIII Congreso Brasileiro de Ornitologia, Florianópolis.

Russell, D. G. D., Hansell, M. & Reilly, M. 2013. Bird nests in museum collections: a rich resource for research. *Avian Biol. Res*. 6: 178–182.

Sanders, W. B. & Masumoto, H. 2021. Lichen algae: the photosynthetic partners in lichen symbioses. *Lichenologist* 53: 347–393.

Sick, H. 1979. Zur Nistweise der Cotingidae *Iodopleura* und *Xipholena*. *J. Orn*. 120: 73–77.

Sick, H. 1997. *Ornitologia brasileira*. Ed. Nova Fronteira, Rio de Janeiro.

Simon, J. E. & Pacheco, S. 2005. On the standardization of nest descriptions of Neotropical birds. *Rev. Bras. Orn*. 13: 143–154.

Snow, D. W. 1982. *The cotingas, bellbirds, umbrellabirds and their allies*. Trustees of the Brit. Mus. (Nat. Hist.), London, UK.

Snow, D., Sharpe, C. J., Mlodinow, S. G., Pyle, P. & Kirwan, G. M. 2024. Buff-throated Purpletuft (*Iodopleura pipra*), version 1.1. *In* Keeney, B. K. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.butpur1.01.1 (accessed September 2024).

Teixeira, D. M., Nacinovic, J. B. & Pontual, F. B. 1987. Notes on some birds of northeastern Brazil (2). *Bull. Brit. Orn. Cl.* 107: 151–157.

Teixeira, D. M., Luigi, G. & Almeida, A. C. C. 1990. A redescoberta de *Iodopleura pipra leucopygia* (Salvin, 1885) no nordeste do Brasil (Passeriformes, Cotingidae). P. 179 *in* Resumos, XVII Congreso Brasileiro de Zoologia, Londrina.

Warren, R. L. M. & Harrison, C. J. O. 1971. *Type-specimens of birds in the British Museum (Natural History),* vol. 2. Trustees of the Brit. Mus. (Nat. Hist.), London.

Whittaker, A. & Kirwan, G. M. 2008. Natural history data for the canopy-dwelling purpletufts *Iodopleura* (Cotingidae), and first documentation of Dusky Purpletuft *I. fusca* for Brazil. *Bull. Brit. Orn. Cl*. 128: 28–35.

WikiAves. 2023. Anambezinho, *Iodopleura pipra*. www.wikiaves.com.br/wiki/anambezinho (accessed December 2023).

Willis, E. O. & Oniki, Y. 1988. Winter nesting of *Iodopleura pipra* (Lesson, 1831) (Aves, Cotingidae) in southeastern Brazil. *Rev. Brasil. Biol*. 48: 161–167.

Address: Marco Aurélio Crozariol, Setor de Ornitologia, Museu de História Natural do Ceará Prof. Dias da Rocha, Campus Experimental de Educação Ambiental e Ecologia/UECE, Rua Divino Salvador, 225, Centro, Pacoti, CE 62770-000, Brazil; and Setor de Ornitologia, Dpto. de Vertebrados, Museu Nacional da Universidade Federal do Rio de Janeiro, Quinta da Boa Vista S/N, São Cristóvão, Rio de Janeiro, RJ 20940-040, Brazil, e-mail: marcocrozariol@gmail.com. Dante Martins Teixeira, Setor de Ornitologia, Dpto. de Vertebrados, Museu Nacional da Universidade Federal do Rio de Janeiro, Quinta da Boa Vista S/N, São Cristóvão, Rio de Janeiro, RJ 20940-040, Brazil.

ISSN-2513-9894 (Online)

On the identity of *Micrastur guerilla jugularis* Gurney, 1884, with lectotype designation

by Vítor Q. Piacentini, Robert P. Prŷs-Jones & José Fernando Pacheco

Received 1 June 2024; revised 12 October 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:E7E0521E-1A9A-4D3C-83F6-76D838022988

Summary.—*Micrastur guerilla jugularis* Gurney was described based on six specimens from widespread localities in South America and subsequently considered a junior synonym of Barred Forest Falcon *Micrastur ruficollis* (Vieillot). Nonetheless, it has not been discussed in relation to any of the taxonomic splits and descriptions of new species within the *M. ruficollis* clade in the last 50 years, despite being a potential senior synonym of *M. mintoni* Whittaker, 2003. To clarify the status of Gurney's name, here we report on the location and composition of the type series, confirm its mixed composition and, therefore, designate a lectotype that fixes the application of *M. jugularis* Gurney as a junior synonym of nominate *M. ruficollis* (Vieillot).

The genus *Micrastur* (forest falcons) is currently considered to comprise seven species spread across the Neotropical realm and divided into two clades: the Collared Forest Falcon *M. semitorquatus* clade, which also includes Slaty-backed Forest Falcon *M. mirandollei* and Buckley's Forest Falcon *M. buckleyi*; and the Barred Forest Falcon *M. ruficollis* clade, which also includes Lined Forest Falcon *M. gilvicollis*, Plumbeous Forest Falcon *M. plumbeus* and Cryptic Forest Falcon *M. mintoni* (Fuchs *et al*. 2011, Soares *et al*. 2019). The *M. ruficollis* clade, which includes cryptic species only recently recognised (see Schwartz 1972, Whittaker 2003[1]), split into its constituent lineages only recently (*c*.2.5 MYA), and sufficiently rapidly that the divergence pattern among species cannot be fully resolved (Fuchs *et al*. 2011). Within this clade, the range of *M. ruficollis* encompasses that of the three other members. Because of overall plumage variation, an array of available species-group names was conferred historically, some of which have been overlooked more recently, therefore potentially challenging the application of recently proposed names.

M. mintoni is the most recently named species, occurring in both Amazon and Atlantic rainforests, without any noticeable difference in plumage or voice between the two allopatric populations (Whittaker 2003, Simon & Magnago 2013). Such a geographic range overlaps with that originally attributed to *M. guerrilla jugularis* Gurney, 1884, based on grey-backed birds (see details below). However, Gurney's name was not evaluated in the description of *M. mintoni* Whittaker, which is also a grey-backed taxon, so there remains the possibility that *jugularis* is conspecific with, and would have priority over, *mintoni*. For this reason, here we review the composition of the type series and the application of the name *M. guerrilla jugularis* in the context of all recent advances in the taxonomy and systematics of the genus *Micrastur*.

The name *Micrastur guerilla jugularis* was conferred by Gurney Sr. (1884: Appendix B) on six specimens, which he considered to be grey-backed adults intermediate in overall appearance between *M. guerilla* and *M. ruficollis*, notably as regards '… having the jugulum [lower throat area] suffused with rufescent buff, extending over the transverse dark and pale bars…' (Gurney 1884: 117); hence his subspecies name, *jugularis*. Four of these

---

[1] See Dickinson *et al*. (2011: 252) for dating.

ISSN-2513-9894 (Online)

TABLE 1

Data associated with syntypes of the name *Micrastur guerilla jugularis* Gurney, 1884. Columns A–C = data provided in Gurney (1884). Columns D–F = additional information from specimen labels, the relevant catalogue (Gurney 1889, now held by NHMUK) and/or NHMUK register. See text for further discussion of uncertainties indicated.

A	B	C	D	E	F
No.	**Locality**	**Collection**	**NHMUK reg. no.**	**Collector**	**Dealer**
1	Bahia	Salvin and Godman	1887.5.1.135	[Wucherer?]	Jamrach
2	Bahia	Salvin and Godman	1887.5.1.136	Wucherer	–
3	Venezuela	Norwich Museum	1955.6.N.3346	H. Whitely	–
4	U.S. Colombia [1]	Norwich Museum	1955.6.N.3343	Gardiner	–
5	‘Brazil’	Norwich Museum	? (see text)	?	?
6	‘South America’	Norwich Museum	1955.6.N.3345	?	Warwick

[1] ‘United States of Colombia’

specimens were in the Norwich Museum collection and two in that assembled by Salvin and Godman, and they ranged geographically from Bahia (eastern Brazil) to Venezuela and Colombia (with one specimen labelled simply ‘South America’); details provided for each by Gurney are given in Table 1 (columns A–C). Since no formal designation of a holotype was made, all six specimens are deemed syntypes (ICZN 1999, Art. 73.2). All would now be expected to be in the Natural History Museum, Tring (NHMUK), in which Salvin and Godman’s bird collection and the raptor collection of Norwich Museum were subsequently deposited (Sharpe 1906; pers. obs.).

Prior to the formal description by Gurney, the two specimens from Bahia had previously been examined and discussed (*fide* Gurney 1884: 118) by Sclater & Salvin (1869) and Ridgway (1875), who respectively considered them to represent near-adult and adult ‘plumbeous phase’ specimens of what is now *Micrastur ruficollis*. Following Gurney’s description, the status of *jugularis* was considered by Sclater (1918), Hellmayr (1921, 1929) and Hellmayr & Conover (1949), who all synonymised it within *M. ruficollis*, in some cases highlighting that more than one of the latter’s subspecies must be involved. Swann (1922, 1925) ‘restricted’ the type locality of *jugularis* to ‘Venezuela’, but that statement is in disagreement with Art. 73.2.3 of the *International code of zoological nomenclature* and is thus invalid (ICZN 1999: ‘… if the syntypes originated from two or more localities (including different strata), the type locality encompasses all of the places of origin’). His restriction does not qualify as a lectotype designation either (ICZN 1999, Art. 74.5), as he did not use the term ‘lectotype’ or an equivalent expression, nor did he explicitly select a specimen to serve as name-bearing type (in fact, he did not mention any specimen at all). However, none of these authors seems to have examined first-hand the four Norwich Museum specimens of the *jugularis* type series and, subsequent to Hellmayr & Conover (1949), the name *jugularis* does not appear to have been mentioned again in the literature.

Aware of Gurney’s name, VQP located five of the six syntypes on a visit to NHMUK. These specimens were among the main collection, having unsurprisingly (given the obscure history of *jugularis*) not been mentioned by Warren (1966) nor, in consequence, been segregated. Registration and other relevant label details regarding these specimens are given in Table 1, alongside the data provided by Gurney (1884).

A number of points in Table 1 require clarification. Although specimen no. 2 has labels clearly showing it was collected by Otto Wucherer (1820–73), a Brazilian doctor and

Figure 1. From top to bottom: dorsal, lateral and ventral views of specimen NHMUK 1887.5.1.136, from Bahia, Brazil, collected by Otto Wucherer, here designated as the lectotype of *Micrastur guerilla jugularis* Gurney Sr., 1884 (Vítor Q. Piacentini, © Trustees of the Natural History Museum, London)

naturalist who lived in Bahia (now Salvador), specimen no. 1 does not. Instead, the earliest of its three labels, a piece of card, has merely the name Jamrach scrawled on it, although the relevant NHMUK register (dating from receipt there of Salvin and Godman's specimens in 1887) ascribes both to Wucherer. As Charles Jamrach (1815–91) was not himself a collector, but instead a well-known London wildlife dealer, specimen no. 1 may well have been collected by Wucherer but obtained by Salvin via Jamrach. Salvin sent his entire holdings of *Micrastur* specimens to Robert Ridgway at the United States National Museum (USNM), Washington, DC, for examination, and Ridgway specifically mentioned two Salvin 'plumbeous phase' adult *ruficollis* specimens from Bahia that he saw (Ridgway 1875: 494); both nos 1 and 2 now have USNM labels with comments by Ridgway reflecting this. Both specimens also have subsequent label annotations by Charles E. Hellmayr, stating 'One of the types of *M. jugularis* Gurney'.

