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BIRD EGG AND NEST SPECIMENS IN THE COLLECTION OF THE INSTITUTO DE ECOLOGÍA Y SISTEMÁTICA, LA HABANA, CUBA

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Abstract: The collection of Cuban bird eggs and nests in the Instituto de Ecología y Sistemática is the most important in Cuba and, probably, worldwide. The egg specimens include the collections of José Hernández Bauzá and Juan Gundlach (94.0% of all of the specimens), as well as the institute's own collection. The collection is composed of a total of 695 clutches, 1929 eggs, and 29 nests, representing 19 orders, 42 families, and 104 species. Here we present summary data on the egg and nest collection. The complete catalogue is available in English or Spanish on request.

Key words: collection, Cuba, curation, egg, inventory, nest, specimens

Resumen: HUEVOS Y NIDOS DE AVES EN LA COLECCIÓN DEL INSTITUTO DE ECOLOGÍA Y SISTEMÁTICA, LA HABANA, CUBA.—En la colección de huevos y nidos de aves cubanas del Instituto de Ecología y Sistemática, están depositadas las colecciones José Hernández Bauzá y Juan Cristóbal Gundlach (94,0% de todos de los ejemplares), además de la colección Básica del propio Instituto. Esta consta de 695 nidadas, 1929 huevos y 29 nidos pertenecientes a 19 órdenes, 42 familias y 104 especies. Presentamos datos sumarios sobre la colección de huevos y nidos. El catálogo completo en inglés o español esta disponible por demanda.

Palabras clave: colección, Cuba, ejemplares, huevos, manejo, nidos

Résumé : OEUFS ET NIDS D'OISEAUX DE LA COLLECTION DE L'INSTITUTO DE ECOLOGÍA Y SISTEMÁTICA, LA HAVANE, CUBA. La collection d'œufs et de nids d'oiseaux de Cuba de l'Instituto de Ecología y Sistemática est la plus importante à Cuba et probablement dans le monde. Elle comprend les collections d'œufs de José Hernández et Juan Gundlach Bauzá (94% de l'ensemble des spécimens), ainsi que la propre collection de l'institut. Elle est composée d'un total de 695 pontes, 1 929 œufs et 29 nids, représentant 19 ordres, 42 familles et 104 espèces. Nous présentons ici des données synthétiques sur cette collection. Le catalogue complet est disponible en anglais ou en espagnol sur demande.

Mots clés : collection, conservation, Cuba, inventaire, nid, œuf, spécimens

Substantial collections of natural history specimens have been made from the Caribbean islands, but few specimens have been retained in those islands. For the most part, the collected specimens now reside in foreign institutions, mainly in the United States, Europe, and the United Kingdom. Even resident scientists typically sent their specimens abroad to institutions or private collectors; for example, ca. 3000 bird specimens collected by Stuart T. Dansforth (1900–1938) while he resided in Puerto Rico (1926–1938) went to the United States National Museum of Natural History (USNMNH), and William T. March (ca. 1796–1872) gave the USNMNH more than 1200 bird specimens from his native Jamaica, where none of his specimens remains today. Few West Indian nations have substantial collections of natural history materials representative of their fauna and flora. An exception is Cuba, which is unusual in that several important collections were established as early as the mid-1800s and maintained there, with some surviving in Cuban institutions today.

At present, 18 Cuban institutions house important natural history collections, with 10,416 native bird specimens, including skins and mounts (n = 9145 specimens), eggs (1000), nests (40), skeletons (3), alcoholics (2), and fossils (25) (Wiley *et al*. 2008). By comparison, 28 collections examined in the United States, Europe, and United Kingdom have a total of 11,055 avian specimens from Cuba (Wiley *et al*. 2008). The largest Cuban collection of birds (n = 3431; 31.0% of all specimens) is housed at the Instituto de Ecología y Sistemática (IES; La Habana), which includes the original Juan C. Gundlach (1810–1896) "Historic" and the "Basic" (more-recently acquired) collections. The IES bird collection includes 20 holotypes, 15 syntypes, and 28 paratypes of 26 species and subspecies (Aguilera

Román and Garrido 2000). Other major Cuban collections are in the Museo de Historia Natural "Felipe Poey" (MHN Poey) of the Universidad de La Habana (n = 2584 specimens; 23.4% of all specimens), Museo Nacional de Historia Natural de Cuba (MNHNC) in La Habana (n = 1251; 11.3%), and Museo de Historia Natural "Carlos T. Ramsden" (MHN Ramsden) in Santiago de Cuba (n = 1044; 9.4%).

