



A new hadrosaur track from the Upper Cretaceous Fruitland Formation of northwestern New Mexico

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A NEW HADROSAUR TRACK FROM THE UPPER CRETACEOUS FRUITLAND FORMATION OF NORTHWESTERN NEW MEXICO

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ABSTRACT.— We describe a new dinosaur track from the Fossil Forest Research Natural Area, San Juan County, New Mexico. This is the first track from the upper, Fossil Forest Member of the Fruitland Formation and represents only the second locality for Late Cretaceous dinosaur tracks in the San Juan Basin. The tridactyl track is 800 mm long and 870 mm wide and represents a very large hadrosaur.

INTRODUCTION

The Fossil Forest is small area of badlands that encompasses less than 5 sections in San Juan County, New Mexico. This area has been designated a Research Natural Area (RNA) because it is a Lagerstätten that preserves a diverse Late Cretaceous ecosystem, including petrified stumps and logs, plant compressions and macro- and micro-vertebrates (Hunt, 1984, 1991). Trace fossils from this RNA include dinosaur skin impressions and possible caddisfly larval cases (Hall et al., 1988; Wolberg et al., 1988b). Herein we describe the first tetrapod track from the Fossil Forest.

There are several localities in New Mexico that yield Cretaceous dinosaur tracks (Lockley et al., 2000). The majority of tracks are from northeastern New Mexico and include Early Cretaceous tracks from the Mesa Rica and Pajarito Formations and Late Cretaceous tracks from the Raton Formation. Most of these tracks represent ornithomimid dinosaurs, — iguanodonts in the Early Cretaceous and hadrosaurs in the Late Cretaceous.

Wolberg et al. (1988a) described the only other Late Cretaceous dinosaur tracks from northwestern New Mexico. These specimens encompass one complete and two incomplete tracks from the lower, coal-bearing Ne-nah-ne-zad Member of the Fruitland Formation (*sensu* Hunt and Lucas, this volume) near Bisti, north of the Fossil Forest. These specimens are uncollected tridactyl tracks that Wolberg et al. (1988a) reasonably assigned to a hadrosaur.

The purpose of this paper is to describe the new track and to comment on its significance. NMMNH refers to the New Mexico Museum of Natural History, Albuquerque.

GEOLOGIC SETTING

The Fruitland Formation (Upper Cretaceous: upper Campanian) is a unit (Fig. 1) of dominantly paludal origin that is widely exposed around the margin of the San Juan Basin in northwestern New Mexico and southwestern Colorado. The Fruitland Formation yields the majority of New Mexico's coal and coal bed methane and also contains an extensive vertebrate fauna (Hunt and Lucas, 1992). The new dinosaur footprint is from the upper, Fossil Forest Member of the Fruitland Formation (*sensu* Hunt and Lucas, this volume). This interval has yielded the majority of the vertebrate body-fossils from the Fruitland Formation, but this is the first occurrence reported record of a tetrapod track (Hunt, 1984,1991).

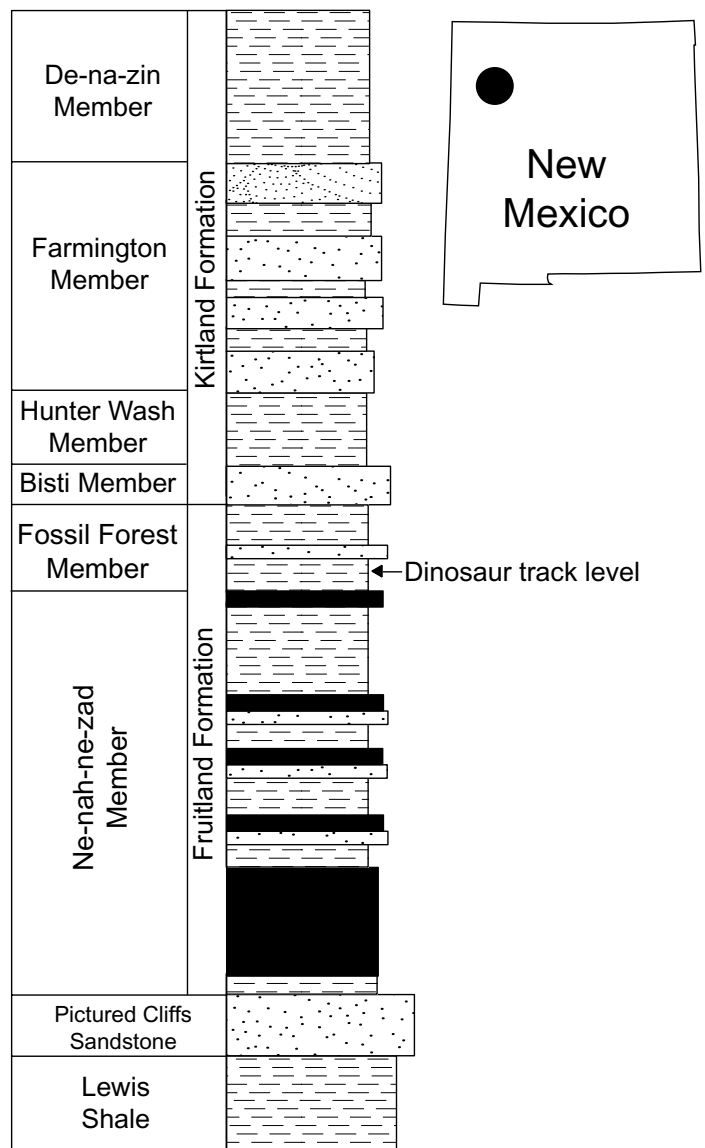


FIGURE 1. Index map and general stratigraphy of Fruitland and Kirtland formations showing location of dinosaur track in the Fossil Forest RNA.