Specimen no. 6 has neither any locality beyond 'South America' nor any indication of who collected it, Warwick being merely a London specimen dealer active in the mid-1800s (Griffiths 1996a,b) from whom NHMUK obtained it. However, it is Gurney's (1884) specimen no. 5 from 'Brazil' that causes most problems in matching to an extant skin. Gurney's unpublished catalogue of raptors then in the Norwich Museum, compiled by the museum curator, James Reeve, lists six specimens under the name *Micrastur jugularis* (Gurney 1889: 456), of which three adults are unambiguously nos. 3, 4 and 6 of Gurney (1884). The three other specimens, from 'Eastern Ecuador', 'South America' and 'Bahia' are listed as immatures; all are now in the NHMUK collection and are clearly young birds with a plumage very distinct from that described by Gurney (1884) for his syntype adults. Furthermore, none is labelled as coming from 'Brazil'.

All potentially relevant Gurney (1889) specimens, adult and juvenile, within the wider *ruficollis* clade that are listed as being from 'Brazil' can now be accounted for in the NHMUK collection; furthermore, there appear to be no candidate specimens left in the Norwich Museum nor any potentially relevant specimen disposed of from there between 1884 and 1889 (T. Irwin *in litt*. 2011). Among NHMUK material, only a single additional 'Brazil' bird in the wider *ruficollis* clade reasonably matches the plumage criteria of Gurney (1884) for *jugularis*, displayed by the five definite syntypes. This is NHMUK 1955.6.N.3354, listed as a 'nearly adult' *M. ruficollis* and received by Gurney from H. Whitely. Henry Whitely Sr. was a 19th-century London dealer, whose specimens frequently have rather general localities (Rasmussen & Prŷs-Jones 2003), and his son, Henry Whitely Jr., collected birds in several South American countries (Anon. 1893). Overall, it therefore seems possible, though not provable, that specimen NHMUK 1955.6.N.3354 may be the sixth *jugularis* syntype, though why its Gurney label and the Gurney (1889) catalogue should not reflect this is unclear.

Both the localities and plumages (e.g. tail-bands, rufous tones) of the definite syntype specimens in Table 1 support the view that the *jugularis* type series is a composite, with the syntypes apparently representing more than one taxon within the current, widely accepted taxonomy of the *Micrastur ruficollis* complex, namely *M. r. concentricus*/*zonothorax* (Colombia and Venezuela), and nominate *M. r. ruficollis* (Bahia, Brazil) (Fuchs *et al*. 2011, del Hoyo & Collar 2014, Soares *et al*. 2019). Hellmayr & Conover (1949) previously highlighted the potential multiple identities of *Micrastur guerilla jugularis*, but nonetheless made no explicit lectotype designation. Thus, following the *International code of zoological nomenclature* (ICZN 1999, Arts. 74.1 and 74.7, including amendments), here we formally designate specimen NHMUK 1887.5.1.136, from Bahia, collected by Otto Wucherer (Fig. 1), as the lectotype of *Micrastur guerilla jugularis* Gurney, 1884, which then becomes a subjective synonym of *M. r. ruficollis* (Vieillot, 1817). Our designation further adheres to the Code regarding the selection of a syntype from a known locality (Recommendation 74E).

Acknowledgements

VQP was supported by the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP grant no. 06/60300-4) during his visit to NHMUK. RPP-J thanks Tony Irwin, former curator of the Norwich Museum, for replying to queries, and Mark Adams, Alex Bond and Hein van Grouw for comments on a draft. We thank the editor Guy Kirwan and an anonymous referee for corrections and suggestions on the submitted manuscript.

References:

Anon. 1893. Obituary: Henry Whitely. *Ibis* 35: 287–288.

Dickinson, E. C., Overstreet, L. K., Dowsett, R. J. & Bruce, M. D. 2011. *Priority! The dating of scientific names in ornithology*. Aves Press, Northampton.

Fuchs, J., Chen, S., Johnson, J. A. & Mindell, D. P. 2011. Pliocene diversification within the South American forest falcons. *Mol. Phylo. & Evol*. 60: 398–407.

Griffiths, G. 1996a. Biographies for zoological historians: 1. John Edginton Warwick. *Bartlett Soc. Newsl*. February [no pagination].

Griffiths, G. 1996b. Biographical notes: an update. *Bartlett Soc. Newsl*. May [no pagination].

Gurney, J. H. 1884. *A list of the diurnal birds of prey, with references and annotations*. John van Voorst, London.

Gurney, J. H. 1889. *A catalogue of birds of prey in the Norfolk and Norwich Museum arranged by John Henry Gurney, Esq*. Catalogue now held by NHMUK, Tring.

Hellmayr, C. E. 1921. Review of the birds collected by Alcide D'Orbigny in South America, part 1. *Novit. Zool*. 28: 171–213.

Hellmayr, C. E. 1929. A contribution to the ornithology of northeastern Brazil. *Publ. Field Mus. Nat. Hist., Zool. Ser*. 12(18): 235–501.

Hellmayr, C. E. & Conover, B. 1949. Catalogue of birds of the Americas and the adjacent islands, pt. 1(4). *Publ. Field Mus. Nat. Hist., Zool. Ser*. 13(1): 1–358.

del Hoyo, J. & Collar, N. J. 2014. *HBW and BirdLife International illustrated checklist of the birds of the world*, vol. 1. Lynx Edicions, Barcelona.

ICZN (International Commission for Zoological Nomenclature). 1999. *International code of zoological nomenclature*. Fourth edn. International Trust for Zoological Nomenclature, London.

Rasmussen, P. C. & Prŷs-Jones, R. P. 2003. History *vs* mystery: the reliability of museum specimen data. *Bull. Brit. Orn. Cl*. 123A: 66–94.

Ridgway, R. 1875. Studies of the American Falconidae – a monograph of the genus *Micrastur*. *Proc. Acad. Nat. Sci. Philadelphia* 27: 470–502.

Schwartz, P. 1972. *Micrastur gilvicollis*, a valid species sympatric with *M. ruficollis* in Amazonia. *Condor* 74: 399–415.

Sclater, P. L. & Salvin, O. 1869. Notes on the species of the genus *Micrastur*. *Proc. Zool. Soc. Lond*. 1869: 364–369.

Sclater, W. L. 1918. Remarks on the hawks of the genus *Micrastur*. *Ibis* 60: 343–347.

Sharpe, R. B. 1906. Birds. Pp. 79–515 *in The history of the collections contained in the natural history departments of the British Museum*, vol. 2. Trustees of the Brit. Mus., London.

Simon, J. E. & Magnago, G. R. 2013. Rediscovery of the Cryptic Forest-Falcon *Micrastur mintoni* Whittaker, 2002 (Falconidae) in the Atlantic forest of southeastern Brazil. *Rev. Bras. Orn*. 21: 257–262.

Soares, J. M. S., Bates, J., Carneiro, L. S., Santos, M. P. D. & Aleixo, A. 2019. Molecular systematics, biogeography and taxonomy of forest-falcons in the *Micrastur ruficollis* species complex (Aves: Falconidae). *J. Avian Biol*. 2019: e01943.

Swann, H. K. 1922. *A synopsis of the Accipitres (diurnal birds of prey)*. Second edn. Addenda to Part 3. Wheldon & Wesley, London.

Swann, H. K. 1925. *A monograph of the birds of prey (Order Accipitres)*, pt. 3. Wheldon & Wesley, London.

Warren, R. L. M. 1966. *Type-specimens of birds in the British Museum (Natural History)*, vol. 1. Trustees of the Brit. Mus., London.

Whittaker, A. 2003. A new species of forest-falcon (Falconidae: *Micrastur*) from southeastern Amazonia and the Atlantic Rainforest of Brazil. *Wilson Bull*. 114: 421–445.

Addresses: Vitor Q. Piacentini, Depto. de Biologia e Zoologia & Programa de Pós-graduação em Zoologia, Instituto de Biociências, Universidade Federal de Mato Grosso, Cuiabá, Brazil; and Comitê Brasileiro de Registros Ornitológicos, e-mail: vitor.piacentini@gmail.com. Robert P. Prŷs-Jones, Bird Group, Natural History Museum, Tring, Herts. HP23 6AP, UK, e-mail: r.prys-jones@nhm.ac.uk. José Fernando Pacheco, Comitê Brasileiro de Registros Ornitológicos, Rio de Janeiro, Brazil, e-mail: pacheco.jfe@gmail.com

ISSN-2513-9894 (Online)

First records of Greater Sand Plover *Anarhynchus leschenaultii* in South America

by Flávio Ronaldo Rodrigues da Silva, André Luíz Fraga Briso, Marcelo Henrique Marques & Fabio Schunck

Received 23 August 2024; revised 8 October 2024; published 4 December 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:DFBFE511-AE66-4AFF-AAD5-495A21EE8939

Summary.—Greater Sand Plover *Anarhynchus leschenaultii* migrates from its breeding areas in western and Central Asia to the coasts of Australasia and the Indian Ocean. It is a vagrant in various parts of the world, including two records in North America. The species was photographed in December 2015 and September 2023 in south and south-east Brazil (Rio Grande do Sul and São Paulo), providing the first records for South America.

Greater Sand Plover *Anarhynchus leschenaultii* breeds in western and Central Asia (Wiersma *et al*. 2023). Three subspecies are recognised: *A. l. leschenaultii*, *A. l. columbinus* and *A. l. scythicus*. The first nests in western China, Mongolia, southern Siberia and the Altai Mountains, migrating in winter to South Asia, Australasia and probably East Africa. The second breeds in Turkey, Syria, Jordan, Armenia and Azerbaijan, migrating to the Red Sea, Gulf of Aden and south-east Mediterranean. Finally, the third occurs in Transcaspia and possibly from north-west Afghanistan to south-east Kazakhstan, migrating to north-east and East Africa and western India. Vagrants have been recorded in many countries in Europe, as well as in Siberia and Korea, North, southern and West Africa (Wiersma *et al*. 2023). In the Americas, the species has been seen only in the USA, in the states of California (January–April 2001) and Florida (May 2009) (Howell *et al*. 2014).

Between 5 and 29 December 2015, a Greater Sand Plover was photographed by FRRS & ALFB in Parque Nacional da Lagoa do Peixe, municipality of Tavares, on the coast of central Rio Grande do Sul, in southernmost Brazil (31°19′49.04″S, 51°03′24.06″W; Fig. 1). The bird was observed on the west side of Lagoa do Peixe (Trilha da Figueira), on a small sediment island, always in the company of Semipalmated Plovers *Charadrius semipalmatus* and White-rumped Sandpipers *Calidris fuscicollis* (Fig. 2).

On 17 September 2023, another Greater Sand Plover was photographed by MHM on the north-central coast of São Paulo, south-east Brazil (23°45′26.00″S, 45°50′39.60″W; Fig. 1). It was observed on Boracéia beach, at the mouth of the Parateus River, on the border of Bertioga and São Sebastião municipalities, a site where various species of shorebirds occur but the individual was feeding alone (Fig. 3).

Both birds photographed in Brazil were in non-breeding plumage and differed from Wilson's Plover *Charadrius wilsonia* in lacking a white nuchal collar and having longer tarsi and tibiae. Based on the criteria elucidated by Hirschfeld *et al*. (2000), they also differed from Siberian Sand Plover *Anarhynchus mongolus* and Tibetan Sand Plover *A. atrifrons* by their larger body proportions, e.g., head, bill and legs (especially the tibiae), which in the case of the individual in Rio Grande do Sul can be compared with the two other species (*Charadrius semipalmatus* and *Calidris fuscicollis*) in the same images (Figs. 2 and 4).

