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Tough abs. The primitive *Odontochelys* had a bony underbelly but lacked a shell.

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Sea Change for Turtle Origins?

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Turtles are best known today for their aquatic feats, like leatherbacks that migrate thousands of kilometers. But the earliest turtles were firmly terrestrial--or so paleontologists thought. Tomorrow, a team will report in *Nature* the discovery of the most primitive turtle fossils yet found, and the data suggest that the newly identified species lived in the sea. Like some living marine turtles, the ancient reptile lacked a hard shell, so the find may shed light on how turtles evolved their defensive armor. But some experts say the fossils raise more questions than they answer.

The previous record-holder for most ancient turtle was *Proganochelys*, a meter-long creature that lived in what is now Germany some 205 million years ago. It had a heavy shell, a spiked tail tipped with a club, and short toes--all features indicating that it lived on land, as did later relatives. The two new specimens are somewhat older. They were found in 220-million-year-old rocks near Guanling, in southwestern China.

Unlike all other known turtles, the 40-centimeter-long species lacked a beak and had a mouthful of teeth, earning it the name *Odontochelys*, which means toothed turtle. "The primitiveness of the animals is just astounding," says paleontologist Olivier Rieppel of the Field Museum in Chicago, Illinois, who described the fossils with colleagues from the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing.

Odontochelys also had long hands and feet that would have been better adapted for swimming than for walking, and it was found in marine sediments deposited near a coast.

Life in an aquatic environment could explain *Odontochelys*'s shell anatomy, Rieppel says. As in all turtles, the underbelly is a rigid, bony structure called the plastron. This shield would have helped protect the animal from predators attacking from below, something that low-slung terrestrial residents don't have to worry about, Rieppel says. In

contrast, there is no sign of the carapace, the upper part of the shell. Instead, the broad ribs resemble those of an embryonic turtle. To Rieppel and his colleagues, *Odontochelys* represents an early stage of turtle history during which they were evolving their shells while living in water.

A pair of paleontologists offer a different interpretation. To Robert Reisz and Jason Head of the University of Toronto Mississauga in Canada, *Odontochelys* may have had a carapace, just not a bony one. Today's soft-shelled turtles, for example, have lost much of the bones in their armor. If that's the case, *Odontochelys* may have descended from a more ancient group of armored terrestrial turtles. "The reason I'm excited about that," Reisz says, is that "it pushes the story of turtle origins even further back in time."

Paleontologist Walter Joyce of Yale University points out that one new ancestor doesn't clinch turtle origins. The question now, he says, is, is *Odontochelys* emblematic of early turtles--or just an oddity? Paleontologists will need to dig up more ancient turtles to find out.