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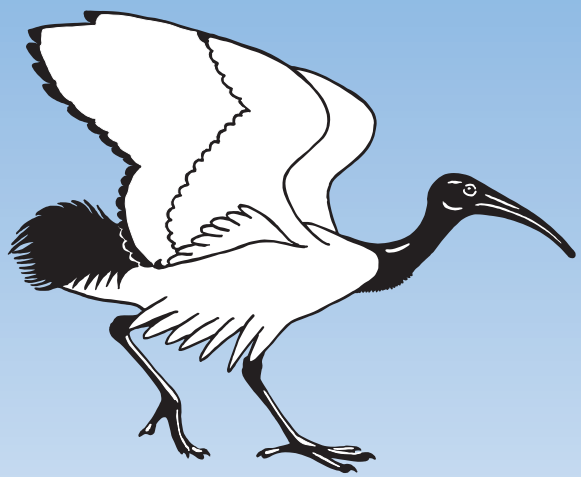

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CLUB ANNOUNCEMENTS

Forthcoming Meeting

The next meeting of the Club will be held on Monday 25 March at 6.30pm (doors open at 6pm) upstairs in the Barley Mow, 104 Horseferry Road, London SW1P 2EE. Laura Vaughan-Hirsh will talk on *The White Stork nesting in Sussex*.

The landscape in a small but expanding part the Low Weald in Sussex has changed for the better over the last decade. Laura Vaughan-Hirsch's talk will explain how White Storks *Ciconia ciconia* are part of this change, with optimism for biodiversity rather than the gloom so commonplace. On the Knepp Estate a bold transition from arable and dairy farming to a new landscape with a mosaic of unfenced fields grazed of Longhorn cattle, Exmoor ponies, Tamworth pigs and native deer. What has not changed is the Sussex marl and flood waters that come with heavy rains, a constant reminder that this was never going to be agricultural land with larger fields of well-drained loamy soil. Research suggests that the ecological requirements for White Storks seem to be the same everywhere, namely open, little wooded and somewhat wet land such as valleys of rivers and streams, cultivated fields, pastures and meadows, provided that they are not too dry or too much drained. On the Knepp Estate there is an aim to promote greater engagement between the public and wildlife in the countryside, so the highly visible and charismatic White Stork, with its history of nesting in close association with man, was an obvious first-choice addition. The talk will address the life cycle of the species in Sussex and the challenges faced by the birds and their fledglings.

Laura Vaughan-Hirsch is the project officer managing the White Stork Project at Knepp Estate, West Sussex. After reading biology at Royal Holloway University, she worked as a science teacher at a secondary school in Horsham. She has always had a keen interest in animal behaviour, and particularly British birds.

New Associate Editors

At the start of 2024, we were pleased to welcome two new Associate Editors.

Juan Freile is an Ecuadorian ornithologist, who authored the *Birds of Ecuador* (Helm Field Guides, 2018) and *Birds of Ecuador and the Galapagos Islands* (Helm Wildlife Guides, 2023). He is Senior Editor of the journals *Cotinga* and *Revista Ecuatoriana de Ornitología*, and an Associate Editor of *Ornitología Neotropical*. Juan is currently also Chairman of the Committee for Ecuadorian Records in Ornithology; he collaborates with the South American Classification Committee in revising and updating individual South American country lists, and serves as a technical advisor on the continent's vagrant and hypothetical species. He is the author of a number of papers on the distribution, natural history, taxonomy and conservation of Andean birds (including in *Bull. Brit. Orn. Cl.*).

Flavia Montaño-Centellas is a Bolivian ecologist, with broad interests in Neotropical bird ecology and conservation, especially Andean birds. She is an Associate Professor at Louisiana State University, as well as serving as an Associate Editor for the journals *Ornitología Neotropical* and *Acta Zoológica Lilloana*. Her own research focuses mostly on disentangling the causes behind avian diversity patterns and the role of environmental gradients in shaping avifaunas. More broadly, she is committed to making academia more inclusive.

Friends of the BOC

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

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

The *Bulletin* and other BOC publications

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

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

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Specimens of the extinct Spectacled Cormorant *Urile perspicillatus*

by Theodore E. Squires & Alexander L. Bond

Received 17 April 2023; revised 31 December 2023; published 4 March 2024

http://zoobank.org/urn:lsid:zoobank.org:pub:5885A76E-51D6-448B-9343-E2B87BF3AA4B

Summary.—In 1741, after reaching Alaska from eastern Russia and exploring the Aleutian Islands, the naturalist Wilhelm Steller became shipwrecked along with the rest of Vitus Bering's crew. During his struggle to ward off starvation on the unmapped Commander Islands, Steller discovered what would eventually be confirmed as the world's largest cormorant. Decades later, Peter Simon Pallas recognised the bird described in Steller's journal as a new species, naming it *Phalacrocorax perspicillatus* (now *Urile perspicillatus*) in his *Zoographia Rosso-Asiatica*. Within 41 years of its listing in the scientific literature, Leonhard Stejneger declared the cormorant had become extinct after finding only bones on Bering Island and conferring with indigenous Unangas regarding its decline. Here, we present an inventory of all known specimens (skins and osteological) of this poorly known seabird. There are six skins in four institutions and osteological material in four. Previous references to specimens in Senckenberg Natural History Collections, Dresden, and the American Museum of Natural History, New York, are incorrect. The original source of the skins remains elusive, but they all passed through Sitka, the then-capital of Russian America. All osteological specimens are from the species' only known breeding site, Bering Island in the Commander Islands.

Spectacled Cormorant, also known as Pallas's Cormorant, *Urile perspicillatus* is an under-represented and under-studied victim of modern extinction. First documented in 1741 in the North Pacific, Spectacled Cormorant appears to have become extinct in the mid-1800s with Stejneger stating that first-hand observations ceased around 1852 (Stejneger 1883), although any records after 1840 lack verifiable evidence. Almost all contemporaneous knowledge of its existence is based upon secondary translations of the journals of Georg Wilhelm Steller (1709–46; Stejneger 1925) that Peter Simon Pallas prepared in the early 19th century (Pallas 1811[1], Golder 1925). Sporadic later anecdotes from indigenous Unangas who encountered the bird provide the last living accounts (Stejneger 1883, Turner 1886). Six specimens, presumably from Bering Island, are the only skins available and are held in museums around the world. Several fossils and bones have since been identified and are shedding new light on the species' life history.

Urile perspicillatus is the largest known species of cormorant measuring nearly 1 m tall (Johnsgard 1993, Nelson 2005, Artukhin 2011, Lobkov 2011). There has been historical debate as to its flight capabilities though most investigations have concluded the bird was volant (Stegmann 1936, Livezey 1992). It can be reasonably assumed that it relied exclusively on marine food and was a diving bird like other members of its clade.

When initially described, Spectacled Cormorant was known only around Bering Island in the Commander Islands, with specific mention of the offshore islet of Arij Kamen' (Арий

[1] The date of publication of *Zoographia Rosso-Asiatica* has been the subject of much discussion, as Pallas died in 1811 and the first print copies were distributed only in 1827, but 1811 was fixed as the date of publication by the ICZN (1954). For further discussion see Mlíkovský (2023: 2716).

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Камень), also called Sivučij (Сивучий; 55°13′N, 165°47′E) which is *c*.6 km west of Toporkov Island (Kondratyev *et al*. 2000). It had been speculated to breed on Medny Island, but this has not been confirmed (Government of Kamchatskiy Krai 2018). This area is home to breeding gulls (Laridae), storm petrels (Hydrobatidae), murres (*Uria* spp.), and kittiwakes (*Rissa* spp.), along with foxes (*Vulpes lagopus*), which are well documented to shape seabird breeding ecology. The cormorant was almost certainly hunted to extinction by an influx of Russian fur traders and the cascading consequences of the enslavement and forcible resettlement of native Unangas peoples (Johnsgard 1993). The species appears to have declined rapidly and was already gone by the time Leonhard Stejneger from the United States National Museum arrived for detailed biological surveys of the Aleutian Islands in the early 1880s (Stejneger 1885).

Very limited information exists about the Spectacled Cormorant and its life history; therefore, any data that can improve our understanding of the species is useful. Via a combination of direct outreach to museums and intensive review of the literature, we set out to verify the location and status of all Spectacled Cormorant specimens and provide detailed information on how each specimen came to its current location.

Summary of specimens

We located six skins and 92 distinct osteological elements belonging to the species. Reviews of specimen labels, museum records and various historical texts provided detailed context for how most of the specimens reached their current locations. Investigations into the origins of each skin generally pointed to the early governors of Russian America in Sitka. Various naturalists visiting the region received biological specimens from Vice-Admiral Ivan Antonovič Kupreânov (1794–1857) during his tenure as Governor of Russian America and head of the Russian-American Company (1835–40). Prior to this, Ferdinand von Wrangell shipped at least one specimen to the Zoological Institute of the Russian Academy of Sciences in St. Petersburg. The exact means and details of skin preparation are poorly documented, and it seems most specimens simply 'appeared' in Sitka, probably brought in by Russian traders and hunters operating in the vicinity of the Commander Islands.

Figure 1. Spectacled Cormorant *Urile perspicillatus* mount at the Finnish Museum of Natural History, Helsinki (MZH UK 3639) (© P. Malinen; full record at http://id.luomus.fi/GZ.18079).

Finnish Museum of Natural History, Helsinki

According to Palmgren (1935) the skin held in Helsinki (MZH UL 3639; Fig. 1) was either acquired directly by naturalist Reinhold Ferdinand Sahlberg (1779–1860) during a trip to Sitka between 13 May 1840 and 15 May 1841 (Palmgren 1935) or via the Zoological Institute of the Russian Academy of Sciences (Neufeldt 1978). Sahlberg reportedly had good relations with

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Kupreânov and received several biological samples from him before he left Sitka a month after Sahlberg's arrival (Palmgren 1935). It should be noted however that this specimen does not appear to be mentioned specifically in Sahlberg's journals (Sahlberg 2007). Sahlberg gives the locality as 'Ins.[ula] Sitcha', meaning that he acquired it in Sitka, not that it was collected there (Palmgren 1935, Leikola 1999). On 1 May 1845, the specimen was prepared by Magnus von Wright (1805–68), the museum's taxidermist during 1845–49 (Leikola 1999). It is mounted upright on a tan rock and appears in reasonable condition with some clear discoloration of the white flanks. The double crest is apparent and several strands of pale yellow facial plume are present. The glass eye is sunken below the skin. Palmgren (1935) noted in his 1935 description that the coverts of the left wing are severely insect damaged, although he claimed the right side to be 'excellently preserved'.

Naturalis Biodiversity Center, Leiden

This specimen (RMNH.AVES.107865; Fig. 2) was received from the Zoological Institute of the Imperial (now Russian) Academy of Sciences in the mid-1800s and noted to have origins in Sitka (Schlegel 1863), but the circumstances of its receipt are unclear and nothing is known of its arrival in Europe (P. Kamminga *in litt*. 2022). What appears to be an original specimen tag notes both the museum in St. Petersburg and the town of 'Sitka' (as opposed to Novo-Arkhangelsk or New Archangel) as origins of the skin, however because the transfer happened before Russian Alaska became part of the USA this may have been an updated tag from some time afterwards. Later publications concur in this specimen being a transfer from the Russian Academy of Sciences (see below; Stejneger & Lucas 1889, Hume 2017). The specimen is mounted upright on a raised white wooden board and appears in fair shape with some clear discoloration all over. The occipital crests are essentially indistinguishable. The bill appears particularly frail and the tail feathers are worn.

Figure 2. Spectacled Cormorant *Urile perspicillatus* mount at the Naturalis Biodiversity Center, Leiden (RMNH.AVES.107865) (© P. Kamminga)

Zoological Institute of the Russian Academy of Sciences, St. Petersburg

According to Neufeldt (1978) the first skin in St. Petersburg was received in 1833 directly from Ferdinand von Wrangell (1797–1870), Governor of Alaska in 1830–35, prior to Kupreânov. This specimen (ZISP 138178; Fig. 3) is unmounted but in very good condition showing good coloration and minimal staining of the white flanks. The tail appears well shaped, and the eyes remain fitted. The feathers of the double crest are clear and pale yellow facial plumes are present.

The second skin (ZISP 138179; Fig. 4) was apparently received directly from Kupreânov and accessioned in 1841 (Neufeldt 1978). It may have arrived during Kupreânov's return from Alaska as he was immediately posted to Kronstadt outside St. Petersburg (Novitsky 1914). This specimen is mounted upright on a square of unpainted pale lacquered wood. It is probably the best-preserved specimen in natural pose, showing clean iridescence and

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Figure 3 (top). Spectacled Cormorant *Urile perspicillatus* skin in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZISP 137178) (© V. Vysotsky)

Figure 4 (right). Spectacled Cormorant *Urile perspicillatus* mount in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZISP 137179) (© V. Vysotsky)

Figure 5 (below). Osteological specimens of Spectacled Cormorant *Urile perspicillatus* in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (various registration numbers and unregistered material); note that the carpometacarpus in the top right of the photograph has been reidentified to a different species since this photograph was taken (© V. Vysotsky)

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Figure 6 (left and below). Detailed photographs of Spectacled Cormorant *Urile perspicillatus* skull and mandible in the collection of the Zoological Institute of the Russian Academy of Sciences, St Petersburg (ZISP 1112) (© V. Vysotsky)

good skin integrity, especially around the eyes. The feathers of the double crest remain clear and many pale yellow facial plumes are present.

Pleske (1890, 1896) also identified 41 bones at the museum in St. Petersburg sent to the institute by Nikolaj Aleksandrovič Grebnickij, who was a manager of Bering Island during and after Stejneger's 1882 expedition (Hartert 1920). Material was at that time reported to include two fairly complete skulls, seven crania, two mandibles, two rostra, four sterna, four coracoids, two incomplete furculae, nine ribs, three pelvises, one femur (left), four tibiotarsi (one right and three left) and a carpometacarpus (all shown in Fig. 5; one cranium and mandible detailed in Fig. 6). The carpometacarpus has since been recognised as belonging to family Laridae. Photographs show that osteological pieces are labelled with registration numbers including the two complete skulls (ZISP 1112 and 1113) and that the postcranials are from at least three individuals. Some of the originally listed materials have since been reassigned to other cormorant species but we have no details of these changes. Currently there are more than 30 remaining elements, which have not been individually accessioned (V. Vysotsky *in litt*. 2023).

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Figure 7. Unmounted skin of Spectacled Cormorant *Urile perspicillatus* in the Natural History Museum, Tring (NHMUK 1842.12.21.4) (J. Jackson, © Trustees of the Natural History Museum, London)

Figure 8. Unmounted skin of Spectacled Cormorant *Urile perspicillatus* in the Natural History Museum, Tring (NHMUK 1858.2.3.1) (J. Jackson, © Trustees of the Natural History Museum, London)

Natural History Museum, Tring

The first specimen (NHMUK 1842.12.21.4; Fig. 7) is well documented as having been acquired by Captain John Belcher during the scientific expedition of *HMS Sulphur* and was presented to him directly by Kupreânov (Gould 1844) either during 13–22 September 1837 or on 17 July 1839 (Barclay 1836–41). It is specimen 'b' in Sharpe & Ogilvie-Grant (1898) and was figured by Gould (1844) and Wolf (Elliot 1869, Allen 1890). When originally accessioned, in December 1842, it was noted as being in a 'very bad state'. There is significant damage to the facial skin and some straw is visible protruding from the body into the slightly open

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oral cavity. The skin is torn in some places making it difficult to establish if the double crest is genuine or an artefact of misplaced feathers. Furthermore, the rectrices are completely missing. Despite this, many pale yellow facial feathers are preserved. According to the label, it was originally a mount but was demounted to make a study skin on 22 August 1885.

The second specimen (NHMUK 1858.2.3.1; Fig. 8) was purchased from John Gould and is specimen 'a' in Sharpe & Ogilvie-Grant (1898). As Gould did not have his own specimen when preparing the *Zoology of the voyage of the HMS Sulphur* (1844), he likely acquired it between 1844 and 1858 (i.e., between his illustration being published and when he donated this specimen). While he may have received it from Johann Friedrich von Brandt (1802–79), Curator at the Imperial Academy of Sciences in St Petersburg, there is nothing in their correspondence to suggest this route (Natural History Museum Archives 1842–53). As with the other skin in NHMUK, it was formerly a mount and relaxed into a study skin on 26 June 1897. This is one of the best-preserved skins, showing clean body coloration and iridescence, and also has good skin integrity on the face. The feathers of the double crest remain mostly clear and pale yellow facial plumes are present. Additionally, the tail appears complete with little fraying.

National Museum of Nature and Science, Tsukuba Research Center, Tsukuba

Fossil material from Pleistocene deposits around Shiriya, Japan was collected in the 1970s and identified as various cormorant specimens in the 1980s. The materials were rechecked by Watanabe *et al*. (2018) and found to contain 13 elements of Spectacled Cormorant (NSM PV 24191 and others; Fig. 9) indicating a much wider historical distribution for the species.

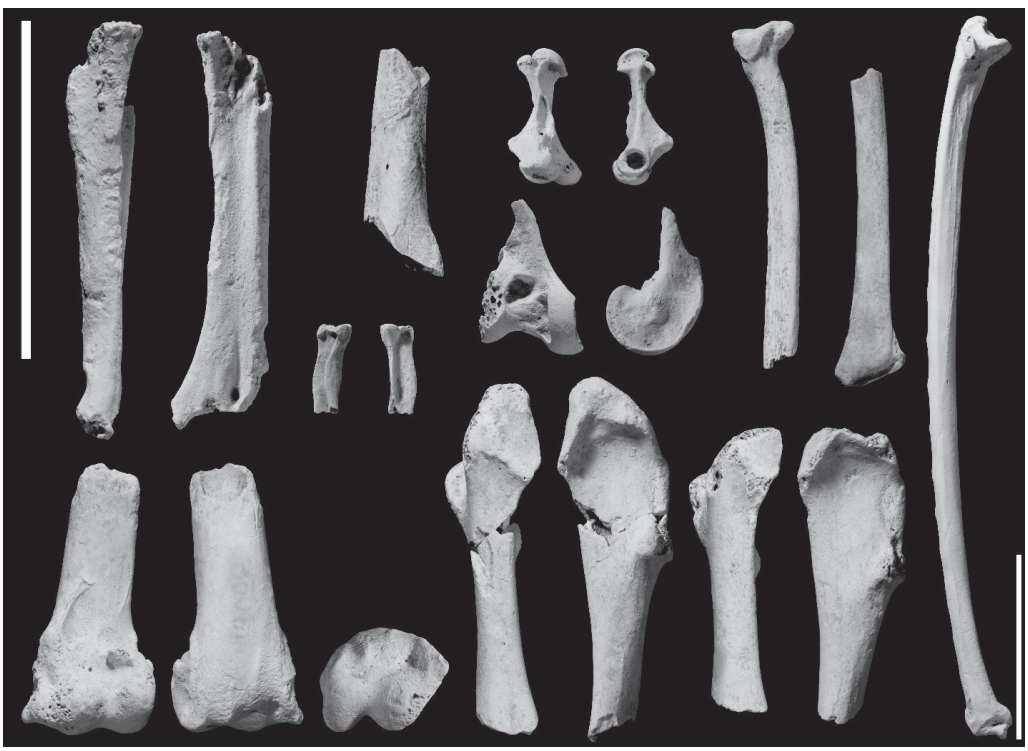

Figure 9. Osteological specimens of Spectacled Cormorant *Urile perspicillatus* in the National Museum of Science and Nature, Tsukuba Research Centre, Tsukuba, Japan (NSM PV 24191); note the differing scale for the ulna (right; both scale bars equal to 50 mm) (© J. Watanabe)

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Material includes one complete ulna and portions of two right coracoids, two humeri, one tarsometatarsus, one quadrate, one left and one right radius, one pelvis, one tibiotarsus, one pterygoid and one femur.

National Museum of Natural History, Washington, DC

On 1 September 1882, Leonhard Stejneger (1851–1943) recovered a small deposit of avian bones in the vicinity of 'Pestshanij Mys' on a hill in the north-west corner of Bering Island (Stejneger & Lucas 1889). Though some of the bones were later identified as belonging to other species, 18 from the initial collection are currently regarded as valid examples of Spectacled Cormorant (USNM 17041). This first batch of material was reviewed by J. Watanabe (*in litt*. 2022) and found to include one premaxilla, two left mandibular fragments, one right coracoid, one right and one left humerus, one right ulna, one right carpometacarpus, two pelvises, one left femur, two right and three left tibiotarsi, and two left tarsometatarsi (not all shown; Figs. 10–17).

In 1895 Stejneger returned to the original bone deposit to search for additional specimens. He was very successful in this endeavour ultimately collecting 30 good elements (USNM 19417). First-hand review of these materials by J. Watanabe (*in litt*. 2022) identified five premaxillae, two incomplete sterna, one left coracoid, one right and one left humerus, five pelvises, three right and one left tibiotarsi, one right fibula, four right and three left tarsometatarsi, and at least three pedal phalanges (the basal phalanges for left II–IV toes; not all shown; Figs. 10–17).

A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow

In 2021, an expedition by the Institute's Laboratory of Historical Ecology excavated 379 skeletal fragments attributed to Spectacled Cormorant from dunes in north-western Bering Island (Samsonov *et al*. 2023). The bones are mostly scattered material, but the collectors indicated that these newest materials will permit clear morphological delineation of future finds. Currently there are 447 bones in the osteological collection attributed to Spectacled Cormorant (S. Samsonov *in litt*. 2023). This is the largest single assemblage of material available for the species and has not been included in our current assessments as accessioning and formal descriptions are ongoing.

American Museum of Natural History, New York

Nikolaj P. Sokolnikov, who was Governor of the Commander Islands in 1905–16, collected several hundred skins of birds (Johansen 1961), which were ultimately purchased by Lord Lionel Walter Rothschild for his Tring Museum (Hartert 1920) and subsequently sold to the American Museum of Natural History along with the majority of his collection in the 1930s. Sokolnikov collected some sterna (Hartert 1920) which Artukhin (2011) and Government of Kamchatskiy Krai (2018) presumed to be in New York, although these were not mentioned in the original description of Sokolnikov's material (Bianchi 1909). No osteological (or other) specimens of Spectacled Cormorant are held at AMNH (P. Sweet *in litt*. 2023).

Senckenberg Natural History Collections, Dresden

Greenway (1958) reported a seventh Spectacled Cormorant skin in Dresden, which was repeated by Fuller (2001), Hume & Walters (2012) and Blencowe (2021). This is incorrect, and Luther (1986) noted that there had been confusion with a specimen of Red-faced Cormorant *U. urile*. No Spectacled Cormorant is mentioned by Eck (1970) in the list of extinct birds in the Dresden collection, and there is no specimen in the collection currently (M. Päckert *in*

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Figure 10. Humeri from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 17041 and USNM 19417); scale bars in mm (© J. Watanabe)

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Figure 11. Left and right coracoid, carpometacarpus, and ulna from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 17041 and USNM 19417); scale bars in mm (© J. Watanabe)

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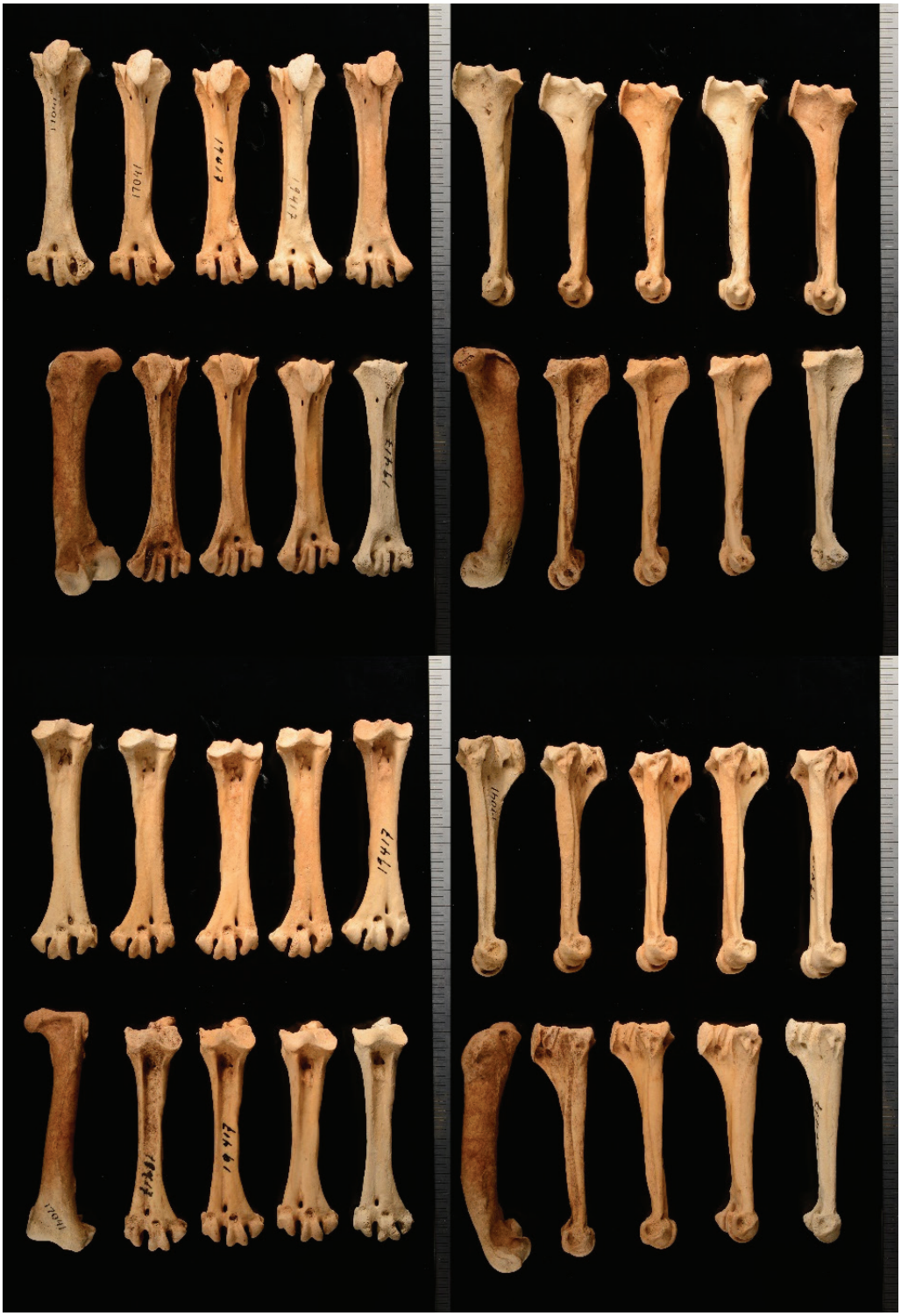

Figure 12. Femur and tarsometatarsi from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 17041 and USNM 19417); scale bars in mm (© J. Watanabe)

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Figure 13. Tibiotarsi from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 17041); scale bars in mm (© J. Watanabe)

Figure 14. Tibiotarsi from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 19417); scale bars in mm (© J. Watanabe)

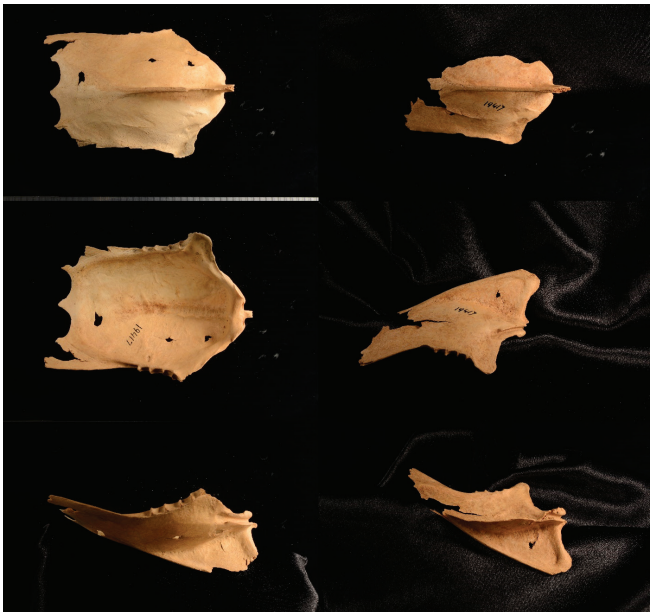

Figure 15. Sterna from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 19417); scale bars in mm (© J. Watanabe)

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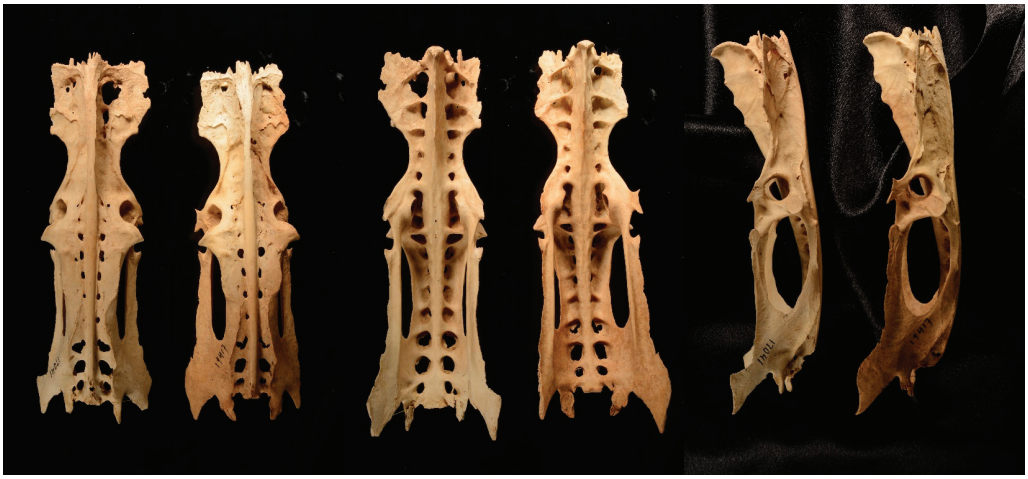

Figure 16 (above). Pelvic girdles from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 17041 and USNM 19417); scale bars in mm (© J. Watanabe)

Figure 17 (right). Maxillae or rostra from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 17041 and USNM 19417); scale bars in mm (© J. Watanabe)

litt. 2023). We conclude that there has never actually been a Spectacled Cormorant skin in Dresden.

Discussion

In attempting to add to the sparse literature on this bird, we must admit that more than a century since the Spectacled Cormorant's extinction and the height of interest in the species, conjecture is the best methodology available to us. We consider it very likely that additional review of contemporary accounts, specifically from the historically disenfranchised peoples of the Aleutian Islands, or first-hand reports from Russian America in Russian archives may yet elucidate more about this enigmatic bird.

To this end, we wish to highlight that some contemporaneous accounts of the birds may have been recorded by Lucien M. Turner (1848–1909) of the US Signal Corps during a year on the Near Islands (Attu, Agattu, Alaid, Nizki and Shemya) in 1880–81. Turner claimed that residents of Attu informed him they hunted a massive cormorant up until 20 years before his visit describing the bird as 'Fully twice as large as the red-faced cormorant and of different plumage' (Turner 1886: 130). If confirmed this would expand the species' range to the Near Islands (>300 km further east than previously known) and the date of extinction into

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the 1860s. It is advisable that early first-hand accounts from the Near Islands be reviewed, potentially with an in-depth look at anthropological data, to determine if other evidence that would corroborate this has been overlooked. For example, naturalist and Curator of the Zoological Museum of the Imperial Academy of Sciences Il'â Gavrjlovič Voznesenskij (1816–71) collected extensively in the Aleutian Islands in the 1840s but did not encounter Spectacled Cormorant (Alekseev 1987). There is no archaeological evidence that the species occurred on Buldir (Lefevre & Siegel-Causey 1993, Lefevre *et al*. 1997), and to date, no concrete evidence has been discovered from the Near Islands (Causey *et al*. 2005).

Previous literature has cited the presence of two partially complete skeletons (Day 1981) whilst Wood & Schnell (1986) noted only the presence of partial remains at the Smithsonian Institution in their review of major osteological collections. Recent field work by the A. N. Severtsov Institute collected enough material to reconstruct two 'almost complete skeletons' (S. Samsonov *in litt*. 2023), though their new material is still being accessioned and we have not been able to review it comprehensively. Without including the most recent elements from 2021, our investigations indicate that there is collectively sufficient bone material to partially reconstruct several more individuals, with at least one more assembled well. This brings the total number of relatively complete skeletons to at least five internationally. Among the 48 Spectacled Cormorant bones collected by Stejneger, it appears that at least seven separate individuals are represented, but the pieces probably originate from many more. Combined with more than 30 additional bones at the Zoological Institute of the Russian Academy of Sciences, and 13 fossil elements from Japan, more than 90 pieces are currently known including the majority of at least three skulls, three sterna and ten pelvic girdles. It should be noted that skeletal remains have previously been misidentified (Olson 2005, Watanabe *et al*. 2018; V. Vysotsky *in litt*. 2023) and the currently listed materials may also include elements from other birds. The inverse may also hold, and there are likely to be several osteological examples of the species mislabelled or as yet unreviewed in collections around the world.

Some remaining questions include who may have been responsible for collecting birds and preparing the taxidermy of the birds distributed by Kupreânov in Sitka. Voznesenskij trained people in Alaska and instructed them to forward specimens to Novo-Arkhangelsk (now Sitka, Alaska; Alekseev 1987). Although he did not arrive in Sitka until 13 May 1840 and Kupreânov departed on 30 September 1840 (Feklova 2014), Kupreânov charged Voznesenskij with preparing specimens for transport to Russia (Alekseev 1987). Voznesenskij returned from California to Alaska in 1842, but did not visit the Commander Islands until July 1844, and then for just two days, making no mention of cormorants (Alekseev 1987). It is therefore unlikely that Voznesenskij furnished specimens, and he certainly would not have been involved in the earliest Spectacled Cormorant collections (Feklova 2014), although he may have had some hand in preparing and packing cormorants from Kupreânov's collection.

The history of specimens prior to their arrival in Sitka remains elusive, however archaeological investigations in the Aleutian, Commander, Kurile and Japanese islands may show a much broader distribution than generally assumed. Spectacled Cormorant was apparently abundant when Steller was on Bering Island (Steller 1741) but much less so a century later, and its extinction in the mid-19th century has been heretofore generally under-studied across its former range. In the future and with the digitisation of additional historical texts, we hope that more clarity on specimen history will be gleaned from marginal accounts stored at institutions worldwide.

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References:

Alekseev, A. I. 1987. *The odyessy of a Russian scientist: I.G. Voznesenskii in Alaska, California and Siberia 1839–1849*. Limestone Press, Kingston, ON.

Allen, J. A. 1890. Stejneger and Lucas on Pallas's Cormorant. *Auk* 7: 276–277.

Artukhin, Y. B. 2011. [Steller's Cormorant]. Pp. 98–100 *in* Ilyichev, V. D. & Zubakin, V. A. (eds.) [*Birds of Russia and continuous regions*]. Association of Scientific Publications KMK, Moscow. (In Russian.)

Barclay, G. 1836–41. Journal of a voyage round the world including excursions to the North West coasts of America and among the islands in the Pacific and Eastern Seas in the years 1836, 1837, 1838, 1839, 1840 and 1841. Unpubl. manuscript. Natural History Museum Library & Archives, B MSS BAR, London.

Bianchi, V. 1909. [Short outline of the avifauna of the Commander Islands]. *Ezhegod. Zool. Muz. Imp. Akad. Nauk* 14: 48–76. (In Russian.)