Siberian Sand Plover breeds in the Russian Far East and migrates to southern Japan, China and Malaysia to Australia and New Zealand (Mlodinow *et al*. 2023). It has been recorded as a vagrant in two South American countries—Peru (an individual in breeding

ISSN-2513-9894 (Online)

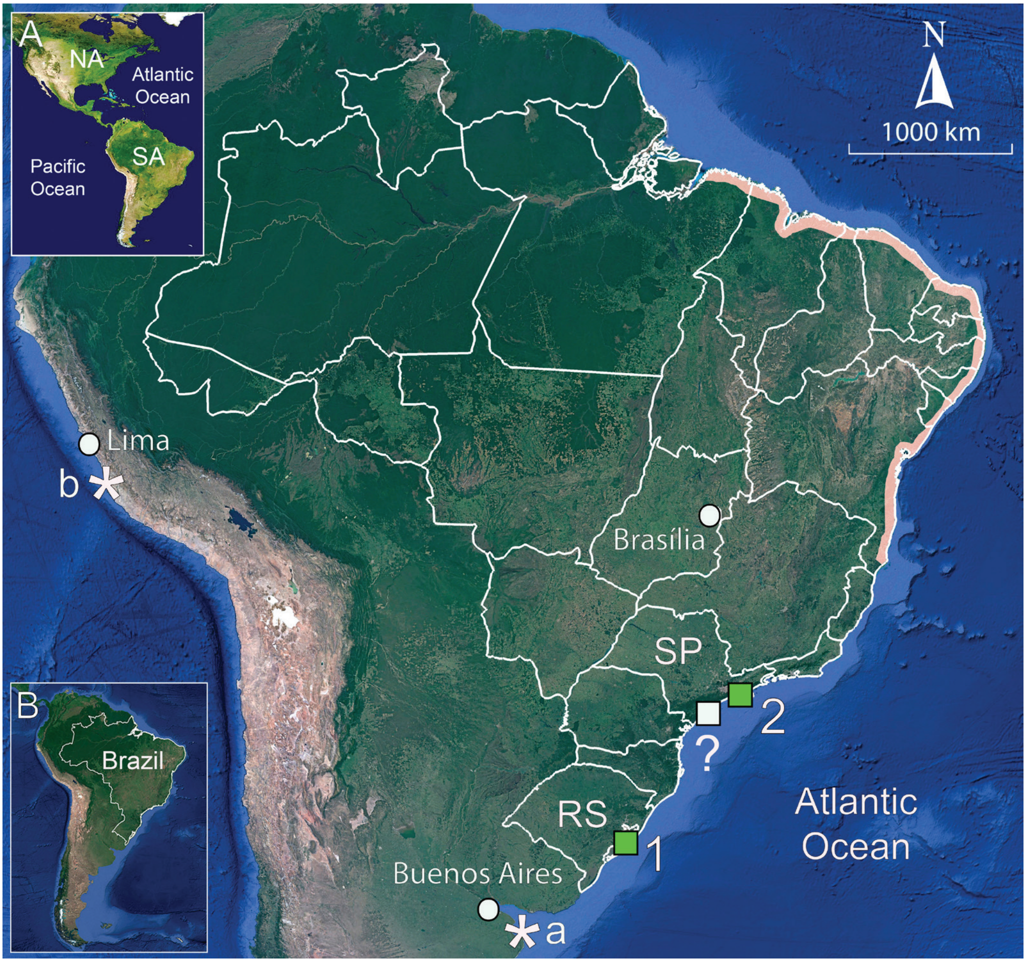


Figure 1. Location of records of Greater Sand Plover *Anarhynchus leschenaultii* in Brazil. (A) Map of the Americas (NA = North America, SA = South America); (B) South America showing the location of Brazil; (Larger map) Brazil showing the capital Brasília and the states of São Paulo (SP) and Rio Grande do Sul (RS). Numbers 1 and 2 (green squares) correspond to the records in Parque Nacional da Lagoa do Peixe (RS) and Bertioga/São Sebastião (SP), respectively. The question mark and white square correspond to the undocumented record of Wilson's Plover *Charadrius wilsonia* in São Paulo (SP) mentioned in the literature. The salmon-coloured strip along the coast of north and north-east Brazil (Pará to Bahia) marks the range of Wilson's Plover in the country (WikiAves 2024). The two asterisks outside Brazil correspond to records of Siberian Sand Plover in South America, in Argentina near the capital Buenos Aires (a) and in Peru close to the capital Lima (b). Image A (Wikipedia 2024); B and large map (Google Earth Pro / © 2023 Maxar Technologies).

plumage, in April 2021; https://ebird.org/checklist/S86564477) and Argentina (March 2011)—where photographic documentation also helped with analysis of body proportions and identification (Le Nevé & Manzione 2011). The Argentine record (in the province of Buenos Aires) was *c.*415 km from the border with the Brazilian state of Rio Grande do Sul (Fig. 1).

The records reported here are the first of Greater Sand Plover for Brazil and South America; the first of the two, in Rio Grande do Sul, was already mentioned as a sand plover sp. by Franz *et al*. (2018) and Pacheco *et al*. (2021). Other Old World birds have been detected on the mainland Brazilian coast in recent years, e.g., Eurasian Whimbrel *Numenius phaeopus*, Marbled Godwit *Limosa fedoa*, Ruff *Calidris pugnax*, Curlew Sandpiper *Calidris ferruginea*,

ISSN-2513-9894
(Online)

Figure 2. Greater Sand Plover *Anarhynchus leschenaultii*, Parque Nacional da Lagoa do Peixe, Rio Grande do Sul, Brazil, December 2015, with a White-rumped Sandpiper *Calidris fuscicollis* in B and two Semipalmated Plovers *Charadrius semipalmatus* in C (A–B: André Luíz Fraga Briso, C–D: Flávio Ronaldo Rodrigues da Silva)

Figure 3. Greater Sand Plover *Anarhynchus leschenaultii*, municipality of Bertioga, São Paulo, Brazil, 17 September 2023 (Marcelo Henrique Marques)

ISSN-2513-9894
(Online)

Figure 4. Greater Sand Plover *Anarhynchus leschenaultii*, Parque Nacional da Lagoa do Peixe, Rio Grande do Sul, Brazil, December 2015, with White-rumped Sandpiper *Calidris fuscicollis* on right; same individual as in Fig. 2 (André Luíz Fraga Briso)

Common Redshank *Tringa totanus* and Lesser Black-backed Gull *Larus fuscus* (Pacheco *et al*. 2021).

There is a record attributed to Wilson's Plover from the coast of southern São Paulo (at Ilha Comprida) on 16 December 1993 (https://ebird.org/checklist/S6616609) that was mentioned by Sick (1997) and by Willis & Oniki (2003). The occurrence of Wilson's Plover in Brazil is restricted to a coastal strip extending from the state of Pará to southern Bahia (Zdravkovic *et al*. 2023, WikiAves 2024) (Fig. 1). Two subspecies have been reported in the country, the North American migratory *C. w. wilsonia* and resident *C. w. cinnamominus* (otherwise found in the southern Caribbean and from Colombia to French Guiana), but the presence of the nominate subspecies was contested after the species was found breeding on the Brazilian coast, although this question remains open (Pacheco *et al*. 2021). With hindsight, we consider the possibility that this bird was one of the sand plover spp. is potentially just as likely as a vagrant from the resident Brazilian population of *C. w. cinnamominus* (which appears remarkably sedentary) or even an even further out-of-range *C. w. wilsonia*; however, the lack of documentation inhibits formal re-evaluation of the record.

The Brazilian records of Greater Sand Plover presumably involved birds that arrived in the 'wrong' hemisphere as a result of having become disoriented while on migration. Given two records in the last decade, and two records elsewhere in South America of Siberian Sand Plover within a similar time period, it is clear that observers throughout the continent should be alert to the possibility of further records of both species.

Acknowledgements

We thank the members of the Comitê Brasileiro de Registros Ornitológicos, who encouraged publication of these records, and Rafael Antunes, Alfredo Rocchi, Fernando Jacobs and Vitor Piacentini, who first suggested the records discussed here involved Greater Sand Plover based on images originally posted on the WikiAves platform. We are grateful to Paulo Rogerio for adjustments to the maps and an anonymous referee and Guy Kirwan for comments on the manuscript.

References:

Franz, I., Agne, C. E., Bencke, G. A., Bugoni, L. & Dias, R. A. 2018. Four decades after Belton: a review of records and evidences on the avifauna of Rio Grande do Sul, Brazil. *Iheringia, Ser. Zool*. 108: 1–38.

Hirschfeld, E., Roselaar, C. S. & Shirihai, H. 2000. Identification, taxonomy and distribution of Greater and Lesser Sand Plovers. *Brit. Birds* 93: 162–189.

Howell, S. N. G., Lewington, I. & Russell, W. 2014. *Rare birds of North America*. Princeton Univ. Press.

Le Nevé, A. & Manzione, M. 2011. First record of the Lesser Sand Plover (*Charadrius mongolus*) in Argentina: a new species for the country and for South America. *El Hornero* 26: 177–180.

Mlodinow, S. G. & Boesman, P. F. D. 2023. Siberian Sand-Plover (*Anarhynchus mongolus*), version 1.0. *In* Sly, N. D. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.lessap2.01 (accessed 30 July 2024).

Pacheco, J. F., Silveira, L. F., Aleixo, A., Agne, C. E., Bencke, G. A., Bravo, G. A., Brito, G. R. R., Cohn-Haft, M., Maurício, G. N., Naka, L. N., Olmos, F., Posso, S., Lees, A. C., Figueiredo, L. F. A., Carrano, E., Guedes, R. C., Cesari, E., Franz, I., Schunck, F. & Piacentini, V. Q. 2021. Annotated checklist of the birds of Brazil by the Brazilian Ornithological Records Committee – second edition. *Orn. Res*. 29: 94–105.

Sick, H. 1997. *Ornitologia brasileira*. Ed. Nova Fronteira, Rio de Janeiro.

Wiersma, P., Kirwan, G. M. & Boesman, P. F. D. 2023. Greater Sand-Plover (*Anarhynchus leschenaultii*), version 1.1. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.grsplo.01.1 (accessed 30 July 2024).

Wikiaves. 2024. Wiki Aves - A enciclopédia das aves do Brasil. http://www.wikiaves.com/6237734 (accessed 30 July 2024).

Wikipedia. 2024. Wikipedia: A enciclopédia livre. https://en.m.wikipedia.org/wiki/File:Americas_satellite_map.jpg (accessed 30 July 2024).

Willis, E. O. & Oniki, Y. 2003. *Aves do estado de São Paulo*. Ed. Divisa, Rio Claro.

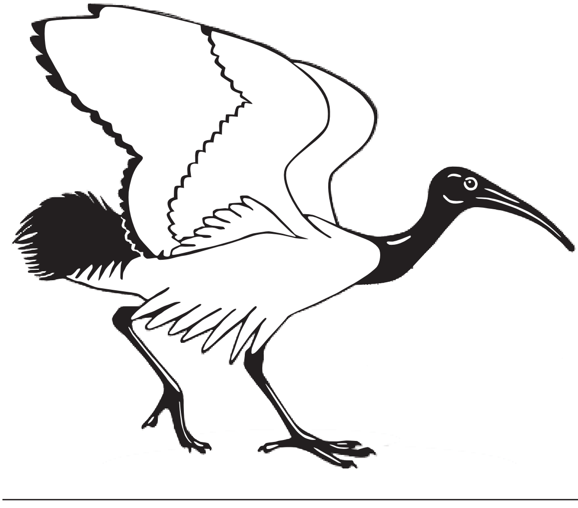
Zdravkovic, M. G., Corbat, C. A. & Bergstrom, P. W. 2023. Wilson's Plover (*Anarhynchus wilsonia*), version 1.1. *In* Rodewald, P. G. (ed.). *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.wilplo.01.1 (accessed 30 July 2024).

