

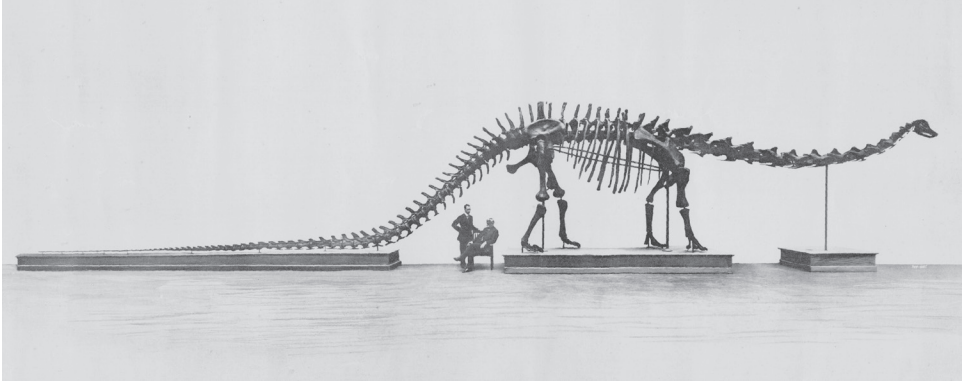


## *Chapter 1*

# *DIPLODOCUS CARNEGII*

The standing skeleton of a dinosaur gives off an unearthly grandeur—grand because of the size, unearthly because the bones leave its living bulk to the imagination. The skeleton is an idea, an armature of what really lived. Like all ideas, it stands for itself but allows room for speculation to meander among its parts. The legs may recall tree trunks, the ribs hint at shipwrecks, but the long arch of vertebrae—tail to spine, to neck, to head—displays a mesmerizing logic. At any natural history museum one may find a person gazing up at a dinosaur for a full half hour. A good museum needs high ceilings. Meaning gathers up there in the darkness, above the skulls.

At one o'clock in the afternoon on Friday, May 12, 1905, Andrew Carnegie presented the trustees of the British Museum with a plaster-of-paris replica of a dinosaur that bore his name, *Diplodocus carnegii*. More than two hundred people had packed into the Gallery of Reptiles in the natural history museum in South Kensington, in London, for speechmaking and ceremony. The dinosaur, 84 feet long over its curves, nearly 15 feet high at the hips, was mounted on a platform down the long axis of the room. The skeleton was made of exact copies of bones found six years earlier on the plains of southeast Wyoming, not far from the tracks of the transcontinental line of the Union Pacific Railroad.



The cast of *Diplodocus carnegii* prepared for Kaiser Wilhelm II of Germany, with Arthur Coggeshall, left, and William Holland on hand for scale. Casts eventually went to nine national museums in Europe and the Americas; the dinosaur was the first that millions of people ever saw. Courtesy of Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, originally published ca. 1908 as Carnegie Museum, Paleontological Illustrations, no. 1.

The guests sat on chairs on either side, and the speakers stood a few feet off the right front leg of the skeleton. Daylight flooded down from clerestory windows. Late arrivers stood in the aisles between the chairs or against glass museum cases along the walls. On hand were scientists, the press, generals, admirals, painters, writers, a few lords, many knights, members of Parliament, and a liberal sprinkling of married and unmarried women. The men wore morning coats and high collars, the women wore dresses and hats.

Professor E. Ray Lankester, director of the museum, rose to speak after the crowd had settled. He linked the size of the dinosaur with the size of Carnegie's generosity. The professor was courteous, yet in the spaces between his words lay discomfort with the *direction* of Carnegie's gift—eastward across the Atlantic. Politely, obliquely, Professor Lankester let it be known that this museum in the capital of the world's greatest empire had no real need of such generosity. The Hall of Paleontology was already full, he noted, making it necessary that the new specimen be erected instead in the Gallery of Reptiles.

He went on to attribute to Carnegie the insight that all Ameri-

can progress—including its forms of government and its great mechanical inventions—had been founded on British ideas. Even the centerpiece of the day, the *Diplodocus*, the professor joked, “is an improved and enlarged form of an English creature, for we have recently discovered in the Oxford clays a specimen of a dinosaur not quite as large as *Diplodocus*, but in a measure a rival. (Laughter.) You will find the remains of this creature in the Hall of Paleontology.” Then the professor read out a brief letter expressing the thanks of King Edward VII to Carnegie.

Carnegie’s turn to speak came next. Short, white-bearded, round-faced, sharp-eyed, Carnegie was a vigorous sixty-nine years old, his health buoyed by the sport he called “Dr. Golf” and by a vast, unreflective self-confidence. In 1901 he had cashed in his steel holdings, nearly all of them based in Pittsburgh, and had converted them into the largest liquid fortune in the world. Now he was four years into the full-time job of giving the fortune away, and he enjoyed giving some of its fruits to a king, even if the king hadn’t shown up to accept them.

