The 991st meeting of the Club was held on Monday 17 September 2018 in the upstairs room at the Barley Mow, 104 Horseferry Road, London SW1P 2EE. Twenty-one people were present: Miss H. Baker, Mr P. J. Belman, Mr R. Baker, Mr T. Brown, Mr S. Chapman, Mr G. Davidson, Mr G. de Silva, Mr D. J. Fisher, Ms R. Gleave, Dr C. F. Mann, Dr H. Lloyd (Speaker), Mr D. J. Montier, Mrs M. Montier, Dr S. Pringle, Mr R. Pritchett, Dr R. Prŷs-Jones, Dr P. Rudge, Mr S. A. H. Statham, Mr C. W. R. Storey (Chairman), Mr S. Turvey, Ms J. White.

Huw Lloyd gave a talk entitled *Crabs, cranes, and cuckoos: developing bird conservation science in China*. China is making tremendous efforts to reach out to the international bird conservation community to help develop its next generation of bird conservationists. Since 2010, Huw Lloyd and colleagues have been working with Chinese universities and the China Ornithological Society, helping to develop these young scientists. These research collaborations have shed new light on the ecology of migratory Red-crowned Cranes *Grus japonensis*, revealing how they respond to the pressures of habitat change, and what sustains their wintering population. They have also discovered how some of China’s threatened bird populations are likely to respond to climate change, and how vocal individuality in populations of male Common Cuckoos *Cuculus canorus* can be used as a non-invasive marker for monitoring their population.

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**OBITUARY**

**Patricia (‘Paddy’) A. Cottam (née Lawford), 1932–2018**

Mrs ‘Paddy’ Cottam, who was born on 5 February 1932 and sadly died on 13 April 2018, worked as a curatorial Assistant in the British Museum (Natural History) (BMNH) Bird Room for six and a half years, from 1 November 1950 until 30 April 1957. The daughter of Commander Lawford, who worked in the Admiralty’s Hydrographic Department in London, she grew up in London’s suburbia, with periods in Dorset and Bath, in the latter of which she was a pupil at the Royal High School. Biology was her favourite subject and she attained a degree in Zoology from Chelsea Polytechnic through attending night school there. Following her initial curatorial apprenticeship after joining BMNH, early in 1952 she and a fellow young Assistant, Graham Cowles, were assigned to the avian osteology collection, which had just been moved into new accommodation in the museum basement. Partly due to the intervention of World War II, little curatorial work had been undertaken on bird skeletons for c.20 years, and the main task they initially set themselves was to prepare a separate avian osteology register, involving the extraction of relevant data from old registers as well as much new registering of backlogged specimens. On completion of this in 1953, a systematic re-curation of the collection was begun, which continued through Paddy’s remaining years of service.

During 1954, Paddy was involved in her first scientific publication, when she assisted the Head of the Bird Room, J. D. Macdonald, to compile records of birds observed at sea during *HMS Challenger’s* recent Pacific Ocean cruise (Macdonald & Lawford 1954). By 1955, the Department’s Annual Report notes that ‘Miss P. A. Lawford has carried out osteological research on the Pelecaniform characters of the Shoe-bill Stork, *Balaeniceps rex*, presumably arising out of the re-curation of storks and their allies on which she had been involved in the previous year. The following year’s report noted that she had not only completed this research but begun further investigations into the osteology of the Anhimidae and Anatidae, although the latter never developed further due to her marriage to husband David on 6 October 1956 and subsequent departure from BMNH in spring 1957, when she moved to Lincoln.

Paddy’s *Balaeniceps* publication (Cottam 1957) is striking for more than one reason. Firstly, as a young female Assistant, she had nevertheless impressed her superiors sufficiently to be supported not only by the Head of the Bird Room, but also by the Zoology Department Keeper and Deputy Keeper (acknowledged in the paper), in undertaking a major piece of research and publishing it as sole author. Secondly, the research itself was quite remarkably prescient and retains a continuing importance. Although Gould had suggested a possible Pelecaniform relationship for *Balaeniceps rex* when he described the species in the early 1850s, consensus opinion for the following 100 years had placed it close to the storks. Paddy’s osteological conclusions have since been largely supported by morphological and molecular research that points to a close relationship between pelicans, the Shoebill and Hamerkop *Scopus umbretta*, the last-named not included...
in her study. The importance of Paddy’s work was immediately recognised, as shown by a letter of August 1957 from the eminent anatomist Prof. A. J. E. Cave, St Bart’s Hospital, to J. D. Macdonald, in which he commented ‘...this is an excellent and gratifying piece of work ... [which] demonstrates what good work can be effected by the unbiased observant eye and a modicum of common sense ... Your lady has produced a little classic which will [long] retain its significance in ‘the literature’.

Paddy loved working in BMNH and clearly had a close and easy-going friendship with her Bird Room colleagues, notably Graham Cowles, who remained working on birds in the museum until his retirement in 1991 and continued to correspond with her up to her death. This included her relationship with J. D. Macdonald, as revealed in letters they exchanged during the period immediately following her retirement. In mid-May 1957, Paddy returned to London to give a lecture at the Zoological Society on her Balaeniceps research. Writing to Macdonald prior to this, she asked him to please ‘tell Graham that it will be much more frightening than getting married’, to which Macdonald replied that she need have no worries as not only had she something really interesting to put across but, moreover, the lecture would soon be over and done whereas the marriage was only just beginning!

In Lincoln, she endeavoured unsuccessfully to find work in a local museum, but ended up working at Fisons until the birth of her first daughter in 1959. Following periods in Hitchin, where her second daughter was born, and Brentwood, the family moved long term to Newcastle in May 1969. To her great frustration, she was again unable to obtain paid work in a natural history museum and had to retrain as a secretary, working in this role in a hotel, a garage and, for many years, a school. However, she also began volunteering in the Hancock Museum (now the Great North Museum: Hancock), Newcastle, initially on a few afternoons but, after retirement, for five mornings a week. Her association with the Hancock, where she identified, catalogued and labelled their important osteology collection, lasted approaching 30 years and, in the words of her family, ‘saved her’! A major exhibition on ‘Bones’ staged by the Hancock in 2017 was in important part dependent on her many prior years of work, and while volunteering there she published her only other scientific paper of which I am aware (Cottam 1991), as well as providing input to work published by others on whale bones. She is remembered by a then senior staff member there, Alec Coles, as someone who selflessly gave her heart, soul and much time to a cause she passionately believed in.

I am grateful to Fiona Waugh, daughter of Paddy, and to Alec Coles, Graham Cowles, Dan Gordon and Effie Warr, former colleagues of Paddy, for information.

References:

Robert Prŷs-Jones

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): David Allan, Jorge Avendaño, Rob Bijlsma, Elisa Bonaccorso, Frederik Brammer, Guilherme Brito, Terry Chesser, Nigel J. Collar (*), Jo Cooper, Andrea Corso, Geoffry Davison, Andrew Elliott, Brian Finch (*), Juan F. Freile, Hector Gómez de Silva, Harold F. Greeney, Hein van Grouw (*), Steve N. G. Howell (*), Julian P. Hume, Nigel Hunter, Morton L. Isler, Ron Johnstone, Niels Krabbe, Alex Lees (*), Wayne Longmore (*), Clive F. Mann, David Manry, Daniel Mennil, Israel Moreno-Contreras, Pat Morris, José Fernando Pacheco (*), Robert J. Payne, Vitor Piacentini, Tony Prater, Robert Prŷs-Jones (*), Paulo C. Pulgarin, Peter Pyle, Joel Ralston, Frank Rheindt, Dominic Rollinson, Roger Safford, Richard Schodde (*), Thomas S. Schulenberg, Christopher J. Sharpe (*), Frank D. Steinheimer (*), Fernando Costa Straube, Michael Tarburton, Till Töpfer, Don Turner, Andrew Vallely, George Wallace, David R. Wells (*), Kevin J. Zimmer (*) and Kristof Zyskowski.—THE HON. EDITOR

BOC MEETINGS
See also BOC website: http://www.boc-online.org

Evening meetings are in an upstairs room at The Barley Mow, 104 Horseferry Road, Westminster, London SW1P 2EE. The nearest Tube stations are Victoria and St James’s Park; and the 507 bus, which runs from Victoria to Waterloo, stops nearby. For maps, see http://www.markettaverns.co.uk/the_barley_mow.html or ask the Chairman for directions.
The cash bar opens at **6.00 pm** and those who wish to eat after the meeting can place an order. **The talk will start at 6.30 pm** and, with questions, will last c.1 hour.

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**Monday 18 March 2019—6.30 pm—Julia Day—Continental vs. island evolution of a ‘great speciator’: resolving the Zosterops taxonomic conundrum.**

*Abstract:* Different environments, such as islands and continents, have had profound effects on how biodiversity is shaped. While evolutionary processes are predicted to follow different patterns in island and mainland radiations, the extent to which these geographical contexts influence evolutionary trajectories remains poorly understood. This is in part because few studies have focused on species-rich groups of highly dispersive animals, which can colonise both continents and extensive archipelagos over comparable timeframes. In this talk I will focus on how resolving the evolutionary relationships of white-eyes (*Zosterops*)—lauded as a ‘great speciator’—in Africa, Arabia and associated islands, combined with morphological data, has allowed us to better understand evolutionary processes across these different geographic landscapes. I will also discuss how museum collections and genetic data have aided in the task of deciphering the tricky and sometimes infuriating taxonomy of this highly cryptic group, leading to a likely substantial increase in mainland species.

*Biography:* Julia Day is Associate Professor at University College London and has developed a research programme in evolutionary and, more recently, ecological research. She mainly works on species-rich groups of African fishes but, being a birder, couldn’t resist the challenge of working on a notoriously difficult-to-identify avian group.

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**The Bulletin and other BOC publications**

From volume 137 (2017), the *Bulletin* of the BOC has become 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 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 132 (2012) are available via the Biodiversity Heritage Library website: www.biodiversitylibrary.org/bibliography/46639/#/summary; vols. 132–136 are 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).
History of the Scarlet Ibis *Eudocimus ruber* in south and south-east Brazil

*by* Henrique Chupil & Emygdio Leite de Araujo Monteiro-Filho

Received 9 March 2018; revised 13 August 2018; published 14 December 2018


**Summary.**—In Brazil Scarlet Ibis *Eudocimus ruber* occurs mainly in the north, south-east and south. During the 1900s, there was a significant reduction in the number of records in the latter two regions of the country, but this began to change in the early 1980s, when numbers of Scarlet Ibis gradually started to increase over the years. We contextualise the history of the species in south and south-east Brazil, and discuss the causes for its apparent disappearance and reappearance in these regions. We believe that anthropogenic factors, coupled with the species’ ecology, were responsible for the reduction and subsequent resurgence of Scarlet Ibis.

Scarlet Ibis *Eudocimus ruber* is one of the most emblematic birds in the Americas, occurring across northern and eastern South America, from northern Colombia to Trinidad, the Guianas and coastal Brazil, with small outlying populations in Panama and Ecuador (Hancock *et al.* 1992). In Brazil, there are two disjunct populations: one in the north, in the states of Pará, Amapá and Maranhão; and the other in the south, in São Paulo, Paraná and Santa Catarina (Sick 1997).

Its occurrence in Brazil was first mentioned as long ago as the 16th century, with reference being made to the use of the species’ feathers by indigenous craftsmen in what is now the state of São Paulo (Staden 1557), while later in the second half of the 16th century the Jesuit Fernão Cardim (Cardim 1925) and Portuguese historian and chronicler Pero de Magalhães Gândavo (Gândavo 1576) both referred to the Scarlet Ibis, especially its striking plumage.

Subsequently, in Santa Catarina the first reports date from 1712 and 1763, representing the southernmost historical records (Haro 1990). In Paraná, according to Straube (2005), the first ‘mention’ of Scarlet Ibis dates from 1653—in an illustration of Paranaguá Bay by José Teixeira Albermás II. Thereafter, more specific references to the species’ occurrence in the state came from Johann Natterer in 1820, on the basis of the specimens that he collected and later deposited in Vienna (Naturhistorisches Museum Wien) and the reports of Augustin Saint-Hilaire between 1820 and 1855, also in Paranaguá Bay, near the mouth of Nhundiaquara River and in the environs of Guaratuba (Straube 2012).

Further historical records of Scarlet Ibis in this region of Brazil were made in the early 20th century, by A. R. Martins, on the coast of Paraná (Straube 2015), and by the engineer and naturalist R. Krone, around Iguape (on the south coast of São Paulo state) during the rainy season (Olmos & Silva e Silva 2003). However, with respect to Santa Catarina, by the time Naka & Rodrigues (2000) discussed the species, they believed it to have been extinct in the state for c.150 years.

Thereafter, in the 20th century, published data suggested that only a very small population was present in south-east Brazil, based on the isolated records available (Lago-Paiva 1994, Teixeira & Best 1981). For example, in 1961 when an individual was collected at São Vicente, in coastal São Paulo, it was considered the first record in south-east Brazil following decades of absence (Lago-Paiva 1994). For Paraná, there was only the report by
P. Scherer-Neto, from 1977, involving three individuals in the municipality of Paranaguá (Teixeira & Best 1981).

Only in the early 1980s did this start to change, when Scarlet Ibis was observed again, initially around Santos (Rio Mourão) on the coast of São Paulo (Silva-Silva 2007; Fig. 1) and in 1989 nesting was confirmed in the municipality of Cubatão (Marcondes-Machado & Monteiro-Filho 1990). The population increased gradually and, in 1998, 385 individuals were estimated at the Santos mangroves (Olmos & Silva-Silva 2001). In the south of the same state, the first individuals and evidence of breeding occurred in Iguape and northern Ilha Comprida in the early 1990s (Bokermann & Guix 1990, Paludo et al. 2004, 2005). In 2006, the first individual was observed at Cananéia, with Roseate Spoonbills Platalea ajaja (ELAM-F pers. obs.). The first flocks were seen in the following year, and the species rapidly became more frequent. In 2007, of the 15 species recorded monthly in the São Paulo Bagre, Cananéia, Scarlet Ibis was the third most abundant (Coelho 2009). In 2009, 971 were estimated foraging in five areas around Cananéia and Ilha Comprida (Barbieri 2009), while during 2011 c.1,000 individuals were counted in the channel (Mar de Dentro) between Cananéia and Ilha Comprida (Noguchi 2011). Since 2014, a new colony has become established at the south end of Ilha do Cardoso and, in 2015, we estimated 1,000 birds were breeding there (HC & ELAM-F pers. obs.).

Paralleling the increase in records on the south coast of São Paulo, several birds were also observed in Paraná, in mangroves of the Paranaguá estuarine complex, where the species became more frequent from 2009 (Krul et al. 2009, Krul 2011). Estimates at different points in the Paranaguá estuarine complex produced a max. 225 individuals at one of the study sites between October 2012 and September 2013 (Vigário 2014). In November 2011, the first birds were observed on the north coast of Santa Catarina, with a breeding colony in Babitonga Bay (Fink 2013, Grose 2016).
The history of Scarlet Ibis around Cananéia and elsewhere in São Paulo, Paraná and Santa Catarina leads us to speculate as to the factors responsible for the paucity of records prior to the 1980s. Anthropogenic factors, such as degradation and reduction of mangroves in these southern states, affecting its foraging and breeding areas (Hass 1996, Olmos 2000), hunting for its beautiful plumage (which was historically coveted by both indigenous and immigrant European peoples) and egg collection (Lago-Paiva 1994, Rodrigues 1995, Hass et al. 1999) are generally cited as being responsible. It is also noteworthy that during the first half of the 20th century there were many fewer naturalists and researchers, which could explain the small number of records of Scarlet Ibis. However, even reports by resident observers were scarce, which is unexpected given that the species is unmistakable and obvious, as evidenced recently by local people in the Cananéia region.

Based on this, we consider the species vulnerable to anthropogenic activities. However, its current range includes colonies and frequent records in urban environments that are more or less disturbed, such as Ilha Comprida, Iguape, Babitonga Bay, Cubatão and Cananéia. In the latter, the species is periodically observed foraging beside a road well used by people and vehicles (plus boats on the river), and does not appear to be disturbed by human presence. With respect to hunting and egg collection, our conversations with local people in Cananéia and on Ilha do Cardoso have revealed no consumption of Scarlet Ibis eggs, nor any interest in hunting the species for its feathers or keeping it in captivity, neither now nor in past decades.

Therefore, are anthropogenic factors alone responsible for the species’ apparent temporary local extinction on the southern Brazilian coast? Perhaps it would be more pertinent to believe that anthropogenic activities could have caused a population decline, but not extinction, yet leading to individuals or small groups dispersing to more remote areas along rivers and in mangroves, in search of safe foraging and breeding sites. Supporting this hypothesis is that as long ago as 1781, Martim Lopes Saldanha issued an edict for the protection of Scarlet Ibis, in which he stated that the species would almost certainly become extinct at some localities in Paraná, with apparent dispersion to more isolated islands (Straube 2011). In addition, it is important to highlight an important issue often overlooked when seeking to understand the dynamics of species, namely that periods of lesser abundance or greater dispersal, in the present case aggravated by anthropogenic factors, might be normal facets of their ecology.

An example of fluctuations in the numbers of Scarlet Ibis over a short period of time was obtained during monitoring of the breeding colony at the south end of Ilha do Cardoso, where approximately 1,000 birds bred in 2015 / 16, but just 300 in 2016 / 17. Concerning dispersal, it is interesting to mention the variation in numbers of Scarlet Ibis recorded during our twice-weekly boat-based surveys of the channel separating Ilha do Cardoso from Ilha de Cananéia (São Paulo) and Ilha do Superagui (Paraná) since 2014. On several occasions we covered the 46-km transect without observing any birds, whereas on others we counted >300. Apparently, the birds tends to be more visible at low tide and to disperse further during the non-breeding season. However, under the same tidal regime, at any season there is still marked variation in the numbers observed.

Additionally, the hypothesis of greater dispersal prior to the 1980s contrasts with the fact that Scarlet Ibis is generally conspicuous and unlikely to go unnoticed. However, again our regular surveys found that the species can be initially overlooked during cursory observations, but that careful checking would reveal small groups or lone individuals inside dense mangroves, where they might easily pass unnoticed if no effort was made to partially penetrate the habitat. Thus, when the species avoids more open areas it is much less conspicuous.
However, if the Scarlet Ibis really did become locally extinct as a breeder, from where does the current population in the states of São Paulo, Paraná and northern Santa Catarina originate? Genetic analyses comparing the population at Cubatão with those in northern Brazil demonstrated a close relationship, suggesting either that southern birds derived from the north or that the species at one time was found virtually throughout the Brazilian littoral (Gonçalves et al. 2010).

Olmos (2003) reported the introduction of 19 pairs of Scarlet Ibis from the state of Maranhão to Cubatão in 1967–69, which would corroborate the first hypothesis of Gonçalves et al. (2010), i.e. that southern birds derive directly from northern Brazil. However, the release of these individuals alone seems unlikely to account for the current population in south-east Brazil. The second hypothesis presented by Gonçalves et al. (2001), namely that the species formerly occupied the entire Brazilian coast to the limit of mangrove occurrence, equally accounts for the currently disjunct populations’ close genetic similarity.

Under the current scenario, some dispersal of birds along the coast is evidenced by records from various localities, ensuring gene flow between, and reinforcing the genetic proximity of, different subpopulations in south-east Brazil (Gonçalves et al. 2010). An example of such movements was reported by Grose (2016), involving birds ringed in Babitonga Bay in November 2012, January 2013 and November 2013 that were subsequently re-sighted in Cananéia (August 2013 and May 2015) and the municipality of Praia Grande (October 2014).

Given the available information as to the history of occurrence of Scarlet Ibis and its ecological characteristics, we believe that the species previously occurred over a much greater part of the Brazilian coast with strongholds in the north and south—as already mentioned by Sick (1997)—but with some movement between areas. By and during the early 1900s, due to anthropogenic factors and the species’ ecology, the southern population was both reduced in numbers and favoured more isolated mangroves. However, during the 1980s, the population began to increase and become more obvious again. We conclude that the species’ biology may also explain its temporary apparent rarity and local extinction in parts of southern and south-east Brazil, as well as anthropogenic factors. Nevertheless, the conservation of estuaries where the birds breed and forage is essential to maintain the species’ populations, despite that Scarlet Ibis appears to some extent tolerant of human disturbance and activities.

References:


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Avifauna of a white-sand vegetation enclave in north-west Rondônia, Brazil: relevant records, body mass and morphometrics

by Edson Guilherme, Edilaine Lemes Marques & Geyse Souza Santos

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http://zoobank.org/urn:lsid:zoobank.org:pub:84EC74FE-95C0-48F7-AF97-CE8900DAEB4F

Summary.—White-sand vegetation (WSV) enclaves occur throughout Amazonia. WSV, known in Brazil as campina or campinarana, possesses peculiar floral and faunal communities, different from those in adjacent forests but with biogeographic affinities to those in similar ecosystems far distant. Recent ornithological studies of these ‘islands’ have yielded new taxa for science and enabled a better understanding of the zoogeography of many poorly known species in Amazonia. Here we report the results of an ornithological survey of a campinarana enclave in north-west Rondônia, southern Amazonian Brazil. The area was inventoried three times in 2010–12, totalling 899 net / hours and 110 hours of observations. A total of 171 bird species was identified, belonging to 44 families. Among them, at least nine species are closely associated with WSV: Green-tailed Goldenthroat Polytmus theresiae, White-fringed Antwren Formicivora grisea, Natterer’s Slaty Antshrike Thamnophilus stictocephalus, Black Manakin Xenopipo atronitens, Plain-crested Elaenia Elaenia cristata, Pale-bellied Mourner Rhytipterna immunda, Campina Flycatcher Cnemotriccus fuscatus duidae, Plush-crested Jay Cyanocorax chrysops diesingii and Red-shouldered Tanager Tachyphonus phoenicius. Approximately 8% of the species recorded are migratory, most of them austral migrants. In addition, body mass and morphometrics of 136 individuals from 55 species are presented. Our results augment ornithological knowledge in Rondônia, aid our understanding of regional zoogeography, and serve as an alert to the need to preserve a region that has suffered severe anthropogenic impacts for >100 years.

Amazonia is the largest and most diverse biome on Earth (Mittermeier et al. 2003). It has the largest extent of continuous forest in the world and harbours impressive biodiversity (Kress et al. 1998, Mittermeier et al. 2003). The biome as a whole is very heterogeneous (Terborgh & Andresen 1998, ter Steege et al. 2003). It is a mosaic of different types of ecosystems resulting from variable regional edaphic and climatic conditions (Duivenvoorden et al. 2005, Haugaasen & Peres 2006, Fine & Kembel 2011, Fine et al. 2012). Among these ecosystems are several forest types, e.g., terra firme and várzea (Terborgh & Andresen 1998), as well as some non-forest environments, e.g. the enclaves or ‘islands’ of open vegetation within forests (Anderson 1981, Fine et al. 2012, Fine & Bruna 2016, Mustin et al. 2017, Demarchi et al. 2018).

Enclaves of open vegetation are distributed discontinuously throughout Amazonia (Adeney et al. 2016). The origin of these enclaves is still being discussed—one hypothesis is a Pleistocene and Holocene provenance, when the climate in Amazonia became drier as a consequence of the last glacial maximum (Pessenda et al. 2001, Clark et al. 2009). The types of open vegetation in Amazonia are distinguished by their general physiognomy dictated by floristic composition according to the local edaphic, hydrological and climatic conditions (Adeney et al. 2016). The two main groups are savanna / cerrado (Sanaiotti et al. 1997, Silva et

Rondônia state, in south-west Amazonian Brazil, lies within an area of endemism of the same name (Silva et al. 2005, Fernandes 2013). Although rich in endemic and / or rare species (Fernandes 2013), the state has already lost >30% of its forest cover due to logging and agroforestry (Serrão et al. 1996, Piontekowski et al. 2014, Fearnside 2017). Ornithological surveys in the state have progressively increased over the last 100 years (e.g. Hellmayr 1910, Stotz et al. 1997, Boçon 1999, Kirwan & Shirihai 2007, Olmos et al. 2011, Santos et al. 2011) and, as further areas are inventoried, several new species of birds have been discovered (Lanyon et al. 1990, Whitney et al. 2013a,b,c). Despite this, the richness of bird species and their distribution in the state as a whole are poorly known and have not been subject to major review. There are still numerous gaps in our ornithological knowledge of Rondônia because many areas are yet to be surveyed. Here, we present the results of a rapid inventory of an enclave of WSV near the BR-364 and the recently implemented Jirau hydroelectric power plant in north-west Rondônia.

**Methods**

**Study area.**—The study was undertaken in an enclave of WSV and its environs called Miratinga, located along a power transmission line west of the BR-364 (between Porto...
Velho and Abunã), c.30 km from Jaci Paraná in the municipality of Porto Velho, Rondônia (09°21'38.3"S, 64°39'29.2"W; Fig. 1).

**Description of the area.**—The campinarana enclave is mainly covered by dense shrubs, with sparse, small trees (2–5 m tall) (Fig. 2A–C) and some *Astrocaryum acaule* and *Mauritiella armata* palms (Fig. 2C). The soil is covered by grasses (Fig. 2A–B) and, as in other WSV environments, should be of low fertility and high acidity. At the edges of the patch, in areas of sparse vegetation and where the soil is more humid, an invasive fern *Pteridium* sp. is present (Fig. 2D). Part of the campinarana has been deforested and sand is being commercially removed (Fig. 2E). In the vicinity, there are small black-water streams and at least one medium-sized pond. During the wet season, puddles form where vegetation is sparse (Fig. 1) and in the campinarana, which is surrounded by fragments of *terra firme* forest severely modified by selective logging, and open pastures (Fig. 1).

