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Source: Journal of Raptor Research, 40(4) : 284-287

Published By: Raptor Research Foundation

URL: https://doi.org/10.3356/0892-1016(2006)40[284:FEOTRC]2.0.CO;2

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SHORT COMMUNICATIONS

J. Raptor Res. 40(4):284–287
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FOSSIL EVIDENCE OF THE RUFOUS CRAB-HAWK (*BUTEOGALLUS AEQUINOCTIALIS*) IN JAMAICA

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KEY WORDS: Buteogallus aequinoctialis; *Rufous Crab-Hawk*; Buteogallus anthracinus; *Common Black-Hawk*; *competition*; *fossil birds*; *Holocene*; *West Indies*.

The historically known avifauna of Jamaica is unusual among the Greater Antilles for its dearth of raptorial birds. The only endemic species is the Jamaican Owl *Pseudoscops grammicus*. The Barn Owl (*Tyto alba furcata*) found on Jamaica is the same subspecies as found in Cuba, Isle of Pines, Grand Cayman, and Cayman Brac (König et al. 1999). Barn owls in Jamaica may have been derived from Cuba following the European introduction of rats of the genus *Rattus* (S. Olson unpubl. data). The only resident falcon is the American Kestrel (*Falco sparverius*), which is nearly ubiquitous in the New World, and the only hawk is the eponymous but very widely distributed Red-tailed Hawk (*Buteo jamaicensis*). In the fossil record, an eagle-sized accipitrid, much larger than *B. jamaicensis*, is known from a single incomplete claw from a cave deposit in Trelawny Parish (Olson and Steadman 1977).

I report here two bones from a cave deposit in the southernmost part of Jamaica that are identified as Rufous Crab-Hawk *Buteogallus aequinoctialis* and that presumably indicate a resident population that has become extinct. This is an extraordinary range extension with some interesting implications.

MATERIAL EXAMINED

Modern comparative skeletons were examined in the Division of Birds, Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). Fossils are in the collections of the Department of Paleobiology of the same institution. The following catalog numbers are all USNM (M = male, F = female): *Accipiter cooperii* 18855 F Maryland, 501627 M West Virginia, 614361 F New Mexico; *A. striatus* 554770 F North Carolina; *Busarellus nigricollis* 345772 F Brazil; *Buteo albicaudatus* 622367 F Guyana; *B. albonotatus* 621010 M Guyana; *B. brachyurus* 50938 unsexed partial Brazil, 291403 M partial Florida; *B. j. jamaicensis* 289619 F Haiti; *B. j. borealis* 561859 M Maryland; *B. platypterus platypterus* 613957 F Panama; *B. p. brunnescens* 500678 unsexed partial Puerto Rico; *B. p. insulicola* 554967 M Antigua; *B. poecilochrous* 346398 M captive; *B. polyosoma* 319437 M Argentina; *B. regalis* 320771 M New Mexico; *B. ridgwayi* 318882 F Haiti; *B. swainsoni* 321986 M California, 614363 F Colorado; *B. ventralis* 400056 M partial Chile; *B. magnirostris* 562526 M Panama, 630135 F Uruguay; *Buteogallus aequinoctialis* 621054 F, 621849 M, 621850 M, 621851 M, 621944 F—all Guyana; *B. anthracinus* 344052 F Venezuela, 562529F, 562530 M, 611554 M, 611555M, 612260 M 612261 F, 613358 M—all Panama; *B. gundlachii* 323421 M partial Cuba; *B. meridionalis* 622379 M Guyana; *Chondrohierax uncinatus* 611557 F Panama; *Circus cyaneus* 291684 M Maryland; *Elanus leucurus* 19603 unsexed California; *Elanoides forficatus* 621940 F Guyana; *Geranospiza caerulescens* 3455774 M Brazil; *Harpagus bidentatus* 612259 F Panama; *Ictinia plumbea* 613357 M Panama; *Leptodon cayanensis* 613953 M Panama; *Leucopternis plumbea* 4321154 M partial Panama; *L. semiplumbea* 613395 F Panama; *L. albicollis* 611558 M Panama; *L. princeps* 613281 M Panama; *Parabuteo unicinctus* 630259 M Uruguay; *Rostrhamus sociabilis* 227376 M Argentina.

