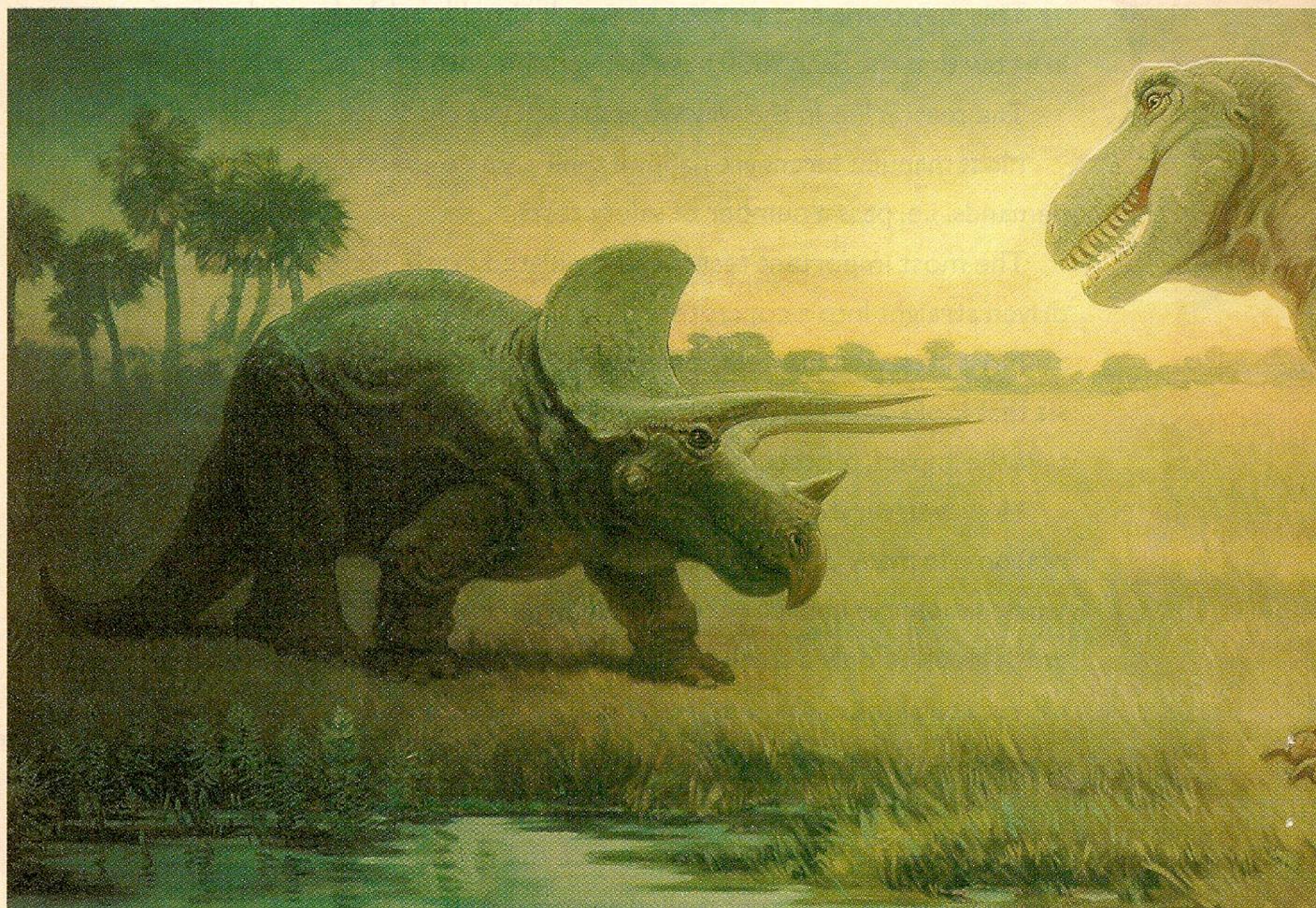


The Art of Charles R. Knight

Long before the film Jurassic Park, Knight's illustrations brought dinosaurs to life in the public's mind