**Avifaunal sampling.**—Three visits were made to the area in 2010–12. The avifaunal survey covered both the campinarana and surrounding fragments of *terra firme* forest and pastures (Fig. 1). Two approaches were used to inventory the area: (a) quantitative, using mist-nets and (b) qualitative, via field observations using binoculars. The campinarana was inventoried on 2 June 2010 (60 net / hours and two hours of observation), 26 February–3 March 2011 (439 net / hours and 54 hours of observation) and 20–24 August 2012 (400 net / hours and 54 hours of observation). Individuals captured with mist-nets were weighed...
using a Pesola® scale and their wing, tarsus and total lengths were taken with a millimetre ruler. Wing, tarsus and total lengths were measured in accordance with standard reference works, see Proctor & Lynch (1993: 295–297) and Sick (1997: 91, Fig. G). Ageing and sexing were performed whenever possible. Some specimens were collected as vouchers and were prepared using standard taxidermy techniques. Specimens were collected under ICMBio / SISBIO authorisation no. 23269-1, and deposited either at the Universidade Federal do Acre (UFAC), Rio Branco, or the Museu Paraense Emílio Goeldi (MPEG), Belém. Scientific nomenclature follows that of the Brazilian Committee of Ornithological Records (Piacentini et al. 2015).

Results and Discussion

A total of 171 species from 44 families was recorded in the campinarana enclave and its environs (Table 1). Of these, 74 (43.2%) species are non-Passeriformes and 97 (56.7%) Passeriformes. Among the latter, the families Tyrannidae (26), Thraupidae (17) and Thamnophilidae (12) were richest in species (Table 1). At least nine species recorded in the study area are closely associated with campinarana: Green-tailed Goldenthroat Polytmus theresiae, White-fringed Antwren Formicicora grisea, Natterer’s Slaty Antshrike Thamnophilus stictocephalus, Black Manakin Xenopipo atronitens, Plain-crested Elaenia Elaenia cristata, Pale-bellied Mourner Rhytipterna immunda, Campina Flycatcher Cnemotriccus fuscatus duidae, Plush-crested Jay Cyanocorax chrysops diesingiii and Red-shouldered Tanager Tachyphonus phoenicus (Table 1). Two other important records included Rondônia Bushbird Clytoctantes atrogularis (Guilherme & Souza 2013) and Buff-cheeked Tody-Flycatcher Poecilotriccus senex. Approximately 8% of the species recorded are visitors, mostly austral migrants, e.g. Large Elaenia Elaenia spectabilis, Chilean Elaenia E. chilensis, Small-billed Elaenia E. parvirostris, Fork-tailed Flycatcher Tyrannus savana, Crowned Slaty Flycatcher Griseotyrannus aurantioatrocristatus, Variegated Flycatcher Empidonomus varius, Southern Scrub Flycatcher Sublegatus modestus, Vermilion Flycatcher Pyrocephalus rubinus, Fuscous Flycatcher Cnemotriccus fuscatus bimaculatus, Chivi Vireo Vireo chivi, Creamy-bellied Thrush Turdus amaurochalinus, Yellow-bellied Seedeater Sporophila nigricollis and Double-collared Seedeater S. caerulescens, while Solitary Sandpiper Tringa solitaria was the only Nearctic migrant (Table 1).

Species accounts

GREEN-TAILED GOLDENTHROAT Polytmus theresiae
Relatively common but discontinuously distributed in enclaves of open vegetation throughout Amazonia (Schuchmann 1999, Borges et al. 2001, Sanaiotti & Cintra 2001, Aleixo & Poletto 2007, Schulenberg et al. 2007, Guilherme 2012). Hellmayr (1910) reported two collected by W. Hoffmanns around Rio Preto, in the north-east of the state, and Aleixo & Poletto (2007) the presence at MPEG of one collected by J. Hidasi at Guajará-Mirim, on the border with Bolivia. Additionally, the species was photographed in the municipalities of Cabixi and Vilhena in southern Rondônia (Wikiaves 2018). On 2 June 2010, three were collected (MPEG 70938, 70939, male, 70940) and on 22–23 August 2012 we collected another five (UFAC 507, 508, 511, 522, 523). Available records of P. theresiae in Rondônia indicate that the species is locally common, but only in enclaves of cerrado, campina and campinarana.

NATTERER’S SLATY ANTSRIKE Thamnophilus stictocephalus
Previously treated as a race of a widespread Eastern Slaty Antshrike T. punctatus (Isler et al. 1997). Distributed patchily in campina and campinarana east of the Guaporé / Madeira Rivers
TABLE 1

Birds recorded in a *campinarana* (white-sand vegetation) and its environs in north-west Rondônia, Brazil. Habitat: C = *campinarana*; TF = *terra firme* forest; R = reservoirs and lakes; AO = open areas; P = pasture and man-modified areas. Record types: V = vocalisation; O = sight; S = museum specimen. Nomenclature follows Piacentini *et al.* (2015). * = white-sand specialists following Stotz *et al.* (1996) and Borges *et al.* (2015). ** = migrants *a* = austral; *n* = Nearctic.

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**PSITTACIDAE**

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**THAMNOPHILIDAE**

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**DENDROCOLAPTIDAE**

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**XENOPIDAE**

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**FURNARIIDAE**

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**PIRIDAE**

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<td>Euphonia chrysopasta</td>
<td>Golden-bellied Euphonia</td>
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to the island of Marajó in Pará (Isler et al. 1997, Zimmer & Isler 2003). Olmos et al. (2011) reported *T. stictocephalus* in savannas at Serra da Cutia National Park, in the south-west of the state, and at Campos do Urupa within the Uru-Eu-Wau-Wau Indigenous Territory, in central Rondônia. Natterer’s Slaty-Antshrike has been found in several municipalities along the BR-364, between Vilhena and Porto Velho (Wikiaves 2018). Very common in the study area, being seen and caught in mist-nets daily (Fig. 3A). Five specimens were collected, a female on 2 June 2010 (MPEG 70950) and two pairs, on 27 February 2011 (UFAC 284, 286) and 1 March 2011 (UFAC 310, 309). Our records of *T. stictocephalus* extend the species’ range to extreme north-west Rondônia.

**RONDÔNIA BUSHBIRD** *Clytoctantes atrogularis*

A globally threatened species (BirdLife International 2017) whose unusual record in the study area was discussed by Guilherme & Santos (2013). The female collected (UFAC 473) represents the westernmost available record (Costa et al. 2017).

**WHITE-FRINGED ANTWREN** *Formicivora grisea*

Occurs from the right bank of the Madeira River east to the Atlantic coast, including all of north-east Brazil, as well as in northern South America including the Guianas, Venezuela and Colombia (Zimmer & Isler 2003). Recently found in *campinarana* in extreme south-west Amazonas (Guajará) and westernmost Acre (Cruzeiro do Sul and Mâncio Lima) (Poletto & Aleixo 2005, Guilherme 2012). In Rondônia, it was known from around Rio Preto in the north-east (Hellmayr 1910) and in savanna at Traçadal Biological Reserve and Serra da Cutia National Park (Olmos et al. 2011) in the centre-west. Abundant in *campinarana* at Miratinga. On 2 June 2010, three were collected (MPEG 70951, male, 70952, female, 70953, male). On 27–28 February 2011, four were trapped of which three were collected (UFAC 283, male, 288, female, 304, female) and on 20–23 August 2012 seven were trapped of which four were prepared as specimens (UFAC 476, juvenile male, 480, male, 510, female, 525, male). Records of *F. grisea* at Miratinga extend the species’ range in Rondônia 232 km to the north-west and 227 km north, from Rio Preto and Traçadal Biological Reserve, respectively.

**BLACK MANAKIN** *Xenopipo atronitens*

Considered an indicator species of *campinarana* (Borges et al. 2016a). Although abundant in habitat, it is patchily distributed (Aleixo & Poletto 2007, Poletto & Aleixo 2005, Guilherme & Borges 2011, Borges et al. 2014, 2016b). Previous records in Rondônia were by Whittaker (2004) at Taquaras (BR-425) and by Olmos et al. (2011) in savanna at Traçadal Biological Reserve and Serra da Cutia National Park. Since 2010, it has been photographed in several municipalities in eastern Rondônia, e.g. Machadinho d’Oeste, Parecis and Chupinguaia (Wikiaves 2018). At Miratinga, Black Manakin was seen and trapped daily. A male was collected on 6 February 2010 (MPEG 70977), while another four were collected subsequently, three in 2011 on 26 February (UFAC 276, female, 282, male) and 1 March (AC 312, female), and one on 22 August 2012 (UFAC 512, male). Records of *X. atronitens* at Miratinga extend its range to far north-west Rondônia.

**BUFF-CHEEKED TODY-FLYCATCHER** *Poecilotriccus senex*

Until very recently, known only from the type locality at Borba, Amazonas state, on the right bank of the lower Madeira River (Hellmayr 1910, Hoyo et al. 2004). In recent years, recorded at localities on the right bank of the middle (Cohn-Haft et al. 2007, Whittaker 2009) and upper Madeira (Whittaker 2004, Wikiaves 2018). In Rondônia, reported initially in 2002, at a *campina* at Taquaras (BR-425), in the north-west of the state (Whittaker...
Unfortunately, during its preparation, mass was not taken and neither was it possible to sex the bird (Fig. 3B; Table 2). Recent records indicate that the species inhabits patches of open vegetation in a swath from northern Rondônia and extreme south-east Amazonas (e.g. Humaitá National Forest) from the right bank of the Madeira east to the Madeira / Tapajós interfluvium (Whittaker 2004, 2009, Cohn-Haft et al. 2007, Wikiaves 2018).

**PALE-BELLIED MOURNER** *Rhytipterna immunda* (Figure 3C)
An uncommon species readily confused with a *Myiarchus* (Lanyon 1973). *R. immunda* is unique to savanna environments in Amazonia, from easternmost Colombia to the Guianas, and in Brazil it occurs patchily in WSV through the Negro drainage east to Pará, Amapá and Tocantins, and in southern Rondônia and Mato Grosso (Lanyon 1973, Scholes 2004, Whittaker 2004, Dornas et al. 2012). It has also been recorded in north-east Bolivia (Scholes 2004, Tobias & Seddon 2007). The first record in Rondônia was documented by Whittaker (2004) in the north-west of the state, in a *campina* at Taquaras, Porto Velho municipality. Subsequently, it was recorded in savanna at Serra da Cutia National Park, south-west Rondônia, and in Uru-Eu-Wau-Wau Indigenous Territory, in central Rondônia (Olmos et al. 2011). Also documented in the municipalities of Guajará-Mirim and Machadinho d’Oeste (Wikiaves 2018). Among species associated with *campinarana*, this was one of the most
abundant in mist-nets. Ten were trapped, of which five were collected: three on 26 and 28 February 2011 (UFAC 278, 295, 296) and two on 22 August 2012 (MPEG 82235–36). Records of *R. immunda* in north-west Rondônia (e.g. Miratinga) are the south-westernmost in Brazil.

**CAMPINA FLYCATCHER** *Cnemotriccusc fuscatus duidae*
Strongly associated with *campina / campinarana* (Borges *et al.* 2016a). Differs from other races of *C. fuscatus* by its much more yellowish underparts (Zimmer 1938; Fig. 4A). It occurs patchily across almost all of Amazonia (Tobias & Seddon 2007, Guilherme & Borges 2011, Borges *et al.* 2016a). One was collected on 22 February 2011 in *campinarana* (UFAC 294; Fig. 4A–B), the first record of this taxon in Rondônia. The closest previous record of *C. f. duidae* was on the Bolivia / Brazil border at Piedritas, on the left bank of the Madeira River, c.100 km south-west of our study area (Tobias & Seddon 2007). *C. f. duidae*, unlike its congeners (see below), appears to be resident in *campina / campinarana* in the region.

**FUSCOUS FLYCATCHER** *Cnemotriccusc fuscatus*
In addition to the specimen attributed to *C. f. duidae* (above), three other specimens of *C. fuscatus* were collected. Two (MPEG 70971 and UFAC 509) match *C. f. beniensis* and a third (UFAC 477) more closely resembles *C. f. bimaculatus* (Fig. 4A–C). Although Tobias & Seddon (2007) argued that *C. f. beniensis* could be synonymous with *C. f. fuscatior*, a series collected in Acre (Guilherme 2009, 2012, 2016) plus the two from Rondônia agree with the description presented by Gyldenstolpe (1945) to differentiate it from *C. f. bimaculatus*. Some of the differences noted by Gyldenstolpe (1945) and observed in UFAC 509 are: ‘…chin and throat grayish-white, usually without any yellowish tinge; breast greyish brown without olivaceous suffusion; bill larger and stronger…’ (Fig. 4A–C). Although bill length is almost identical among specimens UFAC 509 (*beniensis*) and 477 (*bimaculatus*) (14.1 vs. 14.04 mm respectively), in UFAC 509 it is broader (5.0 vs. 3.92 mm) and flatter than in UFAC 477 (Fig. 4C). The morphological similarities, as a whole, between UFAC 509 from Rondônia (Fig. 4A–C) and the holotype of *C. f. beniensis*, from Bolivia, were proven by comparing it with the photograph of the type specimen (NRM 569425) online (http://www.nrm.se). UFAC 509 also shows clear differences from the holotype of *C. f. fuscatior* (Fig. 4D). The latter, AMNH 211013 from Ecuador, as described by Chapman (1926) has ‘…Upperparts much darker and wing-bars narrower than in any other described race of the species… the breast grayish olive, the belly pale sulphur-yellow…’ (Fig. 4D). In UFAC 509, the wingbars are broad as in UFAC 477 (*bimaculatus*) (Fig. 4B) and the back and chest are brown (Fig. 4A–B), not grey as in *C. f. fuscatior* (Fig. 4D). Additionally, *C. f. fuscatior* is associated with *várzea* and river islands (Tobias & Seddon 2007), while UFAC 509 (Fig. 4A–C) and MPEG 70971 are from a *campinarana* enclave in *terra firme*, which reinforces our conviction that the two latter specimens represent *beniensis*. Taxonomy of the group is confused (Chapman 1926, Zimmer 1938, Gyldenstolpe 1945, Tobias & Seddon 2007) and genetic and vocal analyses should seek to clarify how many species-level taxa are involved. The certainty is that at least three taxa of the *C. fuscatus* complex occur at Miratinga. This is the first record of *beniensis* in Rondônia (where its status is uncertain), while *bimaculatus* is an austral migrant (Hellmayr 1910, Stotz *et al.* 1997, Whittaker 2004, Santos *et al.* 2011).

**PLUSH-CRESTED JAY** *Cyanocorax chrysops diesingii*
This subspecies is the Amazonian substitute of *C. c. chrysops*, which is common in south-east Brazil, northern Argentina, Uruguay, Paraguay and Bolivia (Ridgely & Tudor 1994). *C. c. diesingii* is a specialist of *campina / campinarana* (Aleixo & Poletto 2007, Whittaker 2009, Borges *et al.* 2016a). On 1 March 2011 a pair was observed vocalising and later one was
photographed at the edge of campinarana at Miratinga (Fig. 3D). In 2012, the species was seen daily in the same place. This taxon appears to be common in enclaves of campinarana along the BR-364 between Porto Velho and Abunã, in the north-west of the state. It is possible that C. c. diesingii occurs sympatrically with the recently discovered Campina Jay C. hafferi (Cohn-Haft et al. 2013) in campina / campinarana further north, in Amazonas, e.g. in WSV enclaves around Borba (Hellmayr 1910, Wikiaves 2018).

**RED-SHOULDERED TANAGER** *Tachyphonus phoenicius*

Typical of open vegetation in Amazonia (e.g. cerrado, campina and campinarana) and present in three different biogeographic regions. North of the Solimões / Amazon River in the states of Roraima, Pará and Amapá, as well as in eastern Colombia, southern Venezuela and the Guianas; in the south, from the Madeira basin in the region of Guayaramerin
in Bolivia (Tobias & Seddon 2007) to the east; and in the extreme south-west, in north-east Peru (Loreto), western Acre (Mâncio Lima and Cruzeiro do Sul) and south-western Amazonas (municipality of Guajará) (Hilty 2011, Guilherme 2012, 2016; E. Guilherme & A. Aleixo unpubl.). In Rondônia, T. phoenicius was recorded by Olmos et al. (2011) at Traça da Biological Reserve and Serra da Cutia National Park, in the south-west of the state, with other documented records from the municipalities of Parecis and Vilhena (Naumburg 1930, Wikiaves 2018). A female was collected in campinarana at our study site on 20 August 2012 (UFAC 475), extending the species’ range in Rondônia to the north, c.230 km from Traça da Biological Reserve.

**Discussion**

Although our visits to the study site were short, totalling just nine days, a significant number of species was recorded. The avifauna found exclusively in campinarana represented 17.7% of all species recorded and consists of birds that colonise forest edge, open country or habitat specialists (sensu Stotz et al. 1996, Borges 2004, Borges et al. 2016a). Of the 35 taxa considered by Borges et al. (2016a) to be WSV specialists throughout Amazonia, 17.1% were recorded in this small campinarana. However, if we consider only the 11 WSV specialists from the southern Solimões / Amazon basin (sensu Stotz et al. 1996), representativeness increases to 54.5%. Some species (e.g. Xenopipo atronitens) have specialised to such an extent that they occur only in enclaves of open vegetation across Amazonia (Capurrucho et al. 2013, Borges et al. 2016a). This implies that vegetation growing on white sand functions as ‘islands’ or mini-refugia (sensu Isler et al. 1997) within the surrounding forest. These ‘islands’ also offer a range of food resources capable of attracting seasonal migrants from other open biomes (e.g., Cerrado, Chaco, campos sulinos), which explains the comparatively large number of austral migrant species in this small patch of WSV. The result is a unique community of birds different from that in surrounding forest (Borges 2004). Therefore, the presence of an enclave of campinarana contributes significantly to regional diversity in Amazonia (Borges et al. 2016a).

**Body mass and morphometrics.**—These data, taken from 136 individuals of 55 different species (Table 2), are presented separately by age and gender (Table 2). Because many species in the study area are uncommon and patchily distributed, we consider it important to publish these mass and morphometric data. Such information forms the basis of comparative studies in various aspects of animal biology, including community structure and theoretical modelling (Hudson et al. 2013, Frasier 2016). Dunning (2008) compiled body mass data for 8,700 species worldwide, but for some the number of individuals sampled was very small and from a single locality, e.g. Thamnophilus stictocephalus, for which just one male from Bolivia was available to Dunning (2008). In this study, we not only increased the number of T. stictocephalus so measured, but we also collected mass and morphometrics for many other species from Brazil that were poorly sampled or unrepresented in Dunning’s work, e.g. Rondônia Warbling Antbird Hypocnemis ochrogyna, which was recently split from H. cantator (Isler et al. 2007; Table 2).

**Conservation.**—The small enclave of WSV at Miratinga lies within a region that is highly threatened (Vale et al. 2008, Fernandes et al. 2010). It is directly impacted by the BR-364 and, according to the Socioecological and Economic Zoning of Rondônia, forms part of 1.2 Sub-zone, which is subject to accelerated occupation and uncontrolled deforestation. Furthermore, the area is likely to witness increasing agricultural and other anthropogenic disturbance in the future (Fernandes et al. 2010). A concrete example of this is the recently implanted Jirau Hydroelectric Plant, 9.5 km from the study site. Allied to this, an energy transmission line, linking the states of Rondônia and Acre, transects the campinarana (see...
TABLE 2

<table>
<thead>
<tr>
<th>Species name</th>
<th>Age</th>
<th>Sex</th>
<th>Body mass Mean ± SD (n) max.–min.</th>
<th>Wing Mean ± SD (n) max.–min.</th>
<th>Tarsus Mean ± SD (n) max.–min.</th>
<th>Total length Mean ± SD (n) max.–min.</th>
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<td>A</td>
<td>M</td>
<td>2 ± 1.5 (5) 2–3</td>
<td>12–15</td>
<td>2 (2) 12–15</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>F</td>
<td>8 ± 0.5 (3) 8–10</td>
<td>47 ± 2 (3) 46–54</td>
<td>14 ± 2 (3) 106</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>F</td>
<td>24 ± 2.5 (3) 24–30</td>
<td>71 ± 2.5 (3) 70–80</td>
<td>18 ± 2 (3) 168</td>
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<tr>
<td>A</td>
<td>F</td>
<td>26 ± 2.5 (3) 26–31</td>
<td>76 ± 2.5 (3) 75–80</td>
<td>18 ± 2 (3) 180</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fig. 4 in Guilherme & Santos 2013) affecting also adjacent *terra firme* forests. Furthermore, commercial sand mining has directly impacted this small ‘island’ of WSV in north-west Rondônia. This process completely destroys the vegetation, thereby exposing the soil (Ferreira *et al.* 2013, Adeney *et al.* 2016). Post-exploration, the mined areas are usually abandoned without any type of environmental recovery (Ferreira *et al.* 2013; Fig. 2E). Finally, human impacts on this area date back many decades. One evidence of this is the Madeira / Mamoré railway, whose scar, 52 years after its decommissioning, is still visible in the centre of the study site (Fig. 1).

Although small and degraded, the patch of *campinarana* we surveyed still harbours many species of conservation concern (Table 1, Guilherme & Santos 2013). In general, patches of WSV in Amazonia are fragile and sensitive to anthropogenic activities, being both threatened and poorly represented within the protected area system (Adeney *et al.* 2016, Fine & Bruna 2016). Despite an increase in studies of these ecosystems in recent years, many remain largely unknown scientifically (Adeney *et al.* 2016, Fine & Bruna 2016). We recommend that the environmental authorities in Brazil aim to restore the environmental integrity of the site, and consider the possibility of incorporating our study area into a conservation unit.

### Acknowledgements

We thank Francislaine Paulino for inviting us to monitor avifauna along the Porto Velho–Rio Branco powerline. CEPEMAR (Serviços de Consultoria em Meio Ambiente Ltda.) provided financial and logistical support. We also thank the team responsible for the ornithological collection of the Museu Paraense Emílio Goeldi, Belém, especially its curator, Dr Alexandre Aleixo, as well as Maria de Fátima Cunha Lima, Romina Batista and Sidnei de Melo Dantas for their support during this study. Paul Sweet of the American Museum of Natural History, New York, kindly photographed the holotype of *C. f. fuscatior*. Dr Evandro Ferreira (INPA) identified the two palm species in the study area via photographs. EG is grateful to CNPq for its support via project no. 474592/2010-3 (2010-2012). Specimen collection was authorised by the Chico Mendes Biodiversity Conservation Institute (ICMBio) of the Brazilian Ministry of the Environment, via SISBIO license no. 23269-1.

### References


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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

by Gary Allport

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**Summary.**—The first records of Sharp-tailed Sandpiper *Calidris acuminata* for Mozambique and continental Africa (1–2 adults, 4 February–16 April 2018), and additional records of Pectoral Sandpiper *C. melanotos* in Mozambique (1–2 birds, 20 February–31 March 2018) are reported, all at Macaneta, Maputo province. Identification features of these two species attaining breeding plumage are detailed and patterns of occurrence in Africa are discussed.

Pectoral *Calidris acuminata* and Sharp-tailed Sandpipers *C. melanotos* are phenotypically and ecologically similar high-latitude-breeding Holarctic shorebirds with long-distance migrations to South America and Australasia, respectively. Pectoral Sandpiper has two separate breeding areas, in the Arctic tundra of Siberia from the Yamal Peninsula (70°E) east to the Bering Sea, and along the north coasts of Alaska and Canada east to Hudson Bay (Cramp & Simmons 1983, Zockler & Lysenko 2000, Lappo et al. 2012). Sharp-tailed Sandpiper breeds solely in eastern Arctic Siberia from the Taimyr Peninsula (132°E) to Chaun Bay in Chukotka (170°E), and its entire breeding range is overlapped by that of Pectoral Sandpiper (Lappo et al. 2012). There is recent evidence that its breeding range may be expanding west (Lappo et al. 2012).

Sharp-tailed Sandpiper has a complex migration. Post-breeding, adults move south from Siberia on a broad front in early August, mostly passing east of Lake Baikal, and east to the Pacific coast of Russia and the Yellow Sea coasts of China (Barter 2002) and Korea, from where most apparently fly directly to Micronesia and New Guinea in late August (Higgins & Davies 1996). It is uncommon on the Asian coastal flyway south and west of the Yellow Sea, being reported only as a straggler in Vietnam, Cambodia, Peninsular Malaysia, Pakistan (Roberts 1990), India (Ali & Ripley 1969) and Sri Lanka (Roberts 1990, Henkanaththegedara 2002, van Gils et al. 2018). Migrants depart Papua New Guinea at the onset of the wet season, travelling south-west and arriving in north-west Australia mainly in mid September, then moving slowly south to south-east Australia, some crossing the continent en route, where the majority of the world population overwinters, with numbers peaking in December–early February (Higgins & Davies 1996). However, most juveniles, and a few adults, have a remarkably different strategy, migrating east from the breeding grounds across the Bering Strait to Alaska, where they fatten between mid August and late October (Tomkovich 1982, Handel & Gill 2010, Lindstrom et al. 2011). It is presumed that these birds fly from Alaska across central and western Oceania to reach Australia and New Zealand in a non-stop trans-Pacific flight of more than 10,000 km (Grönroos et al. 2010, Lindstrom et al. 2011). Some continue south along the Pacific coast of North America south to Washington state, less frequently to California, and there is a scatter of records east in
North America where the species is considered ‘possible anywhere’ (Mlodinow 2001). Prior to 2001 there were 32 records in the interior USA and 19 records on the Atlantic coast (Mlodinow 2001). It is possible that small numbers continue south on the west coast to Latin America, but to date there are only two records in the region, both recent, from Panama (Anon. 2016) and Bolivia (Knowlton 2016).

Sharp-tailed Sandpiper is a rare vagrant to Europe, with records in 11 countries (most in the UK, with 32 records by 2012: Hudson & the Rarities Committee 2013) of both juveniles and adults, mostly in August–October (Britton 1980, Cramp & Simmons 1983, van Gils et al. 2018). There are records in the Middle East and Central Asia, six from Kazakhstan (Wassink 2014) and singles in Oman (Eriksen & Victor 2013) and Yemen (Brooks et al. 1987).

In the Indian Ocean, the easternmost records are on Christmas Island (Australia), where there are four sets of records totalling 16 birds between 15 October and 10 December (James & McAllan 2014), with at least three records on Cocos (Keeling) Island in November–December 2016 (eBird). Further west there are five records from the Chagos archipelago in September–December (Carr 2015) and also five in the Seychelles, one in July, two overwintering in September / October–February and two on passage in November (Skerrett et al. 2017). There is one record from Madagascar in November 1999 (Patient 2003, Safford & Hawkins 2013).

