

## SUMMARY

Four Indian sites of the late Woodland Period in Ohio and Michigan at the western end of Lake Erie produced 247 identifiable bird bones of 34 species, mainly waterfowl. Radiocarbon dates range from about 700 A.D. to 1100 A.D. The only bird species not reported from this locality in historic times is the Trumpeter Swan (*Olor buccinator*) which may have been extirpated by the Indians soon after they got guns but before the first white settlers arrived.

## ACKNOWLEDGMENTS

For comparative material I have used the osteology collection of the Bird Division, Museum of Zoology, University of Michigan, Ann Arbor, where I had the counsel of Robert W. Storer and Harrison B. Tordoff. I am also grateful for the advice of Paul W. Parmalee of the Illinois State Museum, Springfield.

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Accepted for publication 7 January 1972

## NEOGENE FOSSIL JAYS FROM THE GREAT PLAINS

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Only two of the known paleospecies of Corvidae are jays, both described from the late Pleistocene of Florida. They are *Protocitta dixi* Brodkorb (1957), later also reported from the late Pleistocene of Texas (Weigel 1967), and *Henocitta brodkorbi* Holman (1959). These were large birds of genera unrepresented in the present day avifauna. Their closest living relatives appear to be the Mexican and Central American Magpie Jay (*Calocitta formosa*) and the Mexican Brown Jay (*Psilorhinus morio*).

In the present paper two additional fossil jays are described. A new genus from the late Miocene of Colorado extends the record of the jays in America back as far as that of the crows in Europe, where *Miocorvus larteti* (Milne-Edwards 1867-71) has hitherto been the oldest known member of the Corvidae. The other jay described here represents a second species of the extinct genus *Protocitta*, from the Pliocene-Pleistocene boundary of Texas and Kansas.

## A MIOCENE JAY FROM COLORADO

The bird described here is a medium-sized jay superficially resembling the Pinyon Jay (*Gymnorhinus cyanocephalus*), the Unicolored Jay (*Aphelocoma unicolor*), and Clark's Nutcracker (*Nucifraga columbiana*). It differs from both fossil and living genera of jays as described below.

**Miocitta**, new genus

*Type of Genus.* **Miocitta galbreathi**, new species. *Etymology.* From Greek *meiōn* (less, in reference to the Miocene epoch) and Greek *kitta* (feminine; a jay). The specific name is in honor of the collector, Dr. Edwin C. Galbreath, Department of Zoology, Southern Illinois University, Carbondale, Illinois (see Galbreath 1964).

**Miocitta galbreathi**, new species

*Holotype.* Distal portion of right humerus, Southern Illinois University no. P 198 (fig. 1). From about 20 mi WSW of Peetz, Logan County, Colorado, in SE  $\frac{1}{4}$ , sec. 26, T. 11 N., R. 55 W. In lower part of Pawnee Creek Formation, associated with Kennesaw local fauna, Upper Miocene (see Galbreath 1953).

*Family Reference.* The distal part of the humerus is superficially similar in the Corvidae and Icteridae, but the fossil is referable to the Corvidae on the basis of the following criteria: (1) Entepicondyle short (in Icteridae it is lengthened distally and often produced anconally). (2) Ectepicondylar process also short and rather closely adpressed to the shaft (in Icteridae the process is long and swings laterally to leave a wide space between its more medial spur and the shaft). (3) Brachial depression of moderate depth, with its medial border sunk only slightly below the level of the medial edge of the shaft (in Icteridae the brachial depression is quite deep, and the medial edge of the shaft often forms a steep wall bounding the medial edge of the depression).

*Generic and Specific Diagnosis.* (1) Olecranal fossa a furrow extending transversely from entepicondyle to area proximal to the intercondylar groove, deep throughout, but deepest proximal to the external portion of the internal condyle (in other genera

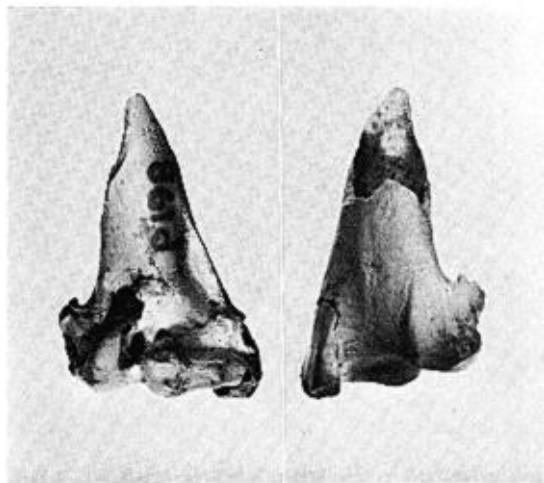


FIGURE 1. *Miocitta galbreathi*, holotype humerus, palmar (left) and anconal (right) views. Actual width, 8.8 mm.