by Gregory S. Paul

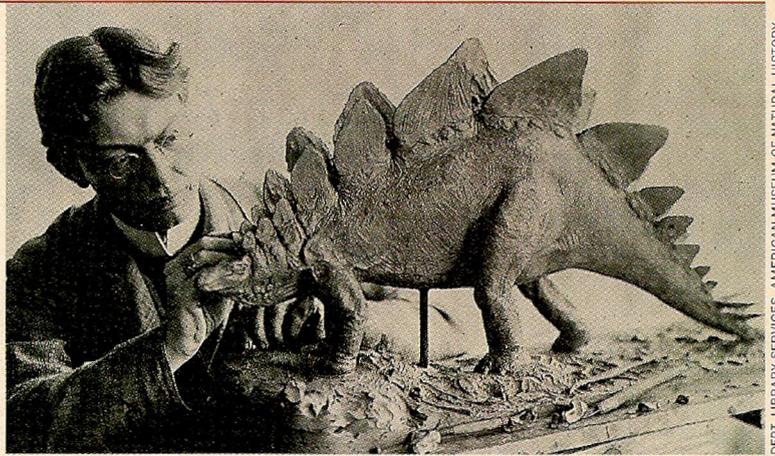


During the first half of the 20th century, paleontologists typically thought of dinosaurs as small-brained, tail-dragging reptiles that practiced little socialization and parenting. In recent years it has become increasingly apparent to some researchers that many dinosaurs were quite active and communal. But the earlier view, which Stephen Jay Gould of Harvard University has dubbed the Modern Consensus, held for many decades. Although paleontologists were responsible for this trend, the American artist Charles R. Knight (1874–1953) popularized it. The murals he painted for mu-

seums around the country dominated the way people viewed prehistoric life not only during his professional career—which extended from the turn of the century to the 1940s—but for several decades after his death as well. Indeed, the current generation of dinosaur illustrators, including myself, grew up admiring his renditions. And these images will very likely continue to inspire paleoartists in the years to come.

Knight's influence prevails in large part because he was both a superb artist and a naturalist who possessed a deep understanding of anatomy. He had the ability to apply his vast knowl-

DEADLY ENEMIES,
 a horned *Triceratops* and towering *Tyrannosaurus*,
 meet face to face in Charles R. Knight's most influ-
 ential mural (*below*), painted in the late 1920s. Such
 paintings still set high standards for today's paleo-
 artists. Relying on his vast knowledge of anatomy
 and his vivid imagination, Knight rendered many
 detailed images of prehistoric animals. For example,
 although the model *Stegosaurus* he created in 1899
 (*photograph at right*) bears too many plates by
 current standards, it carries them in the alternating
 pattern now accepted.



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RON TESTA, Field Museum of Natural History

edge of anatomical structure to make prehistoric creatures come alive again. His paintings remain on display at many museums, including the Field Museum of Natural History in Chicago and the Natural History Museum of Los Angeles County, and they form an important part of the new dinosaur halls at the American Museum of Natural History in New York City.

The first published account of fossils that today are believed to be from a dinosaur appeared in 1824. Throughout the 1800s, scientists collected numerous teeth and bones from

excavations in Europe and the U.S. The public naturally clamored for descriptions of the long-gone giants. But the jumbled skeletons the fossil hunters found offered only sketchy information to artists hoping to re-create the prehistoric animals. The most notable effort to satisfy society's curiosity came from Richard Owen, the preeminent paleontologist who coined the name "Dinosauria" in 1841. In 1854 he commissioned full-size dinosaur sculptures—which are still standing today—for the grounds of the Crystal Palace in London.

The only complete skeleton unearthed before the 1880s

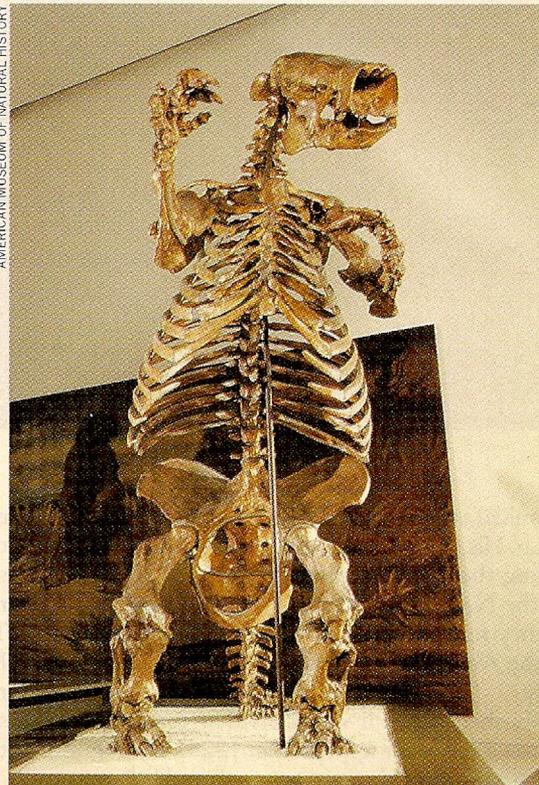


came from Germany: a small, carnivorous, birdlike animal named *Compsognathus*. The situation improved dramatically during the 1870s and 1880s, when scientists began to excavate the dinosaur-rich sediments in the arid western U.S. There they uncovered whole skeletons of sauropods, predaceous allosaurs and plated stegosaurs from the Jurassic period. Knowledge about the shape and size of dinosaurs quickly started to accumulate. Shortly thereafter, in the 1890s, Knight began painting them.