There is also a remarkable specimen from Tristan da Cunha, collected on 16 June 1950, identified by Elliott (1957) as Sharp-tailed Sandpiper. This was followed by Cramp & Simmons (1983) and Higgins & Davies (1996), but the identity was questioned by Hockey et al. (1986). Mackworth-Praed & Grant (1962) referred to it as a Pectoral Sandpiper and Hockey et al. (1986) presumed that this was based on examination of the specimen at what is now the Natural History Museum, Tring (NHMUK). As this is an important record, the specimen was re-examined by A. J. Bond and the identity confirmed as a Sharp-tailed Sandpiper in breeding plumage (Fig. 1.). A. J. Prater (in litt. 2018) had also examined the specimen and noted that it was in suspended inner primary moult and probably therefore not fully adult (Hayman et al. 1996).

Pectoral Sandpiper also has a complex migration and vagrancy pattern. Siberian breeders are believed to depart south across the Arctic Ocean and travel along the east coast of the Pacific (Lees & Gilroy 2004), but the majority—an estimated 90%—migrates south in short hops (Piersma 1987, Farmer & Wiens 1999) via a narrow overland corridor through North America, not concentrating at particular wetlands (Skagen et al. 1999). It is surprising therefore that it is the most frequently recorded of the Nearctic vagrants to Europe (Lees & Gilroy 2004) with a regular annual influx in September–October mainly of juveniles, some of them clearly displaced by transatlantic weather systems. However, it is also possibly a ‘pseudo-vagrant’ (Gilroy & Lees 2003) with relatively small numbers from both North America and Siberia apparently on intentional, regular passage via Europe to wintering quarters in Africa (Lees & Gilroy 2004). This pattern is also mirrored in Australia and New Zealand, where small numbers of presumably Siberian breeders follow the west coast of the Pacific, joining groups of Sharp-tailed Sandpipers to overwinter mainly in Australia (Higgins & Davies 1996).

Pectoral Sandpiper is a regular vagrant to Africa, with records in 23 countries from northern, western, eastern and southern Africa (Hockey et al. 1986, Urban et al. 1986, van Gils et al. 2018b) as well as the Atlantic islands (Cramp & Simmons 1983, Hockey et al. 1986), Madagascar and the Indian Ocean islands (Hawkins & Safford 2013) as far south as the subantarctic (Viet et al. 2007). Up to five birds per annum are recorded in the southern African region (136 records 1965–2018; 36 records 1970–90) between September and May, but most arrive in December (peak) and remain until April. Peak arrival date is later than
most other migrant waders in the region and suggests that they slowly trickle south through the continent (Hockey et al. 1986). Records are mostly coastal and in the east of the region, especially Gauteng Province, South Africa, probably reflecting observer coverage (Hockey et al. 1986). It is surprising, therefore, that the first record in Mozambique was as recently as January 2017 (Allport 2018a).
Both species select similar habitats on passage and in winter, the muddy edges of shallow fresh or brackish wetlands with inundated or emergent sedges, grass, saltmarsh or other low vegetation including lagoons, swamps, lakes and pools near coasts, dams, waterholes, salt pans and hypersaline salt lakes inland (Higgins & Davies 1996). However, Sharp-tailed Sandpiper prefers coastal graminoid meadows in Alaska (Lindstrom et al. 2011) and particularly favours salt marsh and brackish lagoons where Salicornia and Cotula provide cover in Australia, less often using similar inland habitats such as wet fields of short grass. In Australia it is thought to occupy coastal mudflats mainly once ephemeral terrestrial wetlands have dried out (Higgins & Davies 1996).

The identification of this species pair was an early challenge to modern field ornithologists. Britton (1980) presented the first analyses of the identification characters of Sharp-tailed Sandpiper based on field experience of an adult and a juvenile, the written descriptions of all 16 British and Irish sight records at the time, and an examination of three specimens, along with many records of Pectoral Sandpiper. Harrop (1993) later revisited their identification adding more plumage detail. Both papers encompassed identification issues for juveniles and adults in summer or transitional plumages in the boreal autumn. As vagrancy in the non-breeding season and on spring migration is relatively uncommon, identification of winter-plumaged birds and those in transition into breeding plumage is scantily covered in the main Eurasian field guides. These plumages are, however, covered in Australasia (Higgins & Davies 1996, Pizzey et al. 2010), albeit not in great depth, perhaps because Sharp-tailed Sandpiper is a relatively common bird there with which most birdwatchers are very familiar.

Recent records in Mozambique

Regular bird observations were undertaken by GA while based in Maputo, Mozambique, between October 2010 and April 2018. Casual, low-effort, opportunistic observations were made at sites ranging from Ponta d’Ouro and Maputo Special Reserve, in Maputo province in the south, north through Gaza Province to the Bazaruto archipelago in Inhambane province (see Allport 2018b for map). Sightings were recorded in eBird. Coastal and inland wetlands were visited at all times of year. Beaches and mangrove-fringed mudflats in Maputo Bay, Inhambane and Barra were frequently visited, but freshwater and brackish swamps were mostly inaccessible. In 2017 the construction of a new bridge at Marracuene gave access to an area of tidal, tall brackish marsh in the Incomati estuary, the northern part of Maputo Bay, permitting regular coverage of these habitats for the first time.

On 4 February 2018 GA, M. Costeira da Rocha & B. Briggs visited Macaneta wetlands. At 09.10 h an area of tall saltmarsh with scattered reeds, sedges and Salicornia was searched on a rising spring tide where Curlew Sandpipers C. ferruginea and Little Stints C. minuta were feeding (25°44’05.83”S, 32°43’20.49”E). A bird that looked like a Pectoral Sandpiper was found at c.50 m range. It walked purposefully away from the observers and within two minutes started to roost on a bank. Some low-quality photographs were taken as the bird was walking. It was then flushed by an overflying Peregrine Falco peregrinus, along with all of the other waders, and settled distantly out of sight preventing further observations. The photographs (e.g. Fig. 2) suggested that the bird had an unusually ginger crown and a well-marked supercilium, but the pectoral band appeared well defined, the flanks not heavily or clearly marked, and its behaviour matched Pectoral Sandpiper. The photographs were widely shared as a Pectoral Sandpiper on social media without any queries being raised.

At 07.00 h on 18 February 2018, GA revisited the area on a rising spring tide and, in poor weather conditions, found a very different-looking Calidris at c.70 m range. It was feeding in Salicornia, skulking and clambering on and amongst the vegetation, displaying
a strongly marked face and head pattern. Based on previous experience (very similar behaviour to a UK bird; see Catley 1984), GA quickly identified it as a Sharp-tailed Sandpiper and fortunately the bird stayed in the same area for two hours as weather conditions improved, permitting better-quality photographs (Fig. 3; see https://vimeo.com/256275383). This was clearly the same bird as seen on 4 February 2018, but looked and behaved differently. Further inspection of images confirmed the identification, based on the following characters: similar to Pectoral Sandpiper but with bright ginger crown, dark ear-coverts contrasting with supercilium extending and broadening behind the eye, white eye-ring, shorter dark bill with limited pale flesh (not yellow) base, longer legged and with a small number of chevrons on the left flank, although these were only visible in some photographs (Hayman et al. 1986).

The sighting aroused considerable interest and birders from the region visited the site the next day, but the bird was not relocated. On 20 February a very similar bird in exactly the same area was photographed in poor weather and identified as a Sharp-tailed Sandpiper, and the same bird was seen again the following day. However, a close check of the photographs revealed differences from the original bird, and on 22 February it was seen well by GA and identified as a Pectoral Sandpiper (see images at https://ebird.org/view/checklist/S43106332).

On the next spring tide, on 2 March 2018, GA, R. Lindsay-Rae, J. R. Nicolau, D. Pitzalis & D. Snow awaited the rising water, and rather surprisingly at 06.15 h a Sharp-tailed Sandpiper that was clearly not the original bird was found by JRN; it was then joined a few minutes later by the bird seen on 4 and 18 February. The two birds roosted over the high tide and were seen and photographed well (Fig. 4). On 3 March the same area again held two Sharp-tailed Sandpipers but on this occasion they were joined by two Pectoral Sandpipers, and the four birds formed a small flock for two hours over the high tide (Fig. 5).

The two Sharp-tailed Sandpipers remained, usually together, until 6 March when the tidal range ebbed and the feeding area quickly dried out. One Pectoral Sandpiper was also seen but usually not with the Sharp-tailed Sandpipers. The three birds reappeared on the new moon tides on 18–21 March, and singles of both species were seen foraging separately on 31 March. A single Sharp-tailed Sandpiper was last seen on the spring tide on 16 April (Table 1).
Figure 4. Two adult Sharp-tailed Sandpipers *Calidris acuminata*, 2 March 2018; the original bird (front) showing bright fringes to the tertials and a single well-marked chevron on the flanks (© J. R. Nicolau / Unearth Safaris)

Figure 5. Two adult Sharp-tailed Sandpipers *Calidris acuminata* (below and right) and two Pectoral Sandpipers *C. melanotos* (above and left), Macaneta, Mozambique, 3 March 2018 (© Michael Mason)
Both Sharp-tailed Sandpipers showed evidence of having recently completed outer primary moult (cf. Fig. 6.) and were therefore aged as adults (see Prater et al. 1977). It was impossible to determine gender as they were similar in size.

### Identification

The multiple misidentification of both species by experienced observers reported herein is salutary and warrants comment. Whilst the treatment of both species in boreal autumn plumages is thoroughly covered by the main identification texts (see above), they are not well covered during spring moult into breeding plumage. It is worth flagging the following features.

**Head pattern.**—The combination of rufous crown, darker ear-coverts, paler supercilium widening behind the eye and pale eye-ring provide an excellent suite of features for distinguishing Sharp-tailed Sandpiper from Pectoral Sandpiper in winter / spring plumages. However, note that the supercilium is illustrated as being broader behind the eye in Pectoral Sandpiper in some references (e.g. Snow & Perrins 1998). Use of this feature is also made more complex as the supercilium in Sharp-tailed Sandpiper becomes less well defined as summer plumage is attained, when dark-centred feathers speckle the face, breaking-up the superciliary pattern. In contrast the eye-ring emerges as even more distinct during this transition. The dark ear-coverts add contrast to the definition of the supercilium in winter plumage, when they represent a strong feature, but also become less discernible in summer plumage. The two Pectoral Sandpipers also showed quite bright ginger crowns in certain lights, more so than illustrated in major field guides, although much less well marked than the adjacent Sharp-tailed Sandpipers.

**Breast and underparts pattern.**—Underparts pattern is cited as an important feature in separating these two species, but it is clear that as Sharp-tailed Sandpiper mouls into summer plumage this can be very similar to Pectoral Sandpiper (Fig. 1). Pectoral Sandpiper can also show dark-centred feathers on the flanks in summer plumage, so it is only the dark chevrons on the flanks that make the identification of Sharp-tailed Sandpiper obvious at this time (February–May). It is also unclear how much streaking Pectoral Sandpiper can show on the rear flanks and undertail-coverts, making identification using this feature a question of degree and difficult to assess in lone individuals.

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**TABLE 1**

Summary of observations of Sharp-tailed Sandpiper *Calidris acuminata* (STS) and Pectoral Sandpiper *C. melanotos* (PS) at Macaneta, Mozambique, February–April 2018.

<table>
<thead>
<tr>
<th>Date</th>
<th>STS</th>
<th>PS</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 February</td>
<td>1</td>
<td></td>
<td>Identified as Pectoral Sandpiper</td>
</tr>
<tr>
<td>18 February</td>
<td>1</td>
<td></td>
<td>Identified as Sharp-tailed Sandpiper</td>
</tr>
<tr>
<td>20-21 February</td>
<td>1</td>
<td></td>
<td>Identified as Sharp-tailed Sandpiper</td>
</tr>
<tr>
<td>22 February</td>
<td>1</td>
<td></td>
<td>Identified as Pectoral Sandpiper</td>
</tr>
<tr>
<td>2 March</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 March</td>
<td>2</td>
<td>2</td>
<td>Four birds in one flock</td>
</tr>
<tr>
<td>4-6 March</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>18-19 March</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20 March</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 March</td>
<td>1</td>
<td>1</td>
<td>Possibly two Sharp-tailed Sandpipers</td>
</tr>
<tr>
<td>16 April</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 6. The second Sharp-tailed Sandpiper *Calidris acuminata*, Macaneta, Mozambique, March 2018, showing two old outermost primaries, indicating that it is an adult; this bird was mostly in winter plumage when initially found on 2 March 2018 (© David Hoddinott)
Bill colour.—Pectoral Sandpiper usually shows a clear yellow basal third to the bill, and the two Sharp-tailed Sandpipers had a pale flesh-coloured base to the mandible (Fig. 4). However, review of images of summer-plumaged Sharp-tailed Sandpipers revealed birds with clear yellow coloration over up to 50% of the mandible, ‘bleeding’ onto the maxilla (e.g. Lundquist 2011 in April). Therefore, bill colour can be used to positively identify a Sharp-tailed Sandpiper only if it is mostly dark and does not show yellow tones.

Thus the combination of facial pattern and to a lesser extent bill characters are critical for separating these two species in late winter / early spring. Underparts pattern may be conclusive but only if clear chevrons are evident.

Records and vagrancy

A literature search demonstrated that the Sharp-tailed Sandpipers reported herein are the first and second records for Mozambique, for the southern Africa region (T. Hardaker in litt. 2018) and for continental Africa (R. J. Dowsett in litt. 2018). Based on the pattern of records in Europe, Central Asia, the Middle East and on Indian Ocean islands, the possibility of vagrancy by this species to mainland Africa, and the southern Africa region in particular, had been anticipated (Hardaker 2008, Peacock 2016). However, it is remarkable that two were found together with relatively limited effort in suitable habitat in Mozambique. Indeed, several visiting birders commented that the species might prove to be regular at the site in small numbers as a pseudo-vagrant (Gilroy & Lees 2003), as is true for a few other shorebirds at specific wintering localities in the region, such as infrequent but regularly occurring Great Knot *C. tenuirostris* at Barra, Mozambique (Peacock 2016), Steppe Whimbrels *Numenius phaeopus alboaxillaris* at four localities in southern Mozambique and South Africa (Allport 2017), and, further afield, Pacific Golden Plover *Pluvialis fulva* in Gabon (Christy 1990).

There are two possible routes of vagrancy for these birds. The first is the Central Asian–East African corridor, possibly via the Rift Valley. The first conclusive evidence of the use of the Rift Valley overland migratory route by coastal waders was shown by a satellite-tagged Steppe Whimbrel in 2016 (Allport et al. in press) but there is strong circumstantial evidence that this route is used by a wide range of shorebirds wintering in southern Africa (Dowsett 1980). Use of this overland flyway, potentially with no continental stopovers, might explain the lack of records of Sharp-tailed Sandpiper further north in Africa. Southern coastal Mozambique lies on a natural route where migrants following the Rift southbound would reach the coast of the Indian Ocean (a similar explanation for coastal records of Baltic Gull *Larus f. fuscus* in southern Mozambique has been postulated: Allport 2018b). Two records of Sharp-tailed Sandpiper in the Middle East support this idea, and the possibility that the species breeds further west in Siberia (Lappo et al. 2012) increases the likelihood of vagrancy via this route.

The cluster of records on Indian Ocean islands points to a second, possible, transoceanic route. The frequency of records on Christmas Island suggests that Sharp-tailed Sandpipers regularly wander to the eastern Indian Ocean on southbound migration in September–December, probably from the major migratory crossing, Micronesia / Papua New Guinea to north-west Australia, a movement with a strong westerly component and likely to result in overshoots. There is a general decrease in the frequency of records south and west across the Indian Ocean, with none from the relatively well-watched islands of Mauritius and Réunion (Safford & Hawkins 2013), a pattern which again suggests that the origin of vagrancy lies to the east, and only a few stragglers might reach coasts of East Africa. It should also be considered that Sharp-tailed Sandpipers might enter the Indian Ocean via the Indian Subcontinent, but there are only two records in Pakistan / India (Roberts 1990).
and five from Sri Lanka (Henkanaththegedara 2002), making this unlikely to be a major route for transoceanic vagrants. One other, even more unlikely, but intriguing possibility is overshooting by juveniles leaving Alaska intent on reaching their Australian wintering grounds for the first time. Grönroos et al. (2010) postulated that the potential single-haul, 12,000 km migratory flight of juveniles from Alaska to Australia would cross Papua New Guinea potentially on a broad front, meaning some might easily overshoot into the Indian Ocean. Most of the birds recorded in the Indian Ocean were not aged, but all those photographed on the Chagos archipelago were adults (P. Carr pers. comm.) with just one record from the Cocos (Keeling) Islands of a juvenile (19 November 2016, https://ebird.org/view/checklist/S32777999). Both birds in Mozambique were adults.

Both the Rift Valley and Indian Ocean transoceanic routes therefore seem plausible for the birds recorded in Mozambique. Only further records in the region might enable the route of vagrancy to be better understood.

Turning to Pectoral Sandpiper, Hockey et al. (1986) concluded that those found in southern Africa enter the continent solely via the Nearctic–Europe route rather than the Asia–East Africa flyway. In drawing this conclusion, the more easterly distribution of Pectoral Sandpiper records in southern Africa was considered to reflect probable observer bias, and the lack of records of Sharp-tailed Sandpiper—which it was presumed would have arrived via the Central Asia–East Africa flyway—was noted in support of this hypothesis, as was the questionable validity of the Tristan da Cunha record. Both latter suppositions are now invalid, and the notion that Pectoral Sandpiper has a range of inter-African migratory strategies including southerly migration from the western Siberian breeding range via the Asia–East Africa flyway to eastern Africa acquires greater support (Hockey & Douie 1995, Lees & Gilroy 2004, Hjort 2005). This not to say that Pectoral Sandpipers of a Nearctic, rather than Palearctic origin, do not enter the region too, as held by Curry-Lindahl (1981), and implied by Feare & Watson (1984) for the Indian Ocean islands; both entry routes to the continent appear likely.

The distribution of records in the region must, to some extent, reflect both observer coverage and ability to identify the species (as in Australia and New Zealand: Higgins & Davies 1996), but the number of records strongly supports Lees & Gilroy’s (2004) idea that a small population regularly overwinters in Africa and many of these are probably intentional migrants.

Acknowledgements

Barnaby Briggs and Manuel Costeira da Rocha were regular field companions and co-finders of the first Sharp-tailed Sandpiper. David Gandy, Terry Townshend, David Bakewell and Trevor Hardaker helped in the initial identifications. Many people visited the site but Etienne Marais, Robert Lindsay-Rae, Justin Rhys Nicolau, David Snow, Diego Pitzaís and Emidio Sumbane made a special effort, which helped enormously in the finding of the second Sharp-tailed Sandpiper. Susan Mvungi, Graham Catley, Andy Stoddart, Trevor Hardaker, David Hoddinott, Tomas Lundquist, Michael Mason, Justin Rhys Nicolau and Peter Rosewarne provided photographs and gave permission for their reproduction here. Alex Bond examined specimens and arranged the photograph by Harry Taylor. The local people of Macaneta dealt with an invasion of birders with tempered inquisitiveness, patience and the good-natured humour that characterises their country.

This paper is dedicated to Tim Cleeves with whom I had my first discussion of Sharp-tailed Sandpiper identification on the Wirral, UK, in the late 1970s, together picking the brains of Graham Williams, one of the finders of the Shotton Pools bird in 1973 (Johnson et al. 1974). Tim went on to become a guru on the topic and later re-identified a bird at Frodsham in 1983 (Pitches 2018). Tim and I had not been in touch for many years but it was with great sadness that I learned of his death in December 2017, and I have missed what would have surely been an enthusiastic discussion with him on the various birds at Macaneta, Mozambique.
References:
Sultan Qaboos Univ., Muscat.


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Sixty years on: birds of the Sierra del Carmen, Coahuila, Mexico, revisited

by Eliot T. Miller, John E. McCormack, Greg Levandoski & Bonnie R. McKinney

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Summary.—The rugged peaks of the Sierra del Carmen, Coahuila, visible from the Chisos Mountains in Texas, have tempted birdwatchers for decades, yet few have accessed the range, and its avifauna is poorly known. Based primarily on our own observations, supplemented by the literature, museum holdings and eBird records, we present an updated list of the region’s avifauna. This list comprises 301 species, 137 of which breed in the region. As in previous surveys, we found bird species characteristic of both the intermontane West and tropical mountains to the south. We confirm that the Sierra del Carmen is slightly less speciose than sky islands of the Sierra Madre Occidental. Nevertheless, it is the northernmost outpost or migratory stopover of several regionally and globally rare species, and could serve as a stepping stone for species moving north with climate change. Although not a centre of endemism, the Sierra del Carmen is a vital and unique region for avian diversity.

Large online citizen science initiatives such as eBird (Sullivan et al. 2009) have successfully documented global biodiversity, with >500 million observations in its database, representing all countries and 99% of extant avian diversity. Yet, eBird coverage is still highly biased toward well-visited areas, leaving the avifauna across large swathes of the Americas, especially Central and South America, poorly known. Directly across the US border from Big Bend National Park in Texas is the Sierra del Carmen, an isolated mountain range in northern Coahuila, Mexico. Its rugged physiognomy and forested expanses are visible from the Chisos Mountains of Big Bend National Park, but travel there from the USA has always been challenging, making it far more remote and unknown than its distance from major birding areas alone. The Sierra del Carmen forms part of a chain of sky-island mountain ranges extending north from the Sierra Madre Oriental, much like the well-known Madrean Sky Islands north of the Sierra Madre Occidental, and it is the largest forested highland area for many kilometres in any direction. The Chisos Mountains, a well-known birdwatching hotspot, lie 64 km to the north-west and the almost unknown Sierra la Encantada 32 km to the south-east, but these forested highlands are significantly smaller in total area than the Sierra del Carmen. To date, the avifauna of the Sierra del Carmen is little known except to the few people that have lived in the area for years. Sixty years ago, Alden Miller, Aldo Starker Leopold and Ward Russell spent a month in the Sierra del Carmen collecting and observing birds (Miller 1955b). Since then, there has been just one published bird list from the Sierra del Carmen (Wauer & Ligon 1977). As of 1 March 2017, there were only 128 checklists for the Sierra del Carmen in eBird’s database (59 of them by ourselves). These checklists, as well as research papers on the ecology and evolution of birds in the Sierra del Carmen (Wauer & Ligon 1977, McCormack & Smith 2008) appear to confirm observations first made by Miller (1955b): the absence of certain species that would appear to possess suitable habitat in the range, and niche expansion.
into these vacant habitats by other species. Given that recent studies of the avifauna of nearby regions have documented new and surprising records (Benson et al. 1989, Contreras-Balderas et al. 2004, McCormack et al. 2007, Ruvalcaba-Ortega & González-Rojas 2009, Sánchez-González 2013), we have endeavoured here to synthesise a complete checklist for the Sierra del Carmen.

Methods

Location.—The Sierra del Carmen is in northern Coahuila, Mexico (Fig. 1) and largely lies within the 200,000-ha Maderas del Carmen Flora and Fauna Protected Area. The majority of the land is owned and managed by the international cement company CEMEX, which has, since the late 1990s, managed it as a biological preserve (McKinney 2012). Elevation in this region spans 560 m (where Boquillas Canyon empties into the Rio Grande) to the highest peaks above 2,700 m. Los Pilares field station, the base for much recent field work, is at 1,150 m in the west of the range, in Chihuahuan Desert habitat near the mouth of Cañón El Alamo, site of the former Rancho San Isidro.

The Sierra del Carmen is a sky island at the north end of the Sierra Madre Oriental, part of a corridor linking the Mexican highlands to the Rocky Mountains (McKinney 2012). Vegetation in the region can be broadly classified into five major associations: desert shrub, grasslands, chaparral, pine–oak woodland and fir–pine forest. The lowest desert elevations contain creosotebush Larrea tridentata, honey mesquite Prosopis glandulosa, prickly pear cactus Opuntia spp., lechuguilla Agave lechuguilla, native grasses Poaceae spp. and candelilla Euphorbia antisiphilitica. In a transition zone above this, native grasslands, Yucca spp., sotol Dasylirion wheeleri and beargrass Nolina texana dominate. The higher canyons are characterised by pine–oak–juniper Pinus–Quercus–Juniperus woodland, with large stands of American basswood Tilia americana, dogwood Cornus sp., ninebark Physocarpus monogynus and other deciduous woodland species in riparian areas. The highest elevations are dominated by Douglas fir Pseudotsuga sp., Coahuila fir Abies durangensis var. coahuilensis, Arizona cypress Cupressus arizonica, along with several stands of blue spruce Picea sp., quaking aspen Populus tremuloides, oaks and pines. The high escarpments of the sierra trap moisture-laden Gulf Coast air masses, with most rainfall during mid to late summer. Snow and ice storms can occur in winter (McKinney 2012). As a testament to the diversity of habitat types, some authors have divided Mexico into seven major life zones below the Artic–alpine belt (Goldman & Moore 1945); five of these occur in the Sierra del Carmen.

Data collection methods.—Our checklist is a synthesis of our own visual observations and mist-net records, eBird records, museum holdings and published reports (Marsh 1936, Marsh & Stevenson 1938, Taylor et al. 1945, Miller 1955b, Van Hoose 1955, Urban 1959, Ely 1962, Wauer & Ligon 1977, Garza de León et al. 2007). We follow current eBird taxonomy (https://ebird.org/news/2018-ebird-taxonomy-update), which is closely aligned to current AOS taxonomy, except that eBird recognises Mexican Duck Anas diazi as a species distinct from Mallard A. platyrhynchos. Records are assigned to one of four seasons: spring (March–May), summer (June–August), autumn (September–November) and winter (December–February). Most of our observations are made by BRM, who worked as wildlife coordinator in 2001–13 (McKinney 2012). JEM conducted field work in the region for months at a time between 2002 and 2008. We obtained eBird records by querying the database for all records from Coahuila, then selected a subset of records from a region bounded by the USA / Mexico border to the north, by Mexican highway 53 to the west and south (which runs from Boquillas del Carmen towards Santa Rosa de Múzquiz), and by the road between La Linda, Coahuila, Mexico, and highway 53 to the east. Most of our unusual observations and breeding records were documented with photographs or sound-recordings. A few of
our observations are unusual in respect to what has been published to date for the Sierra del Carmen, but are of birds known to occur, albeit rarely, in the Big Bend area; we note these cases. We also note when historical records are associated with museum specimens.
Results

The comprehensive list of the avifauna of the Sierra del Carmen comprises 301 species, 137 of which are confirmed breeders, and an additional four might breed in the area (Table 1). The only species we have excluded from the list are Pine Flycatcher Empidonax affinis (Taylor et al. 1945), which we consider to represent a misidentification, Woodhouse’s Scrub Jay Aphelocoma woodhouseii, which was previously reported in error to eBird, and Imperial Woodpecker Campephilus imperialis. Based on indirect evidence (large nest cavities and discussion with a local hunter), R. Wauer believed that the species might formerly have occurred in the Sierra del Carmen (Nelson 2002), but we have found no evidence to support its presence and do not include it here. Below, we provide details of notable records.

