

TWO FOSSIL BIRDS FROM THE LOWER MIOCENE OF SOUTH DAKOTA

By HILDEGARDE HOWARD¹

ABSTRACT: A new genus and species of raptor (Order Falconiformes) and a new species of quail (Order Galliformes) are described from the Sharp's Formation of Shannon County, South Dakota.

Since Macdonald's (1963) significant report on the Miocene vertebrates from the Wounded Knee area of Shannon County, South Dakota, he has continued field work in the region with parties from the Los Angeles County Museum of Natural History (LACM). Among the specimens collected in 1964 in the Sharp's Formation, are two fragments of bird bones, one representing the Order Falconiformes (diurnal raptors) the other the Galliformes (fowl-like birds). These are the first avian remains to be discovered in this formation, from which Macdonald (1963:151-153) records 61 mammals and 4 reptiles.

Macdonald places the Sharp's Formation and its fauna at the bottom of the Lower Miocene Arikaree group, and at an earlier stage in the Miocene than the avifauna recorded by Miller (1944) from Flint Hill, Bennett County, South Dakota.

ORDER FALCONIFORMES Family Accipitridae Subfamily Aegypiinae

The falconiform bone is a well-preserved distal end of tibiotarsus, which in size is comparable to this element of the Red-tailed Hawk, *Buteo borealis*. But the shorter, stouter, more horizontally-placed supratendinal bridge indicates not only generic, but subfamily distinction. Closest resemblance of the South Dakota fossil is to tibiotarsi of *Neogyps errans* Miller and *Palaeoborus umbrosus* (Cope), North American fossil members of the Old World Vulture subfamily (Aegypiinae), in which characters are more eagle-like than in living representatives of the group. The South Dakota tibiotarsus also displays aegypiine and eagle-like characters, but is sufficiently distinct from tibiotarsi of the previously described forms to warrant establishing a new genus.

In the description to follow, comparisons are made with tibiotarsi of *Neogyps errans* from the Pleistocene of Rancho La Brea, California, in the collections of the Los Angeles County Museum of Natural History, and with the description and illustrations of the tibiotarsus of *Palaeoborus umbrosus*

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from the Pliocene of New Mexico, as presented by Cope (1877:293-294, and pl. 68, fig. 18).

Arikarornis, new genus

Type species: Arikarornis macdonaldi.

Diagnosis: Tibiotarsus with supratendinal bridge short and broad, thickened and distinctly convex on distalmost edge; tendinal groove above bridge deeply cut and centrally placed, with internal attachment for oblique ligament on its sloping, internal face, well above bridge, and shaft external to groove smoothly rounded; lateral flare from shaft to condyles very gradual, and internal condyle with only slightly more lateral thrust than external; condyles nearly equal in anteroposterior depth, projecting at abrupt right angle from shaft anteriorly, and having well-defined parallel borders posteriorly, with only slight trend mediad above level of proximo-anterior border; anterior intercondylar fossa broad, evenly rounded, only slightly rugose, with no marked undercutting of median borders of condyles; distal contour broad and shallow; internal ligamental prominence a well-rounded distinct papilla, approximately centrally located with respect to anteroposterior and proximodistal borders of internal condyle.

Arikarornis macdonaldi, new species

Figure 1, A-D

Type: Distal end of left tibiotarsus, LACM no. 9357, collected by J. R. Macdonald field party, June 19, 1964.

Locality and horizon: LACM loc. no. 1821 (equivalent of South Dakota School of Mines loc. no. 5359 as recorded by Macdonald, 1963), gully on south side of Sharp's Cutoff Road, SW $\frac{1}{4}$ of Sect. 9, T. 39 N., R. 43 W., Sharp's Corner Quadrangle, Shannon County, South Dakota (Pine Ridge Reservation). Middle Sharp's Formation, Arikaree group, lowermost Miocene.