of corvids the external portion of the olecranal fossa is a very deep and rounded pit for the reception of the external lip of the internal cotyla of the ulna, and the internal portion of the olecranal fossa is only a shallow or even obsolescent depression for the reception of the internal edge of the internal cotyla of the ulna). (2) Entepicondyle with its medial surface very slightly concave (more deeply concave in other genera). (3) External condyle, in lateral view, bounded by a very deep and wide groove separating external palmar edge of condyle from root of ectepicondylar process (in other corvids the area is without marked boundary between external condyle and ectepicondylar process). (4) Ectepicondylar process very short, especially portion proximal to origin of anconal branch of extensor metacarpi radialis (ectepicondylar process longer in *Nucifraga* and *Garrulus*). (5) Inner spur of ectepicondylar process very close to shaft of humerus, resembling *Nucifraga* (spur more distant from shaft in other genera). (6) Impression of brachialis anticus deep for a corvid (as in *Gymnorhinus*, *Henocitta*, *Aphelocoma*, *Nucifraga*, and the Asiatic genera *Cissa* and *Dendrocitta*; scar of brachialis little depressed in other jays and magpies; very shallow in *Corvus*). (7) Flexor carpi ulnaris, palmar branch, arises from interno-distal corner of entepi-

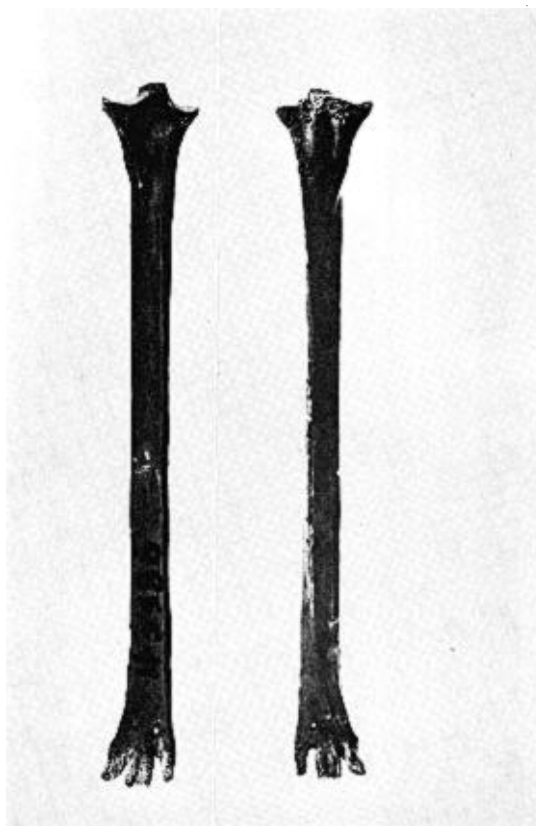


FIGURE 2. *Protocitta ajax*, holotype tarsometatarsus, acrotarsial (left) and plantar (right) views. Actual length, 50.3 mm.

condylar process, which is only slightly produced internally in the area of this muscle and pronator longus (in *Corvus* and *Pyrrhocorax* the entepicondylar process is produced far internally to form a sharp point between the origins of the two muscles). (8) Extensor metacarpi radialis, palmar branch, originates from a large tubercle near mid-line of palmar face of shaft, above level of ectepicondylar process and elevated far above tip of external condyle (in other corvids the tubercle is at or below the level of the ectepicondylar process and close to the tip of the external condyle).

TABLE 1. Measurements (in mm) of humerus of fossil and Recent Corvidae.

Species	Distal width	Depth of external condyle	Length of external condyle	Length of internal condyle	Width of shaft <sup>a</sup>
<i>Gymnorhinus cyanocephalus</i> <sup>b</sup>	7.6-8.8	3.6-4.0	3.2-3.5	2.3-2.6	4.3-5.1
<i>Aphelocoma unicolor</i> <sup>b</sup>	8.6-8.8	3.9-4.0	3.6-3.7	2.4-2.7	5.0-5.7
<i>Miocitta galbreathi</i> <sup>c</sup>	8.8	4.0	3.6	2.6	5.6
<i>Nucifraga columbiana</i> <sup>d</sup>	9.0	4.2	3.6	2.7	5.5
<i>Protocitta dixi</i> <sup>e</sup>	10.3-11.2	4.7-5.3	4.2-4.6	3.0-3.2	6.4-7.1
<i>Henocitta brodkorbi</i> <sup>f</sup>	10.9	5.1	4.2	3.0-3.4	6.6-7.0

<sup>a</sup> Above ectepicondylar process.