Our main objectives in this project were to (1) inventory and organize the bird egg and nest data available in the Colección Zoológica de la Academia de Ciencias de Cuba of the Instituto de Ecología y Sistemática; (2) develop a broad evaluation of the characteristics and research potential of the collection; and (3) make the data widely available to the IES curatorial staff as well as researchers. This report is a summary of the inventory of IES bird egg and nest specimens as well as an overview of the characteristics and limitations of the collection.

EGG AND NEST COLLECTION AT THE INSTITUTO DE ECOLOGÍA Y SISTEMÁTICA

The IES contains the most important collection of Cuban bird eggs and nests within Cuba and, probably, worldwide. The egg specimens represent 70.5% of all those in Cuban collections, with the MHN Ramsden holding 24.1%. Of nests in Cuban collections, IES again maintains the largest number (50.0%), with the MNHNC (15.5%), Museo de Historia Natural "Carlos de la Torre y Huerta" (Holguín; 13.8%), MHN Poey (13.8%), and Museo de Historia Natural "Joaquín Fernández de la Vera" (Gibara; 6.9%) also having specimens.

The IES egg collection consists of 695 clutches, 1929 eggs, and 29 nests, corresponding to 19 orders, 42 families, and 104 species (Table 1). The orders Charadriiformes (23.8% of eggs), Ciconiiformes (23.8%), and Passeriformes (12.8%) include the most specimens, whereas the families Laridae (19.5%), Ardeidae (17.3%), Icteridae (7.7%), and Rallidae (7.7%) are best represented in the egg collection. Species in the collection comprise 67.1% of breeding species reported for Cuba (n = 152; Garrido and Kirkconnell 2000). Eleven (52.4%) of the 21 Cuban endemics are represented by eggs and nests in the collection (Table 1). Also, eggs and nests of 12 species considered of special concern internationally (González Alonso 2002) are in the IES collection (Table 1).

A total of 629 clutches were collected by José Hernández Bauzá (fl. 1920s to mid-1960s), 24 by Gundlach, and 42 by other collectors, especially O. H. Garrido (b. 1931). As with almost all of his specimens, Gundlach provided no collection dates or specific localities (only "Cuba"). The IES collection contains 44 eggs collected by Gundlach, which is only 20.7% of those listed in Gundlach's collection in 1913 (Valdes Ragués 1913), when 213 eggs were inventoried along with 19 nests in his natural history museum in the Instituto de Segunda Enseñanza. Valdes Ragués (1913) listed egg specimens for 74 species in the Gundlach collection. Today, only 20 species comprise the Gundlach egg collection at IES, but among those are four species not in Valdes Ragués' catalogue. No records exist that explain what happened to the other Gundlach specimens, but the collection was transferred among institutions several times over the years since Gundlach's death, and many egg specimens were probably lost through damage (Wiley *et al*. 2008). Fortunately, most of Gundlach's bird skin collection has survived.

Dates of collection span a period from Gundlach's era (1839–1896) through 1998, with the predominant collection periods in the 1930s and 1950–1969 (89.9% of specimens), when Bauzá was most active (Fig. 1). All specimens in the IES egg and nest collection were taken in western and central Cuba, in eight of Cuba's 14 provinces (including the "special province" of Isla de la Juventud), with the majority of the eggs collected in La Habana province (61.0%) (Table 2). Specimens from 22 Cuban satellites are also included in the collection (Table 2).

Although reasonable series of egg specimens exist for several species, many are represented by only one or two clutches. The mean number of clutches per species in the collection is 6.7 ± 14.9 (n = 105; r = 1–136 clutches per species). Also, several lots of eggs have been placed under one catalogue number because no data were available to separate the specimens into clutches; i.e., they were collected *en masse* and noted as "several clutches"). In such cases, we assigned a minimum clutch number of one to the specimen lot, noting an unknown number of clutches was represented.

To facilitate data exchange among investigators and institutions, in addition to serving to help curate the collection, IES specimen data have been entered into several electronic formats, including MS Word, MS Excel (spreadsheet), and MS Access and FileMaker Pro (databases). The data entered into the electronic files include catalogue number; specimen order, family, and species's scientific and common names (following American Ornithologists' Union

Table 1. Orders, families, and species of birds represented by eggs and nests in the collection of the Instituto de Ecología y Sistemática, La Habana, Cuba, with numbers of egg sets and specimens.