“You will have seen from the published accounts how it comes about that this gigantic monster makes his appearance and takes up his abode among you,” Carnegie began. “You owe this to one of your former Trustees who, although no longer of your Board, I am sure retains his interest in your work unimpaired. I refer to His Majesty, who, even in his recreations, seems to keep his eyes and mind ever open for opportunities to advance the interests of his country in every department of national life, from the peace of nations to the acquisitions of his Museum.”

World peace was a subject close to Carnegie’s heart. By 1905 he believed that his own personal wealth and influence could bring it about. Personal contacts among the powerful, Carnegie thought, would end war, just as his own personal contact with the king had brought about this gift of a dinosaur.

“His majesty when at Skibo expressed the hope that the *Diplodocus* before us might some day be seen here,” Carnegie continued. In the autumn of 1902 the king had visited Skibo, Carnegie’s castle in Scotland, where the tycoon spent every summer and fall. Over lunch, the king had inquired about a drawing of a dinosaur

skeleton on the wall. Carnegie explained to his guest how a Wyoming dinosaur had won a Scottish-American plutocrat's name because of some stories in the New York newspapers. It was a remarkable tale. The guests in the Hall of Reptiles would have been familiar with its main outlines if they had been reading the London newspapers during the previous month.

Late in 1898, Carnegie had come across news items trumpeting the discovery in Wyoming of an animal of unimaginably huge proportions—120,000 pounds in weight and 130 feet long. Carnegie asked William Holland, director of the new Carnegie Museum in Pittsburgh, to go get it. The newspaper reports turned out to be less than accurate, but Holland did manage inside of a year to get the first bones of one of the largest dinosaurs then known from Wyoming back to the fossil labs in Pittsburgh, where they could be prepared for display. To do the work, Holland hired William H. Reed, a former buffalo hunter and railroad man, and two seasoned paleontologists from the American Museum of Natural History in New York. He handled the politics himself, bluffing and flattering his way through the corridors of Wyoming power and western land law, making three trips to Wyoming in the space of five months. The first *Diplodocus* bones were shipped by rail to Pittsburgh in the fall of 1899.

Holland was also lucky enough in the following year to hire the brilliant paleontologist John Bell Hatcher to supervise the scientific investigation of the fossil, and to oversee its preparation for study and display. Hatcher wrote the monograph on the dinosaur, and it was an illustration from that monograph which the king saw on Carnegie's wall in 1902.

Over coffee, perhaps, or cigars, the king inquired if he, too, could get a *Diplodocus*. Carnegie must have been pleased. Granting the king's wish would place his own power on equal footing with that of the world's greatest empire. The request went out to Holland: Can we get the king another dinosaur? Not likely, Holland replied. But we could, perhaps, make molds and construct a plaster copy.

Carnegie paid for everything. The work took the full-time labor

of up to four men for a year and a half. Hatcher was in charge of the operation, with young Arthur Coggeshall, formerly of the American Museum of Natural History, in charge of the details of mold making, plaster casting, and display. The plaster bones were crated in Pittsburgh and shipped to London early in 1905. Holland and Coggeshall followed in March to supervise the assembly and erection of the skeleton.

“It is doubly pleasing,” Carnegie continued that May afternoon, “that this should come from the youngest of our museums on the other side to yours, the parent institution of all, for certainly all those in America may be justly considered in one sense your offspring; we have followed you, inspired by your example.” Carnegie had long been eager to show Europe that American science, like its new industrial capacity, was world class. He was determined to appear magnanimous. He praised Holland for having “conducted the first party to the Far West and organized victory” and went on to note that some of the crates which had crossed the Atlantic full of plaster bones would return filled with fossils of which the British Museum had duplicates. “An alliance for peace seems to have been affected . . . Thus you, Trustees of the old museum, and we, Trustees of the new, are jointly weaving a tie, another link binding in closer embrace the mother and child lands, which never should have been estranged, and which, as I see with the eye of faith which knows no doubt, are some day—some day—again to be reunited. (Applause.)”

The Scottish-born Carnegie had left his homeland with his family when he was a boy. Poverty forced them to emigrate. They went to Pittsburgh, where he made his first fortune. During the second half of his life, however, he spent as much time in Britain as in the United States, and his dream of a reunion between the two nations, plus Canada, was an open secret.

