

## Further characterization of *Caracara creightoni* Brodkorb based on fossils from the Quaternary of Cuba (Aves: Falconidae)

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**Abstract.**—*Caracara creightoni*, previously known from three fragmentary fossils from New Providence Island, Bahamas, is here documented from two Quaternary sites in Cuba. It appears to have been a smaller species than *C. cheriway*, but with a more robust bill and quadrate and other cranial differences, relatively shorter wings, and more robust hindlimb elements. The living species *C. cheriway* appears to be a relatively recent arrival in Cuba so that it is likely that fossils of *Caracara* from the West Indies may all belong to extinct endemic species.

In his report on Quaternary birds from a sinkhole on New Providence Island, Bahamas, Brodkorb (1959) erected a new species, *Caracara creightoni*, based only on a single fragment of carpometacarpus consisting mainly of the major metacarpal. Although Olson (1976) regarded this with skepticism, he was forced to concede that it came from a caracara and that it had a few apparently distinctive features. Nevertheless, he adopted a very conservative approach and considered all of the then-named fossil forms of *Polyborus* (now *Caracara* again—see Banks & Dove 1992) to be referable to *Caracara plancus* sensu lato. This conclusion was reversed following the discovery at the type locality of an incomplete quadrate and the distal end of a tibiotarsus that were distinct from *C. plancus*, so that *C. creightoni* was reinstated as a good species despite the paucity of material (Olson & Hilgartner 1982).

An incomplete skull and two portions of femora from Quaternary sites in Cuba were referred to *Caracara creightoni* by Suárez & Arredondo (1997), although these were not described or illustrated. The identification of the femoral portions we now regard as uncertain because of the difficulty of

identifying incomplete specimens, but we here describe the skull along with additional more recently collected postcranial material from Cuba in an attempt to further characterize the species *C. creightoni*. Unfortunately, although vertebrate fossils have been found in many localities in Cuba, very few have been accurately dated and all of those discussed herein can only be assumed to be Quaternary in age (Suárez 2000).

**Comparative material examined.**—Complete skeletons unless otherwise noted: *Caracara cheriway* USNM 11679 (partial postcranial), 19664 (skull), 19670-71, 19682 (skull), 321805, 322338, 343845-46, 346402, 428041, 431612, 553229-30. *Caracara plancus* 18478, 227375 (skull), 345779-80, 488293 (skull), 490931, 614583-84. *Caracara lutosus* 19916.

### Systematics

#### Class Aves

#### Family Falconidae

#### Genus *Caracara* Merrem, 1826

#### *Caracara creightoni* Brodkorb, 1959

#### Figs. 1–3

**Referred material.**—Skull consisting of most of the rostrum, the interorbital bridge,



Table 1.—Skull measurements (mm) of species of *Caracara*. Sequence in modern taxa is: range (mean) n.

Measurement	<i>C. creightoni</i>	<i>C. cheriway</i>	<i>C. plancus</i>
Length of premaxilla from anterior margin of naris to tip	22.6+	18.7–20.2 (19.9) 9	18.8–20.8 (19.9) 7
Depth of premaxilla from ventral margin of nostril to tomium	14.0	10.4–11.4 (11.0) 10	9.7–12.1 (10.8) 7
Width of premaxilla at midpoint through tomia	9.6	8.4–9.6 (9.3) 9	8.6–11.6 (10.0) 7
Width of bridge between nostrils	7.6	5.1–6.2 (5.7) 10	5.2–7.1 (6.1) 7
Width of frontals (interorbital bridge) at posterior margins of lacrimal scars	19.2	18.5–21.0 (19.7) 10	17.0–23.2 (21.9) 7
Dorsal width of cranium posterior to postorbital processes	41.0	29.1–41.2 (40.0) 9	36.9–43.0 (40.5) 7
Posterior width of cranium through temporal fossae	33.2	32.2–34.9 (32.9) 10	31.8–36.4 (34.5) 7
Distance from dorsal margin of foramen magnum to nuchal crest	13.5	11.0–11.9 (11.4) 9	10.3–12.7 (11.3) 7
Depth of foramen magnum (to dorsal surface of occipital condyle)	6.3	6.8–7.5 (7.1) 9	6.7–7.8 (7.2) 7

and the braincase lacking some of the antero-ventral portions, OA 3928; Cuba, Matanzas Province, Municipality of Cárdenas, 1.5 km SE of the town of Cantel, Cueva Calero. This site also contained numerous human skeletons and bones of extinct reptiles, birds, and mammals (Martínez & Rives 1990), but it is not known whether the excavation was sufficiently controlled to exclude the possibility that the caracara skull did not come from lower strata and may not have been directly associated with archaeological material.