Addresses: Flávio Ronaldo Rodrigues da Silva, Rodovia Rst-101, km 200, 929, CEP 96270-000, Mostardas, RS, e-mail: flavioronaldorodriguesdasilva@gmail.com. André Luíz Fraga Briso, Faculdade de Odontologia de Araçatuba, UNESP, Rua José Bonifácio 1193, CEP 16015-050, Araçatuba, SP, Brazil, e-mail: andre.briso@unesp.br. Marcelo Henrique Marques, Rua Márcio Schemberg, 688, casa 8, CEP 11250-000, Bertioga, SP, Brazil, e-mail: marcelohmarques@outlook.com. Fabio Schunck, Comitê Brasileiro de Registros Ornitológicos (CBRO), Av. Eugênio Bartolomai, 386, CEP 04785-040, São Paulo, SP, Brazil, e-mail: fabio_schunck@yahoo.com.br

ISSN-2513-9894
(Online)

Bulletin of the British Ornithologists' Club

Edited by Guy M. Kirwan



Index for Volume 144 (2024)

LIST OF AUTHORS AND CONTENTS

AIMASSI, G. See PRAVEEN J.

ALLPORT, G. & HOGG, J. W. T. Notable updates on the status of selected waders and African Skimmer *Rynchops flavirostris* in Mozambique 338

ARETA, J. I., HALLEY, M. R., KIRWAN, G. M., NORAMBUENA, H. V., KRABBE, N. K. & PIACENTINI, V. Q. The world's largest hummingbird was described 131 years ago 328

AVALOS, N. A. See MONTENEGRO-AVILA, M.

AVALOS, N. A. See VAN ELS, P.

AWALEH, D. G. See DOVE, C. J.

BACCETTI, N. See COLLAR, N. J.

BERRYMAN, A. J. See BOND, A. L.

BERRYMAN, A. J. See COLLAR, N. J.

BERTUS, V. See LENRUMÉ, P.

BICHINSKI, T. See WHITNEY, B. M.

BILLERMAN, S. M. See JOHNSON, O.

BOND, A. L. & BERRYMAN, A. J. Museum specimens, photographs, and sightings of White-eyed River Martin *Pseudochelidon sirintarae* 162

BOND, A. L See SQUIRES, T. E.

BOSS, W. See DOVE, C. J.

BRISO, A. L. F. See SILVA, F. R. R.

BRITO SILVA, M. See LICARIÃO, C.

CANTALOUBE, G. See LENRUMÉ, P.

CETANI, L. E. R. See GUSSONI, C. O. A.

CHESSER, R. T. See JOHNSON, O.

CLAESSENS, O. See LENRUMÉ, P.

COLLAR, N. J. The foundation of the British Ornithologists' Club 187

COLLAR, N. J. & KIRWAN, G. M. *Coua cristata maxima*—species or subspecies, adult or juvenile, extant or extinct, aberrant or hybrid? 269

COLLAR, N. J. & MARTIN, R. W. Sangihe Dwarf Kingfisher *Ceyx sangirensis*: a distinct and extinct endemic species 76

COLLAR, N. J., YAHIA, J., BACCETTI, N. & BERRYMAN, A. J. Distribution and conservation status of Cyrenaica Partridge *Alectoris* [*barbara*] *barbata* 281

CROZARIOL, M. A. & TEIXEIRA, D. M. The nest of Buff-throated Purpletuft *Iodopleura pipra leucopygia* 445

DAVID, N. See ELLIOTT, A.

DEKKERS, W. See VAN GROUW, H.

DONEGAN, T. M. On the nomenclature of wild and domestic *Streptopelia* doves 150

D'ORCHYMONT, Q. See LENRUMÉ, P.

VAN DORT, J. & JUÁREZ, R. Eye colour is geographically variable in Lesser Roadrunner *Geococcyx velox* (Wagner, 1836) 415

DOVE, C. J., WHATTON, J. F., MILENSKY, C. M., BOSS, W., RAYALEH, H. & AWALEH, D. G. Notable records and observations of four passerines in Djibouti, 2020 42

ELLIOTT, A. & DAVID, N. The correct spelling of the family-group name based on *Leiothrix* 183

ELLIOTT, A. See KIRWAN, G. M.

VAN ELS, P., WIJPKEMA, T., WIJPKEMA, J. T., MONTENEGRO-AVILA, M., AVALOS, N. A. & MARTÍNEZ, J. L. New observations on the status, occurrence and ecology of birds in Bolivia 296

EPELBOIN, L. See LENRUMÉ, P.

FOXONET, H. See LENRUMÉ, P.

GILBERT, M. T. P. See VAN GROUW, H.

GOMES, A. M. See GUSSONI, C. O. A.

GOMES, A. M. See MARKS, J. S.

GONZALES, M. See GUSSONI, C. O. A.

GOURAUD, C. & JANSEN, J. J. F. J. Extinct and endangered (‘E&E’) birds in the ornithological collection of Le Beffroi Musée Boucher de Perthes-Manessier, Abbeville, France ... 244

GREENEY, H. F. See MARKS, J. S.

VAN GROUW, H. & JOHANNESSEN, L. E. On another specimen of Faeroese white-speckled raven *Corvus corax varius* ... 238

VAN GROUW, H., DEKKERS, W. & ROOKMAAKER, K. Third time lucky for Forsten’s pigeon; *taeniura*, *forsterii*, *forsteni* ... 29

VAN GROUW, H., DEKKERS, W. & JANSEN, J. J. F. J. Why Bolle’s Laurel Pigeon *Columba bollii* is not named Wagler’s Laurel Pigeon *Columba lamprauchen* ... 109

VAN GROUW, H., HERNÁNDEZ-ALONSO, G., MARTINS, N. F. & GILBERT, M. T. P. On the taxonomic status of Burmese Collared Dove *Streptopelia* (*decaocto*) *xanthocycla* ... 431

VAN GROUW, H. See KIRWAN, G. M.

GUSSONI, C. O. A., TINTI, M. C., GOMES, A. M., RAMASSOTTI, L. C., MACHADO, R. C., CETANI, L. E. R., MICHELOTTO,A. S. & GONZALES, M. Breeding biology, diet and vocal repertoire of White-rumped Monjita *Xolmis velatus* ... 19

HALLEY, M. R. Return to the ‘Great Pine Swamp’ of Alexander Wilson ... 49

HALLEY, M. R. Morphological review of the genus *Eupherusa* (Trochilidae) does not support recognition of the monotypic genus *Dicranurania* Sangster *et al.*, 2023 ... 103

HALLEY, M. R. Remarks on the Costa Rican expeditions of Ridgway and Zeledón in 1905 and 1908, with a focus on three type localities ... 121

HALLEY, M. R. See ARETA, J. I.

HERNÁNDEZ-ALONSO, G. See VAN GROUW, H.

HERNÁNDEZ-BAÑOS, B. E. See JOHNSON, O.

HOGG, J. W. T. See ALLPORT, G.

HORVATH, E. G. Breeding of White-fronted Swift *Cypseloides storeri* in Michoacán, Mexico ... 323

HUDSON, C. See MARKS, J. S.

HUSTLER, K. Recent proposed changes to the taxonomy of spurfowl and francolins: further commentary and concerns ... 191

IRUSTA, J. B. First record of Killdeer *Charadrius vociferus* in Brazil ... 242

JANSEN, J. J. F. J. See GOURAUD, C.

JANSEN, J. J. F. J. See VAN GROUW, H.

JOHANNESSEN, L. E. See VAN GROUW, H.

JOHNSON, O., BILLERMAN, S. M., HERNÁNDEZ-BAÑOS, B. E., LANE, D. F., RASMUSSEN, P. C., REMSEN, JR., J. V., WINKER, K. & CHESSER, R. T. Comments on the species limits of certain North American birds, part 1 ... 367

JUÁREZ, R. See VAN DORT, J.

KELLE, L. See LENRUMÉ, P.

KIRWAN, G. M. & ELLIOTT, A. Proposed conservation of reversed precedence in a woodcreeper (Dendrocolaptinae) taxon ... 159

KIRWAN, G. M., VAN GROUW, H. & SU, M.-R. Confusing female Taiwanese *Tarsiger* bush robins and designation of a lectotype for *Ianthia johnstoniae* Ogilvie-Grant, 1906 ... 96

KIRWAN, G. M. See ARETA, J. I.

KIRWAN, G. M. See COLLAR, N. J.

KRABBE, N. K. See ARETA, J. I.

LANE, D. F. See JOHNSON, O.

LENRUMÉ, P., CLAESSENS, O., D'ORCHYMONT, Q., BERTUS, V., CANTALOUBE, G., TOSTAIN, O., EPELBOIN, L., KELLE, L., FOXONET, H. & WIEGERS, J. N. Transatlantic vagrancy in northern South America: eight Old World bird taxa new to French Guiana................ 132

LICARIÃO, C. & BRITO SILVA, M. First record of Noronha Elaenia *Elaenia ridleyana* on Atol das Rocas, Brazil................ 156

MACHADO, R. C. See GUSSONI, C. O. A.

MARKS, J. S., ZIRL, R., HUDSON, C., YÁBAR, R., GOMES, A. M. & GREENEY, H. F. First nest descriptions of Olive-faced Flatbill *Tolmomyias viridiceps*................ 291

MARTIN, R. W. See COLLAR, N. J.

MARTINS, N. F. See VAN GROUW, H.

MARTÍNEZ, J. L. See VAN ELS, P.

MARQUES, M. H. See SILVA, F. R. R.

MICHELOTTO, A. S. See GUSSONI, C. O. A.

MILENSKY, C. M. See DOVE, C. J.

MONTENEGRO-AVILA,M.,SERRANOR.,A.,AVALOS,N.A.&VELASQUEZ-NORIEGA,P. Record of Markham's Storm Petrel *Hydrobates markhami* in La Paz, Bolivia................ 39

MONTENEGRO-AVILA, M. See VAN ELS, P.

NORAMBUENA, H. V. See ARETA, J. I.

PACHECO, J. F. See PIACENTINI, V. Q.

PIACENTINI, V. Q., PRŶS-JONES, R. P. & PACHECO, J. F. On the identity of *Micrastur guerilla jugularis* Gurney, 1884, with lectotype designation................ 451

PIACENTINI, V. Q. See ARETA, J. I.

PRAVEEN J. & AIMASSI, G. Re-restricting the type locality of *Burhinus* [= *Oedicnemus*] *indicus* Salvadori, 1866................ 74

PRŶS-JONES, R. P. The founding of the British Ornithologists' Club, and its main protagonists...... 91

PRŶS-JONES, R. P. See PIACENTINI, V. Q.

RAMASSOTTI, L. C. See GUSSONI, C. O. A.

RASMUSSEN, P. C. See JOHNSON, O.

RAYALEH, H. See DOVE, C. J.

REMSEN, JR., J. V. See JOHNSON, O.

ROOKMAAKER, K. See VAN GROUW, H.

SALAS-SOLANO, D. & SANDOVAL, L. First description of the nest of Sulphur-rumped Tanager *Heterospingus rubrifrons*................ 311

SANDOVAL, L. See SALAS-SOLANO, D.

SCHMIDT, J.-U. New data on elevational distribution, abundance and nesting of birds on Bougainville Island, Papua New Guinea................ 211

SCHUNCK, F. See SILVA, F. R. R.

SCHUNCK, F. See WHITNEY, B. M.

SERRANO R., A. See MONTENEGRO-AVILA, M.