Blencowe, M. 2021. *Gone: a search for what remains of the world's extinct creatures*. Ivy Press, London.

Causey, D., Corbett, D. G., Lefevre, C., West, D. L., Savinetsky, A. B., Kiselva, N. K. & Khassanov, B. F. 2005. The paleoenvironment of humans and marine birds of the Aleutian Islands: three millennia of change. *Fish. Oceanogr*. 14: 259–276.

Day, D. 1981. *The Doomsday book of animals: a natural history of vanished species*. Viking Press, New York.

Eck, S. 1970. Die ausgestorbenen Vögel (Bälge, Skelette, Eier) in den Sammlungen des Staatlichen Museum für Naturkunde in Dresden. *Zool. Abh. Staat. Mus. Nat. Dresden* 30: 131–134.

Elliot, D. G. 1869. *The new and heretofore unfigured species of birds of North America*, vol. 2. Privately published, London.

Feklova, T. Y. 2014. The expedition of Ilya G. Voznesensky to Russian America in 1839–1849 and the formation of the American collections in St. Petersburg Academic Museums. *Acta Balt. Hist. Phil. Sci*. 2: 44–69.

Fuller, E. 2001. *Extinct birds*. Second edn. Oxford Univ. Press.

Golder, F. A. 1925. *Bering's voyages: an account of the efforts of the Russians to determine the relation of Asia and America*, vol. 2. American Geographical Society, New York.

Gould, J. 1844. Birds. Pp. 39–50 *in* Hinds, R. B. (ed.) *The zoology of the voyage of H.M.S. Sulphur: under the command of Captain Sir Edward Belcher, during the years 1836-42*, vol. 1. Smith, Elder, London.

Government of Kamchatskiy Krai. 2018. [*Red Data Book of Kamchatskiy Krai*], vol. 1. Kamchatpress Publishing House, Petropavlovsk-Kamchatskiy. (In Russian.)

Greenway, J. C. 1958. *Extinct and vanishing birds of the world*. American Committee for International Wild Life Protection, New York.

Hartert, E. 1920. The birds of the Commander Islands. *Novit. Zool*. 27: 128–158.

Hume, J. P. 2017. *Extinct birds*. Second edn. Christopher Helm, London.

Hume, J. P. & Walters, M. 2012. *Extinct birds*. T. & A. D. Poyser, London.

ICZN (International Commission on Zoological Nomenclature). 1954. Opinion 212. Designation of the dates to be accepted as the dates of publication of the several volumes of Pallas (P.S.), "*Zoographia rossoasiatica*". Pp. 17–24 *in* Hemming, F. (ed.) *Opinions and Declarations rendered by the International Commission on Zoological Nomenclature*. International Trust for Zoological Nomenclature, London.

ISO (International Organization for Standardization). 1995. ISO 9: Transliteration of Cyrillic characters into Latin characters—Slavic and non-Slavic languages. International Organization for Standardization, Geneva.

Johnsgard, P. A. 1993. *Cormorants, darters, and pelicans of the world*. Smithsonian Books, Washington, DC.

Johansen, H. 1961. Revised list of the birds of the Commander Islands. *Auk* 78: 44–56.

Kondratyev, A. Y., Litvinenko, N. M., Shibaev, Y. V., Vyatkin, P. S. & Kondratyeva, L. F. 2000. The breeding seabirds of the Russian Far East. Pp. 37–81 *in* Kondratyev, A. Y., Litvinenko, N. M. & Kaiser, G. W. (eds.) *Seabirds of the Russian Far East*. Canadian Wildlife Service Special Publication, Ottawa.

Lefevre, C. & Siegel-Causey, D. 1993. First report on bird remains from Buldir Island, Aleutian Islands, Alaska. *Archaeofauna* 2: 83–96.

ISSN-2513-9894 (Online)

Lefevre, C., Corbett, D. G., West, D. L. & Siegel-Causey, D. 1997. A zooarchaeological study at Buldir Island, western Aleutians, Alaska. *Arctic Anthropol.* 34: 118–131.
Leikola, A. 1999. *Konstnärsbröderna von Wrights dagböcker*, vol. 3. Svenska litteratursällskapet i Finland, Helsinki.
Livezey, B. C. 1992. Flightlessness in the Galápagos cormorant (*Compsohalieus* [*Nannopterum*] *harrisi*): heterochrony, giantism and specialization. *Zool. J. Linn. Soc*. 105: 155–224.
Lobkov, E. G. 2011. [Steller's cormorant *Phalacrocorax perspicillatus* Pallas, 1811: what do we know about it today?] *Questions Geogr. Kamchatka* 13: 41–60. (In Russian.)
Lucas F. A. 1889. Contributions to the natural history of the Commander Islands. No. 11. The cranium of Pallas's Cormorant. *Proc. US Natl. Mus*. 18: 717–719.
Luther, D. 1986. *Die ausgestorbenen Vögel der Welt*. A. Ziemsen Verlag, Wittenberg Lutherstadt.
Mlíkovský, J. 2023. *Systematic catalogue of the birds of Siberia. Historical ornithology*, vol. 1. Centre for Historical Ornithology, Praha.
Natural History Museum Archives. 1842–53. The correspondence of John Gould (1804–1881) Z MSS GOU A-B. Trustees of the Natural History Museum, London.
Nelson, J. B. 2005. *Pelicans, cormorants, and their relatives—The Pelecaniformes*. Oxford Univ. Press.
Neufeldt, I. A. 1978. [Extinct birds in the collection of the Zoological Institute of the Academy of Sciences of the U.S.S.R.] *Trudy Zool. Inst.* 76: 101–110. (In Russian.)
Novitsky, V. F. 1914. [*Military encyclopedia*], vol. 14. I. D. Sytin & Co., Moscow. (In Russian.)
Olson, S. L. 2005. Correction of erroneous records of cormorants from archeological sites in Alaska. *Condor* 107: 930–933.
Pallas, P. S. 1811. *Zoographia Rosso-Asiatica*, vol. 2. Russian Imperial Academy of Sciences, St. Petersburg.
Palmgren, V. P. 1935. Ein Exemplar von *Phalacrocorax perspicillatus* Pall. in den Sammlungen des zoologischen Museums in Helsingfors. *Ornis Fenn*. 12: 78–80.
Pleske, F. D. 1890. [On *Carbo perspicillatus*]. *Zap. Imp. Akad. Nauk* 63: 216–217. (In Russian.)
Pleske, F. 1896. [Bones of *Phalacrocorax perspicillatus*]. *Ezhegod. Zool. Muz. Imp. Akad. Nauk* 1: 10. (In Russian.)
Sahlberg, R. F. 2007. *En resa kring jorden, 1839-1843: anteckningar från Sydamerika, Alaska och Sibirien (utgivna av Patricia Berg)*. Svenska litteratursällskapet i Finland, Helsinki.
Samsonov, S. V., Savinetsky, A. B., Krylovich, O. A., Fomin, S. V. & Mamaev, E. G. 2023. [Steller's Cormorant: new findings in coastal sediments of Bering Island]. P. 237 *in* Kalyakin, M. V., Popovkina, A. B. & Kharitonov, S. P. (eds.) *Abstracts 2nd All-Russ. Orn. Congr. (St. Petersburg, Russia, January 30 - February 4, 2023)*. Association of Scientific Publications KMK, St. Petersburg. (In Russian.)
Schlegel, H. 1863. Pelecani. *Mus. Hist. Nat. Pays-Bas, Rev. Méthod. Crit. Coll. Déposées Établissement* 6: 1–17.
Sharpe, R. B. & Ogilvie-Grant, W. R. 1898. *Catalogue of the birds in the British Museum*, vol. 26. Trustees of the Brit. Mus., London.
Stegmann, B. 1936. Ueber das Flugvermögen der ausgestorbenen Scharbe *Phalacrocorax perspicillatus* Pall. *Orn. Monatsb*. 44: 140–153.
Stejneger, L. 1883. Contributions to the history of the Commander Islands. No. 1. Notes on the natural history, including descriptions of new cetaceans. *Proc. US Natl. Mus*. 6: 58–89.
Stejneger, L. 1885. Results of ornithological explorations in the Commander Islands and in Kamtschatka. *Bull. US Natl. Mus*. 29: 1–382.
Stejneger, L. & Lucas, F. A. 1889. Contributions to the natural history of the Commander Islands. Contributions to the history of Pallas' cormorant. *Proc. US Natl. Mus*. 12: 83–94.
Stejneger, L. 1925. *Steller's journal of the sea voyage from Kamchatka to America and return on the second expedition 1741-2*. Research Series No. 2. American Geographical Society of New York, NY.
Turner, L. M. 1886. *Contributions to the natural history of Alaska: Results of investigations ... in the Yukon District and the Aleutian Islands; conducted under the auspices of the Signal Service, United States Army, extending from May, 1874, to August, 1881*. US Govt. Printing Office, Washington, DC.
Watanabe, J., Matsuoka, H. & Hasegawa, Y. 2018. Pleistocene fossils from Japan show that the recently extinct Spectacled Cormorant (*Phalacrocorax perspicillatus*) was a relict. *Auk* 135: 895–907.
Wood, D. S. & Schnell, G. D. 1986. *Revised world inventory of avian skeletal specimens, 1986*. American Ornithologists' Union & Oklahoma Biological Survey, Norman, OK.

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Breeding biology, diet and vocal repertoire of White-rumped Monjita *Xolmis velatus*

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Summary.—Although generally common in parts of eastern and southern South America, the biology of White-rumped Monjita *Xolmis velatus* is poorly known. We aimed to augment existing knowledge with previously unpublished data concerning its breeding biology, diet and vocal repertoire. We studied three nests and one encounter outside the nest. To complement our field data, we searched the literature and 7,895 media submitted to online citizen science platforms. We present a list of food items consumed by the species and provide the first detailed description of its vocal repertoire, identifying four different call types. All nests were cups sited low above ground (0.3–4.0 m). The breeding season in Brazil extends at least from June to January. In two nests, more than one adult fed the nestlings. At one, nestlings were fed insects of six orders (mainly Coleoptera), spiders, earthworms, one myriapod, and a lizard (*Kentropyx* aff. *paulensis*).

White-rumped Monjita *Xolmis velatus* (Tyrannidae) occurs in Argentina, Brazil, Bolivia and Paraguay (de la Peña 2019, Farnsworth & Langham 2020), in open areas such as grasslands and savannas (Farnsworth & Langham 2020). Although common in many areas, its biology is poorly known (see Farnsworth & Langham 2020), and knowledge of breeding is confined to a few reports, mainly by Buzzetti & Silva (2008), Lombardi *et al*. (2010) and Lopes *et al*. (2013). The species' foraging behaviour has been described in detail recently (Ferrari *et al*. 2023), but dietary data remain scarce, with the most accurate information reports of stomach contents by Moojen *et al*. (1941) and Schubart *et al*. (1965). As a species that vocalises unpredictably after long intervals of silence, there are few recordings available in publicly accessible databases, and its vocal repertoire and functions are still incompletely known. Our objective here is to report unpublished data concerning its breeding biology, diet, and vocalisations.

Material and Methods

Data collection in the field.—To obtain information on breeding biology and diet, we studied three nests found by chance between November 2008 and October 2021, and an encounter with a fledgling in 2021. Nest 1 was found on 15 November 2008 in the municipality of Analândia (22º07′30″S, 47º39′40″W), state of São Paulo, Brazil; nest 2 on 9 October 2010 in the municipality of Marília, São Paulo (22º08′07″S, 49º53′52″W); and nest 3 on 20 October 2021, at Sítio Nossa Senhora de Fátima, Rio Claro, São Paulo (22°25′37″S, 47°37′41″W). At the last nest, we made 12 hours of focal observations (Altmann 1974) during 20–29 October 2021, noting the time and duration of each provisioning event, the food delivered to nestlings, and the adult involved. We photographed all food items

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to facilitate the most accurate identification possible. Nests were classified according to the nomenclature of Simon & Pacheco (2005) and measured with a calliper (accurate to 0.1 mm) and tape measure (1 mm). To study the species' vocal repertoire, we recorded the vocalisations given by three adults and one juvenile using a Tascam DR-40 recorder and Sennheiser ME67 microphone. We measured bioacoustic parameters using Raven Pro 1.6.3 software (Center for Conservation Bioacoustics 2019).

Analysis of citizen science databases.—We located 7,895 media of the species deposited on the online citizen science platforms WikiAves (www.wikiaves.com.br; 6,949 photos), Macaulay Library (www.macaulaylibrary.org; 777 photos and 14 videos) and iNaturalist (www.inaturalist.org; 155 photos) (archived prior to 27 October 2021). We identified photos of adults with nest material, active nests (either contents unknown, with eggs and/or chicks), fledglings, and individuals carrying food. To understand the species' vocal repertoire, we evaluated 61 sound recordings in the same databases to complement our analysis.

Results

Nest 1.—This nest (Fig. 1A) was a low cup/base sited under the roof of a house, *c*.2.5 m above ground, and held three well-grown nestlings. Two adults were observed feeding the young.

Nest 2.—This nest (Fig. 1B) was built in a hollow in a wooden fence, *c*.1 m above ground. At 13.15 h, we observed an individual enter the nest, which we classified as cavity/without tunnel/low cup containing dry grass, some feathers and cattail leaves. We returned on 23 October (i.e., 14 days after discovery) when it contained at least two white eggs (Fig. 1B).

Nest 3.—When found the third nest (Fig. 1C–F) contained at least two early-stage nestlings still with closed eyes. It was inside a 14-cm-diameter PVC pipe, 4 m above ground. It was a cavity/with tunnel/high cup located 67 cm from the pipe's entrance. The nest was constructed mainly of dry twigs, thicker at the base and thinner around the egg chamber, the latter lined with some plumes. On 20 October 2021, at 11.18 h, an adult arrived and fed the nestlings. Two minutes later, an adult was seen carrying a moth, which was ingested a few metres from the nest. On 22 October 2021, we observed two adults feeding

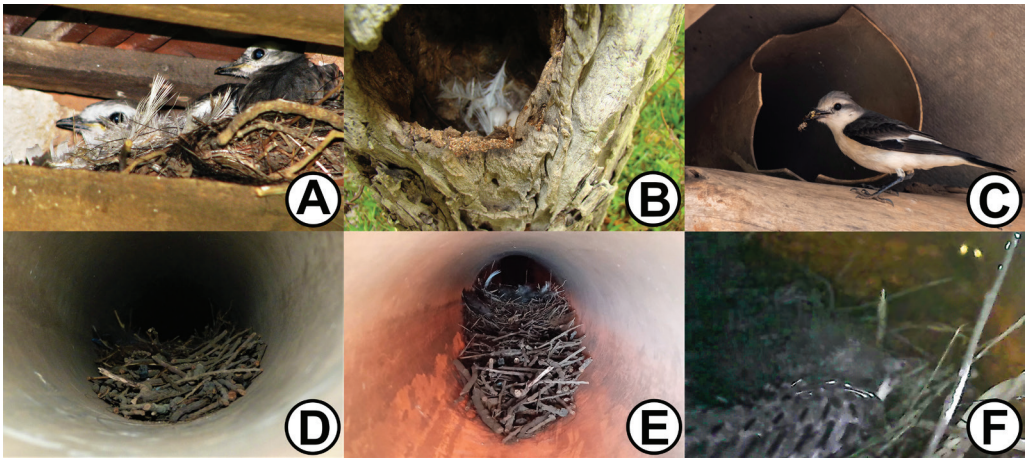

Figure 1. Nests of White-rumped Monjita *Xolmis velatus*. A: nest 1 with nestlings, Analândia, São Paulo, Brazil, 15 November 2008 (Rogério Carlos Machado); B: nest 2 with eggs, Marília, São Paulo, Brazil, 23 October 2010 (Manuel Gonzales); C–F: nest 3, Rio Claro, São Paulo, Brazil; C: adult at entrance to PVC pipe, 20 October 2021 (Luiz Ramassotti); D: nest, 29 October 2021 (Carlos Otávio Araujo Gussoni); E: nest with nestlings, 20 October 2021 (Carlos Otávio Araujo Gussoni); F: nestling, 22 October 2021 (Carlos Otávio Araujo Gussoni)

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the nestlings, at a rate of 14 visits/hour and a mean interval between visits of 247 seconds (SD = 282 seconds, min. 0 seconds, max. 1,306 seconds, median = 105 seconds, *n* = 51). On 25 October, the frequency of provisioning events increased to 32 visits/hour, at a mean interval of 104 seconds (SD = 228, min. 0, max. 792, median = 50, *n* = 111). On 29 October, the frequency was 16.75 visits/hour, at a mean interval of 177 seconds (SD = 228, min. 10, max. 1,085, median = 100, *n* = 62). Several times during these observations, we observed adults capture insects in the immediate environs of the nest, in the air or on the ground. In 30.07% of visits to the nest (*n* = 133 visits with identified items), more than one prey item was carried in the bill (Fig. 2B–C), whereas in the others just one item was brought. Of visits with more than one item, 60% involved two, 35% three, 2.5% four and 2.5% five (*n* = 40). The number of visits with multiple food items increased considerably over time: one on 22 October (06.40–10.40 h), 15 on 25 October (06.57–10.57 h) and 24 on 29 October (06.40–10.40 h). Six times, an adult landed on the edge of the nest but delivered the food to the other adult waiting nearby, and the latter fed nestlings. Table 1 shows food items delivered to the nestlings, as well as those ingested by the adults, on each day of focal observation. On 29 October, at 10.22 h, for the first time in the study, three adults were seen around the nest, but we were unable to verify if all three tended the nestlings. On 5 November, at 06.34 h, the nest was empty, indicating that the nestling period was less than 23 days, if the nestlings were between one and six days old when found, based on available data for White Monjita *X. irupero*, whose nestlings open their eyes aged between four and six days old (de la Peña 2019).

Among the 200 identified items (Figs. 2–3) brought to the nestlings in the 2021 nest, just four involved larvae. Of the remaining 196 items, insects accounted for 90.9%. The most frequent insect order in the nestlings' diet was Coleoptera (80.65%), followed by Orthoptera (9.7%), Lepidoptera (5.8%), Odonata (1.9%), Hemiptera (1.3%) and Blattodea (0.65%). Nine spiders, an earthworm, a myriapod and a lizard (*Kentropyx* aff. *paulensis*) were also delivered.

Removal of faecal sacs. Faecal sacs were removed on average 1.16 times/hour. On three occasions, the adult dropped faecal sacs on the ground after landing on a distant perch, and once the bird swallowed the faecal sac *c*.18 m away. Four times, the adult flew to electricity wires in the vicinity to drop the faecal sac on the ground, three times on a wire 18 m from the nest and once 30 m away. Twice the adult dropped the faecal sac on the ground in flight, *c*.18 m and 27 m from the nest. On six occasions, an adult flew off holding the faecal sac but we were unable to see where it was discarded.

Agonistic encounters near the nest. We recorded three agonistic encounters between adult monjitas and other birds in the vicinity of the nest. In one, an adult attacked a Great Kiskadee *Pitangus sulphuratus* and in another it attacked a Tropical Kingbird *Tyrannus melancholicus* on a mango tree *Mangifera indica*. The third encounter involved a Chestnut-capped Blackbird *Chrysomus ruficapillus*.

Breeding season.—Analysis of data on citizen science platforms and the literature, as well as data collected in the field, indicates that the breeding season in Brazil (Fig. 4) spans at least June–January. The earliest documented evidence of breeding in the year is of a nest in use (contents unknown) photographed on 10 June (WA 659766) and the latest a fledgling being fed by an adult on 6 January (WA 4408771). The earliest and latest records of each stage of the breeding cycle are presented in Table 2.

Nest sites.—Nests were sited in hollows in wood (including trees and fence posts; *n* = 7), termite mounds (*n* = 4), roofs/ceilings (*n* = 3; Lombardi *et al*. 2010; P. G. Costa *in litt*. 2021; this paper), pipes (*n* = 2; WA 3106991; this paper), a clump of orchids (WA 1045064), a hole in a rock wall (WA 2361169), an abandoned nest of a *Furnarius* sp. (Furnariidae, WA 430102) and a hole in an earth bank (WA 2385064, A. Constantini *in litt*. 2021).

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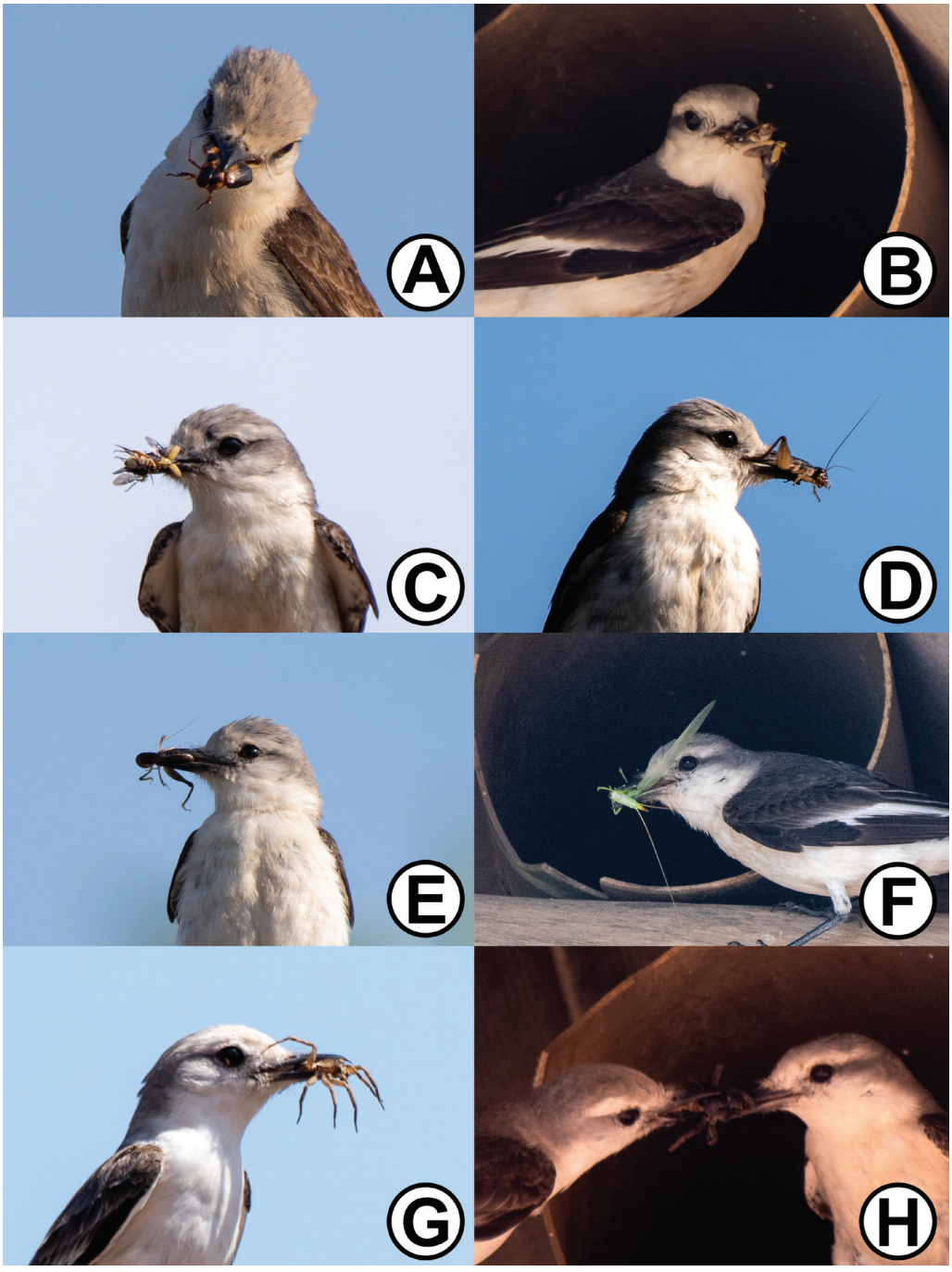

Figure 2. Food delivered to nestlings of White-rumped Monjita *Xolmis velatus*, Rio Claro, São Paulo, Brazil. A–C = Scarabaeidae; D = Grylloidea; E = Ensifera; F = Tettigoniidae, Conocephalinae, Copiphorini; G–H = Lycosidae (Luiz Carlos Ramassotti)

Vocal repertoire.—We present descriptions of those vocalisations that we heard. We did not find any vocalisations in citizen science databases additional to those we heard and recorded in the field.

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TABLE 1

Food (numbers indicate number of items) delivered to nestlings (N) and/or ingested by adults (A) of White-rumped Monjita *Xolmis velatus* during the present study, mentioned in the literature or recorded in photographs submitted to citizen science databases (WikiAves, Macaulay Library, and iNaturalist). Nomenclature follows ITIS (2023) and World Spider Catalog (2022). Literature: a. Moojen *et al*. (1941), b. Schubart *et al*. (1965), c. Gimenes *et al*. (2007), d. Krabbe (2007), e. Buzzetti & Silva (2008). *Scarabaeidae prey in Rio Claro included several *Macrodactylus* cf. *pumilla* (not quantified) and an *Onthophagus* sp. **Described as 'lagartas' ('caterpillars').

Food items	Oct 20 (N)	Oct 20 (A)	Oct 22 (N)	Oct 22 (A)	Oct 25 (N)	Oct 25 (A)	Oct 29 (N)	Oct 29 (A)	Literature	Citizen science databases
Araneae (unidentified)									c	5
Araneae: Lycosidae			7				1			
Blattodea (unidentified)					1					
Diptera: Brachycera									c	
Coleoptera (unidentified)			3		30	2	6		a,c	6
Coleoptera: Curculionidae									b	
Coleoptera: cf. *Dascillus* sp.			1							
Coleoptera: Scarabaeidae*	3		4		12		62	1	b	
Coleoptera: Staphylinidae							1			
Hemiptera: Homoptera									b	
Hemiptera: *Zammara tympanum*							2			
Hemiptera: Reduvioidea									b	
Hymenoptera (unidentified)									a	
Hymenoptera: Vespoidea									b	
Lepidoptera excluding Papilionoidea (moths)		1	3	2	2		1			1
Odonata: Libellulidae							1			
Odonata: *Erythemis vesiculosa*			1		1					
Orthoptera (unidentified)							1		a	5
Orthoptera: Acrididea					2				c	
Orthoptera: Acridoidea									b	1
Orthoptera: *Xyleus* sp.										1
Orthoptera: Grylloidea			2						c	3
Orthoptera: Tettigoniidae										1
Orthoptera: Tettigoniidae, Copiphorini					1					
Orthoptera: Ensifera			4		2		3			2
Insecta (unidentified)			2		10		4		d,e	12
Pterygota (unidentified)					5		3			
Myriapoda			1							1?
Arthropoda (unidentified)			3		2		1			6
Oligochaeta							1			
Larvae			3		1				c**	12
Reptilia: Sauria									e	
Sauria: *Kentropyx* aff. *paulensis*							1			
Sauria: *Cercosaura schreibersii*										2
Unidentified food items			24		82		15			9

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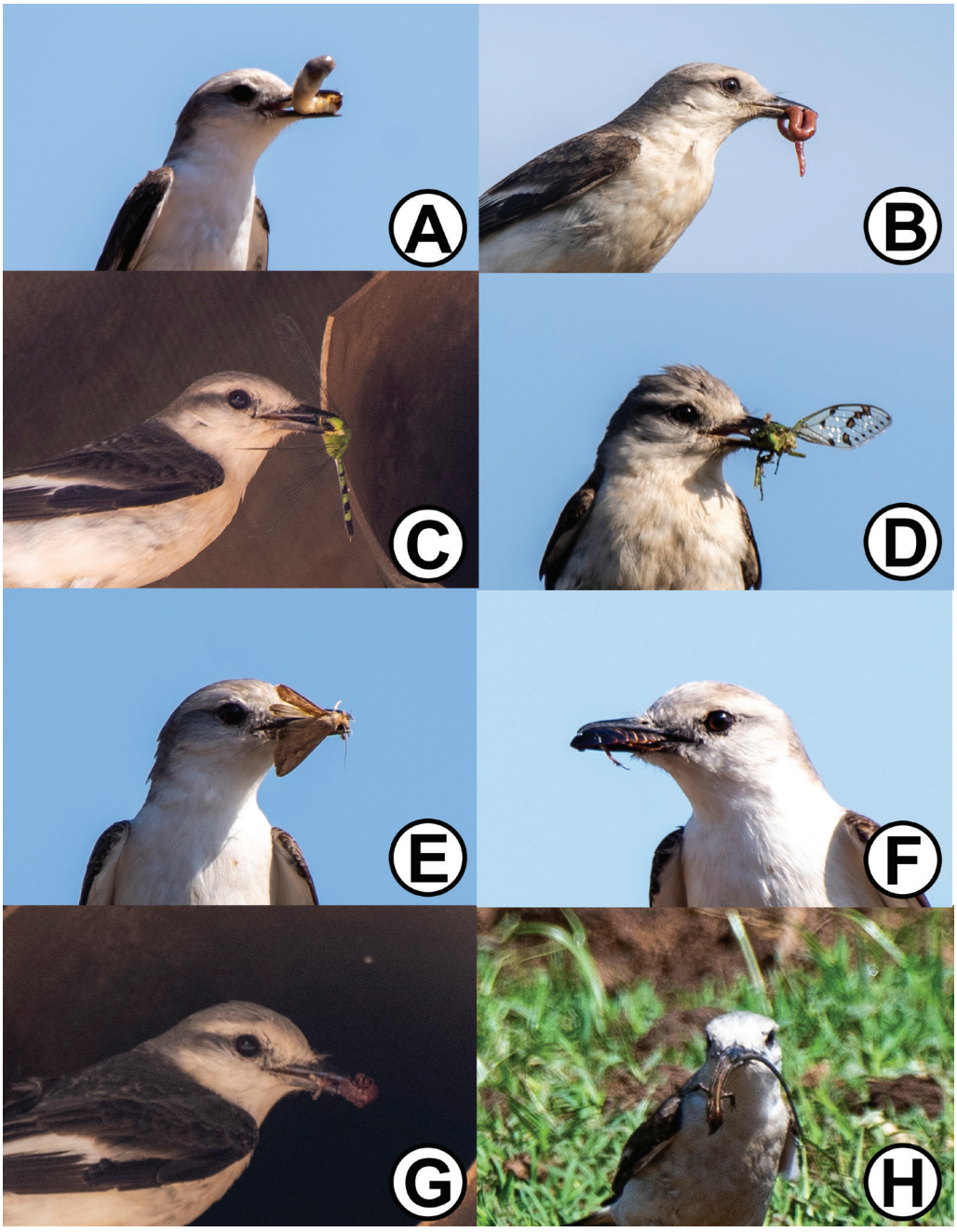

Figure 3. Food delivered to nestlings of White-rumped Monjita *Xolmis velatus*, Rio Claro, São Paulo, Brazil. A: larva, B: Oligochaeta, C: *Erythemis vesiculosa*, D: *Zammara tympanum*, E: Lepidoptera (moth), F: Blattodea, G: Myriapoda, H: *Kentropyx* aff. *paulensis* (Luiz Carlos Ramassotti)

'Rough' call. On 24 April 2021, at Serra dos Cocais (Valinhos, São Paulo, 22º56′42″S, 46º57′13″W) we observed an individual perched on a tree (3.5 m) giving a rough *preeew*. Mean duration of this vocalisation was 0.28 seconds (SD = 0.03; min. = 0.35; max. = 0.72; median = 0.28; *n* = 6), mean highest frequency 3,810 Hz (SD = 1,873; min. = 4,195; max. =

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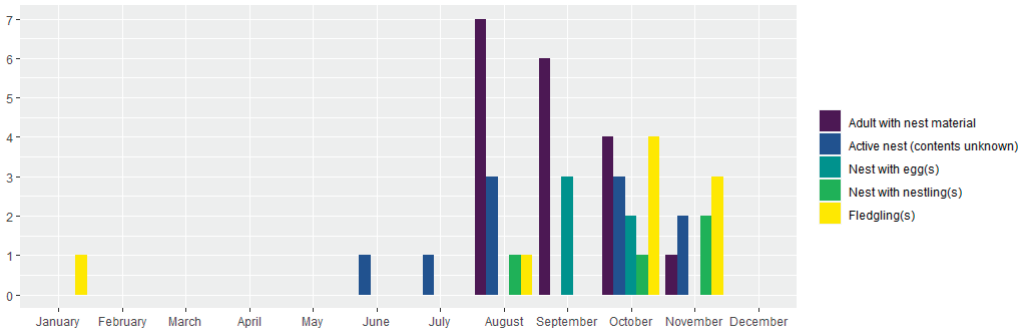

Figure 4. Seasonality in breeding records of White-rumped Monjita *Xolmis velatus* in Brazil based on citizen science data, the literature and this study.

TABLE 2
Earliest and latest records for each stage of the breeding cycle of White-rumped Monjita *Xolmis velatus*.

Stage of the breeding cycle	Earliest record	Latest record
Adult with nest material	1 Aug (WA 3908141)	5 Nov (WA 1145540)
Active nest (contents unknown)	10 Jun (WA 659766)	9 Nov (WA 1520041)
Nest with egg(s)	5 Sep (Lopes *et al.* 2013)	23 Oct (this paper)
Nest with nestling(s)	7 Aug (WA 430102)	29 Nov (WA 2385064)
Fledgling(s)	29 Aug (WA 1816888)	6 Jan (WA 4408771)

5,124; median = 4,541; n = 6) and mean lowest frequency 1,809 Hz (SD = 1,809; min. = 1,552; max. = 2,637; median = 2,238; n = 6). This call was given very intermittently, sometimes only at intervals of more than one hour. It is heard in most of the recordings available in citizen science databases (e.g., ML 235977091), which may indicate that it is frequent in the repertoire.

Aerial calls. Also on 24 April 2021, two monjitas interacted by making aerial pursuits and vocalising similar to the flight calls of Cobalt-rumped Parrotlet *Forpus xanthopterygius* (ML 329724141). The interactions were possibly not agonistic because they landed and foraged near one another, and moved together between foraging sites. Aerial calls had a mean duration of 0.1 seconds (SD = 0.03; min. = 0.05; max. = 0.13; median = 0.11; n = 1), a mean high frequency of 5,494 Hz (SD = 141; min. = 5,367; max. = 5,696; median = 5,457; n = 1) and mean low frequency of 4,107 Hz (SD = 334; min. = 3,747; max. = 4,527; median = 4,077; n = 1). A recording is available with calls similar to those described, which corroborates that they are used in contact between individuals (see comments on ML 69262581).

Begging calls. On 12 October 2021 at 06.30 h, also at Serra dos Cocais, we observed a fledgling begging from its presumed parents. It uttered a quick sequence of simple notes, in 30 seconds emitting 88 notes at a mean interval of 0.25 seconds (SD = 0.11; min. = 0.14; max. = 0.72; median = 0.21), with mean note duration 0.05 seconds (SD = 0.005; min. = 0.04; max. = 0.6; median = 0.05), mean highest frequency 7,513 Hz (SD = 528; min. = 7,016; max. = 8,730; median = 7,295) and mean lowest frequency 5,094 Hz (SD = 65; min. = 4,943; max. = 5,222; median = 5,103) (Fig. 5A; ML 377809741). This vocalisation was given by the fledgling when one of the adults approached its perch with or without food. There is only one recording of begging calls available online (ML 69262591), with vocalisations similar to those described here.

