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## RESEARCHER AT NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY CO-AUTHORS PAPER DISPUTING LONG-HELD BELIEFS ON EVOLUTION OF BREATHING IN VERTEBRATES

***Study by John Long, VP of Research and Collections at Museum, Links Vertebrate Air-Breathing to Decreased Global Oxygen Levels, Rather Than Invasion of New Habitats***

**Los Angeles** - A massive plunge in global oxygen levels – and not freshwater frolicking – could have led to the rise of air-breathing animals on Earth, a new study argues. Researchers have made the claim after analysing the fossilised remains of a new lungfish species from Gogo in northwestern Australia that lived roughly 375 million years ago. The research, funded by the Australian Research Council, is published in the journal *Biology Letters* this week.

Dr. John Long, VP of Research and Collections at the Natural History Museum of Los Angeles County, and his Ph.D. student Alice Clement of the Australian National University, have just published a paper linking low global oxygen levels in the mid-Devonian period with the origins of air-breathing in a marine fossil lungfish *Rhinodipterus*.

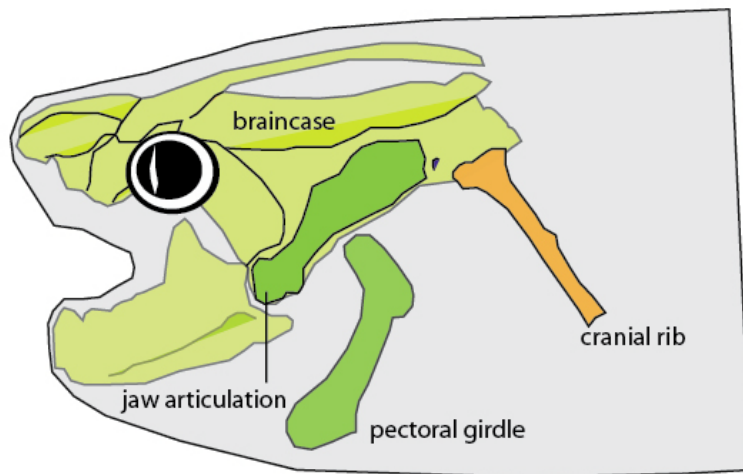
“We found the *Rhinodipterus* specimen on our 2008 expedition to the Gogo site,” said Dr. Long. “After dissolving the rock away and exposing the skull in 3-D I realised immediately that it showed adaptations for breathing air. It’s a truly amazing fossil that reveals evidence of ancient behaviour.”

“Features of the *Rhinodipterus* specimen that suggest it was air breathing, include a long mouth cavity and articulations of ‘cranial ribs,’ which we find in the living forms of lungfish that have air-gulping behavior,” said Ms. Clement. “Yet *Rhinodipterus* lived in the ocean, not in freshwater, which runs counter to the standard theory that fish evolved the ability to breathe air once they moved to freshwater habitats.”

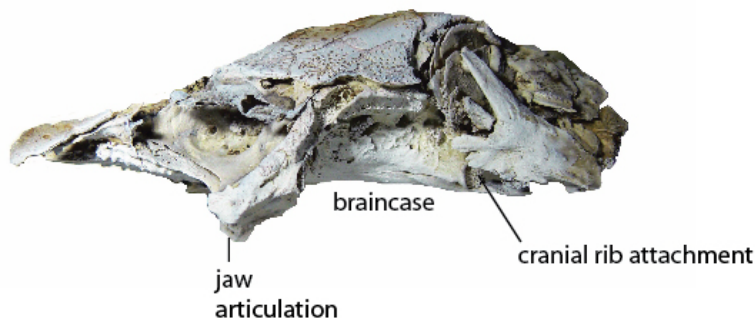
In order to explain the existence of air-breathing adaptations in a marine lungfish, the researchers looked to environmental factors other than habitat. They turned to existing knowledge about global oxygen levels in the Devonian, which fell as low as 12 percent of the total atmosphere. Today oxygen levels are at 20 percent.

“This plunge in global oxygen levels would have been a strong selection pressure on lungfish and other animals, including the tetrapods — the fish-like ancestors of land animals,” explains Dr. Long. “This makes us believe that breathing air arose twice at this early time in vertebrate evolution: once in lungfishes, and once in the fish lineage leading to land animals, and ultimately to us.”

The researchers say this discovery adds an important piece to the puzzle of how life on Earth evolved. The next step will entail searching for more specimens similar to the *Rhinodipterus* find in order to bolster their theory.



*Protopterus*, living lungfish



*Rhinodipterus*, 375 million year old fossil lungfish

**About the Natural History Museum**

The Natural History Museum of Los Angeles County is located at 900 Exposition Blvd., Los Angeles. It is open weekdays, 9:30 am to 5 pm; and weekends and holidays from 10 am to 5 pm. The Museum was the first dedicated museum building in Los Angeles, opening its doors in 1913. It has amassed one of the world’s most extensive and valuable collections of natural and cultural history — with more than 35 million objects, some as old as 4.5 billion years. The Natural History Family of Museums includes the NHM, the Page Museum at the La Brea Tar Pits (Hancock Park/Mid-Wilshire), and the William S. Hart Park and Museum (Newhall, California). The Family of Museums serves more than one million families and visitors annually, and is a national leader in research, exhibitions and education.

**NHM Next**

Last year’s completed renovation of the Beaux-Arts 1913 Building, the original component of the NHM, has set the stage for the rollout of a series of new exhibits leading up to the Museum’s centennial in 2013: *Age of Mammals* and the Haaga Family Rotunda galleries open in Summer 2010; *Dinosaur Mysteries*, and teaching and learning gardens in Summer 2011, and *Under the Sun*, an exhibition focusing on the Southern California environmental history, in Spring 2012.

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