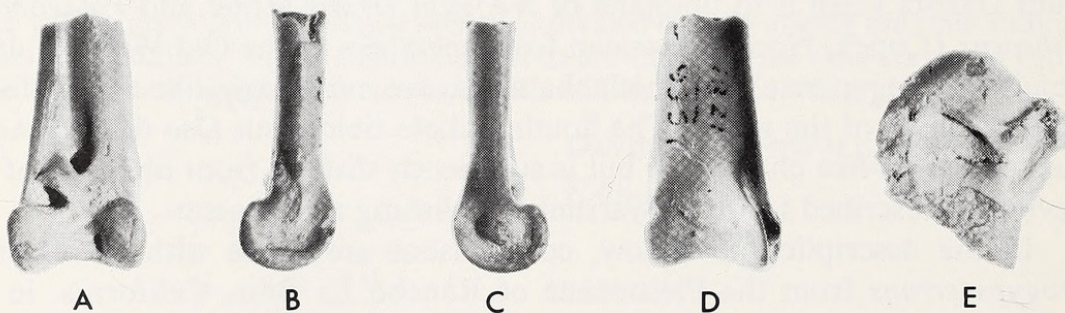


Figure 1. A-D, *Arikarornis macdonaldi* n. gen., n. sp., type tibiotarsus, anterior, external, internal and posterior views; E, *Miortyx aldeni*, n. sp., type humerus, anconal view. All figs. x 1.

Diagnosis: See generic diagnosis.

Comparisons of type tibiotarsus: Similar to this element in Recent genera of Aegypiinae in short, broad supratendinal bridge, less vertical in position than in *Aquila* or *Buteo*, and tendinal groove centrally placed on shaft above bridge, with attachment of oblique ligament on slope of internal face of groove, and anterior face of shaft external to groove well rounded; the short, broad, less vertically placed supratendinal bridge is also characteristic of the tibiotarsus of *Palaeoborus* and *Neogyps*, and the tendinal groove is centrally placed in *Palaeoborus* (slightly more lateral in *Neogyps*). Distinguished from Recent Aegypiinae, and similar to *Palaeoborus umbrosus* and *Neogyps errans* in relatively broad shaft and relatively short anteroposterior depth of condyles (shorter, even, than in *Palaeoborus*). Distinguished from both *P. umbrosus* and *N. errans* in more nearly equal depth of internal and external condyles, and more gradual lateral flare from shaft to condyles; further distinguished from *Palaeoborus* in more central position of internal ligamental prominence with respect to borders of internal condyle, and more parallel posterior borders of external and internal condyles; Cope (1877:293-294) described the contours of the internal condyle of *Palaeoborus umbrosus* as "not parallel to the exterior, but diverging backward and inward;" *Neogyps* is closer to *Arikarornis* in posterior contours of the condyles, but the postero-internal contour in the Pleistocene form slopes much more abruptly mediad at the level of the proximo-anterior border.

Measurements: See Table 1.

Remarks: The North American record of the Aegypiinae comprises the following eight species (the tibiotarsus is known only in those species marked with an asterisk):

Neophrontops vetustus Wetmore, Middle Miocene, Nebraska

Neophrontops dakotensis Compton, Lower and Middle Pliocene, South Dakota and Oregon

Neophrontops vallecitoensis Howard, Middle Pleistocene, California

**Neophrontops americanus* L. Miller, Upper Pleistocene, California and Mexico

Palaeoborus rosatus A. Miller and Compton, Lower Miocene, South Dakota

Palaeoborus howardae Wetmore, Middle Miocene, Nebraska

**Palaeoborus umbrosus* (Cope), Lower Pliocene, New Mexico

**Neogyps errans* L. Miller, Upper Pleistocene, California, Nevada, and Mexico

The skeleton of *Neophrontops* is markedly like that of the Recent Old World Vulture, *Neophron* (see Howard, 1932) and the tibiotarsus is distinctly different from that of *Arikarornis*. In its small size, however, *A. macdonaldi*

TABLE 1

Measurements and Proportions of Tibiotarsus of
Arikarornis macdonaldi, *Palaeoborus umbrosus* and *Neogyps errans*
 (Measurements in millimeters, ratios in per cent)

	<i>Arikarornis</i>	<i>Palaeoborus</i>	<i>Neogyps</i>		
Breadth of distal end	13.2	16.0	18.0	19.4	20.8
Depth of external condyle	9.2	12.0	11.8	12.7	13.4
Depth of internal condyle	9.3	13.0	12.8	13.7	14.5
Ratio of depth of external condyle to breadth of distal end	69.6	75.0	61.5	66.0	68.3
Ratio of depth of internal condyle to breadth of distal end	70.6	81.3	68.0	71.0	72.5
Ratio of depth of external to depth of internal condyle	99.1	92.4	90.0	93.6	96.3

is closer to all species of *Neophrontops* than to any of the other fossil aegypiines.