Species accounts.—Noteworthy records primarily fall into two categories: significant northward range extensions of species that might routinely occur in small numbers, and species that have experienced recent regional range expansions and are now fairly common in the area.

LEAST GREBE Tachybaptus dominicus
A female with a chick on its back was observed in summer 2002 at Tanque Zacatosa, near Rancho Pilares. Also documented to the south-east near Sierra Encantada (McCormack et al. 2007). Considered a rare resident but vacates the area when water tanks dry up during long droughts.

TRICOLOURED HERON Egretta tricolor
There have been a couple of sightings of this uncommon to rare autumn migrant in the Sierra del Carmen. There are a handful of previous records from Chihuahua, where it is considered a rare autumn migrant (Moreno-Contreras et al. 2015).

SWALLOW-TAILED KITE Elanoides forficatus
Observed on 20 May 2007 on the road between Pilares and Múzquiz, flapping and gliding steadily north. This record is well west of the species’ regular migration route, and probably involved a vagrant.

COMMON BLACK HAWK Buteogallus anthracinus
The first nesting record was in May 2002, when BRM & J. Delgadillo Villalobos observed a pair at a nest near Campo Uno. The nest, in a Ponderosa pine Pinus ponderosa, held two young, and an immature was photographed nearby in June 2002. This nest was used annually until 2013. Also in May 2002 pairs were observed in Cañón Carboneras, Cañón Juarez and midway along Cañón El Oso. The species has undergone a range contraction throughout the south-west USA and is considered threatened in Mexico, endangered in New Mexico, threatened in Texas, and is a candidate for listing in Arizona (Schnell 1994), although it breeds infrequently in the Davis Mountains and Big Bend area (Benson & Arnold 2001). It probably occurs sparsely throughout suitable riparian habitat in the Sierra del Carmen, and was first noted from these mountains in the mid-20th century (Taylor et al. 1945).

SOLITARY EAGLE Buteogallus solitarius
The first observation was in March 2003 in upper Juárez Canyon, by BRM & J. Delgadillo Villalobos. Thereafter, BRM saw at least three others: singles at Campo Uno flying around El Mirador, near Campo Cinco, and in flight near Campo Tres. At least one or two were
TABLE 1
Complete bird checklist, with breeding status, of the Sierra del Carmen, Coahuila, Mexico, including the authors’ observations in 2001–15. BRM was a resident in the area in 2001–13. Status abbreviations: RB = resident breeder, M = migrant non-breeder, MB = migrant breeder, H = hypothetical breeder.

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<th>Scientific name</th>
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observed every year BRM conducted field work in 2003–13. All observations were made between 1,460 and 2,450 m elevation. The lowest vegetation association was in Cañón Juárez, characterised by scattered pines, juniper and oak. The highest observation was made near Campo Tres, in pine–oak–fir forest. The majority of observations were centred on pine–oak woodlands, and all were made in mid March–early May.

A specimen was collected in 1961 by A. Garza de Leon, former director of the Museo de las Aves in Saltillo, at Rancho las Margaritas, in the Serranías del Burro, adjacent to the Sierra del Carmen (Howell & Webb 1995). He shot it believing it to be a Turkey Vulture *Cathartes aura*. When he reached the downed bird, he was astounded to discover its true identity. The mounted specimen is in the Museo de las Aves collection, and was examined by Clark *et al.* (2006) for their primer on identification.

In 1993 and 1994, Elizabeth Spence de Sellers & BRM observed a pair of Solitary Eagles in the ‘Lobo Pasture’, Serranías del Burro, during bird surveys, including an observation of a pair hunting and one carrying an Eastern Fox Squirrel *Sciurus niger* in its talons. No nest could be located.

Based on these observations, Solitary Eagle might occasionally nest in the Sierra del Carmen, which would represent a significant range extension. In Mexico, the species is listed as Endangered, and the nearest population is in the Sierra Madre Mountains of Chihuahua far to the west (Howell & Webb 1995). There are also recent photo-documented records on eBird from Tamaulipas.

**WHITE-TAILED HAWK** *Geranoaetus albicaudatus*

On 15 June 2003, JEM observed many at the entrance to Santo Domingo Ranch on the east side of the Sierra del Carmen. In May 2010, one was observed by BRM and a group from US Fish & Wildlife Service, Big Bend National Park, and Rio Grande Joint Venture, flying low over grasslands in the Zacatosa area, near Rancho Los Pilares. It has also been documented on eBird in the vicinity of Múzquiz, as well as in Big Bend National Park and Black Gap Wildlife Management Area.

**NORTHERN GOSHAWK** *Accipiter gentilis*

R. Wauer documented a nest high in the pine–fir forest of the Sierra del Carmen (Wauer 1992). The species is a resident breeder at the highest elevations, in stands of tall, mature
pine–fir habitat with sheer cliffs bordering open areas, during spring to autumn. In winter the species moves downslope to the lower canyons, particularly the upper Cañón El Alamo, Cañón Fronteriza and Cañón Juárez, which support riparian pine–oak habitat. This is a very isolated population of the species, with the nearest populations in the Sierra Madre Occidental and parts of the south-west USA.

**LAUGHING GULL** *Leucophaeus atricilla*

Photographs were taken of this species on the landing strip at Los Pilares in 2001. Presa Don Martin near Sabinas, Amistad Lake at Del Rio, and Balmorhea Lake, in Texas, all have resident Laughing Gulls.

**WHITE-TIPPED DOVE** *Leptotila verreauxi*

Regularly recorded in lower canyons of the sierra, and we found nests in September 2004 and May 2007. Given the relative ease of detection (flushes at close range and calls regularly), it is unlikely to have been missed by Miller (1955). Instead, these new records are probably attributable to range expansion, both locally (McCormack *et al.* 2007) and regionally, possibly as a result of land-use changes (Hogan 1999).

**WHITE-WINGED DOVE** *Zenaida asiatica*

Seen just once by Miller (1955), we regularly observed it in low-elevation canyons like El Alamo. Like White-tipped Dove, it is probable that the species was indeed rare in the 1950s, and that its modern abundance in the region is a function of recent range expansion (Schwertner *et al.* 2002).

**COMMON PURAFAQUE** *Nyctidromus albicollis*

Not documented on eBird much further west than Del Rio, Texas, the species was heard calling near Tanque Pilares one evening in early October 2001 by BRM *et al.*

**RIVOLI’S HUMMINGBIRD** *Eugenes fulgens*

Seen just once by Miller (1955), with a specimen collected by A. Starker Leopold housed at the Berkeley Museum of Vertebrate Zoology (MVZ 129681). We regularly observed it in mid- to high-elevation forests. There are now many eBird records in Big Bend National Park, where it has been known as a breeder for some years (Wauer 1996). On 8 May 2007 a nest was found above Campo Dos. The female was incubating or brooding. The nest was 7 m up in a 17 m-tall conifer, 3 m along a horizontal branch and 60 cm from its tip. At Casa San Isidro, where hummingbird feeders were installed, the species was a daily visitor during spring to early autumn. The surprisingly small number of observations by Miller is hard to explain.

**APLOMADO FALCON** *Falco femoralis*

Spring and autumn sightings in 2003–05 of a lone bird near Los Pilares. No photographs were taken. Perhaps a vagrant from west of the Sierra del Carmen in adjacent Chihuahua, where there is a breeding population (Moreno-Contreras *et al.* 2015). There are a few eBird records in Big Bend National Park.

**EASTERN WOOD PEWEE** *Contopus virens*

At least one in the evening of 28 April 2007 at Campo Uno before a heavy thunderstorm passed. At least one was present again the following morning. Identification was based on the vocalisation, which was clear, plaintive and less hoarse than that of Western Wood
Pewee C. sordidulus. The Sierra del Carmen is outside the known regular migration route of the species, although Howell & Webb (1995) mentioned it as a vagrant in adjacent Chihuahua.

**DUSKY FLYCATCHER** *Empidonax oberholseri*
Mist-netted in Cañón El Alamo on 22 April 2007. Identification confirmed mensurally. There are numerous records in Big Bend National Park on eBird.

**DUSKY-CAPPED FLYCATCHER** *Myiarchus tuberculifer*
First seen on 30 May 2007, when we observed a pair exploring cavities in various snags around Campo Uno. The species’ unique vocalisations first alerted us to the birds’ probable identity. We later confirmed the identification visually—they were much smaller than the common Ash-throated Flycatcher *M. cinerascens*, the undertail was all grey, and the belly was brighter yellow. Considered a very rare breeder in the Jeff Davis and Chisos Mountains of Texas, and it is probably a regular but rare breeder in the Sierra del Carmen as well. All of our observations relate to the same pair at Campo Uno.

**BLACK-CAPPED VIREO** *Vireo atricapilla*
Reported by Miller (1955) as fairly common in the lower Boquillas Canyon, where it was found primarily in catclaw *Senegalia greggii*-dominated areas of dense shrubs. Benson & Benson (1990) estimated 6,301 ± 3,162 breeding pairs in the region, and one of us previously documented a comparatively dense population breeding in the Sierra del Carmen (McKinney 1998). At the eastern end of the range, in Cañón Morteros, Black-capped Vireo was abundant in areas of scattered oaks, large boulders and stands of juniper. Singing males were territorial by early April, and several were mist-netted in 2002. They are also found at Cuesta Malena in a habitat comprising scattered oaks, Gregg ash *Fraxinus greggii* and boulders. To the east, in the Serranías del Burro in similar habitat, a large breeding population was documented in 1993–96 (McKinney 1987, McKinney & Sellers 1996).

**CLARK’S NUTCRACKER** *Nucifraga columbiana*
One was observed by S. Gibert Isern on the road to Campo Dos in 2003. There is also a single eBird record from the Chisos Mountains in Big Bend National Park.

**RED-BREASTED NUTHATCH** *Sitta canadensis*
Seen on Mesa Bonita and at Campo Tres, high in the mountains in pine–oak–fir forest. Observed in all seasons, but nesting not definitively documented. Three were seen in Ponderosa pine *Pinus ponderosa* at Campo Tres in July 2002. Not considered to be resident in the area, and is only an irregular winter visitor to northern Mexico (Howell & Webb 1995, Delgado-Fernández & Delgadillo-Nuño 2016), and a sporadic visitor in autumn to spring throughout the Trans-Pecos, including Big Bend National Park (Peterson & Zimmer 1998).

**RUSSET NIGHTINGALE-THRUSH** *Catharus occidentalis*
On 14 May 2007, at c.2,500 m, we heard a *Catharus* singing, but we assumed the song belonged to an odd migrant Hermit Thrush *C. guttatus*. The vegetation in the ravine comprised small deciduous shrubs (e.g., *Physocarpus monogynus*) with a coniferous canopy on the fairly steep, dry slopes above. We heard the same bird singing upon our return to the area on 31 May 2007, and again on 1 June 2007. On 3 June 2007 we returned at 08.05 h with the goal of observing the bird. It was difficult to see, but we noted that the upperparts were dull brown, the breast grey, it had an eye-ring, a bicoloured bill, and the vent was white or
pale grey. The bird sang almost continuously until we left at 10.15 h. We returned on 7 June 2007 and were able to record two brief song bouts using a digital camera (http://www.xeno-canto.org/357625, http://www.xeno-canto.org/357626). A bandpass-filtered version has also been uploaded to Macaulay Library (ML85671051), where the identification was confirmed by reviewers. Near the singing bird, we noted the presence of at least four old nests that resembled those of other Central and South American *Catharus* and *Turdus* species (ETM, H. F. Greeney & V. Rohwer pers. obs.; Fig. 2). We departed the study site on 10 June 2007, and made no further observations of the bird. This site is c.425 km north of the nearest known population, near Monterrey, Nuevo León. While our evidence of breeding is far from conclusive, the large number of nightingale-thrush-like nests in the ravine, and extensive singing throughout the day for 24 days suggests at least a male advertising for a mate.

**LAPLAND LONGSPUR** *Calcarius lapponicus*
Rare visitor. Observed at the bird feeder at Casa San Isidro. The species has been documented across the Rio Grande in western Texas, in the northern portion of the Trans-Pecos, where it is considered accidental in winter (Peterson & Zimmer 1998).

**GOLDEN-CHEEKED WARBLER** *Setophaga chrysoparia*
Rare, sightings from Cañón Morteros area, where there is Ashe juniper *Juniperus ashei*, the species’ preferred breeding habitat. A few eBird records exist for Big Bend National Park.
RED-FACED WARBLER *Cardellina rubrifrons*

Seen once, on 12–17 April 2006 (only a single checklist was kept for this period) just downstream of Campo Dos, at the entrance to El Moreno Canyon.

SLATE-THROATED REDSTART *Myioborus miniatus*

Like McCormack *et al.* (2005), who documented a breeding pair near Campo Dos, we found the species to be thinly distributed throughout the narrow drainage from Campo Dos to Campo Tres. Our observations were primarily in May–June.

FLAME-COLOURED TANAGER *Piranga bidentata*

Very rare. Documented just three times in the Sierra del Carmen. Photo-documented on eBird in the Chisos Mountains of Big Bend National Park. Common in the Sierra Santa Rosa, 100 km to the south-east (McCormack *et al.* 2007).

AUDUBON’S ORIOLE *Icterus graduacauda*

Not noted by Miller (1955b), but we found the species to be common throughout the lower western canyons. McCormack *et al.* (2007) also noted it as common in the Sierra Santa Rosa, 100 km to the south-east, and suggested that the failure of previous studies to locate the species in this area might reflect a recent increase in its abundance. While this could be true, there is a specimen from the Sierra del Carmen collected in 1940 at the Perot Museum of Nature and Science in Dallas (PMNS 001444), two specimens taken to the south-east near Sabinas, Coahulla, in 1910, housed at the Field Museum of Natural History, Chicago (FMNH 125181–182), and an audio-recording from the nearby Sierra Encantada in 1983 (Florida Museum Bioacoustic Archive UF Audio 7216). It therefore seems probable that the species has long been present in the region, but might have experienced a more recent increase in abundance. Audubon’s Oriole is resident and its preferred habitat is the lower edge of pine–oak woodlands comprising pine, oak, juniper and yucca. It is also common to the east in the Serranías del Burro (Benson *et al.* 1989).

**Discussion**

The Sierra del Carmen possesses an interesting avifauna that combines species from several nearby biogeographic regions. Those characteristic of regions to the north and the high mountains of Mexico include Broad-tailed Hummingbird *Selasphorus platycercus*, Cordilleran Flycatcher *Empidonax occidentalis* and Flammulated Owl *Psiloscops flammulois*. Species primarily found further south include Montezuma Quail *Cyrtonyx montezumae*, Common Black Hawk, Solitary Eagle, White-tipped Dove, Rivoli’s Hummingbird, Blue-throated Hummingbird *Lampornis clemenciae*, Dusky-capped Flycatcher, Russet Nightingale-Thrush, Olive Warbler *Peucedramus taeniatus*, Colima Warbler *Oreothlypis crissalis*, Painted Redstart *Myioborus pictus*, Slate-throated Redstart, Yellow-eyed Junco *Junco phaeonotus*, Varied Bunting *Passerina versicolor* and Audubon’s Oriole. Finally, as noted by Miller (1955a,b), certain species are ‘notably lacking’. We confirm the absence of any breeding evidence for chickadees *Poecile* spp., bluebirds *Sialia* spp. or Brown Creeper *Certhia americana*, and likewise corroborate his observation that some species expected to be common based on habitat are absent or almost so during the breeding season: Hairy Woodpecker *Dryobates villosus*, Steller’s Jay *Cyanocitta stelleri*, Plumbeous Vireo *Vireo plumbeus* and Yellow-rumped Warbler *Setophaga coronata*.

Compared to sky islands north of the Sierra Madre Occidental like the Chiricahua Mountains, those north of the Sierra Madre Oriental, of which the Sierra del Carmen is one, are relatively depauperate in tropical bird species. McCormack *et al.* (2007) posed the
question whether the eastern sky islands truly lack such species, or whether the regional list might grow with additional exploration of this comparatively poorly known area. We conclude that while we have added a few southern taxa to the regional list, these isolated mountains are indeed less diverse in tropical species than their western counterpart sky islands. This begs the question of how these tropical species have come to be distributed in the area. Have they dispersed comparatively recently from further south, or are they perhaps relict populations from when more mesic vegetation dominated the region (Metcalfe et al. 2000, McCormack et al. 2007)? Based on genetic evidence from Mexican Jay Aphelocoma ultramarina, many of these species may be relicts of populations that were previously more widespread during glacial maxima when forest was amply distributed (McCormack et al. 2008).

As a sky island, the Sierra del Carmen rises as a beacon of intact, forested landscape within an otherwise sparse corridor of suitable habitat for montane Middle American species shifting north along the Sierra Madre Oriental with climate change (Davis & Shaw 2001, Colwell et al. 2008). Moreover, it harbours a distinctive set of known (McCormack et al. 2008) and presumed genetically distinct populations of otherwise more southerly distributed species. Fortunately, the majority of the region is federally protected and carefully managed, much of it by the international company CEMEX. Rehabilitation efforts of past environmental injuries have been underway for many years, including removal of logging waste and the re-introduction of Bighorn Sheep Ovis canadensis, Pronghorn Antilocapra americana and Elk Cervus canadensis, and the long-term conservation outlook in the Sierra del Carmen appears promising (McKinney & Villalobos 2014).

Acknowledgements

We thank CEMEX for conserving and stewarding land in the Sierra del Carmen, Elena Berg, Erik Peñaloza and Jan Brotman for contributing their observations, and the anonymous reviewers whose input greatly improved this manuscript. We also appreciate the observations by Billy Pat McKinney (Manager El Carmen), Jonas Delgadillo, Feliciano Heredia Pineda and Santiago Gibert Isern who have conducted field work at El Carmen.

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A price list of birds collected by Alfred Russel Wallace inserted in *The Ibis* of 1863

by Kees Rookmaaker & John van Wyhe

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http://zoobank.org/urn:lsid:zoobank.org:pub:43B17926-9D7F-4DDC-9B8C-AA556354CBD1

Summary.—Vol. 5 of *The Ibis* (1863) contained four loose inserts advertising specimens for sale by the natural history dealer Samuel Stevens. One of these represents the remaining stock of birds obtained by Alfred Russel Wallace during his expedition to the Malay Archipelago in 1854–62. A total of 246 specimens from eight regions were listed, with prices ranging from three to 20 shillings, plus ten specimens priced at more than £1. The most expensive items were a pair of Standardwing Bird-of-paradise *Semioptera wallacii*, and a fine example of the Twelve-wired Bird-of-paradise *Seleucidis melanoleucus*. Only one copy of this insert is known to survive, because they appear to have been removed when the volumes were bound and preserved. All 246 specimens are listed according to the original print version, with the addition of current scientific and vernacular names.

The naturalist Alfred Russel Wallace (1823–1913) travelled through the Malay Archipelago for eight years, between 1854 and 1862 (van Wyhe 2013). As he stated, his ‘main object of all my journeys was to obtain specimens of natural history, both for my private collection and to supply duplicates to museums and amateurs’ (Wallace 1869, I: xii). Before setting out, he had made an arrangement with Samuel Stevens (1817–99), who had a shop for natural history objects at 24 Bloomsbury Street, London. Wallace would send all of his material to Stevens, who would store those items intended for Wallace’s private collection and endeavour to sell the remaining specimens (Baker 2001).

Although Stevens must have sent out lists of new stock to various collectors, both at home and abroad, knowledge of how much he could charge for specimens of various degrees of rarity or beauty is poor. In fact, it seems that very few of his price lists have survived (one listing insects in Berlin was mentioned by Baker 2001: 256). We have located one interesting printed example, issued just over a year after Wallace’s return from the East, which was widely available at the time but appears to have disappeared from the record.

Advertising in *The Ibis*

In January 1859, the first issue of a new magazine of general ornithology, *The Ibis*, appeared under the editorship of Philip Lutley Sclater (1829–1913), ornithologist and, from 1860, Secretary of the Zoological Society of London. The new journal was quarterly and soon established itself as the major British publication for ornithological research.

*The Ibis* vol. 4 (1862) contained two undated inserts styled ‘The Naturalist’s Advertiser’ No. I and No. II. These offered ‘a medium whereby Dealers and others having Objects, Apparatus, or Books relating to this Science, to dispose of, may make the same specially known among the class of persons where they are most likely to find purchasers.’ Booksellers paid a small amount to the publishers Trübner & Co. in London. Both known issues of the *Advertiser* had four pages and advertised only zoological books. Strangely, there is no name or address of a bookseller where these copies could be obtained.
Figure 1. The first page of the ‘List of birds from the eastern islands of the Malay Archipelago’ inserted in *The Ibis* of 1863.
The existence of The Naturalist’s Advertiser shows that The Ibis offered the possibility to sellers of natural history books and objects to list their stock. Although the original concept seems to have been discontinued, apparently Stevens took advantage of the possibility, because in vol. 5 of The Ibis (1863) were four loose inserts: (1) ‘List of birds from the Eastern Islands of the Malay Archipelago, for sale at the annexed prices’, pp. 1–4; (2) ‘List of duplicates from Mr. Swinhoe’s collection of Chinese birds’, pp. 1–2; (3) ‘List of duplicates from Mr. Swinhoe’s collection of Formosan birds’, pp. 1–2; (4) ‘List of M. Du Chaillu’s collection of bird-skins from Africa’, pp. 1–2. Only the last of these is dated, April 1863. Therefore these inserts were mailed either with the January (vol. 5, no. 17) or, more likely, the April 1863 (no. 18) issue of The Ibis.

As these were loose inserts advertising specimens, they were rarely preserved. Institutional copies which were bound appear to have removed them as a matter of course. The copies of the 5th volume of The Ibis on major online platforms like the Biodiversity Heritage Library, Archive or Google Books no longer contain the inserts, which therefore seem now to be incredibly rare. No copies were individually catalogued in any library as far as we have been able to ascertain.

The only copy of these inserts known to us is in one of the sets of The Ibis at the Bayerische Staatsbibliothek, Munich (physical copies at signature Zool. 266 m-5) and available online—see Stevens (1863)—in References.

The list of birds from the eastern islands of the Malay Archipelago

As shown in Fig. 1, the document starts with a title and introduction, followed by lists of species by locality. Within the locality, each species or specimen has a number, a scientific name with authority, and a price, printed across two columns. The final page ends with the printer’s details: McGowan and Danks, Great Windmill Street, Haymarket.

In our transcription in Table 1, the localities, numbering, species names and prices are provided exactly as in the original, with all punctuation, in the subheadings (in bold) and three left-hand columns (no., species, price). The last column in the table provides the best fit for current scientific and vernacular name, following nomenclature in the latest version of the Handbook of the birds of the world Alive (del Hoyo et al. 2018).

Discussion

The ‘List of birds from the eastern islands’ was subdivided into eight geographic sections. The species in each section are numbered consecutively (Table 2). In three cases different specimens of the same species are listed individually. In one case, one number relates to a pair (possibly mounted together). Hence Stevens had a stock of at least 246 specimens.

