

Iron Range Crocodile

A blackened chunk of fossil and skillful scientific probing revealed an extraordinary discovery about sizable reptiles that once lived in Minnesota

A Volunteer Report
Drawing by Ken Sander

AMONG THE MUCH neglected fossil vertebrates of northern Minnesota's Late Cretaceous rocks, there is noteworthy evidence of a very large marine crocodile."

This statement, by Bruce R. Erickson, director of The Science Museum of Minnesota's paleontology department in St. Paul, made startling news. A crocodile — and most certainly crocodiles — had once lived in Minnesota's Iron Range.

The disclosure appeared in a monograph authored by Dr. Erickson in 1969. Because monographs of

this sort circulate exclusively in scientific circles, few Minnesotans heard about the crocodile that had once existed in our state.

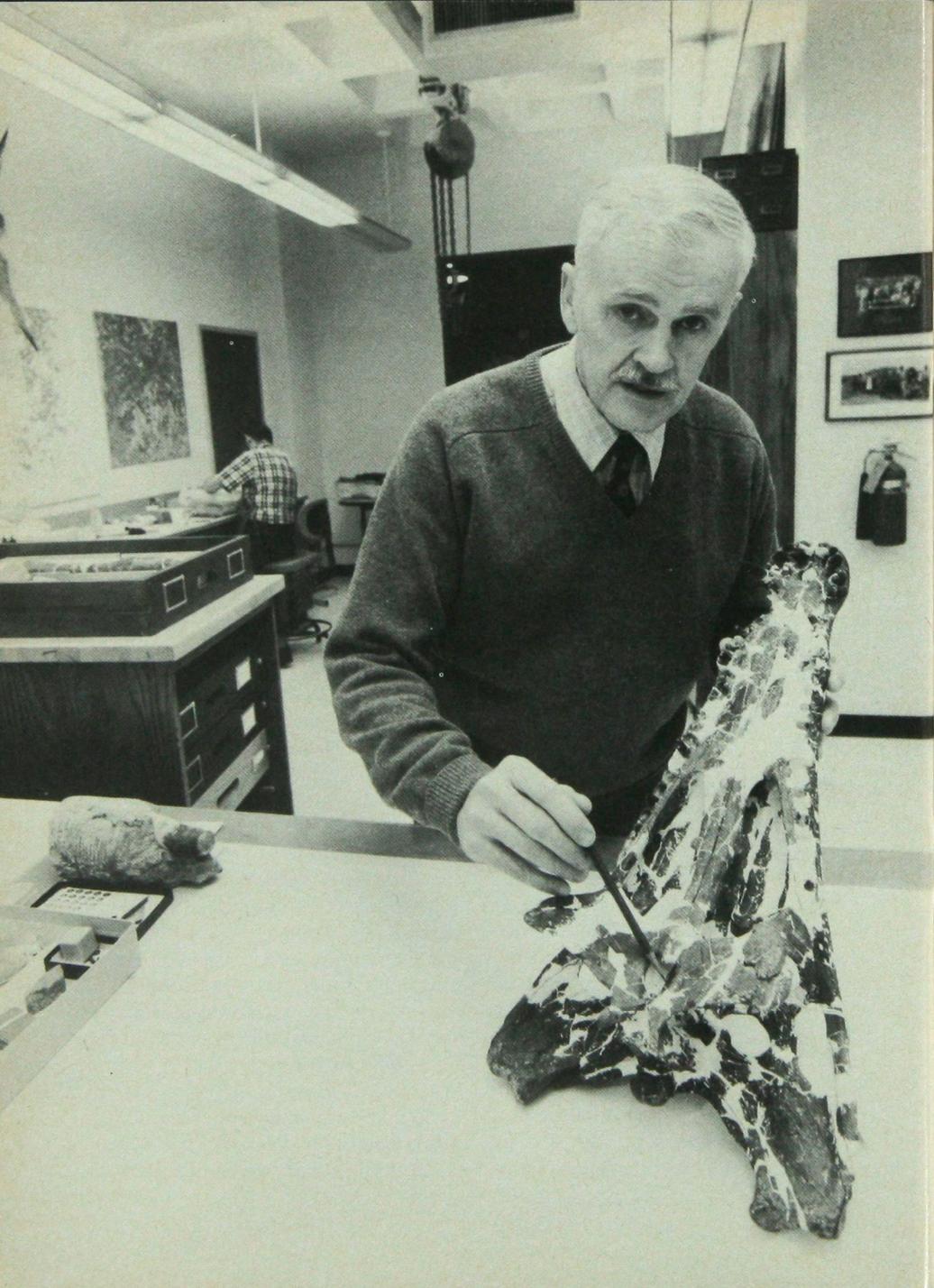
Evidence of this large reptile first appeared in the summer of 1967 when Vincent Garlough, a biology teacher from California, and his brother Gary, were poking in a rock-spoil heap from the Hill Annex Mine near Calumet.

