

### Alaska Beat

# How did air-breathing animals evolve? UAF scientists may have a clue

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How did air-breathing vertebrates evolve from their sea-dwelling counterparts? University of Alaska scientists think they have identified the ancestral trait that allowed for the evolution of the lung, according to a press release sent out Monday.

"To breathe air with a lung ... you need neural circuitry that is sensitive to carbon dioxide," Michael Harris, UAF neuroscientist, said.

That neural circuitry is called a rhythm generator, and it is what allows air-breathing organisms to take in oxygen and expel carbon dioxide as waste.

So scientists went looking for a rhythm generator in non-air breathing vertebrates. They found one in the lamprey, an ancient fish with characteristics similar to the first vertebrates.

As larvae, Lampreys live in tubes dug in soft mud and breathe by pumping water through their bodies. When its tube gets clogged, a lamprey clears it with a cough-like mechanism. A rhythm generator is what controls the cough.

"We thought the lamprey 'cough' closely resembled air breathing in amphibians," said Harris. "When we removed the brains from lampreys and measured nerve activity that would normally be associated with breathing, we found patterns that resemble breathing and found that the rhythm generator was sensitive to carbon dioxide." Harris said.

The carbon-dioxide-sensitive rhythm generator may have been the precursor of the lung. Harris and UAF Neuroscientist Barbara Taylor, along with their lab technician Megan Hoffman also study [Sudden Infant Death Syndrome](#) and they hope understanding the evolution of breathing will provide insights into their research on SIDS.

They will be presenting their research at the annual meeting of the [Society for Neuroscience](#) on Oct.17 in New Orleans.

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