The prices charged by Stevens ranged from three to 240 shillings each, or an average of c.11 shillings per specimen (Table 3). Note that ‘to purchasers of above £25 value, 10 per cent. discount will be allowed’ (Stevens 1863, see Fig. 1). The most expensive items were a Black Lory Chalcopsitta atra (25 shillings), Sula Hanging-parrot Loriculus sclateri (30 shillings), Buru Green-pigeon Treron aromaticus (30 shillings), Yellow-and-green Lorikeet Trichoglossus flavoviridis (40 shillings), Ivory-breasted Pitta Pitta maxima (40 shillings), Golden Myna Minu anais (40 shillings), New Guinea Bronzewing Henicophaes albifrons (40 shillings), Standardwing Bird-of-paradise Semioptera wallacei (200 shillings per pair) and a fine Twelve-wired Bird-of-paradise Seleucidis alba (240 shillings). The most expensive specimen, the Twelve-wired Bird-of-paradise, was certainly rare, although the British Museum subsequently received five specimens collected by Wallace in New Guinea (Sharpe...
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<tr>
<th>No.</th>
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<tbody>
<tr>
<td>1</td>
<td>Trichoglossus ornatus. L.</td>
<td>7s.</td>
<td>Ornate Lorikeet <em>Trichoglossus ornatus</em> (Linnaeus, 1758)</td>
</tr>
<tr>
<td>2</td>
<td>Dendrochelidon Wallacii Gould</td>
<td>5s.</td>
<td>Grey-rumped Treeswift <em>Hemiprocne longipennis wallacii</em> (Gould, 1859)</td>
</tr>
<tr>
<td>3</td>
<td>Hemilophus fulvus. Q. &amp; G.</td>
<td>7s.</td>
<td>Ashy Woodpecker <em>Mulleripicus fulves</em> (Quoy &amp; Gaimard, 1830)</td>
</tr>
<tr>
<td>4</td>
<td>Graucalus leucopygius. Bp.</td>
<td>3s.</td>
<td>White-rumped Cuckoo-shrike <em>Coracina leucopygia</em> (Bonaparte, 1850)</td>
</tr>
<tr>
<td>5</td>
<td>Campophaga morio. Mull</td>
<td>3s.</td>
<td>Sulawesi Cicadabird <em>Edolisoma morio</em> (S. Müller, 1843)</td>
</tr>
<tr>
<td>6</td>
<td>Dicrourus pectoralis. Wall. var.</td>
<td>4s.</td>
<td>White-eyed Drongo <em>Dicrurus hottentottus</em> Wallace, 1865</td>
</tr>
<tr>
<td>7</td>
<td>Corvus validus. Bp. var.</td>
<td>8s.</td>
<td>Sulawesi Crow <em>Corvus enca celebes</em> Stresemann, 1936</td>
</tr>
<tr>
<td>8</td>
<td>Diceum celebicum. Mull</td>
<td>5s.</td>
<td>Grey-sided Flowerpecker <em>Dicaem celebicum</em> S. Müller, 1843</td>
</tr>
<tr>
<td>9</td>
<td>Cinnyris frenata. Mull</td>
<td>3s.</td>
<td>Olive-backed Sunbird <em>Cinnyris jugularis plateni</em> (A. W. H. Blasius, 1885)</td>
</tr>
<tr>
<td>10</td>
<td>Acridotheres cinereus. Mull</td>
<td>6s.</td>
<td>Pale-bellied Myna <em>Acridotheres cinereus</em> Bonaparte, 1851</td>
</tr>
<tr>
<td>11</td>
<td>Treron vernans. Gm.</td>
<td>5s.</td>
<td>Pink-necked Green-pigeon <em>Teron vernans</em> Linnaeus, 1771</td>
</tr>
<tr>
<td>12</td>
<td>Treron griseacauda. G.R. Gray</td>
<td>20s.</td>
<td>Grey-cheeked Green-pigeon <em>Teron griseacauda wallacii</em> Salvadori, 1893</td>
</tr>
<tr>
<td>13</td>
<td>Carphophaga radiata. Q. &amp; G.</td>
<td>15s.</td>
<td>Grey-headed Imperial-pigeon <em>Ducula radiata</em> (Quoy &amp; Gaimard, 1830)</td>
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<tr>
<td>14</td>
<td>Turacaena menadensis. Q. &amp; G.</td>
<td>7s.</td>
<td>White-faced Cuckoo-dove <em>Turaccea menadensis</em> (Quoy &amp; Gaimard, 1830)</td>
</tr>
<tr>
<td>15</td>
<td>Ardea malaccensis. Gm.</td>
<td>4s.</td>
<td>Javan Pond-heron <em>Ardea speciosa</em> (Horsfield, 1821)</td>
</tr>
<tr>
<td>16</td>
<td>Rallus philippensis. L.</td>
<td>4s.</td>
<td>Buff-banded Rail <em>Hypothymis p. philippensis</em> (Linnaeus, 1766)</td>
</tr>
<tr>
<td>17</td>
<td>Forzana phoenicura. Penn.</td>
<td>4s.</td>
<td>White-breasted Waterhen <em>Amaurornis phoenicurus</em> <em>leucomelana</em> (S. Müller, 1842)</td>
</tr>
<tr>
<td>18</td>
<td>Porphyrio smaragdinus. Temm.</td>
<td>7s.</td>
<td>Sunda Swamphen <em>Porphyrio poliocephalus indicus</em> Horsfield, 1821</td>
</tr>
<tr>
<td>19</td>
<td>Paro gallinacoa. Temm.</td>
<td>4s.</td>
<td>Combed-crested Jacana <em>Jacana tibetana</em> Temminck, 1828</td>
</tr>
<tr>
<td>20</td>
<td>Querquedula gibifrons. Mull.</td>
<td>5s.</td>
<td>Sunda Teal <em>Anas gibifrons</em> S. Müller, 1842</td>
</tr>
<tr>
<td>21</td>
<td>Dendrocygna vagans. Eton.</td>
<td>5s.</td>
<td>Wandering Whistling-duck <em>Dendrocygna arcuata</em> (Horsfield, 1824)</td>
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**SULA Is. (East of Celebes.)**

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<tbody>
<tr>
<td>1</td>
<td>Platycercus dorsalis. Q. &amp; G. var.</td>
<td>15s.</td>
<td>Moluccan King-parrot <em>Alisterus anboinensis</em> (Linnaeus, 1766)</td>
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<tr>
<td>2</td>
<td>Loriculus scateri. Wall.</td>
<td>30s.</td>
<td>Sula Hanging-parrot <em>Loriculus scateri</em> Wallace, 1863</td>
</tr>
<tr>
<td>3</td>
<td>Trichoglossus flavivirdis Wall.</td>
<td>40s.</td>
<td>Yellow-and-green Lorikeet <em>Trichoglossus flavivirdis</em> Wallace, 1863</td>
</tr>
<tr>
<td>4</td>
<td>Halcyon melanorhyncha. Temm.</td>
<td>15s.</td>
<td>Black-billed Kingfisher <em>Pelargopsis melanorhyncha</em> (Temminck, 1826)</td>
</tr>
<tr>
<td>5</td>
<td>Halcyon collaris. Sw.</td>
<td>4s.</td>
<td>Collared Kingfisher <em>Todiramphus chloris</em> (Boddaert, 1783)</td>
</tr>
<tr>
<td>6</td>
<td>Dendrochelidon wallacei. Gould</td>
<td>6s.</td>
<td>Grey-rumped Treeswift <em>Hemiprocne longipennis wallacii</em> (Gould, 1859)</td>
</tr>
<tr>
<td>7</td>
<td>Merop somatus. [sic] Lath.</td>
<td>3s.</td>
<td>Rainbow Bee-eater <em>Merops ornatus</em> Linnaeus, 1766</td>
</tr>
<tr>
<td>8</td>
<td>Criniger longirostris. Wall.</td>
<td>10s.</td>
<td>Sula Golden Bulbul <em>Thaprielas longirostris</em> Wallace, 1863</td>
</tr>
<tr>
<td>9</td>
<td>Oriolus frontalis. Wall.</td>
<td>20s.</td>
<td>Black-naped Oriole <em>Oriolus chinensis</em> <em>frontalis</em> Wallace, 1863</td>
</tr>
<tr>
<td>10</td>
<td>Artamus monachus. Bp.</td>
<td>20s.</td>
<td>Ivory-backed Woodswallow <em>Artamus monachus</em> Bonaparte, 1850</td>
</tr>
<tr>
<td>11</td>
<td>Myiagra puella. Wall.</td>
<td>10s.</td>
<td>Pale-blue Monarch <em>Hypothymis puella</em> (Wallace, 1863)</td>
</tr>
</tbody>
</table>

**SULA Is. (East of Celebes.) – Continued.**

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<tbody>
<tr>
<td>12</td>
<td>Monarcha cinerascens. Temm.</td>
<td>4s.</td>
<td>Island Monarch <em>Monarcha cinerascens</em> (Temminck, 1827)</td>
</tr>
<tr>
<td>13</td>
<td>Pachycephala chio. Wall.</td>
<td>10s.</td>
<td>Golden Whistler <em>Pachycephala pectoralis</em> <em>chio</em> Wallace, 1863</td>
</tr>
<tr>
<td>14</td>
<td>Dicrourus pectoralis. Wall.</td>
<td>10s.</td>
<td>Sula Drongo <em>Dicrurus ruffetottus</em> <em>pectoralis</em> Wallace, 1863</td>
</tr>
<tr>
<td>15</td>
<td>Nectarina auriceps. G.R. G.</td>
<td>5s.</td>
<td>Black Sunbird <em>Leptocoma aspasia</em> <em>auriceps</em> (G. R. Gray, 1861)</td>
</tr>
<tr>
<td>16</td>
<td>Corvus validus. Bp. var.</td>
<td>8s.</td>
<td>Slender-billed Crow <em>Corvus enca mangoli</em> Vaurie, 1958</td>
</tr>
<tr>
<td>17</td>
<td>Calornis obscura. Forst.</td>
<td>3s.</td>
<td>Moluccan Starling <em>Aplonis myodens</em> (G. R. Gray, 1862)</td>
</tr>
<tr>
<td>No.</td>
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</tr>
<tr>
<td>18</td>
<td>Treron griseicauda. G.R. Gray</td>
<td>20s</td>
<td>Grey-cheeked Green-pigeon  <em>Treron griseicauda wallacei</em> (Salvadori, 1893)</td>
</tr>
<tr>
<td>19</td>
<td>Ptilonopus melancephalus. L. var</td>
<td>8s</td>
<td>Black-naped Fruit-dove  <em>Ptilonopus melanospilus banguenessis</em> A. B. Meyer, 1891</td>
</tr>
<tr>
<td>20</td>
<td>Carpophaga luctuosa. Temm.</td>
<td>15s</td>
<td>White Imperial-pigeon  <em>Ducula luctuosa</em> (Temminck, 1824)</td>
</tr>
<tr>
<td>21</td>
<td>Carpophaga paulina. Temm.</td>
<td>15s</td>
<td>Green Imperial-pigeon  <em>Ducula aenea paulina</em> Bonaparte, 1854</td>
</tr>
<tr>
<td>22</td>
<td>Macropygia albicapilla. Bp.</td>
<td>10s</td>
<td>Slender-billed Cuckoo-dove  <em>Macropygia amboinensis albicapilla</em> Bonaparte, 1854</td>
</tr>
<tr>
<td>23</td>
<td>Turacoena menadensis. Q. &amp; G.</td>
<td>8s</td>
<td>White-faced Cuckoo-dove  <em>Turacoena manadensis</em> (Quoy &amp; Gaimard, 1830)</td>
</tr>
</tbody>
</table>

**BOURU (Moluccas).**

2. [Geoffroyus personatus.] *female*
3. Tanysiptera galatea nais
4. Eos rubra. Gm.
12. Rhipidura bouruensis. Wall.
15. Mimeta bouruensis. Q. & G.
17. Nectarina proserpina. Wall.
19. Treron aromaticum (Gm.) ("Colomba viridis amboinensis." Briss.)
20. Ptilonopus viridis. L.
23. Macropygia amboinensis. L.
24. Megapodius forsteni. G.R. Gray
25. Podiceps tricolor. G.R. Gray

**CERAM.**

1. Aprosmictus amboinensis. L.
2. Lorus domicella. L.
3. Eclectus purpureus. Gm.
4. Cacatua moluccensis. Gm. (fine)
6. Tanysiptera nais. G. R. Gray
10. Trichoglossus cyanogrammus Wagl.
11. Treron aromatica (Gm.) ("Alisterus amboinensis." Briss.)
12. Dicrourus bracteatus buruensis. L.
13. Ptilonopus melanospilus bangueyensis
14. Pachycephala clio buruensis. L.
15. Eurasian Tree-crested Fruit-dove  *Pachycephala pectoralis buruensis* E. J. O. Hartert, 1899
16. Spangled Drongo  *Dicrurus bracteatus buruensis* E. J. O. Hartert, 1919
17. Buru Dwarf-kingfisher  *Ceyx cajeli Wallae*, 1863
18. Buru Fantail  *Rhipidura bouruensis* Wallace, 1863
19. Golden Whistler  *Pachycephala pectoralis buruensis* E. J. O. Hartert, 1899
20. Buru Oriental Kingfisher  *Alisterus amboinensis* (Quoy & Gaimard, 1830)
22. Olive-backed Sunbird  *Cinnyris jugularis buruensis* E. J. O. Hartert, 1910
23. Buru Green-pigeon  *Treron aromaticus* (J. F. Gmelin, 1789)
24. Moluccan King-parrot  *Alisterus amboinensis* (Linnaeus, 1766)
25. Pied Imperial-pigeon  *Ducula bicolor* (Scopoli, 1786)
26. Spectacled Imperial-pigeon  *Ducula perspicillata* (Temminck, 1824)
27. Slender-billed Cuckoo-dove  *Macropygia amboinensis* (Linnaeus, 1766)
28. Forsten’s Scrub-fowl  *Megapodius freycinet buruensis* Stresemann, 1914
29. Tricolored Grebe  *Tachybaptus ruficollis tricolor* (G. R. Gray, 1861)

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9. Pachycephala macrorhyncha. Gm. 8s.
11. Tropidornyrhynchos subornatus. Temm. 15s.
13. Ptilonopus superb. Temm. 7s.
15. Numenius minor. Mull. 3s.

GILLOLO, BATCHIAN, & MORTY Is.

1. Tanygnathus macrorhyncha. Gm. 15s.
3. Ectucus polyclor. Scop. 15s.
4. Loris garrulus. L. 12s.
5. Eos riciniata. Bechst. 7s.
6. Trichoglossus placentius. Temm. 7s.
8. Tinnunculus moluccensis. Temm. 8s.
10. Halcyon diops. Temm. 6s.
12. Ceyx lepida. Temm. 10s.
15. Centropus goliath. Forst. 20s.
17. Pitta maxima. Forst. 40s.
19. Criniger simplex. Wall. 7s.
25. Pachycephala mentalis. Wall. 10s.
27. Lalage aurea. Temm. 5s.
30. Tropidornyrhynchos fuscicapillus. Wall. 12s.
31. Anthochaera senex G.R. Gray 10s.
32. Corvus validissimus. Schleg. 20s.
33. Lycomorpha morotensis. Schleg. 20s.
34. Semioptera wallacei. G.R. Gray (pair) 200s.
34a. [Semioptera wallacei ] female or Juv. 20s.

Price Current identification
9. Moluccan Whistler Pachycephala macrorhyncha Strickland, 1849
10. Violet Crow Corvus violaceus Bonaparte, 1850
11. Seram Friarbird Philemon subornatus (Hombron & Jacquinot, 1841)
12. Moluccan Starling Aplonis myosotis (G. R. Gray, 1862)
13. Eastern Superb Fruit-dove Ptilonopus superb (Temminck, 1810)
14. Black Bittern Ixobrychus flavidollus australis (Lesson, 1831)
15. Little Curlew Numenius minutus Gould, 1841

GILLOLO, BATCHIAN, & MORTY Is. – Continued.

30. Dusky Friarbird Philemon fuscicapillus (Wallace, 1862)
31. White-streaked Friarbird Melitograis galatea (Temminck, 1824)
32. Long-billed Crow Corvus validus Bonaparte, 1850
33. Halmahera Paradise-crow Lycomorpha pyrrhopterus (Bonaparte, 1850)
34. Standardwing Bird-of-paradise Semioptera wallacei G. R. Gray, 1859
34a. Standardwing Bird-of-paradise Semioptera wallacei G. R. Gray, 1859
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<td>35</td>
<td>Calornis obscura. Forst.</td>
<td>3s.</td>
<td>Moluccan Starling <em>Aplonis myosolepis</em> (G. R. Gray, 1862)</td>
</tr>
<tr>
<td>36</td>
<td>Erythura modesta. Wall.</td>
<td>10s.</td>
<td>Blue-faced Parrot <em>Erythura trichra</em> modesta Wallace, 1862</td>
</tr>
<tr>
<td>37</td>
<td>Ptilonopos ogaster. Wagl.</td>
<td>10s.</td>
<td>Grey-headed Fruit-dove <em>Ptilonopus hygoastrus</em> Temminck, 1824</td>
</tr>
<tr>
<td>38</td>
<td>Ptilonopos monachus. Temm.</td>
<td>8s.</td>
<td>Blue-capped Fruit-dove <em>Ptilonopos monacha</em> (Temminck, 1824)</td>
</tr>
<tr>
<td>39</td>
<td>Nycticorax caledonicus. Gm.</td>
<td>10s.</td>
<td>Rufous Night-heron <em>Nycticorax caledonicus australasiae</em> (Vieillot, 1823)</td>
</tr>
<tr>
<td>40</td>
<td>Todorma radjah. Less.</td>
<td>5s.</td>
<td>Radjah Shelduck <em>Radjah radjah</em> (Lesson, 1828)</td>
</tr>
</tbody>
</table>

**NEW GUINEA, and the ISLANDS of WAIGIOU, MYSOL, and SALWATTY.**

1. *Aprosmictus dorsalis*. Q. & G. 15s. Moluccan King-parrot *Aprosmictus amboinensis dorsalis* (Quoy & Gaimard, 1830)
2. *Eclectus linnaei*. Wagl. 12s. Eclectus Parrot *Eclectus roratus* (Statius Müller, 1776)
3. *Geoffroyus pucherani*. Bp. 8s. Red-cheeked Parrot *Geoffroyus geoffroyi pucherani* Souané, 1856
4. *Cyclopsitta desmaresti*. Garn. 15s. Large Fig-parrot *Psittaculirostris desmarestii* (Desmarest, 1826)
5. *Cyclopsitta diopthalma*. H. and J. 12s. Double-eyed Fig-parrot *Cyclopsitta diopthalma* (Homborn & Jacquinot, 1841)
7. *Chalcospitsa atra* (Scop.) 25s. Black Lory *Chalcospitsa atra* (Scopoli, 1786)
9. *Cacatua equatorialis*. Temm. 10s. Yellow-crested Cockatoo *Cacatua sulphurea* (J. F. Gmelin, 1788)
12. *Halcyon albicilla*. Less. 15s. Collared Kingfisher *Halcyon sancta* Vig. & H., 1827
13. *Halcyon sancta*. Vig. & H. 4s. Sacred Kingfisher *Todiramphus sanctus* (Vigors & Horsfield, 1827)
16. *Alcippe murina*. Mull. 5s. Rusty Mouse-warbler *Crateroscelis murina* (P. L. Sclater, 1858)
17. *Pitta mackloti*. Temm. 15s. Papuan Pitta *Pitta mackloti* Temminck, 1834
22. *Rhipidura gularis*. Mull. 5s. Northern Fantail *Rhipidura isura gularis* S. Müller, 1843
24. *Rhipidura tricolor*. Viell. 3s. Willie Wagtail *Rhipidura leucophrys* (Latham, 1801)
25. *Monarcha chrysomela*. Garn. 15s. Golden Monarch *Carterornis chrysomela* (Lesson & Garnot, 1827)
26. *Monarcha telescophalma*. Garn. 6s. Flrilled Monarch *Arses telescophalbus* (Lesson & Garnot, 1827)
27. *Monarcha dichroa*. G. R. Gray 7s. Hooded Monarch *Symposiachrus manadensis* (Quoy & Gaimard, 1830)
30. *Campephaga melas*. Mull. 10s. Black Cieadabird *Edolisoma melas* (Lesson, 1827)
31. *Campephaga plumbea*. Mull. 6s. Slender-billed Cieadabird *Edolisoma tenuirostre muellerii* (Salvadori, 1876)
34. *Artamus papuensis*. Bp. 4s. White-breasted Woodswallow *Artamus leucoryn leuropgialis* Gould, 1842
35. *Dicrurus carbonarius*. Mull. 4s. Papuan Drongo *Dicrurus bracteatus carbonarius* Bonaparte, 1850

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<tr>
<td>36.</td>
<td>Rectes streptans. Jacq. and Puch.</td>
<td>6s.</td>
<td>Rusty Pitohui <em>Pseudeorectes ferrugineus</em> (Bonaparte, 1850)</td>
</tr>
<tr>
<td>40.</td>
<td>Myiolestes megargynthys. Q. and G.</td>
<td>5s.</td>
<td>Rufous Shrike-thrush <em>Colluricincla megargyntha</em> (Quoy &amp; Gaimard, 1830)</td>
</tr>
<tr>
<td>42.</td>
<td>Myiolestes aruensis. G.R. G.</td>
<td>7s.</td>
<td>Rufous Shrike-thrush <em>Colluricincla megargyntha aruensis</em> (G. R. Gray, 1858)</td>
</tr>
<tr>
<td>43.</td>
<td>Seleucides alba. Blum. (fine)</td>
<td>240s.</td>
<td>Twelve-wired Bird-of-paradise <em>Seleucides melanoleucus</em> (Daudin, 1800)</td>
</tr>
<tr>
<td>44.</td>
<td>Nectarina aspasia. Less.</td>
<td>4s.</td>
<td>Black Sunbird <em>Leptocoma aspasia</em> (Lesson &amp; Garnot, 1828)</td>
</tr>
<tr>
<td>45.</td>
<td>Nectarina zenobia. Less.</td>
<td>4s.</td>
<td>Sahul Sunbird <em>Cinnyris jugularis frenatus</em> (S. Müller, 1843)</td>
</tr>
<tr>
<td>46.</td>
<td>Nectarina eques. Less.</td>
<td>6s.</td>
<td>Ruby-throated Myzomela <em>Myzomela eques</em> (Lesson &amp; Garnot, 1827)</td>
</tr>
<tr>
<td>47.</td>
<td>Arachnothera novoeguinae. Less.</td>
<td>4s.</td>
<td>Yellow-bellied Longbill <em>Toxorhamphus novoeguinae</em> (Lesson, 1827)</td>
</tr>
<tr>
<td>48.</td>
<td>Prionochilus niger. Less.</td>
<td>4s.</td>
<td>Black Berryecker <em>Melanocharis nigra</em> (Lesson, 1830)</td>
</tr>
<tr>
<td>49.</td>
<td>Pilolis similis. Homb. &amp; Jacq.</td>
<td>4s.</td>
<td>Mimic Honeyeater <em>Microptilotis analogus</em> (Reichenbach, 1852)</td>
</tr>
<tr>
<td>50.</td>
<td>Pilolis flavivent. Less.</td>
<td>7s.</td>
<td>Tawny-breasted Honeyeater <em>Xanthotis flavivent</em> (Lesson, 1828)</td>
</tr>
<tr>
<td>52.</td>
<td>Pilolit is megargynthys. G.R. G.</td>
<td>6s.</td>
<td>Long-billed Honeyeater <em>Melistestes megargyntha</em> (G. R. Gray, 1858)</td>
</tr>
<tr>
<td>54.</td>
<td>Cricatus personatus. Temm.</td>
<td>5s.</td>
<td>Hooded Butcherbird <em>Cricatus cassinus</em> (Boddaert, 1783)</td>
</tr>
<tr>
<td>55.</td>
<td>Manucodia atra. Less.</td>
<td>7s.</td>
<td>Glossy-mantled Manucode <em>Manucodia ater</em> (Lesson, 1830)</td>
</tr>
<tr>
<td>56.</td>
<td>Manucodia keraudreni. Less. not fine</td>
<td>20s.</td>
<td>Trumpet Manucode <em>Phonogrammus keraudrenii</em> (Lesson &amp; Garnot, 1826)</td>
</tr>
<tr>
<td>59.</td>
<td>Gracula dumontii. Less.</td>
<td>15s.</td>
<td>Yellow-faced Myna <em>Mino dumontii</em> Lesson, 1827</td>
</tr>
<tr>
<td>60.</td>
<td>Gracula pectoralis. Wall.</td>
<td>40s.</td>
<td>Golden Myna <em>Mino anais</em> (Lesson, 1839)</td>
</tr>
<tr>
<td>61.</td>
<td>Centrobus [sic] menebiki. Garm.</td>
<td>12s.</td>
<td>Ivory-billed Coucal <em>Centrobus menebiki</em> Lesson &amp; Garnot, 1828</td>
</tr>
<tr>
<td>62.</td>
<td>Ptilonopus pulchellus. Temm.</td>
<td>7s.</td>
<td>Beautiful Fruit-dove <em>Ptilonopus pulchellus</em> (Temminck, 1835)</td>
</tr>
<tr>
<td>63.</td>
<td>Carphophaga sundevalii. Bp.</td>
<td>10s.</td>
<td>Spice Imperial-pigeon <em>Ducula myristicivora</em> (Scopoli, 1786)</td>
</tr>
<tr>
<td>64.</td>
<td>Carphophaga pinon. Q. &amp; G.</td>
<td>7s.</td>
<td>Pinon Imperial-pigeon <em>Ducula pinon</em> (Quoy &amp; Gaimard 1824)</td>
</tr>
<tr>
<td>65.</td>
<td>Carphophaga zoeeo. Less.</td>
<td>15s.</td>
<td>Zoe’s Imperial-pigeon <em>Ducula zoeeo</em> (Desmarest, 1826)</td>
</tr>
<tr>
<td>66.</td>
<td>Carphophaga rufigastra. Q. &amp; G.</td>
<td>7s.</td>
<td>Purple-tailed Imperial-pigeon <em>Ducula rufigastra</em> (Quoy &amp; Gaimard 1830)</td>
</tr>
<tr>
<td>67.</td>
<td>Carphophaga puella. Less.</td>
<td>10s.</td>
<td>Wompoo Fruit-dove <em>Megaloprepia magnifica puella</em> (Lesson, 1827)</td>
</tr>
<tr>
<td>69.</td>
<td>Chalcophas stephani. H. &amp; J.</td>
<td>7s.</td>
<td>Stephan’s Dove <em>Chalcophas stephani</em> Pucheran, 1853</td>
</tr>
<tr>
<td>71.</td>
<td>Megapodius reinwardti. Wagl.</td>
<td>15s.</td>
<td>Orange-footed Scrubfowl <em>Megapodius reinwardti</em> Dumont, 1823</td>
</tr>
<tr>
<td>72.</td>
<td>Totanus empusa. Gould.</td>
<td>3s.</td>
<td>Common Sandpiper <em>Actitis hypoleucos</em> (Linnaeus, 1758)</td>
</tr>
<tr>
<td>73.</td>
<td>Botaurs heliostyla. Less.</td>
<td>20s.</td>
<td>Forest Bittern <em>Zonornis heliolius</em> (Lesson &amp; Garnot, 1828)</td>
</tr>
</tbody>
</table>

