

EXPLORE

IN THIS SECTION

Bridge of Roots

Sylvia Earle's Fins

Bedtime for Bears

—or Maybe Not



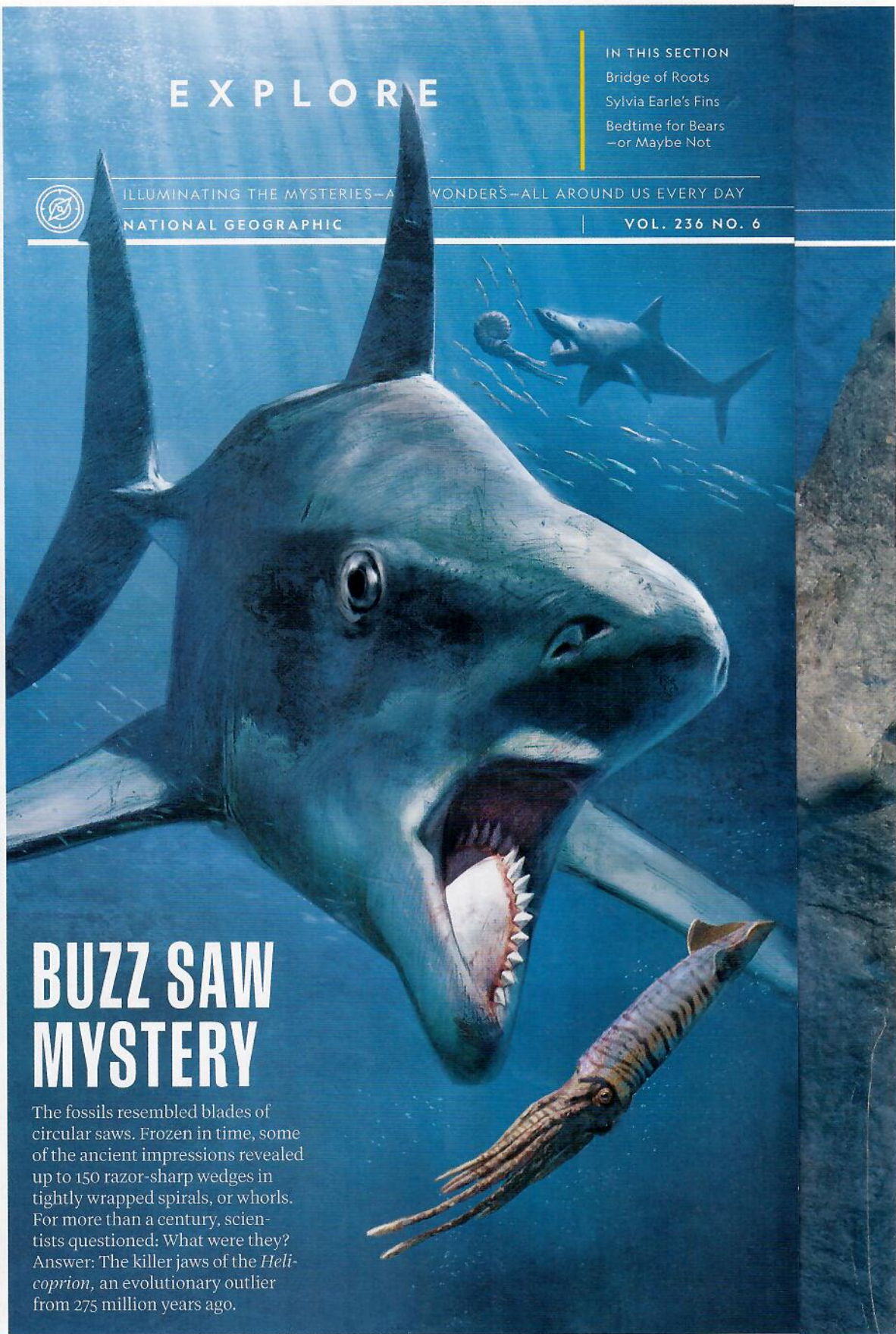
ILLUMINATING THE MYSTERIES—AND WONDERS—ALL AROUND US EVERY DAY

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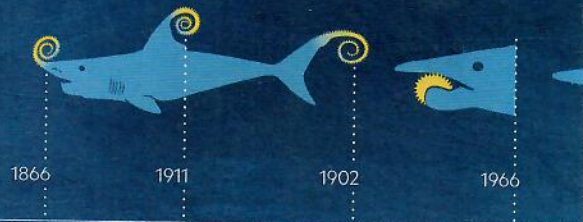
BUZZ SAW MYSTERY

The fossils resembled blades of circular saws. Frozen in time, some of the ancient impressions revealed up to 150 razor-sharp wedges in tightly wrapped spirals, or whorls. For more than a century, scientists questioned: What were they? Answer: The killer jaws of the *Helicoprion*, an evolutionary outlier from 275 million years ago.