Complete left ulna, MPSG 75; right carpometacarpus lacking minor metacarpal, MPSG 77 and the proximal half of a left carpometacarpus MPSG 110; left tibiotarsus lacking internal condyle, MPSG 79; distal end of right tibiotarsus lacking posterior rim of internal condyle, MPSG 83; complete left tarsometatarsus MPSG 103; distal half of left tarsometatarsus, MPSG 106; Cuba, Provincia de Villa Clara, Municipio de Coralillo, El Charcón, "Solapa del Megalocnus." This site is a small pit (*casimba*) less than 2 m in diameter that is filled with water in most years. In 1997, a year of drought, discovery of bones of the ground sloth *Megalocnus* in the exposed mud led to the excavation of the site and

the collection of remains of other mammals, reptiles, and birds, including a condor (*Gymnogyps*—see Suárez 2000), as well as *Caracara creightoni*. At least two, and probably three, individuals of *Caracara* are represented because the distal portion of one tibiotarsus is considerably larger than the other, yet the two left tarsometatarsi are about equal in size.

*Descriptions and comparisons.*—Compared with *Caracara cheriway*, *C. plancus*, or *C. lutosus*, *C. creightoni* has the premaxilla large and high, and more laterally compressed in ventral view; dorsal arc more rounded (less tapered) in lateral view; culmen broader with bridge between nostrils greater; distance between nostril and tomium deeper (Table 1); nostrils smaller and more ovoid, not distinctly reniform. Interorbital bridge relatively narrow compared with overall size of skull (Table 1). Nuchal crest higher (more dorsal and anterior) on skull, with distance to foramen magnum greater (Table 1); dorsal margin of foramen magnum straighter, not curved; foramen magnum oval rather than rounded, wider but dorso-ventral dimension less.

All of the complete postcranial bones are shorter than in any modern individuals of *Caracara* (Tables 2, 3). All but two of the



Table 2.—Measurements (mm) of wing elements of species of *Caracara*. Sequence in modern taxa is: range (mean) n.

Measurement	<i>C. creightoni</i>	<i>C. cheriway</i>	<i>C. plancus</i>
Ulna			
Length	101.2	106.5–121.0 (114.1) 11	114.5–142.3 (138.8) 6
Proximal width	8.5	8.8–10.2 (9.5) 11	9.5–12.0 (10.8) 6
Shaft width at midpoint	5.0	4.9–5.5 (5.2) 11	5.2–6.9 (6.2) 6
Distal width	9.1	9.5–10.6 (10.2) 11	9.8–13.1 (11.5) 6
Caprometacarpus			
Length	50.7	55.6–63.8 (61.9) 11	59.9–75.5 (66.5) 6
Length of major metacarpal from distal margin of alular metacarpal to distal condyle	40.3, 44.9*	43.9–50.8 (48.2) 11	47.3–60.8 (53.6) 6
Proximal width through trochlea	5.8	6.1–7.0 (6.6) 11	6.3–8.3 (7.3) 6
Proximal depth	13.4	12.6–16.2 (15.0) 11	14.2–19.9 (16.9) 6

\* = holotype, from Brodkorb (1959: 353).

other measurements of wing elements are smaller than in *C. cheriway*, whereas most of the other measurements of hindlimb elements fall within those of *C. cheriway*. Ulna with scar for anterior articular ligament larger. Tibiotarsus with fibular crest longer relative to total length of bone; intercondylar sulcus wider.

*Remarks.*—The new Cuban material referred here to *Caracara creightoni* reaffirms the differences from *C. cheriway* and *C. plancus* that were tentatively inferred from the very fragmentary remains previously known from the Bahamas (Olson & Hilgartner 1982). The skull, although not larger overall, has a more massive and dif-

ferently shaped bill, nostril, and foramen magnum, among other differences. Presumably these are associated with some difference in feeding habits. The large size of the quadrate from the Bahamas is assumed to be correlated with the cranial differences observed in the Cuban fossil.

