Extinct and endangered ('E&E') birds in the ornithological collections of the Musée de la Vallée, Barcelonnette, France, with comments on a Siberian Crane Leucogeranus leucogeranus egg

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Extinct and endangered ('E&E') birds in the ornithological collections of the Musée de la Vallée, Barcelonnette, France, with comments on a Siberian Crane *Leucogeranus leucogeranus* egg

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Summary.—The Musée de la Vallée in Barcelonnette, France, houses two privately assembled ornithological collections totalling 1,405 mounted birds and 1,686 eggs, mostly from the 19th century. According to the current IUCN Red List of threatened species, the mounts and eggs represent 36 and 18 extinct or endangered ('E&E') bird species, respectively. This article concentrates on the specimens of 'E&E' species that deserve special curatorial care. The list includes one extinct and six threatened species. Special mention is made of a Siberian Crane *Leucogeranus leucogeranus* egg that is apparently one of the oldest of this species in the world's collections. In addition to IUCN status, the EDGE score of each species is also specified.

The fundamental role played by natural history museums in the dissemination of knowledge is of ever greater importance in this era of global threats to biodiversity (Collar *et al*. 2003, Bauernfeind *et al*. 2010, Webster 2017, Miller *et al*. 2020). Museum collections provide essential historical data for understanding the spatial evolution and historic demography of birds (e.g. Beissinger & Peery 2007), and are important in the implementation of effective conservation measures for species with declining populations. Ecologists and conservationists need to know 'what is where' in museum collections. Therefore, as suggested by Cooper & Steinheimer (2003), museums should publish catalogues of extinct or endangered ('E&E') avian species. For extinct taxa, museum specimens are irreplaceable and special care is required (Adams *et al*. 2003). The 5,000,000 bird eggs in the world's museums are an invaluable and underused resource (Kiff 2005, Marini *et al*. 2020), but they have enabled decisive discoveries that have improved protection of threatened birds (see, e.g., Ratcliffe 1967, Hickey & Anderson 1968). Therefore lists of eggs belonging to 'E&E' species are also of value.

The Musée de la Vallée, Barcelonnette, France (hereafter MDLV) houses two ornithological collections comprising mounted specimens and eggs, which were thoroughly inventoried between 2012 and 2019 (Gouraud 2012, 2015, 2019). They are briefly presented below.

The ornithological collections of the Musée de la Vallée

The Caire-Chabrand collection was initiated by Joseph-Adolphe Caire (1809–84), also known as the 'abbé des Oiseaux' (Arnaud 1904) whose goal was to possess a pair of all European species, as well as an example of their eggs. Three years before Caire died, his nephew-in-law Emile Chabrand (1843–93) acquired the collection. Chabrand was a passionate naturalist who enriched the collection with birds he traded or collected during his journeys, especially a round-the-world trip in 1882–83 (Chabrand *et al*. 2008). As his

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collection grew, in 1886 Chabrand constructed a dedicated repository intended for its public display. After his death in 1893, the collection passed to the municipality. The Caire-Chabrand collection comprises 880 mounts of 487 species, and 1,178 identified eggs from a total of 1,426 representing 318 species (GBIF dataset).

The Berlie collection was started by Pierre Berlie (1832–1914), a teacher near Barcelonnette, and continued by his son Antoine (1864–1934), also a teacher. Like Caire, the Berlies aimed to assemble a collection of European birds and their eggs. The collection remained in the family home until April 2019, when the great-granddaughter of Pierre Berlie reached an agreement with the MDLV's director to deposit the collection in the museum. The Berlie collection holds 525 mounted specimens of 396 species, and 249 identified eggs (from a total of 260) of 102 species (GBIF dataset).

Two manuscript catalogues list the species in the Caire-Chabrand collection. The first, dated 29 September 1881, is the notarial deed prepared when Emile Chabrand acquired the Caire collection[1]. This consists of three columns for each species giving (1) the number of mounts, (2) the French vernacular name, and (3) the number of eggs. The second catalogue, dated 1894, was prepared by Pierre Berlie following the death of Emile Chabrand. It comprises different lists of all natural history and ethnological items present in the collection at that time. Non-European species are listed separately (other than a very small number that were included in the European list). A list of *c*.30 mounts that reached MDLV between 1896 and 1911 completes the catalogue; 16 were located during the recent inventory, including an Andean Condor *Vultur gryphus* (1899) and one of two Egyptian Vultures *Neophron percnopterus* (from 1908) (see Table 1). Pierre Berlie also produced a handwritten catalogue of species in his own collection. Dated 1902, this may be incomplete as it was prepared 12 years before Pierre's death and 32 years before Antoine's. Moreover, some sheets are loose pages and as a result others may have been lost. It contains several lists. The main one appears to be the list of European species; it consists of several columns, with the French vernacular name, the sex, the number of birds, and a price[2]. A second list is dedicated to exotic and non-European species, and gives only the number and sex of specimens of each species.