GUESSING GAME

Was the whorl part of its snout? A defensive fin? Theories abounded. It wasn't until 2013, when a fossil found in 1950—with attached cartilage—was CT scanned and computer modeled, that the answer was clear.



JAGGED JAWS

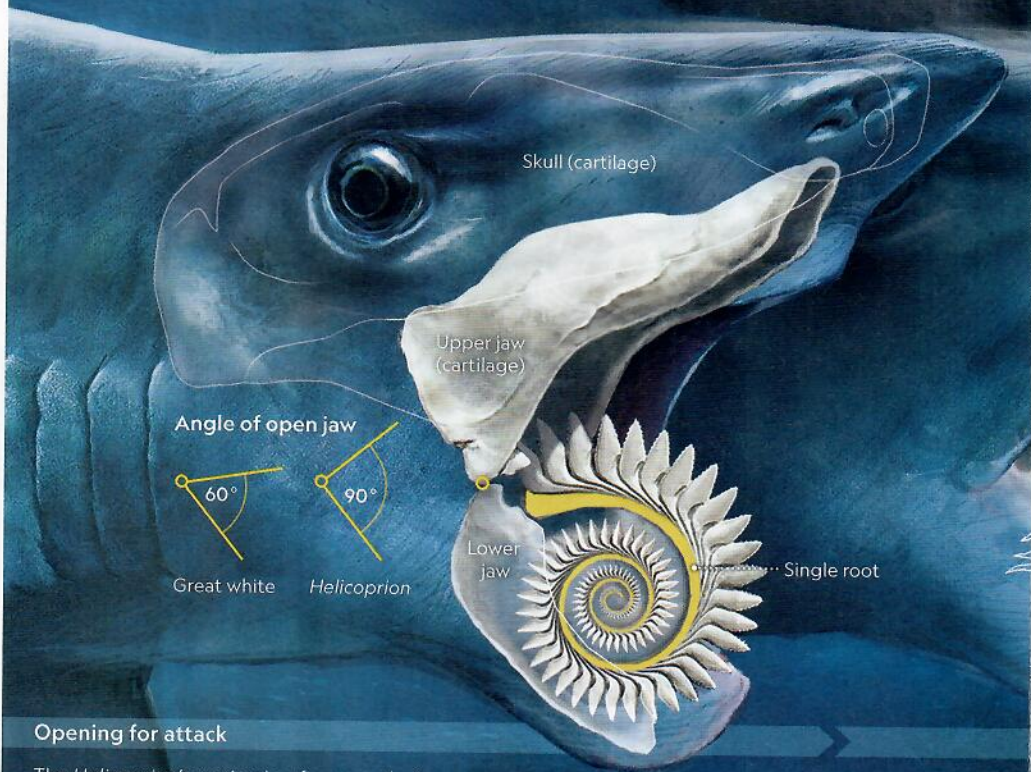
The spiral-toothed giants tripled in size over the eight million years they roamed the seas. Their unique jaws—an anatomical feature never seen again—could slice soft prey like a sword and detach creatures from their hard shells.

Up to 15 teeth could be exposed at the same time.

Modern relative
Spotted ratfish
(*Hydrolagus collieti*)



