

Ornithological collections at the Department of Zoology, University of Dhaka, Bangladesh

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Abstract

The Emeritus Professor Kazi Zaker Husain Museum of the Department of Zoology, University of Dhaka, holds one of Bangladesh's largest natural history collections, with specimens collected before the 1970s, yet needs to be properly catalogued. In this study, we documented the ornithological collection of the museum. This collection contains a total of 1006 specimens from 198 different species belonging to 61 families and 19 orders—about 30% of the bird diversity reported from Bangladesh. It includes 11 IUCN Threatened and Near Threatened species and 27 species listed in CITES, such as the Critically Endangered White-rumped Vulture *Gyps bengalensis* and four Vulnerable species: Common Pochard *Aythya ferina*, River Tern *Sterna aurantia*, Great Hornbill *Buceros bicornis*, and Great Slaty Woodpecker *Mulleripicus pulverulentus*. With the collection being digitized and information systematically archived, the museum can assist in future research, such as examining the ecological history of many rare, threatened, and less-studied birds in the country.

Introduction

Natural history collections are one of the primary sources of information about the biogeography, taxonomy, systematics, and evolution of living organisms (Winker et al. 2010; Kress 2014). The collection of specimens across a wide spatiotemporal scale helps in understanding biodiversity as well as changes in biodiversity. With the advent of technology and increased accessibility to data-sharing platforms, such as the Global Biodiversity Information Facility (GBIF), decade-to-century-old natural history collections act as baseline biodiversity inventories (Jonson 2005; Cooper et al. 2019).

Bangladesh is a small South Asian nation with an area of 147,610 sq. km bordering the Indo-Burma and Eastern Himalaya biodiversity hotspots (Khan 2018). Although one of the densest countries in the world with little forest cover remaining, remarkably, the country harbours more than 700 species of birds. The assemblage is approximately 7% of the world's total bird species. (Grimmett et al. 2021; Khan 2018).

In Bangladesh, of the approximately 50 museums that hold a decent collection of birds and other wildlife, most are owned and maintained by public universities and graduate colleges (Abbas 2016). The Emeritus Professor Kazi Zaker Husain Museum of the Department of Zoology, University of Dhaka, Dhaka, a public museum, also holds a large collection. However, the cataloguing or evaluation of these collections has not been attempted, even though such information is available and well maintained in different natural history collections in other countries within the Indian subcontinent (Chavan & Krishnan 2003).

In this paper, we attempted a systematic evaluation of bird collections in the museum of the Department of Zoology, University of Dhaka. We provide our results as summaries, while the complete details are provided in the supplementary material.

Materials and methods

All specimens were dry skins and were kept in exhibition chambers and reserve cabinets. We cleaned them with blow brushes following the dry-cleaning method of Palumbo (2012) and Moore (2015). We restored specimens with mild damage following Davie (1894). Precautionary measures were followed using Davie (1894) due to the presence of pesticidal arsenic compounds (Marte et al. 2006).

We found no register that tracked the collection. Henceforth, we examined all the bird skins for identification purposes and associated field slips attached to the tarsus for any available information. We added new tags to all the specimens following contemporary taxonomy (del Hoyo & Collar 2014; 2016) while retaining the old tags. However, in the case of severe deterioration and disfigurement, we separated the specimens and labelled them unidentifiable. Wherever available, we extracted the date and place of the collection from the field slip. The data were digitized, and all locality details were georeferenced. In addition, we provided a new data card for every specimen containing an individual accession number, scientific name, vernacular name, and, depending on the availability, the date of collection, locality, habitat, and name of the collector, as well as the date of re-evaluation and name/s of re-evaluators. Finally, we shelved the specimens according to the taxonomic clustering in del Hoyo (2020) and stored them in separate cabinets—coded in conjunction with the accession numbers.

For this work, we updated the taxonomy following Praveen et al. (2024). Here, we provide a catalogued list of species, number of specimens, and pertinent collection information. We also checked the conservation status of each species following the IUCN Red List of Threatened Species (IUCN 2024). A complete catalogue with all the details has been uploaded to Zenodo.