A power shovel had dug the spoil from a layer of rock 20 to 30 feet below the surface. Called the Coleraine Formation — mostly shale, sandstone, and iron-ore conglomerates — the layer had formed some 70 million years ago.

Before the Garloughs came to the old mine, the Coleraine Formation had given up scores of fossils to other hunters — shark, ray, and skate teeth; odd pieces of bone, probably from large aquatic reptiles; a variety of fish spines; oysters, clams, and snails; even a two-foot wide coiled mollusk related to the octopus. These marine fossils indicated that eons ago an ancient sea had covered the Mesabi Range.

Evidence that crocodiles had once shared this ancient sea with these creatures appeared in the form of a nine-inch long fossil embedded in rock. Garlough, recognizing that the fossil was unusual, brought it to Dr. Erickson at The Science Museum to identify.

"We knew that crocodiles and alligators had once lived in North Dakota, Montana, and in Minnesota from



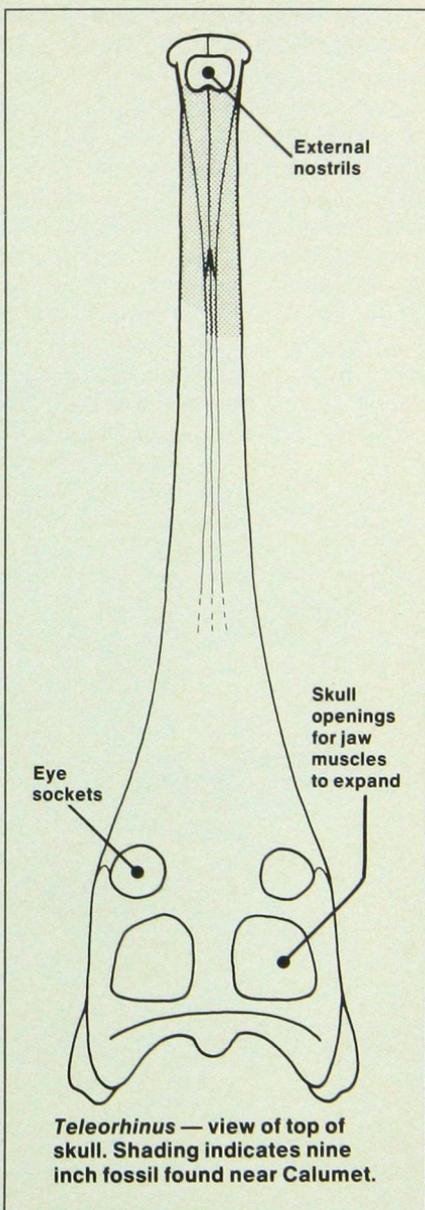
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a few isolated teeth that had been found," Dr. Erickson told the *Volunteer*, "but the Mesabi fossil was the first evidence of an identifiable crocodylian existing in Minnesota."

Examination revealed that the fossil — nine inches of the animal's upper snout — was from an ancient, and now extinct, species of crocodiles belonging to the genus *Teleorhinus*. One of the largest marine crocodiles known to exist, *Teleorhinus* reached a length of perhaps 30 feet. Although remains of numerous species of crocodiles have been discovered world-wide in ancient marine deposits — in Europe, Asia, North Africa, Madagascar, North and South America — evidence of this particular genus had been found in only two other places in the world, Montana and Germany.

Unlike modern, blunt-snouted crocodiles, *Teleorhinus* was narrow-snouted. Dental sockets indicated that its teeth extended at a near 45° angle and were lined up along the perimeter of the upper jaw. From this scant evidence and from his years of study of extinct and modern crocodiles, Dr. Erickson was able to make an approximate reconstruction of what the extinct creature had actually looked like.