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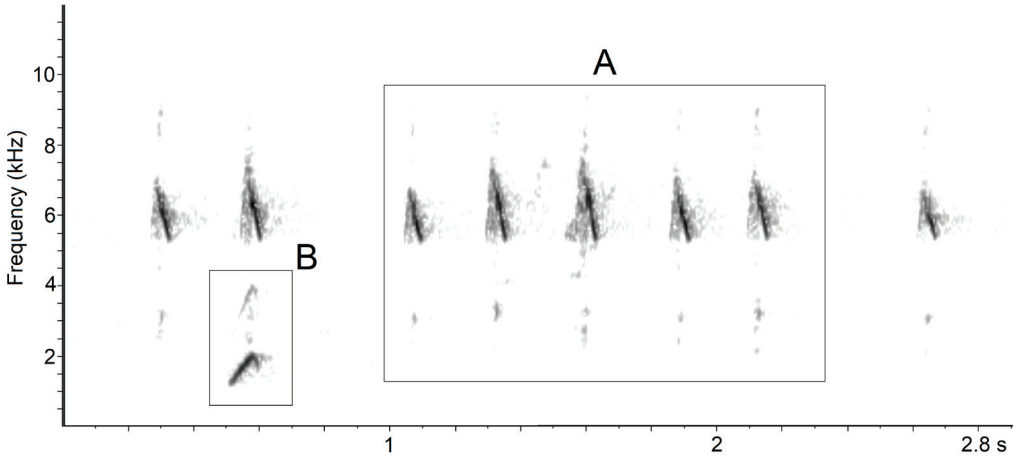

Figure 5. Begging calls of a fledgling (A) and calls of an adult (B) White-rumped Monjita *Xolmis velatus*. Sonogram made using software Raven Pro 1.6.1 (Center for Conservation Bioacoustics 2019).

Contact/Agonistic calls. Also on 12 October 2021, the putative pair used a single call (Fig. 5B) for contact, increasingly frequently when agitated (e.g., prior to agonistic interactions with a Fork-tailed Flycatcher *Tyrannus savana*). The call has a mean note duration of 0.09 seconds (SD = 0.01; min. = 0.07; max. = 0.11; median = 0.09; n = 1), mean highest frequency of 2,471 Hz (SD = 411; min. = 1,913; max. = 3,029; median = 2,671; n = 1) and mean lowest frequency of 1,104 Hz (SD = 186; min. = 837; max. = 1,275; median = 1,196; n = 1). The same call was used by adults on several occasions after feeding nestlings (nest 3) at Rio Claro, perched on the roof of the building before flying off. Similar calls are heard on a few recordings on citizen science databases (e.g., WA 3873817).

Food items.—In the online citizen science platforms, we found 67 photographs showing food items (see Table 1) including: Orthoptera (n = 13), larvae (n = 12), Coleoptera (n = 6), Araneae (n = 5), Sauria (n = 2), Lepidoptera (n = 1), cf. Myriapoda (n = 1), unidentified insects (n = 12), unidentified arthropods (n = 6) and unidentified items (n = 9).

Discussion

As reported by several previous authors, we found that White-rumped Monjita presents great plasticity in its choice of nest site. It occupies roofs (Lombardi *et al*. 2010, this paper) and many different other types of cavities, including hollows excavated by birds such as woodpeckers and parakeets (Fitzpatrick *et al*. 2004), the antechamber of Rufous-fronted Thornbird *Phacellodomus rufifrons* nests (Sick 1997), a fence post (Oniki & Willis 2003) and PVC pipe (this paper). In all cases, they took advantage of pre-existing structures, as mentioned by Fitzpatrick *et al*. (2004). Several nests were in human constructions, indicating a degree of acceptance of anthropogenic environments.

The breeding period, delimited for the first time herein, differs slightly from that recorded for its congener *X. irupero* in Argentina, which nests between August and December (de la Peña 2019).

According to the literature (Lombardi *et al*. 2010) and data collected in the present study, the nest is always sited fairly low down, between 0.3 (A. Gabriel *in litt*. 2021) and 4 m above ground (this study; A. Mendonça *in litt*. 2021), mainly in hollows in wood and termite mounds. All nests were cup types (low cup/base, high cup/base, cavity/without tunnel/low cup, and cavity/with tunnel/high cup *sensu* Simon & Pacheco 2005), and the nest material

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varies, but always contains feathers in the egg chamber lining (Lombardi *et al*. 2010, Lopes *et al*. 2013, this paper). Described nests held 2–4 all-white eggs (Oniki & Willis 2003, Lombardi *et al*. 2010, Lopes *et al*. 2013, this paper).

Concerning parental care, as de la Peña (2019) and Di Giacomo (2005) found for *X. irupero*, more than one adult White-rumped Monjita feeds the nestlings. In this study, we presented the first detailed data on this behaviour in the species, finding that nestling feeding frequency is high, reaching >30 events per hour. However, given the lack of sexual dimorphism in plumage, studies of marked individuals will be needed to determine the role of each sex in nestling provisioning and to verify if there are helpers.

The information presented here about vocalisations comprises the first detailed description of the species' repertoire. Possibly other types of vocalisations are still unknown, such as mobbing, alarm and distress calls. Sick (1997) mentioned the existence of crepuscular and nocturnal vocalisations but did not provide a detailed description.

A definition of the main song in bird species is still controversial. Some authors have considered what we term the 'rough call' to be the song of *X. velatus* (Sick 1997, Farnsworth & Langham 2020). However, song is usually longer and more complex compared to other vocal types in the repertoire (Marler & Slabbekoorn 2004), being used to attract mates and defend territory, which fact has never been objectively tested. More work is needed to document the complete repertoire and function of each vocalisation.

Prey captured by the species includes a wide variety of animals, from invertebrates (Moojen *et al*. 1941, Schubart *et al*. 1965, Gimenes *et al*. 2007, this paper) to small vertebrates like lizards (Buzzetti & Silva 2008, this paper). We recorded for the first time the phylum Annelida, arthropod subphylum Myriapoda and insect orders Blattodea, Lepidoptera and Odonata in the species' diet. The apparent preference for insects corroborates the general pattern among Tyrannidae (Winkler *et al*. 2020).

Finally, we provided the first detailed compilation of the diet of nestlings of White-rumped Monjita, which includes eight orders of insects, spiders, earthworms, myriapods, and even small lizards, showing great plasticity in prey and, consequently, adaptability to environmental disturbance, making it possible for the species to nest near humans.

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References:

Altmann, J. 1974. Observational study of behavior: sampling methods. *Behavior* 49: 227–267.

Buzzetti, D. & Silva, S. 2008. *Berços da vida: ninhos de aves brasileiras*. Second edn. Ed. Terceiro Nome, São Paulo.

Center for Conservation Bioacoustics. 2019. Raven Pro: interactive sound analysis software. Version 1.6.1. Cornell Lab of Ornithology, Ithaca, NY.

Di Giacomo, A. 2005. Aves de la Reserva El Bagual. *Temas de Naturaleza y Conservación* 4: 201–465.

Farnsworth, A. & Langham, G. 2020. White-rumped Monjita (*Xolmis velatus*), version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.whrmon2.01/ (accessed 1 May 2023).

Ferrari, A., Motta-Junior, J. C. & Siqueira, J. O. 2023. Seasonal variation in the foraging behavior of neotropical tyrant flycatchers (Tyrannidae) in a Cerrado fragment, Brazil. *Ethol. Ecol. & Evol*. 35: 222–239.

ISSN-2513-9894 (Online)

Fitzpatrick, J. W., Bates, J., Bostwick, K., Caballero, I., Clock, B., Farnsworth, A., Hosner, P., Joseph, L., Langham, G., Lebbin, D., Mobley, J., Robbins, M., Scholes, E., Tello, J., Walther, B. & Zimmer, K. J. 2004. Family Tyrannidae (tyrant-flycatchers). Pp. 170–462 *in* del Hoyo, J., Elliott, A. & Christie, D. A. (eds.) *Handbook of the birds of the world*, vol. 9. Lynx Edicions, Barcelona.

Gimenes, M. R., Lopes, E. V., Loures-Ribeiro, A., Mendonça, L. B. & dos Anjos, L. 2007. *Aves da planície alagável do alto rio Paraná*. Ed. Universidade Estadual de Maringá, Maringá.

Integrated Taxonomic Information System (ITIS). 2023. Online database. https://doi.org/10.5066/F7KH0KBK (accessed 1 May 2023).

Krabbe, N. 2007. Birds collected by P. W. Lund and J. T. Reinhardt in south-eastern Brazil between 1825 and 1855, with notes on P. W. Lund's travels in Rio de Janeiro. *Rev. Bras. Orn*. 15: 331–357.

Lombardi, V. T., Faetti, R. G., Neto, S. D., Vasconcelos, M. F. & Gussoni, C. O. A. 2010. Notas sobre a nidificação de aves brasileiras raras e/ou pouco conhecidas. *Cotinga* 32: 131–136.

Lopes, L. E., Peixoto, H. J. C. & Hoffmann D. 2013. Notas sobre a biologia reprodutiva de aves brasileiras. *Atualidades Orn*. 171: 33–49.

Marler, P. & Slabbekoorn, H. 2004. *Nature's music: the science of birdsong*. Elsevier Academic Press, San Diego, CA.

Moojen, J., Carvalho, J. C. & Lopes, H. S. 1941. Observações sobre o conteúdo gástrico das aves brasileiras. *Mem. Inst. Oswaldo Cruz* 36: 405–444.

Oniki, Y. & Willis, E. O. 2003. Re-uso de ninhos por aves neotropicais. *Atualidades Orn*. 116: 4–7.

de la Peña, M. R. 2019. Aves argentinas: descripción, comportamiento, reproducción y distribución (actualización). *Com. Mus. Prov. Cienc. Natur. "Florentino Ameghino" (N. S.)* 9: 1–436.

Schubart, O., Aguirre, A. C. & Sick, H. 1965. Contribuição para o conhecimento da alimentação das aves brasileiras. *Arq. Zool*. 12: 95–249.

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

Simon, J. E. & Pacheco, S. 2005. On the standardization of nest descriptions of neotropical birds. *Rev. Bras. Orn*. 13: 143–154.

Winkler, D. W., Billerman, S. M., Lovette, I. J. 2020. Tyrant flycatchers (Tyrannidae), version 1.0. *In* Billerman, S. M., Keeney, B. K., Rodewald, P. G., Schulenberg, T. S. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.tyrann2.01 (accessed 1 May 2023).

World Spider Catalog. 2022. Version 23.0. Natural History Museum Bern. http://wsc.nmbe.ch (accessed 1 May 2023).

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Third time lucky for Forsten's pigeon; *taeniura, forsterii, forsteni*

by Hein van Grouw, Wim Dekkers & Kees Rookmaaker

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Summary.—Temminck's major work on pigeons became famous partly because of the complementary plates by Knip, even though Knip had used subterfuge to make the published work appear to be hers. It was generally assumed that this permanently ended their partnership as the evidence for renewed cooperation between the two, present in Knip's second pigeon book, was widely overlooked. A rediscovered letter from Temminck to Knip confirms the renewed partnership, with Temminck supplying specimens of new species of pigeon to be included in Knip's work. One of these was a *Ducula* from Sulawesi, collected by the Dutch naturalist Forsten. Due to a spelling mistake, this species initially did not receive the name intended by Temminck. Although the error was subsequently corrected by Bonaparte, his action is invalid in the eyes of the *International code for zoological nomenclature*. Another article in the Code, however, dealing with a different matter, *is* applicable and rules that the 'amended' name is valid after all.

'Article 32.5.1. If there is in the original publication itself, without recourse to any external source of information, clear evidence of an inadvertent error, such as a lapsus calami or a copyist's or printer's error, it must be corrected. Incorrect transliteration or Latinization, or use of an inappropriate connecting vowel, are not to be considered inadvertent errors'
ICZN (1999: 39)

Like many ornithologists in the late 18th and early 19th centuries, Coenraad Jacob Temminck (1778–1858), Dutch zoologist and from 1820 the first director of the Dutch National Natural History Museum in Leiden, published his research in multi-volume books. His detailed and often beautifully illustrated works made Temminck one of the most famous ornithologists of his era.

During his lifetime, journals became an increasingly popular medium for naturalists to communicate their findings, as they were far more efficient vehicles for reporting new species than books. In a period of constant discovery and increasing competition, naturalists could no longer afford to wait until a book was ready to be published. There was likewise a need to increase the speed of publication of the results of the efforts of the Natuurkundige Commissie voor Nederlandsch-Indië (Natural Science Committee for the Dutch East Indies, see Appendix 1). Output had been slow and intermittent ever since the start, in 1820, resulting in an increasing reluctance of the Dutch government to finance this large-scale collecting exercise. Finally, by Royal Decree on 10 February 1839, it was settled that the findings of the commission should be published in a new and regular series entitled *Verhandelingen over de Natuurlijke Geschiedenis der Nederlandsche Overzeesche Bezittingen* (Transactions on the Natural History of the Dutch Overseas Possessions). It was published in 29 issues between 1839 and 1847 (Husson & Holthuis 1955: 17–24).

Not everyone was happy with this decision. Eltio Alegondus Forsten (1811–43), since 1838 a member of the Natuurkundige Commissie, was already abroad when he

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complained about it in a letter to the museum's administrator in Leiden (Forsten 1841a)[1]. Forsten stated that he did not intend to contribute to the *Verhandelingen* as, in his opinion, it would result in *his* findings disappearing anonymously in a larger work on colonial natural history. Instead, he wished to publish his own book, under his own name, on the natural history of Celebes (modern Sulawesi) when he returned (Forsten 1840), as this would improve his chances of a scientific career and perhaps even royal honours, as it had for fellow Committee members Salomon Müller (1809–1864) and Pieter Willem Korthals (1807–92) (van Wingerden 2020: 806). However, like many of his predecessors, Forsten never returned. Dogged by constant ill health, he died on 2 January 1843 at the age of 31, on the island of Ambon (Veth 1879: 107).

Histoire naturelle générale des pigeons (1808) or *Les pigeons* (1811)?

Around 1806 Temminck planned to write the first detailed and illustrated monograph on wild pigeons, which became known as the *Histoire naturelle générale des pigeons* (Temminck & Knip 1808). He commissioned Pauline de Courcelles (1781–1851) to execute the plates for this major work, which was published over time in 15 parts (*livraisons*) and included many new species, mainly based on specimens in his own collection or in the Muséum national d'Histoire naturelle (MNHN) in Paris.

Near the end of the process Pauline, then Knip-de Courcelles (hereafter Knip) abused Temminck's trust by using subterfuge to appropriate the credit for the work. Without Temminck's knowledge, she issued a new title page and made some alterations to the text. It was eventually published as *Les pigeons* (Knip & Temminck 1811). For more details see Dickinson *et al*. (2010).

The alterations to the title of the work, the authors and the dates of publications created problems in the field of taxonomy and led to confusion, first identified by Mees (1975: 126–127). Should taxonomists cite Knip or Temminck as the authority of the scientific names and with what dates? Dickinson *et al*. (2010: 213–214, 218) proposed to solve this dilemma by suggesting that it must be seen as two works: the first and largest part (1808–10, livraisons 1–13) of which Temminck alone was the author and therefore the authority for the names, and the last parts (1811, livraisons 14–15) wherein both should be seen as authors. Despite Knip's fraud, her magnificent illustrations played a major role in making Temminck's work on pigeons famous.

Les pigeons, volume 2 (1838–43)

Nearly 30 years later, Knip produced a second volume of her *Les pigeons* together with Florent Prévost (1794–1870), an illustrator and assistant naturalist at MNHN, Paris, who wrote the species accounts. It was commonly assumed that her partnership with Temminck had ended permanently, despite Stresemann (1975) pointing out that it had not. Discussing Knip's second volume, he wrote 'She seems to have reconciled with Temminck at the time, because he allowed her to portray some of the species of pigeons discovered by members of the Natural History Commission [Natuurkundige Commissie]' (Stresemann 1975: 118, although this was not mentioned in the original edition of the same work; Stresemann 1951).

A letter from Temminck to Knip dated 24 January 1842 confirms the renewed collaboration (Temminck 1842) (see Appendix 2). It was preserved in a collection of

[1] Most references in the main text are noted with page numbers except Forsten's handwritten documents, as these are not published in a printed format. For these the last three numbers of the scan code are given instead, e.g. (Forsten 1840–42: 019) refers to scan number NNM001001075_019. The scan can be found by following the relevant URL in the reference list.

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documents purchased by the Royal Library at The Hague in an auction in 2004 and discovered a few years later. The letter but not Stresemann's statement was mentioned by Dickinson *et al*. (2010: 210–211, 215–216), who extensively researched the publication dates of the *livraisons*. Many other students of Temminck have missed both facts, despite the evidence being in plain sight since 1843 in Knip's second *Les Pigeons*.

In his letter to Knip, Temminck (1842) mentioned that he would try to convince libraries in the Netherlands to acquire her new work and that he would supply specimens of new species of pigeon to be included in Knip and Prévost's work. One of these was an imperial pigeon *Ducula* sp. from Sulawesi, collected by Forsten.

Forsten's Pigeon—discovery

In his diary[2] Forsten (1840–42: 33) mentioned that on 16 May 1840 he collected a pigeon in forest on a hill west of the village of Koijal near Tondano. 'Koijal' is present-day 'Koya' (in Minahasa Regency, Sulawesi), on the north-west side of Lake Tondano. Forsten immediately realised that it was an unknown species. He wrote that it resembled 'Colombe à lunettes' *Columba perspicillata* in Temminck's *Planches coloriées*—one of the references Forsten used for identifying species—but there were differences. He called it '*Columba*

Figure 1. Adult male White-bellied Imperial Pigeon *Ducula forsteni* (Bonaparte, 1854), collected by Forsten in North Sulawesi, in the Naturalis Biodiversity Center, Leiden, RMNH.AVES.216523; this specimen, together with two others in Leiden, RMNH.AVES.216524 (female) and RMNH.AVES.216525 (male), are syntypes of the name *Forsterii*, and therefore also of the name *forsteni* (© Naturalis Biodiversity Center, Leiden)

[2] Forsten's diary is, in fact, a copy rewritten by an anonymous person (Forsten 1840–42: 001–120, Mulyasari 2015: 2). On the first page there is a note that it is a copy (Forsten 1840–42: 003). The original diary, written by Forsten himself, was found among the personal estate of the German geologist Carl Schwaner (1817–51), a member of the Natuurkundige Commissie, who died in Bogor. Its current whereabouts, if the diary still exists, is unknown (van Steenis-Kruseman 1950: 179).

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Figure 2. Specimen (NHMUK 1844.5.1.7) of White-bellied Imperial Pigeon *Ducula forsteni* (Bonaparte, 1854), purchased by the British Museum from Leadbeater in 1844; it was without doubt collected by Forsten and therefore a fourth syntype (Jonathan Jackson, © Trustees of the Natural History Museum, London)

taeniura Mihi' [named by me], based on the broad grey tail-band (Latin *taenia* 'band', Greek *oura* 'tail'), but Forsten's wishes did not come to pass.

Nowhere in his diary and notebook is it recorded how many he or his hunters collected, but three examples collected by Forsten are now in the collection of the Naturalis Biodiversity Center, Leiden (Fig. 1). Another in the Natural History Museum (NHMUK) at Tring, appears also to have been collected by Forsten (Fig. 2). It was purchased in May 1844 from the London-based taxidermist and dealer Benjamin Leadbeater (1773–1851). There is no evidence that any other collector was active on Sulawesi during 1841–44. The first Western naturalist to visit Sulawesi after Forsten was Heinrich Zollinger (1818–59) in 1847 (van Gorsel 2022), followed by Alfred Russel Wallace (1823–1913) in 1859 (van Wyhe & Rookmaaker 2015), who also collected a few specimens of the same species at Tondano (Fig. 3). Therefore, the specimen at NHMUK received in 1844 must have been collected by Forsten and was probably sold to Leadbeater by Temminck as a duplicate. Temminck and Leadbeater knew each other, as Temminck had borrowed specimens from him in the past to be figured in his *Nouveau recueil de planches coloriées d'oiseaux* (Temminck & Laugier de

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Figure 3. Male (right) and female (left) specimens of White-bellied Imperial Pigeon *Ducula forsteni* (Bonaparte, 1854), collected by Wallace in 1859 at Tondano, North Sulawesi, in the Natural History Museum, Tring (NHMUK 1860.9.6.4 and NHMUK 1873.5.12.2142, respectively) (Jonathan Jackson, © Trustees of the Natural History Museum, London)

Chartrouse 1820–39). On arrival at the then British Museum in 1844, it was registered as '*Columba forsteri* [*sic*, see below] new sp. Celebes'.

Forsten's Pigeon—naming

Forsten's '*Columba taeniura*' was one of the new species Temminck intended to publish in Knip & Prévost's work. However, instead of giving it the name 'taeniura' suggested by its discoverer, Temminck named it for him: *forsteni*. It is unknown how this was communicated to Knip & Prévost, but Temminck might have included instructions when he sent the specimen to Paris. Prévost mistakenly changed the name in his account (translated from French): 'We are indebted to Mr. Temminck for his communication on this magnificent species, which was named by him to honour Mr. Forster, medical doctor and member of the Natuurkundige Commissie, who discovered it in the northern part of the Island of Celebes, where fig and nutmeg trees grow in abundance' (Knip & Prévost 1838–43: 87). Because of the error in the name—Forster instead of Forsten—the name given to the species in the book was 'Colombe de Forster *Columba Forsterii* – Temm.' (Fig. 4).

Charles-Lucien Bonaparte (1803–57) noticed this error in 1854. Bonaparte was the nephew of Emperor Napoleon I and an ornithologist. He was banned from Italy and France because of his political ideas and remained a political refugee in the Netherlands in 1849–50. During this time, he studied the Leiden collection, and therefore he was well acquainted with Temminck and his work (van den Hoek Ostende *et al*. 1997: 7).

Bonaparte realised that the name *forsterii* for the species was a mistake and wrote (translated from the French): 'An error, for which it will be ungenerous to blame the manager of the printing works or the typesetter, has changed wrongly the specific name

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Figure 4. Colombe de Forster *Columba Forsterii* Temminck, 1842, in *Les pigeons* (Knip & Prévost 1838–43, pl. 47); copy held in the Rothschild Library, NHMUK, Tring (Hein van Grouw, © Trustees of the Natural History Museum, London)

of the fourth *Hemiphaga* that I will call *Hemiphaga forsteni*. Temminck wanted to honour Mr. Forsten, Chairman [*sic*] of the Natuurkundige Commissie for the Dutch East Indies, who made many discoveries: others, better acquainted with the famous German traveller [presumably Johann Georg Forster (1754–94)] than the Dutch medical doctor substituted *Forsteni* for *Forsteri*…' (Bonaparte 1854: 1077). The species, whose common name is White-bellied Imperial Pigeon, has been known as *Ducula forsteni* (Bonaparte, 1854) ever since.

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Discussion

Forsten had intended to publish the descriptions of the new species he collected on Sulawesi, and White-bellied Imperial Pigeon would then have been known as '*Ducula taeniura*'. Without Forsten's knowledge, Temminck decided to describe some of the pigeon species himself, including White-bellied Imperial Pigeon, specimens of which had arrived at the museum in 1841 (Forsten 1841b). Instead of doing so rapidly and efficiently in the *Verhandelingen*, the series in which museum staff were supposed to publish the results of the Natuurkundige Commissie, for unknown reasons Temminck chose a book. Perhaps because he knew Knip was working on a second volume of her *Les pigeons*, Temminck renewed their partnership, hoping that the new pigeons, with names provided by him, could be published in a book rather than a journal.

For whatever reason, White-bellied Imperial Pigeon was not named as intended by its discoverer, Forsten, i.e., *taeniura*, and neither did it, in the first instance, receive the name intended by Temminck, i.e., *forsteni*, due to a spelling mistake. Only after rectification by Bonaparte more than ten years later did the species receive its intended name, with Forsten, posthumously, garnering the honour of having *his* pigeon named after him.

However, Bonaparte's revision runs counter to the *International code for zoological nomenclature* (ICZN 1999). The *Code* is designed to resolve the past and guide the future. As the misspelling does not appear to be a 'slip of the pen' (a *lapsus calami*), being consistent throughout Prévost's text, the name cannot be corrected under Art. 32.5.1. without recourse to an external source of information, for example, a note from Temminck to Prévost with the correct name.

Bonaparte's action can be considered an 'emendation' under Art. 33.2, but as the conditions required by both Art. 33.2.1 and Art. 33.2.2. are not met, his action must be viewed as an 'unjustified emendation' under Art. 33.2.3. Bonaparte's name would have remained a junior synonym but for Desmarest (1826: 340). Bonaparte was apparently unaware that *Columba forsterii* Prévost, 1843, is a junior homonym of *Columba forsteri* Desmarest, 1826, and thus permanently invalid under Art. 58.14[3]. Although the species Desmarest described—Purple-capped Fruit Dove—is now named *Ptilinopus porphyraceus* (Temminck, 1821), Desmarest's name nevertheless pre-occupies Prévost's name. *Hemiphaga forsteni* Bonaparte, 1854, now *Ducula forsteni* (Bonaparte, 1854) is therefore the valid name, not because of any perceived 'correction', although that unquestionably was Bonaparte's intention, but because it is the first available name for the relevant taxonomic concept. So, third time lucky and *Ducula forsteni* it is.

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[3] Seemingly, the name *Columba forsteri* was also employed three years later by Wagler (1829: 739–740), but from the original description it is not clear which modern species Wagler was naming. Generally, it is assumed to have been Polynesian Imperial Pigeon *Ducula aurorea* (Peale, 1848) (Bruce *et al*. 1985). However, although usually cited as *Columba forsteri* Wagler, 1821, Wagler in fact named it *Columba R. Forsteri*, which expands to '*reinholdiforsteri*' (Holyoak & Thibault 1984: 120) and thus not a senior homonym of Prévost's *forsterii*.

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References:

Bonaparte, C. L. 1854. Coup d'œil sur l'ordre des pigeons. *Compt. Rend. Acad. Sci., Paris* 39: 869–880, 1072–1078, 1102–1112.

Bruce, M. D., Holyoak, D. T. & Thibault, J.-C. 1985. *Carpophaga aurorae* Peale, 1848 and *Serresius galeatus* Bonaparte, 1855 (Aves): proposed conservation by suppression of *Columba R. Forsteri* Wagler, 1829. (Z.N.(S)2277. *Bull. Zool. Nomencl*. 42: 50–53.

Desmarest, A. G. 1826. Pigeon, Columba (Ornith). Pp. 295–377 *in* Levrault, F. G. (ed.) *Dictionnaire des sciences naturelles*, vol. 40. Le Normant, Paris.

Dickinson, E. C., David, N., Overstreet, L. K., Steinheimer, F. D. & Jansen, J. 2010. Histoire naturelle des pigeons or Les pigeons: Coenraad Jacob Temminck versus Pauline Knip. *Archiv. Nat. Hist*. 37: 203–220.

Forsten, E. A. 1840–42. *Reisverhaal van Dr. Forsten naar Menado*, pp. 1–233, nco_NNM001001075_001 up to and including nco_NNM001001075_120 *in* Gasso, E., Stork, L., Weber, A., Ameryan, M. & Wolstencroft, K. (eds.) *Natuurkundige Commissie Online*. Brill, Leiden. https://dh.brill.com/nco/view/nco_NNM001001075_001/makingsense (accessed 15 July 2023).

Forsten, E. A. 1840. Letter to J. A. Susanna, Tondano, 30 April 1840, nco_NNM001001229_001 *in* Gasso, E., Stork, L., Weber, A., Ameryan, M. & Wolstencroft, K. (eds.) *Natuurkundige Commissie Online*. Brill, Leiden. https://dh.brill.com/nco/view/nco_NNM001001229_001/makingsense (accessed 15 July 2023).

Forsten, E. A. 1841a. Letter to J. A. Susanna, Tondano, 26 January 1841, nco_NNM001001230_001 up to and including nco_NNM001001230_005 *in* Gasso, E., Stork, L., Weber, A., Ameryan, M. & Wolstencroft, K. (eds.) *Natuurkundige Commissie Online*. Brill, Leiden. https://dh.brill.com/nco/view/nco_NNM001001230_001/makingsense (accessed 15 July 2023).

Forsten, E. A. 1841b. Lijsten der inhoud der vaten en kisten gemerkt NK van Nr.I-XII, verzonden met het schip Bonjol, kapitein C. C. Hansen. Manado den 12 Mei 1841, het Lid der Natuurkundige kommissie. Bijlage 2, nco_NNM001001461_001 up to and including nco_NNM001001461_035 *in* Gasso, E., Stork, L., Weber, A., Ameryan, M. & Wolstencroft, K. (eds.) *Natuurkundige Commissie Online*. Brill, Leiden. https://dh.brill.com/nco/view/nco_NNM001001461_001/makingsense (accessed 15 July 2023).

Gassó Miracle, M. E. 2021. *Coenraad Jacob Temminck and the emergence of systematics (1800–1850).* Brill, Leiden.

van Gorsel, J. T. 2022. Geological investigations of Sulawesi (Celebes) before 1930. *Berita Sedimentologi* 48: 79–114.

van den Hoek Ostende, L. W., Dekker, R. W. R. J. & Keijl, G. O. 1997. Type specimens of birds in the National Museum of Natural History, Leiden. Part 1: Non-Passerines. *Natl. Natuurhist. Mus. Tech. Bull*. 1: 1–248.

Holyoak, D. T. & Thibault, J.-C. 1984. Contribution à l'étude des oiseaux de Polynésie orientale. *Mém. Mus. Natl. Hist. Nat., Paris* 127: 1–209.

Husson, A. M. & Holthuis, L. B. 1955. The dates of publications of "Verhandelingen over de Natuurlijke Geschiedenis der Nederlandsche Overzeesche Bezittingen" edited by C. J. Temminck. *Zoöl. Meded*. 34: 17–24.

ICZN (International Commission for Zoological Nomenclature). 1999. *International code of zoological nomenclature.* Fourth edn. International Trust for Zoological Nomenclature, London.

Knip, P. & Temminck, C. J. 1811. *Les pigeons par Madame Knip, née Pauline de Courcelles, le texte par C. J. Themminck* [*sic*]. Mme Knip & Garnery, Paris.

Knip, P. & Prévost, F. 1838–43. *Les pigeons*, vol. 2. Mme Knip, Bellizard & Dufour et Cie, Paris.

Mees, G. F. 1975. A list of the birds known from Roti and adjacent islands (Lesser Sunda Islands). *Zoöl. Meded*. 49: 115–140.

Mulyasari, P. N. 2015. A short journey to explore the east: Eltio Alegondas Forsten. *Paramita* 25: 1–12.

van Steenis-Kruseman, M. J. 1950. Malaysian plant collectors and collections being a cyclopedia of botanical exploration in Malaysia and a guide to the concerned literature up to the year 1950. *Flora Malesiana* (1)1: vii–clii, 3–639.

Stresemann, E. 1951. *Die Entwicklung der Ornithologie, von Aristoteles bis zur Gegenwart*. F. W. Peters, Berlin.

Stresemann, E. 1975. *Ornithology. From Aristoteles to the present*. Harvard Univ. Press, London.

Temminck, C. J. 1842. Letter from C. J. Temminck to P. Knip, 24 January 1842, ms 79 E 146. Koninklijke Bibliotheek, 's-Gravenhage.

Temminck, C. J. & Knip, P. 1808. *Histoire naturelle générale des pigeons*. Garnery, Paris.

Temminck, C. J. & Laugier de Chartrouse, G. M. J. 1820–39. *Nouveau recueil de planches coloriées d'oiseaux : pour servir de suite et de complément aux planches enluminées de Buffon*, vols. 1–5. F. G. Levrault, Paris.

Veth, H. J. 1879. Overzicht van hetgeen, in het bijzonder door Nederland, gedaan is voor de kennis der fauna van Nederlandsch Indië. Ph.D. thesis. Leiden University. S. C. van Doesburgh, Leiden.

Wagler, J. G. 1829. Beyträge und Bemerkungen zu dem ersten Bande seines Systema Avium. Fortsetzung III. *Isis von Oken* 22: 736–762.

Weber, A. 2019. Collecting colonial nature; European naturalists and the Netherlands Indies in the early nineteenth century. *Low Countries Hist. Rev*. 134: 72–95.

Wyhe, J. van & Rookmaaker, L. C. 2015. *Alfred Russel Wallace, letters from the Malay Archipelago*. Oxford Univ. Press.

ISSN-2513-9894 (Online)

van Wingerden, P. 2020. Science on the edge of empire: E. A. Forsten (1811–1843) and the Natural History Committee (1820–1850) in the Netherlands Indies. *Centaurus* 62: 797–821.

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Appendix 1: Natural Science Committee for the Dutch East Indies

The Dutch Natuurkundige Commissie voor Nederlandsch-Indië (Natural Science Committee for the Dutch East Indies) was established on 2 May 1820, by Royal Decree of King Willem I of the United Kingdom of the Netherlands. The committee was a costly, large-scale surveying and collecting endeavour, to explore mineral deposits and chart the flora and fauna of the Indonesian archipelago (Weber 2019: 73). In the same Royal Decree, it was stated that material collected by the committee must be deposited in the new National Natural History Museum in Leiden and the scientific results be published by the museum's scientific staff. The museum and the committee were separate but intertwined organisations (Gassó Miracle 2021: 103). Members received training in taxonomy and specimen preparation at the museum, and museum staff were aware of the members' activities in the field. They would receive shipments of specimens, publish new species, and keep track of correspondence and reports from the field (van Wingerden 2020: 807). Temminck, as director of the museum, filled the Natuurkundige Commissie with staff from the museum whenever opportunity arose (van Wingerden 2020: 807). After 30 years, with diminishing results, the Natuurkundige Commissie was officially dissolved in 1850, by which time, of the 18 members of the Commissie during this time, only six were still alive (Gassó Miracle 2021: 114).

Appendix 2: Temminck's letter to Knip (1842).

English translation of French transcript

Address on the envelope: Madame Knip-de Courcelles, rue du Bac 77, Paris.

Leiden on 24 January 1842.

Madam!

These are no longer promises carried away by the wind, which I come to show off to you: I am certainly coming to you in the Month of March and contrary to the song, the trinity will not happen, without Marlborough, having come to talk to you.[4]

To tell you that I am interested in the game would not be gallant; however, it is the fact, because I can't wait to finish with my bookseller, the dear Mr. Levrault, who furiously lures me and ends up not answering me anymore.[5]

My dealings with the librarian at The Hague have not been as favourable to You as those made with that of Teyler in Harlem; in fact the first is reduced to what is strictly necessary and the second can cut straight through.

It is true that the Ministry of the Interior in Paris had subscribed for 30 copies of my *Planches coloriées*[6], but those times have passed: a woman author could still recall those beautiful days that have passed and will

[4] Temminck was referring to the popular French folksong *Malbrough s'en va-t-en guerre*, a burlesque lament on the death of John Churchill, first Duke of Marlborough (1650–1722). It was written on a false rumour after the Battle of Malplaquet in 1709, the bloodiest battle of the War of the Spanish Succession, and tells how Marlborough's wife, awaiting his return, is given the news of her husband's death, that he has been buried and that a nightingale sang over his grave. However, her husband actually died in 1722. Temminck referred to the following chorus:

La Trinité se passe
Mironton, mironton, mirontaine
La Trinité se passe
Marlbrough ne revient pas
Marlbrough ne revient pas

[The Trinity Sunday (the first Sunday after Whitsun) passes without the return of Marlborough].
Temminck suggested the opposite: 'The Trinity Sunday will not pass without the return of Marlborough'. He considered himself Marlborough. The Christian doctrine of the Trinity defines one God existing in three divine persons: God the Father, God the Son (Jesus Christ) and God the Holy Spirit who descended like a dove. Temminck's letter deals with pigeons.

