When the amber waves were blue…

by Michael J. Everhart

The Midwest, and especially Kansas, is often characterized by the allusion of being covered by "amber waves of grain" (Bates 1897; *America the Beautiful*) during the harvest season. Millions of years ago, however, this view would have been replaced by the endless blue waves of an ocean that stretched from horizon to horizon. During the Late Cretaceous, this ocean extended from the Gulf of Mexico to the Arctic, and from Utah to Missouri, roughly the size of the Mediterranean Sea (Figure 1).

Hard as it may be to believe today on the high, relatively dry plains of North America, these lands have been under a series of oceans for much longer than they have been above sea level. As an example, in Kansas nearly all of our mineral wealth (oil, gas, salt, gypsum, limestone, and others) are products of a series of oceans that covered the state during the last half billion years. Each of these oceans left a permanent record of their time and

inhabitants in thousands of feet of limestone, shale, chalk and sandstone that were deposited on the sea floor.

Figure 1. Midwestern North America was covered by the Western Interior Sea during the Late Cretaceous Period of the Mesozoic Era (Adapted from an exhibit at the University of Nebraska State Museum).

The Smoky Hill Chalk (Figure 2) was laid down near the end of the Age of Dinosaurs, 87-82 million years ago, when Kansas was covered by what is called the Western Interior Sea. Very similar in composition (and age) to the White Cliffs of Dover in England, the Kansas chalk preserves an accurate record of the many strange and wonderful creatures, now extinct, that once inhabited the

Figure 2. The 600 foot thick Smoky Hill Chalk was deposited near the middle of the Western Interior Sea during the Late Cretaceous. Weathering of the chalk creates fantastic badland exposures such as these bluffs near Castle Rock in Gove County.

last ocean that covered our State. Erosion has exposed the Smoky Hill Chalk in the western third of Kansas, especially

Figure 3. *Elasmosaurus platyurus,* a long-necked plesiosaur, was discovered by Dr. Theophilus Turner in 1867 (Cope, 1868; Everhart 2005). A complete cast of this specimen is now on exhibit at the Fort Wallace Museum, Wallace, Kansas. (This figure is continued on the top of the next page).

along the Smoky Hill River in Ellis, Trego, Gove and Logan counties. It was the discovery of fossils from this ocean that brought famous paleontologists to Kansas in the 1870s, and created a surge of public interest in prehistoric life.

The remains of a long-necked plesiosaur called *Elasmosaurus platyurus* (Figure 3) were discovered in 1867, and then the first examples of our state fossils, a huge sea lizard called *Tylosaurus proriger* (Figure 4) and a flying reptile called *Pteranodon longiceps* (Figure 5), were sent back East for study. Soon expeditions were mounted to the western half of the state to collect more examples of

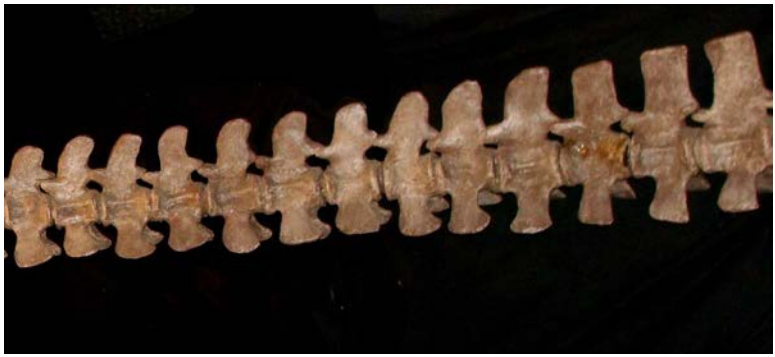

Figure 3. (Continued from previous page.)

Figure 4. The partial skull of the marine lizard *Tylosaurus proriger* was collected by Army Captain John Conyngham in 1869 and sent to Louis Agassiz at Harvard (Cope 1869; Everhart 2016). The above specimen of *Tylosaurus* was collected by George Sternberg in 1927 and is on exhibit at the Sternberg Museum of Natural History.

extinct animals that lived in this ancient ocean, many of which had never been seen before, anywhere in the world. There was *Protostega*, a turtle (Figure 6) as large as a small car, several species of ancient birds with teeth, sharks as large as a modern Great White, and an 18 foot long,

Figure 5. While leading the first Yale College Scientific Expedition, Professor O. C. Marsh collected the first remains of a flying reptile (*Pteranodon longiceps*) from Kansas in 1870 (Marsh 1871). The *Pteranodon* pictured above is on exhibit at the University of Kansas Museum of Natural History.

predatory fish called *Xiphactinus* that looked like a modern Tarpon on steroids. The fossils of these animals were often so well preserved that they were in demand by museums around the world. The initial rush for these fossils lasted about 10 years in Kansas before dinosaurs were discovered

further west, but collecting still continues in the Smoky Hill Chalk and nearly a dozen new species have been named in the last decade.

Figure 6. The type specimen of a giant turtle called *Protostega gigas* was collected from the Smoky Hill Chalk in 1871 by Edward D. Cope of Philadelphia (Cope 1872). The above photo shows the most recent specimen of *Protostega*, in ventral view, collected for the Sternberg Museum of Natural History. Photo courtesy of Triebold Paleontology, Woodland Park, Colorado.

Collections of these fossils are exhibited in the Sternberg Museum of Natural History at Hays, the University of Kansas Museum of Natural History in

Lawrence, and various smaller museums around Kansas. Almost all major museums in the United States and many others in Europe have collections of Late Cretaceous marine fossils from Kansas. It can honestly be claimed that much of the science of modern paleontology got its start here in Kansas.

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