Despite his good timing, it is somewhat remarkable that he became the most famous dinosaur artist of his time. Knight was a sensitive character prone to phobias. And although he showed early promise—he began drawing animals and landscapes at age five or six—he was very nearsighted. In addition, a severe injury to his right eye during

TAR PITS AT RANCHO LA BREA in California were painted by Knight in the 1920s, some 15 years after their excavation in 1906. The deposit yielded a vast number of Ice Age fossils, including those from saber-toothed cats, cave lions, elephants, mastodons, sloths, camels, horses, coyote, bison, antelope and birds. Unlike his drawings of dinosaurs, Knight's paintings of mammals typically showed a great deal of action. So, too, skeletal mounts of mammals made in conjunction with Knight's murals, such as the sloths at the American Museum of Natural History in New York City (*photograph*), took animated poses.

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DUCK-BILLED DINOSAURS
of the genus *Anatosaurus* were painted by Knight in 1909 (painting at left). He based the composition on two skeletons mounted at the American Museum of Natural History. In the museum's newly renovated dinosaur halls, the mounts and Knight's painting are on display side by side.

childhood further impaired his vision. All the same, encouraged by the adults around him, including an artistic stepmother and a talented family friend, Knight attended a series of art schools in and around New York City as he grew older. At age 16, he got his first, and only, full-time job, painting nature scenes for church decorations.

Quickly thereafter, Knight moved from Brooklyn—and away from his increasingly jealous stepmother—to Manhattan. He soon launched a successful freelance career as an illustrator for several natural history publications. He enjoyed going to the city's zoos and parks and chronicled his trips by making numerous, meticulous sketches of animals, plants and other objects. The exercise enhanced his work, as did his habit of visiting the American Museum of Natural History. There he honed his knowledge of anatomy by dissecting carcasses. It was also at the museum that Knight found his calling, when a paleontologist there asked him as a favor to create a replica of an extinct mammal.

After an extended trip to Europe—during which he studied art and visited even more zoos—Knight turned his attention to dinosaurs almost exclusively. He went to work for a short while under Edward Drinker Cope, just before the renowned vertebrate paleontologist died. Cope and his rival, Othniel C. Marsh of Yale College, had brought about the first great rush of American interest in dinosaurs during the 1870s.

But Knight formed his most important association again at the American Museum of Natural History, collaborating with the aristocratic paleontologist Henry Fairfield Osborn. As director of the museum, Osborn wanted someone to translate his collections of dry bones into captivating, living images. Such pictures, he thought, could draw



crowds and make his museum the leading center of natural science.

Knight quickly won attention for the museum and for himself, fashioning restorations that reflected many of Osborn's early ideas. Osborn proposed, for example, that sauropods may have been terrestrial high browsers, and so, under Osborn's direction, Knight painted just such a sauropod—a brontosaurus—rearing up on its hind legs as though in search of foliage [see illustration at right]. Knight also showed large theropods—the most successful predatory dinosaurs—leaping into the air [see upper illustration on opposite page]. Although he was correct to characterize these theropods as agile hunters, most paleontologists of the time rejected that notion.

