A Brief History of US National Museum Specimen 2210

by
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Many visitors to the Museum never realize the history of how a specimen comes to be on display or how it can change over time. To illustrate the sometimes long path, this article tells the story of one of the Museum's two camptosaurs.

Camptosaurus is an ornithischian dinosaur from the Late Jurassic Period (145-160 MYA). Adults typically reach lengths of nearly 7 meters and are nearly 2 meters tall at the hips. They have been found in both western Europe and the western United States, with the largest number of them coming from Quarry 13 near Como Bluff in Wyoming. The National Museum of Natural History has had two on display, one large (catalog number USNM 4282[1]) and one smaller (catalog number USNM 2210). We focus here on USNM 2210.

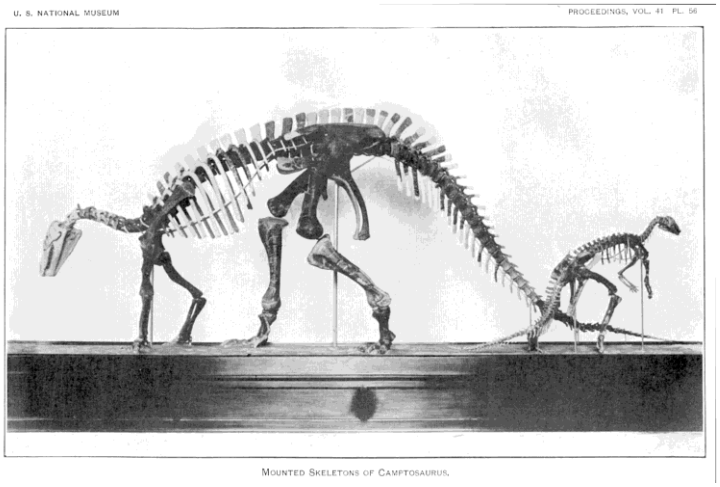

Figure 1: The Smithsonian's mounted camptosaurs as they looked in 1912. USNM 2210 is on the right, with USNM 4282 on the left. From Gilmore (1912).

Collection in Wyoming

The fossil bones composing USNM 2210 were collected by William Reed in 1882 from the Morrison Formation at his "Quarry 13" as part of Prof. O.C. Marsh's collection efforts for the United States Geological Survey (USGS). The skeleton as found was relatively complete, but lacked a skull. At the time, Marsh was simultaneously "Vertebrate Paleontologist for the United States" in the USGS (giving him oversight over all fossil collecting expeditions sponsored by the US Government), a professor of Paleontology at Yale University, and "Curator of Paleontology" at the Peabody Museum of Natural History. Prof. Marsh had Reed ship all the material collected directly to him at Yale.

Preparation and Storage At Yale

When the shipment arrived at Yale, the specimen was accessioned as Yale Peabody Museum (YPM) catalog number 1881. The bones were sufficiently removed from the surrounding rock matrix and cleaned at Yale for Marsh to formally publish a description in 1894, in which he named the specimen the holotype of *Camptosaurus nanus* Marsh. It then was placed in storage.

[1] Today's National Museum of Natural History (NMNH) was created in 1957 as part of the United States National Museum (USNM). To avoid confusion, all fossil specimens in the NMNH retained their USNM catalog numbers and are still catalogued as such today. See http://www.mnh.si.edu/onehundredyears/brief_history.htm for additional information on the USNM and the creation of the NMNH.

