

Early Discoveries of Dinosaurs From North America and the Significance of the Springfield Armory Dinosaur Site

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Abstract—Prior to the "Great American Dinosaur Rush" during the late 1800s, there were relatively few dinosaur sites recorded in North America. *Hadrosaurus foulkii* is recognized as the first articulated dinosaur collected, described and displayed in the New World. Most of the early discoveries consist of the fossil trackways from the Connecticut Valley and few partial dinosaur skeletons. The type specimen of the prosauropod dinosaur *Anchisaurus polyzelus* is recognized as one of the earliest dinosaur discoveries in North America. The fossil bones of *Anchisaurus* were uncovered during a blasting operation at the armory in Springfield, Massachusetts in the early 1800s. The excavation at this site is an important record in the early history of the science of dinosaur paleontology in North America.

Introduction

Prior to the 1870s and the "Great Era of Dinosaur Discoveries" there is a limited history for dinosaur paleontology in North America. Relatively few dinosaur specimens were recovered prior to the American Civil War. There appeared to be a general lack of interest in the petrifications of ancient life during the first half of the 19th century. The description and naming of the dinosaur remains often came long after their discovery.

Early Discoveries Of Dinosaurs In North America

1802 — Dinosaur footprints.— In 1802, Pliny Moody, a student at Williams College, found the footprint impressions near Moody's Corner, his South Hadley, Massachusetts, farmstead. During this time these trackways were referred to as being made by "Noah's Raven" and were generally regarded as associated with gigantic birds. The tracks were not recognized as dinosaurian until after 1860.

The high concentration of fossil tracks were later discovered throughout the Connecticut Valley and studied by Amherst College Professor Edward Hitchcock. Extensive descriptions of the tracks were published in "A report on the Sandstone of the Connecticut Valley especially its Fossil Footmarks.", (Hitchcock, 1858). Subsequent work by other paleontologists associated the tracks with dinosaurs.

1818 — Dinosaur bones from Connecticut.— The earliest discovery and collection of dinosaurian remains in North America occurred in 1818 (Galton, 1976). During the blasting of a well near Ketch's Mills, in East Windsor, Connecticut, fossilized bone fragments were discovered by Solomon Ellsworth, Jr. in the Late Triassic red sandstones. Ellsworth gave the bones to Professors Smith, Ives and Knight, of the Medical Institution of Yale College, who all admitted, "the possibility that they might be human bones, but did not consider the specimens as sufficiently distinct to form the basis of a certain conclusion.", (Smith, 1820).

The Ketch's Mills bone material was recognized as reptilian by Professor Jeffries Wyman in 1855. Wyman described one of the fossil bones as, "... a caudal vertebrae of a Saurian reptile, to which it corresponds in the shape of the body, and the transverse processes, and more nearly to those of the crocodiles than any other." (Wyman, 1855). The

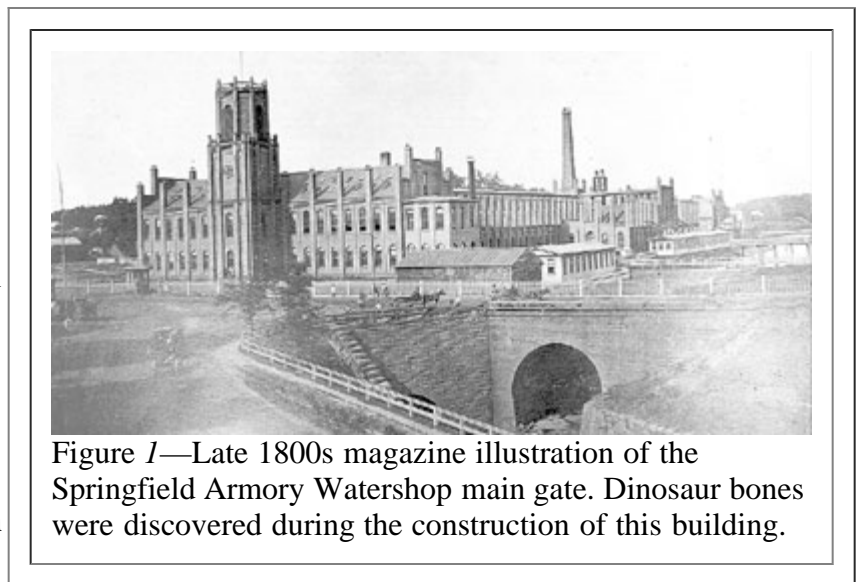


Figure 1—Late 1800s magazine illustration of the Springfield Armory Watershop main gate. Dinosaur bones were discovered during the construction of this building.

specimen was later identified as dinosaurian and named *Anchisaurus colurus* (Lull, 1912). The latest reference to the Ketch's Mills specimen, by Peter Galton (1976), recognizes the remains as prosauropod and reassigns the taxonomic identity as *Anchisaurus polyzelus*.

1830 — A skeleton from New Jersey.— In the late 1830s, a partially articulated dinosaur skeleton was uncovered in a marl pit near West Haddonfield, New Jersey. These fossil bones were later excavated during 1858 under the direction of Professor Joseph Leidy from the Academy of Natural Sciences in Philadelphia. The specimen, preserved in the Late Cretaceous Woodbury Formation, was described by Leidy and assigned the name *Hadrosaurus foulkii* (Leidy, 1858). This type specimen was assembled as a free-standing mount at the Philadelphia Academy of Sciences and represents the first time that a dinosaur had been portrayed standing upright in a bipedal stance.