Likewise, the small size of the wing elements from Cuba are in accordance with the small size of the holotypical carpometacarpus of *Caracara creightoni* from the Bahamas. The leg elements identified here from Cuba are shorter than in *C. cheriway* yet most of the other measurements fall within the range of that species, indicating a more robust hindlimb. Again, the Cuban

Table 3.—Measurements (mm) of leg elements of species of *Caracara*. Sequence in modern taxa is: range (mean) n.

Measurement	<i>C. creightoni</i>	<i>C. cheriway</i>	<i>C. plancus</i>
Tibiotarsus			
Length	101.6	105.7–116.8 (111.7) 11	105.6–129.6 (117.7) 6
Length of fibular crest	18.4	12.6–19.9 (16.3) 10	14.5–20.5 (17.3) 6
Proximal width	14.2	13.7–15.3 (14.7) 11	13.8–18.7 (16.6) 6
Shaft width at midpoint	6.2	6.0–6.6 (6.3) 11	5.7–7.9 (7.1) 6
Distal width	13.3, 14.2*	13.7–15.3 (14.7) 11	11.6–15.8 (14.3) 6
Tarsometatarsus			
Length	82.1	85.8–97.3 (91.6) 11	87.5–108.0 (98.0) 6
Proximal width	12.4	12.3–13.6 (13.0) 11	12.4–16.0 (15.6) 6
Shaft width at midpoint	5.4	5.1–5.7 (5.4) 11	4.8–6.7 (5.9) 6
Distal width	13.8	12.6–16.2 (15.0) 11	14.2–19.9 (16.9) 6

\* = topotype, from Olson and Hilgartner (1982: 30).