Order / Family	Species (Status[a])	Egg Sets[b] (Eggs)	Nests
Anseriformes			
Anatidae	West Indian Whistling-Duck (*Dendrocygna arborea*) (VU)	1 (5)	–
	Fulvous Whistling-Duck (*Dendrocygna bicolor*)	2 [+?] (21)	–
	Canada Goose (*Branta canadensis*[c])	2 (3)	–
	Wood Duck (*Aix sponsa*)	1 (10)	–
	White-cheeked Pintail (*Anas bahamensis*) (VU)	2 (14)	–
	Masked Duck (*Nomonyx dominicus*) (VU)	5 (62)	–
	Ruddy Duck (*Oxyura jamaicensis*)	2 (13)	–
Galliformes			
Odontophoridae	Northern Bobwhite (*Colinus virginianus*)	3 (24)	–
Podicipediformes			
Podicipedidae	Least Grebe (*Tachybaptus dominicus*)	4 (13)	–
	Pied-billed Grebe (*Podilymbus podiceps*)	3 (11)	–
Phoenicopteriformes			
Phoenicopteridae	American Flamingo (*Phoenicopterus ruber*)	3 [+?] (62)	–
Ciconiiformes			
Ciconiidae	Wood Stork (*Mycteria americana*)	1 (1)	–
Suliformes			
Fregatidae	Magnificent Frigatebird (*Fregata magnificens*)	2 (2)	–
Phalacrocoracidae	Neotropic Cormorant (*Phalacrocorax brasilianus*)	8 (16)	–
	Double-crested Cormorant (*Phalacrocorax auritus*)	11 (33)	–
Anhingidae	Anhinga (*Anhinga anhinga*)	7 (15)	–
Pelecaniformes			
Pelecanidae	Brown Pelican (*Pelecanus occidentalis*)	1 (2)	–
Ardeidae	Least Bittern (*Ixobrychus exilis*)	5 (13)	–
	Great Blue Heron (*Ardea herodias*)	1 (1)	–
	Great Egret (*Ardea alba*)	6 (13)	–
	Snowy Egret (*Egretta thula*)	14 (37)	–
	Little Blue Heron (*Egretta caerulea*)	23 (56)	–
	Tricolored Heron (*Egretta tricolor*)	50 (142)	–
	Reddish Egret (*Egretta rufescens*)	1 [+?] (27)	–
	Cattle Egret (*Bubulcus ibis*)	1 (2)	–
	Green Heron (*Butorides virescens*)	8 (24)	–
	Black-crowned Night-Heron (*Nycticorax nycticorax*)	1 [+?] (5)	–
	Yellow-crowned Night-Heron (*Nyctanassa violacea*)	6 (14)	–
Threskiornithidae	White Ibis (*Eudocimus albus*)	38 (76)	–
	Glossy Ibis (*Plegadis falcinellus*)	5 (12)	–
	Roseate Spoonbill (*Platalea ajaja*)	2 [+?] (37)	–
Accipitriformes			
Cathartidae	Turkey Vulture (*Cathartes aura*)	6 (11)	–
Accipitridae	Snail Kite (*Rostrhamus sociabilis*)	4 (7)	–
	Cuban Black-Hawk (*Buteogallus gundlachii*)	3 (4)	–
	Broad-winged Hawk (*Buteo platypterus*)	1 (1)	–
	Red-tailed Hawk (*Buteo jamaicensis*)	1 (3)	–
Falconiformes			
Falconidae	American Kestrel (*Falco sparverius*)	6 (18)	–
Gruiformes			
Rallidae	Clapper Rail (*Rallus longirostris*)	2 (12)	–
	King Rail (*Rallus elegans*)	4 (22)	1
	Virginia Rail (*Rallus limicola*)	1 (1)	–
	Spotted Rail (*Pardirallus maculatus*)	2 (2)	–
	Purple Gallinule (*Porphyrio martinica*)	9 (51)	–
	Common Gallinule (*Gallinula galeata*)	10 (44)	–

Table 1 continued.