French vernacular names used in Chabrand's and Berlie's catalogues are sometimes too vague for clear identification. In addition, neither of these catalogues provides information on the collector or the date and locality of collection. Finally, study and comparison of these catalogues with the contents of the collections sometimes show certain inconsistencies (for example, for some species the 1881 list mentions a single egg and the 1894 list none, when there are in fact two in the collection).

Some specimens (both mounts and eggs) bear a label with the species name and sometimes a locality; very few give more detailed information. Both collections have faced several relocations, which explains how labels have been lost, some eggs were broken and shells of different species were mixed, all of which can hinder identification (especially some passerine eggs of the same genus or family). Generally, the eggs of relatively few species can be identified by the appearance of the shell alone. Without original data, identification of eggs to species can be very difficult, if not impossible, and even with them identification can be debated if an adult was not positively observed at the nest (which is not always noted on the labels). Moreover, the authenticity of many eggs supplied by dealers is doubtful. Much caution is therefore required in identification. However, it now seems

[1] Record in the Digne-les-Bains archives under classification no. 2E 22 161.

[2] No indication is given as to whether this is the price paid to acquire the specimens, or the price at which they were offered for sale. Shortly before his death in 1934, Antoine Berlie sought to part with the collection (Rochon-Duvigneaud 1934: 143). It is not known whether this was already the case in 1902.

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TABLE 1

List of the 39 extinct and endangered ('E&E') bird species (mounts and eggs) in the Musée de la Vallée ornithological collections. * in the EDGE score column refers to the 16 species whose EDGE score has been recalculated following changes in their IUCN status since Jetz *et al*. (2014). The taxonomy of Velvet Scoter *Melanitta fusca* and Italian Sparrow *Passer italiae* have also changed since the publication of Jetz *et al*. (2014): the former was previously considered a polytypic species (now split), whereas the latter was considered as a subspecies of either House Sparrow *Passer domesticus* or Spanish Sparrow *P. hispaniolensis*. The EDGE score provided by Jetz *et al*. (2014) for these two species is therefore no longer representative of current taxonomy and is replaced by 'Taxo'.

Family	Species	English name	IUCN (2020)	EDGE score	No. of mounts	No. of eggs
Anatidae	*Oxyura leucocephala*	White-headed Duck	EN	3.95	3	6
	Clangula hyemalis	Long-tailed Duck	VU	3.59	4	3
	Marmaronetta angustirostris	Marbled Teal	VU	3.44	2	1
	Aythya ferina	Common Pochard	VU	2.44 *	1	3
	Melanitta fusca	Velvet Scoter	VU	Taxo	2	1
Podicipedidae	*Podiceps auritus*	Horned Grebe	VU	4.32 *	2	1
Columbidae	*Ectopistes migratorius*	Passenger Pigeon	EX	N/A	1	0
	Streptopelia turtur	European Turtle Dove	VU	3.11 *	4	1
	Goura cristata	Western Crowned Pigeon	VU	4.07	1	0
Gruidae	*Leucogeranus leucogeranus*	Siberian Crane	CR	5.16	0	1
Otididae	*Chlamydotis undulata*	African Houbara	VU	4.55	2	0
	Otis tarda	Great Bustard	VU	4.55	1	2
Hydrobatidae	*Hydrobates leucorhous*	Leach's Storm Petrel	VU	4.45 *	1	1
Diomedeidae	*Diomedea exulans*	Wandering Albatross	VU	3.17	0	1
Procellariidae	*Puffinus yelkouan*	Yelkouan Shearwater	VU	3.47	1	0
Ardeidae	*Agamia agami*	Agami Heron	VU	4.24	1	0
Charadriidae	*Vanellus gregarius*	Sociable Lapwing	CR	5.23	2	1
Laridae	*Rissa tridactyla*	Black-legged Kittiwake	VU	3.20 *	3	3
	Larus audouinii	Audouin's Gull	VU	2.50 *	1	0
Alcidae	*Fratercula arctica*	Atlantic Puffin	VU	3.37 *	3	3
Strigidae	*Nyctea scandiaca*	Snowy Owl	VU	3.65 *	1	0
Cathartidae	*Vultur gryphus*	Andean Condor	VU	5.19 *	1	0
Accipitridae	*Neophron percnopterus*	Egyptian Vulture	EN	5.44	2	1
	Clanga clanga	Greater Spotted Eagle	VU	3.20	3	0
	Aquila rapax	Tawny Eagle	VU	3.16 *	1	0
Bucerotidae	*Buceros r. rhinoceros*	Rhinoceros Hornbill	VU	4.05 *	1	0
Strigopidae	*Nestor m. meridionalis*	Kaka	EN	5.09	1	0
Cacatuidae	*Cacatua s. sulphurea*	Yellow-crested Cockatoo	CR	4.61	1	0
	Cacatua moluccensis	Salmon-crested Cockatoo	VU	3.37	1	0
Psittacidae	*Amazona v. vittata*	Puerto Rican Amazon	CR	4.12	1	0
Tityridae	*Iodopleura pipra*	Buff-throated Purpletuft	EN	4.50 *	1	0
Laniidae	*Lanius meridionalis*	Southern Grey Shrike	VU	3.05 *	1	7
Alaudidae	*Chersophilus duponti*	Dupont's Lark	VU	4.14 *	1	0

