BULLETIN

OF THE

FLORIDA STATE MUSEUM

BIOLOGICAL SCIENCES

Volume 4 Number 11

PLEISTOCENE BIRDS FROM NEW PROVIDENCE ISLAND, BAHAMAS

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1853

UNIVERSITY OF FLORIDA
Gainesville
1959

The numbers of THE BULLETIN OF THE FLORIDA STATE MUSEUM, BIOLOGICAL SCIENCES, will be published at irregular intervals. Volumes will contain about 300 pages and will not necessarily be completed in any one calendar year.

OLIVER L. AUSTIN, JR., *Editor*

The publication of this number of THE BULLETIN has been made possible by a grant from the Graduate School, University of Florida.

All communications concerning purchase or exchange of the publication should be addressed to the Curator of Biological Sciences, Florida State Museum, Seagle Building, Gainesville, Florida. Manuscripts should be sent to the Editor of the BULLETIN, Flint Hall, University of Florida, Gainesville, Florida.

Published 4 June 1959 Price for this issue $.35

PLEISTOCENE BIRDS FROM NEW PROVIDENCE ISLAND, BAHAMAS

Pierce Brodkorb [1]

Synopsis: Only 4 of 15 species of birds from a Pleistocene deposit on New Providence still exist on the island. The other species either are extinct or occur now farther south in the Bahamas and Greater Antilles. The extinct forms in include 2 raptors previously known only from Great Exuma Island and 6 new species: *Caracara creightoni*, *Burhinus nanus*, *Glaucidium dickinsoni*, *Otus providentiae*, *Bathoceleus hyphalus* (new genus, Picidae), and *Corvus wetmorei*.

The fossil deposit is assigned to the pre-Pamlico portion of the Wisconsin glacial stage, when the sea had retreated to the 10-fathom mark to expose a large land mass which reached within 10 miles of Cuba. At this time the avifauna of the Bahamas appears to have been about 40 percent richer than at present. The faunal tie to the Greater Antilles, particularly Cuba, was strong, while the relationship to Florida was weaker than today.

Introduction

Knowledge of the past bird life of the island of New Providence has heretofore been lacking. Such information from elsewhere in the Bahamas is meager, being limited to a paper on Pleistocene birds from Great Exuma Island (Wetmore, 1937B) and to a report of bird remains from an Indian midden of ceramic age on Crooked Island (Wetmore, 1938). Although small, these collections are of great interest. From Great Exuma the 13 species identified include 3 extinct raptors and 3 living forms presently confined to the Greater Antilles. The 11 species reported from the pre-Columbian site on Crooked Island also include several birds that no longer occur on that island, although still extant elsewhere in the West Indies.

During the summer of 1958 Dr. J. C. Dickinson, Jr., of the University of Florida, discovered a Pleistocene vertebrate locality on New Providence. With the assistance of Dr. Walter Auffenberg preliminary excavations were carried out during August. Abundant remains of large extinct rodents (*Geocapromys*) comprise the bulk of the collection, but bats, birds, reptiles, and frogs are also present. The avian material, which forms the subject of this report, contains a high proportion of extinct species, besides others that no longer

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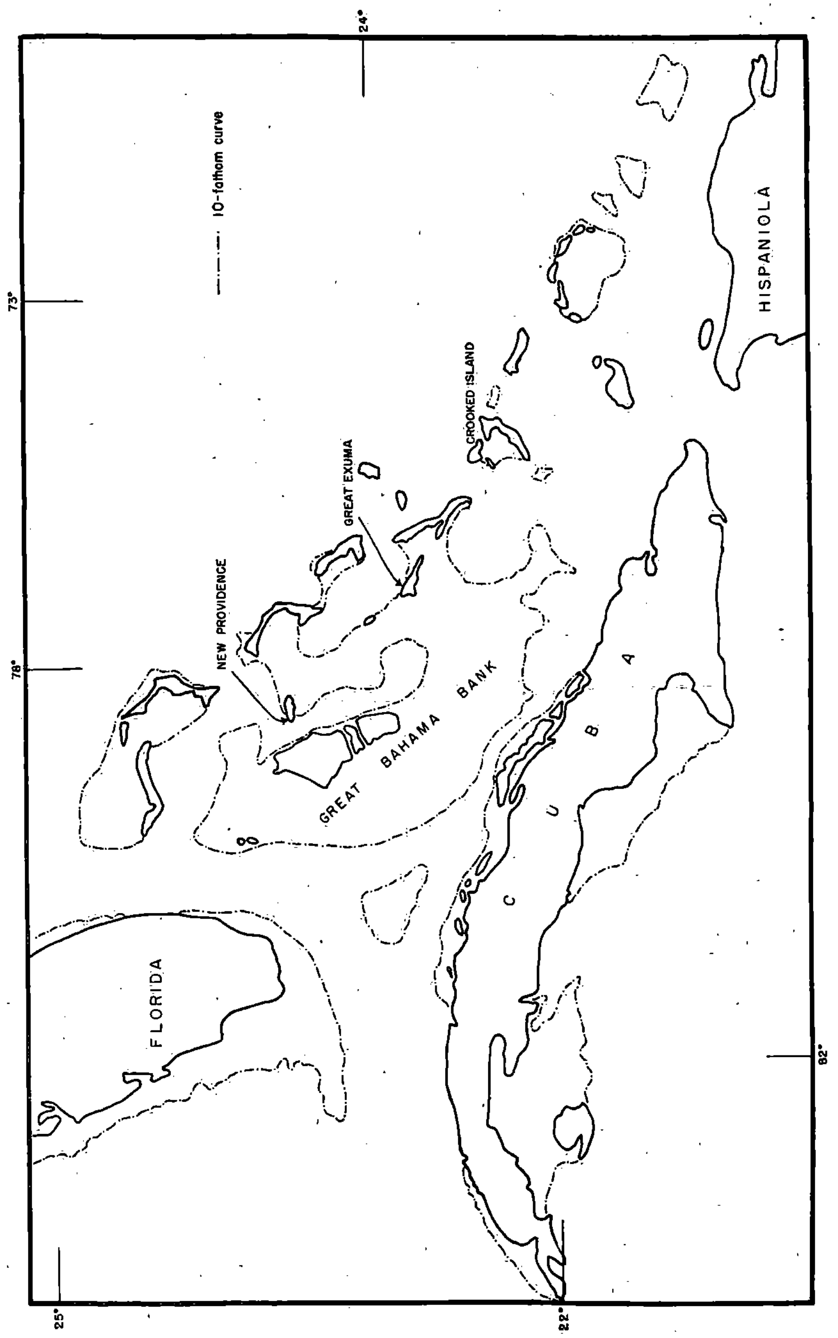
10-fathom curve
24°
73°
78°
25°
22°
82°
HISPANIOLA
CROOKED ISLAND
GREAT EXUMA
NEW PROVIDENCE
GREAT BAHAMA BANK
CUBA
FLORIDA