Family Accipitridae
Genus *Buteogallus* Lesson
Rufous Crab-Hawk *Buteogallus aequinoctialis* (Gmelin)
(Fig. 1B, 1E)

REFERRED MATERIAL

Complete right humerus (USNM 531488) lacking most of the internal tuberosity and with the entepicondyle abraded; complete left tibiotarsus (USNM 531489). Collected by Ross MacPhee and Donald A. McFarlane in 1995.

LOCALITY AND AGE OF FOSSILS

Both bones were collected in Clarendon Parish, Jamaica, on Portland Ridge Peninsula at Jacksons Bay Caves (ca. 17° 44′N, 77° 3′W), Lloyd's Cave (McFarlane et al. 2002, Figs. 1–2; MacPhee and Horovitz 2004). The tibiotarsus came from Calcite Passage of Mantrap entrance. Details of where within Lloyd's Cave the humerus was found were not recorded but the preservation (very fresh-appearing but with reddish stains) was identical to that of the tibiotarsus and the size would be compatible with both specimens being from a single individual. All Calcite Passage specimens were surface-collected (R. MacPhee pers. comm.). In a pas-

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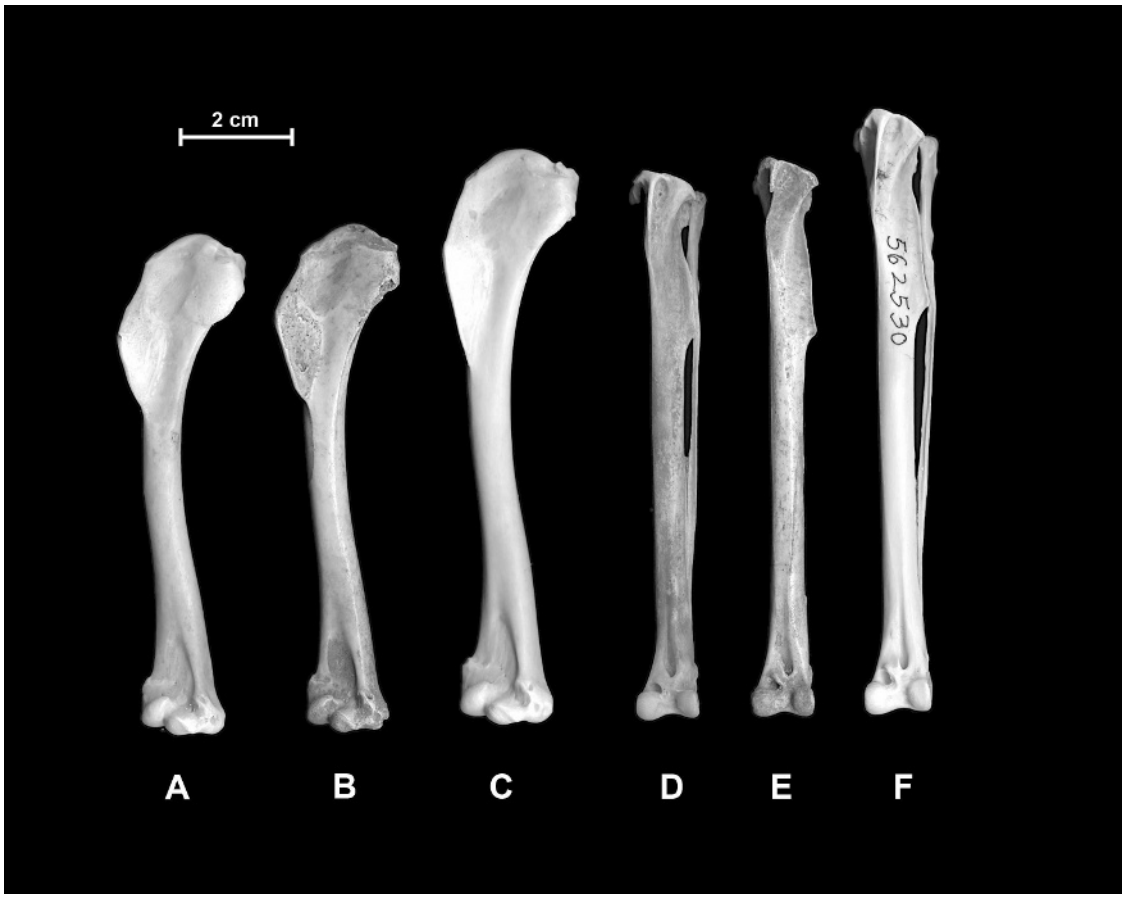