Order / Family	Species (Status[a])	Egg Sets[b] (Eggs)	Nests
Gruiformes			
Rallidae	American Coot (*Fulica americana*)	2 (16)	–
Aramidae	Limpkin (*Aramus guarauna*)	5 (22)	–
Gruidae	Sandhill Crane (*Grus canadensis* (EN)	2 (4)	–
Charadriiformes			
Charadriidae	Wilson's Plover (*Charadrius wilsonia*)	3 (8)	–
	Killdeer (*Charadrius vociferus*)	8 (29)	–
Recurvirostridae	Black-necked Stilt (*Himantopus mexicanus*)	5 (17)	–
Jacanidae	Northern Jacana (*Jacana spinosa*)	6 (23)	1
Scolopacidae	Willet (*Tringa semipalmata*)	2 (6)	–
Laridae	Laughing Gull (*Leucophaeus atricilla*)	14 [+?] (89)	–
	Brown Noddy (*Anous stolidus*)	26 (27)	–
	Sooty Tern (*Onychoprion fuscatus*)	136 (136)	–
	Bridled Tern (*Onychoprion anaethetus*)	22 (24)	–
	Least Tern (*Sternula antillarum*)	27 (59)	–
	Roseate Tern (*Sterna dougallii*) (VU)	1 (2)	–
	Royal Tern (*Thalasseus maximus*)	1 [+?] (18)	–
	Sandwich Tern (*Thalasseus sandvicensis*)	1 [+?] (22)	–
Columbiformes			
Columbidae	White-crowned Pigeon (*Patagioenas leucocephala*) (VU)	4 (6)	–
	White-winged Dove (*Zenaida asiatica*)	1 (2)	–
	Zenaida Dove (*Zenaida aurita*)	1 (1)	–
	Mourning Dove (*Zenaida macroura*)	4 (8)	–
	Common Ground-Dove (*Columbina passerina*)	4 (8)	–
	Ruddy Quail-Dove (*Geotrygon montana*)	1 (2)	–
	Blue-headed Quail-Dove (*Starnoenas cyanocephala*) (E; VU)	1 (2)	–
Psittaciformes			
Psittacidae	Cuban Parakeet (*Aratinga euops*) (E; VU)	11 (29)	–
	Cuban Parrot (*Amazona leucocephala*) (VU)	2 (7)	–
Cuculiformes			
Cuculidae	Yellow-billed Cuckoo (*Coccyzus americanus*)	3 (5)	–
	Great Lizard-Cuckoo (*Coccyzus merlini*)	4 (9)	1
	Smooth-billed Ani (*Crotophaga ani*)	4 (24)	–
Strigiformes			
Tytonidae	Barn Owl (*Tyto alba*	2 (6)	–
Strigidae	Bare-legged Owl (*Gymnoglaux lawrencii*) (E)	3 (4)	–
	Cuban Pygmy-Owl (*Glaucidium siju*) (E)	2 (3)	–
	Burrowing Owl (*Athene cunicularia*)	1 (3)	–
Caprimulgiformes			
Caprimulgidae	Antillean Nighthawk (*Chordeiles gundlachii*)	18 (28)	–
	Greater Antillean Nightjar (*Caprimulgus cubanensis*)	3 (6)	–
Apodiformes			
Apodidae	Antillean Palm-Swift (*Tachornis phoenicobia*)	14 (56)	4
Trochilidae	Cuban Emerald (*Chlorostilbon ricordii*)	2 (3)	9
Trogoniformes			
Trogonidae	Cuban Trogon (*Priotelus temnurus*) (E)	1 (3)	–
Coraciiformes			
Todidae	Cuban Tody (*Todus multicolor*) (E)	3 (12)	–
Piciformes			
Picidae	West Indian Woodpecker (*Melanerpes superciliaris*)	1 (4)	–
	Cuban Green Woodpecker (*Xiphidiopicus percussus*) (E)	2 (5)	–
	Fernandina's Flicker (*Colaptes fernandinae*) (E; VU)	1 (3)	–
Passeriformes			
Tyrannidae	Cuban Pewee (*Contopus caribaeus*)	1 (3)	–

Table 1 continued.

Order / Family	Species (Status[a])	Egg Sets[b] (Eggs)	Nests
Passeriformes			
Tyrannidae	La Sagra's Flycatcher (*Myiarchus sagrae*)	2 (6)	1
	Gray Kingbird (*Tyrannus dominicensis*)	4 (12)	1
	Loggerhead Kingbird (*Tyrannus caudifasciatus*)	1 (3)	–
	Giant Kingbird (*Tyrannus cubensis*) (EN)	1 (3)	1
Vireonidae	Cuban Vireo (*Vireo gundlachii*) (E)	2 (4)	–
	Black-whiskered Vireo (*Vireo altiloquus*)	2 (6)	1
Hirundinidae	Cave Swallow (*Petrochelidon fulva*)	3 (9)	–
Turdidae	Red-legged Thrush (*Turdus plumbeus*)	2 (8)	–
Mimidae	Northern Mockingbird (*Mimus polyglottos*)	3 (12)	
Parulidae	Olive-capped Warbler (*Setophaga pityophila*)	3 (15)	3
	Yellow-headed Warbler (*Teretistris fernandinae*) (E)	2 (4)	–
Emberizidae	Yellow-faced Grassquit (*Tiaris olivaceus*)	4 (12)	–
	Zapata Sparrow (*Torreornis inexpectata*)	–	1
Icteridae	Tawny-shouldered Blackbird (*Agelaius humeralis*)	2 (6)	–
	Eastern Meadowlark (*Sturnella magna*)	1 (4)	–
	Cuban Blackbird (*Dives atroviolaceus*) (E)	17 (56)	5
	Greater Antillean Grackle (*Quiscalus niger*)	19 (73)	–
	Cuban Oriole (*Icterus melanopsis*)	3 (9)	–
Passeridae	House Sparrow (*Passer domesticus*)	1 (1)	–