exist on New Providence. As it adds materially to our knowledge of the origin of the ornis of the Bahamas, it is to be hoped that further investigations may soon be made at this important site.

DESCRIPTION OF LOCALITY

The fossil locality is a sinkhole in oolitic limestone near the western end of New Providence. A large banana tree growing in the sink led the collectors to designate it the Banana Hole. The sink is located along the roadside between Lyford Cay and Clifton Pier. It is just north of the old settlement of Clifton and lies about one-half mile inland from Clifton Point. The surface elevation is about 30 feet above present sea level. The floor of the sink lies about 20 feet below the surface and consists of reddish brown clay containing vertebrate fossils. Excavation was made to a depth of only 1 foot.

When brought to the laboratory the bones were covered with reddish matrix. Washing and microscopic inspection showed the matrix to consist of nothing but clay, with no other minerals or marine invertebrates. The bones themselves, when cleaned, have a buffy coloration and are more heavily mineralized than cave fossils usually are. Many of them are abraded, but others show no erosion. They are thought to have accumulated in the sink largely through the feeding activities of raptorial birds.

Class AVES

Order FALCONIFORMES

Family ACCIPITRIDAE

Calohierax quadratus Wetmore

Plate I, fig. 1

Calohierax quadratus Wetmore, 1937B, p. 429, fig. 1-3 (Pleistocene, Great Exuma Island).

REFERRED MATERIAL. Distal portion of right tibiotarsus; UFC 3152.

DESCRIPTION. Agrees with *Buteo* Lacépède and *Buteogallus* Lesson and differs from *Accipiter* Brisson in having shaft of tibiotarsus stout and flaring gently above internal condyle; internal rugosity of oblique ligament situated near upper end of supratendinal bridge. Differs from *Buteo* and *Buteogallus* in having raised edges of peroneal groove forming ridges, not shelves; internal rugosity of oblique ligament situated slightly lower on shaft.

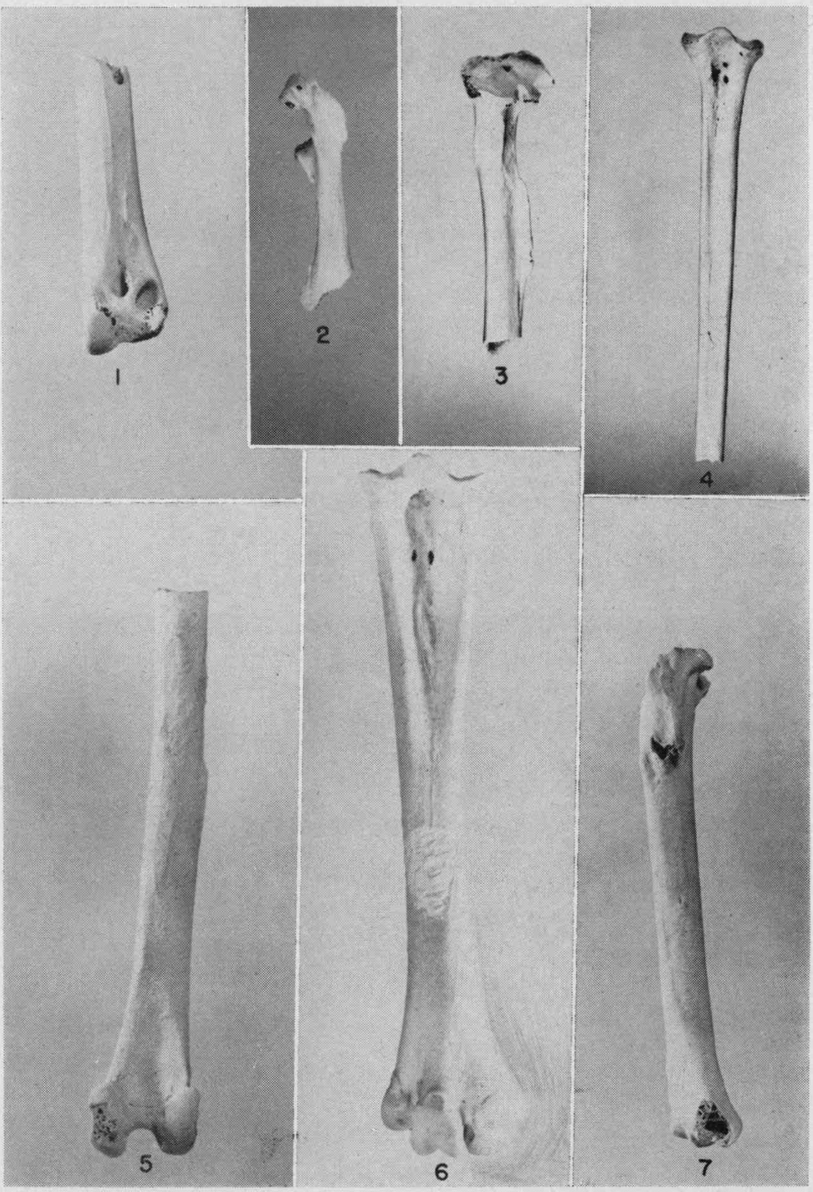

Plate I. Fig. 1, *Calohierax quadratus* Wetmore, tibiotarsus, UFC 3152, X 1.3. Fig. 2-4, *Burhinus nanus* n. sp., holotype coracoid, UFC 3154, X 1.3; tibiotarsus UFC 3155, X 1.3; tarsometatarsus, UFC 3156, X 1.1. Fig. 5-6, *Tyto pollens* Wetmore, tibiotarsus, UFC 3195, X 0.9; tarsometatarsus, UFC 3196, X 1. Fig. 7, *Caracara creightoni* n. sp., holotype carpometacarpus, UFC 3153, X 1.3.