[5] In a previous letter, Madame Knip probably would have mentioned that she was aware of a conflict between Temminck and Levrault, his current publisher, based at rue de la Harpe no. 81, Paris.

[6] Madame Knip probably mentioned in a previous letter that she heard a rumour about the order by the French Interior Minister of 30 sets of Temminck's *Planches coloriées*.

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never return; that is why all works of luxury are dying or are dead, and you must have had great courage or powerful protectors to dare to start the work you are publishing now.

I hope soon to supply your publication by sending a new reinforcement of pigeons which I intend to send to Mr. Prévost, and which I urge you to draw promptly so that on my next trip to Paris, they can be completed and return with me. Your improvised[7] author will no doubt do you the gallantry of mounting [the bird skins].

I will not attach to this shipment the beautiful objects intended for the Museum of Paris; they are in large enough quantity and I myself will be the bearer of them; moreover, I will not relinquish it except from hand to hand. A scalded cat fears even cold water!

I have the honour to greet you and am sincerely
Your devoted Servant,

C.J. Temminck

[7] Temminck referred to Florent Prévost as an 'improvised' author. Apparently Temminck had refused to become the author of Knip's new work for, presumably, obvious reasons.

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Record of Markham's Storm Petrel *Hydrobates markhami* in La Paz, Bolivia

by Miguel Montenegro-Avila, Ana Serrano R., Nicole A. Avalos & Paola Velasquez-Noriega

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Summary.—Markham's Storm Petrel *Hydrobates markhami* is typically found in pelagic waters off Chile, Peru and rarely Ecuador. We report an exceptional record of a grounded fledgling in La Paz, Bolivia, far from its usual habitat and range, possibly as a result of storms or other climatic factors, >300 km from the nearest breeding colonies in northern Chile. The species breeds in the Atacama Desert, with the young flying west to the sea on fledging, but young of other seabirds can become lost due to relatively poorly understood factors, such as light pollution and, more uncommonly, even human intervention. This is the first record of the species in Bolivia and one of the first records of any Procellariform in the country.

Markham's Storm Petrel *Hydrobates markhami* is a seabird confined to the Humboldt Current, including the waters off Chile, Peru and rarely Ecuador (Jahncke 1993, Barros *et al*. 2019, Medrano *et al*. 2021). It is characterised by almost uniformly dark appearance, distinctive diagonal markings on the upperwings and a forked tail. The similar Black Storm Petrel *H. melania* has pale bars on the upperwings that extend to the carpal (Schulenberg *et al*. 2007).

Reproductive phenology varies between colonies, and even among pairs at a single colony (Barros *et al*. 2019). Approximately six colonies are known in northern Chile (five in Arica-Parinacota and one in northern Tarapacá). These colonies initiate breeding in April and conclude with fledglings in December. Further south in Tarapacá, two other colonies (Pampa la Perdiz and Salar Grande) commence breeding in November and conclude in May (Torres & Lemus 2013, Barros *et al*. 2019). Timing at the colony in Paracas, Peru coincides with the colonies of Arica-Parinacota (Jahncke 1993). The species breeds in burrows and crevices within nitrate deposits in the Sechura and Atacama deserts, usually up to 25 km from the coast (Jahncke 1993, Barros *et al*. 2019, Medrano *et al*. 2019). The crevices vary in size and depth, and some are on small hills rather in level ground (Medrano *et al*. 2021). Even within colonies there is no synchrony among pairs (Barros *et al*. 2019).

On 10 January 2023, a Markham's Storm Petrel was brought to the rehabilitation centre Amor por los Animales Bolivia (APLAB) in La Paz (Fig. 1), but died hours later. It had been found by a student from the Universidad Católica in a garden in the Obrajes urban area of La Paz. The bird was handled in accord with biosecurity measures against avian influenza, which was prevalent at the time, and has been deposited in the Colección Boliviana de Fauna, Museo Nacional de Historia Natural, La Paz, CBF 5651 (Fig. 2). This is the first record of *H. markhami* for Bolivia.

The individual was a female, mass 32.7 g, with granulated ovules, oviduct with a mean length of 19.73 mm, a medium-sized ovary measuring 4.61 × 1.95 mm and minuscule ovules. The skull was 5% ossified, indicating that it was a recent fledgling; there was no evidence of moult and it had limited body fat. The bill, tarsus and toes were black. Orange liquid was found in its stomach. Total body length 200 mm; wingspan 483 mm; wing length

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Figure 1. Markham's Storm Petrel *Hydrobates markhami* found at the Catholic University in La Paz, Bolivia, January 2023 (Ana Serrano R.)

Figure 2. The same individual of Markham's Storm Petrel *Hydrobates markhami* prepared as a study skin and deposited in the Colección Boliviana de Fauna, Museo Nacional de Historia Natural, La Paz, Bolivia, CBF 5651 (Nicole A. Avalos)

176 mm; tail averaged 98.63 mm. Additionally, we observed that it had downy feathers in the abdominal region, a characteristic indicative of recent fledglings.

This record is *c*.310 km from the breeding grounds in Arica (Torres & Lemus 2013) and *c*.930 km from Paracas. There are reports from the Panama Bight and even Baja California (Spear & Ainley 2007), with one 85 km inland in the Pica area of Chile (Johnson 1965). Similarly, one was reported 145 km inland in the Chuquicamata area of Chile (Demetrio 1993). Individuals have also been recorded at 3,800 m in the Jangas district of Peru, 90 km

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from the coast (Medrano *et al*. 2021). There are reports outside their range of other pelagic species that share the same waters, e.g., a Hornby's Storm Petrel *Hydrobates hornbyi* at Bariloche, Argentina (https://ebird.org/checklist/S67920491), *c*.200 km from the Chilean coast.

To explain how the Markham's Storm Petrel reached La Paz, there are two possible hypotheses. The first (a) is that the young bird could have become disoriented or become lost due to an unknown natural phenomenon, for example light pollution. Individuals from the Arica colonies are known to vacate the breeding sites between January and April (Barros *et al*. 2019), with the current record in January. The second hypothesis (b) is that it was transported by humans. There is heavy traffic between Arica and La Paz due to tourism and transportation of goods. There is a possibility that someone in Arica found this individual stranded, and picked it up with the intention of taking care of the bird. On reaching La Paz, they may have decided to release the bird in a garden, not knowing what to do with it, as most local people are unsurprisingly not familiar with seabirds. For now, we cannot confirm or eliminate either hypothesis. This is the first record of the species in Bolivia and one of the first of any Procellariform species in the country.

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References:

Barros, R., Medrano F., Norambuena, H. V., Peredo, R., Silva, R., de Groote, F. & Schmitt, F. 2019. Breeding phenology, distribution and conservation status of Markham's Storm-Petrel *Oceanodroma markhami* in the Atacama Desert. *Ardea* 107: 75–84.

Demetrio, L. 1993. Observaciones relevantes de Calama, año 1992. *Bol. Inf. UNORCH* 15: 8.

Jahncke, J. 1993. Primer informe del área de anidación de la Golondrina de la Tempestad Negra *Oceanodroma markhami* (Salvin, 1883). Pp. 339–343 *in* Castillo de Maruenda, E. (ed.) Memoria del X Congreso Nacional de Biología, Lima, Perú, 2–7 agosto 1992, Colegio de Biólogos del Perú, Lima.

Johnson, A. W. 1965. *The birds of Chile and adjacent regions of Argentina, Bolivia and Peru*, vol. 1. Platt Establecimientos, Buenos Aires.

Medrano, F., Silva, R., Barros, R., Terán, D., Peredo, R., Gallardo, B., Cerpa, P., de Groote, F., Gutiérrez, P. & Tejeda, I. 2019. Nuevos antecedentes sobre la historia natural y conservación de la golondrina de mar negra (*Oceanodroma markhami*) y la golondrina de mar de collar (*Oceanodroma hornbyi*) en Chile. *Rev. Chil. Orn*. 25: 21–30.

Medrano, F., Drucker, J. & Jaramillo, A. 2021. Markham's Storm-Petrel (*Hydrobates markhami*), version 2.1. *In* Schulenberg, T. S., Billerman, S. M. & Keeney, B. K. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.maspet.02.1.

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

Spear L. B. & Ainley, D. G. 2007. Storm-petrels of the eastern Pacific Ocean: species assembly and diversity along marine habitat gradients. *Orn. Monogr*. 62: 1–77.

Torres-Mura, J. C. & Lemus, M. L. 2013. Breeding of Markham's Storm-Petrel (*Oceanodroma markhami*, Aves: Hydrobatidae) in the desert of northern Chile. *Rev. Chil. Hist. Nat*. 86: 497–499.

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Notable records and observations of four passerines in Djibouti, 2020

by Carla J. Dove, James F. Whatton, Christopher M. Milensky, Will Boss, Houssein Rayaleh & Djama G. Awaleh

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Summary.—Four passerines, Gambaga Flycatcher *Muscicapa gambagae*, Sombre Rock Chat *Oenanthe dubia*, Green-winged Pytilia *Pytilia melba* and Yellow-rumped Seedeater *Crithagra xanthopygia*, are reported here as occurring or breeding in Djibouti. A male Gambaga Flycatcher is the only modern specimen record of this species from Djibouti. Specimens of Sombre Rock Chat, including one with aberrant plumage, confirm breeding in Djibouti, and the species' juvenile plumage is described for the first time. A single specimen of Green-winged Pytilia confirms morphological variation of this species in the region. Yellow-rumped Seedeaters from Dittilou, Goda Mountains (Tadjoura) confirm the species' common occurrence and breeding status in Djibouti. Further surveys are necessary for the comprehensive exploration and documentation of Djibouti's avifauna.

In March 2020, an expedition to Djibouti was conducted to complement earlier surveys in and around Camp Lemonnier (Dove *et al*. 2017, 2020). Our purpose was to commence avifaunal exploration of areas away from urban settlements, around Dittilou in the Goda Mountains, Tadjoura Region (11º46'50"N, 42º41'37"E; 675 m elevation) and in the mangroves of Godoria, Obock Region (12º09'11"N, 43º24'41"E; 7 m). However, field work was truncated because of the impending covid-19 global pandemic and the survey only lasted 14–21 March 2020. Abnormally heavy rainfall was reported in Djibouti in 2019 creating a lush landscape with dense ground cover and undergrowth in the areas visited. On this short trip, specimens of 25 bird species were obtained and are now in the Smithsonian Institution's National Museum of Natural History (USNM), Washington, DC. DNA barcoding (Hebert *et al*. 2003) was conducted on representative specimens and the resulting mtCO1 (cytochrome-*c* oxidase 1) or NADH-dehydrogenase subunit 2 (ND2) sequences (following protocols in Hackett 1996) processed via Basic Local Alignment Search Tool (BLAST) programs (National Center for Biotechnology Information http://www.ncbi.nlm.nih.gov/) to confirm species identifications. These sequences were deposited to BoLD (Barcode of Life Database) Systems (GenBank accession numbers BankIt2793695:PP339593-PP339650). Here we report noteworthy records obtained during the survey.

GAMBAGA FLYCATCHER *Muscicapa gambagae*

Described as an uncommon migrant (Redman *et al*. 2016) or vagrant to Djibouti (Taylor 2020), but regular sightings and photographs in various habitats throughout the country are available locally (HR pers. obs.). Only one previous specimen (a female) of this species is known from Djibouti, held at the Muséum national d'Histoire naturelle (MNHN, Paris) collected on 30 April 1893 at Obock (http://vertnet.org; accessed April 2023). Our specimen (USNM 664504) was mist-netted on 18 March 2020 at Dittilou and was prepared in fluid (molecular gender identification, male); iris brown, tarsi dark grey, body mass 12.0 g. We

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differentiated the species from Spotted Flycatcher *Muscicapa striata*, which is common in Djibouti in winter, by its smaller size and less distinct streaking on the crown and underparts, shorter bill, pale mandible and overall browner coloration (Taylor 2020). In Djibouti, Gambaga Flycatcher occurs throughout the country in rocky dry areas and wadis, and in the few remaining forested areas such as Forêt du Day and Mabla Mountains, as well as gardens in the town of Arta (HR pers. obs.). More than a dozen sightings and photographs are available from Djibouti on eBird (www.ebird.org; accessed 19 April 2023), in June and September at elevations above 1,100 m near Forêt du Day, and at sites near the Ethiopian border in April and October below 700 m. Additional sightings near and south of Djibouti City (Decan Refuge) and in coastal areas have been reported in September and October. Given the frequency and dates of these observations, the species is probably a common passage migrant or possibly a breeding migrant in Djibouti. Gambaga Flycatcher may have been overlooked in the past due to similarity with Spotted Flycatcher.

SOMBRE ROCK CHAT *Oenanthe dubia*

Generally recognised as an Ethiopian endemic, but one historical specimen, together with sight records in 2010 and 2012, near Mt. Wagar, north-west Somalia (Clement & Rose 2015), suggest that it may be more widespread and thus only near-endemic. A first sight record from Djibouti in September 2010 (Borrow & Jama 2010) was reported as a possible vagrant by Clement & Rose (2015). Sombre Rock Chat is commonly seen in Dittilou by local people (HR pers. obs.) and was frequently seen by us there, with several mist-netted on 17–19 March 2020, including juveniles, and males and females in breeding condition (per gonad measurements). Dittilou (*c.*700 m) is one of the wettest areas in Djibouti with annual rainfall exceeding 400 mm. The main vegetation in higher areas consists of Terminalia (*Terminalia brownii*), boxwood (*Buxus hildebrandtii*), acacias (*Acacia etbaica*, *A. millifera*) and scattered large Sycamore Figs (*Ficus sycomorus*). In lower basaltic cliff areas, Camphor Bush (*Tarchonanthus camphoratus*) and Red Acacia (*Vachellia seyal*) replace boxwoods. Multiple family groups of Sombre Rock Chats were observed in rocky wadis lined with trees (canopy height 10–15 m), often perched on large boulders and unwary of humans. Adults were observed feeding begging young and one family group included two juveniles. Elsewhere, Sombre Rock Chat inhabits arid rocky areas with scattered bushes and lava fields at 740–1,800 m (Redman *et al*. 2016, Collar & Sharpe 2020). The species regularly occurs above 900 m in Djibouti (HR pers. obs.). We separated adults from Brown-tailed Chat *Cercomela scotocerca*, which could occur in the same area, based on the much darker undertail-coverts (brown not white; Clement & Rose 2015). Two juveniles (one skin, USNM 664495, and one fluid-preserved, USNM 664532) were obtained, and were found to differ morphologically from the plumage described in Clement & Rose (2015) based on a photograph of an immature in northern Somalia. Our specimens were associating with adults and match well three photographs labelled juvenile submitted to eBird (C. Burne, http://ebird.org/ebird/view/checklist/S61732820; accessed 19 April 2023) on the northern shore of Lake Basaka, Oromia, Ethiopia. We describe the juvenile plumage from these two specimens as follows (Fig. 1; photographs may appear to differ slightly from the following description due to lighting effects). Head brown, slightly browner ear-coverts with buffy-spotted tips, narrow pale incomplete eye-ring, upperparts spotted buffy, sometimes with dark brown tips. Greater primary-coverts and alula quills edged pale whitish grey. Greater secondary-coverts tipped dark buff brown. Median secondary-coverts brown with light buffy tips. Tail dark brown with buffy tips. Throat pale grey, breast scalloped pale buff with brown tips, belly pale with some scalloped dark tips. Undertail-coverts rusty brown with darker rachises. Bare parts: iris, dark brown; bill,

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Figure 1 (A–B). Juvenile-plumaged Sombre Rock Chat *Oenanthe dubia*, specimen USNM 664495, alongside adult-plumaged (C) specimen USNM 664496 (James Whatton)

dark brown; tarsi and feet, dark brown with silvery sheen.

Specimen USNM 664495 was mist-netted on 17 March 2020 and determined to be a juvenile based on the plumage characteristics described above and gonad measurements (testes, L = 1.0 × 0.5 mm, white; R = 1.0 × 0.5 mm, black), with bursa (9 × 4 mm). Specimen USNM 664532 had identical plumage, but gonad measurements were unavailable due to specimen preparation type. These are the only known juvenile-plumaged birds in collections. In addition, four adult males (enlarged testes and seminal vesicles, collected 17–19 March 2020) and one adult female (ovary in laying condition, largest ovum 10 × 10 mm, collected 18 March 2020) were in breeding condition. Stomach analysis found them to contain insects or to be empty. Most specimens were in body and/or tail moult. One aberrant-plumaged male specimen in breeding condition, USNM 664494, had numerous white feathers on the head, back, breast and wing-coverts (Fig. 2).

Juveniles have also been observed in gardens in Arta, and this species is frequently seen in Assamo, Dikhil, Galafi and at Ghoubet windfarm (HR pers. obs.).

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Figure 2. Male Sombre Rock Chat *Oenanthe dubia*, specimen USNM 664494, showing aberrant plumage (ventral and dorsal views) (Katie Sayers)

These observations, together with the specimen data, prove definitively that the species breeds in Djibouti and is locally common.

GREEN-WINGED PYTILIA *Pytilia melba*

The Green-winged Pytilia known from the Dittilou and Goula (11°57′N, 43°00′E; 565 m) areas of Djibouti was described as a new subspecies, *P. m. flavicaudata* by Welch & Welch (1988), based on observations and four photographs of three different males, and one female (not photographed) near Goula, but this designation was challenged by Payne (1989). Although this plumage is well known to local people (HR pers. obs.), until now no voucher specimens have been available. One female was mist-netted on 19 March 2020 at Dittilou. This specimen, USNM 664520, is similar to the female illustrated in Payne (2010), presumably based on the description in Welch & Welch (1988: 70). The male plumage was also illustrated in Welch & Welch (1998) and Redman *et al*. (2016). Photographs of male *P. melba* submitted to eBird from the Rahhle Valley Ecotourism Campsite near

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Assamo, Djibouti, involve *P. m. jessei*, based on the grey lores, red rump, and orange-red chin and throat (Payne 2020). A thorough taxonomic evaluation of this species is now being conducted by us and will include molecular analysis to determine the status of our specimen.

YELLOW-RUMPED SEEDEATER *Crithagra xanthopygia*

Locally common in the highlands of Eritrea and Ethiopia in dry, open scrub at 900–2,500 m (Redman *et al*. 2016). Mills & Cohen (2015) observed a *Crithagra* sp. in Forêt du Day and suggested that *C. xanthopygia* might occur in Djibouti. Our observations in 2016 at Campement Touristique de la Forêt du Day (Dove *et al*. 2020) were inconclusive and no specimens of this seedeater were obtained. During the 2020 expedition we obtained specimens at Forêt du Day near Campement Touristique Dittilou (11º46′50″N, 42º01′37″E, 675 m), which is *c*.5 km east of our 2016 site; all 12 were identified as Yellow-rumped Seedeater. Our specimens were compared with Reichenow's Seedeater *C. reichenowi* at USNM because the latter is similar and was the only *Crithagra* sp. previously known to occur in Djibouti (Mills & Cohen 2015). The current specimens differed from Reichenow's Seedeater in the lack of whitish superciliary stripes, greyer underparts and by having a white throat (Fig. 3). Sightings on eBird describe in detail both Yellow-throated Seedeater *C. flavigula* and *C. xanthopygia* in the same area of Ethiopia near Dire Dawa (R. Clark, https://ebird.org/checklist/S21407416; accessed 19 April 2023). None of our specimens is similar to descriptions or photographs of Yellow-throated Seedeater submitted to eBird, but they are similar to those of Yellow-rumped Seedeater. As suggested by Mills & Cohen

Figure 3 (A–B). Adult-plumaged Reichenow's Seedeater *Crithagra reichenowi* specimen USNM 246631 (left) compared to Yellow-rumped Seedeater *C. xanthopygia* specimen USNM 664564 (right) showing the lack of whitish supercilium, and greyer underparts and white throat in the Yellow-rumped Seedeater specimen (right) (Carla Dove)

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(2015), more study is needed on *Crithagra* seedeaters in Djibouti to determine whether any other species might occur in the country and to determine the validity and taxonomic rank of the taxa within this genus. We deposited all of our DNA sequences identified as *C. xanthopygia* to GenBank. We found *C. xanthopygia* to be common in the Dittilou area, in the rocky wadi, where we saw and heard their vocalisations daily and throughout the day. The birds appeared to be engaged in a second brood because very young and immature birds were mist-netted, but the adults were still in breeding condition. They fed on small seeds. The species occurs mostly in the Goda Mountains and nearby Mabla Mountains in the remaining small forests in Djibouti.

Our work in Djibouti (2014, 2016 and 2020) has continued to refine and document knowledge of the country's avifauna. Our observations and those recently reported by Buechley *et al*. (2019) indicate that its birdlife is understudied and in need of additional surveys over longer periods to document thoroughly avian diversity in country. Given rapid urban development in this part of the Horn of Africa, such work is a priority to inform conservation efforts.

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References:

Borrow, N. & Jama, A. 2010. Birdquest Djibouti & Somaliland 4-25 September 2010 tour report. https://www.birdquest-tours.com/wp-content/uploads//2019/06/somaliland_&_djibouti_tour_report_2010.pdf (accessed 13 January 2024).

Buechley, E. R., de la Cruz Muñoza, A., Roman, J. R., Caucala, G. & Rayaleh, H. 2019. Notable bird observations for Djibouti, including the first record of Semicollared Flycatcher *Ficedula semitorquata*. *Bull. Afr. Bird Cl*. 26: 179–185.

Clement, P. & Rose, C. 2015. *Robins and chats*. Christopher Helm, London.

Collar, N. & Sharpe, C. J. 2020. Sombre Rock Chat (*Oenanthe dubia*), version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.somcha1.01 (accessed 19 April 2023).

Dove, C. J., Saucier, J., Whatton, J. F., Schmidt, B. K. & Roble, H. R. 2017. First record of River Warbler *Locustella fluviatilis* and additional records for Plain Nightjar *Caprimulgus inornatus* and Lesser Masked Weaver *Ploceus intermedius* in Djibouti. *Bull. Brit. Orn. Cl*. 137: 67–70.

Dove, C. J., Whatton, J. F., Saucier, J. R., Schmidt, B. K., Gotte, S. W., Klope, M. W. & Rayaleh, H. 2020. Avian surveys near Camp Lemonnier and Day Forest, Djibouti, Africa. *Check List* 16: 1067–1084.

Hackett, S. J. 1996. Molecular phylogenetics and biogeography of tanagers in the genus *Ramphocelus* (Aves). *Mol. Phylo. & Evol*. 5: 368–382.

Hebert, P. D. N., Cywinska, A., Ball, S. L. & deWaard. J. R. 2003. Biological identifications through DNA barcodes. *Proc. R. Soc. B. Biol. Sci*. 270: 313–321.

Mills, M. S. L & Cohen, C. 2015. Are Yellow-throated Seedeater *Crithagra flavigula* and White-throated Seedeater *C. xanthopygia* conspecific? Observations of seedeaters from Djibouti. *Bull. Afr. Bird Cl*. 22: 190–195.

Payne, R. B. 1989. Commentary on the Melba Finch *Pytilia melba* of Djibouti and the requirement of a specimen for taxonomic description. *Bull. Brit. Orn. Cl*. 109: 118–119.

Payne, R. B. 2010. Family Estrildidae (waxbills). Pp. 234–377 *in* del Hoyo, J., Elliott, A. & Christie, D. A. (eds.) *Handbook of the birds of the world*, vol. 15. Lynx Edicions, Barcelona.

ISSN-2513-9894 (Online)

Redman, N., Stevenson, T. & Fanshawe, J. 2016. *Birds of the Horn of Africa: Ethiopia, Eritrea, Djibouti, Somalia and Socotra*. Second edn. Christopher Helm, London.

Taylor, B. 2020. Gambaga Flycatcher (*Muscicapa gambagae*), version 1.0. *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.gamfly 1.01 (accessed 19 April 2023).

Welch, G. R. & Welch, H. J. 1988. A new subspecies of *Pytilia melba* from Djibouti, East Africa. *Bull. Brit. Orn. Cl*. 108: 68–70.

Welch, G. R. & Welch, H. J. 1998. Mystery birds from Djibouti. *Bull. Afr. Bird Cl*. 5: 46–50.

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Return to the 'Great Pine Swamp' of Alexander Wilson

by Matthew R. Halley

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Summary.—During an excursion to a place called the 'Great Pine Swamp' in May 1811, Alexander Wilson (1766–1813) collected specimens of three supposedly new species of wood warbler (Parulidae) and one thrush (Turdidae), which he later described in *American ornithology* vol. 5. Two decades later, John James Audubon (1785–1851) claimed that he had 'followed [Wilson's] track' in 1829 and located the 'Great Pine Swamp' at a logging community on the west bank of the Lehigh River, near the modern village of Rockport, Pennsylvania (PA). Most scholars have assumed that Audubon was correct, that Rockport was indeed the site of Wilson's 'Great Pine Swamp'. However, in June 2023, I used historic maps to retrace Wilson's route and discovered that his 'Great Pine Swamp' was actually in Monroe County, PA, *c.*26 km (16 miles) east of Rockport, on the opposite side of the Lehigh River, in a different physio-geographic province. Here, after two centuries, I resolve the location of the 'Great Pine Swamp' and shed new light on Wilson's and Audubon's published accounts of species they reportedly encountered there.

Alexander Wilson (1766–1813), author of the nine-volume *American ornithology* (1808–14), having just returned from a long expedition to the southern USA, spent the winter of 1810/11 in Philadelphia, Pennsylvania (PA), preparing the illustrations and text accounts for his third and fourth volumes, which would be published in February and September 1811, respectively (Burns 1908). After several months of labour, Wilson wrote on 4 March 1811: 'I have just published my third volume of Amer. Orn. and have got nearly half of the plates of the Fourth finished. I live secluded from the rest of Mankind always poring over birds, or pursuing them in the woods' (Hunter 1983: 385). Thus, after a productive but lonely winter, Wilson turned his focus back to field work. In mid-May 1811, he left Philadelphia on horseback and travelled north to a place he called the 'Great Pine Swamp', in search of new (undescribed) species for his anticipated fifth volume (Wilson 1812a).

On a round-trip journey that lasted about one week, Wilson collected specimens of three supposedly new species of wood warbler (Parulidae) and one thrush (Turdidae), which he subsequently depicted and described in his fifth volume (Wilson 1812a). Ever since, those four species have been subjects of much debate. Tawny Thrush *Turdus mustelinus* Wilson, 1812a, proved to be a taxonomic composite (Halley 2018a). Some authors have suggested that Blue-mountain Warbler *Sylvia montana* Wilson, 1812a, which is often listed among Wilson's unidentified 'mystery birds', may have been based on an unknown hybrid (Parkes 1985, Holt 2004, but see Coues 1872: 105). Another new species, Pine-swamp Warbler *Sylvia pusilla* Wilson, 1812a, was presumably based on females of Black-throated Blue Warbler *Setophaga caerulescens* (J. F. Gmelin, 1789), a sexually dichromatic species, although paradoxically Wilson (1812a: 100–101) stated that he collected specimens of both sexes and the 'plumage of the female [differed] in nothing from that of the male.' Finally, Hemlock Warbler *Sylvia parus* Wilson, 1812a, was probably based on a male Blackburnian Warbler *Setophaga fusca* (J. F. Gmelin, 1789) in first-basic plumage, a solution first proposed

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by Baird *et al*. (1858: 274), although the species is still called 'mysterious' and 'unknown' by some authors (e.g., Burtt & Davis 2013: 157, 289).

Despite a lingering interest in these species, there has been remarkably little discussion about the location of the 'Great Pine Swamp' or Wilson's journey there. George Ord (1781–1866), who completed Wilson's final two volumes, edited the second edition of *American ornithology* (1824–25, see Faxon 1901) and authored one of the first biographies of Wilson, did not mention the expedition (Ord *in* Wilson 1814, 1825). To my knowledge, the first (and practically the last) person to discuss the location of the 'Great Pine Swamp' was John James Audubon (1785–1851), the controversial painter and ornithologist, who claimed that he had 'followed [Wilson's] track' in August 1829, and relocated the 'Great Pine Swamp' near a logging settlement now called Rockport, PA, on the west bank of the Lehigh River. In the second volume of *Ornithological biography*, in his account of Hemlock Warbler *S. parus*, Audubon (1834: 205) wrote:

> 'It is to the persevering industry of Wilson that we are indebted for the discovery of this bird. He has briefly described the male, of which he had obtained but a single specimen. Never having met with it until I visited the Great Pine Forest, where that ardent ornithologist found it, I followed his track in my rambles there, and had not spent a week among the gigantic hemlocks which ornament that interesting part of our country, before I procured upwards of twenty specimens.'

Rockport is located in Carbon County, PA, on the Lehigh River *c*.11 km (7 miles) north, and a couple of degrees west, of the town of Jim Thorpe, which was called 'Mauch Chunk' until 1954. As the name 'Rockport' implies, it is at the base of a steep and rocky gorge, carved by the Lehigh River, and there are no standing wetlands that could plausibly be considered a 'swamp' by today's definition, nor by most definitions of the early 19th century. Audubon (1831: 56) acknowledged this in an essay ('episode') called 'The Great Pine Swamp', which appeared in the first volume of *Ornithological biography*: 'I spent six weeks in the Great Pine Forest—Swamp it cannot be called—where I made many a drawing.' This memorable remark implied that Wilson's (1812a: 100) description of the 'Great Pine Swamp' was exaggerated and unreliable ('a thousand holes, springs and swamps, into which [one] is incessantly plunged').

The word 'swamp' (first used in 1624) was sometimes used by Americans until the mid-18th century to describe places with dense vegetation, irrespective of their wetness (Wallace 1965: 3). However, by 1811, when Wilson visited and wrote about the 'Great Pine Swamp', the 'wet' definition was already mainstream. Webster (1806) had defined the word as 'a marsh, bog, fen, soft watery ground', and, in his expanded dictionary, as 'Spungy land; low ground filled with water; soft wet ground … in the interior country … This is the true meaning of the word' (Webster 1828). The modern dictionary gives a similar definition: 'a wetland often partially or intermittently covered with water, especially … one dominated by woody vegetation' (Merriam-Webster 2023).

In his writings, Wilson used the word 'swamp' exclusively to refer to wet habitats with dense vegetation, including in the English name of the 'Swamp Sparrow' *Melospiza georgiana* (Latham, 1790), which he said inhabits the 'swamps, and reedy borders of our creeks and rivers' (Wilson 1811: 50). He referred to the tidal marshes near Philadelphia as a 'swamp' because they were 'thickly covered with trees, and inundated during [a] great part of the year' (Wilson 1812b: 74); and he clearly distinguished between 'swamp' and 'forest' habitats, when he wrote: 'Instead of rambling through the leafy labyrinths of umbrageous groves, fragrance-breathing orchards, fields and forests, we must now descend into the

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watery morass, and mosquito-swamp' (Wilson 1813: v). Despite this, few scholars have questioned Audubon's (1831) assertion that Rockport, which lacks any standing wetlands, was the site of the 'Great Pine Swamp' of Wilson. Rhodes (2004: 332), one of the few modern authors to discuss Audubon's trip to Rockport, took him at his word and concluded that 'Alexander Wilson had been in the [Great Pine] forest before him; [and that] Audubon followed his predecessor's track.'

In 1829, during Audubon's visit to Rockport, the ancient forests in that region were being felled by the expanding coal and timber industries. His host, 'Mr. Jediah Irish … [had been] chosen by the agent of the Lehigh Coal Company, as their mill-wright, and manager for cutting down the fine trees which covered the mountains around' (Audubon 1831: 54). Another local sawmill, located *c*.6.4 km (4 miles) south-west and upslope of Rockport, was established by Benjamin Romig in 1825, at a settlement called Black Creek (until 1848), now known as Weatherly (Brenckman 1913: 340). As the Lehigh Coal Company envisioned, and as Audubon (1831) foreshadowed, the logging operations quickly expanded and had largely denuded the region by the 1840s, and this was followed by a boom of anthracite coal mining, which attracted my own family to the region.

My great-great-grandparents, Thomas Wilkinson (1863–1936) and Maria (Bell) Wilkinson (1868–1959), immigrated to Weatherly in the 1880s and are buried there at Union Cemetery. My family's homestead ('Stoffa Cabin'), where I collected the neotype of Eastern Wood Pewee *Contopus virens* (Linnaeus, 1766) in August 2022, is near the modern town of Freeland, which was established as a mining village in the 1840s, about 12.5 km (7.8 miles) north-west of Weatherly (Halley 2023a). Thus, because of my family connections to this region, I was already familiar with the area between Weatherly and Rockport—the successional remnants of the 'Great Pine Forest'—before the spring of 2023, when I re-examined Audubon's claims and began my search for the 'Great Pine Swamp' of Wilson.

To my knowledge, before me, Franklin L. Burns (1868–1946) was the only scholar to surmise, based on a reading of Wilson's published volumes, that the 'Great Pine Swamp' was located somewhere in the '*headwaters* of the Lehigh [River] and Pocono region' (Burns 1908: 183, my italics), but he did not elaborate on the matter, and evidently did not attempt to retrace Wilson's journey. Burns' unpublished diaries, which were loaned to me by the Tredyffrin-Easttown Historical Society (T-EHS), Berwyn, PA, contain no mention of the 'Great Pine Swamp'.

Wilson's expedition to the 'Great Pine Swamp'

The history of Wilson's expedition in May 1811 remains virtually unknown. His principal biographers made no mention of it, even though it yielded four new species for Wilson's work (e.g., Ord *in* Wilson 1814, 1825, Cantwell 1961, Hunter 1983, Burtt & Davis 2013). This is probably because no primary sources from Wilson's trip to the 'Great Pine Swamp' are known (Hunter 1983: 384–387), except possibly for some of his original drawings (reproduced in Burtt & Davis 2013: 153–156), but these may have been drawn from specimens after he returned to Philadelphia. The only available information about Wilson's route and itinerary (and presumably the only information available to Audubon in 1829, excluding hearsay) comes from a few seemingly disparate comments in his published accounts. Arranged chronologically (i.e., not in the order they were published), the following comments provide the clues needed to retrace Wilson's path.

Prior to his arrival at the 'Great Pine Swamp', Wilson observed a pair of Barn Swallows *Hirundo rustica* Linnaeus, 1758, 'On the sixteenth of May, being on a shooting expedition on the top of Pocano mountain, Northampton [county]' (Wilson 1812a: 39), which he later stated was 'between Easton and Wilkesbarre' (Wilson 1813: 53). Then, 'About the twentieth

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Figure 1. Cropped view of a map published by 'J. Reid New York' in 1796, showing the Lehigh River valley, the Blue Mountain Ridge ('Blue Mountains') and major roadways in the region. Encircled letters denote the 'Great Pine Swamp' collecting localities of Wilson (W) and Audubon (A). The road from Easton to 'Wilksbarre' (both towns highlighted with red rectangles), which Wilson travelled in May 1811, crosses the Blue Mountain Ridge at Wind Gap, before turning north-west. That taken by Audubon in 1829 follows the path of the Lehigh River, north-west from Bethlehem, toward the modern town of Jim Thorpe ('Mauch Chunk' to Audubon), which is on the west bank (near the first 'O' in 'NORTHAMPT[ON]') (www.biodiversitylibrary.org, accessed 13 March 2023)

of May, [Wilson] met with numbers of [Tawny Thrushes] in the Great Pine swamp, near Pocano' (Wilson 1812a: 98). Finally, 'On the twentieth of May in returning from an excursion to the Great Pine swamp, [he] spent part of the day in Easton' (Wilson 1812a: 53). Therefore, we may deduce that Wilson's 'Great Pine Swamp' was on the north side of the Pocono Mountain Ridge (i.e., 'beyond Pocano mountain', Wilson 1812a: 44), along the road from Easton to Wilkes-Barre, and within a day's journey on horseback from Easton (Wilson 1812a: 53). These topographic landmarks and the primary roads in this region were marked on many different contemporary maps, published in Philadelphia and New York, which Wilson and Audubon may have consulted. For example, the road between Easton and Wilkes-Barre, which Wilson travelled by horseback in May 1811, and the road between Bethlehem and Mauch Chunk, which Audubon travelled by coach in 1829, both appear on the 1796 'Reid map' (Fig. 1); and the location of the Pocono Mountain Ridge is prominently marked on the 1814 'Carey map' (Fig. 2).