[a] Status: "E" = endemic to Cuba (after Garrido and Kirkconnell 2000); threatened species: "EN" = endangered, "VU" = vulnerable (after González Alonso 2002).
[b] "[+?]" indicates that two or more eggs were catalogued collectively, with no means of determining the actual number of clutches represented. In such cases, the minimum number of one clutch was assigned to the catalogue number.
[c] Species known only as rare migrant in Cuba, so eggs were likely obtained elsewhere or from captives.

2012); number of eggs; number of clutches if more than one clutch is under one catalogue number (where determinable); clutch status (e.g., complete or incomplete); locality and date of collection; and collector's name. The complete catalogue is available in Spanish and English, on request to RAR or JWW.

DISCUSSION

Taxonomic collections are indispensable as depositories of knowledge of the biology of species, serving as critical sources of information on the natural history, ecology, systematics, biogeography, and conservation (Fitzpatrick 1985, Remsen 1995). Further, collections serve as important banks for the biodiversity of regions and nations, providing information on spatial and temporal variation in species, and, thereby, serve as a vital tool for inventorying biological diversity (Alberch 1993, Davis 1996, Mehrhoff 1996, Stork *et al*. 1996, Winker 1996, Shaffer *et al*. 1998, Taub 1998, Brooke 2000, Krishtalka and Humphrey 2000, Beolchini 2002, Roselaar 2003, Watkins and Donnelly 2005), a process that has been initiated in Cuba recently. Moreover, collections have an important role in the natural and national heritages of counties or whole regions. Although avian egg specimens have long been a part of natural history collections, their value to science has seldom been realized fully.

A critical step in making data available in natural history collections is the inventorying and cataloguing of specimens in a modern and accessible format and medium. Catalogues of bird egg specimens have been published elsewhere, most notably by Kiff (1979) and Kiff and Hough (1985) for North American collections, and the value of such catalogues has been recognized (Green and Scharlemann 2003). The catalogue of the bird egg and nest specimens in the IES follows a similar project completed for the bird skins in the Institute (Wiley *et al*. 2008).

Bird eggs have formed the basis of a wide range of research. For example, studies of avian eggs have provided important insights into geographic (e.g., Anderson *et al*. 1970, Chylarecki *et al*. 1997, Encabo *et al*. 2002) and intraspecific (e.g., Williams 1994, Dittmann and Hötker 2001) variation. Also, variation in inter- (e.g., Bree 1957, Valkama *et al*.