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Acrocephalidae	*Acrocephalus paludicola*	Aquatic Warbler	VU	3.44	5	2
Passeridae	*Passer italiae*	Italian Sparrow	VU	Taxo	1	0
Emberizidae	*Emberiza aureola*	Yellow-breasted Bunting	CR	4.55 *	0	1
Icteridae	*Leistes defilippi*	Pampas Meadowlark	VU	3.12	1	0
	Euphagus carolinus	Rusty Blackbird	VU	3.09	1	0
	Xanthopsar flavus	Saffron-cowled Blackbird	EN	3.54 *	1	0
Totals					60	39

possible to extract DNA from even a tiny fragment of shell (Birkhead 2016: 19). Hopefully, the development of molecular techniques will help identify eggs without original data (thereby underlining the importance of preserving unlabelled oological material that is sometimes considered—wrongly—to be 'scientifically worthless'). Larger eggs at MDLV usually have inscriptions on their shells, whilst smaller eggs are identified on a separate label (some with information, often a number, also on the shell). I systematically tried to confirm the species mentioned on the original inscriptions by comparing their appearance and dimensions with those of eggs of the species in the literature (plates in Cramp *et al*. 1977–94, Walters 1995, Harrison & Castell 2002)[3].

Although all continents, except Antarctica, are represented in both of the two collections, the birds and their eggs are of species that predominantly occur in Western Europe. Because the Berlies never travelled abroad, it is probable that exotic or non-European species in their collection were obtained via exchanges or purchases with other naturalists or dealers.

I present here the catalogue of 'E&E' bird species, including eggs, in MDLV. According to the Red List of threatened species (IUCN 2021), the MDLV ornithological collections house 60 mounts of extinct and threatened birds comprising one extinct species (a single specimen) and 35 threatened taxa, of which three are Critically Endangered (CR), five Endangered (EN) and 27 Vulnerable (VU). Among eggs, a total of 39 units comprising 18 threatened species, of which three are CR, two EN and 13 VU are held at MDLV (Table 1). From this list, I provide additional information for seven species that meet the following criteria. As with the Baillon collection (Gouraud 2014), I have detailed mounts and eggs of all Critically Endangered species at MDLV because of their small number. In addition to the criteria applied by Adams *et al*. (2003: 341) to the EN and VU categories, I have elected to also detail species with either (1) a restricted geographic range, either Extent of Occurrence or Area of Occupancy (IUCN criterion B), or (2) a small and declining population (IUCN criterion C). Just one species is involved (Buff-throated Purpletuft *Iodopleura pipra*) of which the number of mature individuals is estimated to be fewer than 2,500 and the number of individuals in the largest subpopulation <250 (i.e. IUCN criterion C2a(i), see BirdLife International 2016).