The comparisons given above show *Arikarornis* to have similarities with *Neogyps* and *Palaeoborus*, but to be distinct from *N. errans*, the monotypic species of *Neogyps*, and from *P. umbrosus*, the genotype of *Palaeoborus*. The tibiotarsus is not known for *P. howardae* or *P. rosatus*, but the tarsometatarsus and ulna (respectively) on which these species are based are close in size to these elements of *Neogyps errans*, and therefore indicate that both species were larger even than *Palaeoborus umbrosus*, hence considerably larger than *Arikarornis macdonaldi*.

The extinct *Palaeohierax* from the early Miocene of France (based on the tarsometatarsus) is said by Milne-Edwards (1871, 2:456-457) to combine characters of *Gypohierax* and the eagles ("Aquilides"). The genus is now listed under the Aegyptiinae (Brodkorb, 1964:275). Lacking comparable skeletal elements of *Palaeohierax* and *Arikarornis*, it is impossible to draw any conclusions as to the relationship of these two aberrant forms, other than to state that the tarsal breadth in the single species of *Palaeohierax* (*P. gervaisii*) indicates a much larger form than *A. macdonaldi*. In the present state of knowledge, science is better served by maintaining generic as well as specific identity of these birds.

The generic name, *Arikarornis* refers to the Arikaree group of the Lower Miocene, in which the Sharp's fauna occurs. The species is named in honor of

J. R. Macdonald whose studies have so significantly furthered the knowledge of the Miocene of South Dakota.

ORDER GALLIFORMES
Family Phasianidae
Subfamily Odontophorinae

The galliform bone is a fragment of left humerus characterized by very deep undercutting of the head. In living galliforms this is an outstanding feature of the American quails (excepting *Dendrortyx* and *Odontophorus* according to Holman, 1961:208). In the living quails, however, the head terminates squarely and abruptly at the capital groove. The fossil at hand has a rounded contour of the head as described for *Miortyx teres* Miller (1944:93), and it is, therefore, assigned to the genus *Miortyx*. The genotypic *Miortyx teres* is based on a proximal end of humerus found in the Flint Hill quarry, Bennett County, South Dakota, of Miocene age, but younger than the Sharp's Formation. This specimen was lent by the University of California Museum of Paleontology for this study.

That the Sharp's Formation specimen cannot be allocated to *Miortyx teres* is obviously attested by its markedly larger size, as well as certain qualitative features. A distinct species is therefore established in honor of Dr. Alden H. Miller, describer of the genus, whose untimely death, in 1965, has deprived paleornithology of one of its ablest contributors.

In the original description, the characters of the genus *Miortyx* were not separated from those of the type species. This second species makes possible the designation of characteristics at the generic level.

***Miortyx*, A. H. Miller**

Diagnosis (proximal end of humerus): Anconal side of shaft below head broadly depressed, and head deeply undercut as in *Oreortyx*; descending, lip-like anconal border of head above median crest shorter and broader than in *Oreortyx*, and head less abruptly terminated internally above capital groove, with anteroposterior depression (which in *Oreortyx* faces directly internally) facing proximo-internally on the gradually rounded internal contour of the head; capital groove well defined, with borders nearly parallel, terminating anconally at median crest in distinct open lip; pneumatic fossa long and oval, and anconally less markedly obscured by overhang of internal tuberosity than in *Oreortyx*; ligamental furrow on palmar surface deeply grooved.

***Miortyx aldeni*, new species**

Figure 1, E

Type: Proximal fragment of left humerus lacking external and internal tuberosities and deltoid crest: LACM no. 9388, collected by H. Garbani of J. R. Macdonald field party, June 23, 1964.

Locality and horizon: LACM loc. no. 1982 (equivalent of South Dakota School of Mines loc. 5360 as recorded by Macdonald, 1963), gully beside Sharp's Cutoff Road, N. ½ of Sect. 17, T. 39 N., R. 43 W., Sharp's Corner Quadrangle, Shannon County, South Dakota (Pine Ridge Reservation). Middle of Sharp's Formation, Arikaree group, lowermost Miocene.

Diagnosis: Humerus approximately 50 per cent larger than that of *Miortyx teres* and differing also in the following qualitative characters: prominent descending median border of head more anconally projected, with undercutting of head deepened in this area; shaft below head, anconally, more broadly and evenly depressed; external bordering ridge of depression extending at least to level of distal terminus of pneumatic fossa (bone broken beyond this point).

Measurements: See Table 2.