1855 — Dinosaurs from the west.— In 1855, members of a government survey in the western territories, under Dr. Ferdinand Hayden, discovered a number of fossilized bones and teeth. In Nebraska Territory, the Hayden party found a fossil toe bone and some vertebrae. In Montana Territory, near the confluence of the Judith and Missouri rivers, a few fossil reptile teeth were collected by the survey team. The specimens were sent to Leidy and his descriptions of this material represent the first dinosaurs named in North America (Leidy, 1856).

The Springfield Armory Dinosaur Site

Despite the abundance of fossilized tracks in the Connecticut Valley, there is a relative rarity of fossil bones within the same deposits. In addition to the dinosaur bones collected at Ketch's Mills, fossilized bones of an early Jurassic dinosaur were also collected, during the early nineteenth century, from a site located in the National Armory in Springfield, Massachusetts. This site is now administered by the National Park Service as Springfield Armory National Historic Site.

The Springfield bones were discovered by William Smith during blasting related to some improvements at the "water shops" of the United States armory (Figure 1). The fossils were found at Mill Pond during the construction project. The actual date on which the bones were collected remains unknown, but the earliest reports indicate a date prior to 1856. A large portion of the fossilized remains were taken away by the workmen before Smith intervened. Armory superintendent General Whitney ordered the fossil specimens to be re-examined. Smith recovered as much material as possible and presented it to Professor Edward Hitchcock. According to Hitchcock (1858), the fossil remains from Springfield Armory were entirely replaced by a "carbonate of lime".

Hitchcock eventually sent the fossil bones to Professor Jeffries Wyman for examination. Wyman provided the following reply dated January 21, 1857:

"With regard to the bones, I think that there can be no question that they are those of a reptile. This is shown by the configuration of the head, small trochanter, and a part of the shaft of a thigh bone, as well as by the imperfect caudal vertebrae; these last, however, are deficient in the concavo-convex bodies which are found in all scaly reptiles except the Enaliosaurians. Those from the sandstone are flat, or nearly so, on the ends, as in the Mammalia. The most remarkable feature, however, of the whole collection, is that of hollowness. This is carried so far, that but for the indications referred to, they might be referred to birds. Every bone except the vertebrae, and perhaps the small phalanges, is hollow. Nothing of the kind is known in Mammalia. Among reptiles the Pterodactyle had hollow bones, and some of them were referred, by Professor (Richard) Owen, to birds; but he subsequently corrected his opinion. . .".

According to paleontologist Walter Coombs, "the discovery of the Springfield Armory bones seemed to have aroused little or no public interest and it is doubtful there are more detailed accounts of the circumstances of their discovery in contemporary local newspapers." During the mid-1800s the concept "dinosaur" was in its infancy. There is no indication from Hitchcock's writings that he associated this skeleton or any of the tracks he studied with dinosaurs. Likewise, it remains uncertain whether Hitchcock ever read about or even knew the word "dinosaur" (Coombs, pers.comm., 1998).

The Springfield Dinosaur Specimen

The fossil remains from Springfield Armory were originally described by Wyman (in Hitchcock, 1858) but he did not

name the specimen. Hitchcock (1865) later named the specimen *Megadactylus polyzelus* based on comments given by Richard Owen. Taxonomic revisions led to the specimen being reassigned as the type specimen of *Anchisaurus polyzelus* (Marsh, 1885).

The *Anchisaurus polyzelus* specimen from Springfield Armory was collected from the early Jurassic Newark Series, Longmeadow Sandstone. The specimen is curated into the Vertebrate Paleontology Collection of the Pratt Museum of Natural History at Amherst College (catalog number is ACM 41109). The most recent and detailed description of the Springfield Armory *Anchisaurus polyzelus* type specimen is presented by Galton (1976). The Springfield Armory specimen consists of the following elements:

- 11 vertebrae (including dorsal and caudal);
- right manus;
- distal ends of right radius & ulna;
- left femur & proximal end of left tibia;
- left fibula & pes;
- 2 ischia.

Ostrom's Report To The NPS

In 1971, Dr. John Ostrom from Yale University was contracted by the National Park Service to produce a publication titled, "Report to the National Park Service on Mesozoic Vertebrate Paleontological Sites for Possible Inclusion in the Registry of Natural Landmarks" (Ostrom, 1971).

The objectives of Ostrom's study included: 1) Compilation of an inventory of important Mesozoic paleontological sites, particularly of dinosaurs and Mesozoic mammals; 2) Analyses of those sites that are considered of unusual significance and potentially eligible for designation as a Natural Landmark; and, 3) Recommendation of sites for inclusion in the National Register of Natural Landmarks.

In his report, Ostrom recognized the historic and scientific significance of the Springfield Armory dinosaur site and identified the remains of *Anchisaurus polyzelus* as one of the earliest recognized fossil vertebrate remains from the Mesozoic of New England. This specimen also represents one of the earliest dinosaurs collected and reported in the New World.

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