An important parameter for ecologists and conservationists is the 'originality' of a species, expressed as a measure of its genetic isolation (measured in My). This parameter, first developed for mammals by Isaac *et al*. (2007), then extended to birds by Jetz *et al*. (2014), combines the global threat level (or extinction risk, i.e. IUCN status) and results in an estimate of a species' expected loss of evolutionary history per unit of time. The result (termed the Evolutionary Distinctiveness and Globally Endangered, or EDGE, score) 'incorporates a species value of originality, or irreplaceability, weighted by the urgency of

[3] Photos of eggs held in the oological collection at the Zoological Museum, Moscow Lomonosov State Univ. are at http://www.fotoparus.com/photogalery, and were used to compare eggs of species that breed in Russia.

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action' (Reilly 2018: 108) and is complementary to IUCN status but EDGE species do not include extinct taxa. I have added EDGE scores according to the list prepared by Jetz *et al*. (2014: Table S1). For a consistent assessment of the EDGE scores presented below, note that those calculated by Jetz *et al*. (2014) ranged from 0.58 (species with a low level of threat and low degree of genetic isolation) to 6.83 (species with a high degree of genetic isolation), and a 95th percentile of 3.94 (based on 9,993 bird species; mean = 2.31 and median = 2.13). The IUCN status of 16 species had changed since Jetz *et al*. (2014). I recalculated and updated their respective EDGE scores following equation (1) in Isaac *et al*. (2007: 2).

Photographs of the mounts can be viewed in the respective GBIF database by following the hyperlinks attached to the inventory numbers. Eggs were not photographed, except the Siberian Crane *Leucogeranus leucogeranus* egg for the purpose of this study. The taxonomy and nomenclature of del Hoyo & Collar (2014, 2016) are employed for the Caire-Chabrand and the Berlie collections, and are followed here. IUCN status is that in the IUCN Red List of threatened species website (https://www.iucnredlist.org) during the inventory and updated on 15–23 December 2020. I present and discuss data from original labels, where possible, in relation to information provided in the catalogues dated 1881, 1894 and 1902.

Extinct species

COLUMBIDAE

PASSENGER PIGEON *Ectopistes migratorius*

Columba migratoria Linnaeus, 1766

MDLV.2012.0.429; mount, adult male, Caire-Chabrand collection. *Catalogue 1881*.—'Colombe voyageuse'. *Catalogue 1894*.—'Colombe voyageuse'.

Remarks.—This mount bears a Chabrand label that merely states 'Colombe voyageuse', or 'passenger dove'. It is unknown when and where it was collected, and from whom it was obtained. I am confident that it is the bird mentioned in the 1881 catalogue, and therefore collected prior to that date. At least 1,532 skins in museums worldwide were reported in the early 1960s (Hahn 1963) to which at least three more can be added: one in the Baillon collection of La Châtre (Gouraud 2014), another in the ornithological collection of Abbeville museum (pers. obs.), and that mentioned here. The 1902 catalogue mentions a 'Colombe voyageuse' which indicates that another bird was held in the Berlie collection. The whereabouts of the latter is unknown.

Threatened species

GRUIDAE

SIBERIAN CRANE *Leucogeranus leucogeranus* CR / EDGE score: 5.16

Grus leucogeranus Pallas, 1773

MDLV.2015.0.4; egg, measurements 95.53 × 57.45 mm, Caire-Chabrand collection (Fig. 1). *Catalogue 1881*.—Not mentioned. *Catalogue 1894*.—Two mounts (male and female) listed under 'Grue leucogérone / Grus leucogeranus' with the comment 'manquant [missing]'. No egg is mentioned.

Remarks.—The only inscription on the egg reads 'Grus leucogeranos'. It appears twice, once in pencil, and again on a small label pasted on the shell, apparently in different handwriting (Fig. 1). Although no egg is mentioned in the 1881 and 1894 catalogues, it was almost

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certainly part of the Caire-Chabrand collection when Emile Chabrand died in 1893. After his death, very few natural history objects were added to the collection (*c*.30 mounts—and no eggs—between 1896 and 1911). Moreover, this is not the only case where a specimen (mount or egg) is present but not listed in the 1894 catalogue. For example, the 1881 catalogue mentions a single egg of Common Crane *Grus grus*, but the 1894 catalogue none. However, the collection has two, one dated '1853' and which is the egg mentioned in 1881.