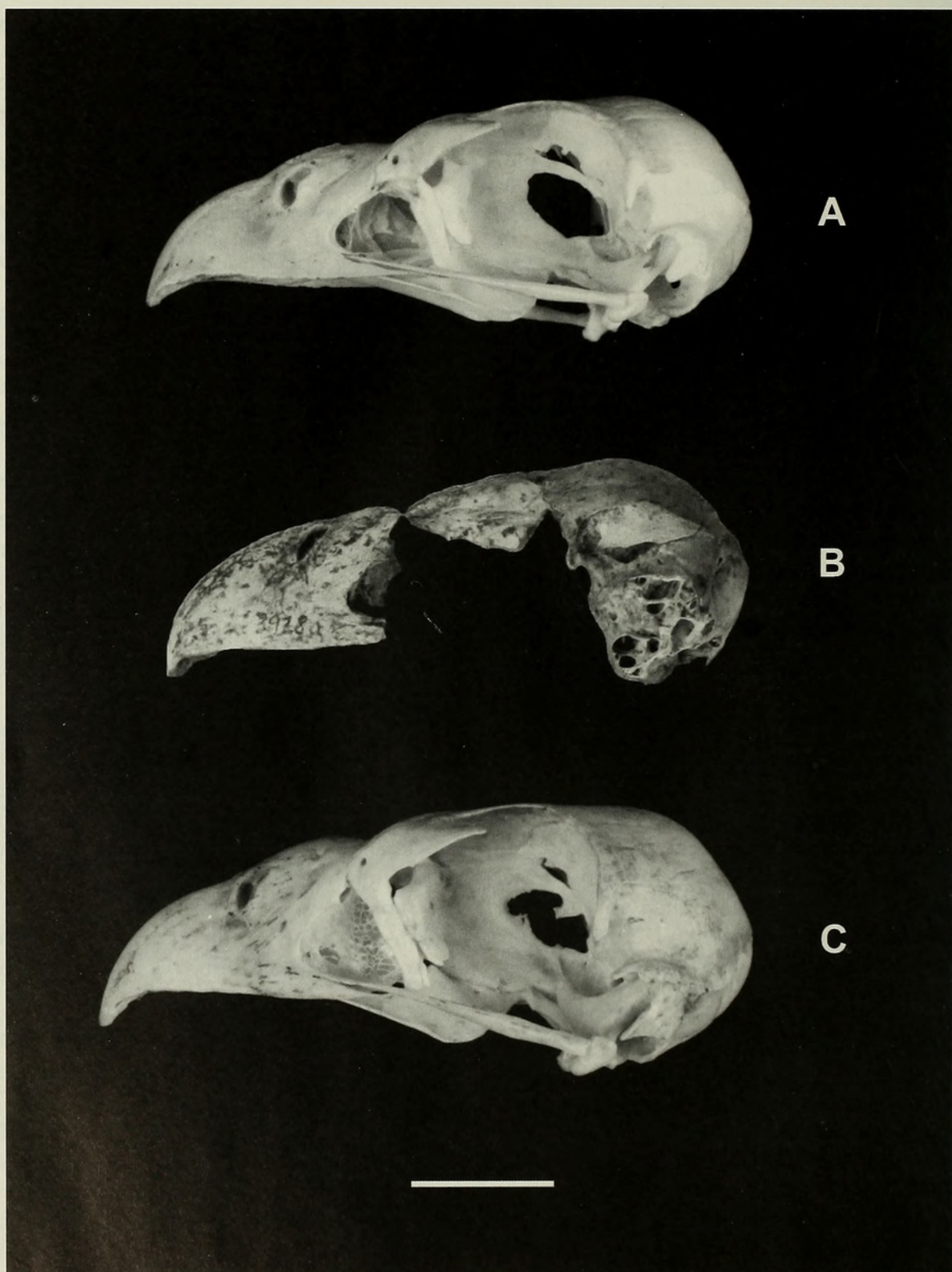


Fig. 1. Lateral view of skulls of *Caracara*. A, *C. cheriway* USNM 322338; B, *C. creightoni* OA 3928; C, *C. plancus* USNM 614584. Scale = 2 cm.