**TIMOR.**

1. Aprosmictus vulneratus. Temm. | 12s. | Olive-shouldered Parrot *Aprosmictus jonquilsaceus* (Vieillot, 1818) |
3. Trichoglossus euteles. Temm.  | 8s.  | Olive-headed Lorikeet *Trichoglossus euteles* (Temminck, 1835) |
4. Trichoglossus iris. Temm.     | 15s. | Iris Lorikeet *Psitteuteles iris* (Temminck, 1835) |
<table>
<thead>
<tr>
<th>No.</th>
<th>Transcription of species as listed</th>
<th>Price</th>
<th>Current identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Cacatua sulphurea. Gm.</td>
<td>6s</td>
<td>Yellow-crested Cockatoo Cacatua sulphurea varvula (Bonaparte, 1850)</td>
</tr>
<tr>
<td>6</td>
<td>Accipiter cruentus. Gould.</td>
<td>6s</td>
<td>Brown Goshawk Accipiter fasciatus hellmayri Stresemann, 1922</td>
</tr>
<tr>
<td>7</td>
<td>Merops javanicus. Horsf.</td>
<td>3s</td>
<td>Blue-tailed Bee-eater Merops philippinus javanicus Horsfield, 1821</td>
</tr>
<tr>
<td><strong>[p.4]</strong></td>
<td><strong>TIMOR. – Continued.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Cuculus canoroideis. Mull.</td>
<td>4s</td>
<td>Oriental Cuckoo Cuculus saturatus optatus Gould, 1845</td>
</tr>
<tr>
<td>9</td>
<td>Centropus medius. Mull.</td>
<td>3s</td>
<td>Lesser Coucal Centropus bengalensis medius Bonaparte, 1850</td>
</tr>
<tr>
<td>10</td>
<td>Motacilla flavescens. Shaw</td>
<td>3s</td>
<td>Grey Wagtail Motacilla cinerea Tunstall, 1771</td>
</tr>
<tr>
<td>11</td>
<td>Saxicola luctuosa. Mull.</td>
<td>4s</td>
<td>White-bellied Bushchat Saxicola gutturalis (Vieillot, 1818)</td>
</tr>
<tr>
<td>12</td>
<td>Pratincola caprata. L.</td>
<td>3s</td>
<td>Pied Bushchat Saxicola caprata pyrrhonotus (Vieillot, 1818)</td>
</tr>
<tr>
<td>13</td>
<td>Artamus perspicillatus. Temm.</td>
<td>5s</td>
<td>Black-faced Woodswallow Artamus cinereus perspicillatus Bonaparte, 1850</td>
</tr>
<tr>
<td>14</td>
<td>Hirundo nigricans. Viell.</td>
<td>3s</td>
<td>Tree Martin Petrochelidon nigricans (Vieillot, 1817)</td>
</tr>
<tr>
<td>15</td>
<td>Monarcha trivirgata. Temm.</td>
<td>4s</td>
<td>Spectated Monarch Symposiachrus trivirgata (Temminck, 1826)</td>
</tr>
<tr>
<td>16</td>
<td>Rhipidura ochrogastra. Mull.</td>
<td>5s</td>
<td>Northern Fantail Rhipidura rufiventris (Vieillot, 1818)</td>
</tr>
<tr>
<td>17</td>
<td>Rhipidura semicollaris. Mull.</td>
<td>4s</td>
<td>Arafura Fantail Rhipidura drues Gould, 1843</td>
</tr>
<tr>
<td>18</td>
<td>Cyornis hyacinthinus. Temm.</td>
<td>5s</td>
<td>Timor Blue-flycatcher Cyornis hyacinthinus (Temminck, 1820)</td>
</tr>
<tr>
<td>19</td>
<td>Pachycephala calliope. Mull.</td>
<td>7s</td>
<td>Timor Whistler Pachycephala macrorhyncha calliope Bonaparte, 1850</td>
</tr>
<tr>
<td>20</td>
<td>Pachycephala orpheus. Jard.</td>
<td>5s</td>
<td>Fawn-breasted Whistler Pachycephala orpheus Jardine, 1849</td>
</tr>
<tr>
<td>21</td>
<td>Sphecothera viridis. Q. &amp; G.</td>
<td>7s</td>
<td>Timor Figbird Sphecothera viridis (Vieillot, 1816)</td>
</tr>
<tr>
<td>22</td>
<td>Dicrourus densus. Temm.</td>
<td>4s</td>
<td>Timor Drongo Dicrurus densus Bonaparte, 1850</td>
</tr>
<tr>
<td>23</td>
<td>Graucalus personatus. Mull.</td>
<td>7s</td>
<td>Wallacean Cuckooshrike Coracina persona (S. Müller, 1843)</td>
</tr>
<tr>
<td>24</td>
<td>Campephaga plumbea. Mull.</td>
<td>5s</td>
<td>Slender-billed Cicadabird Edolisoma tenuirostre timoriense (Sharpe, 1878)</td>
</tr>
<tr>
<td>25</td>
<td>Lalage timoriensis. Mull.</td>
<td>3s</td>
<td>Slender-billed Cicadabird Edolisoma tenuirostre timoriense (Sharpe, 1878)</td>
</tr>
<tr>
<td>26</td>
<td>Lanius schah. L.</td>
<td>3s</td>
<td>Sunda Long-tailed Shrike Lanius schah bentut Horsfield, 1821</td>
</tr>
<tr>
<td>27</td>
<td>Tropicorhynchus cinereus. Mull.</td>
<td>5s</td>
<td>Timor Friarbird Phileornis inornatus (G. R. Gray, 1846)</td>
</tr>
<tr>
<td>28</td>
<td>Ptilotis reticulata. Mull.</td>
<td>4s</td>
<td>Streak-breasted Honeyeater Microptilotis reticulata (Temminck, 1820)</td>
</tr>
<tr>
<td>29</td>
<td>Ptilotis maculata. Mull. (poor)</td>
<td>3s</td>
<td>Streaky-breasted Honeyeater Microptilotis reticulata (Temminck, 1820)</td>
</tr>
<tr>
<td>30</td>
<td>Deceum [sic] maklotii. Mull.</td>
<td>4s</td>
<td>Red-chested Flowerpecker Dicaeum maklotii Lesson, 1830</td>
</tr>
<tr>
<td>31</td>
<td>Nectarinae solari. Temm.</td>
<td>5s</td>
<td>Flame-breasted Sunbird Cinnyris solari Temminck, 1825</td>
</tr>
<tr>
<td>32</td>
<td>Calornis minor. Temm.</td>
<td>5s</td>
<td>Short-tailed Starling Aplonis minor (Bonaparte, 1851)</td>
</tr>
<tr>
<td>33</td>
<td>Estrelda purifica. Horsf. (sar.)</td>
<td>4s</td>
<td>Yellow-bellied Avadavat Amandava amandava flaviventris Wallace, 1864</td>
</tr>
<tr>
<td>34</td>
<td>Amadina insularis. Wall.</td>
<td>5s</td>
<td>Timor Zebra Finch Taeniopygia guttata (Vieillot, 1817)</td>
</tr>
<tr>
<td>35</td>
<td>Carphophaga rosacea. Temm.</td>
<td>12s</td>
<td>Pink-headed Imperial-pigeon Ducula rosacea (Temminck, 1836)</td>
</tr>
<tr>
<td>36</td>
<td>Turacaena modesta. Temm.</td>
<td>15s</td>
<td>Black Cuckoo-dove Turacaena modesta (Temminck, 1835)</td>
</tr>
<tr>
<td>37</td>
<td>Turtur tigrina. Temm.</td>
<td>4s</td>
<td>Eastern Spotted Dove Streptopelia chinensis tigrina (Temminck, 1810)</td>
</tr>
<tr>
<td>38</td>
<td>Geopelia maugui. Temm.</td>
<td>5s</td>
<td>Barred Dove Geopelia maugui (Temminck, 1809)</td>
</tr>
<tr>
<td>39</td>
<td>Chalcothrips timoriensis. Bp.</td>
<td>10s</td>
<td>Brown-capped Emerald-dove Chalcothrips longirostris timoriensis Bonaparte, 1856</td>
</tr>
<tr>
<td>40</td>
<td>Charadrius longipes. Temm.</td>
<td>3s</td>
<td>Pacific Golden-plover Pluvialis fulva (J. F. Gmelin, 1789)</td>
</tr>
<tr>
<td>41</td>
<td>Scolopax horfieldi. G.R. Gray.</td>
<td>7s</td>
<td>Pintail Snipe Gallinago stenura (Bonaparte, 1831)</td>
</tr>
<tr>
<td>42</td>
<td>Himantopus leucocephalus. Gould.</td>
<td>5s</td>
<td>Black-winged Stilt Himantopus himantopus leucocephalus Gould, 1837</td>
</tr>
<tr>
<td>43</td>
<td>Dendrocygna vagans. Eyton.</td>
<td>5s</td>
<td>Wandering Whistling-duck Dendrocygna arcuata (Horsfield, 1824)</td>
</tr>
<tr>
<td>44</td>
<td>Querqueula gibbifrons. Mull.</td>
<td>5s</td>
<td>Sunda Teal Anas gibbifrons S. Müller, 1842</td>
</tr>
</tbody>
</table>

**TIMOR LAUT.**

1. Eos cyanosatria. Bp. (poor skin) | 10s | Blue-streaked Lory Eos reticulata S. Müller, 1841

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If all stock had been sold at the undiscounted price, the revenue would have been £137 and 13 shillings.

This list with prices for individual species is remarkable, as so few other examples are known. Wallace (1905: 360) was happy with the proceeds of the journey, which amounted to £300 for each of the eight years of travel. However, for another specimen of *Semioptera wallacei*, Stevens asked £20 in 1859 (Baker 2001: 257).

It is probable that this list contained all birds remaining in stock from Wallace’s collecting expedition. It provides a welcome glimpse into the sale of natural history specimens in the 1860s.

References:


Stevens, S. [1863.] List of birds from the eastern islands of the Malay Archipelago. Loose insert in some copies of Ibis 5(17 or 18). [Available at https://opacplus.bsb-muenchen.de/metaopac/singleHit.do?methodToCall=showHit&curPos=154&identifier=100_SOLR_SERVER_1608822777&showFulltextFirstHit=true]


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The generic taxonomy of the Australian Magpie and Australo-Papuan butcherbirds is not all black-and-white

by Martin Cake, Andrew Black & Leo Joseph

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Summary.—Recent phylogenetic analyses showing that Australian Magpie and Black Butcherbird are sister taxa and together comprise the sister group of other Australo-Papuan butcherbirds have justified an expanded Cracticus. This treatment reflects earlier arguments that Australian Magpie’s distinctive traits are simply adaptations to terrestrialism and not a sound basis for recognition of a monotypic Gymnorhina. Acknowledging the expediency of a broad Cracticus, we reviewed data from anatomy, plumage, nidification and voice to reassess the optimal number of genera for the group, in particular whether Melloria is warranted for Black Butcherbird. Australian Magpie has multiple unique traits, including many without obvious adaptive significance for terrestrial foraging or open habitat. It shares with Black Butcherbird glossy black plumage, long tarsus and deep temporal fossa, and short currawong-like calls. Black Butcherbird’s rounded wing is possibly adaptive for closed-forest habitats. We recommend use of Gymnorhina, Melloria and Cracticus to represent this evolutionary diversity within the butcherbird-magpie clade.

The Australo-Papuan butcherbirds and Australian Magpie are usually grouped at family or subfamily rank, Cracticidae or Cracticinae, within a broader assemblage of birds including the woodswallows Artamus spp., currawongs Strepera spp., and enigmatic New Guinean peltops Peltops spp. Notwithstanding some views to the contrary (e.g., Johnstone & Storr 2004), most recent taxonomic reviews and global checklists (e.g. Schodde & Mason 1999, Higgins et al. 2006, Dickinson & Christidis 2014, Gill & Donsker 2016, del Hoyo & Collar 2016) show a trend to assigning them to two or three genera: Cracticus Vieillot, 1816, for the butcherbirds, monotypic Gymnorhina G. R. Gray, 1840, for the Australian Magpie as G. tibicen (Latham, 1802), and in some recent checklists (Dickinson & Christidis 2014, Gill & Donsker 2016) monotypic Melloria Mathews, 1912, for Black Butcherbird as M. quoyi (Lesson & Garnot, 1827). Australian Magpie’s close relationship to butcherbirds has long been recognised (Storr 1952, Amadon 1953, Schodde & Mason 1999, Johnstone & Storr 2004). Molecular phylogenetic analysis of the group (Kearns et al. 2013) renewed debate over the number of genera that should be recognised. Our broad aim here is to address that question.

Three key results of Kearns et al. (2013) frame our review: (1) Australian Magpie is phylogenetically nested within the clade of butcherbirds; (2) within that clade its closest relative (sister species) is Black Butcherbird [C.] quoyi, and (3) the Australian Magpie / Black Butcherbird pair itself comprises the sister group of all other butcherbirds. Together, these results render Cracticus paraphyletic if Gymnorhina is retained for Australian Magpie.

The most pragmatic taxonomic response to this phylogenetic result, and that advocated by Kearns et al. (2013), is to recognise Cracticus for the entire clade. That treatment had been adopted previously by some (Storr & Johnstone 1979, Johnstone 2001, Johnstone & Storr 2004, Christidis & Boles 2008, Russell & Rowley 2009) and has since been followed by others (Nguyen et al. 2013, Beehler & Pratt 2016). Alternatively, if Gymnorhina is retained for Australian Magpie then the paraphyly of Cracticus can be addressed either by
assigning Black Butcherbird to Melloria, or placing it with Australian Magpie in Gymnorhina. Accordingly, our specific aim here is to assess all of the available data (morphological, molecular, behavioural) to determine which of these options is best applied.

Debate over generic assignment of the Australian Magpie has hinged on how best to interpret its traits associated with terrestriality in genus-level systematics. In choosing to advocate a broad Cracticus, Kearns et al. (2013) stressed a view that had been argued earlier: that distinctive traits of Australian Magpie solely comprise an adaptive suite and that Cracticus should be used for the whole group including Australian Magpie (e.g. Storr 1952, 1977, Johnstone & Storr 2004, Christidis & Boles 2008, Russell & Rowley 2009, Kearns et al. 2013, Nguyen et al. 2013, Beehler & Pratt 2016). Alternatively, it has been argued that when coupled with the bird’s complex communal social system, these traits are indicative of a degree of evolutionary distinctiveness that warrants recognition at genus level (Schodde & Mason 1999, Horton et al. 2013).

Given agreement that Australian Magpie is indeed a terrestrially-adapted butcherbird (Kearns et al. 2013), the pertinent questions become whether all of its distinctive traits can be consistently interpreted in this way and how many genera should be recognised among Australo-Papuan butcherbirds. This paper seeks to answer these questions by freshly appraising the diversity and evolutionary history of the group. In particular, we test assertions in the literature that the distinctive traits of Australian Magpie are predominantly adaptations for terrestrialism (Storr 1952, 1977, Christidis & Boles 2008, Russell & Rowley 2009, Nguyen et al. 2013, Beehler & Pratt 2016), and that Black Butcherbird is insufficiently distinctive or divergent from other Cracticus to warrant a separate genus (Russell & Rowley 2009, Beehler & Pratt 2016). We also take the opportunity to correct errors in osteological criteria proposed by Schodde & Mason (1999) and cited by Higgins et al. (2006).

**Methods**

We have (i) reviewed relevant literature, (ii) examined collections held at the Western Australian Museum, Perth (WAM), Australian National Wildlife Collection, Canberra (ANWC), and South Australian Museum, Adelaide (SAMA); (iii) skulls held at ANWC and Murdoch University, Perth; (iv) reviewed data from egg collections in Online Zoological Collections of Australian Museums (OZCAM) accessed via the Atlas of Living Australia (www.ala.org), and the photographic plates of eggs in Johnstone & Storr (2004). One of us (MC) measured proportional egg shape of a representative sample (n = 287 eggs from 157 clutches) using the egg modelling plug-in for ImageJ (National Institutes of Health; https://imagej.nih.gov/ij/) developed by Troscianko (2014). This generated max. width (as proportion of length) and ‘pointedness’, a measure of deviation from an ellipse. We reviewed available images, including exploratory analysis of bill shape and proportions from head profile images. We reviewed vocalisations available on Xeno-canto (www.xenocanto.org), Macaulay Library (www.macaulaylibrary.org), published audio collections (Bird Observers Club of Australia 1983–99) and commercially available digital sources (Morecombe & Stewart Guide to Birds of Australia [iOS app], PDA Solutions; Pizzey and Knight Birds of Australia Digital Edition v.1.2 [iOS app], Gibbon Multimedia). For morphometric comparisons we assembled standard measurements (wing chord, tail, culmen, tarsus length) published for all relevant taxa (Amadon 1951, Rand & Gilliard 1967, Ford 1979, Black 1986, Johnstone & Storr 2004, Higgins et al. 2006, Kearns et al. 2011), supplemented by finer-grained datasets for Black Butcherbird (Mees 1964, Ford 1983) and Hooded Butcherbird C. cassicus (Mayr 1940, Junge 1958). Principal component analysis (PCA) was performed (SPSS Statistics, v.22, IBM) using a rotated covariance matrix on sex-adjusted z-scores.
Results

Australian Magpie—unique traits
Key diagnostic traits are indicated in italics. For simplicity, species epithets are used to refer to species (i.e., *tibicen* and *quoyi* for Australian Magpie and Black Butcherbird, respectively). In the following, Australian Magpie is named as a butcherbird (i.e., the term is used in the broad sense); the term ‘core *Cracticus*’ indicates all butcherbirds excluding Australian Magpie and Black Butcherbird.

Structure and bare parts

i. Markedly different proportions, with much longer wing and shorter tail relative to body length (Amadon 1951, 1953). Wing:tail ratio 1.8–1.9, cf. 1.2–1.4 in other butcherbirds (as similar to *Strepera*). PCA using published wing / tail / culmen / tarsus measurements demonstrated the clear structural differentiation of Australian Magpie vs. the remaining butcherbirds, the major disjunction from all other taxa being along principal component axes correlated to wing or wing + tarsus length (Fig. 1).

ii. Shape of wing more pointed, with a broad base and narrower tips forming a long triangle, particularly evident in flight (Parsons 1968, Schodde & Mason 1999, Higgins *et al.* 2006); this difference is reflected in more acutely tapered wing formula (data from Higgins *et al.* 2006) with p7 longest, compared with blunter wings in other butcherbirds, especially *quoyi* (Fig. 2). Shape of individual outer primaries also more pointed (Parsons 1968). Wing formulae for New Guinea species not available, but wing shape of *Cracticus cassicus* matches the core *Cracticus* in available flight images (e.g. Coates 1990: 376).

Figure 1. Principal component analysis (PCA) on sex-adjusted z-scores from published morphometrics of butcherbird and Australian Magpie taxa, using (a) wing / tail / culmen length, or (b) wing / tail / culmen / tarsus length. In each PCA the first two components explained >91% of the variance. In the first PCA (wing / tail / culmen), PC1 was most strongly correlated to wing and PC2 was most strongly correlated to tail and culmen length; in the second (wing / tail / culmen / tarsus), PC1 was most strongly correlated to wing and tarsus, and PC2 was most strongly correlated to tail and culmen length. Squares = males; circles = females; white = *Gymnorhina*, black = *Melloria*, grey = white-throated group, black / white = ‘hooded’ group taxa as labelled: nig, *Cracticus n. nigrogularis*, pic, *C. n. picatus*, her, *C. cassicus hercules*, lou, *C. louisiadensis*. 
iii. Longer wing contains 11 secondaries, cf. ten in other butcherbirds (Parsons 1968, Higgins et al. 2006).

iv. Long-legged with long tarsus, both proportionately (e.g. relative to body length) and absolutely (tarsus >45 mm), being closest to quoyi (see below). Feet and claws rather powerful, almost raptorial in character (Kaplan 2004, Higgins et al. 2006).

v. Semi-booted laminiplantar tarsus, vs. weakly scutellate in at least other Australian butcherbirds (Schodde & Mason 1999, Higgins et al. 2006).

vi. Bill lacks prominent hook, cf. in all other butcherbirds, tip characteristically decurved to form a sharp hook with adjacent notch in upper tomidum (Higgins et al. 2006). Long wedge-shaped bill distinctive for the following combination of characters, although none diagnostic alone (Fig. 3): bill proportionately long and deep-based (as in quoyi, Cracticus cassicus and Tagula Butcherbird C. louisiadensis), with straight edge to upper and lower profile (in this closest to nigrogularis), and is the most steeply tapered bill of all of the butcherbirds (i.e. proportionately narrowest at bill midpoint relative to base, and forming greatest angle between culmen and mandible).

vii. Iris brighter, orange-brown to red-brown to red in adults, cf. dark brown in all other butcherbirds (Robinson 1956, Johnstone & Storr 2004, Higgins et al. 2006) vs. notably, yellow in Strepera and red in Peltops, and also reportedly paler brown in juvenile quoyi (Coates 1990, Pratt & Beehler 2014).

**Plumage and moult**

viii. Plumage sexually dimorphic, with mottled (or scaled) grey replacing male’s brilliant white upperparts in females of all subspecies and intergrades, including on the hindneck and rump of those with black dorsal bands, and more distinctly dimorphic (black-scaled female dorsum) in white-backed subspecies G. tibicen dorsalis; cf. sexes...
very similar (at most, e.g., slightly duller hood) in all other butcherbirds (Amadon 1951, Beehler et al. 1986, Higgins et al. 2006).

ix. Slow to mature to adult plumage, with second immature males resembling females, and males taking up to four years to reach adult plumage (Robinson 1956, Johnstone & Storr 2004, Higgins et al. 2006) followed by progressive whitening of rectrix shafts and narrowing of terminal tail-band for up to ten years (Robinson 1956, Black & Ford 1982); cf. one year to mature in other butcherbirds, albeit slower in Grey Butcherbird *Cracticus torquatus* which has a subtle second immature plumage (Schodde & Mason 1999). Similarly, Australian Magpie is slower to achieve adult bill colour than other butcherbirds (Robinson 1956, Higgins et al. 2006, Russell & Rowley 2009).

**Eggs**

x. Proportional egg shape averages longer and more pointed (this study; *P*<0.0001 and *P*<0.01, respectively) compared to all other Australian butcherbirds (Fig. 4), and presumably also *Cracticus cassinus* from published egg dimensions.
Eggs highly variable in ground colour and character and colour of markings (Fig. 5), even at same locality, as particularly noted by Campbell (1900). Base colour most commonly pale bluish or blue-green, being closest to quoyi (typically pale greyish green), cf. more typically olive, brown, buff or pink tones in other butcherbirds (Campbell 1900, Beruldsen 1980, Higgins et al. 2006, Russell & Rowley 2009), as in Strepera.

Egg markings include linear streaking, scrawls and fine lines, cf. in all other butcherbirds limited to dots, spots and blotches (Coates 1990, Higgins et al. 2006, Horton et al. 2013), as in Peltops, Artamus and most Strepera (although those of Pied Currawong S. graculina occasionally exhibit fine streaks). Egg markings less commonly concentrated at larger end, c.1/4 of clutches vs. 3/4 of clutches in other butcherbird species.

**Behaviour**

Highly social, with permanent group territories and complex social interactions including dominance hierarchies, across sometimes large groups, and forming seasonal
flocks of territorially excluded birds in some subspecies (Brown & Veltman 1987, Higgins et al. 2006); cf. other butcherbirds generally in simple pairs or, at most (e.g., in Cracticus nigrogularis and C. cassicus), small social groups mostly including previous offspring (Peckover & Filewood 1976, Russell & Rowley 2009).

xiv. Extreme territoriality reflected in many specialised territorial behaviours (Brown & Veltman 1987).

xv. Highly complex and varied vocalisations, many with complex social functions (Higgins et al. 2006), notably unique carolling behaviour as group display of territoriality (cf. simpler antiphonal duetting in other butcherbirds) and a greater range of short calls (see below).

xvi. Easy walking and running gait, rather than hopping on the ground as in other butcherbirds which are lighter and shorter-legged (Kaplan 2004).


xviii. Nest site usually higher in exposed crown or upper canopy of a tall tree, and occasionally nests on artificial structures; cf. typical nest sites of other butcherbirds lower in smaller trees (Beruldsen 1980, Higgins et al. 2006, Russell & Rowley 2009), although Pied Butcherbird Cracticus nigrogularis nests can be similarly exposed (Johnstone & Storr 2004).
Does not wedge or hang 'butcher' prey, as in the classic shrike-like behaviour observed in other butcherbirds; rather, oversize prey held with feet while dismembering it (Debus 1996, Higgins et al. 2006).

**Black Butcherbird and Australian Magpie—shared traits**

i. Generally large size (e.g. total length).

ii. Long-legged; tarsus long, robust (pace Mathews 1912) and laterally flattened (Higgins et al. 2006). Tarsus in smallest Black Butcherbird subspecies rufescens >37 mm, thus >12% longer than hooded butcherbird group, including cassicus of similar body weight. In considering tarsal form, it may be significant that quoyi forages more frequently on the ground than other more arboreal 'perch-and-pounce' butcherbirds (Diamond 1972, Peckover & Filewood 1976, Debus 1996, Beehler & Pratt 2016), and that Nguyen et al. (2013) noted the lateral shaft of the tarsometatarsus as shallowly concave in these species, but not other Australasian butcherbirds.


iv. Bluish-green gloss to black plumage, distinctly so in quoyi but slightly less so in tibicen in good light (Fig. 3), as also in Peltops; cf. in core Cracticus, at most a slight black gloss in good light on underparts of nigrogularis (Coates 1990, Johnstone & Storr 2004, Higgins et al. 2006).

v. Both lack white tail tips, a motif otherwise conserved across all other butcherbirds including C. louisiadensis and similarly melanistic Strepera species (Debus 1996); both also have all-black remiges, thus lacking conserved motif of white or white-edged inner 2–3 secondaries (+/- outer tertials) forming long wingbar in all other butcherbirds.

vi. In this study, skulls of both tibicen (n = 7) and quoyi (n = 2; one Australian and one New Guinean) found to have more defined and deeply depressed temporal fossae, resulting in relatively more prominent and thus longer post-orbital process due to caudal excavation (contra errata in Schodde & Mason 1999, repeated in Higgins et al. 2006); cf. temporal fossa weakly defined and shallower, with reduced caudal excavation of post-orbital process, in Cracticus nigrogularis (n = 2) and C. torquatus (n = 3). Zygomatic process and its medial accessory process typically broader based and ‘bluntly bifid’, although in this study these features found to be more variable within than between taxa, thus not diagnostic (contra Schodde & Mason 1999).

vii. Habitual use of short calls in vocal repertoire, including short caws, yodels and ringing notes used for social contact; vs. in other butcherbirds, short calls infrequent (cf. complex piping or rollicking song) and limited to sharp alarm notes and begging calls, plus soft croaks in Cracticus cassicus. Notably, Black Butcherbird calls in Queensland, Northern Territory and on Daru Island include a kurr-ra-rung call very similar to Strepera graculina (Rix 1970, Coates 1990, Debus 1996, Higgins et al. 2006), while certain calls of Australian Magpie, plus Black Butcherbird in New Guinea (Diamond 1972) and reportedly also the Kimberley region of Western Australia (Johnstone & Storr 2004), have a ringing quality similar to Grey Currawong Strepera versicolor (Fig. 6).

