

## A fossil cranium of the Cuban Macaw *Ara tricolor* (Aves: Psittacidae) from Villa Clara Province, Cuba

STORRS L. OLSON<sup>1,\*</sup> AND WILLIAM SUÁREZ<sup>2</sup>

<sup>1</sup>Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, P. O. Box 37012, Washington, D.C. 20013-7012, U.S.A.

<sup>2</sup>Departamento de Paleogeografía y Paleobiología, Museo Nacional de Historia Natural, Obispo 61, Plaza de Armas, La Habana, CH 10100, Cuba. \*Corresponding author: olsons@si.edu.

**ABSTRACT.**—A cranium of the extinct Cuban Macaw *Ara tricolor* from a Quaternary sinkhole in Villa Clara Province, Cuba, is the third paleontological record for the species in Cuba or for any macaw in the West Indies. The specimen also constitutes the northern and easternmost proven occurrence of the species and adds further information bearing on the osteology and size of *Ara tricolor* relative to other members of the genus. Aquatic depositional environments may be important for determining the true distribution of macaws in the West Indies through the fossil record.

**KEYWORDS.**—extinction, fossil birds, parrots, Pleistocene.

The Cuban Macaw *Ara tricolor* is the only Antillean macaw known in the historic period from preserved skins, of which only 19 specimens still exist in collections (Wiley et al. 2008), the exact provenance of almost none of which is now known. Gundlach (1876: 126) found it only in the area of the Zapata Swamp (Matanzas Province) from Hanábana to the Ensenada de Cochinos, where it could still be easily encountered in 1849, although its numbers diminished rapidly afterwards. Its range was said to have extended west into Pinar del Río Province, where the birds supposedly disappeared after the hurricane of 1844, and there is an unsubstantiated but credible tradition of the species having been on the Isle of Pines (Gundlach 1893, Barbour 1923: 80-81). Some evidence, including archeological, indicates that this species was hunted around La Habana city in the 16<sup>th</sup> to 18<sup>th</sup> centuries (Osvaldo Jiménez, Gabinete de Arqueología, Oficina del Historiador, Ciudad de La Habana, pers. comm. to WS 13 Mar 2008). Barbour (loc. cit.) relates that Gundlach obtained his specimens of the macaw at Zarabanda, Matanzas (22° 23' N; 81° 02' W), which is at the eastern edge of the Zapata Swamp. That the species persisted until about 1864 and was last taken at La Vega, Cienfuegos Province (22° 23' N; 80°

34' W), appears to rest entirely on the testimony of Walter Zappey, who was given this information by the owner of the plantation where the birds were shot (Bangs and Zappey 1905: 200). There is no indication that these last specimens were preserved. La Vega is some 45 km due E of Zarabanda and the Zapata Swamp.

The first fossil occurrence of the Cuban Macaw was the proximal half of a carpometacarpus from spring deposits (not a cave as given in Williams and Steadman 2001: 176) assumed to be Pleistocene at Ciego Montero, Cienfuegos Province (22° 22' N; 80° 20' W), reported by Wetmore (1928). Ciego Montero is only about 18 km SSE of La Vega. The second fossil specimen recorded (Arredondo 1984: 18) was a rostrum from a Quaternary cave deposit at Cueva de Paredones, Caimito, La Habana Province (22° 51' N; 82° 37' W). Here we report a third fossil occurrence that provides additional information about this very poorly known species.

Family Psittacidae  
Genus *Ara* Lacépède, 1799  
*Ara tricolor* Bechstein, 1811

*Referred material.*—Abraded cranium lacking the zygomatic arches, the right por-

tion of the frontal area, and most of the bone around the otic regions, AC-7.

*Locality.*—Cuba, Villa Clara Province, Sagua La Grande, Mal Páez (ca. 22° 48' N, 80° 04' W), Casimba en Los Buentes. The depositional environment was a *casimba*, a small water-filled sinkhole with a clay bottom in which fossils accumulated.