Size near that of female *Buteo lineatus alleni*, larger than *Buteo platypterus*, smaller than *Buteo jamaicensis* and *Buteogallus anthracinus*. Least width of shaft, 5.1 mm.; abrasion of the condyles prevents taking other standard measurements.

DISTRIBUTION. *Calohierax* was described on the basis of a fragmentary tarsometatarsus from Great Exuma, and the type has heretofore remained unique.

Family FALCONIDAE

Caracara creightoni, new species

Plate I, fig. 7

HOLOTYPE. Left carpometacarpus, lacking proximal end and shaft of metacarpal III, UFC 3153. From Pleistocene at Banana Hole, New Providence Island, Bahamas. Collected by J. C. Dickinson, Jr., and Walter Auffenberg, 28 August 1958.

DIAGNOSIS. Differs from living *Caracara cheriway* (Jacquin) of tropical and subtropical America in having carpometacarpus with distal edge of pisiform process curved forward; a depression on shaft distad to pisiform process; metacarpal III with its base nearly straight, without medial angulation proximal to intermetacarpal tuberosity; tuberosity of metacarpal II, in medial view, with its outline more angular and less rounded, and its base more deeply excavated dorsally and laterally; subterminal tubercle on dorsal surface of shaft of metacarpal II obsolete. Size somewhat smaller than in congeneric species, living and fossil.

Length, from anterior edge of metacarpal I to distal condyle of metacarpal II, 44.9 mm. (46.0-49.0 in *C. cheriway*); width of metacarpal II, at level of intermetacarpal tuberosity, 4.9 mm. (5.1-5.3 in *C. cheriway*).

ETYMOLOGY. The new species from the Bahamas is dedicated to Albert M. Creighton, of Boston and Nassau, in recognition of his support of the summer's field work.

In substituting the generic name *Caracara* Merrem for *Polyborus* Vieillot, Hellmayr and Conover (1949) retained the masculine endings of the several species formerly in *Polyborus*, and this action was followed by the American Ornithologists' Union (1957). As the name *Caracara* is of barbaric rather than classical origin, its gender is to be determined by the original author. Merrem (1826) included four species in *Caracara*. For three of these, *C. accipitrina*, *C. aquilina*, and *C. crotophaga,* he used adjectives with feminine endings. Only the fourth specific name, *Caracara plancus,* is masculine, but the word *plancus* is a noun (meaning a kind of eagle), and therefore its gender is not effected by the gender of *Caracara.* As all the adjectives Merrem used in *Caracara* are feminine, it is obvious that he considered his new generic term as of feminine gender, and the endings of the specific adjectives currently placed in *Caracara* should agree.

DISTRIBUTION. In the modern fauna this arid tropical and subtropical genus occurs on the mainland from southern South America to Arizona, Texas, and southern Florida. Its modern West Indian range extends only to Cuba and the Isle of Pines, where the mainland species, *Caracara cheriway,* occurs.

Caracara prelutosa (Howard, 1938) is known from the Pleistocene of California and Florida, and from early Recent deposits in New Mexico. It was represented in the Pleistocene of Nuevo León by a slightly differentiated race, *Caracara prelutosa grinnelli* (Howard, 1940). The only prehistoric West Indian representative hitherto known is *Caracara latebrosa* (Wetmore, 1920, 1922A), from a Quaternary cave deposit on Puerto Rico.

Order CHARADRIIFORMES

Family BURHINIDAE

Burhinus nanus, new species

Plate I, figs. 2, 3, 4

HOLOTYPE. Left coracoid, lacking lower end, UFC 3154. From Pleistocene at Banana Hole, New Providence Island, Bahamas. Collected by J. C. Dickinson, Jr., and Walter Auffenberg, 28 August 1958.

DIAGNOSIS. Differs from living *Burhinus dominicensis* (Cory) of Hispaniola in smaller size; much smaller than living *Burhinus bistriatus* (Wagler) of Central and South America (see table 1).

REFERRED MATERIAL. Proximal portion of right tibiotarsus, UFC 3155; proximal portion of left tarsometatarsus, UFC 3156.

ETYMOLOGY. Latin, nanus, dwarf.

DISTRIBUTION. Although widespread in the Old World, the thick-knees, family Burhinidae, occur in America at present only in arid portions of the Neotropical mainland, from southern Mexico to Peru and Brazil, and on the island of Hispaniola.

TABLE 1

MEASUREMENTS (IN MM.) OF *Burhinus*

Element	*B. nanus*	*B. dominicensis* (3)	*B. bistriatus* (2)
Coracoid:			
Length to notch above internal sternal angle	22.5	24.9–25.3	26.1–28.8
Head to procoracoid foramen	13.5	14.1–15.1	14.5–15.9
Least width of shaft	3.1	3.5– 3.6	3.8– 3.9
Tibiotarsus:			
Length to end of fibular ridge	22.6	24.3	24.9–26.7
Proximal width	8.2	9.7	10.2–11.2
Width through fibular ridge	5.1	6.1	6.9– 7.1
Tarsometatarsus:			
Proximal width	9.5	——	10.9–11.1
Depth through hypotarsus	8.8	——	9.6–10.0
Width of shaft at middle	3.4	——	3.6– 3.7

Order COLUMBIFORMES

Family COLUMBIDAE

Columba squamosa Bonnaterre

REFERRED MATERIAL. Anterior portion of sternum, UFC 3157; left and right coracoids, UFC 3158-3159; 2 right ulnas, UFC 3160-3161; right tarsometatarsus, UFC 3162.