SILVA, F. R. R., BRISO, A. L. F., MARQUES, M. H. & SCHUNCK, F. First records of Greater Sand Plover *Anarhynchus leschenaultii* in South America................ 456

SQUIRES, T. E. & BOND, A. L. Specimens of the extinct Spectacled Cormorant *Urile perspicillatus* 3

SU, M.-R. See KIRWAN, G. M.

TEIXEIRA, D. M. See CROZARIOL, M. A.

TINTI, M. C. See GUSSONI, C. O. A.

TOSTAIN, O. See LENRUMÉ, P.

VELASQUEZ-NORIEGA, P. See MONTENEGRO-AVILA, M.

WHATTON, J. F. See DOVE, C. J.

WHITNEY, B. M., SCHUNCK, F. & BICHINSKI, T. Documentation of the nest of the Greenish Tyrannulet *Phyllomyias virescens* 425

WIEGERS, J. N. See LENRUMÉ, P.

WIJPKEMA, T. See VAN ELS, P.

WIJPKEMA, J. T. See VAN ELS, P.

WILLRICH, G. Additional information on the breeding biology of Azure-shouldered Tanager *Thraupis cyanoptera* 316

WINKER, K. See JOHNSON, O.

YÁBAR, R. See MARKS, J. S.

YAHIA, J. See COLLAR, N. J.

ZIRL, R. See MARKS, J. S.

INDEX TO SCIENTIFIC NAMES

All generic and specific names (of birds only) are indexed. New specific and subspecific names are indexed in bold print under generic, specific and subspecific names. Illustrations and figures are numbered in italics.

Accipiter 394
Accipiter albogularis 214
Accipiter chionogaster 395
Accipiter erythronemius 395
Accipiter hiogaster 214
Accipiter striatus 367, 395, 396
Accipiter ventralis 395
Acridotheres melanopterus 247, 260
Acridotheres tertius 260
Acridotheres tricolor 260
Acrocephalus australis 216
Acrocephalus caffer 264
Acrocephalus paludicola 247, 264
Actenoides bougainvillei 212
acuminata, Calidris 340, 351
acuticauda, Sterna 180
Aegolius harrisii 305
aegyptius, Milvus 132, 143
aeneum, Dicaeum 216, 222, *232*
Aerodramus spodiopygius 213
Aerodramus vanikorensis 213
aeruginosus, Colaptes 402, 403, 407
Aethopyga duyvenbodei 88
afer, Pternistis 191, 192, 194, 195, 198, 202–205, 207, 208
affinis, Geococcyx 415
affinis, Haplophaedia *385*, *386*
agilis, Oporornis 296, 297, *307*
alba, Motacilla 146
albatrus, Diomedea 262
albatrus, Phoebastria 262
albicollis, Rynchops 247, 259
albilinea, Columba 373
albilinea, Patagioenas 373, 374
albocinctus, Turdus 75
albocoronata, Microchera 104
albogularis, Accipiter 214
albogularis, Peliperdix 192, 193, 195, *197*, 201, 202, 204, 207
albovittatus, Conopias 121, 125, 128–130
Alca impennis 249
Alectoris [barbara] *283*
Alectoris barbara 281–290, *286*
Alectoris barbata 285, 288
Alectoris chukar 75
alleni, Porphyrio 146
Amaurolimnas concolor 296, 297, *303*
Amaurornis cinerea 247
Amazona versicolor 262
ambiguus, Trogon 397–399
Ampelis atro-purpurea 263
Ampelis maculatus 258
anabatinus, Thamnistes 124
Anarhynchus atrifrons 456
Anarhynchus leschenaultii 456–460, *457–459*
Anarhynchus mongolus 456
Anas melleri 247, 259
Anas platyrhynchos 152
anerythra, Pitta 234
anser, Anser 152, 154
Anser anser 152, 154
Anser cygnoides 154
Anthochaera phrygia 258
Anthracothorax aurulentus 380, 382
Anthracothorax dominicus 367, 379, *380*, *381*
Anthracothorax prevostii 381
apiaster, Merops 146
Aplonis cantoroides 216
Aplonis grandis 216, *231*
Aplonis metallica 216
apus, Apus 132, 133
Apus apus 132, 133
Aratinga auricapillus 408
Aratinga pertinax *409*
Aratinga solstitialis 408
Aratinga weddelli *409*
araucana, Columba 374
Ardea purpurea 132, 138, 139
Ardea ralloides 140, 141
ardeola, Dromas 338, 340, 360
Ardeola ralloides 132, 133, 139
arquata, Numenius 338, 340, 355, *356*
asiaticus, Charadrius 338, 340, 346, *347*
Asio solomonensis 214, 225
assimilis, Haplophaedia 382, *383*, 384, *386*, 387
astec, Eupsittula 407, 408, 409, 410
Asthenes pyrrholeuca 296, 307
ater, Haematopus 387, 389, 390
Athene jacquinoti 214, 225
Atlapetes gutturalis 125
atricapilla, Heteronetta 299
atricilla, Leucophaeus 137
atricollis, Colaptes 403, *405*
atrifrons, Anarhynchus 456
atrifrons, Charadrius 338, 340, 358
atrigena, Zoothera 216, 231
atro-purpurea, Ampelis 263
atropurpurea, Xipholena 247, 263
attwateri, Tympanuchus [cupido] 370
audouinii, Ichthyaetus 132, 137, 138
aurantia, Sterna 180
aureliae, Haplophaedia 367, 382, *383*, 384, *385*, *386*, 387
aureola, Emberiza 258
auricapillus, Aratinga 408
auricularis, Colaptes 402, 403, *405*

aurulentus, Anthracothorax 380, 382
australis, Acrocephalus 216
Automolus cervinigularis 121, 125, 128–130
autumnalis, Sylvia 62, 63
Aviceda subcristata 214
bachmani, Haematopus 367, 387, 388, 390
barbara, Alectoris 281–290, *286*
[barbara], Alectoris *283*
barbata, Alectoris 285, 288
barbatus, Gypaetus 75
barbatus, Symposiachrus 215, 220, 222, 228
bella, Goldmania 104, 105, 107
bengalensis, Gyps 255
bengalensis, Vultur 255
bidentata, Piranga 125
bollii, Columba 109–120
bonana, Icterus 247, 264
bonana, Oriolus 264
borealis, Numenius 254
borealis, Scolopax 254
bougainvillei, Actenoides 212
bougainvillei, Stresemannia 215, 220, 227
bouvryi, Trocaza 112, 114
brachyurus, Idiopsar 296
brachyurus, Ramphocinclus 261
brachyurus, Turdus 261
brasilianum, Glaucidium 125
bridgesii, Drymornis 296, 297, 307
bruijnii, Micropsitta 214, 226
Bubulcus ibis 133
Buceros vigil 256
buckleyi, Micrastur 451
Burhinus [= Oedicnemus] indicus 74, 75
Burhinus indicus 74, 75
burmeisteri, Phyllomyias 425, 428
Cacatua ducorpsii 214, 220, 221, *226*
Cacomantis variolosus 213, 220, 221
caerulea, Coua 269, *274*, 277–279
caeruleitorques, Erythropitta 88
caerulescens, Setophaga 49, 66–70
caffer, Acrocephalus 264
caffra, Sitta 264
Calcarius lapponicus 195
Calidris acuminata 340, 351
Calidris canutus 338, 340, 349
Calidris falcinellus 338, 340, 341, *350*
Calidris ferruginea 135, 338, 340, 357, 457
Calidris fuscicollis 303, 340, 352, 456, *458*
Calidris himantopus 303
Calidris melanotos 134, 340, 352
Calidris minuta 146, 352
Calidris minutilla 351
Calidris pugnax 457
Calidris ruficollis 146, 340, 341, 351
Calidris subminuta 338, 340, 341, 351
Calidris tenuirostris 338, 340, 347, *348*
californianus, Geococcyx 417
Callipharus 107
Callipharus nigriventris 105
calvus, Sarcogyps 255
calvus, Vultur 255
Campephilus imperialis 256, *257*
Campephilus principalis 256
campestris, Colaptes *405*
Campocolinus 191
Canachites *372*
Canachites canadensis 367, 368, *369*, 370, *371*, 373
Canachites franklinii 368, *369*, 370
canadensis, Canachites 367, 368, *369*, 370, *371*, 373
canadensis, Cardellina 55
canadensis, Falcipennis 370
canadensis, Motacilla 66
canadensis, Sylvia 65, 66
canipileus, Colaptes *405*
canorus, Cuculus 132
Cantorchilus nigricapillus 125
cantoroides, Aplonis 216
canutus, Calidris 338, 340, 349
capensis, Tanagra 252
capensis, Turnagra 244, 252
capensis, Zonotrichia 125
Cardellina canadensis 55
cardinalis, Pseudeos 215, 221, 227
caribaea, Columba 110, 112, 116, 118, 120
caribaea, Patagioenas 109–111, 115, 117, 120
carolinensis, Conuropsis 244, *251*
carolinensis, Psittacus 251
castanea, Sylvia 62
catamene, Loriculus 88
caucensis, Haplophaedia *385*
Centrocercus 373
Cercomacra manu 306
Cercomela scotocerca 43
cerulea, Setophaga 60
cervinigularis, Automolus 121, 125, 128–130
Ceyx cyanopectus 86
Ceyx fallax 76, 79–81, 83–88
Ceyx lepidus 86
Ceyx margarethae 86
Ceyx melanurus 86
Ceyx mindanensis 86
Ceyx nigrirostris 86
Ceyx sangirensis 76–90
Chalcophaps stephani 213
chalcopterus, Rhinoptilus 341, 360, 361
Charadrius asiaticus 338, 340, 346, *347*
Charadrius atrifrons 338, 340, 358
Charadrius gregarius 254
Charadrius leschenaultii 358
Charadrius pallidus 338, 340, 345, 346
Charadrius semipalmatus 456, *458*
Charadrius vociferus 242, 243, *242*, *243*
Charadrius wilsonia 456, *457*, 459
Charmosynoides 215
chaski, Patagona 328, 329, 332
cherriei, Cypseloides 327