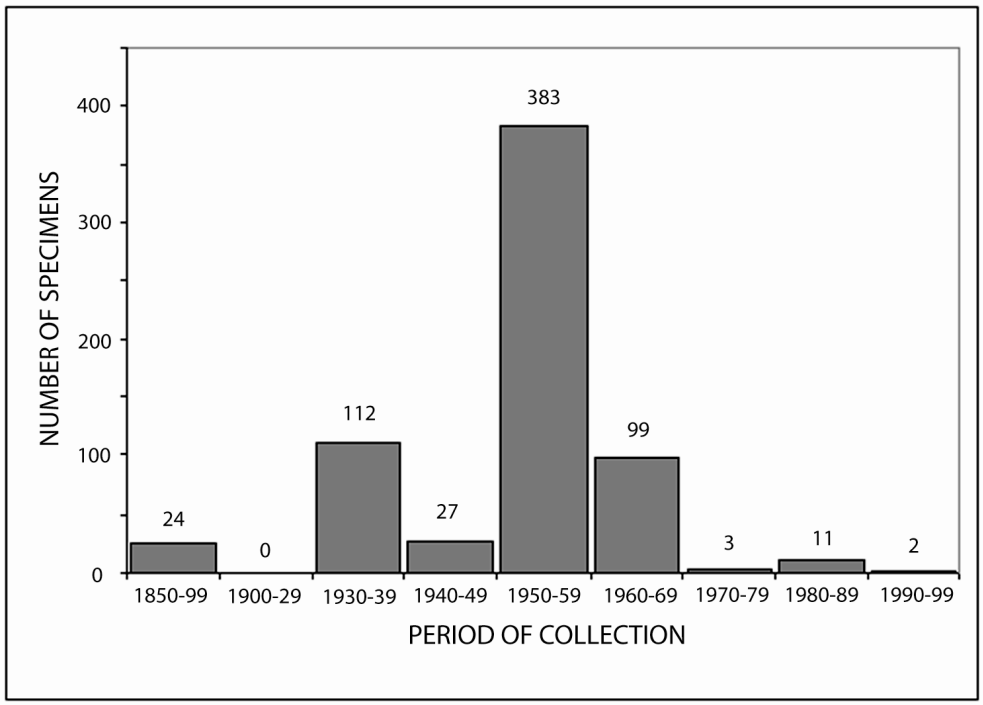

Fig. 1. Distribution of collection dates for 661 bird clutches from Cuba, 1850–1999, Instituto de Ecología y Sistemática, La Habana, Cuba.

2002) and intra-clutch characteristics (e.g., Slagsvold *et al*. 1984, Aparicio 1999, Dolenec 2002), and egg size variation (e.g., Bancroft 1984, Briskie and Sealy 1990, Chabi *et al*. 2000, Christians 2002, Styrsky *et al*. 2002) have become fertile research areas. Certainly, raptor egg characteristics were of critical importance in recognizing and monitoring the problem of pesticides in the environment during the 1960s through 1980s (e.g., Peakall and Kiff 1979, Moriarity *et al*. 1986, Kiff 1988). The utility of egg characteristics in determining species limits has been suggested (e.g., Wiley *et al*. 2010).

Studies of museum egg collections have proven important in avian research (e.g., Svensson 1978, Tryjanowski *et al*. 2001). For example, the locality data for egg specimens provide valuable information on a species's breeding distribution, past and present. An important use of such egg specimen data is in the development of national and regional bird atlases. But, despite the potential material available in egg collections, the IES specimens have received little attention. An exception is the valuable contribution of Valdés Miró (1984), who summarized the patterns and forms of nidification of 116 species of birds, based on the egg collections of IES and the Museo de Historia Natural "Carlos de la Torre."

Few specimens have been added to the IES collection in recent years (Fig. 1) and, as in most countries, growing concerns for bird conservation makes it unlikely that the collection will grow substantially in the future. Thus, the present specimens are largely irreplaceable (Rasmussen and Prŷs-Jones 2003), adding to the considerable value of the IES collection.

Although the IES collections are well curated, the current period of economic hardship in Cuba has left natural history institutions and collections in need of international assistance to improve facilities for the maintenance of specimens. Many of the IES specimens are stored in the original cabinets and display cases used by Juan Gundlach at the Instituto de Segunda Enseñaza. Whereas those cases and cabinets are important in themselves for their historical value, most are in need of repair. Other specimens need additional suitable storage facilities. Also, the IES collection is in need of climate and pest control to ensure the preservation of specimens and would benefit greatly from improved security. A tragic example of the latter need occurred in 2007, when the only specimen in Cuba (and one of 19 known specimens worldwide) of Cuban Macaw

Table 2. Cuban provinces and satellites represented by bird eggs and nests in the collection of the Instituto de Ecología y Sistemática, La Habana, Cuba.

Region	Egg Sets	Nests
Provincias		
Habana	256	20
Matanzas	41	5
Ciego de Ávila	32	–
Villa Clara	19	–
Cienfuegos	1	–
Pinar del Río	54	4
Sancti Spíritus	8	–
Isla de la Juventud (Isla de Pinos)	9	–
Total for provincias	420	29
Cayos [a]		
Cayo Anegadizo	2	–
Cayo Caimán del Faro	1	–
Cayo Caimán de Barlovento	2	–
Cayo Caimán de los Cayuelos	1	–
Cayo Caimán de Sotavento	3	–
Cayo Cantiles	3	–
Cayo Chalupa	2	–
Cayo Corúa	58	–
Cayo Cupey	8	–
Cayo Eusebio	1	–
Cayo Felipe	1	–
Cayo Griego	1	–
Cayo Largo del Sur, Archipiélago de los Canarreos	4	–
Cayo Los Ballenatos, Archipiélago de los Canarreos	5	–
Cayo Los Pájaros	8	–
Cayos al Sur de Tunas de Zaza	1	–
Cayería Los Guzmanes	1	–
Cayuelo de la Vela	1	–
Cayo Monitos de Jutia	2	–
Cayo Mono Grande	8	–
Cayuelos al Sur de Casilda	1	–
Cayuelos, Costa Norte, Barlovento, Ciego de Ávila	1	–
Total for cayos	115	–

[a]Data for the cayos are included also in provinces.