DESCRIPTION. Bones from *Columba squamosa* differ from those of *Columba leucocephala* in being larger and more robust, although some measurements overlap. In addition the inner surface of the sternal plate of *C. squamosa* has near its anterior end a large median foramen, which is lacking in *C. leucocephala*. Most of the bones referred above agree with modern skeletons, but the two ulnas are even larger and heavier than in available comparative material. The length of the single complete fossil ulna is 58.4 mm., against 54.1-56.1 in modern *C. squamosa*. This could reflect a specific difference, and therefore further material is desirable.

DISTRIBUTION. At the present time the Scaled Pigeon has a wide distribution in the West Indies, being absent only from Jamaica and the Bahamas. It was previously reported, however, from the Pleistocene of Great Exuma in the Bahamas (Wetmore, 1937B) and has also been found in prehistoric sites on Puerto Rico (Wetmore, 1922A, 1938), St. Croix (Wetmore, 1937A), and Martinique (Wetmore, 1952).

Columba leucocephala Linnaeus

Referred Material. 3 left coracoids, UFC 3163-3165; 2 left humeri, UFC 3166-3167; right ulna, UFC 3168; 4 left and 4 right carpometacarpi, UFC 3169-3176; left digit II, phalanx 1 of manus, UFC 3177; left and right femora, UFC 3178-3179; left tibiotarsus, UFC 3180; left and right tarsometatarsi, UFC 3181-3182.

Distribution. The White-crowned Pigeon is common today in the Florida Keys, Bahamas, Greater Antilles, and northern Leeward Islands. It has been recorded from prehistoric sites on Crooked Island in the Bahamas (Wetmore, 1938), Puerto Rico (Wetmore, 1922A), and St. Croix (Wetmore, 1937A), but this is the first Pleistocene record of the species.

Zenaida aurita (Temminck)

Referred Material. Left coracoid, UFC 3183; right scapula, UFC 3184; 2 left and 1 right humeri, UFC 3185-3187; 2 left ulnas, UFC 3188-3189; 3 left carpometacarpi, UFC 3190-3192.

Distribution. The Zenaida Dove occurs today throughout the West Indies and on the coast of Yucatan. It has been recorded from prehistoric sites on Puerto Rico (Wetmore, 1922A, 1938), St. Croix (Wetmore, 1937A), and Martinique (Wetmore, 1952), but this is its first Pleistocene occurrence.

Order PSITTACIFORMES

Family PSITTACIDAE

Amazona leucocephala (Linnaeus)

Referred Material. Right tarsometatarsus, UFC 3193; distal end of right radius, UFC 3194.

Distribution. This parrot is limited at present to the Caymans, Cuba, the Isle of Pines, and to Abaco, Acklin, and Great Inagua in the Bahamas. Its former Bahaman range was more extensive, as it occurred within recent years on Long and Fortune islands (Bond, 1956) and in pre-Columbian time on Crooked Island (Wetmore, 1938). This is the first Pleistocene record.

Order Strigiformes

Family Tytonidae

Tyto pollens Wetmore

Plate I, figs. 5-6

Tyto pollens Wetmore, 1937B, p. 436, fig. 10-16 (Pleistocene, Great Exuma Island).

Referred Material. Distal portion of left tibiotarsus, UFC 3195; left tarsometatarsus, UFC 3196; proximal portion of right tarsometatarsus, apparently from another individual, UFC 3197; inner trochlea of right tarsometatarsus, UFC 3198; outer trochlea of right tarsometatarsus, UFC 3199.

Description. Measurements of these specimens are given in table 2. They indicate that while *Tyto pollens* was a very robust bird, with the widths of the bones almost twice those of living *Tyto alba pratincola,* the tarsometatarsus was relatively short and exceeded that of the modern barn owl by only about 15 percent.

TABLE 2

Measurements (in mm.) of *Tyto*

Element	*T. pollens*	*T. ostologa*	*T. alba pratincola* (9)
Tibiotarsus:			
Width through trochleae	16.7	—	9.9–11.0
Least width of shaft	7.8	—	4.8– 5.4
Tarsometatarsus:			
Length	93.5	—	75.4–81.9
Proximal width	17.7–18.2	17.5	10.0–11.1
Least width of shaft	8.6	—	4.5– 4.9
Width through trochleae	21.2	—	12.1–13.0
Width of outer trochlea	14.9, 14.9	13.5	7.8– 8.7
Width of inner trochlea	12.3–13.2	11.7	6.9– 7.5

Distribution. Previous knowledge of giant Pleistocene barn owls is due to Wetmore (1922, 1937B, 1959), who reported *Tyto ostologa* from Haiti, *Tyto pollens* from Great Exuma, and an unnamed form from Cuba. These tremendous birds, which must have equaled or exceeded in bulk any owl now living, were probably derived from the same stock and apparently were contemporaries during the Pleistocene. It is quite possible that they had differentiated from each other only to the subspecific level.

The remains of these owls are associated with those of large extinct rodents, which seem to have been their principal food.

Whether the giant stock ever extended to Puerto Rico is not known. The Quaternary *Tyto cavatica* Wetmore (1920, 1922A) of Puerto Rico was a small bird. From other parts of the world Pleistocene barn owls have also been described, viz.: *Tyto melitensis* (Lydekker, 1891) from Malta, *Tyto sauzieri* (Newton and Gadow, 1893) from Mauritius, and *Tyto newtoni* (Rothschild, 1907) likewise from Mauritius. These too were small and resembled modern barn owls in size.

Tyto alba (Scopoli)

Referred Material. Premaxillary, UFC 3200; left tarsometatarsus, lacking both ends, UFC 3201. The premaxillary is from a young but fully grown bird.

Distribution. The Barn Owl is of almost cosmopolitan distribution and occurs today on New Providence, as well as others of the Bahama Islands and through the West Indies. It has been recorded from the Pleistocene of the United States, Mexico, Brazil, and Europe.

As the remains of 2 individuals were associated with the 2 individuals of the giant *Tyto pollens*, it appears that the species were contemporaneous and sympatric.

Family STRIGIDAE

Glaucidium dickinsoni, new species

Plate II, fig. 1

Holotype. Distal half of left tibiotarsus, UFC 3202. From Pleistocene at Banana Hole, New Providence Island, Bahamas. Collected by J. C. Dickinson, Jr., and Walter Auffenberg, 28 August 1958.