DESCRIPTION

The new track is a large tridactyl pedal impression reposit in the collections of the New Mexico Museum of Natural History and Science (NMMNH P-7145). This track is preserved in dark grey gray, carbonaceous silty sandstone. The track is preserved in convex hyporelief (Fig. 2).

The maximum length of the track (through the central digit impression) is of 800 mm and its maximum width is 870 mm. The track is imbedded in plaster and is only visible in ventral view.

The right digit impression (which appears as on the left in ventral view; Fig. 2) is narrow (average width 170 mm) and parallel-sided with little indication of pad impressions. It is 750 mm long and separated from the remainder of the track by a deep furrow.

The central digit impression is sub-parallel-sided with a maximum width of 210 mm. It is confluent with a portion of the heel impressions that angles towards the right digit impression. This portion of the heel impression extends posterior to the remainder of the track.

The left digit impression is separated in the heel area from the middle digit impression by a furrow. This digit impression is roughly triangular, with a maximum width of 250 mm and a length of 630 mm. There is some indication of two pads, one anterior to the divergence from the central digit impression and one near the posterior margin of the track.

INTERPRETATION

Upper Cretaceous rock units of the Western Interior generally have diverse vertebrate faunas, but depauperate ichnofaunas (Lockley and Hunt, 1995). The majority of North American

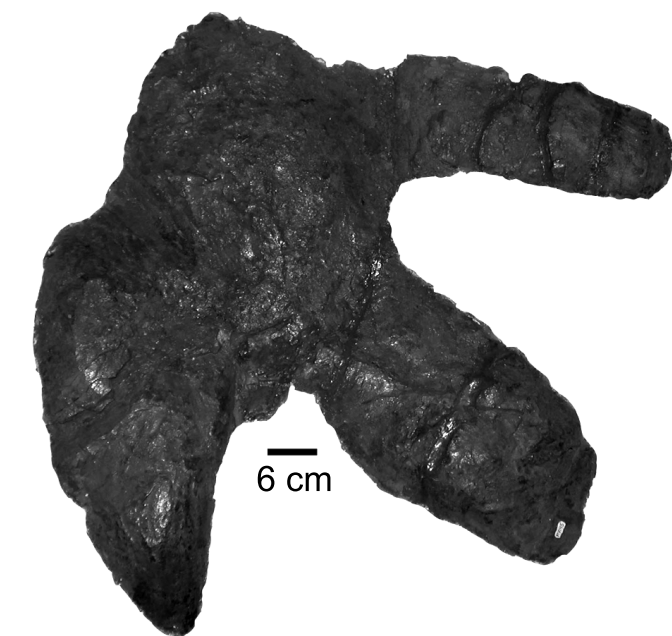


FIGURE 2. Ventral view of giant hadrosaur track (NMMNH P-7145) in ventral view from the upper Fruitland Formation of the Fossil Forest RNA, San Juan County, New Mexico.

ichnofaunas of this age are dominated by ornithopod tracks. NMMNH P-7145 is similar to an ornithopod track in: (1) being wider than long; (2) having wide divarification of the digit impressions; (3) in the length of the middle digit impression not being substantially greater than the side digit impressions; (4) possessing broad digit impressions; and (5) in the tips of the digit impressions being blunt. Hadrosaurs are the only large Campanian ornithopods known from New Mexico (Hunt and Lucas, 1992) and so NMMNH P-7145 presumably represents a hadrosaur. The Fruitland Formation contains the lambeosaurine *Parasaurolophus cyrtocristatus* and indeterminate hadrosaurines (Williamson, 2000). However, the conservative postcrania of hadrosaurs does not allow the identification of tracks below the family level, and so we identify this track only as hadrosaurian.

There are many ichnotaxonomic names that have been applied to Cretaceous ornithopod tracks. Some names, such as *Caririchnium*, are clearly valid. However, we are unclear as to the correct ichnogenus for Late Cretaceous hadrosaur tracks such as the one described herein and we are not convinced that Early Cretaceous (presumably iguanodontid) tracks such as *Amblydactylus* can be distinguished from those of hadrosaurs.

We interpret NMMNH P-7145 to be a right pedal impression as the right digit impression is more elongate and more separated from the central digit impression than the left digit impression.

SIGNIFICANCE OF TRACK

NMMNH P-7145 is of significance because:

1. It is the first dinosaur track from the upper, non-coal-bearing Fossil Forest Member of the Fruitland Formation.
2. It demonstrates the presence of a large hadrosaur track in the upper Fruitland fauna. Based on the foot length the trackmaker was about 472 cm high at the hip using the formula of Thulborn, (1990, p. 251) for a large ornithopod. This is comparable to, and actually larger than, the size of the giant hadrosaur *Shantungosaurus* (Hu, 1972), which is known from relatively complete skeletal remains. The Fruitland hadrosaur would be comparable in size to the largest Baja specimens described by Morris (1972). A large, but slightly smaller hadrosaur is known from a femur from the Kimbetoh Member of the Ojo Alamo Sandstone (Maastrichtian) of northern San Juan County (Fassett and Lucas, 2000).

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Crossbedded sandstones of the Upper Triassic Sonsela Member of the Petrified Forest Formation, Zuni Mountains.