

## FOSSIL BIRD REMAINS FROM THE EOCENE OF WYOMING

WITH ONE SET OF ILLUSTRATIONS

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For a number of years the paleontological department of Princeton University has conducted explorations in the Eocene deposits of Wyoming, particularly in the Bighorn Basin. Through Professor William J. Sinclair the bird remains from these investigations have been placed in the writer's hands for study; a report on them is here given. Drawings illustrating this paper have been made by Mr. Sydney Prentice.

Avian fossils from the Eocene deposits of North America, with two exceptions, have been fragmentary and poorly preserved, and in most cases have been difficult of study. The species that have been described exhibit certain resemblances to living groups so that part have been placed in existing families, while two, *Diatryma* and *Gallinuloides*, have been made the types of peculiar families. Some have been described in living genera but generic allocation in these instances is considered doubtful.

The author may repeat here a statement he has made elsewhere that it is his opinion that the fossil birds of the Eocene, while resembling modern birds in general, in most instances differ considerably in structural detail. Though some have been placed in modern genera, such close relationship is doubtful, and it appears probable that with sufficient study most if not all Eocene species will be allocated in sub-families and families other than those in existence today. In addition there are certain highly peculiar forms representative of an order no longer in existence, and others of similar status will in all probability be found as exploration of our Eocene fossil deposits continues.

## Order GRUIFORMES

## Superfamily GRUOIDEA

## Family GERANOIDIDAE, fam. nov.

## Geranoides, gen. nov.

*Characters*.—Those of the species described below.

*Type*.—*Geranoides jepseni*, new species.

## Geranoides jepseni, gen. et sp. nov.

*Characters*.—Distal end of metatarsus somewhat like that of *Grus canadensis* [*Ardea canadensis* Linnaeus, Syst. Nat., ed. 10, vol. 1, 1758, p. 141], but with the second and fourth trochlea more nearly on the transverse plane of the third, projecting less posteriorly behind the axis of the shaft; second and fourth trochlea extended farther distally in relation to the third; intertrochlear spaces relatively wider; lower end of shaft more flattened.

*Description*.—Type, distal end of left metatarsus, Princeton University cat. no. 13257, from Grey Bull formation, Lower Eocene, South Elk Creek, Bighorn County, Wyoming, collected by G. L. Jepsen, August 29, 1928 (fig. 22, 1-3). Shaft long and relatively slender, much crushed and broken, but with a shallow groove indistinctly indicated in front, much flattened transversely at lower end; a distinctly impressed groove leading into an inferior foramen of good size; facet for articulation of first toe small but evident; supporting base for trochleae flattened, with curve formed by the three trochleae relatively flat and open; inner trochlea flattened from side to side, projecting behind line of shaft except at its attachment, its distal margin reaching slightly more than one-third the height of middle trochlea, its posterior margin projecting in a flattened plate (tip of this broken away); distal margin marked by a shallow groove with two excavations on outer face; inner margin deeply excavated; internal intertrochlear sulcus wider than ordinary, part of the separation being due, however, to crushing so that original width is not certain; middle trochlea projecting distally beyond level of other two, in lateral outline elliptically rounded, lateral faces

much excavated and entire free margin marked by a broad, strongly impressed groove; on posterior face trochlea narrowed decidedly before it merges with shaft; outer trochlea flattened, swung posteriorly back of line of middle trochlea, and extended distally nearly to level of distal margin of middle trochlea; inner face much exca-