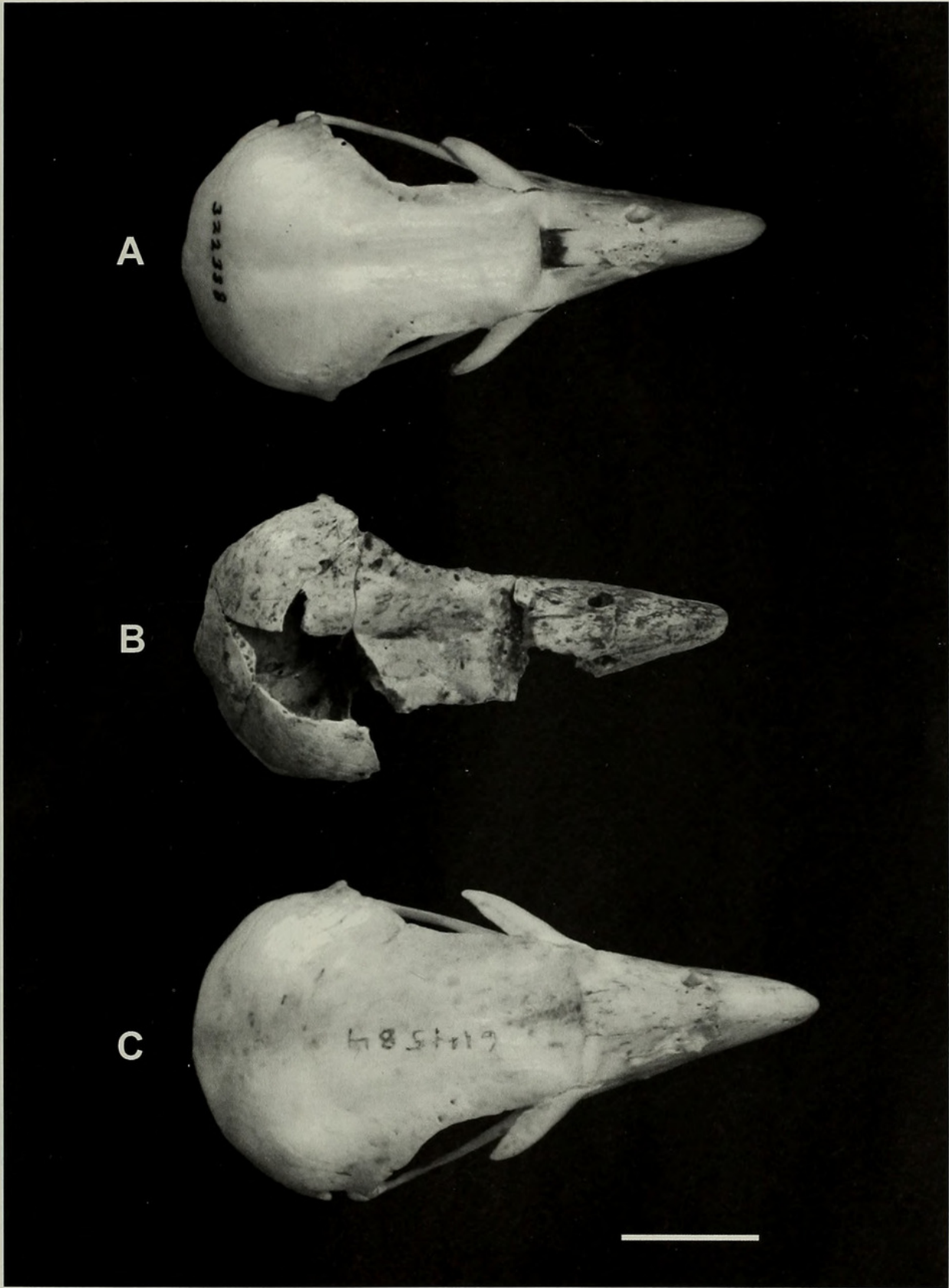


Fig. 2. Dorsal view of skulls of *Caracara*. A, *C. cheriway* USNM 322338; B, *C. creightoni* OA 3928; C, *C. plancus* USNM 614584. Scale = 2 cm.