Results

In the Emeritus Professor Kazi Zaker Husain Museum, we found a total of 1006 specimens comprising 198 species belonging to 61 families under 19 orders (Appendix 1, <https://doi.org/10.5281/zenodo.11410463>). The order Passeriformes was the most diverse ($n = 83$), followed by 49 species of waterbirds belonging to 12 families and five orders. Sixteen raptor species from three different orders were present in the collection. Piciformes has 12 species of woodpeckers and barbets. There are nine species of Coraciiformes kingfishers, rollers, and bee-eaters. There are eight species each of Columbiformes (pigeons and doves) and Cuculiformes (coucals and cuckoos). The remaining five orders (Galliformes, Caprimulgiformes, Bucerotiformes, Psittaciformes and Trogoniformes) were represented by fewer than five species (Fig. 1).

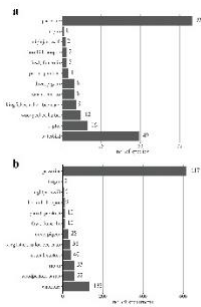


Fig. 1. Different groups of birds in the ornithological collections of the Emeritus Professor Kazi Zaker Husain Museum, Department of Zoology, University of Dhaka, Bangladesh. **a.** Total number of species; **b.** Total number of specimens.

The museum has specimens of 11 Threatened and Near Threatened birds as per IUCN: Critically Endangered (White-rumped Vulture *Gyps bengalensis*) apart from four Vulnerable (Common Pochard *Aythya ferina*, River Tern *Sterna aurantia*, Great Hornbill *Buceros bicornis*, and Great Slaty Woodpecker *Mulleripicus pulverulentus*) and six Near Threatened (Ferruginous Duck *Aythya nyroca*, Oriental Darter *Anhinga melanogaster*, Grey-headed Fish Eagle *Haliaeetus ichthyaeus*, Green Imperial Pigeon *Ducula aenea*, Blossom-headed Parakeet *Psittacula roseata*, and Red-breasted Parakeet *P. alexandri*) species. We found 27 species listed in the CITES (one in Appendix I, 24 in Appendix II, and two in Appendix III) (see Supplementary material).

All bird species were collected from Bangladesh, of which 149 were residents and 49 were migrants (three summer breeders and 46 were wintering species). According to Thompson & Chowdhury (2023), there were specimens of 18 species considered rarities in the country (14 residents, four wintering species), such as the Black Francolin *Francolinus francolinus* from Savar, a peri-urban area near Dhaka, the capital of Bangladesh (EPKZHMDU#Dis_Francolinus_francolinus_01) and the Grey Peacock Pheasant *Polyplectron bicalcaratum* from Chattogram (EPKZHMDU#Dis_Polyplectron_bicalcaratum_01); both of these specimens were collected in 1970.

Among 1006 bird specimens, only 698 specimens (69.38%) had adequate spatiotemporal data. The available data revealed that specimens were largely collected from central, northern, and eastern Bangladesh, which encompasses wetlands, riverine grasslands, mixed evergreens, and wet deciduous forests (Fig. 2). Only six specimens came from the mangrove forests.

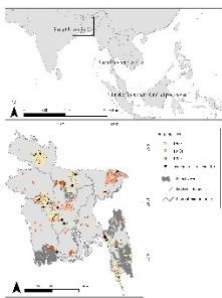


Fig. 2. The geographical distribution of sites where collections were carried out based on the spatial records extracted from the old field tags of 698 bird skins.

In the 1960s, 382 specimens of 131 species were collected. It gradually decreased to 281 specimens and 98 species in the 1970s and 53 and 31 in the 1980s. The latest specimens were dated back to 1993 (Fig. 3). Most collections were made in winter (396 specimens, 134 species), following that is monsoon (187 specimens, 69 species), and lastly in summer (134 specimens, 76 species).

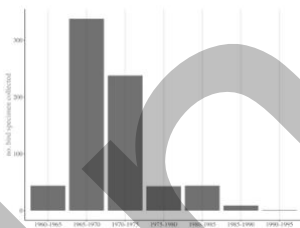


Fig. 3. The time periods of collection of bird specimens were based on the temporal records extracted from the old field tags of 698 bird skins.

Discussion

The study catalogues the current state of the largest and oldest ornithological collection archived at a public university in Bangladesh. The collection contains nearly 30% of the 721 species reported in Bangladesh to date (Thompson & Chowdhury 2023).