Figure 1. Limb elements of fossil and modern *Buteogallus*: A–C, right humeri in palmar view; D–F, left tibiotarsi in anterior view. A, D, Rufous Crab Hawk *B. aequinoctialis* (USNM 621851); B, E, fossils of Rufous Crab Hawk *B. aequinoctialis* from Jamaica (USNM 531488, 531489); C, F, Common Black-Hawk *B. anthracinus* (USNM 562530). Scale = 2 cm.

sage nearby, equally fresh-looking cranial remains of the extinct platyrrhine monkey *Xenothrix mcgregori* were discovered (MacPhee and Horovitz 2004). Surface guano at another point in Lloyd's Cave gave a date of 1750 ± 80 radiocarbon years BP (McFarlane et al. 2002), so it is highly likely that the hawk fossils are Holocene in age.

COMPARISONS

Comparisons were made with virtually all possible taxa of New World Accipitridae except eagle-sized species that would obviously be too large. All kites had proportionately smaller hindlimbs and most were absolutely too small to agree with the Jamaican fossils. In *Accipiter* the humerus had the pectoral crest larger, more triangular, with the apex situated more distally, the shaft more sigmoid, and the distal end relatively wider. That of *Circus* differed in about the same way and the tibiotarsus was much more elongate and gracile. These may be relatively closely related genera (Olson 2006) and the Jamaican fossils lacked other osteological features by which *Circus* and *Accipiter* may be recognized (Olson and James 1991).

The fossils were very similar in size to *Leucopternis albicollis*, in which, however, the shafts of the humerus and tibiotarsus were much less robust. The other species of *Leucopternis* examined were either too small (*L. plumbea* and *L. semiplumbea)* or too large (*L. princeps*) to agree with the fossils. In *Parabuteo* the proportions were very different with the humerus shorter and tibiotarsus longer than in the fossils and the pectoral crest of humerus much more triangular.

The Jamaican fossils came from a species considerably smaller than *Buteo jamaicensis*, the only hawk in Jamaica today, and larger than *B. ridgwayi* or any of the forms of *B. platypterus*, the only other species of the genus now pres-

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Table 1. Skeletal measurements (range and mean in mm) of Jamaican fossil and modern *Buteogallus*. Length of tibiotarsus includes the cnemial crest.

MEASUREMENT	JAMAICAN FOSSILS *B. AEQUINOCTIALIS*	MODERN ($N = 5$) *B. AEQUINOCTIALIS*	MODERN ($N = 8$) *B. ANTHRACINUS (B. GUNDLACHII)*
Humerus length	95.3	90.7–100.8 (95.5)	106.1–120.5 (110.4) (>113)
Tibiotarsus length	104.2	100.8–106.3 (103.3)	110.5–120.9 (115.2) (117.4)

ent in the West Indies (Raffaele et al. 1998). The humerus would fall in the size range of *B. lineatus*, a mainland species now known from fossils in the Bahamas and Cuba (Olson 2000, Suárez and Olson 2003). In all species of *Buteo*, however, the tibiotarsus was proportionately shorter and more robust than the Jamaican fossil.