<sup>b</sup> Four specimens.

<sup>c</sup> Holotype.

<sup>d</sup> One specimen.

<sup>e</sup> Seven Pleistocene fossils from Reddick, Florida.

<sup>f</sup> Two Pleistocene fossils from Williston and Reddick, Florida.

TABLE 2. Measurements (in mm) of tarsometatarsus of fossil and Recent Corvidae.

Measurement	<i>Protocitta ajax</i> <sup>a</sup>	<i>Protocitta dixi</i> <sup>b</sup>	<i>Calocitta formosa</i> <sup>c</sup>	<i>Psilorhinus morio</i> <sup>d</sup>
Length	50.3	—	40.4–48.9	48.4–51.5
Distal width	5.1–5.4	5.1–5.2	4.5–5.5	5.0–5.6
Least width of shaft	2.7–2.9	2.5	2.4–2.7	2.6–3.0
Height of M-I scar <sup>e</sup>	9.8–10.1	8.7–9.1	9.0–10.3	10.3–11.4
Height of distal foramen <sup>f</sup>	1.3–1.6	1.1–1.3	1.3–1.6	2.1–2.7
Width of middle trochlea	1.9–2.0	1.8	1.5–1.9	1.9–2.0
Depth of inner trochlea	2.6–2.7	2.3–2.4	2.0–2.8	2.7–2.9
Depth of outer trochlea	2.7	2.4–2.5	2.1–2.6	2.7–2.8

<sup>a</sup> Two Blancan fossils from Texas and Kansas.

<sup>b</sup> Three late Pleistocene fossils from Reddick and Haile, Florida.

<sup>c</sup> Nine specimens.

<sup>d</sup> Four specimens.

<sup>e</sup> From proximal end of scar to distal end of middle trochlea.

<sup>f</sup> From distal end of anterior opening to intertrochlear notch.

*Measurements.* *Miocitta galbreathi* resembles *Gymnorhinus cyanocephalus*, *Aphelocoma unicolor*, and *Nucifraga columbiana* in size. It is much smaller than the two previously known paleospecies, *Protocitta dixi* and *Henocitta brodkorbi*. Comparative measurements of these species are given in table 1.

#### A SECOND SPECIES OF PROTOCITTA

The specimen selected as the holotype of this species was previously misidentified as *Pica pica*, the living Black-billed Magpie (Miller and Bowman 1956).

#### *Protocitta ajax*, new species

*Holotype.* Left tarsometatarsus, complete except for damage to hypotarsus and inner trochlea, Univ. Calif. Mus. Paleo. No. 43386 (fig. 2; see also line drawing in Miller and Bowman 1956). From Palo Duro Falls, locality No. V-5318, 9 mi. E and 3.5 mi. N of Canyon, Randall County, Texas (see Johnston and Savage 1955, map 3). Collected by Donald E. Savage, summer 1953. Age originally thought to be "probably post-Blancan," i.e., early Pleistocene, but it seems more likely that it is Blancan, i.e., late Pliocene.

*Referred Material.* Right tarsometatarsus, lacking proximal end, Univ. Michigan Mus. Paleo. No. 27162. From Rexroad Formation, Blancan age, late Pliocene, at Rexroad Ranch, Meade County, Kansas. Collected by Claude W. Hibbard and party.

*Etymology.* Latin Ajax, from Greek Aias, the strongest Greek hero in the Trojan War.

*Diagnosis.* Referable to the genus *Protocitta* Brodkorb (1957) on the following characters: (1) Inner trochlea strongly inflected (moderately inflected in *Calocitta* and *Psilorhinus*; slightly inflected in *Pica*). (2) Inner face of inner trochlea deeply excavated by a diagonal groove that leaves a strong protuberance at base of trochlea (groove and protuberance less pronounced in *Calocitta* and *Psilorhinus*; in *Pica* groove shallow and protuberance obsolete). (3) Outer trochlea wide, with rims pronounced and outer face deeply excavated (thus also resembling *Calocitta* and *Psilorhinus*; in *Pica* outer trochlea narrow, with rims obsolete and outer face shallowly excavated). (4) Acrotarsial tendinal groove deep and wide

throughout whole length of shaft (groove shallower, narrower, and often interrupted in *Calocitta*, *Psilorhinus*, and especially in *Pica*).

Differs from *Protocitta dixi* in having the tarsometatarsus stouter (see table 2).

#### ACKNOWLEDGMENTS

The holotypes described herein were sent for study by E. C. Galbreath and the late R. A. Stirton, and J. Alan Feduccia kindly asked me to include the University of Michigan specimen. The photographs are by Robert W. McFarlane.

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Accepted for publication 2 March 1972