The water flow rate of a fish's 'home' affects the survival of their offspring

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Amphiprion chrysopterus in Heteractis magnifica, French Polynesia. Credit: Rick Stuart-Smith / Reef Life Survey/Wikimedia Commons, CC BY

The water flow where adult fish live can affect the body shape and survival of their offspring, according to new research.

The study—led by an international collaboration between CRIOBE (French Polynesia) and the University of Glasgow, and published today in *Functional Ecology*—found that the survival of fish born from parents living under high water flow was reduced by half compared to fish born from those living under low water flow.

The study looked at orange-fin anemonefish *Amphiprion chrysopterus* from a wild population in Moorea, French Polynesia. The researchers found that offspring born from fish living under high water flow had distinct fin shapes when they left to find their own "home," but slower growth once they had selected an environment in which to live.

Animals live in environments in which many factors may differ, and often the environments of parents and their offspring are not the same. In the marine realm, most fish have two parts to their life-cycle: an early stage as offspring, where young fish can disperse long distances in open water before selecting a suitable environment in which to develop and grow, and secondly a less mobile adult stage.

Offspring may experience different conditions to those of their parents before becoming adults themselves. This latest research helps to explain which traits are inherited from their parents, and which traits may be caused by environmental factors such as water flow, separating the effect of water flow experienced by parents and the water flow experienced during development.

Daphne Cortese, who is currently a postdoctoral researcher at the University of Glasgow but carried out her Ph.D. at CRIOBE (PSL University Paris, Ecole Pratique des Hautes Etudes, EPHE) said, "On coral reefs, water flow varies between sites, as well as over time. To cope with these varied water flows, fish may present differences in the shape, size and dimensions of their fins and body, as well as in their swimming ability and metabolism."

"However, until now, we've not known to what extent these trait differences come from their parents and the environment in which their parents live; via genes or differences the parents have passed on; or if the water flow in which offspring develop determines their traits."

Suzanne C. Mills, associate Professor at PSL University Paris and based at CRIOBE, French Polynesia and co-author on the study, said, "In this study, we've seen that the water flow environments of both the parents and offspring impact traits like fin shape, however it is the water flow of the parent's environment which is the main determinant of offspring survival."

"Overall, these findings suggest consequences of living in different environments with likely
compromises between parents and offspring traits and survival in wild populations" concluded Ricardo Beldade, Center National de la Recherche Scientifique (CNRS) at CRIOBE, France and currently professor at the Universidad Pontificia de Chile.


Provided by University of Glasgow

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