chionogaster, Accipiter 395
Chlamydotis undulata 285
Chlidonias leucopterus 138
Chlorophanes spiza 311
Chloropipo flavicapilla 247, 263
Chondrohierax uncinatus 367, 390, *391*, 392, *393*, 395
Chondrohierax wilsonii 390, 395
Chroicocephalus ridibundus 137
chrysogaster, Colaptes 402
chrysomelas, Chrysothlypis 124, 125, 311
Chrysothlypis chrysomelas 124, 125, 311
Chrysothlypis salmoni 311
Chrysuronia versicolor *302*
chukar, Alectoris 75
cinerea, Amaurornis 247
cinereus, Xenus 135, 146, 340, 359
cinnamomina, Halcyon 254
cinnamominus, Todiramphus 244, 254
Cinnyris frenata 216, 220, 222
Cissa jefferyi 258
Cissa thalassina 258
citreola, Motacilla 146
citreola, Pseudocolopteryx 307
citreola, Pseudocolopteryx cf. *306*
Cittura sanghirensis 87
Claravis mondetoura 301
Charadrius leschenaultii *358*
Coccycus delalandei 248
cockerelli, Rhipidura 215, 222, 228
Coeligena prunellei 247, 261
Colaptes aeruginosus 402, 403, 407
Colaptes atricollis 403, *405*
Colaptes auricularis 402, 403, *405*
Colaptes campestris *405*
Colaptes canipileus *405*
Colaptes chrysogaster 402
Colaptes gularis 402
Colaptes punctigula *405*
Colaptes rubiginosus 367, 402, 403, *404*, *405*, 406, 407
Colaptes yucatanensis *405*
collari, Otus 88
Collocalia esculenta 213, 220, 221
Columba 373
Columba albilinea 373
Columba araucana 374
Columba bollii 109–120
Columba caribaea 110, 112, 116, 118, 120
Columba caribea *111*
Columba domestica 151
Columba fasciata 373
Columba forsteri 33
Columba forsterii 34, 35
Columba junoniae 112, 114, 115
Columba lamprauchen 109–120
Columba laurivora 112, 113
Columba livia 151, 152
Columba migratoria 248
Columba pallidiceps 234
Columba perspicillata 31
Columba portoricensis 116
Columba taeniura 33
Columba trocaz 112, 114, 115
concolor, Amaurolimnas 296, 297, *303*
Conopias albovittatus 121, 125, 128–130
Contopus virens 51
Conuropsis carolinensis 244, *251*
coqui, Peliperdix 191–194, *196*, 198–200, *201*, 203–205, 207
Coracina lineata 215
Coracina papuensis 215, 221, 227
Coracornis sanghirensis 88
corax, Corvus 238–241, *239*
coromanda, Halcyon 87
Corvus corax 238–241, *239*
Corvus meeki 216, 220, 222, 229
Coryphilus goupilii 257
Corythornis madagascariensis 86
coscoroba, Coscoroba 298
Coscoroba coscoroba 298
Cotinga maculata 258
Coua caerulea 269, *274*, 277–279
Coua cristata 269–280, *270*, *271*, *273–276*
Coua delalandei 244, *248*
Coua pyropyga 275
Coua reynaudii 277
cranchii, Pternistis 195, 202, 203, 205
crassirostris, Reinwardtoena 221, 223
crassirostris, Vanellus 340, 358
crawshayi, Scleroptila 195
crex, Crex 132
Crex crex 132
cristata, Coua 269–280, *270*, *271*, *273–276*
cristatus, Lanius 146
Crithagra flavigula 46
Crithagra reichenowi 46
Crithagra xanthopygia 42, 46, 47
cryptus, Cypseloides 326
Cucullus pyrrhocephalus 261
Cuculus canorus 132
Cuculus velox 415
Cuculus viaticus 415
cupido, Tetrao 248
cupido, Tympanuchus 244, 248
cupreiceps, Microchera 104
Cursorius temminckii 341, 361
cutucuensis, Haplophaedia *383*, *385*, *386*
cyanopectus, Ceyx 86
cyanophrys, Eupherusa 103–106
cyanoptera, Thraupis 316–322, *317*, *318*, *320*
cyanurus, Tarsiger 96
cygnoides, Anser 154
Cypseloides cherriei 327
Cypseloides cryptus 326
Cypseloides niger 133

Cypseloides storeri 323–327, *325*, *326*
decaocto, Streptopelia 151, 431, *432*, *433*, 434, *435*, 436, 438, 439, *440*, *441*, 442
decaocto, Turtur 431, 443
delalandei, Coccycus 248
delalandei, Coua 244, *248*
Dendragapus fuliginosus 370, 373
Dendragapus obscurus 370, 373
Dendrocincla 160
Dendroica 60
Dicaeum aeneum 216, 222, *232*
Dicranurania 103–108
dimidiata, Hirundo 344
dinelliana, Pseudocolopteryx 307
Diomedea albatrus 262
Dolichonyx oryzivorus 66
domestica, Columba 151
domestica, Streptopelia 152, 154
dominica, Pluvialis 134, 344
dominicus, Anthracothorax 367, 379, *380*, *381*
dorsalis, Idiopsar *308*
dorsalis, Picoides 367, 399–401
Dromas ardeola 338, 340, 360
drownei, Rhipidura 215, 222, 228
Drymornis bridgesii 296, 297, 307
dubia, Oenanthe 42–45
dubius, Leptoptilos 247
ducorpsii, Cacatua 214, 220, 221, *226*
Ducula 225
Ducula forsteni 31–33, 35
Ducula pistrinaria 213, 221, 224
Ducula rubricera 213, 221, 224
Ducula taeniura 35
duvaucelii, Vanellus 180
duyvenbodei, Aethopyga 88
Eclectus polychloros 214, 221, 226
Ectopistes migratorius 244, 248
Edolisoma holopolium 215
Edolisoma remotum 215, 221
Egretta garzetta 133, 142
Elaenia flavogaster 125, 158
Elaenia mesoleuca 156
Elaenia parvirostris 158
Elaenia ridleyana 156–158, *157*
Elaenia spectabilis 156, 158
elegans, Trogon 367, 397, *398*, 399
Emberiza aureola 258
Eos histrio 88
episcopus, Thraupis 321
eremita, Megapodius 213
erythronemius, Accipiter 395
Erythropitta caeruleitorques 88
erythropus, Tringa 146, 338, 340, 354
erythrostictus, Monarcha 216, 220, 222, 228
Erythrura trichroa 216, 220
Esacus recurvirostris 180
esculenta, Collocalia 213, 220, 221
Eudromia formosa 296, 298
Eudynamys orientalis 213, 221
Eupherusa 103–108
Eupherusa cyanophrys 103–106
Eupherusa eximia 104–107
Eupherusa nigriventris 103–107
Eupherusa poliocerca 104–107
Eupsittula astec 407–410
Eupsittula nana 367, 407, 408, *409*
Eupsittula pertinax 408
eurystomina, Pseudochelidon 177
Eurystomus orientalis 214, 221
Eutrichomyias rowleyi 77
eximia, Eupherusa 104–107
falcinellus, Calidris 338, 340, 341, *350*
Falcipennis canadensis 370
falcipennis, Falcipennis 370
Falcipennis falcipennis 370
Falcipennis franklinii 370
Falco subbuteo 132
Falco tinnunculus 146
fallax, Ceyx 76, 79–81, 83–88
fasciata, Columba 373
fasciata, Patagioenas 367, 373, 374, *375*, 376, *377*, *378*, 379, 407, 436, 437, *441*
fasciatus, Phyllomyias 425
feae, Pterodroma 145
fedoa, Limosa 457
ferrocyanea, Myiagra 216, 220, 222, 228
ferruginea, Calidris 135, 338, 340, 357, 457
flavicapilla, Chloropipo 247, 263
flavicapilla, Pipra 263
flavigaster, Xiphorhynchus 159
flavigula, Crithagra 46
flavirostris, Rynchops 338–366
flaviventris, Pseudocolopteryx 307
flaviventris, Tolmomyias 291
flavogaster, Elaenia 125, 158
flavoviridis, Vireo 125
floccus, Haplophaedia 382, *385*
formosa, Eudromia 296, 298
Forpus xanthopterygius 25
forsteni, Ducula 31–33, 35
forsteni, Hemiphaga 34, 35
forsteri, Columba 33
forsterii, Columba 34, 35
franklinii, Canachites 368, *369*, 370
franklinii, Falcipennis 370
frenata, Cinnyris 216, 220, 222
fuliginosus, Dendragapus 370, 373
fulva, Pluvialis 338, 340, 344, 345
furcatus, Parus 183
fusca, Iodopleura 449
fusca, Setophaga 49, 64, 65
fuscicollis, Calidris 303, 340, 352, 456, *458*
fuscus, Larus 138, 459
Galbula leucogastra 305
Gallinago media 338, 340, 357
gallus, Gallus 154

Gallus gallus 154
gambagae, Muscicapa 42
Garrulax rufifrons 259
garzetta, Egretta 133, 142
Geococcyx affinis 415
Geococcyx californianus 417
Geococcyx mexicanus 415
Geococcyx variegata 415
Geococcyx velox 415–424, *416–421*
geoffroyi, Schistes 296, 297, *301*
Geoffroyus heteroclitus 214, 227
gigas, Patagona 328, 330
gilvicollis, Micrastur 451
Glareola ocularis 338, 340, 343
Glareola pratincola 132
glareola, Tringa 132, 134, 135
Glaucidium brasilianum 125
Glaucidium parkeri 304
Glyphorynchus 160
Goldmania bella 104, 105, 107
Goldmania violiceps 104, 105, 107
goodfellowi, Ianthia 96–98
goupilii, Coryphilus 257
Gracula melanoptera 260
grandis, Aplonis 216, *231*
gregarius, Charadrius 254
gregarius, Vanellus 254
griseocapilla, Phylloscartes 425
gryphus, Vultur 247, 262
guerilla, Micrastur 451–455, *453*
guira, Hemithraupis 311
gularis, Colaptes 402
gutturalis, Atlapetes 125
Gymnophaps solomonensis 213, 220, 225
Gypaetus barbatus 75
Gyps bengalensis 255
Gyps tenuirostris 255
haddeni, Horornis 216, 222, 229
haematodus, Trichoglossus 215, 220, 221, 227
Haematopus ater 387, 389, 390
Haematopus bachmani 367, 387–390
Haematopus leucopodus 388, 389
Haematopus moquini 338, 340, 342, *343*
Haematopus ostralegus 340, 343, 388
Haematopus palliatus 387–390
Hafferia zeledoni 121, 127, 130
Halcyon cinnamomina 254
Halcyon coromanda 87
haliaetus, Pandion 214
Haliastur indus 214
hamlini, Zosterops 216, 220, 222, 229, *230*
Haplophaedia *387*
Haplophaedia affinis *385*, *386*
Haplophaedia assimilis 382, *383*, 384, *386*, 387
Haplophaedia aureliae 367, 382, *383*, 384, *385*, *386*, 387
Haplophaedia caucensis *385*
Haplophaedia cutucuensis *383*, *385*, *386*
Haplophaedia floccus 382, *385*
Haplophaedia lugens 382, *383*, 384, *385*
Haplophaedia russata 382
harrisii, Aegolius 305
hauxwelli, Turdus 296, 297, 307
Hemiphaga forsteni 34, 35
Hemithraupis guira 311
heteroclitus, Geoffroyus 214, 227
Heteronetta atricapilla 299
Heterospingus rubrifrons 311–315, *312*, *313*
himantopus, Calidris 303
hiogaster, Accipiter 214
Hirundo dimidiata 344
Hirundo rustica 177
hirundo, Sterna 146
Hirundo tahitica 216, 229
histrio, Eos 88
holopolium, Edolisoma 215
horni, Sternula nereis 262
Horornis haddeni 216, 222, 229
hubbardi, Peliperdix 199
Hydrobates markhami 39–41, *40*
Hydrobates monorhis 145
Hydrocoloeus minutus 145
Hypocnemis 160
Hypsipetes platenae 88
Ianthia goodfellowi 96–98
Ianthia johnstoniae 96–100
ibis, Bubulcus 133
Ichthyaetus audouinii 132, 137, 138
Icterus bonana 247, 264
Icthyophaga sanfordi 214
Ictinia mississippiensis 296, 297, 303
Ictinia plumbea 303
Idiopsar brachyurus 296
Idiopsar dorsalis *308*
iliacus, Turdus 132
impennis, Pinguinus 239, 244, *249*
imperialis, Campephilus 256, *257*
imperialis, Picus 256
indicus, Burhinus 74, 75
indicus, Burhinus [= Oedicnemus] 74, 75
indicus, Tarsiger 96, 98, 100
indus, Haliastur 214
Iodopleura fusca 449
Iodopleura isabellae 445, *447*, 448, 449
Iodopleura pipra 247, 260, 445–450, *446*
Iridophanes pulcherrimus 311
irupero, Xolmis 26
isabellae, Iodopleura 445, *447*, 448, 449
Ixobrychus minutus 146
jacquacu, Penelope 300
jacquinoti, Athene 214, 225
jefferyi, Cissa 258
johnstoniae, Ianthia 96–100
johnstoniae, Tarsiger 96–100
jugularis, Micrastur 451, 452, 454
junoniae, Columba 112, 114, 115