Siberian Crane eggs do not appear to be common in world oological collections and the majority appear to have been collected post-1900 (Appendix). Of 93 Siberian Crane eggs reported in collections, 73 were laid in captivity, and according to their labels only 16 are of wild provenance. The other four, including MDLV.2015.0.4, are of unknown origin. Although the *Siberian Crane studbook* gives 1905 as the date of the first captive Siberian Cranes (Kashentseva & Belterman 2009), Lord Lilford had this species in his aviaries as early as 1893 (Lilford 1903: 284). The first eastern and western Siberian Crane nests seem to have been discovered in 1960 and 1981, respectively (P. Tomkovich *in litt*. 2021, *fide* Vorobyev 1963 and Sorokin & Kotyukov 1982, respectively). The origin of any egg said to have been collected in the wild pre-1960 therefore appears questionable and further research is needed.

On his return from the North Cape in 1890, Chabrand made a short stopover in St. Petersburg (24–27 July) and Moscow (28–30 July). During his travels Chabrand frequently visited museums and sometimes met their directors or curators (Homps 2010). He visited the 'Parc zoologique' of St. Petersburg (probably what is now the St. Petersburg Zoo)

Figure 1. Egg of Siberian Crane *Leucogeranus leucogeranus* (MDLV.2015.0.4) showing the two different inscriptions (© Aurélie Béranger / Musée de la Vallée)

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on 25 July, and the 'Musée de l'Industrie' in Moscow (where he saw a mammoth, genus *Mammuthus*) on 29 July. Chabrand's diaries[4] do not specify if he met the curators or directors, or if he obtained specimens or eggs (during this period, Valentin Bianchi was one of the curators at the Imperial Academy of Sciences, St Petersburg; see Appendix). Although the provenance of MDLV.2015.0.4 is unclear, it is reasonable to hypothesise a captive origin. With a laying date prior to 1 September 1893 (and the death of Emile Chabrand), this egg seems to be, if not one of the first obtained, at least one of the oldest in the world's collections. Moreover, in addition to one at Muséum d'Histoire naturelle de Toulouse (Appendix), that in the Caire-Chabrand collection appears to be the second egg known in France (the Paris museum does not possess any eggs of this species; J. Fuchs *in litt*. 2021).

As mentioned in the 1894 catalogue, the two bird specimens are no longer part of the collection, and their whereabouts are unknown.

CHARADRIIDAE

SOCIABLE LAPWING *Vanellus gregarius* CR / EDGE score: 5.23

Charadrius gregarius Pallas, 1771

MDLV.2012.0.275; mount, adult male, Caire-Chabrand collection.

MDLV.2012.0.276; mount, adult female, Caire-Chabrand collection.

MDLV.2015.0.118; egg, measurements 45.51 × 31.38 mm, Caire-Chabrand collection. *Catalogue 1881*.—Two 'Vanneau social [Sociable Lapwing]'; no egg mentioned. *Catalogue 1894*.—Two 'Vanneau social / Vanellus gregarius' (male and female); one egg mentioned.

Remarks.—The mounted male and female bear Chabrand labels that state 'Vanneau social male / Vanellus gregarius Europe / 1881' and 'Vanneau social femelle / Vanellus gregarius Europe / 1881', respectively. The geographical definition of 'Europe' is vague. It is also unknown if 1881 was the year of collection or acquisition, but they were presumably collected before 31 December 1881. The egg bears a handwritten note that states 'Vanneau / social' and a label pasted to its shell inscribed 'Van[ellus]. gregarius Wolga'. The latter suggests that the egg was taken near the Volga River, which traverses three Russian federal districts (Central, Volga and Southern). Because the egg is mentioned only in the 1894 catalogue, and not 1881, it is reasonable to suggest that it reached the Caire-Chabrand collection between these years; the date of collection, however, could be earlier than 1881.

CACATUIDAE

YELLOW-CRESTED COCKATOO *Cacatua sulphurea sulphurea* CR / EDGE score: 4.61

Psittacus sulphureus J. F. Gmelin, 1788

MDLV.2012.0.432; mount, adult; Caire-Chabrand collection. *Catalogue 1881*.—No precise mention of the species, but '10 perroquets [10 parrot species]' are mentioned. *Catalogue 1894*.—A 'Cacatua à huppe jaune [Yellow-crested Cockatoo]' is mentioned.

[4] These consist of two notebooks, which are still in the family archives of Chabrand's descendants and are therefore not at MDLV. They are known as 'Carnets de voyage d'Émile Chabrand, 1890. Private collection, Barcelonnette'. Surprisingly, natural history information is almost absent from these notebooks and there is no mention of the acquisition of any ornithology specimens.

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Remarks.—The mount lacks any label or inscription. The plumage matches the nominate subspecies and therefore the bird was probably collected on Sulawesi, Indonesia.