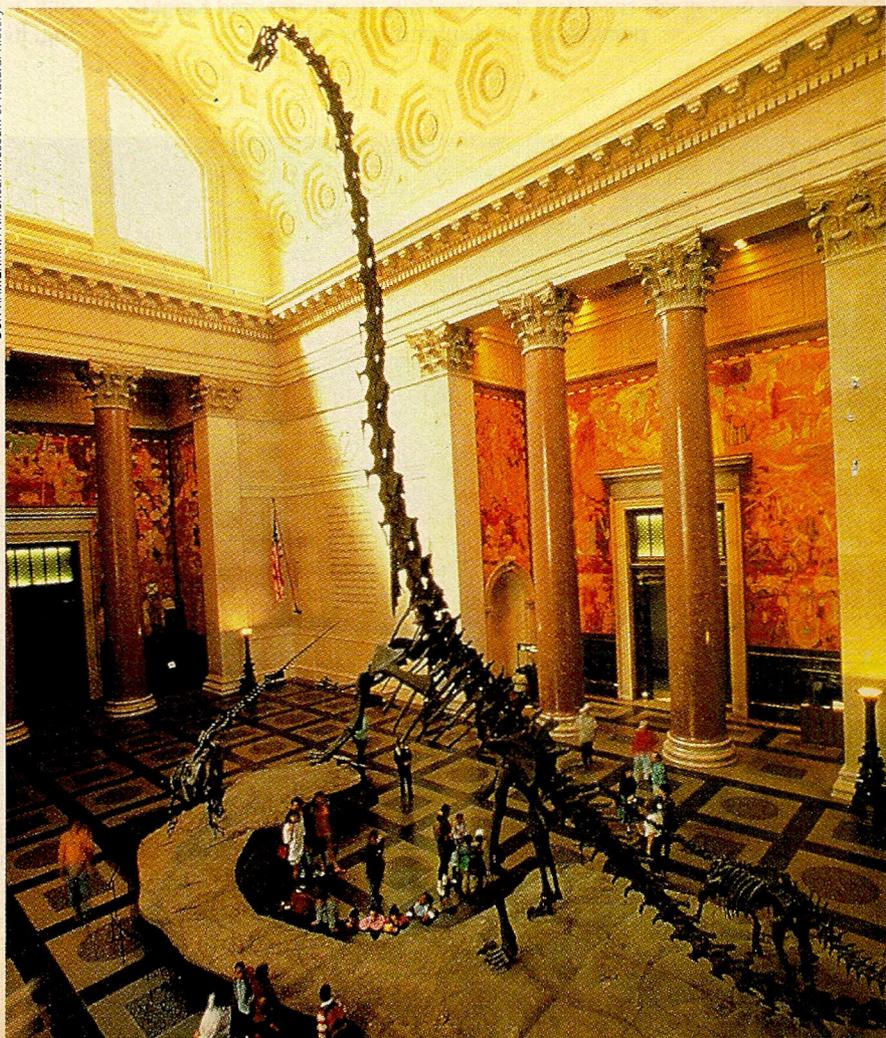
During the early 20th century, digs in North America and Asia produced remnants of remarkable dinosaurs from the Late Cretaceous period—among them terrible tyrannosaurs, horned ceratopsians, duck-billed hadrosaurs and armored ankylosaurs. Knight's paintings from this time—primarily murals for the American Museum of Natural History and for the Field Museum of Natural History—were sophisticated works of art. He typically painted misty scenes, possibly because of his poor long-range vision, filled with finely rendered, highly realistic figures of well-known dinosaurs. These were Knight's most productive years, and his illustrations became the world's most celebrated.

Knight's personal life was also at its zenith during the 1920s. He and his wife, the spirited Annie Hardcastle, were a popular couple on New York's social scene. Annie secured a comfortable life for them, managing all Knight's money matters, from his pocket change to his payments for paintings (he was notoriously absentminded about finances). At age 13, their daughter, Lucy, took charge. Seven years later, she successfully obtained \$150,000 from the Field Museum for her father's murals on display there. In the 1930s Knight augmented his income by giving lectures, and his authority expanded even further. Today dinosaur restoration is a minor industry, practiced around the world. Necessarily, much of the romance that Knight enjoyed—having been almost alone in the field—has disappeared.