(*Ara tricolor*) was stolen from the Instituto, along with several other irreplaceable specimens.

We appeal to the international community for assistance in ensuring that the avian collections of IES survive.

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LITERATURE CITED

AGUILERA ROMÁN, R., AND O. H. GARRIDO. 2000. Tipos de la colección de aves del Instituto de Ecología y Sistemática, Cuba. Pitirre 13:1–4.

ALBERCH, P. 1993. Museums, collections and biodiversity inventories. Trends in Ecology and Evolution 8:372–375.

AMERICAN ORNITHOLOGISTS' UNION. 2012. Checklist of North American birds. American Ornithologists' Union, Washington, D.C. www.aou.org/checklist.north.index.php; last visited 1 October 2012.

ANDERSON, D. W., H. G. LUMSDEN, AND J. J. HICKEY. 1970. Geographical variation in the eggshells of Common Loons. Canadian Field Naturalist 84: 351–356.

APARICIO, J. M. 1999. Intraclutch egg-size variation in the Eurasian Kestrel: advantages and disadvantages of hatching from large eggs. Auk 116: 825–830.

BANCROFT, G. T. 1984. Patterns of variation in size of Boat-tailed Grackle *Quiscalus major* eggs. Ibis 126:496–509.

BEOLCHINI, F. 2002. A relational database for the management of the collections housed in the G. B. Grassi Museum (University of Rome "La Sapienza"): a general survey. Rendiconti Lincei Scienze Fisiche e Naturali 13:65–69.

BREE, P. J. H. VAN. 1957. Variations in length and breadth of eggs from a colony of Black-headed Gulls (*Larus r. ridibundus* Linnaeus) on the island of Texel. Beaufortia 5:245–255.

BRISKIE, J. V., AND S. G. SEALY. 1990. Variation in size and shape of Least Flycatcher eggs. Journal of Field Ornithology 61:180–191.

BROOKE, M. D. 2000. Why museums matter. Trends in Ecology and Evolution 15:136–137.

CHABI, Y., S. BENYACOUB, AND J. BANBURA. 2000. Egg-size variation in Algerian populations of the

Blue Tit (*Parus caeruleus ultamarinus*): effects of altitude and habitat. Revue d'Ecologie: La Terre et la Vie: 55:183–192.

CHRISTIANS, J. K. 2002. Avian egg size: variation within species and flexibility within individuals. Biological Review 77:1–26.

CHYLARECKI, P. L. KUCZYŃSKI, M. VORGIN, AND P. TRYJANOWSKI. 1997. Geographic variation in egg measurements of the Lapwing *Vanellus vanellus*. Acta Ornithologica 32:137–148.

DAVIS, P. 1996. Museums, biodiversity and systematics. Pp. 128–145 *in* Museums and the natural environment (P. Davis, ed.). Leicester University Press, London.

DITTMANN, T., AND H. HÖTKER. 2001. Intraspecific variation in the egg size of the Pied Avocet. Waterbirds 24:83–88.

DOLENEC, Z. 2002. Intraclutch egg dimensions variation in the Tree Sparrow *Passer montanus*. Larus 48:47–54.

ENCABO, S. I., E. BARBA, J. A. GIL-DELGADO, AND J. S. MONRÓS. 2002. Geographical variation in egg size of the Great Tit *Parus major*: a new perspective. Ibis 144:623–631.

FITZPATRICK, J. W. 1985. The role of scientific collections in ecological morphology. Pp. 195–208 *in* Museum collections: their roles and future in biological research (E. H. Miller, ed.). British Columbia Provincial Museum Occasional Paper Number 25.

GARRIDO, O. H., AND A. KIRKCONNELL. 2000. Field guide to the birds of Cuba. Cornell University Press, Ithaca, NY.

GONZÁLEZ ALONSO, H. J. (ED.). 2002. Aves de Cuba. Instituto de Ecología y Sistemática, La Habana, Cuba.

GREEN, R. E., AND J. P. W. SCHARLEMANN. 2003. Egg and skin collections as a resource for long-term ecological studies. Bulletin of the British Ornithologists' Club 123A:165–176.

KIFF, L. F. 1979. Bird egg collections in North America. Auk 96:746–755.

KIFF, L. F. 1988. Changes in the status of the peregrine in North America: an overview. Pp. 123–139 *in* Peregrine Falcon populations. Their management and recovery (T. J. Cade, J. H. Enderson, C. G. Thelander, and C. M. White, eds.). The Peregrine Fund Inc., Boise, Idaho

KIFF, L. F., AND D. J. HOUGH. 1985. Inventory of bird egg collections of North America, 1985. American Ornithologists' Union and Oklahoma Biological Survey, Norman, Oklahoma.