PSITTACIDAE

PUERTO RICAN AMAZON *Amazona vittata vittata* CR / EDGE score: 4.12

Psittacus vittatus Boddaert, 1783

MDLV.2012.0.440; mount, unsexed adult, Caire-Chabrand collection. *Catalogue 1881*.—No precise mention of the species, but '10 perroquets [10 parrot species]' are mentioned. *Catalogue 1894*.—Several parrots listed but their French vernacular names are too vague to link any to this species.

Remarks.—Like the previous mount, this one bears no label. Endemic to Puerto Rico and I believe the bird was collected there, but we cannot exclude the possibility of captive origin (see, e.g., Ghiraldi & Aimassi 2019: 39). The size of the specimen matches the nominate subspecies. This parrot was formerly found throughout the island, but the current wild population is estimated to be fewer than 50 mature birds (BirdLife International 2020).

TITYRIDAE

BUFF-THROATED PURPLETUFT *Iodopleura pipra* EN / EDGE score: 4.50

Pardalotus pipra Lesson, 1831

MDLV.2019.8.254; mount, adult male, Berlie collection. *Catalogue 1902*.—Not found or listed.

Remarks.—The mount bears a Berlie label that states 'Manaquin / a parents / violets'. The name given on the label is not listed in the 1902 catalogue. The bird was perhaps obtained later but before the deaths of Pierre and Antoine Berlie (in 1914 and 1932, respectively). As this species is endemic to coastal eastern and north-eastern Brazil, the bird was presumably collected there.

EMBERIZIDAE

YELLOW-BREASTED BUNTING *Emberiza aureola* CR / EDGE score: 4.55

Emberiza aureola Pallas, 1773

MDLV.2015.0.654; egg, no measurements taken, Caire-Chabrand collection. *Catalogue 1881*.—Two 'Bruant auréole [= Yellow-breasted Bunting]'; no egg mentioned. *Catalogue 1894*.—Two 'Bruant auréole [= Yellow-breasted Bunting]'; no egg mentioned.

Remarks.—The only inscription on the egg reads 'Bruant [Bunting] / E[mberiza]. aureola'. Like many buntings, eggs of this species show important intraspecific variation in their ground colour as well as in size, number and colour of the markings. The appearance and pattern of MDLV.2015.0.654 match eggs of clutch Q-3762 at the Zoological Museum, Moscow Lomonosov State Univ.[5]. It is unknown when and where the egg was collected, or who obtained it. The two bird specimens mentioned in the 1881 and 1894 catalogues no longer form part of the collection, and their whereabouts are unknown.

[5] Photo at: http://www.fotoparus.com/photogalery/animals/wild_animals/aves/21_PASSERIFORMES_FRINGILLIDAE_Emberiza_aureola/bird.html (accessed 26 April 2021).

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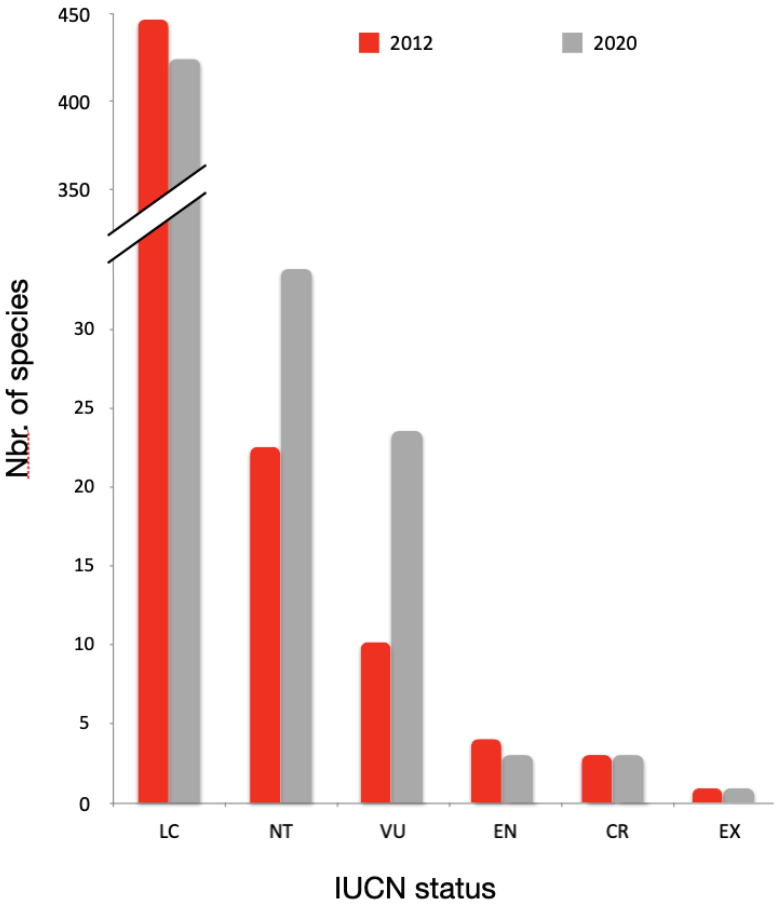

