Our Cousin The Fishapod

An ancient fish with primitive fingers fills an evolutionary gap and shows Darwin's theory in action

By J. MADELEINE NASH

THE V-SHAPED BONE TURNED OUT TO BE the lower jaw of a fish, but not any fish Neil Shubin had ever seen. The University of Chicago paleontologist had been chipping his way through an ancient rock formation in an icy drizzle near Bird Fjord on Canada's Ellesmere Island last July when one of his colleagues pointed to a wall of red siltstone and exclaimed, "What's that?"

That, as Shubin and his colleagues reported last week in a pair of articles in *Nature*, was part of a creature that grew to at least 2.75 m in length and lived some 375 million years ago, just at the point in evolutionary history when fish were giving rise to the four-legged animals known as tetrapods. And indeed, the creature was a little of each, for along with a fish's scales, fangs and gills, it had anatomical features usually found only in animals that spend at least some of their time on land. It is, in short, exactly the sort of transitional animal Darwinian theory predicts, with new physical traits gradually emerging to help it thrive in a novel environment. And it has become scientists' Exhibit A in their long-running debate with creationists and other antievolutionists who have been using the lack of such missing-link organisms to argue that Darwin's theory is wrong.

It will be hard to explain away the "fishapod," as Shubin and his team nicknamed their find. Unlike a true fish, it had a broad skull, a flexible neck, and eyes mounted on the top of its head like a crocodile. It also had a big, interlocking rib cage, suggesting that it had lungs and did at least part of its breathing through them, as well as a trunk strong enough to support itself in the shallows or on land. And most startling of all, when technicians dissected its pectoral fins, they found the beginnings of a tetrapod hand, complete with a primitive version of a wrist and five fingerlike bones. "This is not some archaic branch of the animal kingdom," says Shubin. "This is *our* branch. You're looking at your great-great-great-great cousin!"

What really fascinates scientists about the fishapod is that it fits so neatly into one of the most exciting chapters in the history of life—when creatures that swam in seas and rivers gave rise to things that walked, ran and crept on land. The fishapod appears to be a crucial link in the long chain that over time led to amphibians, reptiles, dinosaurs, birds and mammals. Indeed, *Tiktaalik roseae*, the official name bestowed on the fishapod (in the language of the local Inuit, *tiktaalik* means "large fish in stream"), falls anatomically between the lobe-finned fish *Panderichthys*, found in Latvia in the 1920s, and primitive tetrapods like *Acanthostega*, whose full fossil was recovered in Greenland not quite two decades ago.

Together, these fossils have overturned the old picture of the fish-tetrapod transition, which conjured up the image of creatures like the modern lungfish crawling out of water onto land. That picture certainly didn't fit *Acanthostega*, whose short, flimsy legs were ill equipped for terrestrial locomotion. Rather, according to University of Cambridge paleontologist Jennifer Clack, *Acanthostega* was an aquatic creature that used its limbs and lungs to make a living in water. And that scenario makes sense because it sets up conditions for natural selection—the force that powers evolution—to favor transitional life-forms like the fishapod, with its funny wrist and five digits encased in the webbing of a fin.

On land, observes Shubin's collaborator Ted Daeschler, chair of vertebrate zoology at Philadelphia's Academy of Natural Sciences, such an appendage would have been worse than useless. But it would have been more than adequate for pro head above the water so its surroundings or for water as it waited to a advantage of being able lungs as well as gills w been immediate, given made its home in warm were frequently render decaying vegetation.

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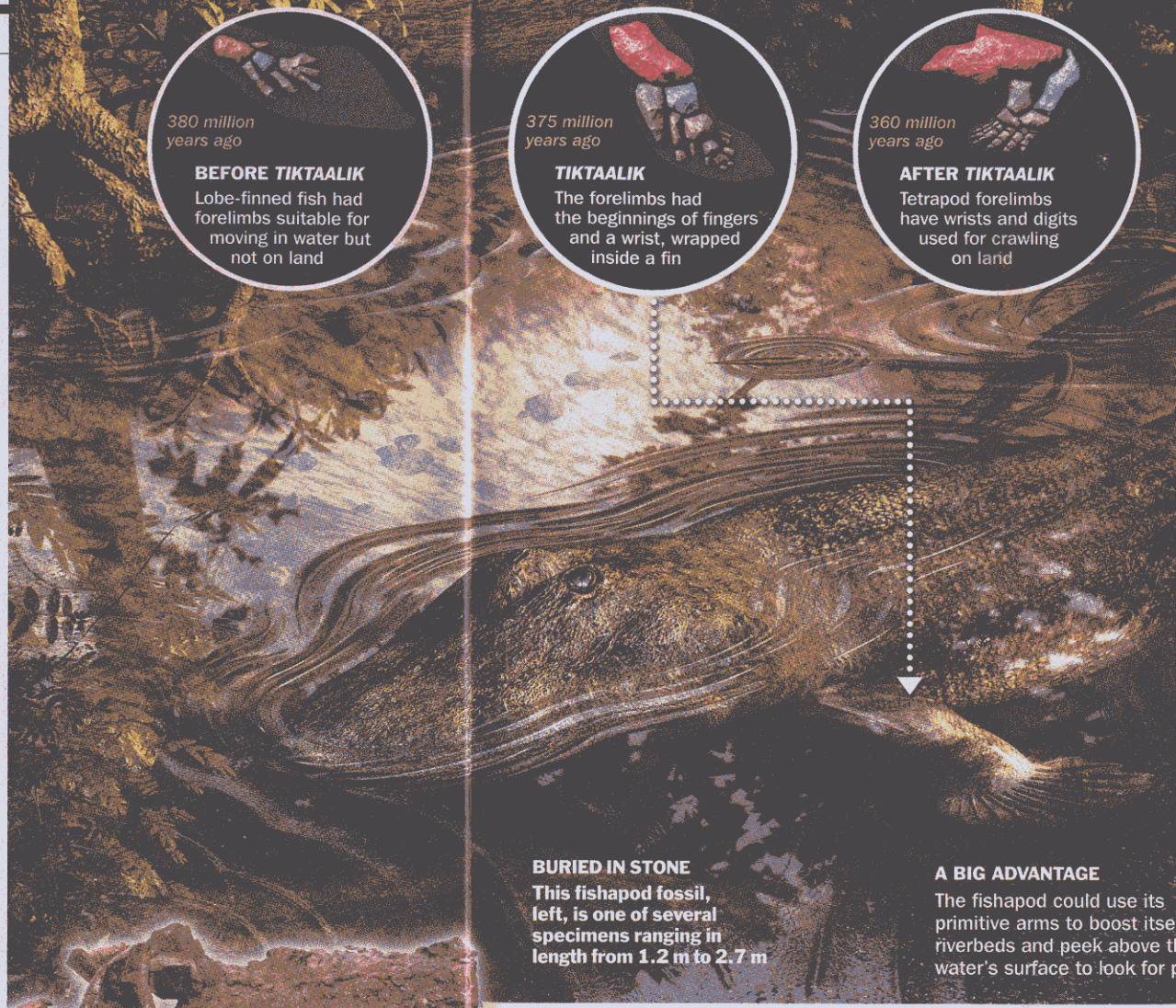

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