Lord Avebury, a bald man with white muttonchops, spoke next, on behalf of the trustees. Though he protested that the “size of the animal does not indeed necessarily add much to the interest,” he seems to have been as stimulated by the skeleton’s magnitude as was everyone else that day. He noted, slightly incorrectly on both counts,



On May 12, 1905, fashionable Londoners gathered for an afternoon of speechmaking to celebrate Carnegie's gift of a dinosaur to the king. Lord Avebury is speaking; William Holland is visible just behind Avebury's left arm. Photo first published in *Annals of the Carnegie Museum*, vol. 3 (1905): plate xvii.

that the *Diplodocus* was "the most colossal quadruped which has yet been discovered; and it is not likely that any much larger ever existed." He further noted the surprisingly small head, given the size of the body.

It then fell to Holland to acquaint the audience with some of the animal's natural history as it was then understood. The fossil stump of a palm tree had been found near the dinosaur bones, leading to the conclusion that *Diplodocus* lived in a tropical climate, and ate "the soft succulent vegetation of the shores and marshes which it haunted." The animal was primarily an eating machine, Holland said, "simply intended to convert vegetable fiber into flesh, upon which the carnivorous dinosaurs of the time fed." He was right that the climate of the time was tropical, if probably wrong about the dinosaur's habits and surroundings.

*Diplodocus* was in fact the longest, though not the most massive, dinosaur known at the time. That honor went to the genus *Apatosaurus*, then and now more popularly known as "Brontosaurus." Both *Apatosaurus* and *Diplodocus* were sauropods—the long-necked, long-tailed, elephant-legged, small-headed dinosaurs whose shape is

now so familiar. *Apatosaurus*, though shorter than *Diplodocus*, was so stocky that it may have weighed three times as much—thirty-five tons compared to eleven, according to some estimates. Both flourished during the Jurassic period, around 140 million years ago. Even larger genera of sauropods have since been found; *Brachiosaurus*, for example.

The size of the sauropods led early paleontologists to conclude that the animals must have lived in swamps, believing that immersion in water would have been necessary to buoy all that bulk. Many paleontologists now, however, understand sauropods to have been dry-land tree browsers, inhabitants of an ecological niche similar to the ones occupied today by giraffes or elephants on the Serengeti Plains of East Africa. Like the Serengeti, Wyoming in the Jurassic swung between distinct wet and dry seasons, and supported large herds of plant eaters whose populations were controlled in part by far smaller numbers of carnivores.

Holland modestly passed to O. C. Marsh, the great paleontologist from Yale, the credit for having first named the *Diplodocus* genus and to Carnegie the true credit for discovery of the specimen being celebrated that day. “To Mr. Carnegie’s intelligent appreciation of paleontological science and his generosity, far more than to my humble efforts,” he said, “are to be attributed the discovery, not only of this great animal, but of a multitude of other strange creatures, the remains of which we have secured for the Museum of which I have the honor to be the Director.”

Holland’s modesty hides the love of command which had driven him to carry out Carnegie’s wishes. His ambition had led him through stints as a clergyman and university president and now to his position as a museum director with substantial real estate holdings in Pittsburgh, a love for butterflies, and a knowledge of six or eight modern languages. In paleontology, however, he was self-taught, a state of affairs that caused some friction over the years with the more professional men he hired. His eyes were on the next big task of his career: expanding his museum.

The Carnegie Institute in Pittsburgh first opened in 1895 and included a library, music hall, art gallery, and natural history museum, all paid for by Carnegie. Holland came on as director of

the museum in 1898. By the spring of 1899 the impending acquisition of a dinosaur spurred Carnegie to come up with more money, and plans began for a major expansion. Construction was underway in 1905, transforming an elegantly Italianate public building into one far more massive in bulk and French in style. “In the Hall of Dinosaurs in the Museum of the Carnegie Institute in Pittsburgh,” Holland told his audience, “it is our wish to assemble and display a series of skeletons representing the more striking forms of dinosaurian life. The present specimen may be regarded as a sort of first fruits of our undertaking. Such an enterprise involves the expenditure of no little labor and of much money. Fortunately, the kindness of our Maecenas, the distinguished founder and benefactor of the Institute, has never failed to provide the sinews for our scientific war.”

A genuine competition was under way at the time among American natural history museums, for splendor as much as for specimens. America’s most memorable dinosaur halls—at the American Museum of Natural History in New York, the Carnegie Museum in Pittsburgh, the Smithsonian Institution in Washington, D.C., the Peabody Museum at Yale—all were built and filled in the first quarter of the twentieth century. Our notion of natural history museums as temples to science, with the dinosaur exhibit their central shrine, dates to that time. Smaller institutions around the country—the little University of Wyoming, for example—followed suit as best they could. As a result, vertebrate paleontology remained a museum-based science, as had much of natural history throughout the nineteenth century. Darwin, for example, had strong ties to the British Museum, where fossils he sent back from the *Beagle* voyage were examined and described by other scientists. Natural sciences that depended on collections depended on museums to house their resource materials. But, by 1905, that was changing.