**Black Butcherbird—unique traits**

i. Wholly black adult plumage.

ii. Shape of wing more rounded, with a bluntly rounded tip in flight and less tapered wing formula (Higgins et al. 2006), and blunter shape to primary remiges; clearly
contrasting with pointed wing of sister *tibicen*, but also divergent from other Australian butcherbirds (Fig. 2).

iii. Larger black tip to bill, typically half of bill length or greater, cf. distal third or less in other butcherbirds (Johnstone & Storr 2004, Higgins *et al.* 2006).


**Discussion**

**Genera: to split or not to split.**—Given the phylogeny for the butcherbird group (Kearns *et al.* 2013), three options preserving monophyly of genera are available for its classification: (1) all species placed in *Cracticus* (i.e. recognising Australian Magpie as *Cracticus tibicen*), (2) recognition of *Gymnorhina* for Australian Magpie and Black Butcherbird, or (3) recognition of two monotypic genera, *Gymnorhina* for Australian Magpie and *Melloria* for Black Butcherbird.

While all of these options are nomenclaturally valid, we note that avian systematics in recent years has seen many genera dismantled essentially for one of three reasons (Provost *et al.* 2018). First are cases in which the relevant species are now confidently understood not to be each other’s closest relatives. Dismantling *Lichenostomus* and *Monarcha* in the
Australo-Papuan honeyeaters and monarch flycatchers, respectively (see Nyári & Joseph 2011, Andersen et al. 2015, Marki et al. 2017), or Myrmeciza for some Neotropical antbirds (Isler et al. 2013) are straightforward examples. Second are genera where the member species are not each other’s closest relatives but not all relevant species have been sampled. A split is needed and either is recommended or held in abeyance until taxon sampling is completed. Arguably, these two situations are the only ones where a decision to dismantle a genus can be objective. Third are cases where the relevant species are indeed each other’s closest relatives, and can validly be recognised with a single genus. Inevitably, in this case some subjectivity based on a ‘weight-of-evidence’ criterion is involved in decisions to dismantle larger genera into component smaller ones. For example, clear phylogenetic structure revealed by DNA studies and concordant variation in other character sets (e.g. plumage, anatomy, vocalisations) is judged as amounting to a sufficient weight of evidence to recognise different genera. Examples are the break-ups of Aratinga and Ara among Neotropical parrots (Kirchman et al. 2012, Remsen et al. 2013), Calyptorhynchus among Australian cockatoos (Dickinson & Remsen 2013) and Meliphaga in Australo-Papuan honeyeaters (Joseph et al. 2014). The present case is clearly excluded from the first two categories but does fall within this last, more subjective category.

Next we note the utility of smaller genera as tools for efficient communication of information on both the evolutionary history and phenotypic traits of the constituent species (Vences et al. 2013), and as a means for clarifying rather than obscuring the true relationships and basic patterns of the broader group (Mayr 1943). Vences et al. (2013) proposed criteria for optimising supraspecific classifications in this context. Their criterion of phenotypic diagnosability states that classifications should highlight the most important and conspicuous evolutionary changes (e.g. body plan, behaviour) such as those that are readily recognised even by non-specialists (i.e. lay recognition of [Australian] ‘maggie’ and ‘butcherbird’ morphotypes), while accepting that recognition of more cryptic groups can sometimes be necessary. A further, albeit subjective, criterion suggests that minimal taxonomic change is warranted for well-known and frequently encountered taxa (Vences et al. 2013) which might be invoked here. However, Vences et al. (2013) specifically dismissed as theoretically and practically problematic the application of a hybrid viability criterion, which might be argued for the butcherbirds given several records of Australian Magpie × Pied Butcherbird hybridisation (Debus 1996, Donato & Potts 2004).

Vences et al. (2013) further proposed a secondary adaptive zone criterion particularly applicable to the rank of genus, encouraging classifications defined by exploitation of a particular ecological niche. This contrasts directly with the opposing argument advocated for synonymising Gymnorhina in Cracticus, i.e., that the numerous divergent traits of Australian Magpie are unworthy of generic recognition because they represent a single correlated suite of adaptations for terrestrial foraging (Storr 1952, Christidis & Boles 2008, Russell & Rowley 2009, Nguyen et al. 2013, Beehler & Pratt 2016). This taxonomic dismissal of niche-driven ‘ecological adaptation’ also contrasts with, to use the same examples cited by Kearns et al. (2013), the conventional multi-generic treatment of adaptive radiations such as the Malagasy vangas (Reddy et al. 2012) or indeed Darwin’s Galápagos finches (Sato et al. 1999).

Regardless, we conclude here that only a subset of the many distinctive traits of Australian Magpie are justifiably and unequivocally correlated to terrestrialism (viz. robust legs and walking gait, short tail accommodating a more upright stance, dorsal not ventral patterning, lack of hooked bill). If extended to include adaptation to expanding open savannas during Miocene-Pliocene aridification (Kearns et al. 2013), this suite might arguably also include its distinctly long and pointed wings. Counter to this is the lack of
similar structural differentiation between savanna-dwelling *Cracticus nigrogularis* and its tropical forest-associated sister group of *C. cassicus* and *C. louisiadensis*. Conversely, we note divergence in traits with no known adaptive significance for either terrestrial foraging or open savanna habitat, but which warrant research in this regard (e.g. plumage, iris colour, egg shape and colour, moult and maturation, social behaviour, vocalisation). This suggests a pattern of general divergence (or alternatively, if implausibly, ancestral traits lost in other butcherbirds), alongside more focused niche adaptation.

The implication that all ‘butcherbirds’ should constitute a single genus and that the phenotypic divergence of Black Butcherbird is insufficient for recognition at genus level (Russell & Rowley 2009, Beehler & Pratt 2016) is countered with contemporary examples of genus-level radiation with weak morphological divergence but clear phylogenetic structure (see above). Examples in Australia are within the Australo-Papuan robins (e.g. *Eopsaltria / Quoyornis*; *Microeca* and related genera; Loynes et al. 2009) and honeyeaters (e.g. *Meliphaga*, *Microptilotis*; Joseph et al. 2014). Mathews (1912: 114) originally diagnosed *Melloria* for the Black Butcherbird by its ‘stouter longer bill and longer wing and tail and stouter feet’. All but the last trait neglect some overlap in measurements between the smallest subspecies *rufescens* and *Cracticus cassicus*, especially its large island form *C. c. hercules*. Here, we instead note a number of traits shared by Black Butcherbird and Australian Magpie but not by other butcherbirds, including their long robust tarsus, glossy plumage, distinctly deeper temporal fossa (correcting error in Schodde & Mason 1999), and habitual use of short ringing or yodelling calls. The similarity of some Black Butcherbird calls to those of *Strepera* has been noted by others (Rix 1970, Debus 1996, Johnstone & Storr 2004, Higgins et al. 2006), and we note here the same similarity for some calls of Australian Magpie. These shared traits can variously be interpreted as either derived from the most recent common ancestor of Australian Magpie and Black Butcherbird, thereby affirming their monophyly, or as inherited from a more distant ancestor but correspondingly lost or modified in other butcherbirds, so affirming their divergence. Additionally we note the proportionately long inner primaries of Black Butcherbird yielding a uniquely rounded wing compared to other butcherbirds (although wing formula data are absent for New Guinean species), possibly an adaptation for its preferred closed-forest habitat, vs. the long pointed wings and open savanna habitat of Australian Magpie. These shared and unique traits collectively establish a wider morphologic and phenotypic ‘gap’ between Black Butcherbird and other *Cracticus* (sensu Mayr’s 1943: 139 ‘decided gap’ or Vences et al.’s 2013: 224 ‘phenotypic diagnosability’) than has previously been appreciated. While acknowledging some inevitable subjectivity in these arguments, we suggest that the evolutionary diversity this ‘gap’ represents warrants emphasis at the generic level. That is, recognition of *Gymnorhina* and *Melloria* serves the biologically useful purpose of communicating this diversity. Concomitantly, we posit that their shared traits do not form sufficient argument for a shared *Gymnorhina* containing both *tibicen* and *quoyi*, as that would ignore the many unique traits of Australian Magpie, whether adaptive or simply divergent, or both, as well as diagnosability criteria we have discussed.

**Conclusion**

Our re-appraisal of the Australo-Papuan butcherbirds and Australian Magpie shows that the deep genetic structure confirmed by Kearns et al. (2013), i.e. Black Butcherbird representing a separate lineage to other butcherbirds and sister to Australian Magpie, is broadly concordant with patterns and ‘gaps’ in phenotypic diversity within the group. This is especially so when fully compared across structure (including wing shape, osteology), plumage, behaviour (including nidification and vocalisations), and ecological niche. We conclude that this clade of closely related species has an evolutionary history and diversity
most usefully recognised in three genera: robust, terrestrial Gymnorhina; robust, forest-dwelling Melloria; and the smaller more gracile, more structurally and ecotypically similar core Cracticus. These groups broadly represent divergent radiations for open terrestrial foraging, closed-forest subcanopy, and more open woodland and forest edge, respectively. However we also note examples of divergence (perhaps ancestral diversity) lacking a clear ecological basis. We specifically refute a repeated misconception in the literature that has caused the many distinctive traits of Gymnorhina to be dismissed as a single suite of ‘foraging adaptations’ (Storr 1952, Christidis & Boles 2008, Russell & Rowley 2009, Beehler & Pratt 2016). In addition, we particularly note the shared blue-green gloss, long robust tarsus, temporal form, and short currawong-like calls of the Melloria + Gymnorhina clade, and the broad rounded wing of Melloria. We view these as significant to systematics when combined with distinctions previously acknowledged for all-black Melloria and terrestrially adapted Gymnorhina, and all within the phylogenetic structure outlined by Kearns et al. (2013). While nomenclaturally valid, synonymising Gymnorhina with Cracticus including quoyi (sensu Johnstone & Storr 2004, Christidis & Boles 2008, Russell & Rowley 2009, Beehler & Pratt 2016) needlessly discards much significant information regarding the evolutionary history and adaptive diversity of the group, as summarised above. We thus commend recognition of both Gymnorhina and Melloria (sensu Dickinson & Christidis 2014, Gill & Donsker 2016, del Hoyo & Collar 2016) as the taxonomic treatment best reflecting current understanding of evolutionary relationships and phenotypic diversity in the Cracticini.

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A black page in the French partridge’s history: the melanistic variety of Red-legged Partridge *Alectoris rufa*

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**Summary.**—The melanistic variety of Red-legged Partridge *Alectoris rufa* was described from a small population in western France around the 1850s. In this region, the Red-legged Partridge population as a whole was hunted, but melanistic individuals were targeted for both private and museum bird collections, and by 1865 the variety was extinct in western France. An extensive search for extant specimens documented 13 melanistic birds in six museums, and their details are presented here. Remarkably, some of these specimens were collected in areas elsewhere in France or even in other countries. After 1915, the allele for melanism appears to have been lost within the Red-legged Partridge population as a whole, and we discuss possible reasons for this.

‘…, nous sommes persuadé que cette perdrix qui tend à demeurer en Anjou [now Maine-et-Loire] se multipliera dans quelques années, au grand contentement des amateurs de la chasse et de l’ornithologie.’ […] we are persuaded that this partridge which tends to remain in Anjou will multiply in a few years, to the great satisfaction of the amateurs of hunting and ornithology.] (de Soland 1861: 146).

Colour aberrations, especially melanistic varieties, have always confused ornithologists. In the past, when little was known concerning plumage pigmentation and mutations, aberrant-coloured birds were often viewed as new taxa, and were named scientifically. Perhaps the oldest and best-known example is the melanistic form of Grey Partridge *Perdix perdix*, which was named as a species, the Mountain Partridge *P. montana*, by Brisson (1760; Fig. 1).

Melanism is the only mutation in which there is no real loss of pigments or changes in the shape or size of the melanin granules (van Grouw 2017). Therefore the plumage of a melanistic bird often is not obviously aberrant, i.e. the plumage looks ‘natural’ but may be completely different to any known species. That melanistic birds were, especially in the past, mistaken for ‘new species’ is therefore understandable. Sometimes ‘new species’ were erected on the basis of a single specimen simply because it was differently coloured, like Sharpe’s Rail (Hume & van Grouw 2014). Mostly, however, the confusion was based on melanistic forms that occurred, or still occur, quite commonly in the relevant species / populations. The fact that more individuals were found was, for many ornithologists, evidence that these aberrant birds were indeed species. An example is the melanistic form of Red-legged Partridge *Alectoris rufa*. This aberration was, for a period, quite common in a small area in western France, and it was consequently described as *Perdix Atro-rufa* (de Soland 1861; Fig. 2). The mutation also occurred sporadically elsewhere in Europe, as will be demonstrated later in this paper. A remarkable bird, occurring in small numbers, was inevitably the target of collectors, so specimens were deliberately obtained for museums and collectors of curiosities. Currently, the mutation is apparently not present in any extant Red-legged Partridge population, and just 13 melanistic specimens remain in museums.
Figure 1. Mountain Partridge *Perdix montana*. Brisson knew this ‘species’ only from the mountains of Lotharingen, France, hence *montana*. However, subsequently ‘*montana*’ was proven to occur all over Europe and to be a melanistic form of Grey Partridge *P. perdix*. From Sir William Jardine’s *Naturalist’s library*, 1834, *The natural history of game birds* (Hein van Grouw, © Natural History Museum, London)

Figure 2. *Perdix atro-rufa*, the melanistic variety of Red-legged Partridge, described taxonomically by de Soland (David Riou, © Musées d’Angers)
Here, we discuss the nature of melanism in Red-legged Partridge and its history, and present information for all of the remaining specimens.

**History of Perdix atro-rufa in France**

The first records of melanistic Red-legged Partridges are from France in the mid-19th century. A small population was discovered south-west of Cholet, at the hamlet of Cou-Pinson, part of Saint-Aubin-des-Ormeaux, in the department of Vendée, Pays-de-la-Loire, western France. A specimen was sent to the Linnaean Society of Maine-et-Loire in May 1858 by Esprit Guillou (1798–1870), a naturalist from Cholet and member of the society. During the society’s committee meeting on 18 May 1858, it was decided that the specimen represented a new ‘race’. They named it *Perdix Atro-rufa* and a description with colour plate (Fig. 2) was published by de Soland (the society’s president) in 1861. In the following years, various authors published information concerning the occurrence of *atro-rufa*, enabling us to compile a short history of the population.

The first melanistic bird was discovered by Guillou as early as 1846 (Millet de la Turtaudière 1868) in the area around Saint-Aubin-des-Ormeaux, Vendée department (de Soland 1861, Vincelot 1867). As this is only a few km from Cholet, Maine-et-Loire department, many authors considered the provenance of *atro-rufa* to be ‘the vicinity of Cholet’, but in fact the mutation was never observed in Maine-et-Loire (Millet de la Turtaudière 1865, 1868). After the first observation, at least 5–6 family groups including dark-coloured individuals were recorded in the area annually (de Soland 1861, Vincelot 1865), and the aberration would probably have become established in the population if it had not been targeted by collectors. Specimens were collected for private collections, as well as being sold as game at the markets in Cholet, or sent to Paris for research (Vincelot 1867).

De Soland (1861) already warned as to the negative effects of over-exploitation, and Millet de la Turtaudière (1865) reported that *atro-rufa* was killed by poachers and repeated that excessive hunting would threaten the population. By then, it was already too late as, according to Baugas (Lemetteil 1869), the last six individuals were killed in spring 1865. In less than 20 years after its discovery, the small population of melanistic Red-legged Partridges was wiped out. At that time, specimens were present in the private collections of Baugas (several), Guillou (four) and Lemetteil (one), and in the natural history museums of Angers (two), Saumur (at least one) and Paris (two) (de Soland 1861, Millet de la Turtaudière 1865, 1868, Vincelot 1865, Lemetteil 1869). Much of the above information was summarised by Mayaud (1947). He also mentioned specimens in different museums like Cholet and some English specimens. However, he did not mention the specimens held in Angers, Saumur and Paris. Remarkably, no-one appeared to be aware of a specimen collected in 1844 in the south of France, present in Marseille museum, which was depicted by Hachisuka (1928).

**Perdix atro-rufa in England**

In early 1900 the mutation appeared again, but this time in England, and three specimens are present in the Natural History Museum, Tring (NHMUK) collection (Fig. 8). Ogilvie-Grant (1912) mentioned and depicted (Fig. 3) the variety; ‘The most extraordinary variety, however, that we have ever examined, is that shown in the second figure. It has the fore-part of the head, eyebrow-stripes, cheeks and throat black; the rest of the head, mantle, breast, and flanks dull vinous-red, with the exception of a few white feathers on the middle of the breast; and the abdomen, thighs, and under tail-coverts are dull greyish-brown, with the exception of a few buff feathers on the middle of the belly. The tail-feathers are dull greyish-
brown, like the lower back, rump and wings.' He did not mention the earlier French history of this aberration, but he may have been unaware of it. Furthermore, he did not mention where the specimen came from, but it was in all likelihood that shot in Essex in 1908 (see Extant specimens). In March 1915, two \textit{atro-rufa} specimens were present in what is now the NHMUK collection, and Ogilvie-Grant (1915) exhibited a series of aberrant partridges at the Zoological Society meeting. He noted: ‘The remarkable variation which I now exhibit has the head, eyebrow-stripes, cheeks, and throat black, and the rest of the plumage dull vinaceous-red with a patch of white feathers in the middle of the belly, forming an irregular horse-shoe mark. … and it seems a remarkable coincidence that a second specimen of this quite unique variation of the red-leg should have been killed exactly six years after the first, and in nearly the same locality.’ Coincidence or not, in September 1915, the museum received a third specimen taken near the same locality as the second bird the year before.

The English melanistic specimens were also described by Bateson & Bateson (1925) as the ‘dull variety’, which they named \textit{Alectoris rufa rufa Var. obliterata}. Both Lowe (1945) and Ash (1966) mentioned the melanistic variety briefly without adding further details, although Ash also referred to the French population.

Red-legged Partridges in England originated from France, with the first introduction orchestrated by King Charles II in 1673 (Potts 2012). These birds came from Chambord, department Loir-et-Cher, in the Loire Valley, and were released in Windsor Great Park, on the Berkshire / Surrey border. This population apparently died out quickly. After several more attempts, the species eventually became well established on the Suffolk coast by c.1790. However, over the rest of England Red-legged Partridges remained uncommon until the late 1950s (Barbanera \textit{et al.} 2015). It seems probable that the English melanistic birds derived directly from the French population. However, the French population described by de Soland came from Saint-Aubin-des-Ormeaux, Vendée department, which is c.250 km west of Chambord, Loir-et-Cher department, and it is unlikely that the rare allele for
melanism was present in that population too. Furthermore, contra Potts (2012), molecular work demonstrates that English Red-legged Partridges are genetically closer to Italian and Corsican populations than to those of mainland France, with the three melanistic birds not diverging in this respect from other historical English specimens, and no relationship to birds from the Loire Valley is evident (Barbanera et al. 2015). Consequently, we consider the melanistic English birds as a fresh occurrence of the same mutation, rather than originating from the original French population.

**Museum specimens of *Perdix atro-rufa***

Probably the oldest museum specimen, collected in 1844, is in Marseille but, apart from Hachisuka (1928), no other author seems to have been aware of it. Based on the pre-1870 literature (de Soland 1861, Millet de la Turtaudière 1865, 1868, Vincelot 1865, Lemetteil 1869) the following specimens were then known: four in Guillou’s private collection, ‘a few’ in Baugas’ collection, one in Lemetteil’s collection, two in Angers, at least one in Saumur and two in Paris. Mayaud (1947) seemingly listed seven additional specimens; three in London (see above) and four in Cholet. The specimens in Cholet, however, are the same as the Guillou specimens mentioned by earlier authors. Following Guillou’s death in 1870 his collection was donated to the Cholet museum (see Extant specimens).

The whereabouts of Baugas’ collection are unknown and the specimens are considered lost. Edouard Leon Baugas (1824–1901) was also from Cholet and a friend of Guillou. The specimen from Lemetteil also appears to be lost. Eugène Lemetteil (1822–90), a keen amateur ornithologist from Bolbec, was particularly interested in the avifauna of the department of Seine-Maritime (formerly Seine Inférieure), in Normandy, northern France. The melanistic partridge was sent to him by Abbot Vincelot (Lemetteil 1869). Michel Honoré Vincelot (1815–77) was an abbot at Angers (Crépon 1877), an amateur ornithologist and a member of the Linnaean Society of Maine-et-Loire with a keen interest in the etymology of bird names. Probably initiated by Lemetteil’s son-in-law Georges Pinchon, Lemetteil’s collection, which comprised approximately 2,000 specimens, both birds and eggs, was sold 14 years after his death by the auctioneer Hommais in Bolbec, and bought by Lemaistre. Although it was Hommais’ intention to sell the collection as a whole (letter PEN6 1904-018 in Rouen Museum archive), apparently Lemaistre purchased only part of it (P. Cantrel *in litt.* 2016). At the time, Edmond Lemaistre (1876–1953), a rich textile manufacturer and keen hunter, had just started to assemble a private collection of local birds. Lemaître’s collection as a whole is still at the Municipal Museum in Lillebonne, Seine-Maritime, having been bequeathed to the town in 1953. The melanistic partridge of Lemetteil, however, was never part of the bequest (P. Cantrel *in litt.* 2016), so Lemaistre may have parted with it earlier, as *atro-rufa* was not a local bird, or he never received it in the first place. If the specimen still exists, its whereabouts are unknown to us.

The Château-Musée de Saumur was founded in 1829 and based in the town hall until 1919; apparently an *atro-rufa* specimen was sent to this museum in the mid 1800s (Millet de la Turtaudière 1868). However, currently no melanistic specimen of Red-legged Partridge is present there (MB pers. obs.) and also we have not found any evidence that one was once in the collection (Courtiller 1868).

**Extant specimens**

*Muséum d’Histoire naturelle de Marseille (MHNM), France*

One mounted specimen, MHNM.0.394, originally labelled ‘Basses Alpes, France 1844’ (Fig. 4). No further details known. According to Hachisuka (1928) the specimen is a
female, but no evidence of the bird’s sex is recorded with the specimen. Until April 1970, ‘Basses-Alpes’ was the name of the Alpes-de-Haute-Provence, in southern France. If the date and locality are correct, then this specimen was collected before the population in Vendée was discovered, and is probably unrelated genetically.

**Muséum national d’Histoire naturelle de Paris (MNHN), France**

Two mounted specimens, Cat. Gén. 1858-1318 (other nos. 12436 and 562), originally labelled ‘France. Collection du prince Charles Bonaparte, achetée par l’état en 1858’, and Cat. Gén. 1859-610 (other nos. 12435 and 561), originally labelled ‘femelle, Bretagne. Trouvé sur le marché de Paris en décembre 1859, venant de Bretagne, acquis à Mme Perrot le 15 décembre 1859’ (Fig. 5). 12435 and 12436 are former registration numbers used in the ‘Catalogue des Oiseaux n°4 placée dans la galerie du muséum d’histoire naturelle’. 561 and 562 refer to these specimens’ entries in the ‘Catalogue des Montages’. Bretagne (Brittany) traditionally included part of Pays-de-la-Loire, so this specimen probably emanates from the original population.

**Muséum des sciences naturelles d’Angers (MHNAn), France**

Two mounted specimens, both males, MHNAn.2003.522 and 2003.523 (Fig. 6). In the museum’s register (2R24) both are mentioned under the same entry: 16 November 1863, two
‘Perdrix lugubres, achetée 10 francs’ It is unclear whether 1863 is the date of acquisition, collection or registration. 1863, however, appears to be incorrect for collection or acquisition as, based on de Soland (1861), these specimens must have been present in the museum.
before 1861. According to Mayaud (1947) Deloche, the former taxidermist at Angers, obtained two specimens two years after Guillou presented one to the Linnaean Society of Maine-et-Loire in 1858, so these Angers specimens probably came to the museum in 1860, rather than 1863.

Museum de Société des Sciences Lettres et Arts de Cholet et sa région (SLA), France
Four mounted specimens, SLA 274-37.2, 288-37.6, 265-37.8 and 266-37.7 (Fig. 7). These were part of the private collection of Esprit Guillou (Mayaud 1947). His son, Arthur Guillou, donated the collection to the town of Cholet in 1905, when they were placed in the SLA (F. Lambert pers. comm.). E. Guillou was a keen naturalist, bird collector and member of the Linnaean Society of Maine-et-Loire. None of his specimens are accompanied by original data or labels, but we assume that all were collected at ‘métairie du Cou-Pinson’ of the village of Saint-Aubin-des-Ormeaux in Vendée between 1846 and 1861. One of these is probably that shown to the Linnaean Society and therefore the type of the name atro-rufa, although none agrees fully in shape and posture with the depiction in the type description (see Fig. 2).
Three skin specimens, NHMUK 1908.10.22.1, male, Spaynes Hall, Braintree, Essex, shot 20 October 1908 and presented by A. W. Ruggles Brise; NHMUK 1915.1.15.1, male, Higham,

Natural History Museum, Tring (NHMUK), UK

Three skin specimens, NHMUK 1908.10.22.1, male, Spaynes Hall, Braintree, Essex, shot 20 October 1908 and presented by A. W. Ruggles Brise; NHMUK 1915.1.15.1, male, Higham,
Figure 10. Melanistic form of Red-legged Partridge *Alectoris rufa* (left) compared with a normal-coloured specimen (NHMUK 1908.10.22.1 and 1912.12.18.4). A: the upperparts are hardly affected except the neck where phaeomelanin is increased, but the underparts are uniform reddish grey-brown due to an increase of both eumelanin and phaeomelanin, while the few white feathers are a form of leucism, which often occurs concurrently with certain forms of melanism; see Figs. 12 and 15. B: flank feathers of the same specimens (Harry Taylor, © Natural History Museum, London)
near Gravesend, Kent, shot 20 October 1914 and presented by Dr Hammond Smith; NHMUK 1915.10.5.1, male, Mockbeggar, Rochester, Kent, shot 1 September 1915 and presented by Herbert Cobb (Fig. 8).