An elongated tibiotarsus was characteristic of the species of *Buteogallus*. There was no overlap in skeletal measurements between *B. anthracinus* and the smaller species *B. aequinoctialis*, and the Jamaican fossils fell squarely on the mean of values for the latter (Table 1). Although the Cuban Black-Hawk (*B. gundlachii*) was stated to be smaller than *B. anthracinus* and judged to be specifically distinct from that species (Wiley and Garrido 2005), bones removed from a study skin were still considerably larger than in the Jamaican fossils (Table 1), which were in every respect identical with *B. aequinoctialis* and are assigned to that species.

DISCUSSION

The Rufous Crab-Hawk *Buteogallus aequinoctialis* occurs in coastal mangroves from southern Brazil (Paraná) to the Gulf of Paria in Venezuela (Hilty 2003). Mangrove habitats are scattered around coastal Jamaica but the largest area is around the Portland Ridge Peninsula and extending NE to near Kingston (Asprey and Robbins 1953). The Jamaican fossil locality is very close (0.5 km or less) to the southern coast of the Portland Ridge Peninsula near areas of mangrove extending to the NW. Only about 5 km across the peninsula are the even more extensive mangrove forests around West Harbour and Portland Bight (Asprey and Robbins 1953), where there are about 80 km^2 of mangrove habitat extending continuously for about 48 km. It is doubtless not a coincidence that the fossils of Rufous Crab-Hawk were found in the one area of Jamaica with the most suitable habitat for the species.

Because the range of the Rufous Crab-Hawk does not now extend into the Caribbean basin at all, its occurrence some 1760 km to the WNW in Jamaica seems all the more extraordinary. This suggests that its distribution in the Holocene included mainland shores of the Caribbean from which it would have been better able to colonize Jamaica. The nearest point of Colombia to southern Jamaica is about 750 km, which differs little from the ca. 700 km to the nearest point of Central America. Present distributions suggest rather strongly that *B. aequinoctialis* may be in the process of being replaced by the larger Common Black-Hawk *B. anthracinus*, as their ranges overlap only in easternmost Venezuela and Guyana. Thus, they are not mutually exclusive, but occur in sympatry only in a very limited part of the ranges of either species, as might be expected if one were gradually replacing the other. Field observations of the interactions of these two species where they occur together and long-term monitoring of the relative abundance of each may clarify this possibility.

What caused the extinction of the Rufous Crab-Hawk in Jamaica is unknown, as there is no species now occupying the niche of a large avian predator of coastal invertebrates in southern Jamaica. Habitat loss due to rising sea-levels and cutting of mangroves for charcoal, perhaps in combination with human-introduced predators, may have been factors.

FÓSILES DE *BUTEOGALLUS AEQUINOCTIALIS* EN JAMAICA

RESUMEN.—Fósiles del Holoceno tardío provenientes de un depósito subterráneo en la península de Portland Ridge al sur de Jamaica extienden el rango de *Buteogallus aequinoctialis* hasta la cuenca del Caribe, a más de 1700 km al oeste-noroeste de la distribución actual más occidental de esta especie. Los fósiles se localizaron cerca de las áreas más extensas de manglares, el cual es el hábitat requerido por esta especie. La ocurrencia de *B. aequinoctialis* en Jamaica sugiere que su distribución pudo extenderse en algún momento a través del Caribe, en donde fue posiblemente reemplazada por *B. anthracinus*.

[Traducción del equipo editorial]

ACKNOWLEDGMENTS

I am most grateful to Ross MacPhee for supplying fossil material from Jamaica and providing information on it. The figure is by Brian Schmidt, Division of Birds, Smithsonian Institution.

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Received 1 May 2006; accepted 7 August 2006

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