Natural history collections are becoming increasingly difficult to sustain. This practice is curtailed by statutory laws or even criticized for compromising bird diversity (Minteer et al. 2014; Waeber et al. 2017). In this museum, we also observed a decline in specimen accumulation over the years, and this timeline coincides with the legislation of the conservation acts in Bangladesh and the formation of CITES, the global regulatory body to regulate wildlife trade. In contrast, similar to the study of Zarrin (2023) that examined the bird collection of the State Museum, Uttar Pradesh, India, this bird collection also has historical value in providing an overview of the biodiversity of Bangladesh during 1960–80, a period when biodiversity inventorization was hardly a norm in the country. In developing countries, where wildlife research and conservation practices are still evolving, such scientific collections will prove to be gap filler. As the world is facing a massive biodiversity decline and Bangladesh is no different in this respect, old specimens such as this can be particularly useful for understanding the ecological history of certain sites that have

undergone some massive alteration due to human activities (Monteiro et al. 2016). For example, a specimen of the Black Francolin *Francolinus francolinus*, a species of grassland and shrubland, was collected near Dhaka, the capital of Bangladesh. The site is now completely urbanized, and the species has lost 95% of its range in Bangladesh (Sourav 2014).

This study necessitated systematic cataloguing to maintain the value of scientific collections. It also highlights the precarious state of the collection, which was previously well catalogued, with more than half of the specimens requiring a curative or preventive conservation approach. Many field tags were partially or completely deteriorated or missing, depriving science of vital information. The present digitised catalogue will now enable proper archiving, facilitate future research, and be coupled with open-source biodiversity archives such as the GBIF. More effort should be expended to quickly bring out catalogues for other existing collections in the country. Taken together, these works will provide an opportunity to compare the previous and present bird diversity of the country.

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Appendix 1. Total number of bird skins per species present in the ornithological collections of the Emeritus Professor Kazi Zaker Husain Museum, Department of Zoology, University of Dhaka, Bangladesh. Supplementary material 1 provides a detailed description of each specimen.

Sl No.	Common Name	Count
1	Black Francolin <i>Francolinus francolinus</i>	1
2	Grey Peacock Pheasant <i>Polyplectron bicalcaratum</i>	1
3	Red Junglefowl <i>Gallus gallus</i>	8
4	Fulvous Whistling Duck <i>Dendrocygna bicolor</i>	3
5	Lesser Whistling Duck <i>Dendrocygna javanica</i>	1
6	Tufted Duck <i>Aythya fuligula</i>	3
7	Common Pochard <i>Aythya ferina</i>	1
8	Ferruginous Duck <i>Aythya nyroca</i>	3
9	Gadwall <i>Mareca strepera</i>	2
10	Common Teal <i>Anas crecca</i>	7
11	Northern Pintail <i>Anas acuta</i>	2
12	Garganey <i>Spatula querquedula</i>	1
13	Northern Shoveler <i>Spatula clypeata</i>	1
14	Ruddy Shelduck <i>Tadorna ferruginea</i>	1
15	Cotton Pygmy Goose <i>Nettapus coromandelianus</i>	3
16	Little Grebe <i>Tachybaptus ruficollis</i>	1
17	Watercock <i>Gallixrex cinerea</i>	2
18	White-breasted Waterhen <i>Amaurornis phoenicurus</i>	4
19	Common Moorhen <i>Gallinula chloropus</i>	1
20	Eurasian Coot <i>Fulica atra</i>	2
21	Purple Swampphen <i>Porphyrio porphyrio</i>	8
22	Eurasian Spoonbill <i>Platalea leucorodia</i>	1