Transfer to the United States National Museum

How the specimen got from Yale to the US National Museum is a bit of a tangled story. In 1846, the legislation that established the Smithsonian Institution also stated that "…all objects of natural history, plants, and geological and mineralogical specimens belonging to or hereafter to belong to the United States" would be held in trust by the Smithsonian for the American people. In 1879, the Sundry Civil Act enlarged this list to specifically include all rocks, minerals, soils, fossils, and objects of natural history collected for the US Government (and particularly mentioning the USGS). As Prof. Marsh's 1882 expedition to Quarry 13 had been sponsored and funded by the USGS, all the specimens collected, including the *C. nanus*, were therefore destined to eventually be transferred to the Smithsonian. However, during the 1880s, Marsh was still deeply enmeshed in the so-called "Bone Wars" with Edward Drinker Cope and was tightly restricting access to the USGS collections at Yale. While some material was sent to Washington in the early 1890s, it was not until Marsh died in 1899 that all the vertebrate fossils he had collected for the USGS that still remained at Yale (some five train car loads) were finally transferred to the Smithsonian. A final transfer letter from Charles D. Walcott, the Director of the USGS, to Prof. Samuel P. Langley, Secretary of the Smithsonian, dated 9 December 1899 indicated all Prof. Marsh's vertebrates belonging to the Government had been shipped from the Peabody Museum to the US National Museum. Among the vertebrates listed was a sole *C. nanus*. That specimen was accessioned by the National Museum the next year and given the designation USNM 2210.

Mounting at the Smithsonian

As indicated earlier, USNM 2210 was an unusually perfect skeleton -- with the exception of the skull, much of the skeleton as collected was intact.

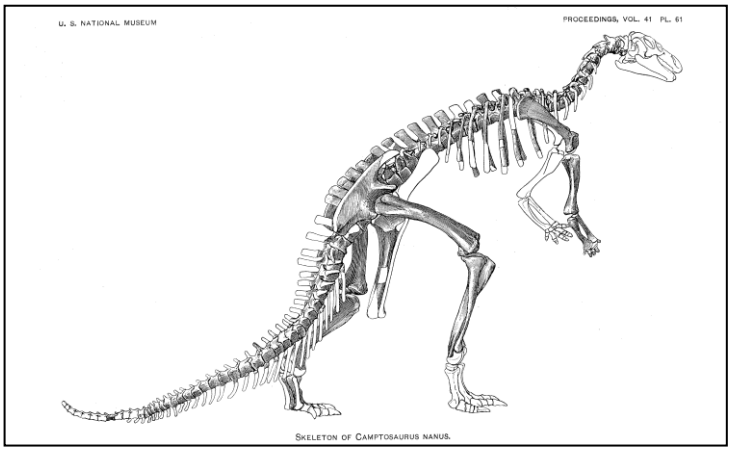

Figure 2: Drawing of USNM 2210 showing real and restored bones. Parts restored are in outline. From Gilmore (1912)

Norman H. Boss, one of the best fossil preparators of the time, did the final preparation and mounting of USNM 2210 in 1911. Even with such a complete specimen, significant reconstruction and limited "mix and match" from other specimens was still required. Charles Gilmore, Custodian of the Reptilian Collection at the time, noted: "The skeleton as mounted is composed of the bones of one individual with the exception of the second and third metatarsals of the left hind foot which are from another individual (Cat No 5960) of the same proportions, and from the same quarry as the type. The other missing parts have been restored and painted a light color to make these distinct from the fossil portions."

The most noticeable problem was the lack of a skull. The skull finally mounted on the display specimen was completely restored. It appears that this plaster cast was made by Boss and Gilmore based on other pieces in the USNM and Yale collections, and drawing on their background knowledge. Interestingly, a plaster cast of the skull of a *C. nanus* was obtained in

1911 as part of an exchange with the American Museum of Natural History, possibly for comparison. However, it looks quite different than the one created for USNM 2210, and does not appear to have been used for this specimen.

USNM 2210 was mounted together with USNM 4282 (a much larger *C. browni* Gilmore, also from Quarry 13) in an attempt to show an example of the varieties of *Camptosaurus*. They were mounted side-by-side on the same artificial base, textured and painted to represent the texture and color of the sandstone matrix in which the bones were found. The larger USNM 4282 was mounted in a quadrupedal position and USNM 2210 was shown walking on its hind legs. The display was erected in the new (at the time) Smithsonian Institution Natural History building on the Mall in Washington D.C. in 1911, and was the first ever to show a large mounted *Camptosaurus* skeleton.

Camptosaurs could reach lengths of nearly 7 meters and nearly 2 meters tall at the hips. USNM 2210 is considerably smaller than that at roughly 3 meters long by ½ meter tall at the hips. This size differential is one of the factors that led Marsh to declare it a new species. However, since the display was originally mounted, it has been recognized that *C. nanus* is actually a very young *C. dispar*, and not a separate species. In addition, *C. browni* is now considered to be an older growth stage of *C. dispar*, making the side-by-side mounting of these two specimens even more appropriate.

