

# DINOSAURS



# IN IOWA

## FRONT COVER

Hadrosaurs, commonly known as duck-billed dinosaurs, occupied subtropical environments in the coastal lowlands of the central United States during the Cretaceous Period, about 100 million years ago.

Detail of "Dinosaur Society Hadrosaur,"  
(complete painting inside)  
by natural history and wildlife artist Karen Carr,  
courtesy of [www.TheFernleaf.com](http://www.TheFernleaf.com)



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**D**id dinosaurs once live in Iowa? The simple and unqualified answer is "Yes, without a doubt!" Actual evidence is limited to only a few fossils, but remains found in adjoining states suggest the wandering dinosaurs certainly would have been here too.

Fortuitous circumstances are needed to preserve dinosaur bones in ancient sedimentary environments. Following the death of an animal, the bones need to be buried and protected from chemical and mechanical destruction. Many great dinosaur discoveries are associated with ancient river systems, where dinosaur bones may be preserved within floodplain and river channel deposits. The discovery of fossil bones is aided by careful understanding of a region's geology, considerable patience, and a significant measure of good fortune.

Dinosaurs were the dominant land animals for about 170 million years of earth history, spanning the Late Triassic, Jurassic, and Cretaceous periods. This "Age of Dinosaurs" came to a close 65 million years ago when a mass extinction ended the dinosaurs' reign. (Almost all paleontologists consider birds to be descendents of small carnivorous dinosaurs, so a segment of the dinosaur pedigree survived this extinction.) Cretaceous deposits cover extensive portions of Iowa and have real potential to yield dinosaur fossils (see map). The more local Jurassic-age Fort Dodge Formation also was deposited at the same time as strata in the American West



that have produced remarkable dinosaur fossils, but no Jurassic dinosaur fossils have yet been found in Iowa.

Iowa's oldest Cretaceous sediments, the Dakota Formation, were deposited in river systems that drained westward to an interior seaway during the middle part of the Cretaceous period about 95 to 100 million years ago, a time of global "greenhouse" warming. Floodplains and coastal lowlands were covered with lush subtropical vegetation at that time, providing suitable habitats for dinosaurs. The first dinosaur fossil found in the Dakota Formation, a portion of a leg bone (femur), was collected in 1928 from the Missouri River bluffs near Decatur, Nebraska – only about one mile from the Iowa border. Although this fragmentary fossil has not been assigned to a particular dinosaur species, its features are sufficient to identify it as a large ornithopod, a highly successful group of bipedal plant-eating dinosaurs. The proportions of this leg bone, when compared with other ornithopods, indicate a dinosaur that was about 32 feet long. This Dakota fossil likely represents an early



Fossil bone from the Dakota Formation in the Iowa area indicates that large ornithomimid dinosaurs once inhabited the region. Reaching a length of 32 feet, these plant-eating giants browsed the lush subtropical forests and swamps. (Six-foot-tall human for scale.)

hadrosaur, a well-known family of “duck-billed” ornithomimid dinosaurs that comprise the most abundant and diverse group of Late-Cretaceous dinosaurs in North America (see illustrations).

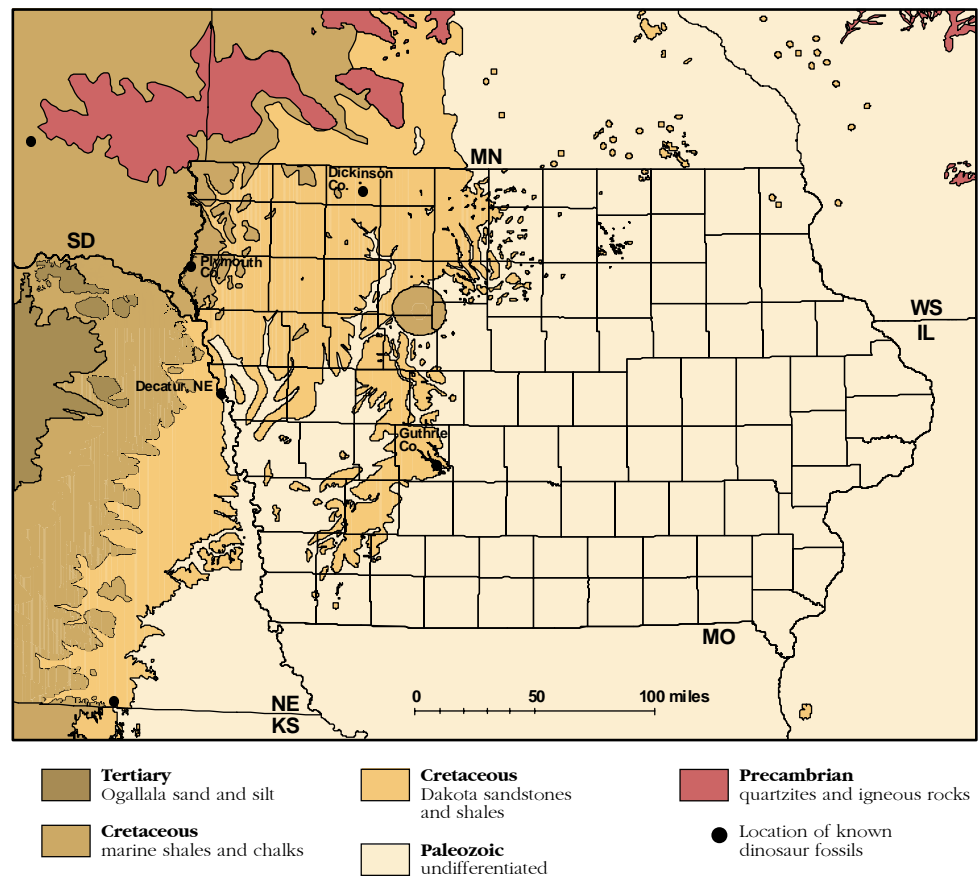
Other dinosaur fossils have been uncovered from the Dakota Formation in nearby northern Kansas, eastern Nebraska, and Minnesota. A family of heavily armored ankylosaurian dinosaurs, the nodosaurids, is represented by partial skeletons of a ten-foot-long creature known as *Silvisaurus*. Additional hadrosaur bones have been found in Minnesota, and three-toed fossil footprints of ornithomimid dinosaurs have been discovered recently in Dakota strata. In Iowa, a fragment of fossil bone was found by a geologist in 1982 in ancient river gravels of the Dakota Formation in Guthrie County. Its microscopic structure revealed densely vascularized bone, indistinguishable from that seen in typical dinosaur bone. Although not particularly impressive by itself, the Guthrie County discovery confirms that dinosaur fossils indeed occur in the Dakota Formation of Iowa.