23	Little Cormorant <i>Microcarbo niger</i>	3
24	Oriental Darter <i>Anhinga melanogaster</i>	2
25	Purple Heron <i>Ardea purpurea</i>	1
26	Yellow Bittern <i>Ixobrychus sinensis</i>	1
27	Cinnamon Bittern <i>Ixobrychus cinnamomeus</i>	3
28	Black-crowned Night Heron <i>Nycticorax nycticorax</i>	2
29	Indian Pond Heron <i>Ardeola grayii</i>	12
30	Striated Heron <i>Butorides striata</i>	3
31	Cattle Egret <i>Bubulcus ibis</i>	6
32	Little Egret <i>Egretta garzetta</i>	2
33	Intermediate Egret <i>Ardea intermedia</i>	2
34	Kentish Plover <i>Charadrius alexandrinus</i>	1
35	Greater Sand Plover <i>Charadrius leschenaultii</i>	4
36	Pacific Golden Plover <i>Pluvialis fulva</i>	1
37	Grey-headed Lapwing <i>Vanellus cinereus</i>	1
38	Red-wattled Lapwing <i>Vanellus indicus</i>	4
39	Greater Painted-snipe <i>Rostratula benghalensis</i>	2
40	Bronze-winged Jacana <i>Metopidius indicus</i>	4
41	Pheasant-tailed Jacana <i>Hydrophasianus chirurgus</i>	2
42	Common Sandpiper <i>Actitis hypoleucos</i>	1
43	Green Sandpiper <i>Tringa ochropus</i>	3
44	Common Greenshank <i>Tringa nebularia</i>	1
45	Wood Sandpiper <i>Tringa glareola</i>	9
46	Temminck's Stint <i>Calidris temminckii</i>	1
47	Whimbrel <i>Numenius phaeopus</i>	1
48	Pintail Snipe <i>Gallinago stenura</i>	3
49	River Tern <i>Sterna aurantia</i>	1
50	Brown-headed Gull <i>Chroicocephalus brunnicephalus</i>	1
51	Pallas's Gull <i>Larus ichthyæetus</i>	1
52	Asian Emerald Dove <i>Chalcophaps indica</i>	1
53	Eurasian Collared Dove <i>Streptopelia decaocto</i>	1
54	Red Collared Dove <i>Streptopelia tranquebarica</i>	4
55	Rock Pigeon <i>Columba livia</i>	8
56	Spotted Dove <i>Spilopelia chinensis</i>	10
57	Orange-breasted Green Pigeon <i>Treron bicinctus</i>	2
58	Yellow-footed Green Pigeon <i>Treron phoenicopterus</i>	1
59	Green Imperial Pigeon <i>Ducula aenea</i>	1
60	Great Eared Nightjar <i>Lyncornis macrotis</i>	1
61	Large-tailed Nightjar <i>Caprimulgus macrurus</i>	5
62	House Swift <i>Apus nipalensis</i>	8
63	Green-billed Malkoha <i>Phaenicophaeus tristis</i>	2
64	Greater Coucal <i>Centropus sinensis</i>	7
65	Asian Koel <i>Eudynamis scolopaceus</i>	16
66	Common Hawk Cuckoo <i>Hierococyx varius</i>	8
67	Indian Cuckoo <i>Cuculus micropterus</i>	2
68	Chestnut-winged Cuckoo <i>Clamator coromandus</i>	1
69	Pied Cuckoo <i>Clamator jacobinus</i>	2
70	Banded Bay Cuckoo <i>Cacomantis sonneratii</i>	2
71	Brown Fish Owl <i>Ketupa zeylonensis</i>	4
72	Brown Boobook <i>Ninox scutulata</i>	2
73	Collared Scops Owl <i>Otus lettia</i>	4
74	Oriental Scops Owl <i>Otus sunia</i>	1
75	Asian Barred Owllet <i>Glaucidium cuculoides</i>	1
76	Spotted Owllet <i>Athene brama</i>	6
77	Common Barn Owl <i>Tyto alba</i>	5
78	Black Kite <i>Milvus migrans</i>	8
79	Black-winged Kite <i>Elanus caeruleus</i>	4
80	Brahminy Kite <i>Haliastur indus</i>	5
81	Crested Serpent Eagle <i>Spilornis cheela</i>	7
82	Eurasian Sparrowhawk <i>Accipiter nisus</i>	1
83	Grey-headed Fish Eagle <i>Haliaeetus ichthyæetus</i>	4
84	Pied Harrier <i>Circus melanoleucos</i>	1
85	White-rumped Vulture <i>Gyps bengalensis</i>	1
86	Common Kestrel <i>Falco tinnunculus</i>	3
87	Red-headed Trogon <i>Harpactes erythrocephalus</i>	2
88	Great Hornbill <i>Buceros bicornis</i>	1
89	Oriental Pied Hornbill <i>Anthracoceros albirostris</i>	4
90	Eurasian Hoopoe <i>Upupa epops</i>	4
91	Green Bee-eater <i>Merops orientalis</i>	16
92	Blue-tailed Bee-eater <i>Merops philippinus</i>	1
93	Chestnut-headed Bee-eater <i>Merops leschenaulti</i>	1
94	Indian Roller <i>Coracias benghalensis</i>	3
95	Indochinese Roller <i>Coracias affinis</i>	5
96	Common Kingfisher <i>Alcedo atthis</i>	2
97	Stork-billed Kingfisher <i>Pelargopsis capensis</i>	2

