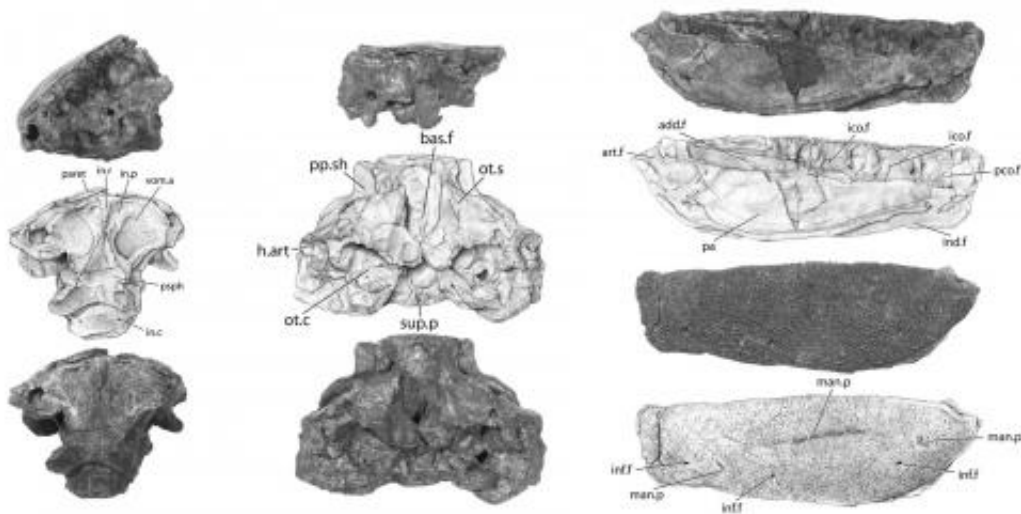


New fossil species from a fish-eat-fish world when limbed animals evolved

March 27 2013



This shows portions of the skull (left and center) and lower jaw (right) of *Holoptychius bergmanni*. Credit: Academy of Natural Sciences of Drexel University, with drawings by Scott Rawlins

Scientists who famously discovered the lobe-finned fish fossil *Tiktaalik roseae*, a species with some of the clearest evidence of the evolutionary transition from fish to limbed animals, have described another new species of predatory fossil lobe-finned fish from the same time and place. By describing more Devonian species, they're gaining a greater understanding of the "fish-eat-fish world" that drove the evolution of limbed vertebrates.

"We call it a '[fish](#)-eat-fish world,' an ecosystem where you really needed to escape predation," said Dr. Ted Daeschler, describing life in the Devonian period in what is now far-northern Canada.

This was the environment where the famous [fossil fish](#) species *Tiktaalik roseae* lived 375 million years ago. This lobe-finned fish, co-discovered by Daeschler, an associate professor at Drexel University in the Department of Biodiversity, Earth and Environmental Science, and associate curator and vice president of the Academy of Natural Sciences of Drexel University, and his colleagues Dr. Neil Shubin and Dr. Farish A. Jenkins, Jr., was first described in *Nature* in 2006. This species received scientific and popular acclaim for providing some of the clearest evidence of the evolutionary transition from lobe-finned fish to limbed animals, or tetrapods.

Daeschler and his colleagues from the *Tiktaalik* research, including Academy research associate Dr. Jason Downs, have now described another new lobe-finned [fish species](#) from the same time and place in the [Canadian Arctic](#). They describe the new species, *Holoptychius bergmanni*, in the latest issue of the *Proceedings of the Academy of Natural Sciences of Philadelphia*.

"We're fleshing out our knowledge of the community of vertebrates that lived at this important location," said Downs, who was lead author of the paper. He said describing species from this important time and place will help the scientific community understand the transition from finned vertebrates to limbed vertebrates that occurred in this ecosystem.

"It was a tough world back there in the Devonian. There were a lot of big predatory fish with big teeth and heavy armor of interlocking scales on their bodies," said Daeschler.



Dr. Ted Daeschler handles a lower jaw fossil from *Holoptychius bergmanni*, a lobe-finned fish species from the Devonian Period that he co-discovered and described. Credit: Drexel University

Daeschler said *Holoptychius* and *Tiktaalik* were both large predatory fishes adapted to life in stream environments. The two species may have competed with one another for similar prey, although it is possible they specialized in slightly different niches; *Tiktaalik*'s tetrapod-like skeletal features made it especially well suited to living in the shallowest waters.

The fossil specimens of *Holoptychius bergmanni* that researchers used to characterize this new species come from multiple individuals and include lower jaws with teeth, skull pieces including the skull roof and braincase, and parts of the shoulder girdles. The complete fish would have been 2 to 3 feet long when it was alive.

"The three-dimensional preservation of this material is spectacular," Daeschler said. "For something as old as this, we'll really be able to collect some good information about the anatomy of these animals."

The research on *Holoptychius bergmanni* was led by Downs, a former post-doctoral fellow working with Daeschler who also teaches at Swarthmore College. Other co-authors of the paper with Downs and Daeschler are Dr. Neil Shubin of the University of Chicago, and the late Dr. Farish Jenkins, Jr. of Harvard University, who passed away in 2012.



This shows a field research team excavating Devonian fossils at the site in the Canadian Arctic where they found *Tiktaalik roseae*. Credit: Academy of Natural Sciences of Drexel University

Honoring a Modern Arctic Explorer and Supporter of Science

The researchers named the new fossil fish species *Holoptychius bergmanni* in honor of the late Martin Bergmann, former director of the Polar Continental Shelf Program (PCSP), Natural Resources Canada, the organization that provided logistical support during the team's Arctic research expeditions spanning more than a decade. Bergmann was killed in a plane crash in 2011 shortly after the team's most recent field season in Nunavut.

"We decided to choose Martin Bergmann to honor him, not ever having met him, but with the understanding that his work with PCSP made great strides in opening the Arctic to researchers," said Downs. "It's an invaluable project happening in the Canadian Arctic that's enabling this type of work to happen."

Bergmann's organization assisted the research team with many aspects of expedition logistics including difficult flight operations to carry supplies and research personnel to remote research sites on Ellesemere Island. Daeschler described the pilots as capable of landing a Twin Otter aircraft almost anywhere, as long as the ground was solid – a condition they tested by briefly touching down the airplane and circling back to see if the tires left a deep mark in the mud.

Daeschler and colleagues intend to return to Ellesemere Island for another field expedition in the summer of 2013 to search for fossils in older rocks at a more northerly field site than the one where they discovered *T. roseae* and *H. bergmanni*.

A Deeper Look at the Devonian

Daeschler and a different co-author described another new [species](#) of Devonian fish in addition to *H. bergmanni*, in the same issue of the Proceedings of the Academy of [Natural Sciences](#). More information about this new placoderm from Pennsylvania is available at

<http://newsblog.drexel.edu/2013/03/27/dusting-for-prints-from-a-fossil-fish-to-understand-evolutionary-change/>.

Provided by Drexel University

Citation: New fossil species from a fish-eat-fish world when limbed animals evolved (2013, March 27) retrieved 11 May 2024 from <https://phys.org/news/2013-03-fossil-species-fish-eat-fish-world-limbed.html>

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