Wilson first needed to cross the Blue Mountain Ridge on his way north from Easton to the 'Great Pine Swamp' (Fig. 2). If he took the path of least resistance, he probably crossed near the modern town of Wind Gap, marked on the Reid map (Fig. 1), where General John Sullivan (1740–95) had, in 1779, enlarged an indigenous trail that penetrated a low-elevation pass (Wallace 1965: 157). This is probably where Wilson collected the (non-extant) holotype of the enigmatic Blue-mountain Warbler *S. montana*, of which he wrote: 'This new species was first discovered near that celebrated ridge, or range of mountains, with whose name I have honored it' (Wilson 1812a: 113). Baird *et al.* (1858: xxxii, 278) and later Coues (1872: 105)

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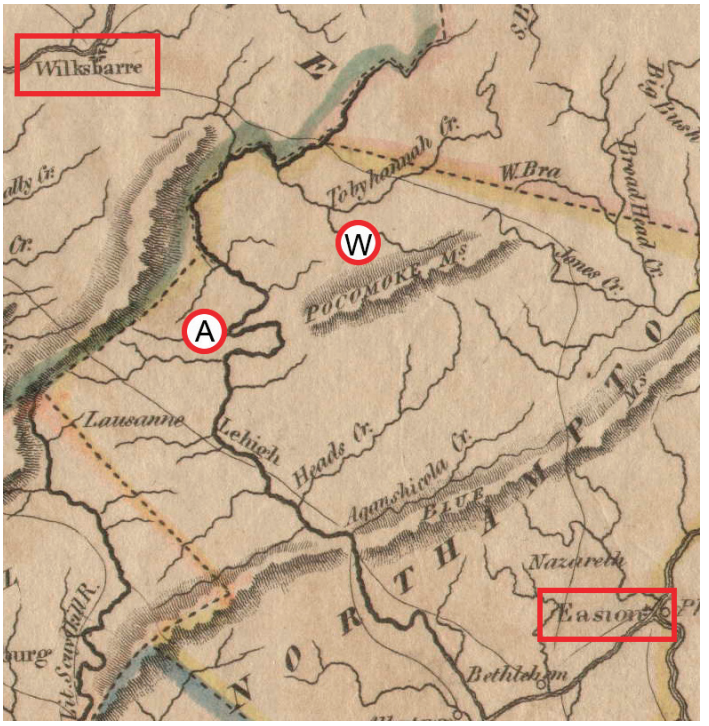

Figure 2. Cropped view of a map published in Mathew Carey's *General atlas* (1814, Philadelphia), which shows the location of the Pocono Mountain Ridge ('Pocomoke Ms') along Wilson's expedition route, between Easton and 'Wilksbarre' (= Wilkes-Barre, PA), which are highlighted with red rectangles. The probable locations of the field sites of Wilson (W) and Audubon (A), on opposite sides of the Lehigh River (thick black line), are denoted by encircled letters (www.biodiversitylibrary.org, accessed 13 March 2023)

erred when they stated that Wilson collected the type of *S. montana* in the 'Blue Mountains of Virginia'.

On the north side of the Blue Mountain Ridge, 'Sullivan's Rd.' (as it was known in Wilson's time) came to a fork near the modern town of Saylorsburg, PA. Wilson evidently took the left side of the fork and headed north-west, following the 'Wechquetank path', another Native American trail that had been widened into a road by that time (Fig. 3; Wallace 1965: 157). That road followed the path of modern Route 115, north-west towards the modern (since 1884) community of Blakeslee, PA. After *c.*17 km (10.5 miles), the road ascends the Pocono Mountain Ridge at a place now known as Poplar Gap (41.000440°N, 75.461892°W). This could be the location of the 'miserable cabin' where Wilson spent the night of 15 May 1811, 'on the top of Pocano mountain' (Wilson 1812a: 39). Inclement weather had arrived, according to Peirce (1846: 93): '[There was a] spell of warm, pleasant weather [in Philadelphia] until the 14th, when the wind changed to south-east, and brought three or four overcast and partly rainy days.'

The following morning (16 May), Wilson continued north (now more slowly) into the 'desolate recesses' of the 'Great Pine Swamp'. Today, we recognise this swampy tract as the watershed of the Tunkhannock Creek, in the headwaters of the Lehigh River, which includes sites now known as Long Pond and Fern Ridge Bog Preserve. Wilson spent the next four days exploring the area, during which time he collected: (1) the holotype of Hemlock Warbler *S. parus*, which he 'met with in the Great Pine swamp … [where it was] almost always [foraging] among the branches of hemlock trees' (Wilson 1812a: 114); (2) three syntypes of Pine-swamp Warbler *S. pusilla*, two females and a male (Wilson 1812a: 100); and (3) an unknown number of syntypes of Tawny Thrush *T. mustelinus*, which he 'met with in the Great Pine Swamp, near Pocano' (Wilson 1812a: 98). Finally, on 20 May 1811, having already secured specimens of four supposedly new species on his excursion,

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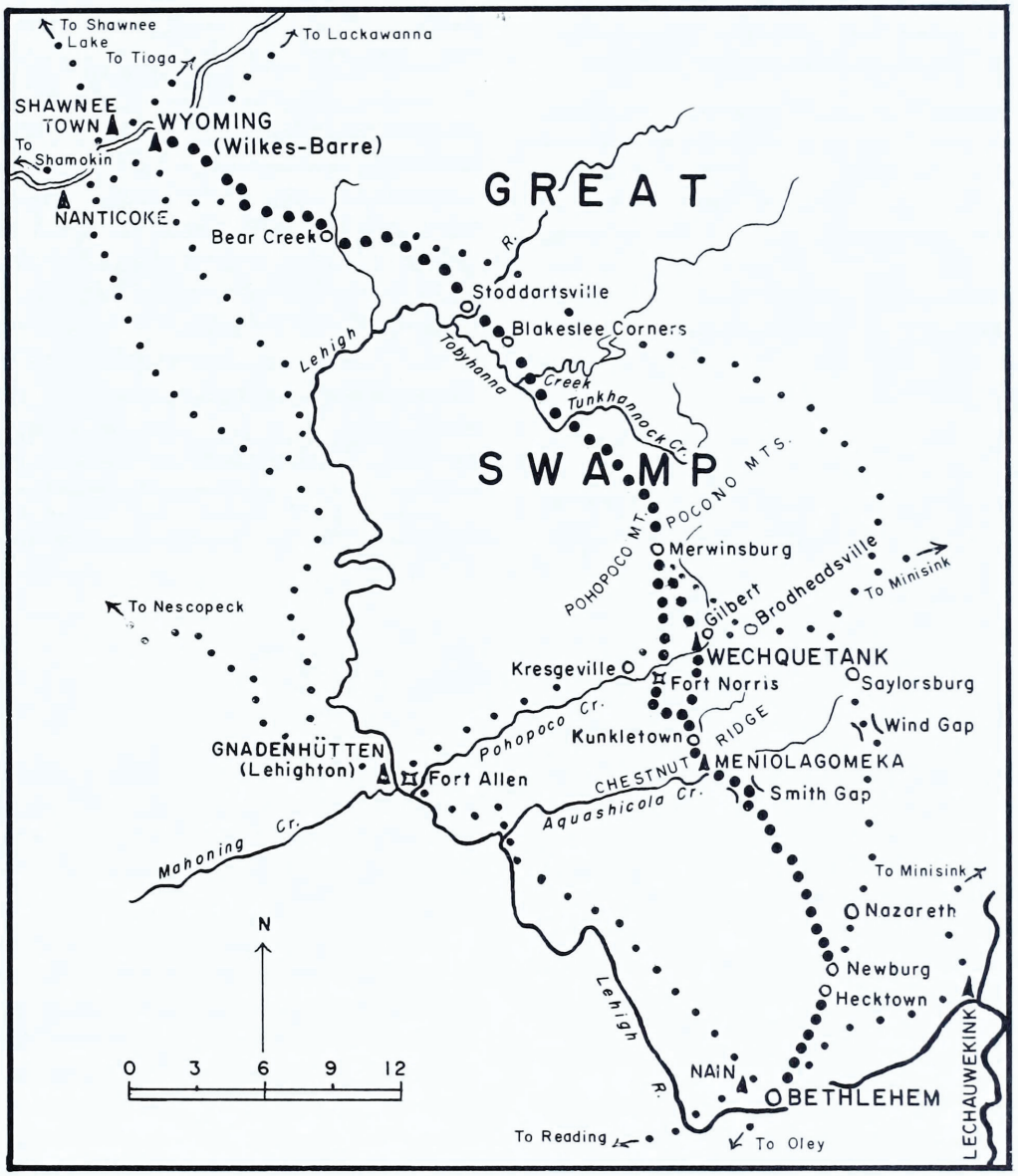

Figure 3. Map of the 'Wechquetank Path' (large dots), reproduced from Wallace (1965: 187), showing the 'Great Swamp' in the Tunkhannock Creek watershed, south-east of Wyoming (Wilkes-Barre), PA. In this map, the 'Great Swamp' encompasses the headwaters of the Lehigh River, including the southern edge of Tunkhannock Creek, just north of the Pocono Mountain Ridge ('Pocono Mts'), where Wilson probably entered the 'Great Pine Swamp'.

Wilson returned to the road and travelled south, retracing his original path to Easton, then to Philadelphia (Wilson 1812a: 53).

Return to the 'Great Pine Swamp'

On 20 June 2023, I drove east from Drums (Stoffa Cabin) to Weatherly, then to Rockport, where I spent about an hour visiting the remnants of the 'Great Pine Forest' along Rockport Road, and along the riverbank at Lehigh Gorge State Park (LGSP) Rockport

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Figure 4. Freshwater wetlands in the Tunkhannock Creek watershed in the vicinity of Wilson's 'Great Pine Swamp', Monroe County, PA, 20 June 2023 (Matthew R. Halley)

Access. As mentioned, these forests are supported by rocky, well-drained soil—a 'Swamp it cannot be called' (Audubon 1831: 56). Audubon's visit to this small community in Carbon County remains a source of pride for its modern residents (e.g., Rabenold-Finsel 2004). An interpretive sign on the main river trail at LGSP Rockport Access, near the site of the historic wharves and lumber mill described by Audubon (1831), states that 'Audubon Spoke for the Trees' and features a reproduction of Pl. 103 from *The birds of America*, depicting two Canada Warblers *Cardellina canadensis* (Linnaeus, 1766). The caption reads: 'While visiting the "Great Pine Swamp," Audubon painted these two small birds on rhododendron blossoms.'

After leaving Rockport, I drove south to Muhlenberg College, Allentown, PA, where I attended the 104th Annual Meeting of the Wilson Ornithological Society (20–23 June). Then, on 23 June, I drove toward Easton and (following Wilson's likely path) crossed the Blue Mountain Ridge at Wind Gap, turned north-west at Saylorsburg, and followed Route 115 north-west to Poplar Gap. After crossing to the north side of the Pocono Mountain Ridge, near the presumed location of the 'miserable cabin' where Wilson stayed on 15 May 1811, there began a marked transition in the landscape from (dry) upland forest to the swampy forested wetlands of the Tunkhannock Creek watershed (Fig. 4). This area, the headwaters of the Lehigh River, is characterised by swampy wetlands and glacial bogs; the habitat is quite different than the dry forests surrounding Rockport. These differences have a geologic basis, owing to their unique glacial histories. Tunkhannock Creek is located in the 'glaciated Pocono Plateau' section of the 'Appalachian Plateaus' physio-geographic province, but Rockport is about 26 km (16 miles) to the west, on the opposite side of the Lehigh River, in the 'Anthracite Upland' section of the 'Ridge and Valley' province (Sevon 2000).

I parked my vehicle on Hypsie Gap Road, on the south side of Tunkhannock Creek near the intersection with Fire Lane (restricted access), and hiked a few hundred metres into the forest on the eastern edge of State Game Lands 38. There, among the hemlocks on the south side of the Tunkhannock Creek, for an unrelated study, I collected an adult male Black-throated Green Warbler *Setophaga virens* (J. F. Gmelin, 1789) and an adult male Blue-headed Vireo *Vireo solitarius* (Wilson, 1810), with appropriate government permits (see Acknowledgements). I later took the specimens to the Delaware Museum of Nature & Science, Wilmington (DMNH, formerly Delaware Museum of Natural History) and prepared them as data-rich study skins with spread wings and frozen tissues (DMNH 85643 and 85646, respectively). These are, to my knowledge, the first bird specimens collected in the vicinity of the 'Great Pine Swamp' (*sensu stricto*) since Wilson's expedition in 1811 (www.VertNet.org, www.iDigBio.org, accessed 27 July 2023).

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Sources of Audubon's 'error'

I have shown, by reconstructing Wilson's expedition route with information readily available to Audubon in 1829, that his claim to have 'followed [Wilson's] track' was not true. This is because Rockport was not the location of the 'Great Pine Swamp' of Wilson. How did Audubon get it so wrong? The third edition of *American ornithology* was then in print, published in 1828 by Harrison Hall in Philadelphia (see Faxon 1901), and Audubon could have consulted the work in one of the many bookstores and libraries there, prior to leaving for Mauch Chunk (see below for timeline discussion). Copies of the earlier editions, which did not differ with respect to the relevant passages, were also likely available.

Nevertheless, a comment in his 'Great Pine Swamp' episode suggests that, instead of consulting Wilson's works, Audubon probably relied on directions provided to him by an unreliable third party: 'Left to my thoughts, I felt amazed that such a place as the Great Pine Forest should be so little known to the Philadelphians, scarcely any of whom could direct me towards it' (Audubon 1831: 57). There is also evidence that Audubon's trip to the 'Great Pine Swamp' (Rockport) was more impulsive than planned. In a letter written at Philadelphia and dated 5 July 1829, less than a month beforehand, Audubon was unable to inform his son Victor where he intended to travel next, and he made no mention of the 'Great Pine Swamp' or Mauch Chunk or Rockport: 'direct [future letters] to the care of Messrs Thos. E. Walker, & Co., merchants here [in Philadelphia], who know all my movements, and will see anything forwarded to wherever I may choose to go to' (Herrick 1917: 424).

Hazard (1830: 67) mentioned that forested tracts in the Lehigh River gorge (opposite Rockport) were known colloquially by the name 'Pine Swamp' in the early 19th century ('smaller streams, not extending more than six or eight miles … fall into the Lehigh on the east side, passing through what is called the Pine Swamp'). Therefore, it seems plausible that someone in Philadelphia, upon being asked the location of the 'Great Pine Swamp', may have directed Audubon to Mauch Chunk. However, can we reasonably assume that Audubon was unaware that many places in eastern Pennsylvania were (or had been) known by similar names? For example, on the 1756 'Kitchin map', one of the first maps to show the town of Easton (established 1752), the words 'Great Swamp' appeared not over the Lehigh River, which drains into the Delaware River, then into Delaware Bay, but over the Lackawanna River, which drains into the Susquehanna River, into Chesapeake Bay (Fig. 5). In any case, it appears that the primary cause of Audubon's 'error' was that he did not consult Wilson's accounts before he ostensibly 'followed [Wilson's] track'.

Timeline discrepancies

Audubon (1831: 56) stated that he 'spent six weeks in the Great Pine Forest', but some authors have concluded that his trip was much longer. The uncertainty stems from a conflict between primary sources. Severely edited transcripts of entries from Audubon's (now lost or destroyed) diary, published independently by Buchanan (1868) and Maria Audubon (1897), suggest Audubon visited Rockport in the autumn: 'September 1. Having accomplished my purpose in visiting the sea-shore of New Jersey, I returned to Philadelphia, and made preparations to go to the Great Pine Swamp, in Northumberland County, Pennsylvania' (Buchanan 1868: 162); '[October 11]. I returned yesterday from Mauch Chunk' (Audubon 1897: 61). Maria Audubon was so confident of this timeline that she wrote that her grandfather spent 'Six weeks in September and October … in the Great Pine Swamp, or Forest, as he called it' (Audubon 1897: 61).

However, these 'primary' sources conflict with dated inscriptions on five of Audubon's mixed-media 'paintings', in his own handwriting, which give the locality 'Great Pine

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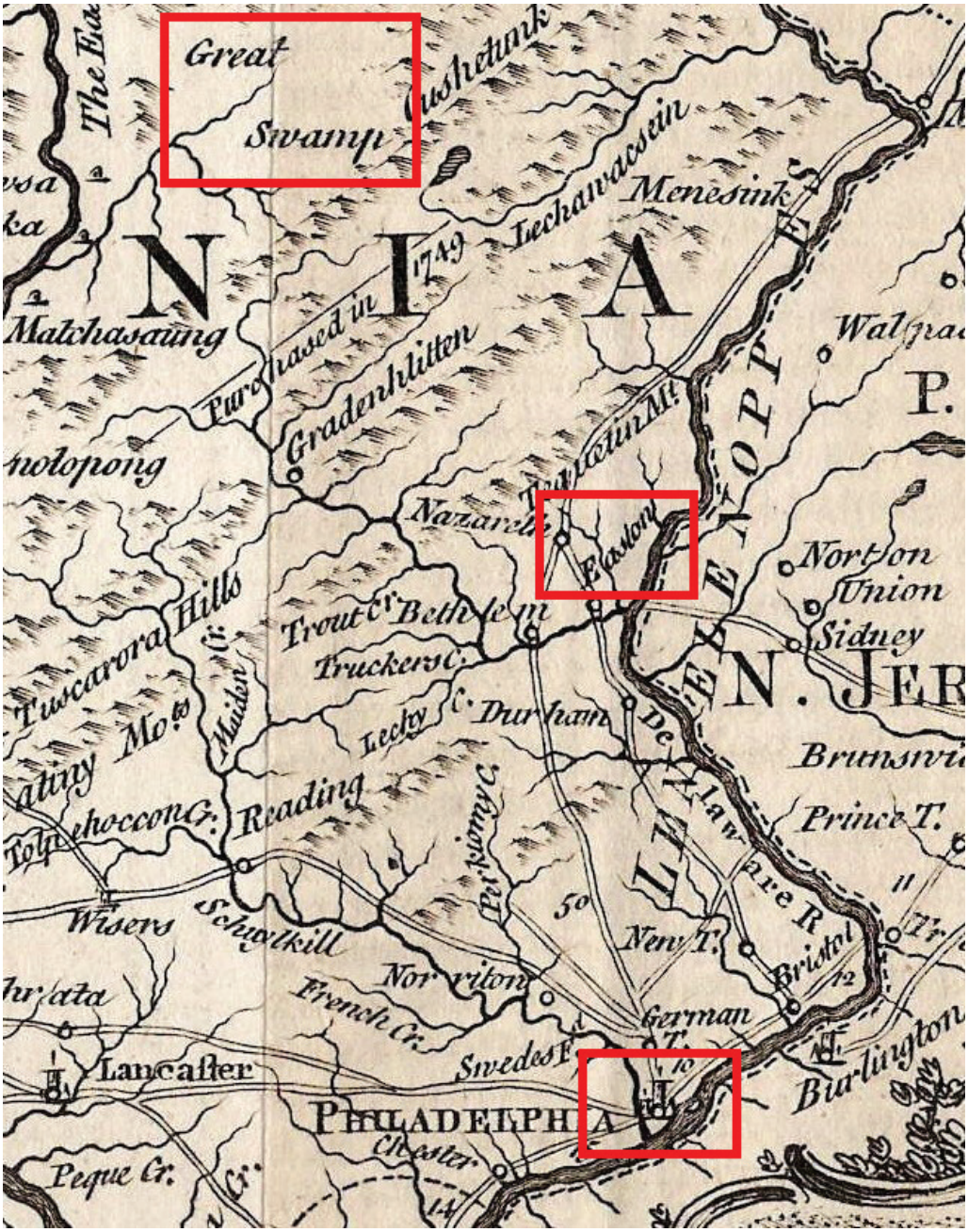

Figure 5. Cropped view of a map published by 'T. Kitchin Gr., printed for R. Baldwin in Pater Noster Row' (1756, London), which shows the Lehigh River valley region prior to colonial development ('Purchased in 1749'). Red rectangles denote Philadelphia (bottom right), Easton (centre) and the 'Great Swamp' (top left). Notably, the 'Great Swamp' label is placed over the Lackawanna River valley, which is part of the Susquehanna River watershed (www.biodiversitylibrary.org, accessed 13 March 2023)

Swamp' and dates ranging between 1 and 20 August [1829]—not September and October. There are also extant letters to his wife and son, which corroborate the August timeline (Fig. 6). In a letter dated 25 August 1829, Audubon wrote: 'Great Pine Swamp Northampton

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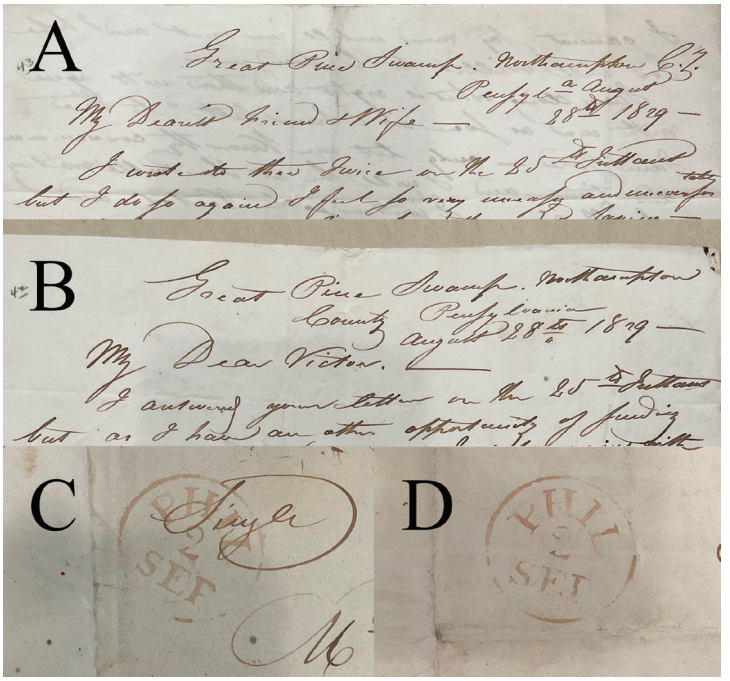

Figure 6. Headings of two letters written by Audubon on 28 August 1829 in the 'Great Pine Swamp', addressed to his wife (A) and son Victor (B), and the postal stamps ('PHIL' = Philadelphia) dated '2 Sept' on their address-bearing faces (C and D, respectively); courtesy of American Philosophical Society Library (Mss.B.Au25) (Matthew R. Halley)

C'y / Pen'a … I have been in this desolate place since the [first] of this month—have made 10 drawings and have now altogether 30 since my arrival' (Corning 1969, 1: 93). Audubon also told William Swainson (1789–1855), in a letter dated 14 September 1829, that he had returned to Camden, New Jersey (i.e., immediately opposite Philadelphia on the Delaware River), on 12 September (Logan 2016: 529).

Herrick (1917: 426) assumed that all these sources were legitimate and concluded that, 'About ten weeks were spent in the woods, from late July until the 10th of October, when the naturalist returned to Philadelphia and settled again for a time in Camden … Though Audubon said that he spent only six weeks in the forest, the indications upon his drawings imply a longer period.' Likewise, Arthur (1937: 385) accepted the dates in Buchanan (1868) and Audubon (1897) and concluded that 'October was almost half done when Audubon returned to Philadelphia.' Fries (2006: 38), citing Lucy Audubon's (1869) edition of *Life and adventures of John James Audubon* (an edited copy of Buchanan 1868), contended that Audubon's 'visit to the Great Pine Swamp lasted until 1 October', although that date does not appear in the cited work.

How do we reconcile these contradictions? It is true that some of the inscriptions on Audubon's paintings were not written contemporaneously. For example, one of his paintings of Ruffed Grouse *Bonasa umbellus* Linnaeus, 1766, was inscribed with the year '1805', but executed on paper watermarked '1810'. Some scholars have concluded that Audubon intentionally backdated the painting, to claim seniority over Wilson, while others remain incredulous (Pick 2004, Olson & Mazzitelli 2017). However, in this case, there is no evidence of backdating and the dates of the August letters from the 'Great Pine Swamp' are independently corroborated by postage stamps applied in Philadelphia on 2 September (Fig. 6). Therefore, the diary entries published independently by Buchanan (1868: 162) and Maria Audubon (1897: 61) were likely incorrect, but the source of those 'errors' cannot be established without the original diary, which was probably destroyed (Arthur 1937, Halley 2022a).

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Species accounts

For the rest of the paper, I review the published accounts of wood warbler (Parulidae) species that Wilson and Audubon reportedly collected and/or observed at the 'Great Pine Swamp', and use specimens to resolve questionable identifications. I also scrutinise and compare Wilson's and Audubon's behavioural accounts of each species, because Audubon (1831: xviii) professed that '[he] should have less pleasure in presenting to the scientific world a new bird [species], the knowledge of whose habits [he did] not possess, than in describing the peculiarities of one long since discovered.'

BLUE-MOUNTAIN WARBLER *Sylvia montana* Wilson, 1812

Wilson illustrated and described a male that he collected on the Blue Mountain Ridge, probably near Wind Gap (see above). His original illustration (reproduced by Burtt & Davis 2013: 156) was engraved by J. G. Warnicke (*c*.1780–1819) and appeared next to the Hemlock Warbler on Pl. 44 of *American ornithology* (Fig. 7; Wilson 1812a). The specimens are not known to exist. Audubon (1839: 295) stated that he never saw the species in life, and that his own illustration, which was engraved by Robert Havell, Jr. (1793–1878), for Pl. 434 of *The birds of America* (1838), was based on 'a specimen lent to [him] by the Council of the Zoological Society of London that had come from California.' Many possible identifications have been proposed.

Bonaparte (1824: 199, 1828: 82) stated that *S. montana* was a synonym of *Setophaga tigrina* (J. F. Gmelin, 1789), now known as Cape May Warbler, and that synonymy was adopted in Robert Jameson's (1774–1854) edited reissue of *American ornithology* (Wilson & Bonaparte 1831: 147). However, Nuttall (1832: 393) contended that *S. montana* was 'allied to the Pine

Figure 7. Cropped view of Pl. 44 from *American ornithology*, vol. 5 (Wilson 1812a), showing the 'Hemlock Warbler' (left) and 'Blue-mountain Warbler' (right), taken from the second edition, which was produced with the original plates and published in 1824; courtesy of Delaware Museum of Nature & Science (Matthew R. Halley)

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Figure 8. DMNH 32758, study skin of a female Black-throated Green Warbler *Setophaga virens* in first-basic plumage, the most likely identity of Blue-mountain Warbler *Sylvia montana* Wilson, 1812a, collected by Allan R. Phillips in Ithaca, New York, on 5 October 1941; courtesy of Delaware Museum of Nature & Science (Matthew R. Halley)

Warbler' *Setophaga pinus* (Linnaeus, 1766). Brewer (1840: 696) treated *S. montana* as a distinct species, as Wilson and Audubon had done. Baird *et al*. (1858: 278) concurred with Nuttall (1832), stating that 'The relationships [of *S. montana*] to the pine creeping warbler are very close, and it is not unlikely that some states of the autumnal plumage in this, or even in the black poll warbler [*Setophaga striata* (J. R. Forster, 1772)], may furnish a clue to this species.' Turnbull (1869: 18) claimed, without elaboration, that *S. montana* was based on an immature specimen of Cerulean Warbler *Setophaga cerulea* (Wilson, 1810). More recently, Parkes (1985: 91) stated that the 'wing bars, white-spotted tail feathers and streaked sides [of *S. montana*] all suggest a wood warbler of the large genus *Dendroica* [G. R. Gray, 1842], but no species belonging to that genus combines these characters with the sharply delineated yellow forehead and unstreaked back' seen in Wilson's plate.

Coues (1872: 105) and later Ridgway (1902: 784) proposed that Wilson's specimen was an immature Black-throated Green Warbler *S. virens*, and Audubon's (loaned) specimen was probably an immature Townsend's Warbler *S. townsendi* (Townsend, 1837). In my opinion, this explanation, which was overlooked by Parkes (1985) and other modern authors, remains the most plausible. Coues (1872: 105) wrote:

> 'I think myself that it is simply the young of [*S.*] *virens*! of which, it seems, Wilson never recognized an autumnal example. A September specimen of *virens*, before me as I write, agrees almost precisely with Wilson's description—rich yellow olive; front, cheeks, chin and sides of neck yellow; * * two exterior tail feathers white on the inner vanes from the middle to the tip, and edged on the outer side with white, etc. Now [*S.*] *virens* is the only Eastern species, showing this latter feature, that agrees with the other assigned characters at all. It is curious additional evidence that I am right in this surmise, that the original of Audubon's figure, in the British Museum, came from "California;" for I suppose that this specimen was the young of *occidentalis* [i.e., Hermit Warbler *Setophaga occidentalis* (Townsend, 1837)] or *townsendii* [*sic*], some of the plumages of which, as well as can be made out, are with difficulty distinguishable from immature *virens*.'

Hatch-year females of *S. virens* in the DMNH collection, in first-basic plumage, are a close match for Wilson's *S. montana*, including the 'sharply delineated yellow forehead [viewed from the side] and unstreaked back' (Fig. 8, *contra* Parkes 1985: 91). They also

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have a slightly rounded tail (i.e., outer rectrices shorter than inner rectrices), which was mentioned by Wilson (1812a: 113, 'handsomely rounded') and considered by Nuttall (1832: 393), who never saw a specimen of *S. montana*, to be 'a striking external trait of distinction.' If this hypothesis is correct, then Wilson's male (collected in mid-May) merely had a later than average first-cycle pre-alternate moult (Morse & Poole 2020, Pyle 2022). Thus, despite its frequent inclusion among the 'mystery birds' of Wilson and Audubon (e.g., Parkes 1985, Holt 2004), it seems that the identity of the Blue-mountain Warbler was satisfactorily resolved more than a century ago.

BLACK AND YELLOW WARBLER *Sylvia magnolia* Wilson, 1811

An inscription on Audubon's original painting of the 'Black & Yellow warbler' at the New-York Historical Society (N-YHS), now known as Magnolia Warbler *Setophaga magnolia* (Wilson, 1811), states that both subjects were 'males' collected at the 'Great Pine Swamp' on 'Aug^{t} 12th / J.J.A.' (N-YHS 1863.17.123). The sex of the birds is evidenced by broad rectangular white patches on the second rectrix (i.e., the first non-white rectrix from the centre), and the pure black dorsal surface of the upper bird in Audubon's illustration, which are consistent with the breeding plumage (March–August) of adult males in the definitive cycle (Pyle 2022: 617–618). However, the inscription on Pl. 123 of *The birds of America* claims the image shows both sexes (Fig. 9). Audubon (1834: 146–147) repeated this claim three years later, in his text account ('The Female is similar to the male, but somewhat paler underneath'), apparently with full knowledge that his painting had actually depicted two 'males' (N-YHS 1863.17.123). There may have been a selfish motive for this, because Wilson (1811: 63) had written: 'The markings of the female are not known.'

Unbeknown to both Wilson and Audubon, there was already a specimen of the female *S. magnolia* in the collection of Charles Willson Peale (1741–1827), mounted in the Philadelphia Museum, of which he was the proprietor. Peale had described the female (and the male) under the name 'Black and Yellow Warbler' in his unpublished 36th lecture, first delivered publicly in 1799: '…the top of the head is rather browner than in the male; the back a greater

Figure 9. Cropped view of Pl. 123 of *The birds of America* (*c.*1831, see Stone 1906: 301), which features the 'Black & Yellow Warbler. *Sylvia maculosa*. Lath. Male, 1. Female, 2.' Now known as Magnolia Warbler *Setophaga magnolia*, these birds were drawn by Audubon at the 'Great Pine Swamp' and labelled as 'males' on his original painting (N-YHS 1863.17.123); reproduced courtesy of the John James Audubon Center at Mill Grove in Audubon, PA, and the Montgomery County Audubon Collection.

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tinge of green & spotted with black; less black on the breast; in general the colours [are] less vivid. These were found in the vicinity of Philadelphia. They are a scarce bird.' (Halley in press). In his lectures, Peale refrained from supplying new Linnaean names for undescribed species. In the original description of *S. magnolia*, Wilson (1811: 63) cited 'Peale's Museum No. 7783', presumably referring to Peale's adult male, and used Peale's English name for the species, 'Black and Yellow Warbler', which Sophonisba Peale (1786–1859) had likely painted on the wooden frame attached to the glass display case, in 1803, before Wilson's first visit to the museum (Halley 2022b: 235).

AUTUMNAL WARBLER *Sylvia autumnalis* Wilson, 1811

Wilson (1811, Pl. 23) based his description of this 'plain little species' on specimens he collected in Philadelphia, during autumn migration, and his description and plate are insufficient to distinguish between the immature (i.e., first-basic plumage) Bay-breasted Warbler *Setophaga castanea* (Wilson, 1810) and Blackpoll Warbler *S. striata*. Wilson probably had specimens of both and classified them as one species (Trippe 1868). The relevance to the present study is that Audubon (1831) claimed to have observed a nesting pair of *S. autumnalis* in the 'Great Pine Swamp' in August 1829—an utterly impossible claim, if we concede (as Audubon eventually did, see below) that *S. autumnalis* was based on hatch-year (immature) individuals.

Nine years before his visit to Rockport, according to an extant diary, Audubon wrote on 12 October 1820: 'Shot an Autumnal Warbler as Mr. A. Wilson is pleased to designate the young of the Yellow rumped Warbler; this was a young male in beautiful plumage for the season, and I drew it, as I feel perfectly convinced that Mr. Wilson has made an error in presenting the bird as a new species' (Deane 1910). However, 11 years later, Audubon (1831: 447) not only agreed with Wilson, that *S. autumnalis* was a distinct and sexually monochromatic species ('The female resembles the male in external appearance.'), he further claimed to have found them breeding in multiple locations:

> 'I have found it breeding in the immediate vicinity of the Cayuga Lakes, and on the borders of Lake Champlain, in retired parts of the woods … I have also found it in the lofty forests of that portion of Pennsylvania usually called the Great Pine Swamp. The nest, like that of many other Sylviae, is partially conical and pensile, and is formed of the soft bark of vines, lined with the down of various plants. The eggs are from four to six, of a white colour, tinged with red, and sprinkled with brownish dots at the larger end. The nest is usually placed in the fork of a bush. I have found the female sitting as late as the 20th of August, and therefore conclude that this species raises two broods in the season, although I have had no opportunity of finding the nest and eggs at an earlier period.'

This entire paragraph appears to have been fabricated, as evidenced by multiple highly improbable claims. First, both *S. castanea* and *S. striata* are sexually dichromatic during the breeding season, whereas Audubon (1831: 447) claimed to have observed sexually monochromatic pairs of hatch-year birds ('The female resembles the male') breeding in non-breeding plumage. Audubon even retroactively conceded that the birds in his plate were immature, which proves his anecdotes were invented: 'The bird described under the name of *Sylvia autumnalis* by Wilson, Bonaparte, Nuttall, myself, and all the compilers, is only the young of [Hemlock Warbler] *Sylvia parus*' (Audubon 1839: 457). Second, the nesting season (especially the incubation stage) is typically concluded, in both *S. castanea* and *S. striata*, by late August, when Audubon claimed to have observed the behaviours.