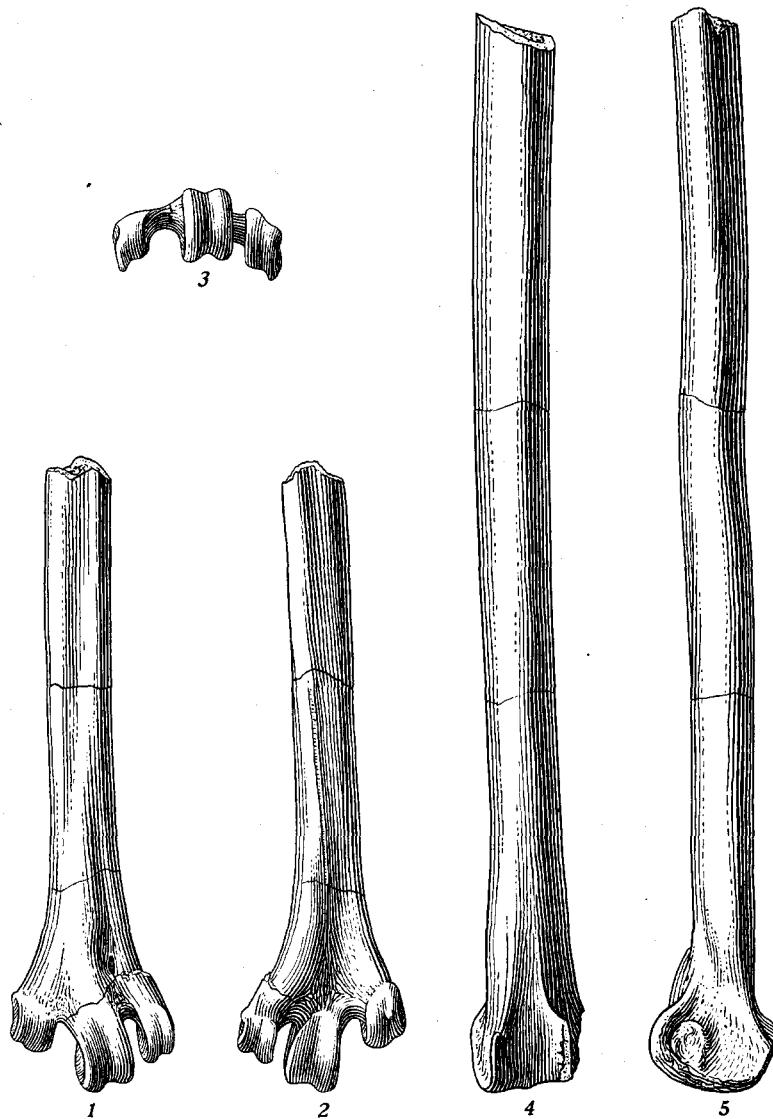


Fig. 22. *Geranoides jepseni*: 1, 2, 3, THREE VIEWS OF THE TYPE METATARSUS; 4, 5, TWO VIEWS OF FRAGMENTARY TIBIO-TARSUS. NATURAL SIZE.

vated, with a smaller pit-like depression on outer face; external margin projecting in a narrow, flattened plate that rises distally to level of central portion, separated from this central portion by a slightly indicated groove; external intertrochlear sulcus relatively broad. Specimen dull brownish in color.

*Measurements*.—Greatest transverse breadth across trochleae, 21.7 mm.; smallest transverse breadth of shaft, 8.0 mm.

*Remarks.*—In addition to the broken metatarsus selected as the type there were found associated, in such a manner as would indicate that they were part of the same individual, several other bones including a left tibiotarsus with the head missing and considerable wear on the condyles, the poorly preserved head of a right tibiotarsus, part of the shaft of a metatarsus (possibly from the right side, although this is not certain), three phalanges, the end of a radius, and three fragments of uncertain affinity. All bear the same catalogue number, 13257, as the type.

Allocation of this fossil in the superfamily Gruoidea has come only after prolonged comparison. The type metatarsus differs in various details from that of any bird known to me. In its general form and in the relative positions of the trochleae it appears distinctly gruiform and more similar to the superfamily Gruoidea than to others included in the order. Its most peculiar feature is the width of the inter-trochlear sulci, the trochleae being more widely separated than in any other bird that I have seen. There is a suggestion of this condition in *Diatryma steini*, but due to abrasion and crushing it is not certain that the lower end of the metatarsus in the type of *D. steini* is not considerably modified from its natural condition. As *Geranoides* is decidedly different from modern cranes it is placed in a separate family the Geranoididae.

The tibiotarsus (fig. 22, 4-5) is long and slender. The external condyle is more rounded on its anterior margin than in modern *Grus*, and the central tubercle on the anterior face external to the supratendinal bridge is lower and less developed. The internal condyle is missing except for its posterior portion. The other characters evident are gruine so far as they are present. The shaft in its smallest transverse diameter measures 9.3 mm., and the outer face of the external condyle is 15.4 mm. broad.

The other fragmentary bits and the phalanges offer no characters worthy of note.

*Geranoides jepseni* was apparently about the size of the Little Brown Crane, *Grus canadensis canadensis* (Linnaeus), with the long, slender legs characteristic of that bird. The species is named in honor of the collector Dr. G. L. Jepsen of Princeton University, well known for his work in vertebrate paleontology.