98	White-throated Kingfisher <i>Halcyon smyrnensis</i>	4
99	Pied Kingfisher <i>Ceryle rudis</i>	2
100	Blue-eared Barbet <i>Psilopogon duvaucelii</i>	2
101	Blue-throated Barbet <i>Psilopogon asiaticus</i>	5
102	Coppersmith Barbet <i>Psilopogon haemacephalus</i>	8
103	Lineated Barbet <i>Psilopogon lineatus</i>	8
104	Eurasian Wryneck <i>Jynx torquilla</i>	2
105	Grey-capped Pygmy Woodpecker <i>Yungipicus canicapillus</i>	2
106	Fulvous-breasted Woodpecker <i>Dendrocopos macei</i>	8
107	Rufous Woodpecker <i>Micropternus brachyurus</i>	6
108	Streak-throated Woodpecker <i>Picus xanthopygaeus</i>	4
109	Black-rumped Flameback <i>Dinopium benghalense</i>	11
110	Greater Flameback <i>Chrysocolaptes guttacristatus</i>	1
111	Great Slaty Woodpecker <i>Mulleripicus pulverulentus</i>	1
112	Blossom-headed Parakeet <i>Psittacula roseata</i>	1
113	Red-breasted Parakeet <i>Psittacula alexandri</i>	3
114	Rose-ringed Parakeet <i>Psittacula krameri</i>	4
115	Vernal Hanging Parrot <i>Loriculus vernalis</i>	2
116	Ashy Woodswallow <i>Artamus fuscus</i>	4
117	Common Iora <i>Aegithina tiphia</i>	14
118	Ashy-crowned Sparrow Lark <i>Eremopterix griseus</i>	3
119	Bengal Bushlark <i>Mirafra assamica</i>	2
120	Greater Short-toed Lark <i>Calandrella brachydactyla</i>	1
121	Barn Swallow <i>Hirundo rustica</i>	2
122	Sand Martin <i>Riparia riparia</i>	2
123	Black-headed Cuckooshrike <i>Lalage melanoptera</i>	5
124	Black-winged Cuckooshrike <i>Lalage melaschistos</i>	3
125	Common Woodshrike <i>Tephrodornis pondicerianus</i>	13
126	Large Cuckooshrike <i>Coracina macei</i>	6
127	Scarlet Minivet <i>Pericrocotus speciosus</i>	1
128	Small Minivet <i>Pericrocotus cinnamomeus</i>	7
129	Swinhoe's Minivet <i>Pericrocotus cantonensis</i>	1
130	Brown Shrike <i>Lanius cristatus</i>	13
131	Grey-backed Shrike <i>Lanius tephronotus</i>	2
132	Long-tailed Shrike <i>Lanius schach</i>	10
133	Ashy Drongo <i>Dicrurus leucophaeus</i>	5
134	Black Drongo <i>Dicrurus macrocercus</i>	40
135	Bronzed Drongo <i>Dicrurus aeneus</i>	6
136	Greater Racket-tailed Drongo <i>Dicrurus paradiseus</i>	1
137	Hair-crested Drongo <i>Dicrurus hottentottus</i>	7
138	House Crow <i>Corvus splendens</i>	8
139	Large-billed Crow <i>Corvus macrorhynchos</i>	5
140	Rufous Treepie <i>Dendrocitta vagabunda</i>	12
141	Abbott's Babbler <i>Malacocincla abbotti</i>	9
142	Chestnut-capped Babbler <i>Timalia pileata</i>	2
143	Greater Necklaced Laughingthrush <i>Pterorhinus pectoralis</i>	4
144	Jungle Babbler <i>Argya striata</i>	11
145	Pin-striped Tit Babbler <i>Mixornis gularis</i>	8
146	Puff-throated Babbler <i>Pellorneum ruficeps</i>	3
147	White-crested Laughingthrush <i>Garrulax leucolophus</i>	1
148	Orange-headed Thrush <i>Geokichla citrina</i>	3
149	Tickell's Thrush <i>Turdus unicolor</i>	1
150	Blue Whistling Thrush <i>Myophonus caeruleus</i>	1
151	Golden-fronted Leafbird <i>Chloropsis aurifrons</i>	2
152	Common Tailorbird <i>Orthotomus sutorius</i>	10
153	Indian White-eye <i>Zosterops palpebrosus</i>	1
154	Black-crested Bulbul <i>Rubigula flaviventris</i>	4
155	Cachar Bulbul <i>Iole cacharensis</i>	3
156	Red-vented Bulbul <i>Pycnonotus cafer</i>	21
157	Red-whiskered Bulbul <i>Pycnonotus jocosus</i>	11
158	White-throated Bulbul <i>Alophoixus flaveolus</i>	3
159	Asian Glossy Starling <i>Aplonis panayensis</i>	1
160	Asian Pied Starling <i>Gracupica contra</i>	71
161	Bank Myna <i>Acridotheres ginginianus</i>	2
162	Chestnut-tailed Starling <i>Sturnia malabarica</i>	15
163	Common Hill Myna <i>Gracula religiosa</i>	1
164	Common Myna <i>Acridotheres tristis</i>	41
165	Jungle Myna <i>Acridotheres fuscus</i>	68
166	Black-hooded Oriole <i>Oriolus xanthornus</i>	11
167	White-throated Fantail <i>Rhipidura albicollis</i>	3
168	Verditer Flycatcher <i>Eumyias thalassinus</i>	1
169	White-rumped Shama <i>Copsychus malabaricus</i>	4
170	Black Redstart <i>Phoenicurus ochruros</i>	1