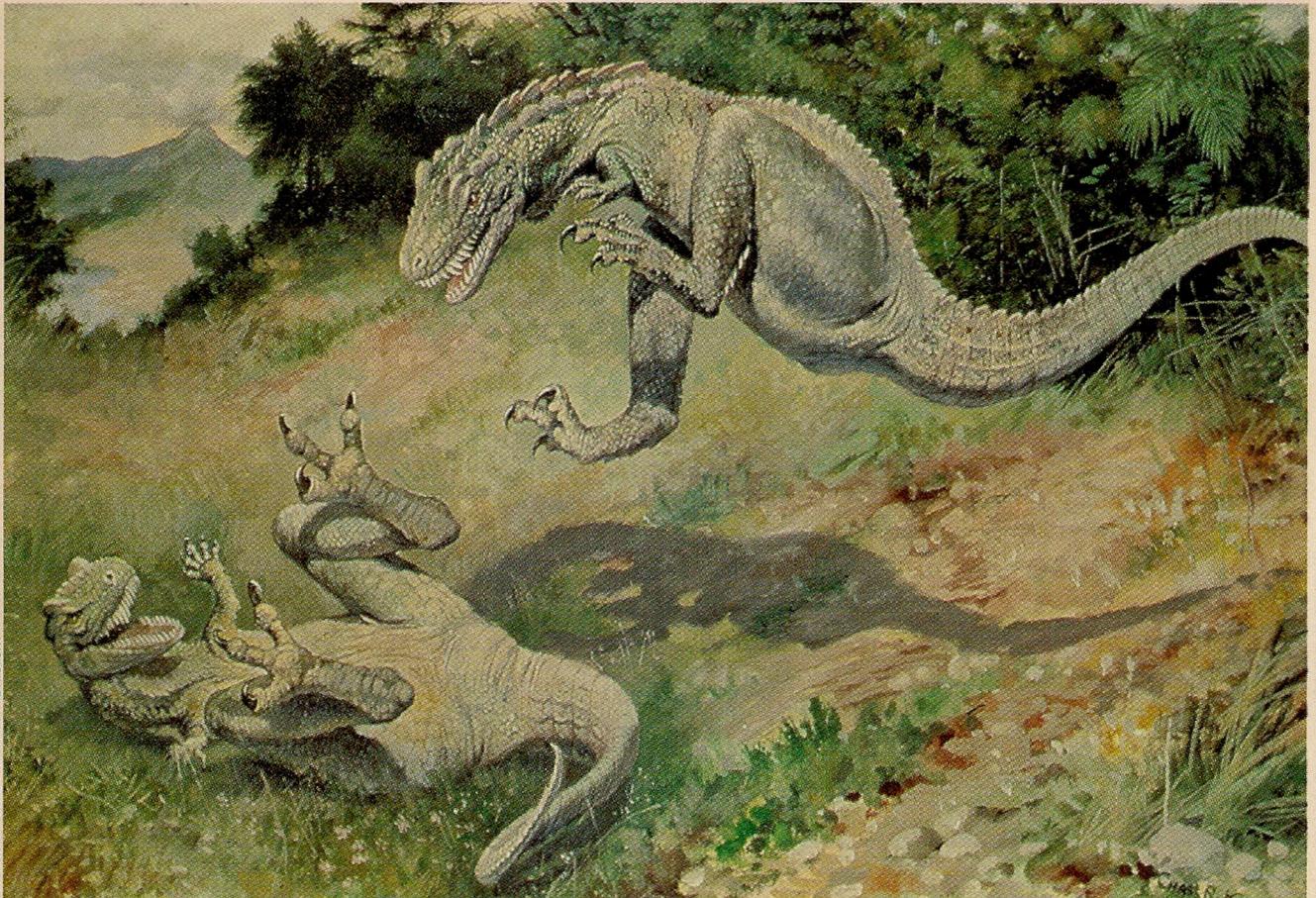
REARING SAUROPOD, which Knight painted early in his career, near the turn of the century, was influenced by one of the theories of the paleontologist Henry Fairfield Osborn—namely, that such dinosaurs might have been terrestrial high browsers (*painting*). Most paleontologists rejected the idea at the time; even so, the famed barosaur installed in 1991 in the entry hall of the American Museum of Natural History to greet visitors is mounted in the same position (*photograph*).



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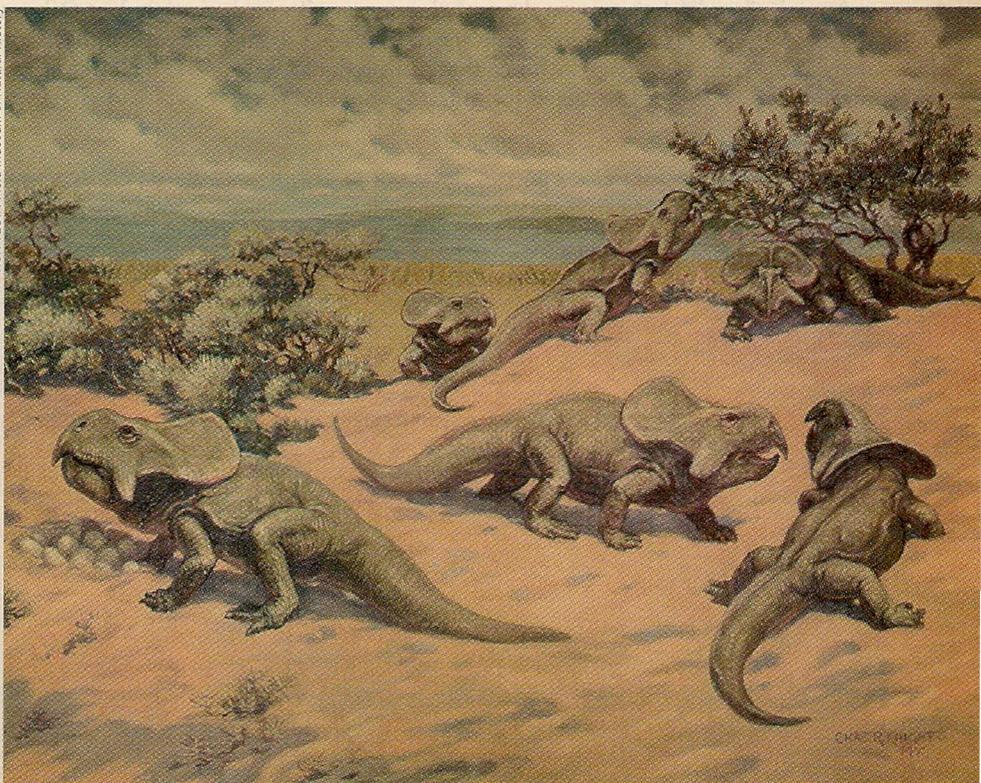