Figure 2. Comparison of the number of bird species in the Caire-Chabrand collection listed in each IUCN Red List category, between 2012 (red bars) and 2020 (grey bars)

Evolution of the list of threatened species at MDLV during 2012–20

Birds are the best-studied taxonomic group and is the only class to have been evaluated in its entirety (52 species lack data and are treated as Data Deficient). In 2020, 14% of the world's extant bird species were threatened, i.e. listed as CR, EN or VU (IUCN 2021, see Summary statistics, Table 1a). There is broad consensus as to the loss of biodiversity globally and the notion of the sixth mass extinction (Barnosky *et al*. 2011, Kolbert 2014, Ceballos *et al*. 2017). Like other large groups, birds are no exception (Inger *et al*. 2015, Rosenberg *et al*. 2019). At the start of the present millennium, 1,186 bird species were threatened and 128 extinct (Stattersfield & Capper 2000). Twenty years later, 1,508 species are classified as threatened and 159 extinct (IUCN 2021, see Summary statistics, Table 3). We can expect to see these changes reflected in museum ornithological collections, leading inevitably to an ever-growing list of species potentially on the verge of extinction or worse. Regular reappraisal of 'E&E' species lists ideally would be necessary.

The inventory of mounted birds in the Caire-Chabrand collection was made in 2012. As expected, eight years later the number of threatened species has increased slightly. Near Threatened (NT) and VU species increased by 11 and 13, respectively, reflecting the

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reclassification of 23 Least Concern species (Fig. 2). Finally, the status of one species (Velvet Scoter *Melanitta fusca*) moved from EN to VU in 2015 (see IUCN 2021, Summary statistics, Table 7 [2014–15]).

As the inventories of the Caire-Chabrand oological collection and of the Berlie collection (birds and eggs) were completed in 2015 and 2019, respectively, I judged that the time difference with the present study was not sufficient for a comparison. A reassessment of the IUCN status of species in the MDLV's ornithological collections is planned in 10–15 years.

Recognition of the number of species whose IUCN status has changed over the last decade is certainly much greater in large ornithological collections, which are more likely to contain species otherwise poorly represented in collections worldwide, and is even truer for those rich in endemic or (especially Pacific) island species. In the context of global biodiversity loss, reassessment of the number of threatened species in the world's ornithological collections is another, albeit sad, means of documenting the current ecological crisis.

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Appendix

Institutions that hold Siberian Crane *Leucogeranus leucogeranus* eggs. These data are the result of a request sent to museums via the electronic Bulletin for European Avian Curators (eBEAC) mailing list, consequently it may not be an exhaustive or definitive list. Data are presented chronologically. Dates given for wild eggs are either when collected or arrival in collections (see comments). Acronyms: AMNH: American Museum of Natural History (New York, USA); MDLV: Musée de la Vallée (Barcelonnette, France); MHNT: Muséum d'Histoire naturelle (Toulouse, France); NHMUK: Natural History Museum (Tring, UK); Oka: Crane Breeding Center of Oka State Nature Reserve (Russia); SMF: Senckenberg Museum Frankfurt (Frankfurt am Main, Germany); ZFMK: Zoologisches Forschungsmuseum Alexander Koenig (Bonn, Germany); ZMB: Museum für Naturkunde (Berlin, Germany); ZMMU: Zoological Museum, Moscow Lomonosov State Univ. (Russia).