171	Black-backed Forktail <i>Enicurus immaculatus</i>	1
172	Bluethroat <i>Luscinia svecica</i>	1
173	Blue-throated Flycatcher <i>Cyornis rubeculoides</i>	3
174	Siberian Stonechat <i>Saxicola maurus</i>	1
175	Grey-headed Canary-flycatcher <i>Culicicapa ceylonensis</i>	4
176	Oriental Magpie Robin <i>Copsychus saularis</i>	17
177	Pied Bushchat <i>Saxicola caprata</i>	2
178	Black-naped Monarch <i>Hypothymis azurea</i>	12
179	Indian Paradise-flycatcher <i>Terpsiphone paradisi</i>	3
180	Crimson Sunbird <i>Aethopyga siparaja</i>	1
181	Little Spiderhunter <i>Arachnothera longirostra</i>	2
182	Purple Sunbird <i>Cinnyris asiaticus</i>	7
183	Purple-rumped Sunbird <i>Leptocoma zeylonica</i>	2
184	Van Hasselt's Sunbird <i>Leptocoma brasiliana</i>	3
185	Orange-bellied Flowerpecker <i>Dicaeum trigonostigma</i>	1
186	Great Tit <i>Parus major</i>	11
187	House Sparrow <i>Passer domesticus</i>	7
188	Chestnut Munia <i>Lonchura atricapilla</i>	2
189	Indian Silverbill <i>Euodice malabarica</i>	2
190	Red Munia <i>Amandava amandava</i>	2
191	Scaly-breasted Munia <i>Lonchura punctulata</i>	3
192	Baya Weaver <i>Ploceus philippinus</i>	9
193	Forest Wagtail <i>Dendronanthus indicus</i>	1
194	Paddyfield Pipit <i>Anthus rufulus</i>	11
195	Citrine Wagtail <i>Motacilla citreola</i>	7
196	White Wagtail <i>Motacilla alba</i>	8
197	White-browed Wagtail <i>Motacilla maderaspatensis</i>	1
198	Western Yellow Wagtail <i>Motacilla flava</i>	3