DOON HAWERMAN, American Museum of Natural History

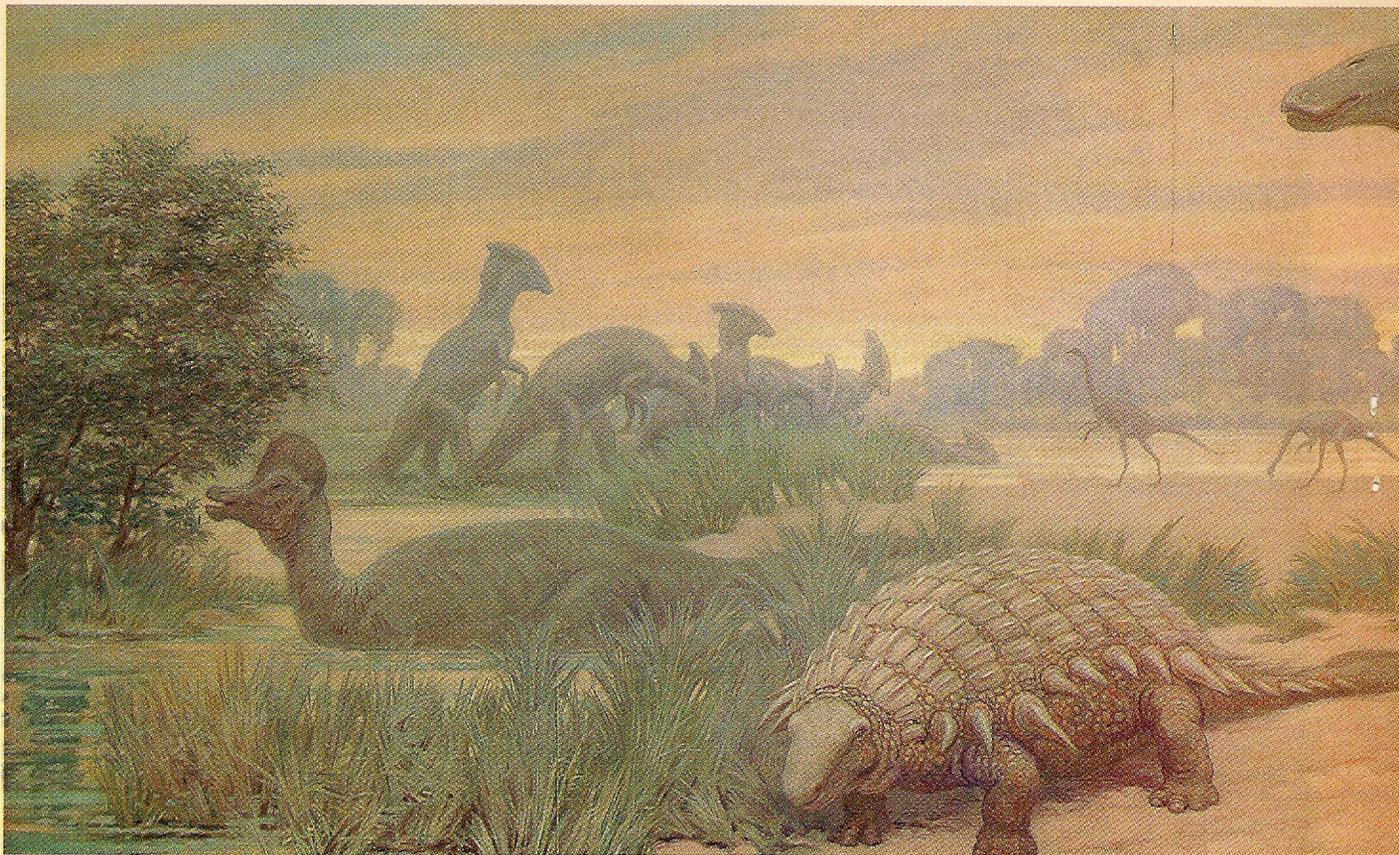


FIGHTING CARNIVORES
of the genus *Dryptosaurus* are shown here as they were described by the paleontologist Edward Drinker Cope. Knight completed the painting in 1897, shortly after Cope died. Within a decade, most scientists frowned on the idea that these dinosaurs leaped into the air. Some scientists now think these theropods may have been quite aggressive hunters.

