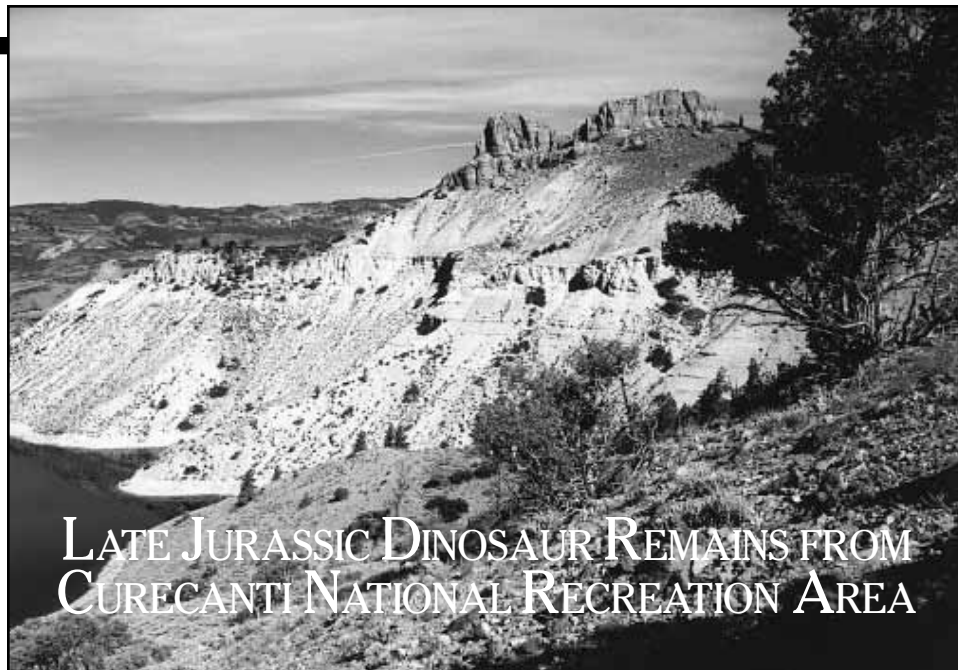




LATE JURASSIC DINOSAUR REMAINS FROM CURECANTI NATIONAL RECREATION AREA

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CURECANTI NATIONAL Recreation Area encompasses the eastern portion of the Black Canyon of the Gunnison, and shares a common boundary with the Black Canyon of the Gunnison National Monument. Both are located in west-central Colorado and are on the Gunnison River, a tributary to the Colorado River. Curecanti contains three dams that comprise the Wayne N. Aspinall Unit of the Upper Colorado River Storage Project. The largest reservoir created by the dams, Blue Mesa Reservoir, is also the largest body of water in Colorado and serves as a major recreational resource for anglers and water recreation enthusiasts.

Geologically, the park is recognized for exposures of rock that date to over 1.7 billion years in age, making them among the oldest in western North America. In addition to these well-recognized resources, the park also contains fossils that have significant scientific and educational value. The most important of these is in the Upper Jurassic Morrison Formation (approximately 150 million years old) in the park (figure 1).

The Morrison Formation of the western United States has produced the vast majority of the Jurassic dinosaurs from North America. However, most of these remains have been derived from only a

few major localities (e.g., Dinosaur National Monument, northwestern Colorado, the historically important sites of Como Bluff in southeastern Wyoming and Cañon City in southern Colorado, and others). This important fossil unit, comprised largely of ancient stream, floodplain, and lake deposits, is found at the surface or in the subsurface from Montana to New Mexico and from Oklahoma to Utah. The youngest part of the Morrison Formation is the Brushy Basin Member, which is the source of most of the vertebrate remains from this formation. The age of this rock unit has traditionally been considered to be Late Jurassic. Historically, climatic interpretations for Morrison Formation deposition range from wet to dry and most specialists have suggested a strong seasonality during Morrison times. Given the large geographic extent of the Morrison Formation, many gaps still exist in understanding the distribution of dinosaurs from this interval of time.

A NEW FIND

In the area surrounding the town of Gunnison, only one significant dinosaur find had been reported previously (Bartleson and Jensen, 1988). A new di-

Figure 1. Morrison Formation

exposures in the Dillon Pinnacles area of Curecanti National Recreation Area, Colorado.



