A NEW PTEROSAUR RECORD FROM THE JUDITH RIVER (OLDMAN) FORMATION OF ALBERTA

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A NEW PTEROSAUR RECORD FROM THE JUDITH RIVER (OLDMAN) FORMATION OF ALBERTA

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The strata of Dinosaur Park are world famous for the number and variety of Campanian animals that have been found there; nevertheless, only one pterosaur remain has been reported to date (Russell, 1972). Recently, the distal end of a right tibia of a pterosaur (Tyrrell Museum of Paleontology, TMP P79.14.247, Figure 1) was collected in Dinosaur Park (L.S.D. 15, Sec. 32, Twp. 20, Rge. 11, W 4th Meridian) not far from the first recorded pterosaur find.

The maximum width of the articular surface is 11.3 mm, which indicates that it was derived from a pterosaur larger than the *Gallodactylus* specimen described by Fabre (1974), although not nearly as large as most pteranodontids. The broken end of the shaft is 5.6 mm by 9.6 mm, and the wall of the shaft is 0.6 mm thick. This feature reinforces the identification of the bone as pterosaurian. The long bones of pterosaurs were strikingly thin, because they were designed mainly to withstand the compressive forces of flight, while at the same time economizing weight as much as possible (Bramwell and Whitfield, 1974). To this end they surpassed both birds and bats in reducing the shafts to "cylinders of bone no thicker than a visiting card" (Watson, 1974).

The distal end of the present specimen is expanded into a rounded pulley joint, somewhat as in birds. In most pterosaurs this area is crushed flat and nearly featureless, but in well-preserved specimens it can be seen that the expansion is greater towards the anteriorly facing side of the tibia. This is shown in pterodactyloid remains from the Cambridge Greensand, and also in specimens of the Liassic rhamphorhynchoid *Dimorphodon* in the British Museum (Natural History) (Seeley, 1901, p. 103) and in the Yale Peabody Museum (Figure 2). The distal ends of the tibia and wing metacarpal are often difficult to distinguish, especially in partial or crushed specimens. The bone described here

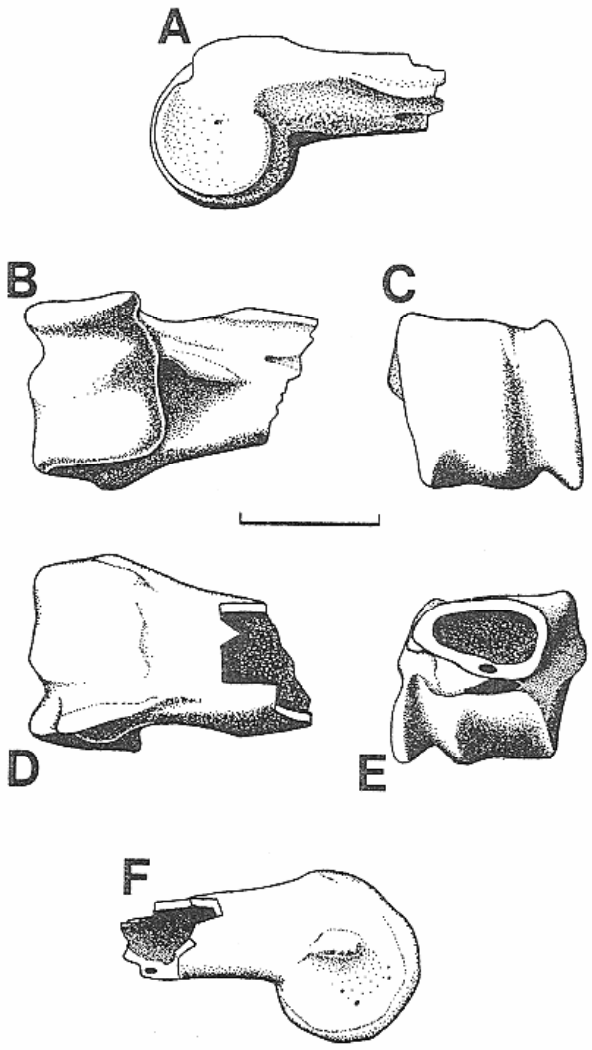

FIGURE 1—Pterodactyloid, distal end of right tibia (TMP P79.14.247). *A*, lateral view. *B*, anterior view. *C*, distal view, anterior side down. *D*, posterior view. *E*, proximal view. *F*, medial view. Scale is 1 cm.

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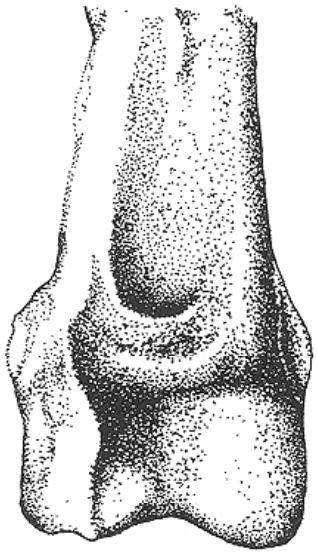

FIGURE 2—Distal end of right tibia of *Dimorphodon macronyx* (Yale Peabody Museum YPM 350B), anterior view. Scale is 1 cm.

is not crushed, and the disparity in breadth of the two condyles is characteristic of pterosaur tibiae, not metacarpals. In the metacarpal, a distinctive feature is that the two condyles are not parallel, but oblique to each other. By contrast, the two condyles of the distal end of the tibia are parallel, but the medial condyle is broader than the lateral one. Finally, the presence of a deep trough on the anterior surface of the shaft just proximal to the distal expansion of TMP P79.14.247 and on the tibia of *Dimorphodon* permits identification of the bone as the distal end of the tibia.

It is difficult to estimate the wingspan of the animal from the end of the tibia alone. The proportions of the hind limb in relation to other parts of the body are not constant in pterosaurs (Padian, unpubl. data). This problem is compounded because, as the body mass increased, the wings had to increase at a faster rate in order to provide adequate supporting area for flight. We estimate the entire length of the tibia to have been between 150 and 200 mm. The *Gallodactylus* specimen described by Fabre has a tibia 138 mm long and a wingspan of slightly over one meter. By contrast, Russell (1972) estimated the wing span of the first Canadian specimen to be about 3.5 m, based on the proximal end of the first wing phalanx.

Rhamphorhynchoids are not known from Upper Cretaceous strata. For the present, this specimen, like the one described by Russell (TMP P72.1.1), probably represents the Pterodactyloidea on the basis of stratigraphic position, but no further taxonomic designation can be given. This second discovery of a pterosaur is encouraging, especially in view of its uncrushed preservation, which compares favorably with most American pterosaur material.

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