*Age.*—Although there are no direct radiometric dates for this site, the nature of the associated fauna and degree of mineralization are similar to deposits elsewhere in Cuba assigned to the Quaternary that range from late Pleistocene to middle Holocene (Jull et al. 2004; Steadman et al. 2005; MacPhee et al. 2007). The associated fauna includes the Bare-throated Tiger-Heron *Tigrisoma mexicanum* (Olson and Suárez 2008) and the extinct sloths *Megalocnus rodens*, *Parocnus browni*, and *Neocnus gliriformis*, as well as the extinct large rodent *Macrocapromys* sp. (Silva et al. 2007).

*Measurements* (mm).—(those of *Ara severus* USNM 19115, and USNM 502504 follow in parentheses): length from naso-frontal hinge to occipital condyle 47.0 (39.6, 43.4); estimated width across naso-frontal hinge (double the half) 25.0 (22.5, 22.3); width at postorbital processes ca. 40 (34.3, 36.7).

*Comparisons.*—With *Ara macao* ROM 109190, *Ara ararauna* ROM 33810, *Amazona autumnalis* ROM 94350, *Aratinga erythrogenys* ROM 92439. The specimen is immediately recognizable as a member of the Psittacidae by the characteristic knife-edged parasphenoid rostrum (Fig. 1, arrow 1). It is much larger than *Amazona leucocephala* or *Aratinga euops*, the only other parrots known from Cuba. It agrees with *Ara* and differs from *Amazona* in lateral view in the much less sloping frontals with the dorsal rim of the orbit situated distinctly below the dorsal surface of the cranium (Fig. 1, arrow 2), instead of being at the same level. The fonticulus orbitocranialis (the large opening in anterior wall of the cranium in the orbits) is much larger in the fossil (Fig. 1, arrow 3) and in *Ara* than in *Amazona*.

Wetmore (1928) observed that the carpometacarpus from Ciego Montero was from a species "larger than *Ara severa* but smaller than the large species of the genus." Using

measurements of carpometacarpus and tibiotarsus taken from X-radiographs of *A. tricolor*, Olson and Maíz (2008) confirmed that this species is larger than *A. severa* but smaller than all other macaws that are larger than *A. severa*. The new fossil cranium conforms perfectly with a macaw of that size.

*Remarks.*—The flattened dorsal surface of the cranium of *Ara tricolor* indicates that it probably fed mainly on very hard seeds, especially those of palms, similar to the larger mainland macaws as opposed to the smaller species that are more frugivorous. According to Gundlach (1876: 126, our translation) the diet of the Cuban Macaw 'consists of fruits, palmiche [*Roystonea regia*] and other seeds such as those of the Paraíso (*Melia azedarach*). It also eats tender shoots.' The palm flora of Cuba is diverse (Leiva 1999) and was probably important in the diet of the Cuban Macaw, especially those species found in swamps.

The site of the new fossil find, Sagua La Grande, is approximately 60 km NE of Ciego Montero, and, although not a great extension of the known range of *Ara tricolor*, this still constitutes the northernmost and easternmost point at which the species has been documented. It is instructive that the two of the three fossils of *Ara tricolor* found so far were deposited in aquatic environments and it is in such deposits that the best chance may exist for extending the prehuman paleontological record of macaws elsewhere in the West Indies. It is worth noting that almost all bones of the largest of Mascarene parrots (*Lophopsittacus mauritianus*) were recovered from swamp deposits (Hume 2007). Although most fossil birds in the West Indies have been recovered from cave deposits, macaws do not usually frequent caves and in the Antilles there are few or no predators that are capable of preying on a bird as large as a macaw. Cueva de Paredones is located on the Llanura Meridional de La Habana, which was apparently a swampy region in the past (Iturralde-Vinent 2003 and literature therein), so that fossil remains of crocodiles and some aquatic birds have been recovered therein (Acevedo-González and Arredondo 1982, Arredondo and Ar-

