

DINOSAUR HEAD HUNT

After 100 years and the maturity of an entire science, *Brontosaurus* has a new—and it is hoped the right—look

BY SUSAN WEST

Brontosaurus. In these many years the epitome of the towering dinosaur, ogled by schoolchildren and advertised by an oil company, has a new head.

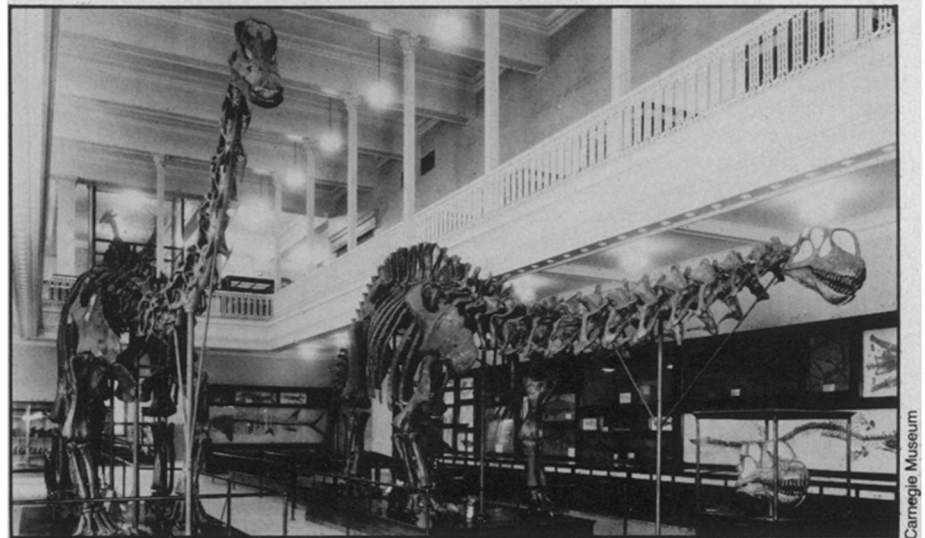
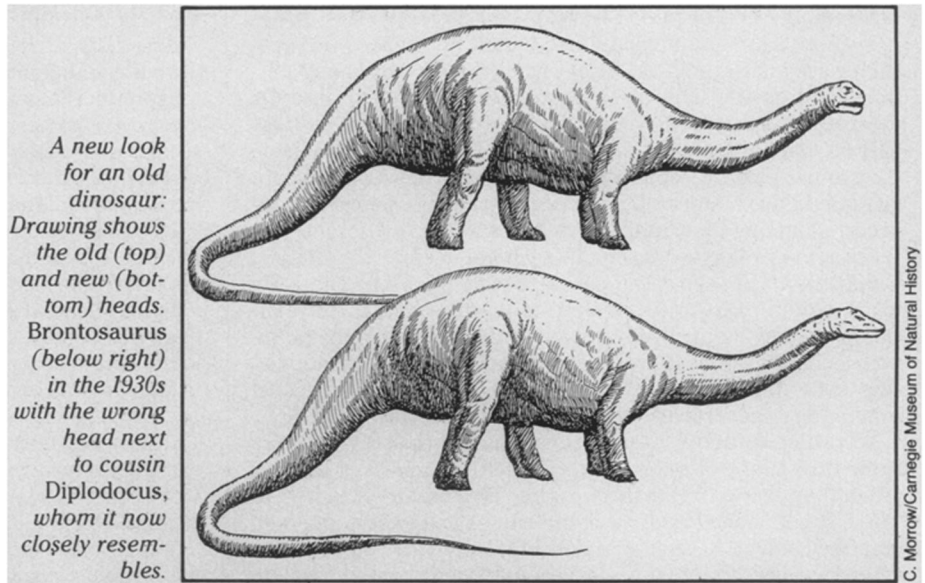
But that very public and somehow disturbing change is only the epilog of a century-long story. The great, familiar dinosaur, it seems, is the victim of hasty research compounded by repeated clashes of ego and reputation that occurred as the science of vertebrate paleontology (the study of ancient life through fossils) bloomed and matured. Bluntly put, *Brontosaurus* fell through the cracks.

To begin at the end, on Oct. 15 the curators of the Carnegie Museum of Natural History in Pittsburgh replaced the massive, snub-nosed skull that had topped their *Brontosaurus* skeleton for more than 40 years with a more slender, elongated version. The new headgear is the direct result of a re-examination of the Jurassic period (136 million to 190 million years ago) creature by John S. McIntosh of Wesleyan University in Middletown, Conn., and David S. Berman, associate curator of the museum. McIntosh and Berman first published their suspicions of *Brontosaurus*'s wrong-headedness in 1975 (*JOURNAL OF PALEONTOLOGY*, v. 49, no. 1) and expanded their thesis in the November 1978 issue of the museum's *BULLETIN*.