But the question the fossil brought to mind was: How did a crocodile, a creature of tropical climes, arrive in northern Minnesota, a region hardly renowned for palm trees and warm breezes.



Dr. Erickson points to internal nostrils in upper palate of 58 million year-old crocodile unearthed in North Dakota. Reconstructed head is made up of black, fossilized pieces of bone. White plaster holds pieces in place.

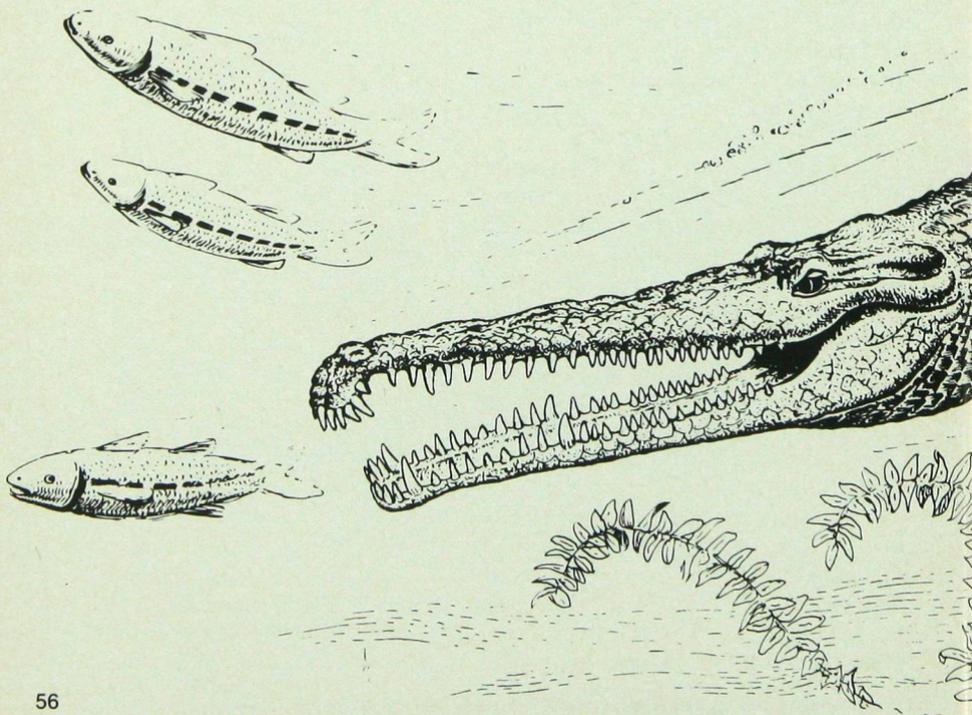
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Time Beyond Time. The Mesabi crocodile lived in the Iron Range 70 million years ago — Dr. Erickson determined this by dating the rocks in which the fossil was embedded. The span of time that has passed between now and then is beyond comprehension. However, we can appreciate these years by assigning a single minute to each year gone by. Then World War II ended fewer than 45 minutes ago; Columbus arrived in America eight hours ago; Egypt's Great Pyramid was built 3½ days ago. But *Teleorhinus* ended its

days in the Hill Annex Mine deposits 133 years ago, about 1850 on our scale of one minute per year.