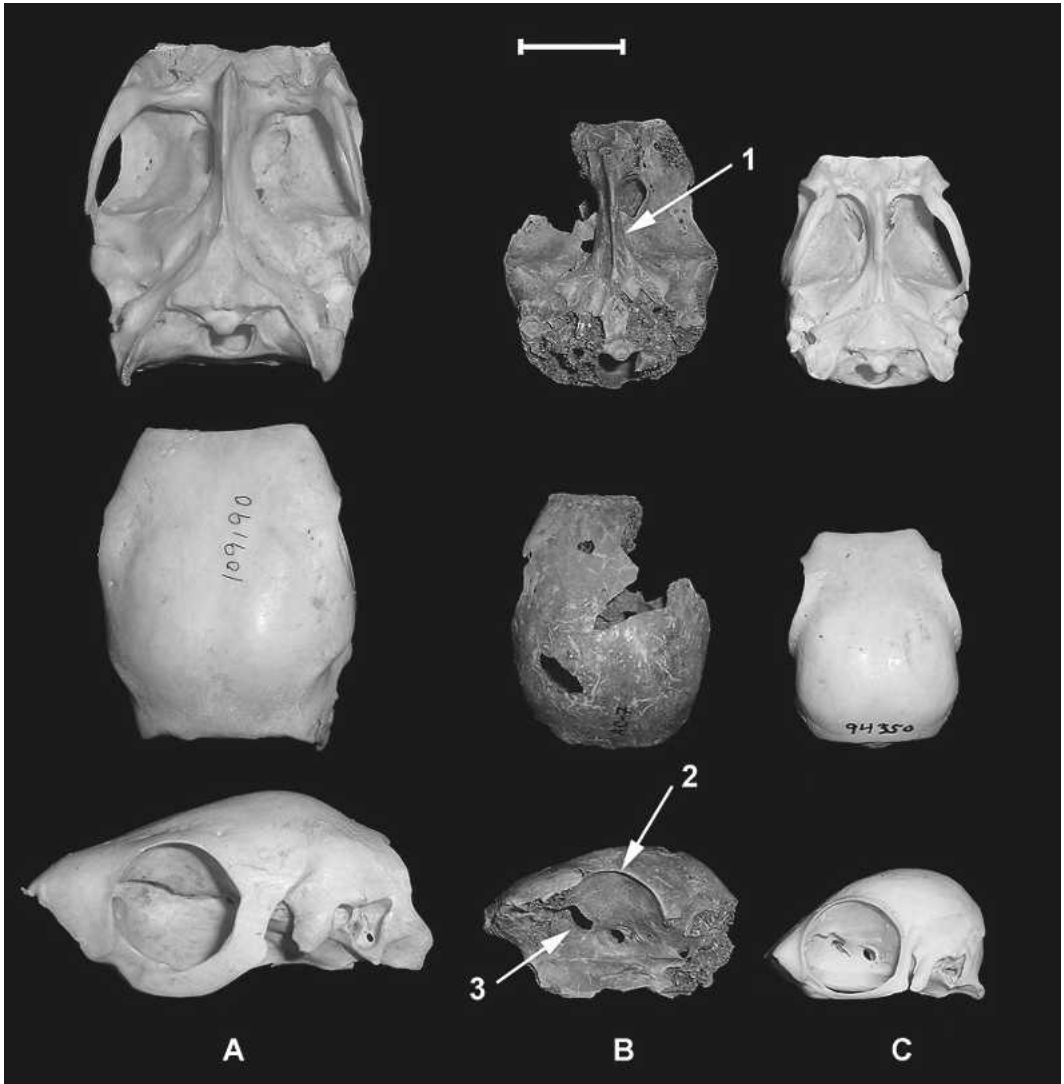


FIG. 1. Crania of parrots in ventral (top), dorsal (middle) and left lateral (bottom) views: A, *Ara macao* (ROM 109190); B, *Ara tricolor*, referred fossil (AC-7); C, *Amazona autumnalis* (ROM 94350). The numbered arrows correspond to characters discussed in the text. Scale = 2 cm.

redondo 2002). The only other fossil record of macaws are from caves in Brazil (Winge 1888), where there are many more macaws and more potential predators than anywhere in the West Indies. Because of potential prehistoric human transport of macaws throughout the islands of the West Indies (Olson and Maíz 2008), finding more bones of macaws in a paleontological context is critical to determining which islands actually harbored indigenous macaws.

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