The information amassed during the nineteenth century’s increasingly organized labors in descriptive science bred more and more hypotheses. Scientists needed to test them—to run experiments—and experiments were more likely to occur in university laboratories. Experimental biology—genetics in particular—was already regarded by most life scientists as the true frontier of the pro-



fession, not the erection and display of extinct fossil vertebrates. By contrast, leaders of natural history museums at the turn of the century began just then to articulate the triple mission they had haphazardly been undertaking for years: collecting specimens, maintaining them in an orderly fashion for study, and educating the public by means of displays. Museum administrators discovered that people loved dinosaurs and would flock to grand halls to admire them. Far into the twentieth century, that gave vertebrate paleontology, and particularly dinosaur paleontology, a financial and political power base that greatly outweighed its intellectual prestige.

Meanwhile, there was no room for *Diplodocus carnegii* at the Carnegie Museum in Pittsburgh when the fossil was cleaned and prepared, so the cast intended for Carnegie's gift to the king was first mounted in an exposition hall miles away. The original was finally erected in 1907, when the doors opened to the expanded institute with its newly created Dinosaur Hall. By mid-century, ten complete dinosaur skeletons would fill the hall, along with a number of other marine and flying reptiles from dinosaur times. They all still may be seen there today.

Before concluding his remarks, Holland praised a colleague whose absence he may have felt with some pain. "I should be false to the promptings of my heart," he said, "did I not allude tenderly and in terms of highest appreciation to the labors of Professor J. B. Hatcher, my learned colleague, who for fully eighteen months devoted himself to superintending the restoration of the object before us, but who unfortunately was stricken down in the midst of his activities by the hand of death, a premature victim to the hardships and exposures of those expeditions, which Mr. Carnegie, who always sees things from an interesting angle, has designated as 'annual holidays.' Mr. Hatcher was one of the most successful students of paleontology whom America has produced."

Hatcher's reputation, like the reputations of so many people who die young, will always be bound up with the question of how much more he would have accomplished had he lived longer. While still in his thirties, before he came to work for the Carnegie Museum, he had suffered severe attacks of rheumatism on Princeton-sponsored expeditions to Patagonia. He was then beginning to develop a

hypothesis of global proportions. By the time he came to Pittsburgh in 1900, he had formulated the notion that the land masses of South America, Antarctica, and Australia once had been joined, and he began pressuring Holland for help in getting to Antarctica to test his ideas. But he never got there, and it would be sixty years before geologists would work out comprehensive, theoretically consistent answers to all the questions Hatcher had begun to ask.

Lord Avebury introduced the final speaker, Sir Archibald Geike, geologist and fellow of the Royal Society, and asked him to say a few words on behalf of the geologists of England:

“It is a great pleasure to possess this gigantic creature in the flesh (Laughter), or at least in the bone (Laughter), and to be able to study the animal in its entirety, and thus to interpret other forms, the separate and fragmentary bones of which hitherto were all that we knew, but the significance of the scattered remains of which now becomes plain to us,” Geike said. Here, at last, was a scientist speaking. He was talking about the logic of the full form of the animal, how the parts each have so much more meaning when the whole can be seen. The reason to collect fossils is to compare them with one another, so that the forms of life may be better understood. It seemed appropriate, Geike went on, that “such a monster as this” would come from a continent so vast in resources. American scientists were to be envied for having these resources available to them. And, not failing to render his praise to the emperor of the day, he concluded, “Supported by the beneficence of such a far seeing man as Mr. Carnegie, we may expect that the student of paleontology in America will achieve discoveries even surpassing in interest those which have already been made, and that, bit by bit, the wonderful story of the evolution of existing forms of life, through forms, many of them long since extinct, will be deciphered. (Applause.)”

Then the meeting broke up, the guests got a chance to shake hands with Mr. Carnegie, “and the assembled company leisurely examined the skeleton, which appeared to create much interest in the minds of all.”

As it turned out, the international journeys of *Diplodocus carnegii* were just beginning. The crowned heads of Europe, as they were then called, were eager for a gift like King Edward’s, and Carnegie

proved equally eager to continue demonstrating his imperial generosity. In the next decade, he had more *Diplodocus* casts made in Pittsburgh and shipped to museums in Berlin, Paris, Vienna, Bologna, St. Petersburg, La Plata in Argentina, and Madrid. Holland and Coggeshall accompanied the casts and supervised their assembly at each location. *Diplodocus carnegii* gained international fame. It was the first dinosaur millions of people ever saw.

How that came about may be traced back twenty-eight years to Wyoming Territory at a time when there was a brisk trade in buffalo bones on the plains, but few had noticed fossils.