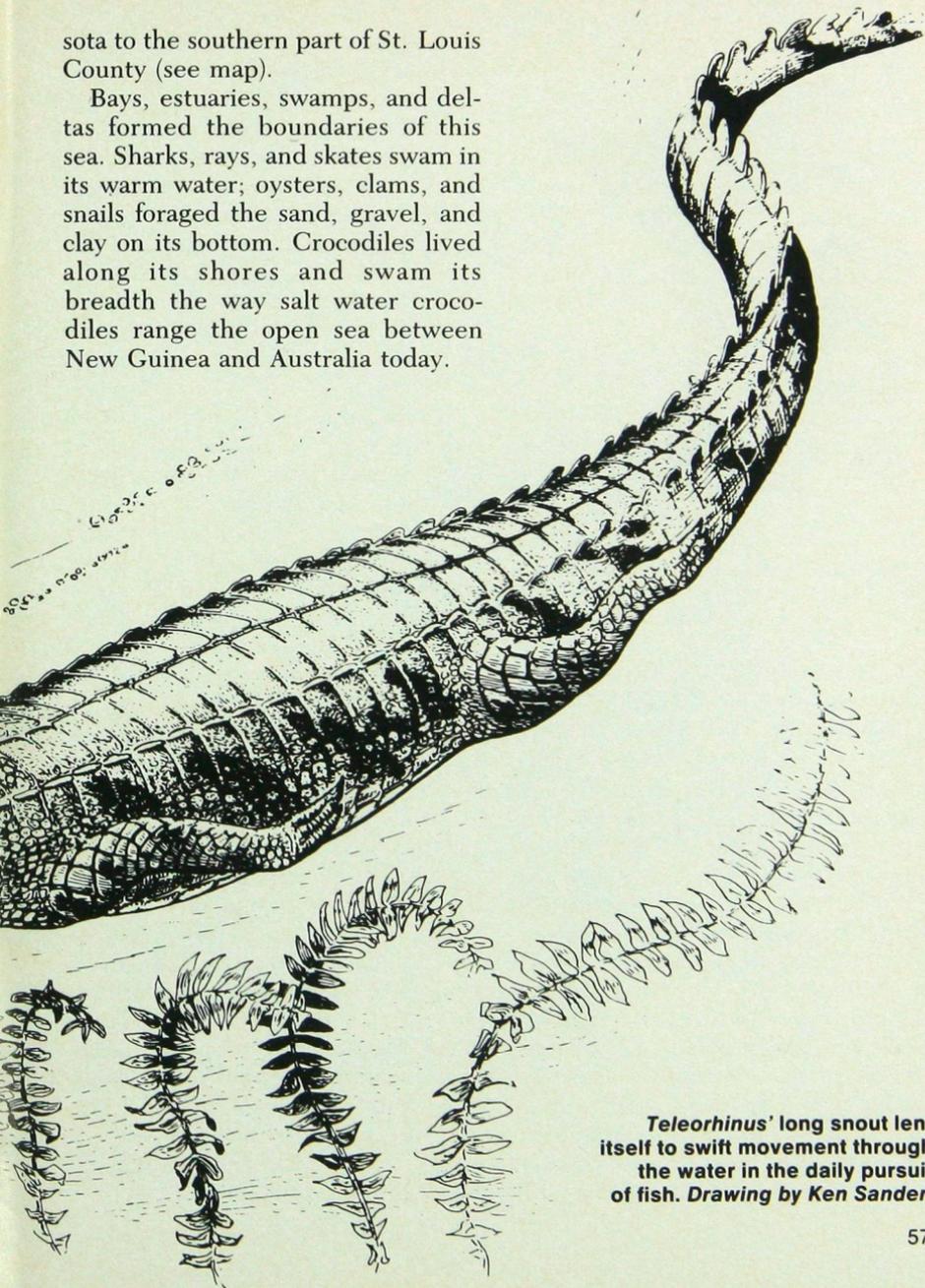
“Back then, Minnesota was a far different place,” Dr. Erickson said. “Days were warm and sunny for an entire year, much like southern Florida today. Palmettos and redwoods thrived in the damp, warm climate.”

Lake Superior didn't exist, the Atlantic Ocean was a seaway in the early stages of separating North America and Europe, dinosaurs trod the land, and a shallow sea dotted with islands spread across Montana, North Dakota, and east into Minne-



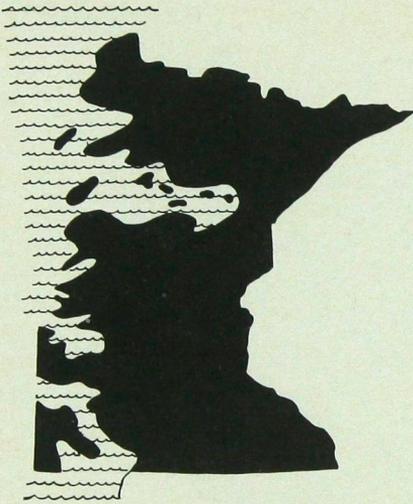
sota to the southern part of St. Louis County (see map).

Bays, estuaries, swamps, and deltas formed the boundaries of this sea. Sharks, rays, and skates swam in its warm water; oysters, clams, and snails foraged the sand, gravel, and clay on its bottom. Crocodiles lived along its shores and swam its breadth the way salt water crocodiles range the open sea between New Guinea and Australia today.