Not that *Brontosaurus*'s predicament was unknown among vertebrate paleontologists. As Nicholas Hotton of the Smithsonian Museum of Natural History explains, "It's been hanging over people's heads ever since [*Brontosaurus* was first described in 1883]." Says John Horner of Princeton, "People that study dinosaurs aren't surprised. We've known for a long time." Even McIntosh says he's been "positive... for at least 15 years."

Yet popular books on dinosaurs, encyclopedia articles on *Brontosaurus*, even vertebrate paleontology textbooks—not to mention museums—fail to note what seems to be common knowledge. And, prior to McIntosh and Berman's work, only one largely unnoticed attempt had been published in the scientific literature to pin down what Hotton calls "lore."

By itself, the skull switch is not of great scientific significance. The 80-foot to 90-foot animal does not suddenly become a ravenous meat-eater, or transform from a small-brained, lumbering giant to a crafty,



fleet-footed hunter. To the contrary, the delicate pencil-like teeth of the new head indicate that it probably nibbled at soft grasses or aquatic plants; the broad, spoon-shaped teeth of the former skull attest to a coarser vegetarian diet.

The new head may, however, settle a few squabbles, such as the long-running debate about *Brontosaurus*'s predilection for aquatic or terrestrial life (SN: 1/31/71, p.79). The more delicate teeth and slightly higher nares (breathing passages), say Berman and McIntosh, may mean it spent more time in water searching for softer grasses. The new skull also throws *Brontosaurus* into a different classification. *Brontosaurus* is a member of the suborder Sauropoda, the largest four-legged creatures ever to shake the earth. The skull it sported this last century or so placed it in the same family as the less spectacular and quite different sauropod *Camara-*

saurus. Its new head puts it in the same family as its nearly identical cousin, *Diplodocus*. While such taxonomic matters may be important for the record, they are really only of academic interest. Says Eugene S. Gaffney of the American Museum of Natural History in New York, "In the mainstream of paleontology, it is a tributary."

The plight of the *Brontosaurus* may indeed be small stuff compared to the entire field. But even small stuff is usually settled in the scientific literature, especially when it's so widely accepted. As Berman and McIntosh point out, the real story of the *Brontosaurus*, and the reason its head hasn't been put straight in the literature, lies with the roots of U.S. vertebrate paleontology.

In the United States, that science marks its birth in the mid-1800s when fur traders sent back scraps of bone from the upper

Missouri River country. By the late 1870s, the great bone-hunts were on in Utah, Wyoming and Colorado. The front runners at that time were two of the most vivid personalities of vertebrate paleontology, Othniel Charles Marsh of the Yale Peabody Museum of Natural History and Edward Drinker Cope of Philadelphia. They quickly became world leaders in the science — between them they described more than half of the 3,200 species of vertebrate fossils known in the United States in 1900 — and just as rapidly became fierce competitors. Their feud — called the “Dinosaur Wars” — ended up destroying both of them.

When the huge bones of the sauropods were found, the Dinosaur Wars reached their height. In the attempt to be the first to identify these giants, Marsh and Cope were naming new species as quickly as they could dig them up. Such haste inevitably resulted in mistakes. *Brontosaurus*, apparently, became one of their casualties.

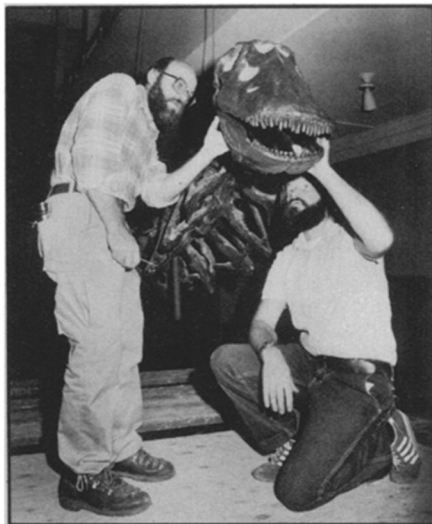
Marsh first described *Brontosaurus* from a specimen found in 1879. Actually, he first found *Brontosaurus* in 1877, but called it *Apatosaurus* and in his haste did not realize they were the same. (Because it is the first name given the animal, *Apatosaurus* is the correct scientific name. *Brontosaurus*, because of its familiarity, is used here.)

Not mentioned in his paper, however, is the fact that the two skulls Marsh used in his restorations were found 4 miles and 400 miles away from the rest of the skeleton. Moreover, the skulls were found with skeletons of *Camarasaurus*, not *Brontosaurus*, and probably belong to that genus. It is these *Camarasaurus*-like skulls that adorn every museum restoration of *Brontosaurus*. Says McIntosh, “Marsh needed a head, so he guessed. Most of his guesses were remarkably good, but this was not.” “We couldn’t get away with that now,” says Berman. “Their rush to publication was definitely the beginning of the problem — not doing careful work.”