Kitta thalassina 258
kreffti, Mino 216, 220, 222, 231
lafargei, Myzomela 215, 220, 221, 227
Lalage typica 263
lamprauchen, Columba 109–120
Lanius cristatus 146
lapponica, Limosa 135, 338, 340, 356
lapponicus, Calcarius 195
Larus fuscus 138, 459
Larus marinus 145
Laterallus melanophaius 296, *302*
laurivora, Columba 112, 113
laurivora, Trocaza 114
Leiothrix lutea 183
lepidus, Ceyx 86
Leptoptilos dubius 247
leschenaultii, Anarhynchus 456–460, *457–459*
leschenaultii, Charadrius 358
leucogaster, Pionites *305*
leucogastra, Galbula 305
Leucophaeus atricilla 137
leucophrys, Rhipidura 215, 222
leucopodus, Haematopus 388, 389
leucopterus, Chlidonias 138
leucopygius, Todiramphus 214, 221, 225
leucotis, Psittacus 262
leucotis, Pyrrhura 247, 262
levaillantoides, Scleroptila 206
Limosa fedoa 457
Limosa lapponica 135, 338, 340, 356
limosa, Limosa 340, 347
Limosa limosa 340, 347
lineata, Coracina 215
livia, Columba 151, 152
Lonchura oryzivora 247, 261
Lonchura striata 154
Lophospingus pusillus 296, 297, *308*
lophotes, Pseudoseisura 296, 297, 307
lorata, Sternula 247, 260
Loriculus catamene 88
Loxia oryzivora 261
lugens, Haplophaedia 382, *383*, 384, *385*
lutea, Leiothrix 183
lutea, Sylvia 183
Machaeropterus pyrocephalus 296, 297, 306
mackinlayi, Macropygia 213, 220, 221
Macropygia mackinlayi 213, 220, 221
maculata, Cotinga 258
maculatus, Ampelis 258
maculosa, Sylvia 61
madagascariensis, Corythornis 86
magnolia, Setophaga 61, 62
magnolia, Sylvia 61, 66
maharao, Peliperdix 199
manu, Cercomacra 306
margarethae, Ceyx 86
marginata, Saurothera 415
marinus, Larus 145
markhami, Hydrobates 39–41, *40*
marshalli, Megascops 296, 297, *304*
media, Gallinago 338, 340, 357
meeki, Corvus 216, 220, 222, 229
meeki, Vini 215, 220, 227
Megapodius eremita 213
Megascops marshalli 296, 297, *304*
melancholicus, Tyrannus 21
melanocephalus, Phasianus 261
melanocephalus, Tragopan 75, 247, 261
melanophaius, Laterallus 296, *302*
melanops, Porphyriops 302
melanops, Sporophila 277
melanoptera, Gracula 260
melanopterus, Acridotheres 247, 260
melanotos, Calidris 134, 340, 352
melanotus, Porphyrio 214
melanurus, Ceyx 86
melba, Pytilia 42, 45, 46
melleri, Anas 247, 259
mendozae, Pomarea 251
meridionalis, Nestor 251
Merops apiaster 146
Merops phrygius 258
mesoleuca, Elaenia 156
Metabolus rugensis 247, 260
metallica, Aplonis 216
metcalfii, Zosterops 216, 220, 222, 229, 231
mexicanus, Geococcyx 415
Micrastur 451
Micrastur buckleyi 451
Micrastur gilvicollis 451
Micrastur guerilla 451–455, *453*
Micrastur jugularis 451, 452, 454
Micrastur mintoni 451
Micrastur mirandollei 451
Micrastur plumbeus 451
Micrastur ruficollis 451
Micrastur semitorquatus 451
Microchera albocoronata 104
Microchera cupreiceps 104
Micropsitta bruijnii 214, 226
migrans, Milvus 132, 142, 143
migratoria, Columba 248
migratorius, Ectopistes 244, 248
Milvus aegyptius 132, 143
Milvus migrans 132, 142, 143
mindanensis, Ceyx 86
Mino kreffti 216, 220, 222, 231
minor, Phoeniconaias 346
mintoni, Micrastur 451
minuta, Calidris 146, 352
minutilla, Calidris 351
minutus, Hydrocoloeus 145
minutus, Ixobrychus 146
mirandollei, Micrastur 451
mississippiensis, Ictinia 296, 297, 303
Monarcha erythrostictus 216, 220, 222, 228

mondetoura, Claravis 301
mongolus, Anarhynchus 456
monorhis, Hydrobates 145
montana, Sylvia 49, 52, 53, 59, 60, 61, 63
moquini, Haematopus 338, 340, 342, *343*
Motacilla alba 146
Motacilla canadensis 66
Motacilla citreola 146
Muscicapa gambagae 42
Muscicapa rugensis 260
Muscicapa striata 43
Muscivora swainsoni 263
mustelinus, Turdus 49, 53
Myiagra ferrocyanea 216, 220, 222, 228
Myrmeciza zeledoni 127
Myzomela lafargei 215, 220, 221, 227
nana, Eupsittula 367, 407, 408, *409*, 410
nana, Psittacara 408
nanus, Turnix 341, 359
nebularia, Tringa 135
nehrkorni, Zosterops 88
nereis, Sterna 262
nereis, Sternula 247
Nestor meridionalis 251
Nestor norfolcensis 250
Nestor productus 244, *250*
niger, Cypseloides 133
nigricapillus, Cantorchilus 125
nigrirostris, Ceyx 86
nigriventris, Callipharus 105
nigriventris, Eupherusa 103–107
norfolcensis, Nestor 250
nukuhivae, Pomarea 244, *251*, *252*
Numenius arquata 338, 340, 355, *356*
Numenius borealis 254
Numenius phaeopus 132, 133, 135–137, 457
Numenius tenuirostris 255
obscurus, Dendragapus 370, 373
occidentalis, Setophaga 60
occipitalis, Podiceps 296, 297, 299
ochropus, Tringa 340, 353
ocularis, Glareola 338, 340, 343
Oenanthe dubia 42–45
Onychorhynchus swainsoni 247, 263
Oporornis agilis 296, 297, *307*
orientalis, Eudynamys 213, 221
orientalis, Eurystomus 214, 221
orientalis, Streptopelia 436, *438*
orioloides, Pachycephala 215, 222, 227, 228
Oriolus bonana 264
Ortygornis sephaena 206
oryzivora, Lonchura 247, 261
oryzivora, Loxia 261
oryzivorus, Dolichonyx 66
ostralegus, Haematopus 340, 343, 388
Otus collari 88
Oxynotus typicus 263
Pachycephala orioloides 215, 222, 227, 228
Pachycephala richardsi 215, 220, 222, 228
palliatus, Haematopus 387, 388, 390
pallidiceps, Columba 234
pallidus, Charadrius 338, 340, 345, 346
palmarum, Thraupis 321
palmeri, Zapornia 247
paludicola, Acrocephalus 247, 264
paludicola, Sylvia 264
palustris, Quiscalus 244, *253*
palustris, Scaphidurus 253
Pandion haliaetus 214
papuensis, Coracina 215, 221, 227
Pardalotus pipra 260
parkeri, Glaucidium 304
Parus furcatus 183
parus, Sylvia 49, 53, 62–65
parvirostris, Elaenia 158
Patagioenas albilinea 373, 374
Patagioenas caribaea 109–111, 115, 117, 118, 120
Patagioenas fasciata 367, 373, 374, *375*, 376, *377*, *378*, 379, 407, 436, 437, *441*
Patagioenas squamosa 116
Patagona chaski 328, 329, 332
Patagona gigas 328, 330
Patagona peruviana 328, 329, *331*, *332*
Peliperdix albogularis 193, 195, *197*, 201, 202, 204, 205, 207
Peliperdix coqui 191–194, *196*, 198–200, *201*, 203–205, 207
Peliperdix hubbardi 199
Peliperdix maharao 199
Peliperdix spinetorum 199
Peliperdix stuhlmanni 192, 197, 199, *201*, 205, 207
Penelope jacquacu 300
Penelope superciliaris 296, 297, *300*
perspicillata, Columba 31
perspicillatus, Phalacrocorax 3
perspicillatus, Urile 3–18
pertinax, Aratinga *409*
pertinax, Eupsittula 408
peruviana, Patagona 328, 329, *331*, *332*
Petroica polymorpha 216, 220, 222, 229
Phacellodomus rufifrons 26
Phaenicophaeus pyrrhocephalus 247, 261
phaeopus, Numenius 132, 133, 135–137, 457
Phaetusa simplex 137
Phalacrocorax perspicillatus 3
Phasianus melanocephalus 261
Phoebastria albatrus 262
Phoeniconaias minor 346
phrygia, Anthochaera 258
phrygius, Merops 258
Phyllomyias burmeisteri 425, 428
Phyllomyias fasciatus 425
Phyllomyias virescens 425–430, *427*
Phylloscartes griseocapilla 425
Phylloscartes reiseri 425
Phylloscartes urichi 425

Phylloscartes ventralis 425, *429*
Phylloscopus poliocephalus 216, 220, 222, 229
Picoides dorsalis 367, 399–401
Picoides tridactylus 399–401
Picus imperialis 256
Picus principalis 256
Pinguinus impennis 239, 244, *249*
pinus, Setophaga 60
Pionites leucogaster *305*
Pipra flavicapilla 263
pipra, Iodopleura 247, 260, 445–450, *446*
pipra, Pardalotus 260
Piranga bidentata 125
pistrinaria, Ducula 213, 221, 224
Pitangus sulphuratus 21
Pitta anerythra 234
platalea, Spatula 299
platenae, Hypsipetes 88
platyrhynchos, Anas 152
Plegadis ridgwayi 303
plicatus, Rhyticeros 214, 221, 225
plumbea, Ictinia 303
plumbeus, Micrastur 451
Pluvialis dominica 134, 344
Pluvialis fulva 338, 340, 344, 345
Pluvialis squatarola 340, 345, 354
Plyctolophus productus 250
Podiceps occipitalis 296, 297, 299
poliocephalus, Phylloscopus 216, 220, 222, 229
poliocephalus, Turdus 216, *232*
poliocerca, Eupherusa 104–107
polychloros, Eclectus 214, 221, 226
polymorpha, Petroica 216, 220, 222, 229
Polytmus theresiae 301
Pomarea mendozae 251
Pomarea nukuhivae 244, *251*, *252*
porphyraceus, Ptilinopus 35
Porphyrio alleni 146
Porphyrio melanotus 214
Porphyriops melanops 302
portoricensis, Columba 116
pratincola, Glareola 132
prevostii, Anthracothorax 381
principalis, Campephilus 256
principalis, Picus 256
Procnias tricarunculatus 125
productus, Nestor 244, *250*
productus, Plyctolophus 250
prunellei, Coeligena 247, 261
prunellei, Trochilus 261
Pseudeos cardinalis 215, 221, 227
Pseudochelidon eurystomina 177
Pseudochelidon sirintarae 162–182
Pseudocolopteryx cf. citreola *306*
Pseudocolopteryx citreola 307
Pseudocolopteryx dinelliana 307
Pseudocolopteryx flaviventris 307
Pseudoseisura lophotes 296, 297, 307
Psittacara nana 408
Psittacus carolinensis 251
Psittacus leucotis 262
Psittacus ultramarinus 257
Psittacus versicolor 262
Pternistis afer 191, 192, 194, 195, 198, 202–205, 207, 208
Pternistis cranchii 195, 202, 203, 205
Pterodroma feae 145
Ptilinopus porphyraceus 35
Ptilinopus solomonensis 213, 220, 221, *223*, *224*
Ptilinopus superbus 213, 221, 223
Ptilinopus viridis 213, 221, 223, 224
pugnax, Calidris 457
pulcherrimus, Iridophanes 311
punctigula, Colaptes *405*
punicea, Xipholena 263
purpurea, Ardea 132, 138, 139
pusilla, Sylvia 49, 53, 66
pusillus, Lophospingus 296, 297, *308*
pyrocephalus, Machaeropterus 296, 297, 306
pyropyga, Coua 275
pyrrhocephalus, Cucullus 261
pyrrhocephalus, Phaenicophaeus 247, 261
pyrrholeuca, Asthenes 296, 307
Pyrrhura leucotis 247, 262
Pytilia melba 42, 45, 46
Quiscalus palustris 244, *253*
Rallaria sandwicensis 247
ralloides, Ardea 140, 141
ralloides, Ardeola 132, 133, 139
Ramphocinclus brachyurus 261
recurvirostris, Esacus 180
reichenowi, Crithagra 46
Reinwardtoena crassirostris 221, 223
reiseri, Phylloscartes 425
remotum, Edolisoma 215, 221
reynaudii, Coua 277
Rhegmatorhina 160
Rhinoplax vigil 256
Rhinoptilus chalcopterus 341, 360, 361
Rhipidura cockerelli 215, 222, 228
Rhipidura drownei 215, 222, 228
Rhipidura leucophrys 215, 222
Rhipidura rufofronta 215, 222, 228
Rhyticeros plicatus 214, 221, 225
richardsi, Pachycephala 215, 220, 222, 228
ridgwayi, Plegadis 303
ridgwayi, [Thalurania] 103–107
ridibundus, Chroicocephalus 137
ridleyana, Elaenia 156–158, 157
risoria, Streptopelia 150–152, *439*, 440, *441*
Rissa 4
Rissa tridactyla 145
roseogrisea, Streptopelia 150–152, 154
rowleyi, Eutrichomyias 77
rubiginosus, Colaptes 367, 402, 403, *404*, *405*, 406, 407