**Museo Nacional de Ciencias Naturales (MNCN), Madrid, Spain**

One skin specimen (relaxed mount), MNCN-A4955. Adult, originally labelled (in Spanish): ‘South West Europe, probably Spain’ (Fig. 9). The specimen was probably collected in Spain, but it is possible that it came from southern France, potentially from the same area (Alpes-de-Haute-Provence) as the Marseille specimen. The collection date is unknown, but it must be before 1912 when the museum’s collection was inventoried (J. Barreiro pers. comm.)

**Discussion**

The pigments responsible for the Red-legged Partridge’s plumage colour are melamins. Melanin comprises two forms: eumelanin and phaeomelanin. Depending on its concentration and distribution within the feather, eumelanin is responsible for black, grey and/or dark brown feathers, whereas phaeomelanin produces warm reddish-brown to pale buff feathers. Together, both melamins can produce a wide range of greyish-brown colours. Melanin is produced by cells called melanocytes, which are found mainly in the skin and the feather follicles (from which the feathers grow). Melanocytes within the feather follicles produce melanin, which is added to the feather cells as the feather grows. However, melanin distribution does not always occur at a constant rate. In most species, feathers have certain patterns and/or colour differences caused by the type, amount and distribution of melanin. During feather growth, sudden changes from the production of eumelanin to phaeomelanin may occur, giving rise to these different patterns (van Grouw 2017).

Many mutations in birds are known to cause plumage that is darker than normal (= melanism). Melanism, from the Greek *melanos* (= dark-coloured), is often defined as an increased amount of dark pigmentation (melanin). Aberrant dark plumage is, however, not necessarily the result of an increased amount of pigment. A change in the arrangement or distribution of pigment granules, rather than more granules being present, also causes darker plumage. Therefore a better definition of melanism is: ‘a condition characterised by abnormal deposits of melanin in skin and feathers’ (van Grouw 2017).

Although the melanistic form of Red-legged Partridge looks strikingly different from that with normal-coloured plumage, closer observation reveals that the original reddish grey-brown colour of the upperparts and wings in ‘atro-rufa’ is hardly darker (Fig. 10A). Only on the neck is more phaeomelanin present, affording the plumage a more reddish appearance. Despite its name *atro-rufa* (Latin *ater* = black and *rufus* = red), the melanistic variety displays relatively little black in the plumage, perhaps even less than in normally coloured birds. The black head and throat markings typical of normal plumage are reflected in the solid black forehead and throat of the melanistic form, but the black stripes on the flanks have disappeared, instead the flanks and underparts are uniform reddish grey-brown (Fig. 10B). The normally reddish-brown tail feathers (produced by phaeomelanin alone) now contain both melamins, and are the same colour as the underparts.

In *atro-rufa* mainly phaeomelanin seems to be increased, although not to the same extreme as in *Perdix montana* (Fig. 11) and the phaeomelanistic variety of Northern Bobwhite *Colinus virginianus* known as ‘Red Tennessee’ (Fig. 12; Cole et al. 1949). Although in appearance these melanistic varieties are very similar to *atro-rufa*, large parts of their plumage contain only phaeomelanin, while in the melanistic Red-legged Partridge both pigments seem to be equally present in most feathers. In this respect, the mutation in Red-legged Partridge is highly comparable with ‘recessive black’ in Japanese Quail *Coturnix*...
Figure 11. Melanistic form of Grey Partridge *Perdix perdix*, originally named *P. montana*, a specimen in the Naturalis Biodiversity Centre, Leiden (Hein van Grouw)

Figure 12. Melanistic form of Northern Bobwhite *Colinus virginianus* known as ‘Tennessee Red’; note the few white feathers (leucism) which often co-occur with certain forms of melanism; see Figs. 10 and 15 (© Joel Sartore)
japonica, as in the latter, due to the mutation, each feather also contains both pigments and the original patterns and markings are faded (Fig. 13). In appearance, the varieties of both species do not look like each other at all, but in their normal colour the two are also totally different. In comparing mutations within different species, one must examine what happens to the pigmentation process, rather than just comparing the final result, as this can differ between species.

The inheritance of recessive black in Japanese Quail is, unsurprisingly, recessive, and the mutation is associated with the agouti gene (Hiragaki et al. 2008). Two important genes that regulate the production and deposition of the two types of melanin are agouti (A) and extension (E). The agouti gene regulates the distribution of eumelanin and phaeomelanin on each feather and over the surface of the body, while the extension gene is responsible for controlling the type of melanin being produced: eumelanin or phaeomelanin. Mutations of either of these genes can cause an abnormal deposition of melamins in the plumage (van Grouw 2017). Based on the similarity to recessive black in Japanese Quail, we assume the melanistic form of Red-legged Partridge was also recessive in inheritance.

Recessive black is also recorded in Common Quail Coturnix coturnix and this variety was described as a species, Synoicus lodoisiae, by Verreaux & des Murs (1862; Fig. 14). A similar mutation, which is rather common in northern Russia west of the Urals, chiefly in Perm and Olonetz Oblasts, also occurs in Hazel Grouse Tetrastes bonasia. Due to its frequency, Menzbier (1880) considered it a valid species and named it T. gryseiventris (Figs. 15–16).

The presumably recessive gene mutation responsible for the melanistic variety of Red-legged Partridge altered the deposition of both melamins in the feathers. In some species, like Northern Bobwhite, the melanistic variety (which mainly shows increased phaeomelanin) is weaker and less fertile than typical individuals (Cole et al. 1949). In Feral Pigeons Columba livia negative effects on fitness are also linked to strongly phaeomelanised plumage (van Grouw 2017). Furthermore, the reddish ‘morph’ of Grey Partridge, ‘montana’, persistently
Figure 14. *Synoicus lodoisiæ*, in Verreaux & des Murs (1862), which proved to be a melanistic variety of Common Quail *Coturnix coturnix* (Hein van Grouw, © Natural History Museum, Tring)

Figure 15. Menzbier’s Hazel Grouse *Bonasa griseiventris* [sic], in Dresser (1896), proved to be a melanistic variety of Hazel Grouse *Tetrastes bonasia*; the specimen Dresser selected for the illustration had a small white bib and a few white feathers behind the eye, features which he assumed distinguished the ‘species’. However, a few white feathers often co-occur with certain forms of melanism, but are certainly not usual (Hein van Grouw, © Natural History Museum, London)
re-appears due to the recessive nature of the mutation, but there is no evidence that this phaeomelanised variety increases numerically anywhere in the species’ natural range. So mutations causing an increase of phaeomelanin apparently negatively affect fitness, whereas ‘eumelanism’ often has no effects or even contributes positively (van Grouw 2017).

The small population of melanistic Red-legged Partridges in the Pays-de-la-Loire region of north-west France became extinct less than 20 years after its discovery in 1846. In addition to being hunted for their meat, melanistic birds were consistently targeted by collectors.
which certainly contributed to their extirpation. Whether the mutation also had negative effects on fitness meaning that a thriving population would never have become established is unknown. Many mutations, however, like ‘Leucism’, ‘Dilution’ and ‘Brown’ (Figs. 17–19), in Red-legged Partridge are widespread in populations and appear repeatedly in the wild. In contrast, the melanistic variety is known only from three localities and for a period of c.70 years prior to 1915. A possible explanation for the loss of the melanistic variety is that the allele for this mutation has disappeared altogether from Red-legged Partridge populations due to hunting and an influx of genetically unrelated birds.

The estimated combined population of Red-legged and Grey Partridges in 1858 in France was c.20 million individuals. Subsequently, due to hunting and climatic changes, numbers of Red-legged Partridge declined dramatically and, in 1979, they were estimated at just 300,000–550,000 breeding pairs. Consequently, since the 1970s the species has been bred for hunting on a large scale in France (ONCFS 2018). In 1995, for example, no fewer than 2.5 million birds were released for sport hunting (Tupigny 1996). Due to the large influx of captive-bred birds into the wild, the genetic composition of the wild population has been
diluted to the extent that the original population may become extinct sooner rather than later (ONCFS 2018).

In Britain the situation is little better. Although the species was by then well established in the wild in many parts of the UK, releasing captive-bred birds for sport commenced in 1963. For a time, the closely related Chukar *A. chukar* and Chukar × Red-legged Partridge hybrids were released too, but this practise was prohibited in 1992 to protect the genetic integrity of the wild population. Currently releases of captive-bred Red-legged Partridges are estimated at 6.6 million birds p.a. in the UK (Game & Wildlife Conservation Trust 2018).

Whether it was unfitness, consistently being targeted by hunters, reduced genetic diversity, or a combination of these factors, the melanistic form has disappeared from Red-legged Partridge populations. All that remains are 13 museum specimens—the dark reminders of an even darker history.

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First description of the nest, eggs and nestlings of Scallop-breasted Antpitta *Grallaricula loricata*

by Jhonathan E. Miranda T., Karen López & Harold F. Greeney

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The genus *Grallaricula* (Grallariidae) comprises 8–9 species of small, semi-terrestrial antpittas (Krabbe & Schulenberg 2003, del Hoyo *et al.* 2017, Remsen *et al.* 2017). Following the first nest description for Rusty-breasted Antpitta *G. ferrugineipunctatus* (Schwartz 1957), the first for the genus, our knowledge of the breeding biology of other *Grallaricula* remained a mystery until the start of the 21st century, when the first nests were described for Ochre-breasted Antpitta *G. flavirostris* (Holley *et al.* 2001, Maillard-Z. & Vogel 2003). Less than a decade later, nest descriptions and reproductive data were available for half of the species (Greeney *et al.* 2008), with the most recent addition being a nest description for Crescent-faced Antpitta *G. lineifrons* (Greeney & Jipa 2012). To date, nest descriptions are available for five species and egg descriptions have been published for six species (see Discussion), with Ochre-fronted Antpitta *G. ochraceifrons* and Scallop-breasted Antpitta *G. loricata* being the only two species lacking descriptions of both nests and eggs.

Scallop-breasted Antpitta is endemic to the north coastal mountains of Venezuela, where it inhabits the understorey of humid montane forests, generally above 1,400 m (Verea & Greeney 2014, Greeney 2018). As a range-restricted species facing severe habitat loss, it is currently considered Near Threatened (BirdLife International 2017). Despite several studies in the past two decades that have improved our knowledge of its distribution, plumage, moult, and basic habits (Verea *et al.* 1999, 2009, Verea 2004, 2007, Verea & Solórzano 2011), the reproductive biology of Scallop-breasted Antpitta remains completely unknown (Verea & Greeney 2014). Here we provide the first descriptions of the nest, eggs and nestlings, based on two active nests and five inactive nests found in Venezuela’s Sierra de Aroa National Park.

**Methods and Results**

All of the following observations were made in the El Silencio section of Sierra de Aroa National Park, near Pico El Tigre, Yaracuy, Venezuela. We found the first active nest (hereafter nest 1), containing two nestlings, on 26 May 2013, at an elevation of 1,696 m along the road to Pico El Tigre (10°22′36″N, 68°48′39″W). Both nestlings were still in the nest the following day but we found the nest empty, but intact, upon our return on 31 May. The second active nest (hereafter nest 2) was c.0.25 km south-east of nest 1 at an elevation of 1,767 m, and contained a single egg on 1 June 2013 at 13.30 h. Upon our return at 06.30 h on 2 June, the nest held a second egg. We visited this nest until 3 June and subsequently on 21 June. During the first three weeks of June 2013 we found five additional nests, all inactive when found, but almost certainly belonging to Scallop-breasted Antpitta based on similarities in architecture with the two active nests (see below) and based on the experience of HFG with the nests of other *Grallaricula*. Three of these were very close to nest 1 and probably belonged to the same pair. One was close to nest 2, and the final inactive nest was at 1,943 m near the crest of a ridge c.1.1 km south-east of nest 2 (10°26′15″N, 68°47′01″W).

All nests were architecturally very similar, being shallow, open cups composed externally of moss and neatly lined with dark fibres and rootlets (Fig. 1). A conspicuous
detail common to all nests was the presence, below the cup, of a sparse platform of long (c.100 cm) unbranched twigs or leaf petioles that were clearly arranged to provide support for the main cup. These bases of supporting twigs were very similar to those described for nests of Peruvian Antpitta *G. peruviana* (Greeney 2009) and Ochre-breasted Antpitta (Greeney et al. 2012). Measurements for nests 1 and 2, respectively were: external diameter (measured at perpendicular angles), 111 × 108 mm, 115 × 110 mm; external height (thickness), 53–55 mm, c.65 mm; internal diameter, 78 × 70 mm, 70 × 70 mm; internal depth, 38 mm, 40 mm. All nests were in the understorey of humid montane forest typical of the region, with a closed canopy, c.15–25 m high, and dominated by trees in the families Apocynaceae, Elaeocarpaceae, Cunoniaceae and Podocarpaceae. The understorey surrounding the nests was fairly open and dominated by Rubiaceae, Piperaceae and ferns. The two active nests were built 86 cm and 97 cm above ground, while inactive nests ranged in height from 55 cm to 119 cm. Mean (± SD) height of all nests was 92.20 ± 23.99 cm. Nest 1 was in a small sapling (1.6 m tall), supported basally by several small branches and by the petioles of epiphytic ferns growing on the side of the substrate tree. Nest 2 was in a Rubiaceae and supported by several small branches. The remaining (inactive nests) were all in very similar situations.

The eggs in nest 2 were short subelliptical, with a white ground colour sparsely flecked and blotched with various shades of brown and lavender. We did not measure them. Adult behaviour while we were in the vicinity of the nest was ‘nervous’; they frequently changed perches (thin horizontal branches 0.5–1.5 m above ground), rhythmically twitching their lower bodies in typical *Grallaricula* fashion (Greeney 2018) and occasionally flicking their wings. The only vocalisations noticed during our presence at the nest were the typical, drawn-out, somewhat melancholy notes described by Verea (2004), but these were always made while the calling individual was hidden in the undergrowth.

Figure 1. Nest of Scallop-breasted Antpitta *Grallaricula loricata*, Sierra de Aroa National Park, Yaracuy, Venezuela, 21 June 2013 (Jhonathan Miranda)
Based on comparisons with nestlings of known age of other *Grallaricula* (see Greeney *et al.* 2010, Greeney 2012), we estimate that the nestlings in nest 1 were c.8–12 days old when the nest was found. They were mostly covered in dense, wool-like, rufescent or rusty-brown down, wings with more developed flight feathers and prominent orange commissures, all similar in form and colour to that of other *Grallaricula* nestlings (Greeney 2012). We recorded the following measurements from each nestling: wing 13.6 mm, 13.5 mm; bill depth at nares 13.4 mm, 13.1 mm; bill width at nares 14.4 mm, 14.8 mm; bill length from front of nares 14.8 mm, 14.6 mm; exposed culmen 18.8 mm, 18.3 mm; tarsus 20.9 mm, 20.5 mm.

**Discussion**

Although the taxonomic affinities of Scallop-breasted Antpitta have not been investigated, based on plumage and vocal similarities it is probably closely allied to Peruvian and Ochre-fronted Antpittas, which two have been suggested to form a superspecies (Graves *et al.* 1983). Unsurprisingly, therefore, the nest, egg and nestling of Scallop-breasted Antpitta appear very similar to those of Peruvian Antpitta (Greeney *et al.* 2004a,b). The relatively shallow, open-cup nest agrees in general form with all other described *Grallaricula* nests, all of which also have a well-defined lining of dark, flexible fibres. In being composed externally of moss and mossy twigs, it is most similar to Peruvian (Greeney 2009), Ochre-breasted (Holley *et al.* 2001, Maillard-Z. & Vogel 2003, Greeney *et al.* 2012) and Crescent-faced Antpittas (Greeney & Jipa 2012), and differs from the leaf, stick and petiole exterior of nests of Slate-crowned *G. nana* (Greeney & Sornoza 2005) and Rusty-breasted Antpittas (Schwartz 1957, Niklison *et al.* 2008). Although the process of nest construction has not been observed, the nest of Scallop-breasted Antpitta clearly consists of a loose platform of twigs supporting the well-formed nest cup, a key architectural detail that may turn out to unify the nests of all *Grallaricula* (Greeney *et al.* 2008, 2012, Greeney 2009).

With respect to the form and coloration of the eggs, those of Scallop-breasted Antpitta are also consistent with other descriptions within the genus *Grallaricula*. Their whitish to beige ground colour and variable markings of brown, cinnamon and lavender are well aligned with egg descriptions for Ochre-breasted Antpitta (Greeney *et al.* 2012), Hooded Antpitta *G. cucullata* (Selater & Salvin 1879, Oates & Reid 1903), Peruvian Antpitta (Greeney *et al.* 2004a), Slate-crowned Antpitta (Greeney & Sornoza 2005) and Sucre Antpitta *G. cumanensis* (Kreuger 1968), but differ from eggs of Rusty-breasted Antpitta (Schwartz 1957, Niklison *et al.* 2008), the only member of the genus known to have eggs with a pale greenish ground colour. Similarly, mid-aged nestlings’ dense covering of rusty-brown down supports the suggested uniformity of nestling appearance in the genus (Greeney 2012, 2018, Greeney & Jipa 2012) and the resemblance of *Grallaricula* nestlings to those of *Hylopezus* antpittas (Greeney *et al.* 2016, Greeney 2018).

Our observation of active nests in May and June suggests that the reproductive period of March–May suggested by previous authors (Schäfer & Phelps 1954, Schäfer 1969) may extend at least through June, perhaps concluding with the onset of the drier months in the coastal mountains of Venezuela. Based on the moult and reproductive condition of adults captured in mist-nets, Verea (2004) concluded that Scallop-breasted Antpitta may breed during most of the year. Further sampling is needed to confirm this, but it is possible that Scallop-breasted Antpitta may have two reproductive peaks during the year, as suggested by nesting records of the ecologically similar Peruvian Antpitta (Greeney 2006, 2009).

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First record of Red-throated Pipit *Anthus cervinus* in Central America

by Esteban Matías & Knut Eisermann

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On 15 April 2018, EM photographed a pipit in rocky grassland at Sierra Los Cuchumatanes, 2 km east of La Capellanía (15°24′38.7″N, 91°25′55.3″W), dpto. Huehuetenango, at 3,100 m (Fig. 1). The rufous face, supercilium, throat and upper breast are unique in the genus *Anthus* to adult Red-throated Pipit *A. cervinus* (Alström *et al.* 2003, Tyler 2004). Although the sexes cannot be distinguished with certainty, those with extensive rufous and only weak streaking on the upper breast are probably males (Alström *et al.* 2003).

The observation is notable because it is the first record of Red-throated Pipit in Central America. In the Neotropics, the species was previously reported only in central and southern Mexico and Ecuador. Mexican records away from the Baja Peninsula include singles in the Pacific slope lowlands of Michoacán in April 1988 (Howell & Webb 1989), Colima in March 1992 (Howell & Webb 1995) and Oaxaca in November 2008 (Gómez de Silva 2009). In coastal Ecuador, a first-winter was documented in March 2008 (Brinkhuizen *et al.* 2010).

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Figure 1. Adult Red-throated Pipit *Anthus cervinus*, Sierra Los Cuchumatanes, dpto. Huehuetenango, Guatemala, 15 April 2018: (a) rocky grassland habitat with the bird in the centre of the image, (b) close-up view of the bird (Esteban Matías)
Red-throated Pipit breeds mainly in Arctic tundra from northern Europe (in Scandinavia) to northern Asia (Dementiev & Gladkov 1954, Glutz von Blotzheim & Bauer 1985), but also in Alaska (Kessel & Gibson 1978). Wintering areas are mainly in the Old World tropics. Western populations (breeding from Scandinavia to the Taimyr Peninsula) are thought to winter in Africa, and eastern populations (east of the Taimyr to Alaska) mainly in South-East Asia (Glutz von Blotzheim & Bauer 1985). Some individuals of the latter population migrate instead south along the eastern Pacific seaboard, indicated by records in the western USA (Roberson 1980, King 1981, Hamilton et al. 2007), Mexico (Howell & Webb 1989, 1995, Erickson et al. 2013), Ecuador (Brinkhuizen et al. 2010) and now Guatemala. The species is now observed almost annually, sometimes in autumn flocks of up to 15 birds, on the Baja California Peninsula, where small numbers winter in the south in some years (Erickson et al. 2012; S. N. G. Howell in litt. 2018). Bird migration routes can be altered by unusual weather conditions (e.g. strong winds), but also by evolutionary processes, e.g. access to more favourable wintering grounds (Berthold et al. 1992, Berthold 2001). Causes of the apparent recent increase in numbers of Red-throated Pipit wintering in the Americas are unknown. It is possible that the species is more frequent in Middle America than the few records suggest. All pipits in the region should be well documented, because especially first-winter birds represent identification challenges (see Brinkhuizen et al. 2010). Other long-distance migrant Anthus could exceptionally occur in Central America, namely Sprague’s Pipit A. spragueii which winters in Mexico (Howell & Webb 1995), and three Old World species reported as vagrants in North America (AOU 1998): Tree Pipit A. trivialis, Olive-backed Pipit A. hodgsoni and Pechora Pipit A. gustavi.

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First record of Crested (or Crested-type) Honey Buzzard
_Pernis ptilorhynchus_ for Greece

_by Stylianos P. Zannetos, Yiannis Zevgolis & Triantafyllos Akriotis_

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_Crested Honey Buzzard_ _Pernis ptilorhynchus orientalis_ is a long-distance migrant that breeds across southern Siberia to Sakhalin and Japan, and winters mainly in South-East Asia, Indonesia and the Philippines (Higuchi _et al._ 2005, Wells 2010, Orta _et al._ 2018). In southern Siberia, at its western limit, the breeding range partially overlaps with that of European Honey Buzzard _P. apivorus_ (Stepanyan 1983, Ferguson-Lees & Christie 2001). Six subspecies of Crested Honey Buzzard are recognised, but only _orientalis_ is a migrant (Orta _et al._ 2018). The species was recorded for the first time in the Western Palearctic at Borçka, north-east Turkey, in September 1979 (Laine 1996) and then at Eilat, Israel, in May 1994 (Shirihai 1994). _P. ptilorhynchus_ is now considered regular in small numbers on passage through Israel, mainly at Eilat, which is a major passage bottleneck for European Honey Buzzards (Shirihai 1994). Fifteen to 20 individuals are recorded every spring, mainly in May, with 5–12 in autumn, mainly in mid September (Babbington & Campbell 2016). There have also been many recent records of _P. ptilorhynchus_ at Batumi (Georgia) where the first to be officially accepted was in autumn 2007 (Abuladze 2013). Since then, the species has been identified annually at Batumi, with a total of 163 records until 2018 and a max. 51 birds in 2013 (https://www.batumiraptorcount.org/migration-count-data#annual-total).

It is presumed that those Crested Honey Buzzards recorded in Israel, and elsewhere in the Middle East in spring, joined flocks of _P. apivorus_ wintering in Africa (Ferguson-Lees & Christie 2001). Many records have been suspected to be potential hybrids with _P. apivorus_ (Babbington & Campbell 2016).

In Europe, Crested Honey Buzzard has been fully documented just twice: on Cyprus in October 2012 (Harrison 2014) and in Italy on 18 May 2011, at the Strait of Messina between Sicily and the mainland (Scuderi & Corso 2011).

On 2 May 2018, near the village of Alyfanta (39°06'04"N, 26°31'45"E) on Lesvos, 4 km from the largest urban centre on the island (Mytilini), we observed an adult male Crested (or Crested-type) Honey Buzzard. It was watched as it soared, gradually gaining height, for c.3 minutes at a distance of c.150 m from the observers (SPZ, YZ). SPZ managed to take 12 photographs of the bird (Figs. 1–3). Subsequently, it headed south-west and was not seen again. Identification was made by the authors, following the observation, based on the photographs. This is the first documented record for Greece and the third to be accepted for Europe.

_P. ptilorhynchus_ can be easily confused with _P. apivorus_. In this case, the bird’s structure was obviously different: heavier bodied, slightly larger and bulkier (more eagle-like) compared with _P. apivorus_. Furthermore, its wings appeared broader and the tail shorter than that of European Honey Buzzard. The absence of the diagnostic carpal patch of _P. apivorus_, the six clearly fingered primaries protruding from the trailing edge of the wing, and the dark tail with a broad white bar in the centre of the undertail, are diagnostic features of _P. ptilorhynchus_ (Ferguson-Lees & Christie 2001, Svensson _et al._ 2009, Forsman 2016). The inner secondaries show two well-defined bars while a third bar is visible on the inner primaries and outer secondaries. The head is grey with a pale throat, bordered by a
dark ‘gorget’ that contrasts with the pale sandy-ochre underparts and underwings. This plumage is commonest in adult males according to Forsman (2016).

Alternatively, the possibility of hybridisation between *P. apivorus* and *P. ptilorhynchus* (Faveys 2011, Forsman 2016) and some structural and plumage features that do not match perfectly with *P. ptilorhynchus* made us consider the possibility that the bird was a potential hybrid. Specifically, the bird shows a quite rounded wingtip, rather than the blunt tip of Crested Honey Buzzard (p5 is not clearly longer). Furthermore, the wing is typically more rectangular in Crested Honey Buzzard, but in the Greek bird appears broadest at the carpal joint, tapering towards the body and tip. The intermediate underwing and tail barring, and possible hint of a darker carpal area, typical of supposed hybrids, reinforce this hypothesis (D. Forsman in litt. 2018).

However, the lack of genetic research into the hybridisation question, in parallel with the fact that *P. apivorus* and *P. ptilorhynchus* are (a) not known to form mixed pairs in the region of overlap (Mosquitin 1973, Kislenko 1974, Stepanyan 1983), and (b) are not even each other’s closest relatives (Gamauf & Haring 2004), raises doubts as to whether it is justifiable to discuss hybrids between the two species. The unquestionable similarity of *P. ptilorhynchus* to *P. apivorus* and, for most European observers, the lack of understanding of their distinguishing features and especially their morphological variability, lead us to suspect that *P. ptilorhynchus* may be a more frequent vagrant to parts of south-east Europe than is currently perceived. More attention should be paid along the major raptor passage flyways in the Western Palearctic to better understand the western limit of Crested Honey Buzzard’s migration route. Furthermore, genetic analysis is critical to provide a more solid basis for discussing hybridisation between these two *Pernis* species.

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