Diagnosis. Agrees with modern *Glaucidium siju* (d'Orbigny) of Cuba in having intercondylar sulcus wide; tendinal groove forming a very deep fossa at its distal end, where encroaching under intercondylar bar. Differs in having intercondylar bar oblique rather than transverse; peroneal groove reduced, not forming a shelf; internal prominence for oblique ligament on anterior face of shaft, instead of

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Plate II. Fig. 1, *Glaucidium dickinsoni* n. sp., holotype tibiotarsus, UFC 3202, X 1.7. Fig. 2-6; *Otus providentiae* n. sp., holotype tibiotarsus, UFC 3207, X 1.7; coracoid, UFC 3203, X 2.2; carpometacarpus, UFC 3205, X 1.9; tibiotarsus, UFC 3206, X 1.9; ulna, UFC 3204, X 2.3. Fig. 7, *Bathoceleus hyphalus* n. g. and sp., holotype coracoid, UFC 3209, X 1.7.

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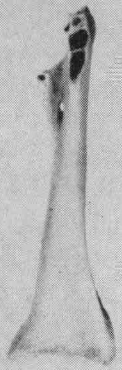

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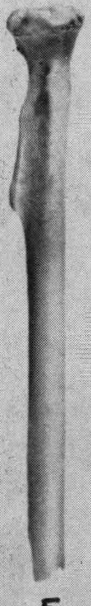

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protruding medially; shaft only slightly expanded distally. Size somewhat smaller. Distal width, 5.0 mm (5.5 in *G. siju*); width of shaft through internal prominence for oblique ligament, 2.6 (3.2 in *G. siju*); width of shaft above prominence, 2.4 (2.9 in *G. siju*).

ETYMOLOGY. Named for the collector, J. C. Dickinson, Jr., Associate Professor of Biology at the University of Florida and Acting Director of the Florida State Museum.

DISTRIBUTION. This genus is represented in the modern fauna of the West Indies only by *G. siju* of Cuba and the Isle of Pines, although other species occur in the western United States, Central and South America, and the Old World. No fossil species have previously been described in this genus.

Otus providentiae, new species
Plate II, figs. 2-6

HOLOTYPE. Distal portion of left tibiotarsus, UFC 3207. From Pleistocene at Banana Hole, New Providence Island, Bahamas. Collected by J. C. Dickinson, Jr., and Walter Auffenberg, 28 August 1958.

DIAGNOSIS. Agrees with *Otus* Pennant and differs from *Glaucidium* Boie in having intercondylar sulcus narrow; tendinal groove forming a shallow fossa at its distal end, with a pit undercutting medial end only of intercondylar bar.

Differs from modern *Otus asio floridanus* (Ridgway) of Florida in having intercondylar bar straight, not undulating; tendinal pit under medial end of bar deeper; shaft only slightly expanded distally, with margins gently flaring, not convex.

Differs from modern *Otus nudipes* (Daudin) of Puerto Rico as from *Otus asio*; in addition, peroneal groove obsolete, without raised edges; tendinal fossa without a knob above external condyle; intercondylar fossa only slightly excavating sides of condyles.

Size small. Distal width, 5.2 mm. (5.5-6.3 in *floridanus*, 6.0 in *nudipes*); width of shaft through internal prominence for oblique ligament, 2.8 (2.5-3.1 in *floridanus*, 3.4 in *nudipes*).

ETYMOLOGY. Latin, *providentiae*, of Providence.

REFERRED MATERIAL. Proximal three-fourths of left tibiotarsus of another individual, UFC 3206; left coracoid, lacking upper end, UFC 3203; proximal portion of right ulna, UFC 3204; proximal portion of left carpometacarpus, UFC 3205.

Proximal portion of tibiotarsus with a foramen on posterior side of shaft between fibular ridge and head (foramen present in *O. asio*, absent in *O. nudipes*); flexor attachment distal to foramen forming a pronounced, laterally deflected ridge (ridge small in *O. asio*, obsolete in *O. nudipes*); size small, but shaft not narrowing near middle. Proximal width, 4.8 mm. (4.7-5.1 in *floridanus*, 5.8 in *nudipes*); least width of shaft, 2.4 (2.2-2.5 in *floridanus*, 2.7 in *nudipes*).

Coracoid agrees with that of *Otus* and differs from that of *Glaucidium* in having anterior face of shaft perpendicular to procoracoid, rather than inclined toward it; posterior surface of procoracoid curved toward head, not flat; procoracoid foramen large and high, near scapular facet. Resembles *Otus nudipes* rather than *Otus asio* in having procoracoid narrow, rising toward head just medial to foramen and thus leaving a narrower groove along anterior face of bone. Size small: length from scapular facet, 16.1 mm. (17.0-17.7 in *floridanus*, 17.3 in *nudipes*); sternal width, 6.0 (6.1-7.0 in *floridanus*, 7.3 in *nudipes*).

Ulna resembles that of *O. nudipes* in having area for bicipital attachment more rugose and closer to head than in *O. asio*; differs from both those species in having prominence for anterior articular ligament rounded instead of angular. Proximal width, 4.9 mm. (4.8-5.1 in *floridanus*, 5.5 in *nudipes*).

Carpometacarpus with intermetacarpal tuberosity smoothly rounded as in *Otus* (knoblike in *Glaucidium*). Resembles *Otus asio* in having posterior carpal fossa elongate and shallow (round and deep in *Otus nudipes*). Differs from both species of *Otus* in having process of metacarpal I more upright, less bent back. Height through metacarpal I, 5.5 (5.0-5.7 in *floridanus*, 6.0 in *nudipes*).

Detailed comparison with *Otus lawrencii* (Sclater and Salvin) of Cuba is not possible at this time, as skeletal material of that species is unavailable. However, *O. lawrencii* resembles *O. asio* in size, and thus the New Providence bird is smaller.

DISTRIBUTION. The genus has an almost world-wide distribution, but the modern fauna of the West Indies contains only two species, *Otus nudipes* (Daudin) of Puerto Rico and the Virgin Islands and *Otus lawrencii* (Sclater and Salvin) of Cuba and the Isle of Pines. Because of their bare legs and lack of ear tufts, these two species are often placed in a separate genus, *Gymnasio* Bonaparte. In most characters the New Providence screech owl is closer to true *Otus* than to *Gymnasio*. No fossil species of *Otus* were previously known.

