Crossbreeding could create stronger future for coral reefs

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The hybridisation of algae that live in reef corals could increase their rate of development and provide a means for corals to adapt to global warming, Victoria University of Wellington research has shown.

A study by Shaun Wilkinson, who graduates with a PhD in Ecology and Biodiversity at Victoria's May graduation celebrations, explored the

potential of crossbreeding between different types of microscopic algae, which are vital to the coral's survival.

A partnership, or 'symbiosis'—between the algae and coral animals—enables corals to survive in nutrient-poor tropical oceans, and a change of just one or two degrees in temperature can cause a breakdown of this partnership and have dramatic effects on the reefs. Warming ocean temperatures have already resulted in coral bleaching, death and often the degradation of entire reefs.

Shaun says natural and human-assisted crossbreeding could allow the algae, and hence the coral, to better survive in these degraded environments.

"These algae are genetically and physiologically diverse, with some types being more thermally resistant than others," says Shaun. "The creation of new genetic material through crossbreeding could create new algal strains that make corals better able to survive in a warming environment."

Shaun's research, recently published in *BMC Evolutionary Biology*, was conducted during a number of field trips to Lord Howe Island.

"We looked for potential hybrids by inspecting the genome of single algal cells, and then tested whether these algae show physiological differences from their 'pure-bred' counterparts. We gathered good evidence though further research is needed to definitively confirm hybridisation," says Shaun.

"We also measured changes in the abundance of these algae through time, and whether their numbers were correlated with environmental variables such as temperature and depth."

Shaun's research contributes to a global effort to stop the demise of coral reefs, with recent studies suggesting this loss could occur within the next 100 years.

"There is an emerging field that seeks to selectively breed thermally-resistant corals for the rehabilitation of reefs," says Shaun. "Looking at the different ways that corals can evolve and react to temperature changes will be important as the oceans continue to warm."

More information: "Intra-genomic variation in symbiotic dinoflagellates: recent divergence or recombination between lineages?" *BMC Evolutionary Biology* 2015, 15:46 DOI: 10.1186/s12862-015-0325-1

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