Brontosaurus’s first shot at vindication came in 1915. Earl Douglass, digging for the Carnegie Museum in what is now the Dinosaur National Monument in Utah, found a very complete *Brontosaurus* skeleton and, beneath its ribs, a very un-*Camarasaurus*-like skull. In fact, the skull looked much like that of the genus *Diplodocus*, but its close association with the skeleton convinced Douglass it belonged to the *Brontosaurus*. In addition, none of the skulls recovered at the site, which contained only *Diplodocus* and *Brontosaurus*, resembled Marsh’s *Camarasaurus*-like skull. William J. Holland, the museum’s director at that time, said, “Had nothing in the past been written in reference to the structure of the skull of *Brontosaurus* the conclusion would naturally and almost inevitably have been reached that [the *Diplodocus*-like] skull belongs to the skeleton. . . .” Remarking on the distance between the head and body of Marsh’s

Brontosaurus, he said, “... perhaps an error has been made and *Brontosaurus* ... may have had a skull like that of *Diplodocus*.”

According to McIntosh and Berman, the close association of the skull and skeleton should have been sufficient evidence to change *Brontosaurus*. But Marsh’s word still carried weight and Holland ran into resistance from another famous paleontological ego — Henry Fairfield Osborn. As director of the influential American Museum of Natural History in New York, Osborn “had authority with a capital ‘A,’” says Hotton, “and he tended to throw his weight around in a field that was small and concentrated.” “By all accounts,” says John R. Bolt of Chicago’s Field Museum of Natural History, “he was a very arrogant



Mounting the new, *Diplodocus*-like skull.

and overwhelming person.” Osborn had also studied *Brontosaurus*, and according to Berman, had virtually called it and *Camarasaurus* the same creature. Osborn had good reason for wanting to retain a *Camarasaurus*-like skull.

“My good friend, Dr. Osborn,” Holland said in the 1915 paper, “has in a bantering mood ‘dared’ me to mount the [*Diplodocus*-like] head. . . . At moments I am inclined to take his dare. . . .”

Holland never took the dare. But neither did he give in: The Carnegie’s *Brontosaurus* stood headless until Holland’s death in 1932. At that time, director J. LeRoy Kay, influenced by tradition, crowned it with a *Camarasaurus*-like skull. *Brontosaurus*’s hope, it appeared, had died.

Enter McIntosh. A physicist by profession, McIntosh is called by other paleontologists, such as Yale’s John H. Ostrom, “The world’s authority on sauropods.” His fascination with sauropods, says McIntosh, goes back “years and years and years. Most of my life.” After studying the tons of bones at the Carnegie, the field notes and correspondence between Holland and Douglass, McIntosh became convinced that Holland was right. He snared

the interest of Berman, usually a student of Triassic mammals, and the two nailed down their hypothesis.

According to McIntosh, “it’s obvious” from the rest of the skeleton that *Brontosaurus* shares many of the features of *Diplodocus* and nearly none of *Camarasaurus*. Those features include short front limbs two-thirds as long as the thigh, a very long, whip-like tail and more vertebrae in the neck than the trunk. It follows, says McIntosh, that the skull should also be similar to *Diplodocus*. “Before,” says Berman, “it was a mixed-up animal — the body belonged to one group and the head to another. There was absolutely no other evidence that it was like *Camarasaurus*. Now the whole skeleton makes sense.”

More important, the researchers discovered several previously undescribed pieces of skull that were found with Marsh’s original, 1877 *Brontosaurus* — the one he called *Apatosaurus*. Berman and McIntosh demonstrated that these pieces, which are indisputably part of that skeleton, are of *Diplodocus* type, not *Camarasaurus* type. Together with the Holland-Douglass skull, they seem to cinch the hypothesis. “Had Marsh noticed and taken the time to describe these pieces,” says Berman, “he would undoubtedly have given it a *Diplodocus*-like skull.”

Their work is enough to satisfy the rest of the community. “Berman and McIntosh have come up with quite a bit of new evidence,” says Princeton’s Horner. “No one can argue with their evidence.” Berman and McIntosh, however, still give the credit to Holland. “The whole data were not available to Holland,” says McIntosh, “but he did recognize some *Diplodocus*-like post-cranial characteristics such as the tail. It was just a standoff between him and Osborn ... a matter of inconclusive evidence.”

And what about other museums? The curators at the Museum of Geological History at the University of Wyoming in Laramie weren’t even aware that their *Brontosaurus* — originally one of the Carnegie’s — had any problems. “I doubt if we’ll get massively excited and tear out the head,” said Jeff Eaton, when told of the research. The American Museum of Natural History in New York, on the other hand, has had the new head for a few years since making a cast of it for the Carnegie. “In the interest of maintaining accuracy, I’m sure we’ll mount it at some point,” said curator Gaffney, who noted the museum is observing their dinosaur’s 100th birthday. Yale’s Ostrom says the Peabody Museum will probably note the *Brontosaurus*’s tale by a change in the label on their specimen, but both Ostrom and Bolt of the Field Museum in Chicago say they must wait until more casts are made of the Carnegie’s head.

So it may take a while for museums and textbooks to catch up with Berman and McIntosh. In the meantime, it looks as if the last head has rolled in the Dinosaur Wars. □