Order PICIFORMES

Family PICIDAE

Bathoceleus, new genus

TYPE OF GENUS. *Bathoceleus hyphalus*, new species.

DIAGNOSIS. Coracoid with internal margin of upper end of shaft nearly straight (as in *Xiphidiopicus*; curved medially toward brachial tuberosity in *Colaptes, Nesoceleus,* and *Melanerpes*); pneumatic foramina not extending from region of brachial tuberosity onto upper end of posterior face of shaft (resembling *Nesoceleus* and *Melanerpes*; area pneumatic in *Colaptes* and *Xiphidiopicus*); a pneumatic foramen between scapular facet and procoracoid (foramen present in *Colaptes, Nesoceleus,* and *Xiphidiopicus*; absent in *Melanerpes*); lower part of shaft slightly compressed in medial view (as in *Melanerpes* and *Xiphidiopicus*; expanded in *Colaptes* and *Nesoceleus*); lower part of shaft narrowly V-shaped in lateral view (concave on posterior face in allied genera); scar of coracobrachialis longer and shallower than in allied genera; a pneumatic foramen on posterior side above internal distal angle (as in *Nesoceleus*; foramen absent in *Colaptes, Melanerpes,* and *Xiphidiopicus*); anterior sternal facet curved (as in *Xiphidiopicus*; straight in *Colaptes, Nesoceleus,* and *Melanerpes*).

Bathoceleus hyphalus, new species

Plate II, fig. 7

HOLOTYPE. Right coracoid, nearly complete, UFC 3209. From Pleistocene at Banana Hole, New Providence Island, Bahamas. Collected by J. C. Dickinson, Jr., and Walter Auffenberg, 28 August 1958.

DIAGNOSIS. Differs in generic characters from other West Indian woodpeckers. Smaller than living *Colaptes chrysocaulosus* Gundlach and *Nesoceleus fernandinae* (Vigors) of Cuba; larger than living *Melanerpes striatus* (Müller) of Hispaniola, *Melanerpes superciliaris* (Temminck) of Cuba and the Bahamas, and *Xiphidiopicus percussus* (Temminck) of Cuba. Length, 26.0+ mm.; least width of shaft, 2.0; width of sternal facet, 5.6.

ETYMOLOGY. Greek, bathos, deep, and keleos, masculine, woodpecker; Greek, huphalos, under the sea, in allusion to the former larger extent of the Bahamas.

DISTRIBUTION. The 3 previously described fossil woodpeckers are from the Oligocene and Miocene of France.

Melanerpes superciliaris (Temminck)

REFERRED MATERIAL. Distal portion of right humerus, UFC 3208.

MEASUREMENTS. Distal width of humerus, 7.6 mm., identical in size with a Recent specimen from Cuba and much larger than *Melanerepes striatus* from Hispaniola.

DISTRIBUTION. The present distribution of this species is irregular. It occurs in the Bahamas on Grand Bahama and Abaco at the northern end of the chain, on Watlings Island in the eastern part of the Bahamas, and then reappears on Cuba, the Isle of Pines, and Grand Cayman. Each of these islands has a distinct race, so it is quite possible that more adequate material may prove the New Providence bird to be separable. Wetmore (1937B) reported the species from the Pleistocene of Great Exuma.

Order PASSERIFORMES

Family CORVIDAE

Corvus wetmorei, new species

Plate III, figs. 1-9

[?] *Corvus nasicus* Temminck, Wetmore, 1937B, p. 440 (Pleistocene, Great Exuma).

HOLOTYPE. Left humerus, lacking proximal end, UFC 3210. From Pleistocene at Banana Hole, New Providence Island, Bahamas. Collected by J. C. Dickinson, Jr., and Walter Auffenberg, 28 August 1958.

DIAGNOSIS. Resembles living *Corvus leucognaphalus* Daudin of Cuba, Hispaniola, and Puerto Rico, but smaller (see table 3); entepicondyle small through reduction of area of origin of both heads of flexor carpi ulnaris, resulting in its internal border being nearly straight instead of produced internally, and further in being produced distally for a shorter distance at a blunt rather than sharp angle (125° instead of 100°).

REFERRED MATERIAL. Proximal end of left humerus, possibly from the same individual as the type, UFC 3211; left ulna, lacking proximal end, UFC 3212; right carpometacarpus, with both ends broken, UFC 3213; 2 left femora, complete and proximal portion, UFC 3214-3215; distal portion of left tibiotarsus, UFC 3216; proximal portion of left tarsometatarsus, UFC 3217; unguis, UFC 3218.

ETYMOLOGY. Named for Alexander Wetmore, who is responsible for all previous knowledge of fossil birds of the West Indies.

