

New middle Paleocene (Tiffanian NALMA) birds from North Dakota

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The fossil record of birds prior to the last ~1 million years of the Paleocene in North America is more poorly known than that of the latest Cretaceous. Lithornithids and rare neognathous birds represent the only known avian records from North America in the middle to late Paleocene. However, late Tiffanian (~ 58 Ma) Bullion Creek and Sentinel Butte Formation localities in North Dakota recently have produced a diverse vertebrate fauna including fishes, amphibians, reptiles, mammals, and birds. The 10 bird bones recovered from these new excavations represent at least 3 different taxa of small-bodied birds (duck-sized and smaller). None of the new bones appear referable to any of the previously named avian taxa from the Tiffanian of North Dakota and add to the known diversity of birds from the Paleocene of North America.

One of the new species represented by 4 bones (2 coracoids, a scapula, and a humerus) is a presbyornithid approximately the same size as the early Eocene *Presbyornis pervetus* and significantly smaller than the contemporaneous *Presbyornis isoni*. It has a much larger procoracoid foramen and a smaller acrocoracoid than the Eocene species. Another taxon represented by a single coracoid has a strong resemblance to the Late Cretaceous *Cimolopteryx* and is likely from a plesiomorphic basal avian. One other coracoid that has a procoracoid foramen, but a relatively shallow scapular cotyla that is subtriangular in outline represents a third distinct coracoid-based taxon. It also lacks a distinctly medially projecting or overhanging acrocoracoid/furcular facet (present in the coracoids of the other Tiffanian taxa), and seems to be allied to one of the higher landbird clades. It may be the oldest known record of the stem of a derived ordinal level clade. A tibiotarsus is from a small non-anseriform bird that appears related to gruiforms or ciconiiforms. That tibiotarsus has an elongate tuber for the attachment of part of the extensor retinaculum on the shaft that might indicate that it represents a fourth avian taxon.

The abundance of presbyornithid remains is not unexpected given the interpreted paludal/pond depositional environments and abundance of freshwater vertebrate taxa in these localities. Furthermore, one of the bird bones appears to have damage from ingestion by a carnivore (i.e. gastric etching and related damage). That ingestion also is consistent with the abundance of coprolites and broken bones previously reported from the Medora Site in North Dakota. If accurate, that bone would be the oldest known record of predation on birds in North America.