Experience trumps youth among jumping fish

March 16 2018

Mangrove rivulus jumping. Credit: Ben Perlman and Nickolay Hristov

Tiny jumping fish can leap further as they get older, new research shows.

Mangrove rivulus are capable of "tail-flip jumping" many times their body length when out of water, allowing them to escape predators and find better habitats.

Researchers from the universities of Exeter and Alabama looked at how physical traits and age affected how far the fish - found in the US, the Bahamas and Central America - could jump.

They found certain traits were linked to longer jumping among younger fish, but as they got older these effects diminished and age itself was most closely linked with jumping distance.

Of more than 200 fish examined, the longest jumper was also the oldest - a four-year-old mangrove rivulus that jumped more than twelve times its body length.

"We found that the length and position of certain bones seem to help younger fish jump further," said Dr Tom Houslay, of the Centre for Ecology and Conservation on the University of Exeter's Penryn Campus in Cornwall.

"However, these links disappear as they age, and older fish are better at jumping regardless of these physical characteristics.

"Adults probably rely less on bones because they have the musculature and neural systems to coordinate jumping, something that isn't highly developed in the young fish.

"Few studies have examined how the relationship between form and function changes across lifespan, and we were intrigued to find experience trumps all - at least if you're a mangrove rivulus."

The study found that older fish typically jump about half a body length further than younger ones, meaning they are better jumpers even when their larger size is taken into account.

Mangrove rivulus, which live in noxious crab burrow habitats, are about 2-3cm long as adults and have a number of unusual adaptations to allow them to live out of water.

They are also self-fertilizing simultaneous hermaphrodites, meaning if they find themselves with no mate they can reproduce alone by making clones.

This adaptation, unique among vertebrate life, also makes them a useful species for studying genetic differences in physical form and performance.

"The next step in this line of research is to figure out whether genetic variation underlies differences in body structure associated with jumping performance in young fish," said Joe Styga, PhD candidate at the University of Alabama and lead author of the study.

"This information may help us to determine to what extent jumping performance may evolve in the face of environmental change."

The paper, published in the *Journal of Experimental Zoology Part A: Ecological Genetics and Physiology*, is entitled: "Ontogeny of the morphology-performance axis in an amphibious fish (Kryptolebias marmoratus)."

More information: Joseph M. Styga et al, Ontogeny of the morphology-performance axis in an amphibious fish (Kryptolebias marmoratus), *Journal of Experimental Zoology Part A: Ecological and Integrative Physiology* (2018). DOI: 10.1002/jez.2150

Provided by University of Exeter