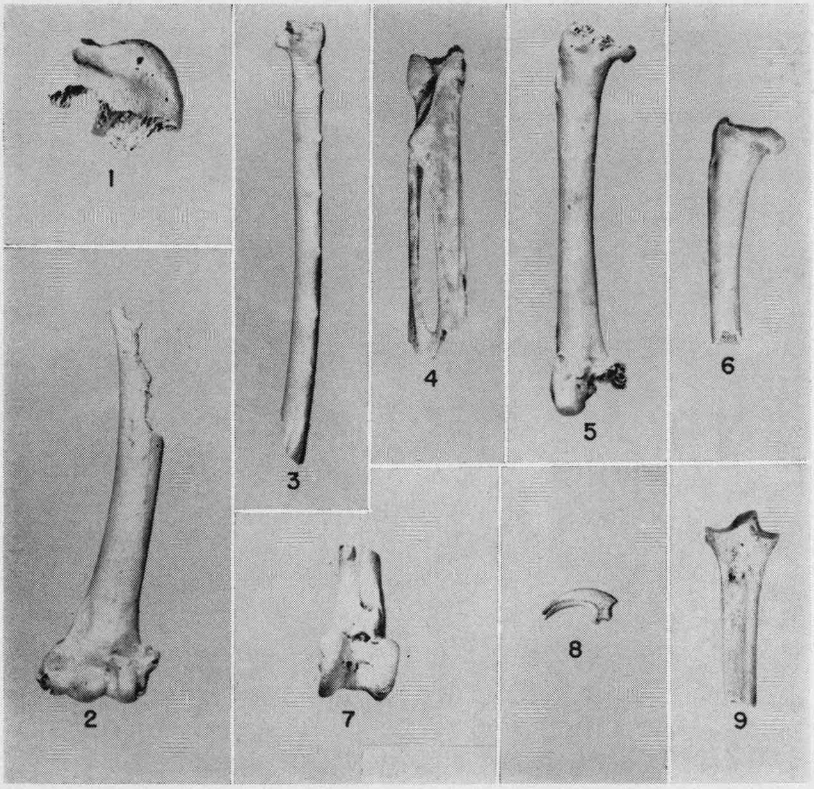

Plate III. Fig. 1-9, *Corvus wetmorei* n. sp., proximal portion of humerus, UFC 3211, X 1.1; holotype humerus, UFC 3210, X 1.2; ulna, UFC 3212, X 0.9; carpometacarpus, UFC 3213, X 1.1; femora, UFC 3214-3215, X 1.1; tibiotarsus, UFC 3216, X 1.3; unguis, UFC 3218, X 1; tarsometatarsus, UFC 3217, X 1.1.

DISTRIBUTION. The crow bones from the Pleistocene of Great Exuma (Wetmore, 1937B) and from the prehistoric site on Crooked Island (Wetmore, 1938) should be restudied, since at that time skeletal material of *C. l. nasicus* was unavailable.

At present two size-classes of crows occur in the West Indies. The larger species, *Corvus leucognaphalus,* is represented by two subspecies. *Corvus leucognaphalus nasicus* inhabits Cuba, the Isle of Pines, and Grand Caicos in the southern Bahamas. *Corvus leucognaphalus leucognaphalus* occurs on Hispaniola and Puerto Rico, and it extended to St. Croix during pre-Columbian time (Wetmore, 1938).

The smaller size-class is represented in the modern fauna by *Corvus palmarum* of Cuba and Hispaniola and by the aberrant *Cor-*

vus jamaicensis of Jamaica. *Corvus pumilus* Wetmore (1920, 1922A) was the Quaternary representative of the small crow on Puerto Rico.

TABLE 3

MEASUREMENTS (IN MM.) OF *Corvus*

Element	*C. wetmorei*	*C. l. nasicus* (2)	*C. l. leucognaphalus* (5)
Humerus:			
Proximal width	16.1	——	16.9–18.7
Width of shaft	5.0	——	5.9– 6.3
Distal width	12.8	14.0	14.1–15.4
Ulna:			
Depth through condyles	7.6	8.8	9.0– 9.9
Mid-shaft width	3.8	3.9	4.3– 4.7
Carpometacarpus:			
Posterior carpal fossa to end of intermetacarpal space	27.0	26.4	28.4–29.8
Width of shaft of metacarpal II	3.6	3.4	3.6– 4.0
Femur:			
Length	44.2	——	50.4–52.6
Width through head	8.7–8.8	——	10.9–11.4
Least width of shaft	3.3–3.9	——	4.3– 4.7
Distal width	9.3 plus	——	10.2–10.8
Tibiotarsus:			
Distal width	7.8	8.5– 9.1	8.3– 9.5
Tarsometatarsus:			
Proximal width	8.7	10.1	8.9–10.1

Family MIMIDAE

Mimus gundlachii Cabanis

REFERRED MATERIAL. Proximal half of right humerus, UFC 3219; distal portion of right tarsometatarsus, UFC 3220.

DESCRIPTION. In the humerus of *Mimus* the deltoid crest is angular, and the medial bar fuses to the side of the shaft rather than reaching the floor of the tricipital fossa. *Mimus gundlachii* is larger than *Mimus polyglottos.* The tarsometatarsus of *M. gundlachii* has the inner trochlea lengthened, so that it is decidedly longer than the outer trochlea and nearly as long as the middle one. In *M. polyglottos* the inner and outer trochleae are about equal in length, and both are distinctly shorter than the middle one.

DISTRIBUTION. *Mimus gundlachii* has a relict distribution today, in the Bahamas (execpt the northernmost islands), on cays off the north coast of Cuba, and in southern Jamaica. It has been recorded from the pre-Columbian site on Crooked Island (Wetmore, 1938), but this is the first fossil record.

Other species of mockingbirds occur widely in the West Indies and elsewhere in the Americas.

RELATIONSHIPS OF PRESENT AVIFAUNA

The present avifauna of the Bahamas contains 93 species of breeding birds, besides winter visitants, transients, and stragglers (data summarized from Bond, 1956). Endemism is mainly at the subspecific level, as only 4 species of birds (*Philodice evelynae, Callichelidon cyaneoviridis, Vireo crassirostris,* and *Geothlypis rostrata*) are confined to the Bahamas as breeders, and only one of these (*Callichelidon*) has differentiated generically.

The relationships of the present Bahaman avifauna are primarily to the Greater Antilles and secondarily to Florida. Of the 93 resident species no less than 77 percent breed also on Cuba, and 74 percent on Hispaniola. While the Bahamas share 61 percent of their breeding birds with Florida, these are mainly species of wide distribution, and only 5 species (*Pandion haliaetus, Dendrocopos villosus, Sitta pusilla, Polioptila carulea,* and *Dendroica dominica*) breed on the Bahamas and in Florida but not on Cuba or Hispaniola.

FACTORS RESTRICTING PRESENT AVIFAUNA

The adjacent areas have richer avifaunas than the Bahamas. Florida has 141 breeding species of birds (Howell, 1932), and its avifauna is thus 50 percent larger than that of the Bahamas. Cuba has 133 breeding species and Hispaniola 123 (Bond, 1956), and their avifaunas are thus respectively 40 and 30 percent larger than that of the Bahamas. Physical factors which might account for these differences include separation from the mainland, absence of mountains, and a small land mass.