#### DIATRYMIFORMES

The lower end of a metatarsus, cat. no. 13258, collected in 1928 in the Lower Eocene of the Sand Coulee Beds, Sand Coulee Basin, Parley County, Wyoming, at "Camp 1," is in such condition of preservation that its definite identification is not considered practicable. The bone in question is similar in size to that of the small Darwin's Rhea, *Pterocnemia pennata*. It is much eroded and worn; judging from its porous appearance it apparently came from a young individual in which the bone had not yet been fully formed. The lower end of the shaft is flattened and compressed, with the lateral trochleae flaring rather widely. The ends of the trochleae are more or less rounded, but the characteristic grooves and processes of this part of the skeleton are missing, possibly not having been fully ossified before the death of the animal. The position of the trochleae in relation to one another is suggestive of what is seen in *Diatryma steini*, and the specimen is considered to belong in the Diatrymiformes. The individual is smaller than any described species in the order, being approximately one-half the size of *Omorhamphus storchi* Sinclair.

#### EGG SHELL FRAGMENTS

During their several seasons' work in the Eocene deposits of Wyoming, Dr. Jepsen and his associates have obtained five lots of ancient egg shell in more or less fragmentary condition. The material is well fossilized and presents the characteristic appearance of egg shell.

Whether this material is avian or reptilian it is not practicable to say. Dr. V. Van Straelen, who has devoted careful study to fossilized eggs, has indicated that without accompanying skeletons or other evidence it is not practicable to distinguish between eggs of the two groups under discussion when in a state of fossilization. (See Van Straelen, V., *Les oeufs de Reptiles fossiles*. *Palaeobiologica*, Bd. 1, 1928, pp. 295-305.) Brief notes on the material under examination may be of interest.

The first lot was collected by Dr. Jepsen on August 8, 1927, in the Lower Eocene of the Grey Bull formation between two and two and one-half miles southwest of Wardell's Ranch, on the south side of Dorsey Creek, Bighorn Basin, Wyoming. The material consists of a number of shell fragments, irregularly broken, dull grayish brown in color, and rather thin. The outer surface is smooth, with small irregularly placed pores. The shell averages .8 mm. in thickness. With this are two broken bits of bone, embedded in matrix, that are not identified.

Another lot was obtained in 1931 (field no. 178) in the Wind River Eocene of the red badlands west of Cottonwood Creek and north of Lost Cabin, Wyoming. The shell in these is much thicker, averaging 1.5 mm., and is light gray, more or less colored with reddish brown evidently from the matrix in which it was found. The shell is fine and somewhat rough without visible pores.

The third collection (field no. 197) comes from an area north of Wind River at the mouth of Dinwoodie Creek, and was taken in 1931. This also is from the Wind River Eocene. The shell is dull brown in color, somewhat roughened, with numerous depressed lines and evident pores, averaging 1.3 mm. in thickness.

A further set was obtained in 1931 (field no. 235) in the Wind River Eocene on Alkali Creek, five miles northwest of Arminio, Wyoming, in the *Lambdotherium* zone. These are a lighter brown than the last, with the shell fairly smooth with evident scattered pores, and averaging 1.5 mm. in thickness.

The last lot obtained in the Grey Bull formation, Lower Eocene of Dry Creek, north of Emblem, Bighorn Basin, Wyoming (no date of collection given), is similar to the first listed in color and in smooth texture, but has few pits evident under a low magnification. The shell fragments average .7 to .9 mm. in thickness. With them are a few fragments of small bones that are not identified.

It would appear that the five lots represent as many species falling into at least two groups, the first and last being contained in one, and the other three in another.

*U. S. National Museum, Washington, D. C., December 5, 1932.*

## FROM FIELD AND STUDY

**Feeding Habits of the Lesser Scaup Duck.**—About 3:30 in the afternoon of January 18, 1933, while riding up the Pungo River in a motor boat about a mile and a half from Belhaven, North Carolina, I noticed a flock of approximately 325 Lesser Scaups (*Nyroca affinis*). Inasmuch as I was searching for plant foods of waterfowl I started my boat in the direction of the birds with the view of collecting some of the aquatic vegetation on which I supposed they were feeding. Shortly I noticed that the flock, with the exception of three or four birds, had disappeared. Continued observation with the aid of field glasses revealed that the entire flock would dive almost in unison, except two to six birds that remained on the surface possibly to serve as sentinels. In diving they would usually leap forward, some of them almost out of the water, with wings closed and tail slightly spread out. The interval from the time the first individuals of the raft began to dive until they were all up again varied from one minute, fifteen seconds, to one minute, thirty-five seconds.

The majority of the flock were under the water approximately one minute, but the exact time the various individuals were submerged could not accurately be determined. The period spent above water between dives was just slightly longer than that under the water. This extremely long period of time spent under the water for the Lesser Scaup is undoubtedly unusual, as John C. Phillips in his "Natural History of the Ducks" (vol. 3, p. 279) writes: "I have no notes upon the maximum length of time under water, but doubt if it is much over 35 seconds." He reports that 50 to 60 seconds have been recorded for the Greater Scaup, but that from 15 to