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Third, there is no suitable breeding habitat for either species near Rockport in modern times, nor apparently historically by Audubon's (1831: 56) own admission: 'Swamp it cannot be called'. To my knowledge, there is no confirmed breeding record of *S. castanea* in Pennsylvania (McWilliams & Brauning 2000: 371) and the only *S. striata* breeding records come from an extralimital population first described by Gross (1994) in an isolated boreal conifer swamp dominated by spruce (*Picea rubens*, *P. mariana*), *c*.60 km (37.4 miles) northwest of Rockport (Zawatski *et al*. 2019). Wilson (1812b: 101), who did not see nesting activity, nevertheless speculated that *S. striata* (i.e., based on his knowledge of the adult) 'doubtless breeds both here [in Pennsylvania] and in New Jersey, having myself found it in both places during the summer'. Wilson's 'summer' observations may simply refer to late migrants because *S. striata* is the last warbler species to pass through the Philadelphia region, and transient males are often heard singing in late May and early June, when the 'summer' nesting season of resident birds is well underway (e.g., Halley & Croasdale 2018, Halley 2023b).

K. Kaufman (*in litt.* 2023) alerted me to yet another incongruity in Audubon's account of the migration of *S. autumnalis*. Audubon (1831: 447) claimed that the species 'makes its appearance in great numbers, in the lower parts of Louisiana, early in March', but neither *S. castanea* nor *S. striata* arrives in Louisiana until April, nor do they migrate north in their autumn (non-breeding) plumage. Wilson (1811: 40) had committed a similar error, underestimating the arrival date of *S. striata* in Philadelphia by about three weeks, when he stated that it 'arrives in Pennsylvania about the twentieth of April'. As mentioned, *S. striata* is the last warbler species to arrive in Philadelphia during the spring migration, in modern and historical times: '[*S. striata* is] bringing up the rear of the migrations. Occurs at Philadelphia, May 10–June 1' (Stone 1894: 135). Wilson may have received his inaccurate information about *S. striata* from Peale, who stated in his unpublished lectures (*c*.1799) that 'They visit us early in the spring and most probably [go] further northward to breed' (Halley in press). However, there is no easy explanation, beyond invention, for Audubon's report of 'great numbers' in Louisiana in March.

HEMLOCK WARBLER *Sylvia parus* Wilson, 1812

Wilson (1812a) described a male that he collected 'in the Great Pine swamp … [where it was] almost always [foraging] among the branches of hemlock trees' (Fig. 7; Wilson 1812a: 114). The original drawing of *S. parus*, hand-coloured by Wilson, shares the page with Blue-mountain Warbler *S. montana* and the extinct Passenger Pigeon *Ectopistes migratorius* Linnaeus, 1766 (reproduced by Burtt & Davis 2013: 156). Relying solely on Wilson's account, Stephens (1817: 726) and Latham (1823: 216) included *S. parus* in their compilations, and Bonaparte (1824: 200), who likewise did not see a specimen, considered it to be 'closely allied to several [other *Sylvia* species], but apparently distinct from all.'

Thus, in 1829, when Audubon visited Rockport, the female of *S. parus* was unknown and the male was known only from Wilson's description and plate. A mostly erased graphite inscription at the lower left of Audubon's original painting reads 'Great Pine Swamp / Aug 12th — / J.J.A.', and an inscription in brown ink is in the lower centre: 'Hemlock Warbler. Male, 1. F, 2. / Sylvia parus. — / Great Pine Swamp Augt 12th / J.J.A.' (N-YHS 1863.17.134). Audubon's illustration, as engraved by Havell, appeared on Pl. 134 of *The birds of America* in 1832 (Fig. 10). In his text account, Audubon (1834: 206–207) stated that the birds in his illustration were an 'Adult Male' and 'Adult Female … The Female resembles the male, but is rather paler.' However, Baird *et al*. (1858: 274) identified the birds in Audubon's painting (and the single individual in Wilson's Pl. 44) as immature male Blackburnian Warblers *Setophaga fusca* (Müller, 1776), in first-basic (autumn) plumage:

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Figure 10. Cropped view of Pl. 134 of *The birds of America*, which features the 'Hemlock Warbler. / *Sylvia parus*. Wils. / Male, 1. Female, 2.' 'Engraved, coloured, and printed by R. Havell, London, 1832.' Reproduced courtesy of the John James Audubon Center at Mill Grove in Audubon, PA, and the Montgomery County Audubon Collection.

> 'An autumnal male is like the female, the single white band on the wing replaced by two [like in Wilson's and Audubon's drawings]; the black stripes on the sides much larger and more conspicuous; the upper parts glossed with yellowish; the throat orange yellow, passing insensibly into purer yellow behind … It is this plumage that I consider to be the *Sylvia parus* of Wilson and Audubon, their descriptions agreeing exactly with specimens before me of [late] summer [*S. fusca*].'

Specimens in DMNH confirm that *S. fusca* males in first-basic plumage possess the morphological characters of *S. parus* (Fig. 11). This means there is nothing especially 'mysterious' about the Hemlock Warbler (*contra* Burtt & Davis 2013: 157), except that Wilson's male (collected in mid-May) had a moult schedule later than average, as it evidently had not yet undergone its (partial) first-cycle pre-alternate moult, which typically occurs from March to early May (Morse 2020, Pyle 2022). Next, with this identification in mind (i.e., *S. fusca* male in first-basic plumage), we can critically re-examine Audubon's (1834) behavioural 'observations' of *S. parus*. As in his account of *S. autumnalis*, Audubon (1834: 206) again claimed to have observed a nest attended by two 'adults' in what we now know to be immature male plumage (Baird *et al*. 1858: 274). The timing of his observations (August) is also suspicious because, in Pennsylvania, the breeding season of *S. fusca* begins shortly after the arrival of the birds on their breeding grounds (mid-April to early May) and first clutches are typically initiated by late May or early June (Morse 2020). Females are single-brooded but may try one or more replacement clutches if early attempts are

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Figure 11. DMNH 49326, study skin of male Blackburnian Warbler *Setophaga fusca* in first-basic plumage, the most likely identity of Hemlock Warbler *Sylvia parus* Wilson, 1812a, collected by George M. Sutton in Brooke County, West Virginia, on 10 September 1937; courtesy of Delaware Museum of Nature & Science (Matthew R. Halley)

unsuccessful; in either case, breeding is typically concluded by late July, by which time adults have begun their definitive pre-basic moult (Morse 2020). These facts cast doubt on Audubon's 'observations'.

PINE-SWAMP WARBLER *Sylvia pusilla* Wilson, 1812

Wilson's (1812a) illustration of *S. pusilla*, engraved by Alexander Lawson (1772/73–1846) for Pl. 43 of *American ornithology* (Fig. 12), is a clear match for an adult female Black-throated Blue Warbler *Setophaga caerulescens* (J. F. Gmelin, 1789). Wilson (1810, Pl. 15) had already depicted and described the adult male in his second volume, under the name 'Black-throated Blue Warbler / *Sylvia canadensis*'. When preparing that account, Wilson apparently copied the catalogue number ('Peale's Museum No. 7222') and nomenclature (English and Latin species names) from the painted frame in the Philadelphia Museum (Halley 2022b: 235). In his 36th lecture (*c*.1799), Peale had described the 'Black-throated Blue Warbler' and

Figure 12. Cropped view of Pl. 43 from *American ornithology* vol. 5 (Wilson 1812a), showing the 'Pine-swamp Warbler', taken from the second edition, produced with the original plates and published in 1824; courtesy of Delaware Museum of Nature & Science (Matthew R. Halley)

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associated it with the name *Motacilla canadensis* Linnaeus, 1766 (Halley in press).[1] Wilson (1810: 115) admittedly '[knew] little of this bird' when he moved it to the genus *Sylvia* Scopoli, 1769 (i.e., his experience was limited to stopover sites), and he must have consulted Linnaeus's (1766) account directly because he correctly cited '*Motacilla canadensis* Linn. *Syst.* 336' among the synonyms, correcting Peale's error (see footnote).

Wilson (1812a: 100) did not cite a 'Peale number' or list any synonyms in his original description of *S. pusilla*, because he thought his specimens from the 'Great Pine Swamp' were novel (i.e., not in Peale's collection or described in any published works). However, as in *S. magnolia* (see above), there is evidence that Wilson overlooked a female specimen of *S. caerulescens* mounted in the Philadelphia Museum before his arrival. In his 36th lecture (*c*.1799), Peale wrote: 'Brown Warbler. This is a female. I do not know the male. I have given it for the present this name [i.e., chosen not to apply a Linnaean name], as all the upper parts are brown; a single white bar on the wings; the throat, breast and all the under parts are a sallow white. Found near Philad[elphi]a' (Halley in press). Modern ornithologists use the single white 'bar' or 'spot' on the wings as a field mark to distinguish *S. caerulescens*, especially females, from other sympatric species of Parulidae (Pyle 2022).

To my knowledge, there is no evidence that Wilson attended Peale's lectures, which mostly occurred during 1799–1803, before Wilson ramped up his ornithological studies (Hunter 1983); the two men did not meet until spring 1804 (Halley 2022b: 235). Therefore, it is notable that Wilson (1812a: 100) independently emphasised that 'immediately below the primary coverts [on the wing of *S. pusilla*] there is a single triangular spot of yellowish white', the same field mark Peale highlighted in his 'Brown Warbler' description more than a decade earlier (Halley in press). Wilson had previously noted that 'the primaries [of *S. canadensis* are] marked with a spot of white immediately below their coverts' (Wilson 1810: 115). However, like Peale before him, Wilson failed to realise that *S. canadensis* and *S. pusilla* were simply the male and female, respectively, of a single species—or so historians and ornithologists have assumed ever since Audubon (1839).

Wilson thought he had examined males and females of both *S. canadensis* and *S. pusilla*, so he had no reason to suspect that they were the same species. After describing an adult male *S. canadensis* in detail, Wilson (1810: 116) wrote that 'The female is more of a dusky ash on the breast; and in some specimens nearly white.' His type series of *S. pusilla* also included specimens of both sexes: 'I shot three, one male and two females. I have no doubt that they breed in these solitary swamps … The plumage of the female differs in nothing from the male' (Wilson 1812a: 100–101). By 1811, Wilson was an experienced collector and preparator, certainly capable of distinguishing the sexes via dissection in May, when testes and ovaries are becoming enlarged and unlikely to be confused. Indeed, before he travelled to the 'Great Pine Swamp', Wilson (1810: 51) had already demonstrated a sophisticated knowledge of this subject, which he had gained by dissecting 'many hundreds' of Bobolinks *Dolichonyx oryzivorus* (Linnaeus, 1758), which enabled him to correct an old error in Catesby (1731). Given his experience in this area, is it safe to assume that the female-like 'male' specimen of *S. caerulescens* that Wilson (1812a) collected in the 'Great Pine Swamp' was merely a sexing error?

[1] Linnaeus (1766) separately described two species under the name *Motacilla canadensis*, the first (Linnaeus 1766: 334) bearing a citation to Brisson's (1760: 524, Pl. 27, f. 1) 'Le Figuier cendré de Canada', which is a synonym of Yellow-rumped Warbler *Setophaga coronata* (Linnaeus, 1766), and the second (Linnaeus 1766: 336) to Brisson's (1760: 527, Pl. 27, f. 6) similarly named 'Le Petit Figuier cendré de Canada', which is a preoccupied (by the first *S. canadensis* description) senior synonym of *S. caerulescens* (J. F. Gmelin, 1789). In his lecture, Peale cited the first *M. canadensis* description, evidently in error because he also cited 'Pl. Enl. 685' (Daubenton 1765–81), which depicts an adult male Black-throated Blue Warbler (Halley in press).

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Figure 13. Four recent (2015–20) study skins of Black-throated Blue Warbler *Setophaga caerulescens* with 'female-like' plumage and original (dissection) data indicating the presence of testes, and one historical 'female-like' specimen with '♂' on label. (A) ANSP 194201, hatch-year male ('skull not oss., bursa 3×1 mm, testes 2×1 mm', recorded by Robert J. Driver) collected 9 September 2011 in Ocean County, NJ; (B) ANSP 208203, hatch-year male ('2 testes, 2 mm × 2 mm / skull not ossified … bursa 3×3 [mm]', recorded by Dana Stott Cohen) collected 2 October 2020 in Philadelphia, PA; (C) ANSP 207898, hatch-year possible male ('possible teste 1×1 mm, [left] only, yellow. Skull 10% oss., bursa 2×2 mm', recorded by Therese A. Catanach) collected November 2019 in Philadelphia, PA; (D) ANSP 203119, second-year male ('2 testes 1×1 mm, skull ossified … no bursa', recorded by Dana Stott Cohen) collected 5 May 2015 in Philadelphia, PA; (E) ANSP 37215, male ('♂') collected by 'Dr. [S. W.] Woodhouse' on 7 October 1840 in Pennsylvania. Woodhouse's original label identifies the specimen as 'Sylvicola sphagnosa / young of [S.] canadensis' (Matthew R. Halley)

Ever since Audubon (1839: 458), ornithologists have universally assumed that *S. caerulescens* is a strictly sexually dichromatic species, with the sexes being clearly distinguishable starting in first-basic plumage, and lacking the delayed plumage maturation in immature males that is widespread in Parulidae (e.g., Nuttall 1840, Baird *et al.* 1858, Coues 1872: 98, Lyon & Montgomerie 1986, Covino *et al.* 2020, Terrill *et al.* 2020, Pyle 2022). However, during my research for this paper, I found five specimens in the collection of the Academy of Natural Sciences of Drexel University, Philadelphia (ANSP), which have the olive-brown plumage typical of *S. caerulescens* females in first-basic plumage, but original data indicating that they are males (Fig. 13). I also found a sixth female-like 'male' study

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skin in the Carnegie Museum of Natural History, Pittsburgh (CM P16331). Two of the ANSP specimens are modern (data-rich) study skins with frozen tissues and measurements of the testes, recorded by experienced preparators (ANSP 194201, 203119). Both were salvaged window-strikes; one was (like Wilson's) collected during the spring migration, and the other during autumn migration. If the gonad data are correct, then these specimens must lead us to believe that some *S. caerulescens* males in first-basic plumage are indistinguishable from females. If so, Wilson may have been the first to discover this phenomenon, but he mistook it for taxonomic variation.

Since 2019, when this hypothesis came to mind, I have prepared 11 specimens of *S. caerulescens* in 'female-like' plumage including a group of six hatch-year migrants that collided with windows in Philadelphia on 2 October 2020 (ANSP 208100–208105), an after-hatch-year individual that I collected on its breeding ground in Tioga County, PA, on 20 July 2019 (ANSP 35988), a hatch-year individual that I collected during autumn migration at Little Creek Wildlife Area, Kent County, Delaware (DE), on 26 September 2022 (DMNH 85696), and three DE window-strikes salvaged on 12 October 2019 (DMNH 85781), 16 May 2020 (DMNH 85695) and 11 October 2022 (DMNH 85782). The birds were female in each case, as evidenced by the presence of an ovary. Nevertheless, a much larger sample will be needed before this hypothesis can be confidently rejected, if the 'female-like' phenotype occurs at low frequency in the population of hatch-year males (e.g., see Bleiweiss 2001, on detection of rare 'transexual phenotypes' in Trochilidae). The ANSP specimens could also be sexed molecularly to test this hypothesis. For now, I encourage preparators to carefully examine the gonads of all *S. caerulescens* in first-basic plumage that come to hand.

After Wilson (1812a), Stephens (1817: 722) and Latham (1823: 215) included *S. pusilla* in their compilations, relying solely on his account. Then, Bonaparte (1824: 199) found the name *pusilla* preoccupied in the genus *Sylvia* and published a replacement name, *Sylvia sphagnosa* Bonaparte, 1824, which was subsequently used by Audubon (1834: 279). Audubon was, until 1838 or 1839, admittedly ignorant of the fact that (setting aside the aforementioned hypothesis about female-like males) *S. sphagnosa* was merely based on the female of *S. caerulescens* (see Audubon 1839: 458), and this is critical context for interpreting his earlier account (Audubon 1834: 279):

> 'In the early part of May, I have found [*S. sphagnosa*] in New Jersey, as well as in Pennsylvania, particularly in the Great Pine Forest, where I drew a pair of them, and found their nest … The nest that I found in the Pine Forest was placed in one of the forks of a small bush, not more than five feet from the ground … The female was so gentle that I put my hand close over her before she moved; and when she did so, she flew only a few feet, returning to her eggs whenever I retired a few yards. The male expressed his sorrow by a low tweet, but made no attempt to molest me.'

The birds in Audubon's original painting of 'Pine Swamp Warbler / *Sylvia sphagnosa*, Bonap.' (N-YHS 1863.17.148), which he claimed were attending a nest with eggs, are both in the 'female-like' plumage of *S. caerulescens* (Fig. 14). Audubon's (1831: 260) description of an 'Adult Male' is a match for the typical 'female-like' plumage (e.g., 'rich olive-green [on the dorsal surface] … Cheeks and sides of the neck olivaceous … under parts ochre-yellow, tinged with brown below the wings'); and, like Wilson, Audubon (1834: '260' = 280) asserted that 'The female [*S. sphagnosa*] resembles the male, but is paler in its tints.' However, even if a small percentage of males have female-like phenotypes in first-basic plumage (see above), there is no evidence that second-year males in female-like plumage engage in breeding. No 'female-female' pairs have been documented in *S. caerulescens*, despite decades of

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Figure 14. Cropped view of Pl. 148 of *The birds of America*, which features the 'Pine Swamp Warbler. / *Sylvia sphagnosa*. Bonap. / Male, 1. Female, 2.' 'Engraved, coloured, and printed by R. Havell, London, 1832.' Reproduced courtesy of the John James Audubon Center at Mill Grove in Audubon, PA, and the Montgomery County Audubon Collection.

intensive research of colour-banded populations (Holmes *et al*. 2020). Also, the inscription on Audubon's painting bears the date 'August 11th' (N-YHS 1863.17.148), which is late in the breeding season for *S. caerulescens*, when most nests are attended by successful pairs attempting a second or (rarely) third brood (Holmes *et al*. 2020). These facts cast doubt on Audubon's 'observations'.

Five years after publishing his 1834 account, Audubon realized that the adult female of *S. caerulescens* was practically identical to the species he had previously distinguished as *S. sphagnosa* (Audubon 1834), which Wilson (1812a) had called *S. pusilla*. In the face of evidence that one species had been confounded for two, Audubon (1839) published a correction that undermined his original claims. Audubon (1839: 458) now claimed that the 'Adult male' and 'Adult female' that appeared in Pl. 148 of *The birds of America* (1832), which, according to his 1834 account had been attending a nest with eggs, were merely 'the young of the Black-throated Blue Warbler' (i.e., hatch-year birds, and therefore non-breeders). Audubon (1839: 458) then attempted to shift the blame onto Wilson: 'the female of [*S. caerulescens*] resembles them so much that I looked upon it as of a species distinct from the male. I have no doubt that this error originated with Wilson, who has been followed by all of our writers. Now, however, [*S. sphagnosa*] must be erased from our Fauna' (Audubon 1839: 458).

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As discussed above, 'this error' (i.e., mistaking hatch-year birds for breeders) cannot have originated with Wilson, whose specimens were collected in May (during spring migration) and who did not claim (like Audubon 1834) to have witnessed them breeding in the 'Great Pine Swamp', although he suspected they did. Arthur (1937: 383), like most of Audubon's biographers, lacked expertise in systematic (specimen-based) ornithology and simply assumed that Audubon's ornithological statements were true: '[Audubon's] pine swamp warbler, which [Wilson] supposed was a new species, proved to be the young of the black-throated blue warbler.' However, there are only two plausible explanations for the 'female-like' male specimen depicted in Pl. 43 of *American ornithology* (Fig. 12), and neither involves the conflation of age- and sex-related plumages. Either (1) Wilson collected a male in first-basic plumage that was indistinguishable from a female, which led him to believe that *S. pusilla* was a distinct species; or (2) he mis-sexed his 'male' specimen, which was actually a female.

Audubon's dishonesty

The problematic anecdotes and 'facts' exposed here, among the accounts of species Audubon supposedly encountered in the 'Great Pine Forest' (Rockport), should not be interpreted in isolation. In the pages immediately following his 'Great Pine Swamp' episode, Audubon (1831: 52–65) described the 'Bird of Washington' for the second time, an invented species based on plagiarised images and fabricated data and anecdotes (Halley 2020). In July 1830, as he was preparing these problematic accounts, Audubon conceded in a letter to Bonaparte: 'To no one on Earth have I spoken so openly as I now do to you … [who] knows better than any Man[,] being the best judge[,] that I am not a Learned Naturalist—I am only, and that not to a very great extent[,] a *Practical* one … I am no Scholar of any kind and I have no pretensions' (Stroud 2000: 115). After two centuries, many of Audubon's confidently presented 'observations' continue to appear plausible to outside observers, despite the cumulative onslaught of new evidence that demonstrates the limits of his knowledge and extent of his scientific misconduct (e.g., Woodman 2016, Halley 2018a,b, 2020, 2022a, 2023c). This paper adds to the pile, and I continue to encourage scholars to regard the works of Audubon with caution, when it comes to statements of supposed fact.

Conclusion

After two centuries, I relocated Wilson's 'Great Pine Swamp' in the Tunkhannock Creek watershed, Monroe County, PA, by reconstructing and personally retracing his 1811 expedition route. In so doing, I demonstrated beyond reasonable doubt that Audubon's (1834: 205) claim to have 'followed [Wilson's] track' was not true. Furthermore, I used study skins to clarify the identities of Wilson's (1812a) much-debated new species from this region, and detailed many improbable observations in Audubon's (1831, 1834, 1839) relevant ornithological accounts. During this process, I also uncovered preliminary evidence that some immature males of *Setophaga caerulescens*, in first-basic plumage, are indistinguishable from females. If confirmed, this finding may expand our understanding of the species' natural history.

Acknowledgements

This paper is dedicated to the memory of my grandmother, Dorothy Mae Stoffa (1931–2023), née Murman, who passed away on the morning of 22 June 2023, during my trip to the 'Great Pine Swamp.' She was a professional nurse, a mother of four, the daughter of a coal miner and homemaker, and the granddaughter of Thomas & Maria Wilkinson of Weatherly (see text). She was the sole proprietor of Stoffa Cabin, from 1999 until her death. On 20 June, during our last conversation, while she was receiving hospice care, I told her the story of the 'Great Pine Swamp' and my plan to retrace Wilson's path. She was delighted by the

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prospect and optimistic that I would succeed. Kenn Kaufman, Ashley Kempken, Robert Prŷs-Jones, and two anonymous reviewers critiqued early versions of the manuscript. John O. Senior and the T-EHS board loaned me the Frank L. Burns papers. Nathan H. Rice and Jason D. Weckstein (ANSP) and Serina S. Brady (CM) provided access to study skins in their respective collections. Historic specimens collected and prepared by Allan R. Phillips and George M. Sutton were used to confirm the identities of Wilson's *S. montana* and *S. parus*, respectively. Modern specimens mentioned in this paper were collected or salvaged under US Fish & Wildlife Service (USFWS) Migratory Bird permit nos. MBPER0036206, MB019575-1; PA Game Commission special use permit no. 55967; and DE Division of Fish & Wildlife permit no. 2022-WSC-037.

References:

Arthur, S. C. 1937. *Audubon: an intimate life of the American woodsman*. Harmanson, New Orleans.
Audubon, J. J. 1831. *Ornithological biography*, vol. 1. Adam & Charles Black, Edinburgh.
Audubon, J. J. 1834. *Ornithological biography*, vol. 2. Adam & Charles Black, Edinburgh.
Audubon, J. J. 1839. *Ornithological biography*, vol. 5. Adam & Charles Black, Edinburgh.
Audubon, L. (ed.) 1869. *The life of John James Audubon, the naturalist*. G. P. Putnam, New York.
Audubon, M. (ed.) 1897. *Audubon and his journals*, 2 vols. Scribner's Sons, New York.
Baird, S. F., Cassin, J. & Lawrence, G. 1858. *Explorations and surveys for a railroad route from the Mississippi River to the Pacific Ocean*, vol. 9. Beverly Tucker, Washington DC.
Bleiweiss, R. 2001. Asymmetrical expression of transexual phenotypes in hummingbirds. *Proc. Roy. Soc. Lond. B* 268: 639–646.
Bonaparte, C. 1824. Observations on the nomenclature of Wilson's Ornithology. *J. Acad. Nat. Sci. Philadelphia* 4: 163–200.
Bonaparte, C. L. 1828. The genera of North American birds, and a synopsis of the species found within the territory of the United States; systematically arranged in orders and families. *Ann. Lyceum Nat. Hist. NY* 2: 7–128.
Brenckman, F. 1913. *History of Carbon County Pennsylvania*. James J. Nungesser, Harrisburg, PA.
Brewer, T. M. 1840. *Wilson's American ornithology: with notes by Jardine; to which is added a synopsis of American birds, including those described by Bonaparte, Audubon, Nuttall, and Richardson*. Otis, Broaders & Co., Boston.
Brisson, M.-J. 1760. *Ornithologie, ou, Méthode contenant la division des oiseaux en ordres, sections, genres, espèces & leurs variétés*, vol. 3. J.-B. Bauche, Paris.
Buchanan, R. (ed.) 1868. *The life and adventures of John James Audubon, the naturalist*. S. Low & Marston, London.
Burns, F. L. 1908. Alexander Wilson. IV. The making of the American ornithology. *Wilson Bull*. 20: 165–185.
Burtt E. H. & Davis, W. E. 2013. *Alexander Wilson, the Scot who founded American ornithology*. Belknap Press of Harvard Univ. Press, Cambridge, MA.
Cantwell, R. 1961. *Alexander Wilson, naturalist and pioneer*. J. B. Lippincott Co., Philadelphia & New York.
Catesby, M. 1731. *Natural history of Carolina, Florida and the Bahama Islands*, vol. 1. Privately published, London.
Corning, H. (ed.) 1969. *Letters of John James Audubon, 1826–1840*. Club of Odd Volumes, Boston (Kraus Reprint Co., New York).
Coues, E. 1872. *Key to North American birds*. Naturalists' Agency, Salem, MA.
Covino, K. M., Horton, K. G. & Morris, S. R. 2020. Seasonally specific changes in migration phenology across 50 years in the Black-throated Blue Warbler. *Auk* 137(2): ukz080.
Daubenton, E. L. 1765–81. *Planches enluminées d'Histoire naturelle*, 10 vols. E. L. Daubenton, Paris.
Deane, R. 1910. Extracts from an unpublished journal of John James Audubon. *Auk* 21: 334–338.
Faxon, W. 1901. Early editions of Wilson's Ornithology. *Auk* 18: 216–218.
Forster, J. R. 1772. An account of the birds sent from Hudson's Bay; with observations relative to their natural history; and Latin descriptions of some of the most uncommon. *Philos. Trans. Roy. Soc. Lond*. 62: 382–433.
Fries, W. H. 2006. *The double elephant folio: the story of Audubon's Birds of America*. Reprint. Zenaida Publishing, Amherst, MA.
Gmelin, J. F. 1789. *Caroli a Linne, systema naturae per regna tria natural, secondum classes, ordines, genera, species cum characteribus differentiis, synonymis, locis*, vol. 1(2). J. B. Delamollière, Lyon.
Gray, G. R. 1842. *Appendix to A list of the genera of birds*. Richard & John E. Taylor, London.
Gross, D. A. 1994. Discovery of a Blackpoll Warbler (*Dendroica striata*) nest, a first for Pennsylvania—Wyoming County. *Pennsylvania Birds* 8: 128–132.
Halley, M. R. 2018a. The ambiguous identity of *Turdus mustelinus* Wilson, and a neotype designation for the Veery *Catharus fuscescens* (Stephens). *Bull. Brit. Orn. Cl.* 138: 78–91.
Halley, M. R. 2018b. Audubon's famous banding experiment: fact or fiction? *Arch. Nat. Hist*. 45: 118–121.
Halley, M. R. 2020. Audubon's Bird of Washington: unravelling the fraud that launched *The birds of America*. *Bull. Brit. Orn. Cl*. 140: 110–141.
Halley, M. R. 2022a. Audubon's diary transcripts were doctored to support his false claim of personally discovering Lincoln's Sparrow *Melospiza lincolnii* (Audubon, 1834). *Bull. Brit. Orn. Cl*. 142: 329–342.
Halley, M. R. 2022b. Rediscovery of the holotype of the American Goshawk, *Accipiter gentilis atricapillus* (Wilson, 1812), and a commentary about Alexander Wilson's contributions to the Peale Museum. *Proc. Acad. Nat. Sci. Philadelphia* 167: 233–240.

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Halley, M. R. 2023a. The composite identity of *Muscicapa virens* Linnaeus, and a neotype designation for Eastern Wood Pewee *Contopus virens* (Tyrannidae). *Bull. Brit. Orn. Cl.* 143: 196–211.
Halley, M. R. 2023b. The Philadelphia breeding bird census of 2020. *Cassinia* 78: 14–45.
Halley, M. R. 2023c. Why was John James Audubon denied membership at the Academy of Natural Sciences of Philadelphia in 1824? *Proc. Acad. Nat. Sci. Philadelphia* 168: 97–108.
Halley, M. R. in press. "Ornithology in Peale's Museum". *In* Van Horne, J., Soltis, C. E., King, C. & Halley, M. R. (eds.) *America's earliest museums: a virtual reconstruction of the collections of Pierre Eugène Du Simitière and Charles Willson Peale*. Website hosted by the American Philosophical Society.
Halley, M. R. & Croasdale, A. W. 2018. The Philadelphia breeding bird census of 2016. *Cassinia* 76: 5–26.
Hazard, S. (ed.) 1830. *The register of Pennsylvania, devoted to the preservation of facts and documents, and every other kind of useful information respecting the state of Pennsylvania*, vol. 5. W. F. Geddes, Philadelphia.
Herrick, F. H. 1917. *Audubon the naturalist*, 2 vols. D. Appleton & Co., New York & London.
Holmes, R. T., Kaiser, S. A., Rodenhouse, N. L., Sillett, T. S., Webster, M. S., Pyle, P. & Patten, M. A. 2020. Black-throated Blue Warbler (*Setophaga caerulescens*), version 1.0. *In* Rodewald, P. G. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.btbwar.01 (accessed 27 January 2024).
Holt, J. 2004. Notes on Audubon's "mystery" birds. *Cassinia* 70: 22–24.
Hunter, C. 1983. *The life and letters of Alexander Wilson*. American Philosophical Society, Philadelphia, PA.
Latham, J. 1823. *A general history of birds*. Jacob and Johnson, Winchester.
Linnaeus, C. 1758. *Systema naturae*, vol. 1. Tenth edn. Laurentii Salvii, Holmiae.
Linnaeus, C. 1766. *Systema naturae*, vol. 1. Twelfth edn. Laurentius Salvius, Holmiae.
Logan, P. B. 2016. *Audubon: America's greatest naturalist and his voyage of discovery to Labrador*. Ashbryn Press, San Francisco, CA.
Lyon, B. E. & Montgomerie, R. D. 1986. Delayed plumage maturation in passerine birds: reliable signaling by subordinate males? *Evolution* 40: 605–615.
McWilliams, G. M. & Brauning, D. W. 2000. *The birds of Pennsylvania*. Cornell Univ. Press, Ithaca, NY.
Merriam-Webster. 2023. 'Swamp.' https://www.merriam-webster.com/dictionary/swamp (accessed 25 July 2023).
Müller, P. L. S. 1776. *Carl von Linné, Vollständiges Natursystem*, vol. 9. Gabriel Nicolas Raspe, Nürnberg.
Morse, D. H. 2020. Blackburnian Warbler (*Setophaga fusca*), version 1.0. *In* Poole, A. F. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.bkbwar.01. (accessed 27 January 2024)
Morse, D. H. & Poole, A. F. 2020. Black-throated Green Warbler (*Setophaga virens*), version 1.0. *In* Rodewald, P. G. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.btnwar.01 (accessed 27 January 2024).
Nuttall, T. 1832. *A manual of the ornithology of the United States and of Canada*. Hilliard & Brown, Cambridge, MA.
Nuttall, T. 1840. *A manual of the ornithology of the United States and of Canada*. Second edn. Hilliard, Gray, & Co., Boston.
Olson, R. J. M. & Mazzitelli, A. 2017. Audubon's grouse: no more grousing around. *Master Drawings* 55: 539–548.
Parkes, K. C. 1985. Audubon's mystery birds. *Nat. Hist.* 94(4): 88–91.
Peirce, C. 1847. *A meteorological account of the weather in Philadelphia, from January 1, 1790, to January 1, 1847, including fifty-seven years*. Lindsay & Blakiston, Philadelphia, PA.
Pick, N. 2004. *The rarest of the rare: stories behind the treasures at the Harvard Museum of Natural History*. Harper, New York.
Pyle, P. 2022. *Identification guide to North American birds*, pt. 1. Second edn. Slate Creek Press, Forest Knolls, CA.
Rabenold-Finsel, R. 2004. *Carbon County* (Postcard History Series). Arcadia Publishing, Charleston, GA.
Rhodes, R. 2004. *John James Audubon: the making of an American*. Alfred A. Knopf, New York.
Ridgway, R. 1902. The birds of North and Middle America. *Bull. US Natl. Mus.* 50.
Scopoli, G. A. 1769. *Annus I historico-naturalis. Descriptiones avium musei proprii earumque rariorum, quas vidit in vivario Augustiss. Imperatorus, et museo excell. Comitis Francisci Annib. Turriani*. C. G. Hilscheri, Lipsiae, Sumtib.
Sevon, W. D. 2000. *Physiogeographic provinces of Pennsylvania*. Map 13. Fourth edn. Commonwealth of Pennsylvania Dept. of Conservation and Natural Resources, Bureau of Topography & Geologic Survey, Harrisburg, PA.
Stephens, J. F. 1817. *General zoology, or Systematic natural history*, vol. 10(1). London.
Stone, W. 1894. *The birds of eastern Pennsylvania and New Jersey with introductory chapters on geographical distribution and migration*. Delaware Valley Ornithological Club, Philadelphia, PA.
Stone, W. 1906. A bibliography and nomenclator of the ornithological works of John James Audubon. *Auk* 23: 298–312.

