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Source: Bulletin of the British Ornithologists' Club, 144(1) : 3-18

Published By: British Ornithologists' Club

URL: <https://doi.org/10.25226/bboc.v144i1.2024.a2>

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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 1811¹, 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).

Камень), also called Сивучий (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), murrelets (*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.

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



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>).

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



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)





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).



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

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)

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 ‘Pestshaniy 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*



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)



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



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)



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)

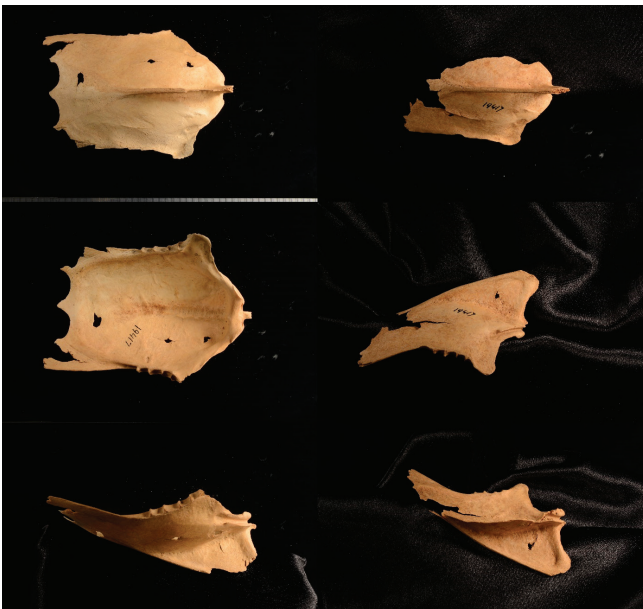


Figure 15. Sterna from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 19417); scale bars in mm (© J. Watanabe)

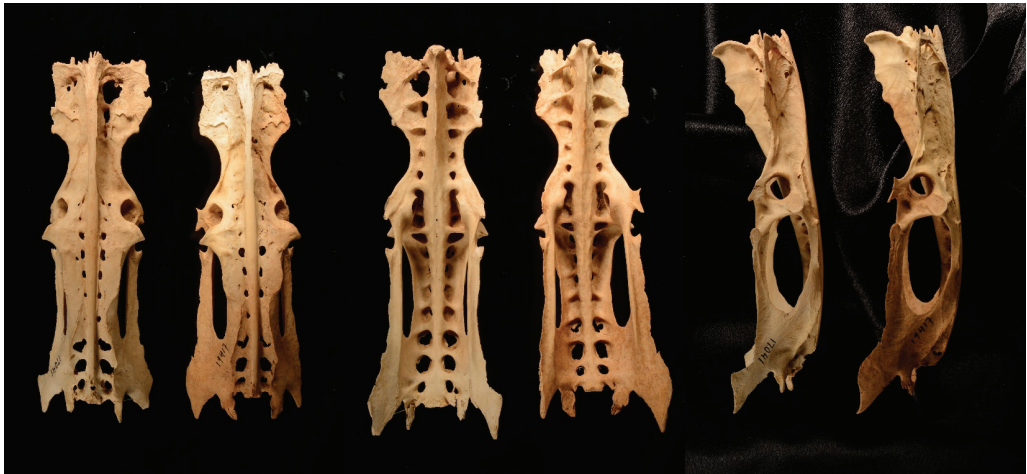


Figure 16 (above). Pelvic girdles from Spectacled Cormorants *Urile perspicillatus* in the National Museum of Natural History, Washington, DC (USNM 17041 and USNM 19417); scale bars in mm (© J. Watanabe)

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



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 Gavriľovič 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.

Acknowledgements

We thank Alexandre Aleixo at the Finnish Museum of Natural History, Pepijn Kamminga at the Naturalis Biodiversity Center, Martin Päckert at Senckenberg Natural History Collections, Stanislav Samsonov at the Laboratory for Historical Ecology in the A. N. Severtsov Institute of Ecology and Evolution, and Vadim Vysotsky at the Zoological Institute of the Russian Academy of Sciences for their significant contributions to our research and ongoing curation of materials. Junya Watanabe was instrumental in providing expert assessment of bone materials in Japan and the USA, and Yuri Artukhin provided valuable references. We thank Katherin Arndt and Joe Antensen of the Alaska Historical Society for helping us investigate the history of biological specimens in Alaska, Ramin Eghbal of Linnaeus University for providing skilled translation of old Swedish texts, and the Natural History Museum Library & Archives (Alison Harding, Cat O'Carroll, and Kathryn Rooke) for assistance with finding references. Transliteration of Russian names follows ISO 9:1995 (ISO 1995). Comments from Julian Hume and Jiří Mlíkovský were invaluable in revising the submitted manuscript.

References:

- Alekseev, A. I. 1987. *The odyssey 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.

- 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 (*Compsohalieu* [*Nannopterum*] *harrisi*): heterochrony, gigantism 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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