RON TESTA Field Museum of Natural History



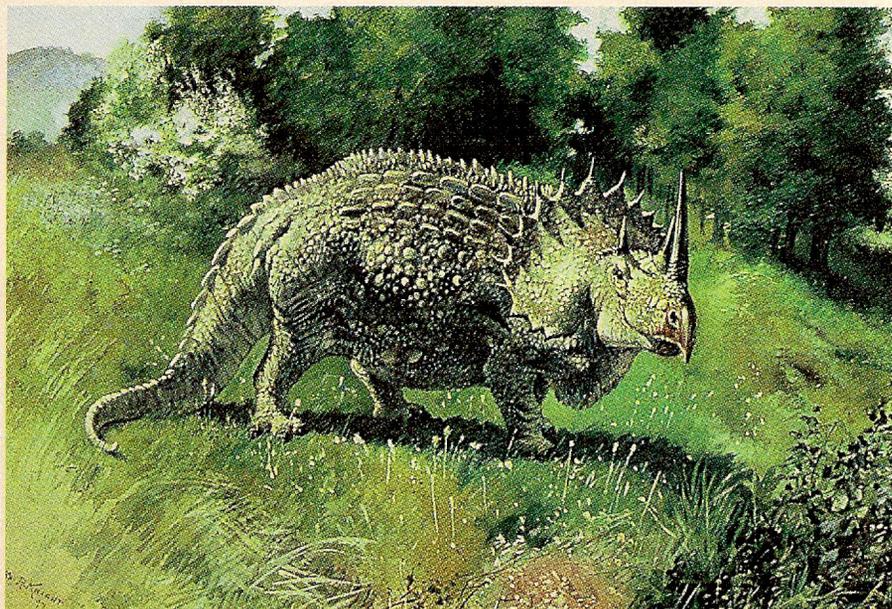
SMALL PROTOCERATOPS
were painted by Knight in 1922, shortly after the first dinosaur nests were uncovered in Mongolia. At Osborn's suggestion, Knight depicted the ceratopsian dinosaurs protecting their eggs. (Recently experts at the American Museum of Natural History demonstrated that these eggs actually belonged to *Oviraptor*.) The painting can now be seen at the Field Museum of Natural History in Chicago.



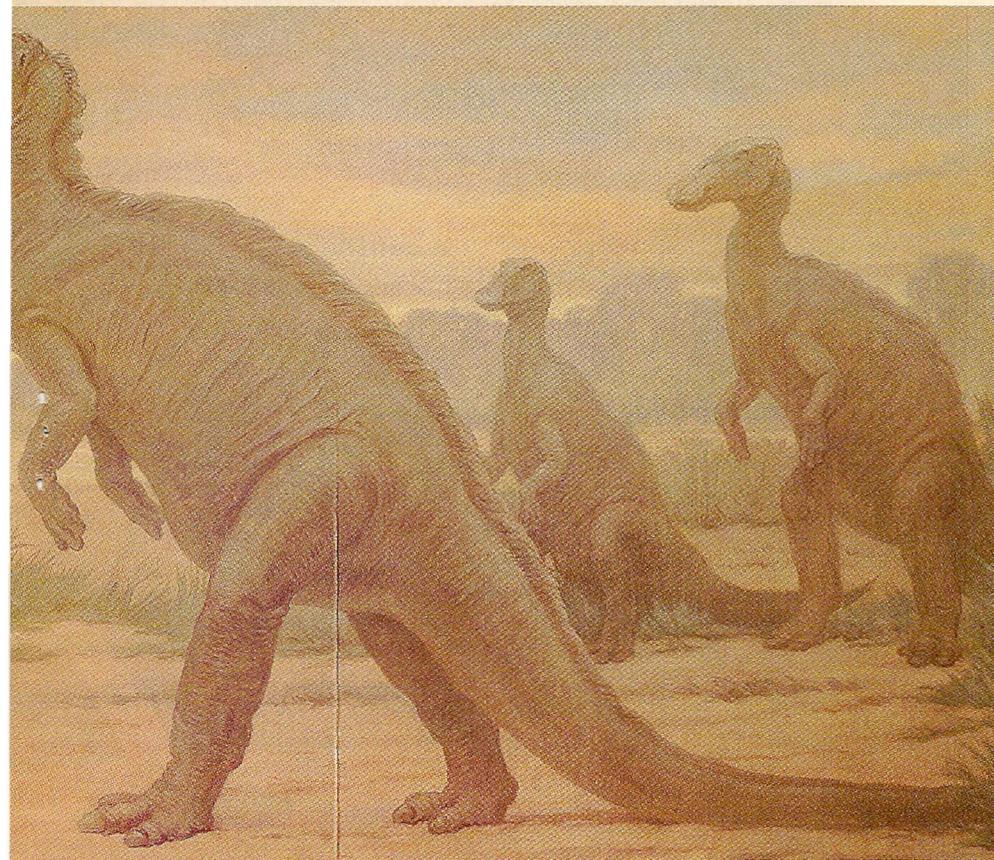
Knight worked in close collaboration with paleontologists. Thus, his art reflects the scientific dogmatism of his times. This dogmatism was by no means absolute, however. For example, in *Life through the Ages*—a catalogue of dinosaurs Knight compiled in 1946—he called dinosaurs “unadapted and unprogressive” and “slow-moving dunces” that were well suited for extinction in favor of “alert, little warm-blooded” mammals. But on the same page he noted that one predaceous dinosaur was “lightly constructed for quick action, and fairly

sagacious for a reptile.” And he did not always draw dinosaurs as “typical” reptiles. In one painting he depicted a pair of *Triceratops* watching over a youngster. On occasion he placed social groups of plant-eating dinosaurs in his work. And after the discovery of dinosaur nests in Central Asia, he painted, at Osborn’s suggestion, diminutive protoceratopsids guarding their eggs.