Damage Sustained Over the Years

Over the years, small repairs have been made to USNM 2210 and it finally was taken off display in 2004. As we have taken it apart, we've been able to see the full extent of damage that nearly 100 years on display can bring, even in a well-regulated museum environment. While the fossil bones themselves were not in bad shape, some weakness and brittleness is evident. The glue and consolidant used in the early 1900s has become brittle over time. The plaster used to simulate the bones not found shows considerable cracking and flaking due to vibrations in the floor from the passage of millions of visitors and changes in environmental humidity and temperature. The ribs and tail in particular have become extremely fragile. In addition, display space constraints forced the specimen to be mounted within arm's reach of the public, and the overly enthusiastic physical attentions of some visitors have caused further damage.

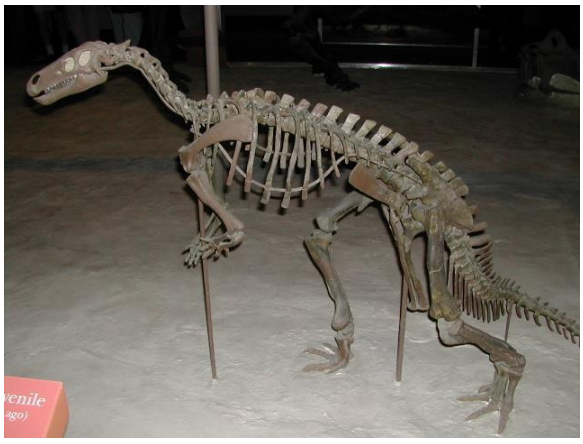

Figure 3: USNM 2210 as it looked in 2004. Photo by Michael Brett-Surman. Copyright Smithsonian Institution.

The mounting technology used in the early 1900s also has taken its toll. Back then, preparators mounted a specimen and expected it to stay mounted forever – no provision was made for repair or reconstruction. Heavy copper wire and iron strapping were used as a support armature, with thinner copper wire used to secure the manus and pes elements. In general, these supports have held up well, with only slight corrosion damage, but some of the bolts and rivets securing the skeleton were drilled through real bone and secured with glue. As we have dismantled the specimen, this mounting technique has occasionally necessitated our cracking bones in order to remove them from the armature, and then making appropriate repairs.

The Future

We have finished taking USNM 2210 apart and making molds of its skeleton. Casts have now been made of all the bones except the skull. We also have taken advantage of the deconstruction to repair damage to the bones, using thickened butvar (polyvinyl butaryl) to reglue any chips and fill cracks created from environmental damage, and thinned butvar to help harden and consolidate the bones. In addition we have created a completely new support armature out of stainless steel that is much more resistant to damage and will allow us to take advantage of new information and analysis available since 1910. The hard plaster we have used for the casts allows for support connections to be made through the simulated bone, reducing the amount of armature seen by the public and providing a more natural looking display. The philosophy is to make all changes reversible, while also ensuring repairs are both state of the art and long lasting.

For security and conservation reasons, only the casts will go back on display; the actual fossil bones will be placed in the research collections. Partially because of the reclassification of USNM 2210 from a separate species to a young *C. dispar*, no decision has yet been made on exactly how to recast its skull. We now have a cast of a *C. dispar* skull from a private collection that is more accurate than the one originally used for USNM 4282. One option may be to 3-D scan this cast and electronically scale it down to juvenile proportions.

In any event, we have plenty of time to make these changes. The current Paleo Halls will close in 2014 and USNM 2210 will not go back on display until the new Deep Time Hall is complete in 2019. That Hall will allow visitors to not only view the reconstructed camptosaurs, but they will better appreciate the ecosystem in which they flourished.

1) Gilmore, C.W. 1912 . The mounted skeletons of *Camptosaurus* in the United States National Museum. *Proceedings of the US National Museum*, 41:687-696
2) Marsh, O. C. 1894. *American Journal of Science* 48:85-90