ISSN-2513-9894 (Online)

Stroud, P. T. 2000. *The emperor of nature: Charles-Lucien Bonaparte and his world*. Univ. of Pennsylvania Press, Philadelphia.
Terrill, R. S., Seeholzer, G. F. & Wolfe, J. D. 2020. Evolution of breeding plumages in birds: a multiple-step pathway to seasonal dichromatism in New World warblers (Aves: Parulidae). *Ecol. & Evol*. 10: 9223–9239.
Townsend, J. K. 1837. Description of twelve new species of birds, chiefly in the vicinity of the Columbia River. *J. Acad. Nat. Sci. Philadelphia* 7: 187–193.
Turnbull, W. P. 1869. *The birds of east Pennsylvania and New Jersey*. A. K. Murray & Co., Glasgow, Scotland.
Trippe, T. M. 1868. The warblers. *Amer. Natur*. 2: 169–183.
Wallace, P. A. W. 1965. *Indian paths of Pennsylvania*. Pennsylvania Historical and Museum Commission, Harrisburg, PA.
Webster, N. 1806. *A compendious dictionary of the English language*. Sidney's Press, New Haven, CT.
Webster, N. 1828. *An American dictionary of the English language*. S. Converse, New York.
Wilson, A. 1810. *American ornithology, or, the natural history of the birds of the United States*, vol. 2. Bradford & Inskeep, Philadelphia, PA.
Wilson, A. 1811. *American ornithology, or, the natural history of the birds of the United States*, vol. 3. Bradford & Inskeep, Philadelphia, PA.
Wilson, A. 1812a. *American ornithology, or, the natural history of the birds of the United States*, vol. 5. Bradford & Inskeep, Philadelphia, PA.
Wilson, A. 1812b. *American ornithology, or, the natural history of the birds of the United States*, vol. 6. Bradford & Inskeep, Philadelphia, PA.
Wilson, A. 1813. *American ornithology, or, the natural history of the birds of the United States*, vol. 7. Bradford & Inskeep, Philadelphia, PA.
Wilson, A. 1814. *American ornithology, or, the natural history of the birds of the United States*, vol. 9. Bradford & Inskeep, Philadelphia, PA.
Wilson, A. 1825. *Supplement to the American ornithology of Alexander Wilson: containing a sketch of the author's life*. J. Laval & S. F. Bradford, Philadelphia, PA.
Wilson, A. & Bonaparte, C. L. 1831. *American ornithology, or, the natural history of the birds of the United States*, vol. 2. Constable & Co., Edinburgh, and Hurst, Chance & Co., London.
Woodman, N. 2016. Pranked by Audubon: Constantine S. Rafinesque's description of John James Audubon's imaginary Kentucky mammals. *Arch. Nat. Hist*. 43: 95–108.
Zawatski, E. J., Gross, D. A. & Brittingham, M. C. 2019. Habitat of breeding Blackpoll Warblers at a persistent extralimital breeding site in Pennsylvania. *Northeastern Natur*. 26: 31–42.

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Re-restricting the type locality of *Burhinus* [= *Oedicnemus*] *indicus* Salvadori, 1866

by Praveen J. & Giorgio Aimassi

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Summary.—The type locality of Indian Thick-knee *Burhinus indicus* is currently restricted to the surroundings of Mussoorie, Uttarakhand, India. We provide evidence for revising this to the environs of Sardhana, Uttar Pradesh, which is *c*.150 km south-southwest of Mussoorie.

The Museo Regionale di Scienze Naturali di Torino houses numerous specimens of birds from India, donated in 1841 by Paolo Solaroli (Elter 1986). Among these are the two syntypes of Indian Thick-knee *Burhinus* [= *Oedicnemus*] *indicus* Salvadori, 1866, with the registration numbers MZUT Av4086 and Av4087 (Fig. 1; Aimassi *et al*. 2020: 79). The type locality was only known imprecisely for many decades—Salvadori (1866: 381) mentioned 'probabilmente dall'Imalaja' (probably from Himalaya); Salvadori (1915: 12) 'inviata dal Barone Solaroli da Sirdanha [*sic*] Monti Imalaia' (sent by Baron Solaroli from Sirdanha [*sic*] Himalayan Mountains); and Peters (1934: 295) referred only to 'India'— until Passerin d'Entrèves *et al*. (1995) proposed restricting the type locality to the 'surroundings of Mussoorie, in Uttar Pradesh', India. They cited a letter from Marquis Paolo Solaroli in the 'fondo Ministero degli Esteri del Regno di Sardegna, Gabinetto, Lettere dei regi sudditi, Lettere ricevute, mazzo 1670', protocol no. 71599, at the Archivio di Stato di Torino (Turin State Archives) relating to the shipment of 444 bird skins. Here, we provide reasons to revise this to the environs of Sardhana, in Uttar Pradesh.

Figure 1: Two syntypes of Indian Thick-knee *Burhinus indicus*, MZUT Av4086 (left) and MZUT Av4087 (right), in the Museo Regionale di Scienze Naturali di Torino (Luca Ghiraldi)

Solaroli (1796–1878) was an Italian mercenary stationed for some time in the principality of Sirdanah / Sirdanha [= Sardhana, 29°25'N, 77°37'E], near Meerut, Uttar Pradesh. Although Sardhana was referred to as a 'rajat at the foot of the Himalayas' by Passerin d'Entrèves *et al*. (1995), it is not even close to the *terai*; in fact, it is slightly less than 100 km from Delhi.

There is little certainty as to where Solaroli collected the 444 specimens now largely at MZUT (335 specimens), and the only 'new' evidence is the letter he sent from Mussoorie (in present-day Uttarakhand).

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Mussoorie is *c*.150 km north-northeast of Sardhana. While at least some birds in the collection give it a 'Himalayan' feel, e.g. Bearded Vulture *Gypaetus barbatus*, White-collared Blackbird *Turdus albocinctus*, Eurasian Wren *Troglodytes troglodytes*, Chukar *Alectoris chukar* and Western Tragopan *Tragopan melanocephalus*, clearly indicating the collector(s) visited the Middle Himalaya, the bulk of the collection comprises common birds of the northern plains expected around Sardhana (which is not Himalayan). We contest that Sardhana must have been site of collection of most of these specimens. In particular, *Burhinus indicus* does not occur around Mussoorie (30°28'N, 78°04'E; *c*.2,000 m) in the Middle Himalaya, but is found on the Gangetic plain around Sardhana (*c*.225 m) (https://ebird.org/india/map/indthk1). As such, the site from where the consignment was sent is not appropriate as the type locality here, and we recommend to revise the type locality of *Burhinus* [=*Oedicnemus*] *indicus* to the 'environs of Sardhana, Uttar Pradesh'.

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References:

Aimassi, G., Pulcher, C. & Ghiraldi, L. 2020. Type specimens of birds in the Museo Regionale di Scienze Naturali (Torino, Italy). *J. Natl. Mus. (Prague), Nat. Hist. Ser*. 189: 65–154.

Elter, O. 1986. *La collezione ornitologica del Museo di Zoologia dell'Università di Torino*. Cataloghi 8. Museo Regionale di Scienze Naturali Torino.

Passerin d'Entrèves, P., Violani, C. G. & Rolando, A. 1995. The Himalayan bird collection of the Marquis Paolo Solaroli, "Prince of Sirdanah", and the type locality of *Oedicnemus indicus* Salvadori, 1865. *Bull. Brit. Orn. Cl*. 115: 128–129.

Peters, J. L. 1934. *Check-list of birds of the world*, vol. 2. Mus. Comp. Zool., Cambridge, MA.

Salvadori, T. 1866. Descrizione di altre nuove Specie di Uccelli esistenti nel Museo di Torino. *Atti Soc. Ital. Sci. Nat*. 8: 375–389.

Salvadori, T. 1915. Notizie storiche intorno alla collezione ornitologica del Museo di Torino. *Mem. R. Accad. Sci. Torino* (2a)65: 1–49.

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Sangihe Dwarf Kingfisher *Ceyx sangirensis*: a distinct and extinct endemic species

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Summary.—Adolf Meyer, first author of the name of the dwarf kingfisher *Ceyx sangirensis*, never visited the island of Sangihe, north of Sulawesi, on which he and co-author Wiglesworth stated the two syntypes were collected (by hired hunters) in the 1870s. The form was lumped with Sulawesi Dwarf Kingfisher *Ceyx fallax* in 1945 and split again only in 2014, based on characters shown by two other specimens Meyer had sent to the UK. However, because (a) the species was (apparently) not seen again after Meyer's birds were collected in 1874 and (b) Meyer wrote elsewhere that the original labels of some of his Sulawesi material were lost, it was recently suggested that *C. sangirensis* did not originate on the island. Two further specimens have come to light (including one apparently taken in 1876, thus not by Meyer's collectors) and, although one syntype has been destroyed, the total of birds conforming to key diagnostic features and labelled from Sangihe is now six. This evidence combined with other information indicates that *C. sangirensis* is or was indeed endemic to Sangihe, and comparisons with 39 *C. fallax* confirm that it should be treated as a separate species, distinguished by its longer bill and tail, more extensive blue-spangled black crown, few or no shining pale turquoise lower dorsal feathers, more mauve or magenta wash dorsally with cobalt- or royal-blue on the uppertail-coverts, and less extensive white throat. A review of field work, including three months by one of us in remaining forest on the island in 2015, shows that the species has not definitively been seen since the 1870s and must regrettably be regarded as extinct.

The Sangihe Dwarf Kingfisher *Ceyx sangirensis* was described by Meyer & Wiglesworth (1898) based on two specimens, an unsexed adult and an unsexed juvenile, taken on the island of Sangihe, Indonesia, in the eastern Celebes Sea between Sulawesi and Mindanao in the Philippines. The adult was given to the Naturhistorisches Museum Wien (NMW 35170) in 1877 (Meyer & Wiglesworth 1898, Schifter *et al*. 2007); the juvenile went to the Staatliche Museum für Tierkunde, Dresden (SMTD C884), evidently much later, after the original description (Eck & Quaisser 2004). Adolf Meyer himself never visited Sangihe, but sent his 'hunters' there in 1874 (Meyer 1884)—not 1870–71 as in White & Bruce (1986)—and any specimens that came to him must be presumed to date from that time. He sent two other specimens, an unsexed adult and an unsexed juvenile (bill short and dark), to the Marquis of Tweeddale, who died in 1878 (Anon. 1879), bequeathing them along with his entire ornithological collection to what is now the Natural History Museum, UK. There the specimens were registered as NHMUK 1888.10.20.392 and 1888.10.20.393 (Gunther 1892). The Dresden juvenile was destroyed by Allied bombing in 1945 (Eck & Quaisser 2004), but an appeal through eBEAC (see Acknowledgements) yielded a fifth bird in the Statens Naturhistoriske Museum in Copenhagen (ZMUC 60.029), with label information reading '20/12 [18]76, Sanghir, Mr J. Wroblewsky, ♂ ad.'. The sex of this bird appeared to solve a puzzle that Forshaw (1985) set when he gave the measurements of a male without

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mentioning where he examined it, but correspondence in October 2022 revealed that the holding institution for this male—a sixth specimen—was in fact the Muséum national d'Histoire naturelle (MNHN), Paris (J. Forshaw *in litt.* 2022).

Provenance

Recently, however, the provenance of the material constituting the form *sangirensis* has been challenged. Eaton *et al*. (2021) declared that 'both [*sic*] known specimens [were] reported to be from Sangihe but [were] obtained in Manado' (where Meyer at least briefly stayed). The implication of this assertion is that the provenance of the form *sangirensis* cannot confidently be ascribed to Sangihe; and the basis for it, kindly explained by J. Eaton (*in litt*. 2022), lies (1) in Meyer's (1879) admission that, owing to inadequate labelling, 'the exact localities where I got my specimens were often destroyed, and the exact dates when I got them nearly always so', and (2) in his observation in the same paper that *C. fallax* (as he then called it, long before he detailed points of divergence from Sulawesi birds) 'appears to be plentiful' in Tabukan (the type locality), an area along Sangihe's east side, when no other certain record of the bird on the island had ever come to light. Curious as this circumstance may be, the view that *sangirensis* is unattributable to Sangihe is difficult to sustain in the face of contextual evidence and argument (points 1–4 below), and even harder following the discovery of the Copenhagen and Paris specimens (points 5–6), unknown to Eaton *et al*. (2021) at the time of their writing.

(1) The quotation from Meyer (1879) is not so self-damning as to destroy trust in what he himself trusted. It referred to his explorations in and around Sulawesi more widely, and stated that labels with '*exact* localities' were '*often* destroyed' (our emphases), not that they were all destroyed or that general localities such as islands were confused during labelling. In any case we know of no evidence or indication that his Sangihe sample was affected by the problem he was openly admitting.

(2) His remark on the apparent plentifulness of the species in Tabukan immediately followed his disclosure that he 'did not procure many specimens' of it on Sulawesi and, in this context, he seems simply to have been offering a speculative reaction to the contrast of receiving five (as it transpires) specimens from a single area in a relatively short space of time. In counter-speculation, one might argue that, given the two young specimens involved, four of the birds might have come from two families or even just one, and therefore cannot constitute an indication of local abundance.

(3) Meyer (1884) and Meyer & Wiglesworth (1898) listed the species for Sangihe without any qualification or doubt, reflecting a confidence in provenance which overrides other considerations. If Meyer had acquired his specimens of *sangirensis* in Manado, or even simply been unsure where they came from, he would surely have admitted as much.

(4) The type of Cerulean Flycatcher *Eutrichomyias rowleyi* was also taken in 'Tabukan' (Meyer 1878), a provenance never questioned despite the lapse of more than 120 years before the indisputable rediscovery of the species on the island (Riley 2002). Notably, at the end of his original description Meyer (1878) referred to the small number of bird species known then from Sangihe 'at least, from trustworthy sources'—a phrase which surely signals his own scrupulousness in sifting the evidence.

(5) The Copenhagen specimen (ZMUC 60.029) was apparently collected in 1876, only a few years after Meyer's collectors were on Sangihe, and appears therefore to have

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been acquired independently (subverting the proposition that the only evidence for the form on Sangihe is Meyer's). The collector or purchaser, J. Wroblewsky, 'was a Danish physician associated with several Danish zoologists such as Mørch and Steenstrup' (Ng *et al*. 2020). The specimen was probably obtained by Finn Salomonsen in an exchange (J. Fjeldså *in litt*. 2022).

(6) The Paris specimen (MNHN-ZO-MO-1991-693) has no original label, but bears one from the Boucard Museum that mentions Meyer as its collector and 'Sanghir' as its provenance. This is the sixth specimen (a) sharing the characters of *sangirensis* (see below) and (b) labelled as from Sangihe.

On the strength of these considerations the most parsimonious interpretation is surely to treat the form *sangirensis* as a Sangihe endemic.

Taxonomic status

Meyer & Wiglesworth (1898) distinguished *C. sangirensis* from Sulawesi's *C. fallax* on multiple characters, namely the larger and more extensive blue spangling covering the black-based crown, larger (and magenta) spots on the wing-coverts, magenta wash to the mantle, longer and different-shaped bill ('not so much narrowed in its terminal third or so much broadened at its base'), and slightly larger ('little greater') overall size. Nevertheless, Peters (1945) reduced the form to a subspecies of *fallax*, an arrangement which prevailed until del Hoyo & Collar (2014) re-evaluated the morphological evidence (comparing the NHMUK's two specimens with the museum's only two *fallax*—NJC) and returned *sangirensis* to species rank based on its larger size, much more extensive blue-spangled crown (unlike in *fallax* covering the supercilium and nape), royal- or cobalt-blue vs. shining pale turquoise rump and uppertail-coverts, and much brighter rufous dorsal area and wing-coverts. The split was of particular significance because it resulted in *sangirensis* being given the IUCN category Critically Endangered, owing to the paucity of evidence that a population still persisted (see BirdLife International 2023).

Subsequent examination of the surviving syntype of *sangirensis* in NMW showed the diagnosis above to be in need of adjustment. The dorsal area of this specimen is *darker* than the museum's only *fallax*, and the rump has two shining pale turquoise-blue feathers (Fig. 1). The larger, magenta wing-covert spotting, magenta wash to the mantle, less attenuated bill and narrower bill base were not apparent (presumably therefore the diagnosis in Meyer & Wiglesworth 1898 was a composite of notes taken on some or all of the material Meyer obtained from Sangihe). However, the strikingly long bill of adult *sangirensis*, its larger general size and far more extensive blackish crown with larger blue spangling were upheld (Figs. 1–3, Tables 1–2). A re-examination of the two NHMUK specimens of *sangirensis* confirmed this basic diagnosis but also revealed that the lower back

TABLE 1

Measurements in mm of the five extant specimens of Sangihe Dwarf Kingfisher *Ceyx sangirensis*. Apart from the bill (see Fig. 5), the dimensions of the juvenile indicate it is valid to include them in the sample average.

Specimen	sex	age	bill	wing	tail
NMW 35170 (syntype)	?	ad	39.4	61	24
NHMUK 1888.10.20.392	?	juv	—	61	25
NHMUK 1888.10.20.392	?	ad	42.0	59	26
MNHN-ZO-MO-1991-693	m	ad	39.6	61	24
ZMUC 60.029	m	ad	40.7	58	27

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Figure 1. Syntype of Sangihe Dwarf Kingfisher *Ceyx sangirensis* (NMW 35170), below, next to a specimen of Sulawesi Dwarf Kingfisher *C. fallax* (NMW 50522), in dorsal view, showing the much more extensive black crown with larger blue spangling, less turquoise in the rump and uppertail-coverts, and larger size; but note the darker dorsum, unlike in the NHMUK sample (Figs. 5–6) (N. J. Collar)

Figure 2. Syntype of Sangihe Dwarf Kingfisher *Ceyx sangirensis* (NMW 35170), below, next to a specimen of Sulawesi Dwarf Kingfisher *C. fallax* (NMW 50522), in ventral view, showing the longer bill and (in this comparison) *slightly* more constrained white throat, not extending onto the upper breast (N. J. Collar)

and rump of the adult is a magenta- or mauve-washed pale blue, shading to royal blue or cobalt on the uppertail-coverts, while the juvenile has the lower back and rump mainly dull turquoise-blue, again shading to cobalt on the uppertail-coverts (Figs. 4–6, Tables 1–2). By contrast the two NHMUK specimens of *fallax* have broad streaks of shining pale turquoise-blue from the rump to uppertail-coverts, with only the tips of the latter shading to blue (Figs. 5–6). The Copenhagen and Paris specimens of *sangirensis* validate the diagnostic characters enumerated here, showing very slight tints of mauve or magenta and lacking the shining pale turquoise-blue on the rump (Figs. 7–10). The somewhat recondite point about

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Figure 3 (left). Syntype of Sangihe Dwarf Kingfisher *Ceyx sangirensis* (NMW 35170), below, next to a specimen of Sulawesi Dwarf Kingfisher *C. fallax* (NMW 50522), in lateral upper body view, showing the longer bill and much more extensive black crown with larger blue spangling (N. J. Collar)

Figure 4 (right). Adult Sangihe Dwarf Kingfisher *Ceyx sangirensis* (NHMUK 1888.10.20.393) below, adult Sulawesi Dwarf Kingfisher *C. fallax* (NHMUK 88.10.20.391) above, showing former's longer bill and more extensive black-and-blue crown (N. J. Collar, © Trustees of the Natural History Museum, London)

Figure 5. Top to bottom: Sulawesi Dwarf Kingfisher *Ceyx fallax* (NHMUK 1888.10.20.390, juvenile, and 1888.10.20.391, adult) and Sangihe Dwarf Kingfisher *C. sangirensis* (NHMUK 1888.10.20.393, adult, and 1888.10.20.392, juvenile); note the more extensive blue crowns of *C. sangirensis* and, in this sample (but see text and Fig. 1), their brighter, lighter upperparts (N. J. Collar, © Trustees of the Natural History Museum, London)

bill shape in the original description of *sangirensis* could not be judged with any confidence and was set aside from further consideration.

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TABLE 2

Mean measurements (and ranges) in mm of five specimens of Sangihe Dwarf Kingfisher *Ceyx sangirensis* (Table 1) and 39 Sulawesi Dwarf Kingfisher *C. fallax* (17 males, ten females, 12 unsexed; AMNH *n* = 13, MNHN *n* = 3, Naturalis *n* = 15, NHMUK *n* = 1, NMW *n* = 1, SMTD *n* = 1, USNM *n* = 1, *n* = ZMB 4; for museum acronyms, see Acknowledgements). *n* = number of specimens; [1]*n* = 4; [2]*n* = 37.

Taxon	*n*	bill	wing	tail
Ceyx sangirensis	5	40.4 (39.4–42.0)[1]	60 (58–61)	25.2 (24–27)
Ceyx fallax	39	35.0 (30.4–38.2)[2]	57.2 (55–60)	21.2 (19–23)[2]

Figure 6. Upperparts (left to right) of Sangihe Dwarf Kingfisher *Ceyx sangirensis* (NHMUK 1888.10.20.393, adult, and 1888.10.20.392, juvenile) and Sulawesi Dwarf Kingfisher *C. fallax* (NHMUK 1888.10.20.391, adult, and 1888.10.20.390, juvenile), the two former showing the cobalt or royal blue of the uppertail-coverts with little or none of the bright metallic turquoise-blue feathering of the two latter (note the lighter dorsal area of the two former) (N. J. Collar, © Trustees of the Natural History Museum, London)

Eight (mounted) syntypes (Fig. 11), four mounted specimens (Fig. 12) and eight study skins of *C. fallax* (Fig. 13) in Naturalis—the 15 evident adults amongst which were measured for Table 2—all show shining pale turquoise-blue streaks in the lower dorsal and rump feathers. Thus it can be said with confidence that the proportion of cobalt-blue on these areas is significantly greater in *sangirensis* than in *fallax*. A further consideration is that the white on the throat of *sangirensis* cuts off rather sharply at the upper breast, whereas in *fallax* it overruns with softer edging onto the top of the breast (Figs. 2 and 14–16).

Measurements of all five known extant specimens of *C. sangirensis*—three unsexed and two male—show very little variation (Table 1). Their means and those of 39 evidently adult (pale-billed) *C. fallax* are presented in Table 2 (the bill of the juvenile *sangirensis* is omitted but, given the tiny sample, its other measurements, overlapping the other three adults, are used). Sexed and unsexed birds are combined (in two-sample equal variance *t*-tests no significant differences appear between the sexes: 17 male and ten female *C. fallax* have bill

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Figure 7 (left). Male Sangihe Dwarf Kingfisher *Ceyx sangirensis* (ZMUC 60.029), dorsal view (Peter A. Hosner)

Figure 8 (right). Male Sangihe Dwarf Kingfisher *Ceyx sangirensis* (MNHN-ZO-MO-1991-693), dorsal view (Patrick Boussès). Both images show a broadly blue-spangled black crown and lack bright turquoise feathers in the rump and uppertail-coverts.

Figure 9 (below). Male Sangihe Dwarf Kingfisher *Ceyx sangirensis* (ZMUC 60.029), lateral view (Povl Jørgensen)

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Figure 10. Male Sangihe Dwarf Kingfisher *Ceyx sangirensis* (MNHN-ZO-MO-1991-693), lateral view (flipped for easier comparison with Fig. 9) (Patrick Boussès)

Figure 11. Eight syntypes of Sulawesi Dwarf Kingfisher *Ceyx fallax* in Naturalis Biodiversity Center, Leiden, showing the prevalence of bright electric blue feathers on the rump and uppertail-coverts (N. J. Collar)

35.3 and 35.1 mm [P = 0.80], wing 56.8 and 57.7 mm [P = 0.11], tail 20.9 and 21.1 mm [P = 0.65], respectively). Inspection of all material was undertaken by NJC, with measurements of bill (tip to skull), wing (curved) and tail (tip to point of insertion) taken using digital callipers. Comparisons between the five *sangirensis* and 39 *fallax* specimens indicate that the bill of the former is 13% longer than that of the latter (rather more than the 10% suggested by Fry *et al*. 1992); neither this nor the tail shows overlap with *fallax* (Table 2).

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Figure 12. Four mounted specimens of Sulawesi Dwarf Kingfisher *Ceyx fallax* in Naturalis Biodiversity Center, Leiden, showing the prevalence of bright electric blue feathers on the rump and uppertail-coverts (N. J. Collar)

Figure 13. Eight study skins of Sulawesi Dwarf Kingfisher *Ceyx fallax* in Naturalis Biodiversity Center, Leiden, showing the prevalence of bright electric blue feathers on the rump and uppertail-coverts (N. J. Collar)

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Figure 14. Upper underparts (left to right) of Sangihe Dwarf Kingfisher *Ceyx sangirensis* (NHMUK 1888.10.20.393, adult, and 1888.10.20.392, juvenile) and Sulawesi Dwarf Kingfisher *C. fallax* (NHMUK 1888.10.20.391, adult, and 1888.10.20.390, juvenile), the two former showing the less extensive white throat than in the two latter (N. J. Collar, © Trustees of the Natural History Museum, London)

Figure 15. Specimen of Sangihe Dwarf Kingfisher *Ceyx sangirensis* (MNHN-ZO-MO-1991-693), below, with one Sulawesi Dwarf Kingfisher *Ceyx fallax* (MNHN-ZO-MO-1968-192), showing the greater bill length of the former and the sharper cut-off white throat above the upper breast (Guy M. Kirwan)

Using the Tobias criteria (see Tobias *et al*. 2010, del Hoyo & Collar 2014: 30–40) we would revise the scores for the diagnostic characters of *sangirensis* as: distinctly longer

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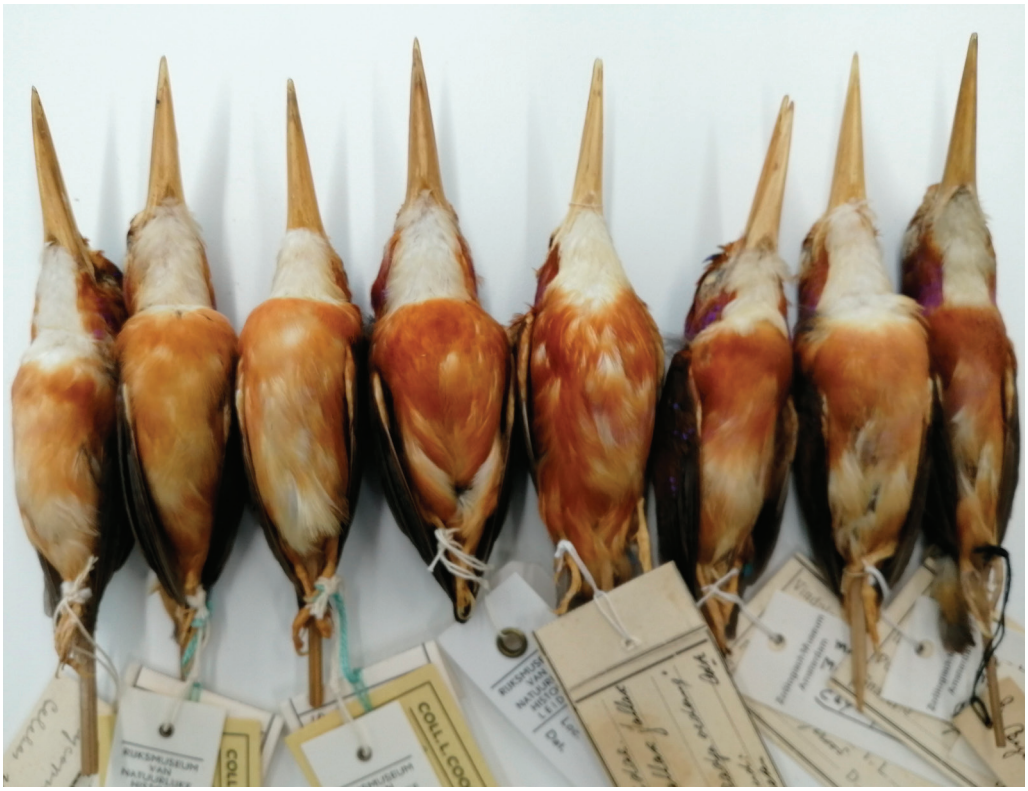

Figure 16. Eight study skins of Sulawesi Dwarf Kingfisher *Ceyx fallax* in Naturalis Biodiversity Center, Leiden (same birds as in Fig. 13), to show that the white of the throat extends onto the upper breast in most (and probably all) of the specimens (N. J. Collar)

bill and tail (2; no effect size calculated as the sample for *sangirensis* is too small); more extensive coverage of the crown by black with larger blue spangles (2); little or no shining pale turquoise streaking on the rump and uppertail-coverts, which instead show mainly soft magenta- or mauve-tinged blue rump feathers grading to soft royal blue or cobalt uppertail-coverts (2); and more circumscribed white throat (1). A score of 7 is one point lower than in del Hoyo & Collar (2014) owing to the omission of the seemingly rather strong difference in dorsal coloration that is apparent in Figs. 5 and 6 but which Fig. 1 shows not to be a consistent character; but it is still sufficient to retain *sangirensis* as a species. Certainly at least in morphological terms *sangirensis* is more obviously distinct from *fallax* than many congeners recently separated as species on both morphological (del Hoyo & Collar 2014) and molecular (Andersen *et al*. 2013, 2018) grounds, e.g. Dimorphic *C. margarethae* and Moluccan Dwarf Kingfishers *C. lepidus*, North Philippine *C. melanurus* and South Philippine Dwarf Kingfishers *C. mindanensis*, and Northern Indigo-banded *C. cyanopectus* and Southern Indigo-banded Kingfishers *C. nigrirostris*. We also note that *sangirensis* shares with *fallax* the vestigial fourth toe that Woodall (2001) regarded as a distinguishing character of this species. However, *contra* Woodall (2001) this toe has a nail and it is also present in (at least) Madagascar Pygmy Kingfisher (NJC pers. obs.), which Woodall placed in *Ceyx* and considered closest to *C. fallax* but which is now treated as *Corythornis madagascariensis* and regarded as basal to its genus (see del Hoyo & Collar 2014).

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Evidence of extinction

Whatever the taxonomic rank of *sangirensis*, its continued existence as a living entity is regrettably improbable. The most important ornithological exploration of Sangihe was carried out by Dr and Mrs Platen in 1886–87, just over a decade after Meyer's collectors visited, but they did not encounter the species (Blasius 1888). A hundred years later, in a pioneering paper drawing attention to the plight of bird species on the island, Whitten *et al*. (1987) reported that 'virtually all of Sangihe has been converted to coconut and nutmeg plantations or else is covered by patches of secondary forest from abandoned gardens'. Coates & Bishop (1997) considered the kingfisher 'possibly extinct… due to habitat loss' (repeated in Woodall 2001) and simultaneously Riley (1997a), reporting no post-1986 sightings, suggested that it had been 'unable to adapt to the loss of forest habitat'. However, the final report of the Action Sampiri expedition (Riley 1997b) mentioned a possible encounter along the Sahendaruman ridge in November 1996 and a record by P. Verbelen (*in litt*.) of an individual in the Sahendaruman ridgetop forest in March 1997 which was 'apparently… the first field observation of this species… this century'. Five years later the same author (Riley 2002) mentioned the latter record again: a single bird in the tiny remnant Sahendaruman Forest in March 1997. However, with no sightings during an extended period of field work on the island, 1998–99, Riley (2002) concluded that 'unless further sightings are made soon… this kingfisher is extinct'. In kindly responding to our enquiry, P. Verbelen (*in litt*. 2022) reported that he put a question mark next to his March 1997 identification in his field notebook and now withdraws the record.

The continued lack of sightings this century, reported by Eaton *et al*. (2016, 2021), is presumably based on the testimony of many Indonesian and foreign biologists, bird tours and birdwatchers recently visiting the island. Moreover, during three months, from 10 February to 16 May 2015, RWM conducted bird surveys covering the last woodland and forest patches on Sangihe, involving Gunung Awu in the north, Gunung Otomata in the centre and Gunung Sahendaruman in the south. Almost 80 km of transects were surveyed on foot (56.5 km around Gunung Sahendaruman, 20 km around Gunung Awu and 2.4 km in two transects around Gunung Otomata), with 468 five-minute point counts undertaken at a minimum spacing of 100 m. *C. sangirensis* was never encountered either on the transects or on the (often considerable) walks necessary to reach and leave them.

There was one false alarm. As also reported by Riley (1997a), a local contact claimed a very recent sighting from Gunung Sahendaruman during field work planning. RWM and his team immediately visited the site in question, where a Ruddy Kingfisher *Halcyon coromanda* was located within a few minutes. A local guide with superb knowledge of all bird species within the forest around the Sahendaruman crater had mistakenly understood this species to be the endemic *Ceyx*. Curiously the initial 1995–97 Action Sampiri expedition did not record Ruddy Kingfisher on Sangihe (Riley *et al*. 1997) but reported the local name of *Ceyx fallax sangirensis* as 'Bengka biasa'. This roughly translates as 'regular' kingfisher in contrast to 'Bengka besar', the 'big' kingfisher, which is the Sangihe Lilac Kingfisher *Cittura sanghirensis*. Presumably 'Bengka biasa' was the local name for Ruddy Kingfisher, which is a scarce resident on Sangihe (subspecies *Halcyon coromanda rufa*) but also a regularly encountered non-breeding visitor to the island (subspecies *H. c. major*) (Coates & Bishop 1997, Eaton *et al*. 2016, 2021, Kamminga & Creuwels 2023).

Possible causes of extinction

Sangihe Dwarf Kingfisher is therefore essentially unknown beyond six (now five) museum specimens. However, given the obvious sister relationship of *C. fallax* and

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C. sangirensis, it seems likely (albeit by no means certain) that the two were similar in ecology. Sulawesi Dwarf Kingfisher is itself poorly known, and even the limited published information is somewhat contradictory: Schlegel (1866) reported that it is 'very rare' and 'lives on the edges of creeks in the mountainous parts of the island', whereas Stresemann & Heinrich (1939–41) found it in lower-lying areas (highest 600 m) in 'deep-shaded forest at a considerable distance from streams' and considered it 'a true primary forest bird in no way tied to watercourses' (our translation). Somewhat by contrast Watling (1983) reported it 'quite common although rarely observed in lowland and lower montane rain forest up to about 1,000 m'. At Manembonembo Nature Reserve, North Sulawesi, Bororing *et al*. (2000) found it common in primary and secondary forest and plantations, and caught a bird in secondary scrub. Moreover, RWM found it in dry secondary forest with frequent ginger in northern Sulawesi, and, even though Eaton *et al*. (2021) characterised it as 'scarce in primary and secondary forest, <600 m, rarely <1000 m', J. Eaton (*in litt*. 2022) remarks that 'all Asian *Ceyx* are highly tolerant of forest/plantation mix'.

Potential causes of the extinction of *C. sangirensis* are not obvious except for the extensive habitat loss on Sangihe first mentioned by Whitten *et al*. (1987), and possibly competition with Sangihe Lilac Kingfisher. The stomach of one *C. fallax* specimen astonished the preparator by revealing a lizard 110 mm long, 20 mm longer than the body of the bird itself (Stresemann & Heinrich 1939–41), and the fact that *C. sangirensis* has an even larger bill than *C. fallax* suggests commensurately larger prey. If extensive habitat loss intensifies food competition between species seeking similar-sized prey, the smaller species seem likely to suffer disproportionately. Alternatively or additionally, the birds' food base may have been reduced by an extensive programme of pesticide application (as reported by RWM's contacts) to control the orthopteran coconut pest *Sexava* in the 1970s. However, if *C. sangirensis* was restricted to the lowlands there may have simply been too little non-plantation habitat on Sangihe even by the end of the 19th century to have allowed it to persist.

Ornithological importance of Sangihe

Since the islands of Sangihe and Talaud were identified as an Endemic Bird Area more than 30 years ago (Bibby *et al*. 1992), the biological importance of both islands, but particularly Sangihe, has only increased. With taxonomic revisions the number of bird species endemic to the latter has risen from three—Sangihe Hanging-parrot *Loriculus catamene*, Cerulean Flycatcher and Elegant Sunbird *Aethopyga duyvenbodei*—in 1998 (Stattersfield *et al*. 1998) to ten in 2023, through the addition of Sangihe Scops Owl *Otus collari*, Sangihe Lilac Kingfisher, Sangihe Dwarf Kingfisher, Sangihe Pitta *Erythropitta caeruleitorques*, Sangihe Whistler *Coracornis sanghirensis*, Sangihe Golden Bulbul *Hypsipetes platenae* and Sangihe White-eye *Zosterops nehrkorni* (HBW & BirdLife International 2022). With habitat loss as the particular threat, only the owl is not on the IUCN Red List: the dwarf kingfisher, whistler, flycatcher, bulbul and white-eye are Critically Endangered, pitta and sunbird Endangered, and lilac kingfisher and hanging-parrot Near Threatened. This is one of the greatest concentrations of threatened species of bird on a single small island, and the lamentable extinction of one of them, the dwarf kingfisher, should not be allowed to pass—as has evidently happened with the nominate subspecies of Red-and-blue Lory *Eos histrio histrio* (del Hoyo & Collar 2014; RWM pers. info.)—without being used widely and loudly to rally the forces of conservation around the remaining species that are so seriously in need of help.