rubricera, Ducula 213, 221, 224
rubrifrons, Heterospingus 311–315, *312*, *313*
ruficollis, Calidris 146, 340, 341, 351
ruficollis, Micrastur 451
rufifrons, Garrulax 259
rufifrons, Phacellodomus 26
rufofronta, Rhipidura 215, 222, 228
rufus, Trogon 399
rugensis, Metabolus 247, 260
rugensis, Muscicapa 260
russata, Haplophaedia 382
rustica, Hirundo 177
rutilus, Xenops 123
Rynchops 388
Rynchops albicollis 247, 259
Rynchops flavirostris 338–366
salmoni, Chrysothlypis 311
sandwicensis, Rallaria 247
sanfordi, Icthyophaga 214
sanghirensis, Cittura 87
sanghirensis, Coracornis 88
sangirensis, Ceyx 76–90
Sarcogyps calvus 255
Saurothera marginata 415
savana, Tyrannus 26
Scaphidurus palustris 253
Schistes geoffroyi 296, 297, *301*
Scleroptila crawshayi 195
Scleroptila levaillantoides 206
Scleroptila shelleyi 206
Scleroptila whytei 206, 207
Scolopax borealis 254
scotocerca, Cercomela 43
semicollaris, Streptoprocne *326*
semifasciata, Tityra 124
semipalmatus, Charadrius 456, *458*
semitorquatus, Micrastur 451
sephaena, Ortygornis 206
Setophaga caerulescens 49, 66–70
Setophaga cerulea 60
Setophaga fusca 49, 63–65
Setophaga magnolia 61, 62
Setophaga occidentalis 60
Setophaga pinus 60
Setophaga striata 60
Setophaga tigrina 59
Setophaga townsendi 60
Setophaga virens 55, 60
shelleyi, Scleroptila 206
simplex, Phaetusa 137
sirintarae, Pseudochelidon 162–182
Sitta caffra 264
solitaria, Tringa 135
solitarius, Vireo 55
solomonensis, Asio 214, 225
solomonensis, Gymnophaps 213, 220, 225
solomonensis, Ptilinopus 213, 220, 221, *223*, *224*
solstitialis, Aratinga 408
Spatula platalea 299
Spatula versicolor 298
spectabilis, Elaenia 156, 158
sphagnosa, Sylvia 68, 69
spinetorum, Peliperdix 199
spiza, Chlorophanes 311
spodiopygius, Aerodramus 213
Sporophila melanops 277
squamosa, Patagioenas 116
squatarola, Pluvialis 340, 345, 354
stephani, Chalcophaps 213
Sterna acuticauda 180
Sterna aurantia 180
Sterna hirundo 146
Sterna nereis 262
Sternula lorata 247, 260
Sternula nereis 247
Sternula nereis horni 262
storeri, Cypseloides 323–327, *325*, *326*
Streptopelia 150–155
Streptopelia decaocto 151, 431, *432*, *433*, 434, *435*, 436, 438, 439, *440*, *441*, 442
Streptopelia (decaocto) xanthocycla 431–444
Streptopelia domestica 152, 154
Streptopelia orientalis 436, *438*
Streptopelia risoria 150–152, *439*, 440, *441*
Streptopelia roseogrisea 150–152, 154
Streptopelia xanthocycla *432*, 434, 437–439, *440–442*, 443
Streptoprocne semicollaris *326*
Stresemannia bougainvillei 215, 220, 227
striata, Lonchura 154
striata, Muscicapa 43
striata, Setophaga 60
striata, Sylvia 62, 63
striatigularis, Xiphorhynchus 159
striatus, Accipiter 367, 395, 396
stuhlmanni, Peliperdix 192, 197, 199, *201*, 205, 207
subbuteo, Falco 132
subcristata, Aviceda 214
subminuta, Calidris 338, 340, 341, 351
sulphuratus, Pitangus 21
superbus, Ptilinopus 213, 221, 223
superciliaris, Penelope 296, 297, *300*
swainsoni, Muscivora 263
swainsoni, Onychorhynchus 247, 263
Sylvia autumnalis 62, 63
Sylvia canadensis 65, 66
Sylvia castanea 62
Sylvia lutea 183
Sylvia maculosa 61
Sylvia magnolia 61, 66
Sylvia montana 49, 52, 53, 59–61, 63
Sylvia paludicola 264
Sylvia parus 49, 53, 62–65
Sylvia pusilla 49, 53, 65, 66
Sylvia sphagnosa 68, 69
Sylvia striata 62, 63

Symposiachrus barbatus 215, 220, 222, 228
taeniura, Columba 33
taeniura, Ducula 35
tahitica, Hirundo 216, 229
Tanagra capensis 252
Tarsiger 96–100
Tarsiger cyanurus 96
Tarsiger indicus 96, 98, 100
Tarsiger johnstoniae 96–100
temminckii, Cursorius 341, 361
tenuirostris, Calidris 338, 340, 347, *348*
tenuirostris, Gyps 255
tenuirostris, Numenius 255
tertius, Acridotheres 260
Tetrao cupido 248
thalassina, Cissa 258
thalassina, Kitta 258
[Thalurania] ridgwayi 103–107
Thamnistes anabatinus 124
theresiae, Polytmus 301
Thraupis cyanoptera 316–322, *317*, *318*, *320*
Thraupis episcopus 321
Thraupis palmarum 321
tigrina, Setophaga 59
tinnunculus, Falco 146
Tityra semifasciata 124
Todiramphus cinnamominus 244, 254
Todiramphus leucopygius 214, 221, 225
Todiramphus tristrami 214, 221, 225
Tolmomyias flaviventris 291
Tolmomyias traylori 293
Tolmomyias viridiceps 291–295, *292*, *294*
totanus, Tringa 338, 340, *353*, 459
townsendi, Setophaga 60
Tragopan melanocephalus 75, 247, 261
traylori, Tolmomyias 293
tricarunculatus, Procnias 125
Trichoglossus haematodus 215, 220, 221, 227
trichroa, Erythrura 216, 220
tricolor, Acridotheres 260
tridactyla, Rissa 145
tridactylus, Picoides 399–401
Tringa erythropus 146, 338, 340, 354
Tringa glareola 132, 134, 135
Tringa nebularia 135
Tringa ochropus 340, 353
Tringa solitaria 135
Tringa totanus 338, 340, *353*, 459
tristrami, Todiramphus 214, 221, 225
Trocaza bouvryi 112, 114
Trocaza laurivora 114
trocaz, Columba 112, 114, 115
Trochilus prunellei 261
troglodytes, Troglodytes 75
Troglodytes troglodytes 75
Trogon ambiguus 397–399
Trogon elegans 367, 397, *398*, 399
Trogon rufus 399
Turdus albocinctus 75
Turdus brachyurus 261
Turdus hauxwelli 296, 297, 307
Turdus iliacus 132
Turdus mustelinus 49, 53
Turdus poliocephalus 216, *232*
Turnagra capensis 244, 252
Turnix nanus 341, 359
Turtur decaocto 431, 443
Tympanuchus 370, 373
Tympanuchus cupido 244, 248
Tympanuchus [cupido] attwateri 370
typica, Lalage 263
typicus, Oxynotus 263
Tyrannus melancholicus 21
Tyrannus savana 26
ultramarina, Vini 257
ultramarinus, Psittacus 257
uncinatus, Chondrohierax 367, 390, *391*, 392, *393*, 395
undulata, Chlamydotis 285
Uria 4
urichi, Phylloscartes 425
Urile perspicillatus 3–18
urile, Urile 10
Urile urile 10
Vanellus crassirostris 340, 358
Vanellus duvaucelii 180
Vanellus gregarius 254
vanikorensis, Aerodramus 213
variegata, Geococcyx 415
variolosus, Cacomantis 213, 220, 221
velatus, Xolmis 19–28
velox, Cuculus 415
velox, Geococcyx 415–424, *416–421*
ventralis, Accipiter 395
ventralis, Phylloscartes 425, *429*
versicolor, Amazona 262
versicolor, Chrysuronia *302*
versicolor, Psittacus 262
versicolor, Spatula 298
viaticus, Cuculus 415
vigil, Buceros 256
vigil, Rhinoplax 256
Vini meeki 215, 220, 227
Vini ultramarina 257
violiceps, Goldmania 104, 105, 107
virens, Contopus 51
virens, Setophaga 55, 60
Vireo flavoviridis 125
Vireo solitarius 55
virescens, Phyllomyias 425–430, *426*, *427*
viridiceps, Tolmomyias 291–295, *292*, *294*
viridis, Ptilinopus 213, 221, 223, 224
vociferus, Charadrius *242*, 242, 243, *243*
Vultur bengalensis 255
Vultur calvus 255
Vultur gryphus 247, 262

weddelli, Aratinga *409*
whytei, Scleroptila 206, 207
Willisornis 160
wilsonia, Charadrius 456, *457*, 459
wilsonii, Chondrohierax 390, 395
xanthocycla, Streptopelia *432*, 434, 437–439, *440–442*, 443
xanthocycla, Streptopelia (decaocto) 431–444
xanthopterygius, Forpus 25
xanthopygia, Crithagra 42, 46, 47
Xenops rutilus 123
Xenus cinereus 135, 146, 340, 359
Xipholena atropurpurea 247, 263
Xipholena punicea 263
Xiphorhynchus 160
Xiphorhynchus flavigaster 159
Xiphorhynchus striatigularis 159
Xolmis irupero 26
Xolmis velatus 19–28
yucatanensis, Colaptes *405*
Zapornia palmeri 247
zeledoni, Hafferia 121, 127, 130
zeledoni, Myrmeciza 127
Zonotrichia capensis 125
Zoothera atrigena 216, 231
Zosterops hamlini 216, 220, 222, 229, *230*
Zosterops metcalfii 216, 220, 222, 229, 231
Zosterops nehrkorni 88