The limitations of the time are most apparent in Knight’s best-known piece, showing a lone, horned *Triceratops* facing down two *Tyrannosaurus* [see illustration on pages 74 and 75]. Knight did not know that enormous beds of bones would eventually reveal that some horned dinosaurs lived in herds. Moreover, in Knight’s picture, little action takes place between the herbivore and its predators. Every foot is planted firmly on the ground. In fact, the “every-foot-on-the-ground” rule is true of almost all Knight’s dino-



HORNED AGATHAUMAS, one of Knight’s earliest works, was finished under the direction of Cope in 1897 for the American Museum of Natural History. During Cope’s day, paleontologists offered many fanciful and unsubstantiated descriptions of dinosaurs. The animal shown at the left sports what would seem by current standards to be an extreme number of adornments.



NORTH AMERICAN DINOSAURS from the Upper Cretaceous period are seen in this mural, which Knight painted in the late 1920s for the Field Museum of Natural History. Moving through this somewhat misty scene, a variety of creatures stand out, including, from left to right, a helmet-crested *Corythosaurus*, a herd of *Parasaurolophus*, an armored *Palaeoscincus*, several *Struthiomimus* and a few flat-headed hadrosaurs (called *Edmontosaurus*).

saur figures. Although he frequently drew mammals, even large ones, walking and running, he almost never depicted dinosaurs doing so. Knight most often colored dinosaurs in rather drab shades of solid dun and green. Dinosaurs may have been such hues, but they probably had color vision much like reptiles and birds, and their scaly skins would have been suitable bases for more intense pigmentation. For these reasons, most of today's artists often apply vivid colors to their dinosaurs.

Knight used his vast knowledge of anatomy to make extinct forms appear so real that his viewers could easily believe he had seen them. This ability no doubt explains why his pictures continue to look plausible today. But this seeming realism was in some ways superficial. Although Knight sketched detailed musculoskeletal studies of living animals, he did not produce similar studies of dinosaurs—in part because skeletons reveal limited information about an animal's musculature. Instead Knight drew skeletal mounts, made rough sculptures or composed life restorations freehand—a tradition in which many dinosaur artists have followed.

One particular anatomical convention that Knight practiced perplexed me when I was a budding dinosaur artist in the

late 1960s—back in the days before the idea that dinosaurs were energetic had gained any popularity. I knew that dinosaurs were considered to be reptiles and that lizards and crocodilians have narrow thigh muscles attached to small hips. Consistent with this theory, Knight made his dinosaurs with narrow, reptilelike thighs. Yet looking at skeletons, I thought that dinosaurs seemed to be built more like birds and mammals, with large hips anchoring broad thigh muscles. What was a teenage dino-artist to do? I copied my hero Knight, even though Alfred S. Romer, the esteemed vertebrate paleontologist of Harvard, had correctly depicted big-hipped dinosaurs with broad, birdlike thigh muscles in his classic 1920s studies of the evolution of tetrapod musculature. The paradox was resolved in the 1970s, when the new hypothesis that dinosaurs were “warm-blooded” at last emerged. An animal having broad hips and large thigh muscles would need to have an aerobic system capable of sustaining high levels of activity for extended periods.

Artists are a bit like magicians: we use optical illusions to fool people into thinking they are seeing a version of reality. Because one's bag of optical tricks gets bigger with time, most artists tend to get better with age. Knight's last decade of restorations, however, did not meet his earlier standards. Deteriorating eyesight may have been the culprit. Also, Osborn was long departed, and the Great Depression and World War II had sent dinosaurology into an era of quiescence that did not lift for 30 years. Knight never knew of dinosaur nesting grounds, the mass migration of herds, polar habitats, the shape of *Apatosaurus's* head, giant meteoritic impacts, or the fact that birds are living dinosaurs. Even so, his re-creations currently set the highest standards for artistic quality—and they keep motivating those of us who follow in his footsteps. SA

The Author

GREGORY S. PAUL has published his artwork in *Nature*, *Smithsonian* and *Science News* and has written articles for many professional journals. A freelance dinosaur scholar and illustrator, Paul studied at Johns Hopkins University and resides in Baltimore, Md.

Further Reading

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