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References:

Andersen, M. J., Oliveros, C. H., Filardi, C. E. & Moyle, R. G. 2013. Phylogeography of the Variable Dwarf-kingfisher *Ceyx lepidus* (Aves: Alcedinidae) inferred from mitochondrial and nuclear DNA sequences. *Auk* 130: 118–131.

Andersen, M. J., McCullough, J. M., Mauck, W. M., Smith, B. T. & Moyle, R. G. 2018. A phylogeny of kingfishers reveals an Indomalayan origin and elevated rates of diversification on oceanic islands. *J. Biogeogr*. 45: 269–281.

Anon. 1879. Memoir of the Marquis of Tweeddale. *Ibis* (4)3: 223–231.

Bibby, C. J., Collar, N. J., Crosby, M. J., Heath, M. F., Imboden, C., Johnson, T. H., Long, A. J., Stattersfield, A. J. & Thirgood, S. J. 1992. *Putting biodiversity on the map: priority areas for global conservation*. International Council for Bird Preservation, Cambridge, UK.

BirdLife International. 2023. Species factsheet: *Ceyx sangirensis*. http://datazone.birdlife.org/species/factsheet/sangihe-dwarf-kingfisher-ceyx-sangirensis (accessed 10 January 2023).

Blasius, W. 1888. Die Vögel von Gross-Sanghir. *Ornis* 4: 527–646.

Bororing, R. F., Hunowu, I., Hunowu, Y., Maneasa, E., Mole, J., Nusolawo, M. H., Talangamin, F. S. & Wangko, M. F. 2000. Birds of the Manembonembo Nature Reserve, North Sulawesi, Indonesia. *Kukila* 11: 58–72.

Coates, B. J. & Bishop, K. D. 1997. *A guide to the birds of Wallacea*. Dove Publications, Alderley.

Eaton, J. A., van Balen, B., Brickle, N. W. & Rheindt, F. E. 2016. *Birds of the Indonesian archipelago: Greater Sundas and Wallacea*. Lynx Edicions, Barcelona.

Eaton, J. A., van Balen, B., Brickle, N. W. & Rheindt, F. E. 2021. *Birds of the Indonesian archipelago: Greater Sundas and Wallacea*. Second edn. Lynx Edicions, Barcelona.

Eck, S. & Quaisser, C. 2004. Verzeichnis der Typen der Vogelsammlung des Museums für Tierkunde in den Staatlichen Naturhistorischen Sammlungen Dresden. *Zool. Abhand. (Dresden)* 54: 233–316.

Forshaw, J. M. 1985. *Kingfishers and related birds: Alcedinidae—Halcyon to Tanysiptera*. Lansdowne Editions, Sydney.

Fry, C. H., Fry, K. & Harris, A. 1992. *Kingfishers, bee-eaters and rollers: a handbook*. Christopher Helm, London.

Gunther, A. 1892. *Catalogue of the birds of the British Museum*, vol. 17. Trustees of the Brit. Mus., London.

Handbook of the Birds of the World & BirdLife International. 2022. Handbook of the Birds of the World and BirdLife International digital checklist of the birds of the world. Version 6b. http://datazone.birdlife.org/userfiles/file/Species/Taxonomy/HBW-BirdLife_Checklist_v6b_Jul22.zip.

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

Kamminga, P. & Creuwels, J. 2023. Naturalis Biodiversity Center (NL) – Aves. Naturalis Biodiversity Center. https://doi.org/10.15468/dxmzbz accessed via GBIF.org on 7 November 2023. https://www.gbif.org/occurrence/2434054945.

Martin, R. W., Collar, N. J., Fauzen, P., Bashari, H., Widyanto, A., Tasirin, J. S. & Marsden, S. J. 2023. On the edge: habitat restoration priorities for three Critically Endangered bird species on Sangihe, Indonesia. *Restoration Ecol*. 31: e13770.

Meyer, A. B. 1878. Description of two species of birds from the Malay Archipelago. [*Rowley's*] *Orn. Misc*. 3: 163–166.

Meyer, A. B. 1879. Field notes on the birds of Celebes. *Ibis* (4)3: 43–70, 125–147.

Meyer, A. B. 1884. Ueber neue und ungenügend bekannte Vögel, Nester und Eier aus dem Ostindischen Archipel im Königl. Zoologischen Museum zu Dresden. *Abhandl. Naturwiss. Ges. ISIS in Dresden* 1884: 3–64.

ISSN-2513-9894 (Online)

Meyer, A. B. & Wiglesworth, L. W. 1898. *The birds of Celebes and the neighbouring islands*. R. Friedländer & Sohn, Berlin.
Ng, P. K. L., Li, J.-J. & Shih, H.-T. 2020. What is *Sesarmops impressus* (H. Milne Edwards, 1837) (Crustacea: Brachyura: Sesarmidae)? *Zool. Stud*. 59: e27.
Peters, J. L. 1945. *Check-list of birds of the world*, vol. 5. Mus. Comp. Zool., Cambridge, MA.
Riley, J. 1997a. The birds of Sangihe and Talaud, north Sulawesi. *Kukila* 9: 3–36.
Riley, J. 1997b. *Biological surveys and conservation priorities on the Sangihe and Talaud islands, Indonesia: the final report of Action Sampiri 1995–1997*. CSB Conservation Publications, Cambridge, UK.
Riley, J. 2002. Population sizes and the status of endemic and restricted-range bird species on Sangihe Island, Indonesia. *Bird Conserv. Intern*. 12: 53–78.
Riley, J., Wardill, J. C., Hunowu, I. & Wangko, M. F. 1997. A status assessment of the Gunung Sahengbalira Protection Forest, Sangihe, North Sulawesi. PHPA/BirdLife International–Indonesia Programme (Tech. Memo. 19), Bogor.
Schifter, H., Bauernfeind, E. & Schifter, T. 2007. Die Typen der Vogelsammlung des Naturhistorisches Museums Wien. *Kataloge der wissenschaftligen Sammlungen des Naturhistorisches Museums in Wien 20: Aves, Heft 1*. Naturhistorisches Museum, Vienna.
Stattersfield, A. J., Crosby, M. J., Long, A. J. & Wege, D. C. 1998. *Endemic Bird Areas of the world: priorities for biodiversity conservation*. BirdLife International, Cambridge, UK.
Stresemann, E. & Heinrich, G. 1939–41. Die Vögel von Celebes. *J. Orn*. 87: 299–425; 88: 1–135, 389–487; 89: 1–102.
Tobias, J. A., Seddon, N., Spottiswoode, C. N., Pilgrim, J. D., Fishpool, L. D. C. & Collar, N. J. 2010. Quantitative criteria for species delimitation. *Ibis* 152: 724–746.
Watling, D. 1983. Ornithological notes from Sulawesi. *Emu* 83: 247–261.
White, C. M. N. & Bruce, M. D. 1986. *The birds of Wallacea (Sulawesi, the Moluccas and Lesser Sunda Islands, Indonesia): an annotated check-list*. BOU Check-list No. 7. British Ornithologists' Union, London.
Whitten, A. J., Bishop, K. D., Nash, S. V. & Clayton, L. 1987. One or more extinctions from Sulawesi, Indonesia? *Conserv. Biol*. 1: 42–48.
Woodall, P. F. 2001. Family Alcedinidae (kingfishers). Pp. 130–249 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of birds of the world*, vol. 6. Lynx Edicions, Barcelona.

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The founding of the British Ornithologists' Club, and its main protagonists

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Summary.—The British Ornithologists' Club (BOC) was founded in 1892 by a group of British Ornithologists' Union (BOU) members who wished to meet to discuss matters ornithological more frequently than the existing BOU annual meeting. This paper overviews the process leading up to the inaugural BOC meeting, the backgrounds of the 15 founder members who attended it and how the BOC developed over its first season (October 1892–June 1893). As such, it will provide the background for more detailed information on each of the founders that is planned to appear subsequently as a series of blogs on the BOC website.

A proposal for setting up an Ornithological Club, as an integral part of the British Ornithologists' Union (BOU), was first formally broached at the 1892 Annual Meeting of the BOU, which took place on 18 May of that year. 'After the Dinner [attended by 28 BOU members and guests] a proposition was made that an Ornithological Club should be formed for the purpose of holding monthly meetings, at which papers should be read and specimens exhibited. A Committee, consisting of the Earl of Gainsborough, Mr. Seebohm, Mr. Howard Saunders, Mr. Bidwell, and Dr. Bowdler Sharpe, was appointed to consider the advisability of carrying out the proposed scheme.' (Anon. 1892: 476). Of these five gentlemen, Saunders, Seebohm and Sharpe comprised the ordinary committee members of the BOU for the 1891–92 year, with Gainsborough and Bidwell also naturally being BOU members.

Figure 1. Richard Bowdler Sharpe, the driving force in setting up the British Ornithologists' Club.

According to Sclater (1909), who was on the BOU Committee at the time as editor of the *Ibis*, the driving force behind this proposal was undoubtedly Richard Bowdler Sharpe, the genial, sociable, enthusiastic and incredibly hard-working Curator of Birds at the British Museum (Natural History) (BMNH), South Kensington (Fig. 1). The Committee seemingly never formally met, possibly because Gainsborough rather inconveniently lived in Rutland, unlike the

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others who were London-based, but Sclater (1909) noted that much discussion of the pros and cons of the idea took place during the summer of 1892. As a result, the Inaugural Meeting of what was now called the British Ornithologists' Club (BOC) took place at the Mona Hotel, Henrietta Street, Covent Garden, on 5 October 1892, attended by 15 BOU members, who thereby became the founder members of the BOC (Table 1), and four guests, at which an initial set of rules for the Club was drawn up (Table 2).

As Sharpe (1893: iii) stated in his Preface to vol. 1 of the *Bulletin of the British Ornithologists' Club* (*Bull. Brit. Orn. Cl.*), the core reason for setting up the BOC was 'giving the Members of the British Ornithologists' Union an opportunity for meeting more frequently than the customary once a year'. At the inaugural meeting, it was decided that such regular meetings should occur monthly from October to June inclusive, i.e. nine per season (Table 3). Furthermore, as noted by Snow (1992: 1), 'Although the rules make no mention of it, the meetings, which were held at a London restaurant or hotel, included a dinner. Thus the Club had both a scientific and a social purpose'. From the beginning of 1893, the meeting place was moved from the Mona Hotel to the Restaurant Frascati, 32 Oxford Street (Table 3), where it remained for the rest of the first season. One other key point in the initial rules was the decision that 'an Abstract of the proceedings be printed as soon as possible after each Meeting' (Table 2), marking the start of publication of the *Bull. Brit. Orn. Cl.*, which has continued uninterrupted ever since.

The 15 founder members comprised a stimulating cross-section of professional and amateur ornithologists, the latter of whom varied in the degree to which they had a research

TABLE 1
Biographical details of the 15 BOU members who attended the inaugural meeting of the British Ornithologists' Club on 5 October 1892.

Surname	First names	Year of birth/ death	Year joined BOU	Where lived in 1892	1892–93 BOC meetings attended	*Ibis* obituary; biographical notice
Bidwell	Edward	1845–1929	1880	London	9	72: 132–133 (1930)
Blanford	William Thomas	*c.*1833–1905	1873	London	1	47: 643–647 (1905)
Crowley	Philip	1837–1900	1882	Croydon, Surrey	5	43: 352–353 (1901)
Graham	William	*c.*1850–97	1886	Crayford, Kent	3	39: 296 (1897)
Monk	Thomas James	*c.*1830–99	1890	Lewes, Sussex	1	42: 402 (1900)
Ogilvie-Grant	William Robert	1863–1924	1890	London	7	66: 774–780 (1924)
Penrose	Francis (Frank) George	1857–1932	1891	London	8	74: 690–691 (1932)
Salvadori Paleotti	Count Adelardo Tommaso	1835–1923	1872	London/Turin, Italy	3	66: 159–161 (1924)
Saunders	Howard	1835–1907	1870	London	9	50: 169–172 (1908); 50 (Jubilee Suppl.): 223–226 (1909)
Sclater	Philip Lutley	1829–1913	1858	London/Winchfield, Hants	8	55: 642–686 (1913); 50 (Jubilee Suppl.): 129–137 (1909)
Sclater	William Lutley	1863–1944	1891	Windsor, Berkshire	3	87: 115–121 (1945)
Seebohm	Henry	1832–95	1873	London	9	38: 159–162 (1896)
Sharpe	Richard Bowdler	1847–1909	1871	London	8	52: 352–358 (1910); 50 (Jubilee Suppl.): 199–201 (1909)
Wharton	Henry Thornton	1846–95	1878	London	2	38: 159 (1896)
Young	John	1838–1901	1878	London	4	44: 173–174 (1902)

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TABLE 2
The rules of the British Ornithologists' Club as proposed and adopted at the inaugural meeting on 5 October 1892 (*Bull. Brit. Orn. Cl.* 1: v, 1893).

I. That a Club be constituted, to consist of Members of the British Ornithologists' Union, and to be called the British Ornithologists' Club.
II. That any Member of the B. O. U. can become a Member of the Club by signifying his wish to do so to the Secretary, and paying a Subscription of *Five Shillings* for the Session.
III. That the Club shall meet on the third Wednesday in every month, from October to June inclusive, at times and places to be arranged by the Committee.
IV. That at the Meeting papers on Ornithological subjects be read, specimens exhibited, and discussion invited.
V. That an Abstract of the proceedings be printed as soon as possible after each Meeting, under the title of the 'Bulletin of the British Ornithologists' Club', and distributed gratis to every member. Copies of this monthly Abstract to be printed and sold at a shilling each.
VI. That R. BOWDLER SHARPE be appointed Editor of the 'Bulletin,' and HOWARD SAUNDERS Secretary and Treasurer to the Club.
VII. That the affairs of the Club shall be managed by a Committee of three members (to be elected, and one of whom is to be changed every year*); together with the Editor of 'The Ibis', the Editor of the 'Bulletin', and the Secretary and Treasurer, *ex officio*.

(* At the inaugural Meeting E. Bidwell, the Earl of Gainsborough, and H. Seebohm were the three Members elected.)

TABLE 3
The ten meetings (one inaugural, nine regular) during the first season of the British Ornithologists' Club, October 1892 to June 1893. *NB: Although no guests were formally noted as attending the 19 October meeting, at least two (G. E. Shelley, who became a member later during the first season, and F. W. Styan) were clearly present as they made presentations recorded in the published abstract of proceedings.

Meeting	Date	Place	Members present	Recorded guests	Total BOC membership
Inaugural	5 Oct 1892	Mona Hotel	15	4	15
1	19 Oct 1892	Mona Hotel	18	0*	60
2	16 Nov 1892	Mona Hotel	14	1	72
3	21 Dec 1892	Mona Hotel	18	3	78
4	18 Jan 1893	Restaurant Frascati	13	1	79
5	15 Feb 1893	Restaurant Frascati	15	3	
6	15 Mar 1893	Restaurant Frascati	9	3	
7	19 Apr 1893	Restaurant Frascati	15	5	
8	17 May 1893	Restaurant Frascati	16	0	
9	21 June 1893	Restaurant Frascati	16	2	85

and publishing interest in the subject. The professionals included Richard Bowdler Sharpe, in charge of the bird collections of the BMNH, his assistant and eventual successor, William Ogilvie-Grant, and the eminent zoologist Philip Lutley Sclater, trained in both mathematics and the law but with an abiding interest in natural history, who had been Secretary of the Zoological Society since 1859, published widely on zoology and had devoted much time also to editing the *Ibis*, journal of the BOU. His eldest son, William Lutley Sclater, was likewise a professional zoologist, having trained in natural sciences and subsequently worked in the Indian Museum in Calcutta; in 1892 he was back in Britain as a science master at Eton College, but would later become Director of the South African Museum in Cape Town.

Pre-eminent in publishing among those who, in the sense of how they had earned their main living, were amateurs comprised the merchant banker Howard Saunders, already by 1892 author of the hugely influential *An illustrated manual of British birds*, an authority on the Laridae and an enthusiastic committee man, and the steel manufacturer Henry Seebohm, renowned for his research on Russian and Japanese birds as well as on the Charadriidae. Although some founder members had spent extensive periods abroad, perhaps not

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surprisingly all but one were British, the exception being the esteemed Italian professional ornithologist Adelardo Luigi Salvadori Paleotti, Vice-Director of the Turin Museum and an honorary member of the BOU, who in 1892 was temporarily based in London while working with Bowdler Sharpe on a volume of the *Catalogue of birds in the British Museum*. More biographical details of each of the founder members can be found in their obituaries and, for a few individuals, other memoirs that were subsequently published in *Ibis* and are referenced in the final column of Table 1. They should each also be the subject of blogs scheduled to appear on the BOC website (https://boc-online.org) over the coming months.

Among the founder members, some attended few if any further meetings during the first season of the BOC's existence, but roughly half became very regular attendees (Table 1). In the case of Salvadori, he attended the first three meetings but then his ability to do so was cut short by his return to Italy towards the end of 1892. A further 47 individuals who had become BOC members after the inaugural meeting also attended subsequent meetings during the first season. Among these were three, the Hon. Walter Rothschild (owner of the Tring Museum), his bird curator Ernst Hartert, and the prominent ornithologist Captain G. E. Shelley, who had attended prior meetings as guests. Fourteen additional individuals were formally noted as attending purely as guests, although there were clearly also at least some others, as F. W. Styan and C. Hose certainly not only attended but spoke in the first regular meeting in late October 1892 without being so noted. One guest, E. Degen, was particularly notable for having been invited to be the sole speaker at the inaugural meeting, with his substantial contribution *On some of the main features in the evolution of the bird's wing* being published in full subsequently in *Bull. Brit. Orn. Cl.* with an extended introduction by another guest at this meeting, W. P. Pycraft (Degen 1894).

At the final meeting of the first season, in June 1893, the Treasurer could proudly state 'that out of 200 Members of the British Ornithologists' Union resident in the United Kingdom, no fewer than 85 had joined and paid their subscriptions to the B. O. Club since the first intimation of its formation.' (Saunders 1893). This is an impressive figure that points to a desire by BOU members, notably those within easy reach of London where all meetings were held, for increased social interaction with their ornithologically-minded contemporaries. Interestingly, the membership list published in July 1893 included only 84 names, with Salvadori not figuring (Anon. 1893); seemingly the fact of his now being resident abroad was the reason for this, as all members listed had British addresses.

The status of one individual mentioned above has as yet not been clarified: Charles William Noel Francis, third Earl of Gainsborough (1850–1926), who lived at Exton Park, Oakham, Rutland. He had succeeded to the Earldom in 1881 and had joined the BOU in 1886. Although clearly closely involved in events leading up to the founding of the BOC and listed as a member (Anon. 1893), he did not attend any meeting in the first season. Indeed, he is not recorded as attending one until a rare joint dinner meeting of the BOU and BOC which took place at the Restaurant Frascati on 16 May 1900. Thereafter, he appeared at very occasional BOC meetings, and even more rarely contributed a brief recorded comment on a talk or presentation. Thus, at the 24 May 1905 meeting, he added the following to a discussion on the apparent lack of scent of an incubating partridge: 'The Earl of Gainsborough observed that his old friend Grantley Berkeley fully 40 years ago had called his attention to the fact that sitting game-birds had no scent.' (Gainsborough 1905). He remained a member of the BOC until 1917 and further resigned from the BOU at its AGM in March 1922 (*Ibis* 64: 395). Alone among those intimately involved in the founding of the BOC, no obituary of him appeared in *Ibis* following his death in 1926.

Since its founding in 1892, well over 1,000 regular meetings of the BOC have occurred and been recorded in the *Bull. Brit. Orn. Cl.* Having been established at a time when both

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the British Empire was near its peak extent, with numerous British officials posted overseas for lengthy periods of time, and numerous new bird taxa were still being described, BOC meetings perhaps not surprisingly assumed a key role as a venue where returning, almost entirely amateur, ornithologists could meet with and present their specimen findings to British-based colleagues, some highly knowledgeable on taxonomy and identification. Likewise, overseas ornithologists who sent interesting specimen material to the BMNH could do so in the knowledge that novelties could rapidly be presented at BOC meetings by Bowdler Sharpe or Ogilvie-Grant and then formally published very quickly in the ensuing *Bull. Brit. Orn. Cl*. issue. Although with the demise of empire and the massive diminution of novel taxa to describe, the role of the BOC and its meetings has evolved, the Club remains an integral part of the worldwide ornithological scene.

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References:

Anon. (= Godman, F. C.) 1892. Anniversary Meeting of the British Ornithologists' Union, 1892. *Ibis* 34: 474–476.

Anon. 1893. List of members. 1892. *Bull. Brit. Orn. Cl*. 1: vi–ix.

Degen, E. 1894. On some of the main features in the evolution of the bird's wing. *Bull. Brit. Orn. Cl*. 2: vii–xxxi.

Gainsborough, Earl of. 1905. [The Earl of Gainsborough observed…]. *Bull. Brit. Orn. Cl*. 15: 77.

Saunders, H. 1893. [The Treasurer stated that…]. *Bull. Brit. Orn. Cl*. 1: liii.

Sclater, P. L. 1909. A short history of the British Ornithologists' Union. *Ibis* 50(Suppl. 1): 19–69.

Sharpe, R. B. 1893. Preface. *Bull. Brit. Orn. Cl*. 1: iii.

Snow, D. (ed.) 1992. *Birds, discovery and conservation: 100 years of the Bulletin of the British Ornithologists' Club*. Helm Information, Mountfield.

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Confusing female Taiwanese *Tarsiger* bush robins and designation of a lectotype for *Ianthia johnstoniae* Ogilvie-Grant, 1906

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Summary.—Recent research reveals that the original series, a male and female, used to describe *Ianthia johnstoniae* Ogilvie-Grant, 1906 (= Collared Bush Robin *Tarsiger johnstoniae*), held in the Natural History Museum, Tring, is mixed. The male is a Collared Bush Robin, but the female is an example of the morphologically very similar White-browed Bush Robin *T. indicus formosanus*. Because the syntypes represent two different species and in order to fix the identity on the universally understood taxonomic concept associated with *T. johnstoniae*, we select as its lectotype the unambiguously identified male specimen (NHMUK 1907.12.12.39).

Collared Bush Robin *Tarsiger johnstoniae* is endemic to the island of Taiwan and its male is arguably the most phenotypically distinctive member of its genus (Clement & Rose 2015). It is one of two bush robins that are resident on Taiwan, the other being White-browed Bush Robin *T. indicus*, which is represented by an endemic subspecies, *formosanus*, described by Collar (2005) as 'moderately distinctive' in plumage, but which a recent molecular phylogeny suggested was sufficiently different genetically to warrant treating at species rank (Wei *et al*. 2022); *T. i. formosanus* is also quite geographically disjunct. A third species, Red-flanked Bluetail *T. cyanurus*, is a non-breeding visitor to the island.

T. johnstoniae was described by Ogilvie-Grant (1906) from two specimens (syntypes), a male and female, collected in early 1906 by the professional zoological collector Walter Goodfellow (1866–1953) and now held at the Natural History Museum, Tring (NHMUK; Warren & Harrison 1971). *T. i. formosanus* was described by Hartert (1910) from specimens of both sexes (the male holotype and single male and female paratypes) collected on Mount Arizan, also in central Taiwan, and now held in the American Museum of Natural History, New York (LeCroy 2005). In particular, Hartert (1910) carefully distinguished how the female of his new taxon differed from the same sex of *T. johnstoniae*. Despite this, just two years later, Ogilvie-Grant (1912) described a third taxon, *Ianthia goodfellowi*, from the same locality, Mount Arizan. It too was based on single male and female specimens obtained by Goodfellow and now held at NHMUK (Warren & Harrison 1971). Perhaps unsurprisingly, *I. goodfellowi* very quickly fell into the synonymy of *T. i. formosanus*; it is not even mentioned in the relevant volume of the Peters checklist (Ripley 1964).

In the original description of *Ianthia johnstoniae*[1], Ogilvie-Grant (1906) reported that he had both a male and female, provided descriptions and measurements of both, and stated that Mt. Morrison is the new species' 'habitat' (= type locality). Finally, he mentioned that he was naming the new species 'in honour of Mrs. Johnstone', i.e., Marian Ada Johnstone (1870–1954), an English aviculturist (Jobling 2010). In a subsequent paper, published one

[1] *Erithacus taiwan* Hachisuka, 1953, *Bulletin of the British Ornithologists' Club* 73: 33, nom. nov. for *Ianthia johnstoniae* Ogilvie-Grant, nec *Pogonocichla johnstoni* Shelley, 1893. However, the latter two names are not homonyms, meaning that Ogilvie-Grant's nomen is not preoccupied by Shelley's, even when they are placed in the same genus, thus Hachisuka's intervention was unwarranted (Ripley 1964).

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year later, Ogilvie-Grant and La Touche (1907) noted that the 'types of the species' were collected in the Racu Racu Mts. (the male) and on Mt. Morrison (the female), in February and January 1906, respectively, both at 8,000 ft. Chang & Severinghaus (1979) clarified that the first-named locality probably corresponds to the range between Tung Pu Hot Springs and Patungkuan in Nantou County. Under the Code (ICZN 1999), Art. 73.2.3 states that 'if the syntypes originated from two or more localities...the type locality encompasses all of the places of origin.'

In September 2023, as part of a planned revision of the Collared Bush Robin account for *Birds of the world* (Kirwan *et al*. 2024), GMK searched for the female syntype of Ogilvie-Grant's nomen *Ianthia johnstoniae*. It (NHMUK 1907.12.12.40, sequential with the male syntype, which is NHMUK 1907.12.12.39) was eventually located among the specimens of *T. i. formosanus*, one of its labels having been modified to read '*Ianthia goodfellowi*' (Fig. 1). Rather remarkably, the female syntype of *I. goodfellowi* had at some time in the past been discovered among the tray of *T. johnstoniae*, where it had been correctly identified as Ogilvie-Grant's other syntype; this specimen is NHMUK 1913.1.29.52 (i.e. sequential with the male syntype of *I. goodfellowi*, NHMUK 1913.1.29.51, which was listed by Warren & Harrison 1971). In both cases, the accompanying label data further satisfactorily identified these female specimens as the relevant syntypes of *Ianthia johnstoniae* and *I. goodfellowi*, respectively.

Separating females of the two *Tarsiger* species on Taiwan can be difficult (e.g., Brazil 2009, Clement & Rose 2015, Hsiao & Li 2017, Kirwan *et al*. 2024). As emphasised by several

Figure 1. Female syntype of Collared Bush Robin *Tarsiger johnstoniae*, collected by Walter Goodfellow at 8,000 ft. [*c*.2,440 m] on Mt. Morrison, Taiwan, in January 1906, and held in the Natural History Museum, Tring (NHMUK 1907.12.12.40); herein reidentified as a female White-browed Bush Robin *T. indicus formosanus* (Jonathan Jackson, © Trustees of the Natural History Museum, London)

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Figure 2. Female syntypes of *Ianthia goodfellowi* (a synonym of White-browed Bush Robin *T. indicus formosanus*) (NHMUK 1913.1.29.52; left; for collection details, see main text) and Collared Bush Robin *Tarsiger johnstoniae* (NHMUK 1907.12.12.40; for collection details, see Fig. 1), showing their identically coloured undertail-coverts (Guy M. Kirwan, © Trustees of the Natural History Museum, London)

of these works, and indeed Hartert (1910) when he described *formosanus*, the single most reliable feature is the colour of the undertail-coverts: white or principally whitish in *T. johnstoniae* and yellowish buff in *T. i. formosanus*. Based on this, it seems clear that both the female syntype of *Ianthia goodfellowi* Ogilvie-Grant, 1912, and the female syntype of *Ianthia johnstoniae*, Ogilvie-Grant, 1906, are representatives of the same taxon, namely that now known as *T. i. formosanus* (see Fig. 2). It is conceivably odd that Hartert (1910) did not notice this, although certainly not as strange as Ogilvie-Grant (1912) so swiftly publishing a straight synonym of Hartert's name. Published mensural data (Clement & Rose 2015, Severinghaus *et al*. 2017) do not suggest that biometrics can be used to help identify a single individual. Although it has been claimed that the two Taiwanese *Tarsiger* species occasionally hybridise (Severinghaus & Severinghaus 1984, Severinghaus *et al*. 2017), which might potentially make females even harder to identify, to date assumed hybrids have been individuals exhibiting only rudimentary male features, including a black throat, black cheeks, and a few rusty feathers on the scapulars Kirwan *et al*. 2024). According to Kirwan *et al*. (2024), ringing data have revealed such individuals to be not rare and all are female, meaning that they are presumably older females that have acquired male characteristics, rather than hybrids.

That the original series of *Ianthia johnstoniae* is mixed becomes less surprising when one recalls that the two syntypes were collected an unknown number of weeks apart and at quite different localities (Ogilvie-Grant & La Touche 1907). Furthermore, in recounting the 'discovery' of *Ianthia goodfellowi*, Ogilvie-Grant (1912) reported that Goodfellow had found the two species of bush robins syntopically and had initially thought that the white-browed

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Figure 3. Male lectotype of Collared Bush Robin *Tarsiger johnstoniae*, collected by Walter Goodfellow at 8,000 ft. [*c*.2,440 m] in the Racu Racu Mts., Taiwan, in February 1906, and held in the Natural History Museum, Tring (NHMUK 1907.12.12.39) (Jonathan Jackson, © Trustees of the Natural History Museum, London)

males were young males of *johnstoniae*, whereas in reality they were just representatives of Hartert's recently described taxon, *formosanus*.

Warren & Harrison (1971: 276) identified the two syntypes of *Ianthia johnstoniae* listed by Ogilvie-Grant & La Touche (1907), and provided details of the adult male collected by Walter Goodfellow at 8,000 ft. [*c*.2,440 m] in the Racu Racu Mts. in February 1906 (NHMUK 1907.12.12.39). It was subsequently placed in one of the type collection cabinets at Tring, and given a red 'Type' label. Because it was not formally designated as a lectotype (Warren & Harrison specifically mentioned that 'the female syntype is also in the collection'), the adult male maintained the same nomenclatural status as the other syntype of *I. johnstoniae* (Arts. 72.4.7 and 74.5; ICZN 1964, 1999). In light of the revelation that the syntypes represent two different species and in order to fix the identity on the universally understood taxonomic concept associated with *Tarsiger johnstoniae*, we select as its lectotype the unambiguously identified male specimen (NHMUK 1907.12.12.39; Fig. 3) collected in the Racu Racu Mts. and listed by Warren & Harrison (1971). This designation satisfies Arts. 74.7.1, 74.7.2 and 74.7.3 (both original and amended versions; ICZN 1999, 2003), as well as being in accord with Recommendations 74A and 74C. It results in NHMUK 1907.12.12.40 becoming a paralectotype of *I. johnstoniae*, irrespective of its taxonomic identity. This designation fixes the identity of *I. johnstoniae* and maintains stability of this nomen, thereby fulfilling a primary objective of the International Commission on Zoological Nomenclature to promote stability of scientific names (ICZN 1999). In contrast, selecting the female (NHMUK 1907.12.12.40) as the lectotype would be exceptionally and needlessly disruptive nomenclaturally as the

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taxon currently known as *T. i. formosanus* would become *T. johnstoniae*, while the current species *johnstoniae* would require a new name.

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References:

Brazil, M. 2009. *Birds of East Asia: eastern China, Taiwan, Korea, Japan and eastern Russia*. Christopher Helm, London.

Chang, W. F. & Severinghaus, S. R. 1979. Notes on the Yellow Tit *Parus holsti* of Taiwan with discovery of its nest. *Bull. Brit. Orn. Cl*. 99: 54–56.

Clement, P. & Rose, C. 2015. *Robins and chats*. Christopher Helm, London.

Collar, N. J. 2005. Collared Bush-robin (*Tarsiger johnstoniae*). P. 755 *in* del Hoyo, J., Elliott, A. & Christie, D. A. (eds.) *Handbook of the birds of the world*, vol. 10. Lynx Edicions, Barcelona.

International Commission for Zoological Nomenclature (ICZN) 1964. *International code of zoological nomenclature*. Second edn. The International Trust for Zoological Nomenclature, London.

International Commission for Zoological Nomenclature (ICZN) 1999. *International code of zoological nomenclature*. Fourth edn. The International Trust for Zoological Nomenclature, London.

International Commission for Zoological Nomenclature (ICZN) 2003. Declaration 44. Amendment of Article 74.7.3. *Bull. Zool. Nomencl*. 60: 263

Hartert, E. 1910. [Exhibition of a new subspecies of flycatcher (*Tarsiger indicus formosanus*) from central Formosa]. *Bull. Brit. Orn. Cl*. 25: 32–33.

Hsiao, M. C. & Li, C. L. 2017. *A field guide to the birds of Taiwan*. Wild Bird Society of Taipei, Taipei.

Jobling, J. A. 2010. *Helm dictionary of scientific bird names*. A. & C. Black, London.

Kirwan, G. M., Su, M.-R., Pyle, P. & Collar, N. 2024. Collared Bush-Robin (*Tarsiger johnstoniae*), version 1.1. *In* Kirwan, G. M. (ed.) *Birds of the world*. Cornell Lab of Ornithology, Ithaca, NY. https://doi.org/10.2173/bow.cobrob1.01.1 (accessed 20 January 2024).

LeCroy, M. 2005. Type specimens of birds in the American Museum of Natural History. Part 6. Passeriformes: Prunellidae, Turdidae, Orthonychidae, Timaliidae, Paradoxornithidae, Picathartidae, and Polioptilidae. *Bull. Amer. Mus. Nat. Hist*. 292: 1–132.

Ogilvie-Grant, W. R. 1906. [On new species from central Formosa]. *Bull. Brit. Orn. Cl*. 16: 118–123.

Ogilvie-Grant, W. R. 1912. Further notes on the birds of the island of Formosa. *Ibis* (9)6: 643–657.

Ogilvie-Grant, W. R. & La Touche, J. D. D. 1907. On the birds of the island of Formosa. *Ibis* (9)1: 151–198.

Ripley, S. D. 1964. Subfamily Turdinae, thrushes. Pp. 13–227 *in* Mayr, E. & Paynter, R. A. (eds.) *Check-list of birds of the world*, vol. 10. Mus. Comp. Zool., Cambridge, MA.

Severinghaus, L. L. & Severinghaus, S. R. 1984. Possible hybridization in wild bush robins of the genus *Tarsiger* (Turdidae). *Wildbird* 1: 141–148.

Severinghaus, L. L., Ding, T. S., Fang, W. H., Lin, W. H., Tsai, M. C. & Yen, C. W. 2017. *The avifauna of Taiwan*, vol. 3. Forestry Bureau, Council of Agriculture, Taipei.

Warren, R. L. M. & Harrison, C. J. O. 1971. *Type-specimens of birds in the British Museum (Natural History)*, vol. 2. British Museum (Natural History), London.

Wei, C., Sangster, G., Olsson, U., Rasmussen, P. C., Svensson, L., Yao, C.-t., Carey, G. J., Leader, P. J., Zhang, R., Chen, G., Song, G., Lei, F., Wilcove, D. S., Alström, P. & Liu, Y. 2022. Cryptic species in a colorful genus: integrative taxonomy of the bush robins (Aves, Muscicapidae, *Tarsiger*) suggests two overlooked species. *Mol. Phylo. & Evol*. 175: 107580.

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