Female
Length 38 in



Opening for attack

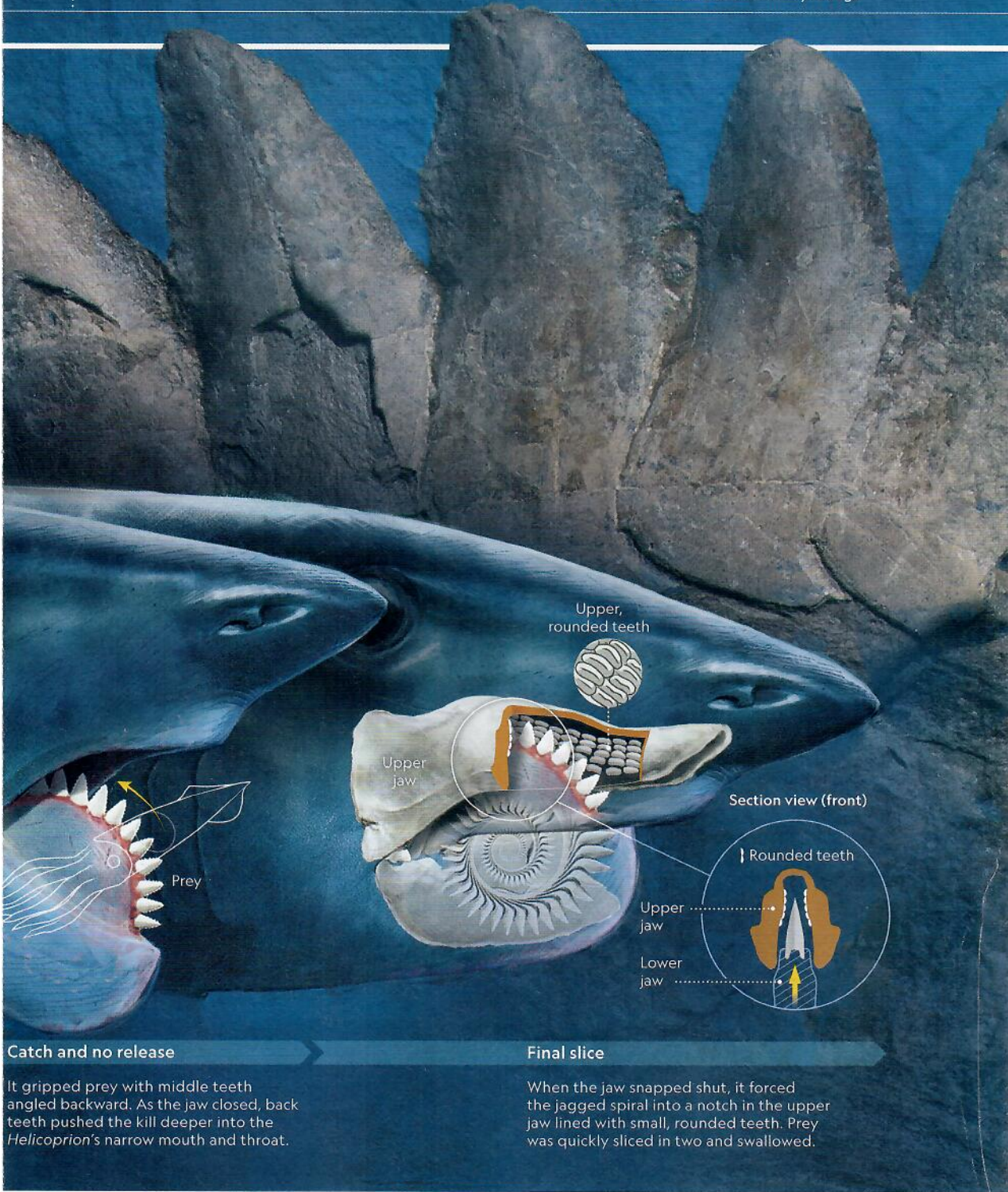
The *Helicoprion's* gaping jaw far exceeded the mouth angle of today's great white shark but had only a third of the bite force, closer to that of a modern crocodile's jaw.

THEIR ANCIENT SEAS

The Permian predator thrived near shorelines in waters where now there are countries. Over 150 fossils have been found—many in Idaho, unearthed in phosphorus mines once deep underwater.



Modern fossil sites 282–275 million years ago



Catch and no release

It gripped prey with middle teeth angled backward. As the jaw closed, back teeth pushed the kill deeper into the *Helicoprion's* narrow mouth and throat.

Final slice

When the jaw snapped shut, it forced the jagged spiral into a notch in the upper jaw lined with small, rounded teeth. Prey was quickly sliced in two and swallowed.



DECODER FERNANDO G. BAPTISTA AND PATRICIA HEALY

Actual size of teeth from a large whorl fossil 1.5 feet in diameter



WHIRLING INTO ADULTHOOD

Modern sharks shed old teeth to make way for new ones. *Helicoprion* juveniles were born with three teeth; new teeth shifted old ones in rotations of up to 150 teeth encased in cartilage and attached to a single root.

PHOTO: EVELYN VOLLMER AT IDAHO VIRTUALIZATION LAB, IDAHO MUSEUM OF NATURAL HISTORY