KRISHTALKA, L., AND P. S. HUMPHREY. 2000. Can natural history museums capture the future? BioScience 50:611–617.

MEHRHOFF, L. J. 1996. Museums, research collections, and the biodiversity challenge. Pp. 447–466 *in* Biodiversity II: understanding and protecting our biological resources (M. L. Reaka-Kudla, D. E. Wilson, and E. O. Wilson, eds.). A. Joseph Henry Press, Washington, DC.

MORIARITY, F., A. A. BELL, AND H. HANSON. 1986. Does p,p'DDE thin eggshells? Environmental Pollution (Series A) 40:257–286.

PEAKALL, D. B., AND L. F. KIFF. 1979. Eggshell thinning and DDE residue levels among Peregrine Falcons *Falco peregrinus*: a global perspective. Ibis 121:200–204.

RASMUSSEN, P. C., AND R. P. PRŶS-JONES. 2003. History vs mystery: the reliability of museum specimen data. Bulletin of the British Ornithologists' Club 123A:66–94.

REMSEN, J. V., JR. 1995. The importance of continued collecting of bird specimens to ornithology and bird conservation. Bird Conservation International 5:145–180.

ROSELAAR, C. S. 2003. An inventory of major European bird collections. Bulletin of the British Ornithologists' Club 123A:253–337.

SHAFFER, H. B., R. N. FISHER, AND C. DAVIDSON. 1998. The role of natural history collections in documenting species declines. Trends in Ecology and Evolution 13:27–30.

SLAGSVOLD, T., J. SANDVIK, G. ROFSTAD, Ö. LORENTZEN, AND M. HUSBY. 1984. On the adaptive value of intraclutch egg-size variation in birds. Auk 101:685–697.

STORK, N. E., M. J. SAMWAYS, AND H. A. C. DAVIDSON. 1996. Inventorying and monitoring biodiversity. Trends in Ecology and Evolution 11: 39–40.

STYRSKY, J. D., R. C. DOBBS, AND C. F. THOMPSON. 2002. Sources of egg-size variation in House Wrens (*Troglodytes aedon*): ontogenetic and environmental components. Auk 119:800–807.

SVENSSON, B. W. 1978. Clutch dimensions and aspects of the breeding strategy of the Chaffinch *Fringilla coelebs* in northern Europe: a study based on egg collections. Ornis Scandinavica 9: 66–83.

TAUB, L. 1998. On the role of museums in history of science, technology and medicine. Endeavour 22:41–43.

TRYJANOWSKI, P., L. KUCYŃSKI, M. ANTCZAK, M. SKORACKI, AND M. HROMADA. 2001. Within-clutch repeatability of egg dimensions in the

Jackdaw *Corvus monedula*: a study based on museum collections. Biologia 56:211–215.

VALDÉS MIRÓ, V. 1984. Datos de nidificación sobre las aves que crían en Cuba. Poeyana 282:1–27.

VALDES RAGUÉS, P. 1913. Catálogo de aves, Cuba, P. R. Museo Cubano "Gundlach." Imprenta y Papereria de Rambla, Bouza y Cia, La Habana, Cuba.

VALKAMA, J., E. KORPIMÄKI, J. WIEHN, AND T. PAKAANEN. 2002. Inter-clutch egg size variation in kestrels *Falco tinnunculus*: seasonal decline under fluctuating food conditions. Journal of Avian Biology 33:426–432.

WATKINS, G. B., AND M. A. DONNELLY. 2005. Biodiversity research in the Neotropics: from conflict to collaboration. Proceedings of the Academy of Natural Sciences of Philadelphia 154:127–136.

WILEY, J. W., R. AGUILERA ROMÁN, A. RAMS BECEÑA, C. PEÑA RODRÍGUEZ, A. KIRKCONNELL, A. ORTEGA PIFERRER, AND M. ACOSTA CRUZ. 2008. The bird collections of Cuba. Bulletin of the British Ornithologists' Club 128:17–27.

WILEY, J. W., O. H. GARRIDO, AND A. KIRKCONNELL. 2010. Natural history notes on the Loggerhead Kingbird *Tyrannus caudifasciatus.* Journal of Caribbean Ornithology 23:19–30.

WILLIAMS, T. D. 1994. Intraspecific variation in egg size and egg composition in birds: effects on offspring fitness. Biological Review 69:35–59.

WINKER, K. 1996. The crumbling infrastructure of biodiversity: the avian example. Conservation Biology 10:703–707.