Institution	No. of eggs	Registration no.	Provenance	Date	Comment
NHMUK	1	1941.4.6.885	Wild	May 1868	a
MDLV	1	MDLV.2015.0.4	Unknown	< 1 September 1893	b
NHMUK	1	1925.12.25.4251	Captivity	10 June 1900	c
NHMUK	2	1973.32.294	Wild	June 1904	d
NHMUK	1	1941.3.1.243	Captivity	1907	
NHMUK	1	1941.3.1.244	Unknown	< 1909	
NHMUK	2	1963.9.97	Unknown	< 10 May 1919	
ZFMK	1	N.IV.1.e.α	Captivity	1933	e
ZMMU	2	Q-2038	Wild	2 June 1960	f, g
ZMMU	2	Q-115	Wild	10 June 1961	f
MHNT	1	MNHT.O.406.1	Captivity	< 1963	h
ZMMU	2	Q-2039	Wild	10 June 1965	i
SMF	2	14695	Wild	23 June 1972	j
ZMMU	2	Q-2040	Wild	1 July 1977	k
ZMMU	2	Not registered	Wild	1 July 1977	l
ZMMU	1	Q-2041	Wild	27 June 1979	i
ZMB	2	Not communicated	Captivity	1996	
ZMB	4	Not communicated	Captivity	2000	
ZMMU	1	Q-5850	Captivity	20 April 2002	
ZMB	2	Not communicated	Captivity	2007	
AMNH	4	AMNH EN 17928	Captivity	< 2018	
ZMB	2	Not communicated	Captivity	2020	
Oka	54	Not communicated	Captivity	1988–2021	m

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a. The index card at NHMUK states that this egg was collected in May 1868 at 'Darasun, Dauria' and purchased by Henry Buckley in July 1869. The collecting location does not lie within the species' known breeding range. Because Siberian and Common Cranes *Grus grus* eggs are very similar, this could be an egg of the latter species.

b. This study.

c. The index card at NHMUK states that 'This egg may be the Lilford egg figured by Dresser, but it does not agree [with] the egg figured therein' (see Dresser 1905).

d. The index card at NHMUK suggests these eggs were collected in the wild ('North east Siberia') and given to Maximilian Kuschel by Russian ornithologist Valentin Bianchi. The latter never visited the species' breeding grounds (P. Tomkovich *in litt*. 2021) and therefore obtained them from a third party. The card also states the eggs were taken from 'nests of rushes and reeds', which matches Common Crane rather than Siberian Crane (P. Tomkovich *in litt*. 2021). Dresser (1905) mentioned and depicted what he said was the only wild-taken egg he had ever seen, and which came from Siberia via Bianchi. The breeding range described by Dresser does not correspond with that of Siberian Crane, but rather its migratory stopovers. Moreover, the first Siberian Crane nests appear to have been discovered only in 1960 and 1981, for eastern and western Siberian populations, respectively (Vorobyev 1963, Sorokin & Kotyukov 1982). Identification thus seems doubtful and they could be Common Crane eggs (P. Tomkovich *in litt*. 2021).

e. Laid in captivity in the Netherlands (breeder F. E. Blaauw) from where Alexander Koenig received it in 1933 (T. Töpfer *in litt*. 2021).

f. Eggs collected in the wild (west of the lower Indigirka River, Allaikhosky District, Yakutia, Russia). The first clutch collected in the wild (P. Tomkovich *in litt*. 2021, *fide* Vorobyev 1963).

g. The label states '02.VI.1960 [2 June 1960]' but Vorobyev (1963) clearly referred to 2 July 1960. The month on the label is probably incorrect (P. Tomkovich *in litt*. 2021).

h. From the Cossaune collection, acquired in 1963 from Jean Sirven (H. Cap *in litt*. 2021).

i. Eggs collected in the wild (west of the lower Indigirka River, Allaikhosky District, Yakutia, Russia).

j. Eggs abandoned, and collected (Makatsch 1974: 151). Locality: Bereljach, North Yakutia (Russia). This clutch is still present in the SMF collection (M. Päckert *in litt*. 2021).

k. Eggs collected in the wild (west of the lower Indigirka River, Allaikhosky District, Yakutia, Russia) and sent to the International Crane Foundation (Wisconsin, USA) for captive-breeding purpose. They proved infertile and were returned to Moscow (P. Tomkovich *in litt*. 2021).

l. Eggs collected in the wild (west of the lower Indigirka River, Allaikhosky District, Yakutia, Russia) for captive breeding. Eggshells from dead unhatched embryos are present in the collection but not registered (P. Tomkovich *in litt*. 2021).

m. In addition to whole eggs, the Oka Crane Breeding Center also has many shell fragments collected after hatching (T. Kashentseva *in litt*. 2021, *fide* Zhuchkova & Kashentseva 2002).

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