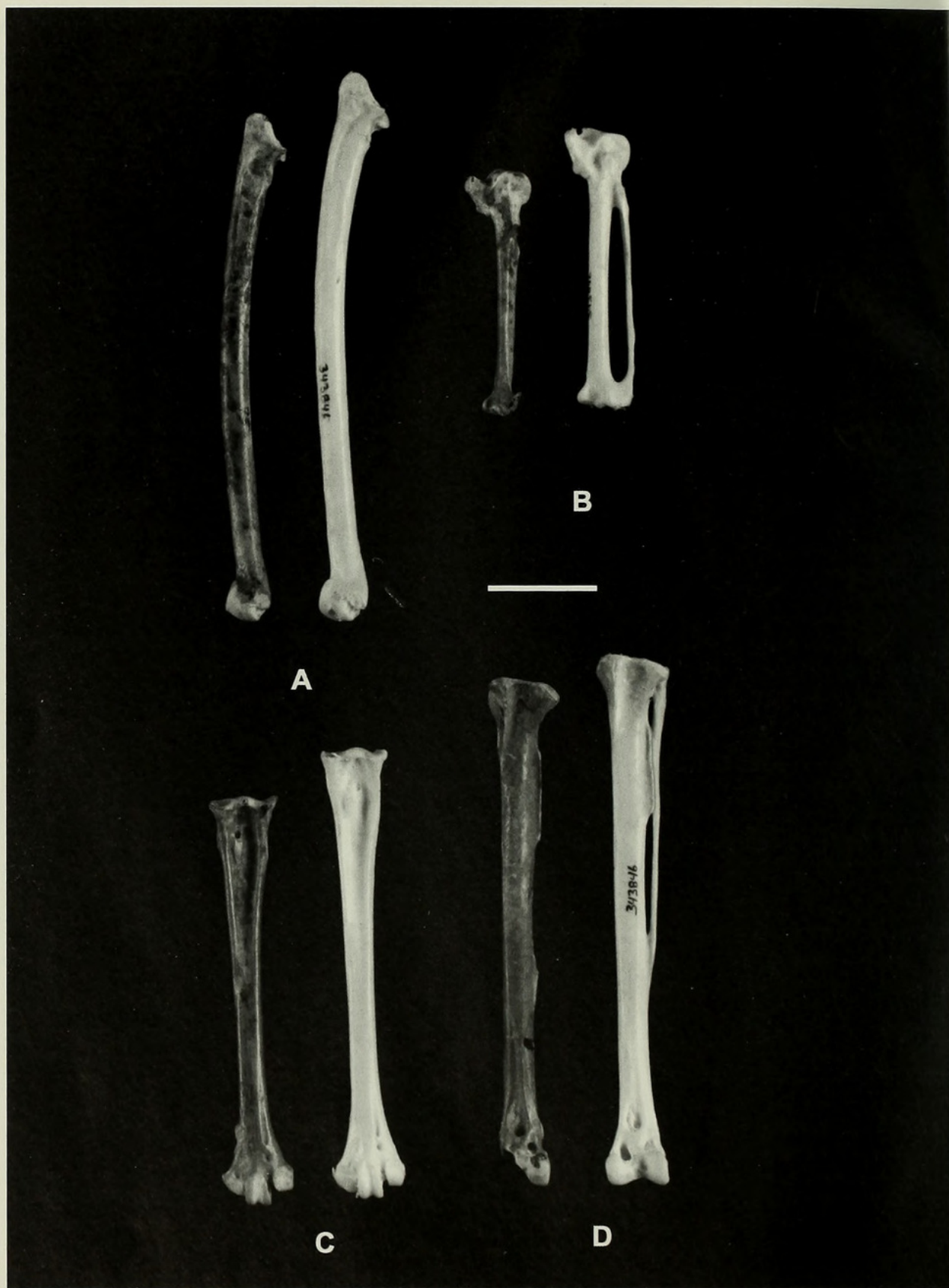


Fig. 3. Limb elements of *Caracara creightoni* (on the left in each pair) compared with *C. cheriway* (on the right in each pair). A, left ulnae in internal view (MPSG 75, USNM 343846); B, right carpometacarpi in internal view (MPSG 77, USNM 343846); C, left tarsometatarsi in anterior view (MPSG 103, USNM 343846); D, left tibiotarsi in anterior view (MPSG 103, USNM 343846). Scale = 2 cm.



material agrees with that from the Bahamas in the noticeably wide intercondylar sulcus of the tibiotarsus.

The historically known taxa of crested caracaras (*Caracara*) were revised by Dove & Banks (1999) who recognized three species: *C. lutosus* Ridgway endemic to Guadeloupe Island, Mexico, and now extinct; a southern species, *C. plancus*, Miller found in South America south of the Amazon; and a northern species, *C. cheriway* Jacquin, in Middle America and northern South America, with outlying populations in southern Florida and Cuba. Each of these three species was regarded as monotypic, with none of the previously named geographic variants being considered valid. Thus, the only resident crested caracaras in the West Indies today are the populations of *C. cheriway* in Cuba and the Isle of Pines.

Emslie (1998) reported that fossils of *Caracara plancus* (= *C. cheriway*) are absent in older deposits in Florida and occur only in the late Pleistocene. The same is probably true of Cuba, where *C. cheriway* may be a relatively recent arrival, as it shows no differences from mainland populations. Fossils thought to be referable to *C. cheriway* have been found in Cuba, but none have been well documented or dated. Furthermore, most fossils of caracaras would be difficult to determine to species when fragmentary, so exceptional conditions of preservation, stratigraphy, or dating may be needed to show whether *C. cheriway* and *C. creightoni* were ever contemporaneous.

Morgan (1994) referred the distal end of a tarsometatarsus from a cave on Grand Cayman to *Polyborus* (= *Caracara*) *creightoni*, with the observation that it was larger than in any of 10 specimens of *C. plancus* (sensu lato) from "throughout its range," and had the inner and outer trochleae more widely separated from the middle trochlea than in *C. plancus*. This does not agree with the tarsometatarsi of *C. creightoni* from Cuba, however, which are not of large size. On the other hand, a species of *Caracara* with a very large tarsometatarsus has been

found in fossil deposits in Jamaica (S. L. Olson, unpubl.) and it seems likely that the specimen from Grand Cayman will prove to be referable to that species rather than *C. creightoni*. The relationship that this may bear to the species *Polyborus latebrosus* that Wetmore (1920) named from the Quaternary of Puerto Rico will be explored in a later paper. In light of the probable recentness of colonization of the West Indies by *Caracara cheriway*, it seems more likely now that fossils of *Caracara* from the West Indies be referable to endemic taxa that have all become extinct.

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