Figure 2. Close-up of 3½ sauropod vertebrae, 1½ of which are partially covered by a plaster jacket. A deer lumbar vertebra is included for scale (arrow). The specimen was encased in a plaster and a burlap jacket to protect it during transport to the preparation lab. A thick layer of tissue paper was placed on the specimen before the plaster and burlap to prevent the plaster from adhering to the fossil bone.

nosaur locality was discovered in the Morrison Formation during recent paleontological fieldwork at both Curecanti and Black Canyon of the Gunnison. This site has already yielded the remains of two dinosaur taxa (groups).

The quarry discussed in this report is noteworthy for two reasons. First, this is only the second major dinosaur discovery site in the Morrison Formation between the historically important Cañon City area of the southern Front Range and the Uncompaghre uplift in western Colorado. Second, the discovery of this site in a park not previously recognized for its paleontological resources, emphasizes the point that important management issues may include resources not traditionally recognized within individual parks.

The quarry is at the edge of a lense-shaped, fine- to medium-grained sandstone that thickens to 1.5m (4.9 ft) and is at least 30m (98 ft) in lateral extent along the outcrop exposure. Sedimentary structures within this sandstone suggest a flood event with rapidly decreasing flow velocity.

As mentioned, the remains of two dinosaur taxa have been found at this quarry: an articulated partial sauropod¹ skeleton consisting of several vertebrae (figure 2), ribs, pelvic bones, a femur, fragmentary limb material, and isolated theropod² teeth. The sauropod has been referred to the genus *Apatosaurus* (Fiorillo and May, in press) and the initial theropod tooth assigned to the genus *Allosaurus* (Fiorillo and May, in press). Subsequent work has yielded additional teeth that are poorly preserved but are archosaurian, i.e., reptilian, in nature.

Isolated predatory dinosaur teeth are commonly found at sites where articulated or associated dinosaur skeletons also exist (Fiorillo, 1991). These occurrences are typically interpreted as the shed teeth of predators as the predators fed on the carcass.

SEDIMENTS YIELD CLUES

Sediment grain size is an estimator of flow velocity in stream deposits. A good deal of experimental work has been done to provide a means to estimate the relationship between sediments of a given size and the corresponding bones that would have been carried by those stream flows. A large disparity between sediment size and the fossil bone size probably indicates that the fossil bones were not transported to the site as part of the *bedload*³ of the stream. At the Curecanti dinosaur site a large disparity exists between bone size

and grain size; therefore, the bones at the site were not part of the bedload of the current. The articulated nature of the skeleton suggests that the sauropod was transported to the site as a bloated carcass.

recreation Area have yielded several additional insights into the changing ancient environment of this important rock unit. Results of the other components of this overall study of the Morrison Formation ecosystem will be presented after the data are analyzed.

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After being buried, this specimen was probably scavenged by at least one *Allosaurus* and a crocodilian.

When the site was discovered, the global scientific importance, and the regional educational potential, were immediately recognized. This site is located along the shores of the Blue Mesa Reservoir in the national recreation area. Previous destruction of bone material at the site was due to prolonged exposure to the weather and wave action during periods of high lake level. Excavation was deemed the only viable alternative for preserving this resource.

EXCAVATION ENSUES

A carefully coordinated excavation project involving the National Park Service, the Dallas Museum of Natural History, the United States Forest Service, and the Academy of Natural Sciences of Philadelphia is currently ongoing. The National Park Service has provided the logistical support and framework for the excavation while the Dallas Museum of Natural History and the Academy of Natural Sciences of Philadelphia have provided the technical expertise for the fine-scale excavation. The first large plaster jacket containing several sauropod vertebrae was removed during the summer of 1995, and subsequent jackets were removed during the summer of 1996. All of these jackets are currently being prepared for detailed study.

Detailed paleontological and sedimentological study of the Morrison Formation of Black Canyon of the Gunnison National Monument and Curecanti Rec-

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¹Sauropod refers to quadrupedal, plant-eating saurischian dinosaurs, such as *apatosaurus* (brontosaurus-type), that have long necks and tails and small heads.

²Theropod refers to bipedal, carnivorous saurischian dinosaurs, such as *allosaurus*, that usually have small forelimbs.

³Bedload is that portion of alluvium in a stream that is transported along the streambed and not in suspension in the water column.