River deposits of the Dakota Formation were progressively flooded by marine waters as a vast interior seaway encroached eastward later in the Cretaceous, and a succession of younger shale and chalk deposits were laid down on the ancient sea bottom in western Iowa. These strata, named the Graneros, Greenhorn, Carlile, and Niobrara formations, have yielded bones of large marine reptiles known as plesiosaurs from several localities in Iowa. In nearby areas these same formations have also produced fossils of other extinct reptile groups including mosasaurs (giant sea lizards) and pterosaurs (large flying reptiles). Although plesiosaurs are sometimes linked with dinosaurs in the public’s imagination,

plesiosaurs actually represent an unrelated group of extinct marine reptiles. The marine shales and chinks of this seaway also yield the remains of true dinosaurs. Dinosaurs certainly did not live at sea, but occasionally a carcass would float out to sea, decay, and settle to the bottom. The discovery of dinosaur bones and teeth (of hadrosaurs and ankylosaurs) in marine strata from nearby Minnesota, South Dakota, and Kansas certainly raises the possibility of similar discoveries in western Iowa.

Long after extinction of the dinosaurs, huge continental glaciers advanced and retreated across Iowa during the “Ice Age” (the last 2.5 million years). These advancing glaciers picked up large volumes of rock and other sediments as they moved across the continent. Much of this material was derived from erosion of Cretaceous strata that underlie large areas of the northern Great Plains. Reworked and transported Cretaceous fossils, such as plesiosaur bones and shark teeth, are sometimes found in the glacial tills and associated gravel deposits in Iowa, especially in the western part of the state. Two dinosaur bones can now be

### Dinosaur-bearing Cretaceous strata in Iowa and adjoining states



Fossil dinosaur vertebrae 3 and 4 inches long have been found in Dickinson (right) and Plymouth (far right) counties, Iowa, respectively. These specimens likely came from hadrosaurs.



photos by Paul VanDorpe

added to the list of Cretaceous fossils recovered from such gravels in Iowa, and these discoveries represent the best dinosaur fossils yet found in the state.

Charlie Gillette of Dickinson County picked up a dark-colored 3-inch fossil bone from a load of landscaping gravel that came from a nearby gravel pit. When his uncle Jack Neuzil, a retired educator and dinosaur enthusiast, saw the bone he suspected that it could be a dinosaur vertebra. His suspicions were confirmed by a leading dinosaur paleontologist, and the discovery of Iowa’s first identifiable dinosaur bone was soon reported in the *Des Moines Register* (9/7/2000). The fossil is a tail vertebra from an unknown dinosaur, possibly a hadrosaur.

Following this discovery, a second dinosaur vertebra from Iowa has come to light thanks to Doris Michaelson of Bellevue. Her father, John Holdefer, had a keen eye and was fascinated by the rocks and fossils that he saw as a Materials Inspector for the Iowa Highway Commission. Sometime in the mid-1930s he picked up a fossil bone from a conveyor in a gravel pit near Akron in Plymouth County, and the bone was kept at home on a shelf and occasionally used as a doorstop. In response to a recent newspaper article about dinosaurs in Iowa, Mrs. Michaelson contacted the Geological Survey Bureau and brought the bone in for identification. It is a partially weathered 4-inch dinosaur vertebra, likely from an unknown hadrosaur.

It’s only a matter of time before some lucky searcher examining Iowa’s Cretaceous formations or Ice-Age gravels finds the next dinosaur fossil from Iowa. So keep looking!