Teleorhinus' long snout lent itself to swift movement through the water in the daily pursuit of fish. Drawing by Ken Sander.

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***Teleorhinus* lived in a shallow, island-dotted sea that covered Minnesota to southern St. Louis County in the east.**

This ancient sea probably did much to shape the physical features of the Mesabi crocodile. “Narrow-snouted crocodiles were fish-eaters,” Dr. Erickson declared. “A long snout lends itself to swift movement through water which is necessary to pursue fish. The forward thrust of the Mesabi crocodile’s three-inch long teeth were designed for capturing fish, not for chewing. It probably grabbed a fish, then maneuvered it towards its throat to swallow. It also probably dashed into schools of fish to capture prey by swinging its head from side to side and trying to impale one on its long teeth, the way today’s sawfish do.”

It breathed by drawing air

through nostrils on the upper end of its snout above the hard palate. The air passed through a hole at the rear of the palate into the throat and then to the lungs. Underwater, a flap of skin closed over the hole in the rear palate to prevent water from entering the throat when the animal opened its jaws.

The basic differences between this prehistoric crocodile and modern crocodiles, Dr. Erickson explained, are two:

“Crocodiles today have shorter snouts — except for the gavials of India — and most stalk their prey rather than pursue it.

“The second difference is that modern crocodiles have a more efficient backbone — a ball and socket arrangement. The rounded back end of each vertebra fits into a hollow in the front of the next vertebra. Ancient crocodiles had a more primitive backbone. Each vertebra was flat-ended and butted the next vertebra in line. This arrangement made for a more rigid, less flexible backbone.”

In North Dakota, in the badlands along the upper branch of the Little Missouri River, Dr. Erickson has led expeditions to search for the fossil remains of these prehistoric reptiles. He and his fellow scientists have found 53 crocodiles, from tiny hatchlings to adult males 15–16 feet long. A cousin to these crocodiles, the Mesabi crocodile was 25–30 feet long, “one of the largest marine crocodiles yet discovered.”

The Last Crocodile. Other evidence of crocodiles in Minnesota may turn up, Dr. Erickson stated. Teeth found in mines in layers of earth belonging to ancient geologic eras have been identified tentatively as crocodile teeth, but more evidence is necessary for positive identification.

Whatever happened to *Teleorhinus*? No one really knows.

What is known is that the warm sea in which this grand reptile once pursued prey vanished 63 million years ago during a period marked by the mass extinction of large reptiles worldwide. The great dinosaurs, flying reptiles, and many marine reptiles died out. But the majority of crocodiles and alligators survived. For some unknown reason, they were not affected by whatever killed off most other reptiles.

"*Teleorhinus* filled a niche created by the environment," Dr. Erickson

concluded. "It was a very specialized animal — a large, marine, fish-eating reptile with a six-foot-long head, protruding teeth, and a partially flexible backbone, not as sophisticated in its breathing or feeding as today's crocodiles.

"As the environment changed and crocodiles better adapted to new conditions appeared, it may have had no place to go. We know it wasn't able to survive. But the fossil record doesn't tell us what happened. Three families of crocodiles survive today — crocodiles, alligators, and gavials. The Iron Range crocodile belongs to one of the ten or so families of crocodylians that became extinct over the past 200 million years." □

Ken Sander, Minneapolis, a freelance science illustrator, created the drawing of Teleorhinus in consultation with Dr. Erickson.



Reintroducing Peregrine Falcons to Their Former Home

IN LATE JUNE, 10 peregrine falcon chicks arrived in St. Paul from Canada where they were raised in captivity at a special rearing facility at the University of Saskatchewan. The birds were taken to two nesting towers south of Lake City near cliffs along the Mississippi River where peregrines once nested before DDT eradicated them. The program calls for releases in southeastern Minnesota over the next four years to help re-establish the peregrine as a nesting species in the state.

The project is a cooperative effort by the Minnesota Chapter of The Nature Conservancy, the University of Minnesota Bell Museum of Natural History, UM Raptor Research and Rehabilitation Center, U.S. Fish and Wildlife Service, and the DNR Nongame Wildlife section. Cost of delivery and release of the peregrine chicks: \$10,000. Donations by Minnesota taxpayers on their state income tax form provided the funds needed to reintroduce the peregrine to its former home along the Mississippi River bluffs. — *DNR News Service*