The Bahamas share with Cuba and Hispaniola a water barrier separating them from the mainland. Although the Bahamas in general are closer to the mainland than is Cuba, yet they have fewer resident species in common with Florida, for only 57 Florida species occur in the Bahamas, against 61 Florida species that reach Cuba. As the water barrier should have operated more effectively against Cuba than against the Bahamas, some other reason must be found to explain the paucity of the Bahaman avifauna.

The absence of mountains in the Bahamas undoubtedly reduces the number of habitats available in comparison with Hispaniola, and to a lesser extent with Cuba. Yet the highest elevation in Florida is 324 feet, less than that of Cat Island in the Bahamas, which reaches about 400 feet, and the greater part of Cuba lies below the 500-foot contour. Thus differences in elevation alone appear insufficient to account for the poverty of the present Bahaman fauna.

The small land area of the Bahamas forms the most striking physical difference between that group and all three of the adjacent regions. Although the Bahamas stretch over a distance comparable to Cuba or Florida and greater than Hispaniola, their actual land area of 4404 square miles is only 8 percent that of Florida, 10 percent that of Cuba, and 14 percent that of Hispaniola. As this total land area is further broken up into numerous small islands, it becomes apparent that the absence of a large land mass is a major factor in restricting the size of the avifauna.

RELATIONSHIPS OF PLEISTOCENE AVIFAUNA

Of the 15 species identified from the New Providence deposit, only 4 still occur on that island, namely: *Columba leucocephala*, *Zenaida aurita*, *Tyto alba*, and *Mimus gundlachii*. Only 2 additional species, *Amazona leucocephala* and *Melanerpes superciliaris*, are found at present elsewhere in the Bahamas. While only 2 of these 6 species extend to Florida, every one of them is represented in the present avifauna of Cuba, and 4 of them also occur on Hispaniola.

Columba squamosa still occurs on Cuba and Hispaniola, but is now absent from the Bahamas.

The remaining 8 species are extinct. As with the extant birds, their relationships are primarily with Cuba and secondarily with Hispaniola. *Calohierax quadratus* and *Bathoceleus hyphalus* had differentiated to the generic level, and their relationships are doubtful. *Caracara creightoni* has a generic representative on modern Cuba, had another in the Quaternary of Puerto Rico, and others in the Pleistocene and Recent faunas of Florida. *Burhinus nanus* is related to a species on Hispaniola, the only place in the West Indies where the family now occurs. *Tyto pollens* is allied to the Pleistocene barn owls of Cuba and Hispaniola. *Glaucidium dickinsoni* was the Pleistocene representative of a modern owl on Cuba. *Otus providentiae* has generic representatives in the present fauna of Florida, Cuba, and Puerto Rico. *Corvus wetmorei* is related to crows now living on Cuba, Hispaniola, and Puerto Rico.

Thus of the 15 species identified from the Pleistocene of New Providence, 80 percent are related to Cuban forms, 53 percent are related to Hispaniolan forms, but only 27 percent occur in or were derived from Florida. Moreover, all 4 species that are related to the Florida ornis are likewise represented on Cuba, and 2 of them on Hispaniola.

If the birds from the Pleistocene of Great Exuma are added to those from New Providence, the combined list of 21 species of resident birds does not change the picture materially. The affinities of 71 percent of them are with Cuba, 62 percent with Hispaniola, but only 24 percent with Florida. All the species in the Florida group are likewise represented in the Cuban or Hispaniolan groups.

Thus during the Pleistocene the faunal tie of the Bahamas to the Greater Antilles, particularly Cuba, was strong, while the relationship to Florida was weaker than today.

Richness of Pleistocene Avifauna

Nine of the 21 resident Pleistocene birds identified from the Bahamas are extinct. A 43 percent extinction rate is higher than reported for other Pleistocene localities (Brodkorb, 1955). All the extinct species represent genera or ecological types absent from the islands today. It is thus logical to conclude that the Pleistocene avifauna of the Bahamas was about 40 percent richer than the present depauperate fauna and comparable in numbers to the present avifaunas of Cuba or Hispaniola.

Age of Pleistocene Avifauna

The absence of a large land mass is thought to be of major importance in restricting the size of the present depauperate avifauna of the Bahamas. The richer Pleistocene avifauna would seem to require a larger land mass than presently exists in the Bahamas, and this would also seem to be needed to support giant raptorial birds, such as *Titanohierax gloveralleni* and *Tyto pollens,* and the plentiful large rodents on which they fed.

There were periodic rises in sea level during the interglacial stages of the Pleistocene and drops from present level during the glacial stages (Cooke, 1932, 1939, 1945; Flint, 1942, 1947; MacNeil, 1950). The Bahamas have been a stable, reef-building area since the Cretaceous (Eardley, 1951). Therefore in the absence of evidence for movement of the land, the requirement of a larger land mass can be met only during one of the glacial stages.

During the Sangamon (third) interglacial stage the sea rose to a height of 90-100 feet above its present level (authors cited above). Such a rise would inundate the fossil locality on New Providence, but no marine materials were recognized. It is thus concluded that the sink hole at the fossil locality postdates Sangamon time.

According to Cooke, the sea dropped to 60 feet below its present level during the early portion of the Wisconsin (fourth) glacial stage and preceding the mid-Wisconsin (Pamlico) temporary rise in sea level. Such a recession of the sea to the 10-fathom mark would expose the Great Bahama Bank, uniting it in one large island with Bimini, Andros, New Providence, Great Exuma, and Long Island (see map). This large island lay within 10 miles of Cuba. It was thus easily accessible to Cuban species, and other islands stretching toward the southeast provided an indirect connection to Hispaniola. Therefore, in view of the geological and faunal evidence, the fossil deposit is thought to represent early Wisconsin (pre-Pamlico) time.

ACKNOWLEDGMENTS

For the use of comparative material I am indebted to Dr. Dean Amadon of the American Museum of Natural History, Dr. Julian J. Baumel of Creighton University, and Drs. Herbert Friedmann and Alexander Wetmore of the United States National Museum. Clayton Ray of Harvard University supplied casts of the types of birds described from Great Exuma. The photographs were taken by J. Hill Hamon of the University of Florida.

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