Remarks: According to Brodkorb's (1964:309-311) recent analysis of previously described fossil Galliformes, seven extinct species of Odontophorinae are recognized, as follows:

Nanortyx inexpectatus Weigel, Lower Oligocene, Saskatchewan

Miortyx teres Miller, Lower Miocene, South Dakota

Cyrtonyx cooki Wetmore, Middle Miocene, Nebraska

Lophortyx shotwelli Brodkorb, Middle Pliocene, Oregon

Colinus hibbardi Wetmore, Upper Pliocene, Kansas

Colinus suilium Brodkorb, Middle Pleistocene, Florida

Neortyx peninsularis Holman, Middle Pleistocene, Florida

TABLE 2

Measurements (in millimeters) of Humerus of
Miortyx aldeni and *Miortyx teres*

	<i>M. aldeni</i>	<i>M. teres</i>
Breadth across proximal end from greatest extent of bicipital crest to probable border of external tuberosity (tuberosity broken in <i>M. aldeni</i>)	19.1	12.6
Breadth of depressed area of shaft from median crest at terminus of capital groove, to ridge bordering external edge of depression	10.0	5.4
Depth of head external to descending median border	7.6	4.8
Height of head from tip of median border to proximal end	9.1	6.3

Comparison of the elements represented in each species with comparable elements in the skeleton of Recent *Oreortyx picta* indicates that *Miortyx aldeni* was outstandingly the largest of the fossil quails, with the nearest approach in size being *Miortyx teres*. Besides the two species of *Miortyx*, only one other quail is recognized from the Miocene. The Barstow, California Miocene spe-

cies described as *Cyrtonyx tedfordi* L. Miller, is now reallocated to the Cracidae under the generic name *Boreortalis* (Brodkorb, 1964:305); this species, also, is much smaller than *M. aldeni*.

European Tertiary galliforms, originally described under the genus *Palaeortyx*, in which the head of the humerus is deeply undercut as in American quails, differ from *Miortyx* in deeper, more acute, and more obliquely placed depression of the shaft anconally, and longer, narrower descending median border of the head. As presently listed by Brodkorb (1964:298-301) the several species involved appear under the genera *Palaeortyx*, *Ludiortyx*, *Piortyx* and *Taoperdix*, and are allocated to the primitive subfamily Gallinuloidinae of the family Cracidae. According to recent personal correspondence with Brodkorb, these European galliforms are badly in need of revision, but present interpretation is based on the primitive condition of the carpometacarpus which lacks the intermetacarpal tuberosity. The carpometacarpus is not known for either species of *Miortyx*.

SUMMARY AND CONCLUSIONS

The first avian representation from the Lower Miocene Sharp's Formation of South Dakota is recorded, and two species are described: a raptor, *Arikarornis macdonaldi*, and a quail, *Miortyx aldeni*. Both are in ecologic agreement with the general terrestrial aspect of the mammal and reptile fauna recorded by Macdonald (1963:151), but contribute no independent information in this regard. Miller (1944:97), describing *Miortyx teres*, the genotype of the quail, notes that it "is not closely enough linked with any one of the modern types to offer a clue to its habitat." The same can also be said of the raptor, *Arikarornis*.

The scant avian representation in the Sharp's fauna makes impossible any critical comparison with other Miocene avifaunas. It is significant, however, to find generic relationship between the quail, *Miortyx aldeni* and *Miortyx teres* of the slightly later Flint Hill Miocene fauna of Bennett County, South Dakota (about 34 miles ESE of Sharp's Corner). There is also a possibility of generic relationship between *Arikarornis macdonaldi* and the Flint Hill aegypiine, *Palaeoborus rosatus*. Miller and Compton (1939:156) in describing the latter species, stated that the generic assignment was "by no means certain." Direct comparison of the type element (ulna) could not be made with previously described species of *Palaeoborus*, but parallel similarities with Pleistocene *Neogyps* were noted. Resemblance to *Neogyps* is noted as well for *Arikarornis* (as described above). No parallel can be drawn between the quail, and the raptor with regard to size trend from earliest Miocene, Sharp's fauna, to that of the somewhat later Miocene, Flint Hill fauna. The quail, *Miortyx aldeni*, is markedly larger than *M. teres* (in fact the largest of the American quails), whereas *Arikarornis macdonaldi* is one of the smallest of the fossil Aegypiinae, and probably less than half the size of *Palaeoborus rosatus*.



Howard, Hildegarde. 1966. "Two fossil birds from the Lower Miocene of South Dakota." *Contributions in science* 107, 1-8. <https://doi.org/10.5962/p.241096>.

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