

Researchers closer to understanding the evolution of sound production in fish

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An international team of researchers studying sound production in perch-like fishes has discovered a link between two unrelated lineages of fishes, taking researchers a step closer to understanding the evolution of one of the fastest muscles in vertebrates.

Understanding the evolution of such fast muscles has been difficult for researchers because slow movement of a swimbladder does not generate sound.

In a study published online Nov. 29 in the journal *Frontiers in [Zoology](#)*, Virginia Commonwealth University [biologists](#), together with researchers Hin-Kiu Mok, Ph.D., at the National Sun Yat-sen University in Taiwan, and Eric Parmentier, Ph.D., at the Université de Liège in Belgium, have found that the pearl-perch belonging to the fish order Perciformes utilizes a hybrid system with characteristics of slow and fast systems. The findings suggest an intermediate condition in the evolution of superfast sonic muscles that drive swimbladder vibration directly. Perciforms are one of the largest orders of [vertebrates](#).

"This work for the first time demonstrates an intermediate condition in the potential evolution of these superfast muscles," said investigator Michael Fine, Ph.D., professor of biology at VCU, who served as corresponding author for the study.

"It's sort of like finding a fossil whale with leg bones indicating affinity to a terrestrial vertebrate, or a dinosaur with feathers indicating potential

steps in the [evolution](#) of reptiles into birds," he said.

According to Fine, a number of fish produce sounds by contracting superfast muscles that vibrate the swimbladder to produce aggressive and courtship calls. For example, in the oyster toadfish found on the east coast of the United States, swimbladder muscles routinely contract more than 200 times a second when a male is calling for a mate. Fine and his colleagues recently found a group of fishes that produce sound by using slow muscles to pull the swimbladder, which then snaps back - like a rubber band - to produce sound. In this case the pearl perch has a hybrid system that uses a slow system but actually pulls the swimbladder forward with a fast [muscle](#). The [fish](#) has a tendon that gets stretched and causes the bladder to snap back, producing the loud part of the sound.

"What is special about this perciform is that its sound producing system appears to have intermediate characteristics between slow systems which are only known in ophidiiform fishes, and fast muscles present in different groups of fishes," he said.

Provided by Virginia Commonwealth University

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