'Test tube' reef a key to understanding coral disease

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Microbial ecologist and UTS Research Fellow Dr Justin Seymour is part of an international team that will apply emerging technology to investigate the causes of bacterial disease in coral.

The Strasbourg based International Human Frontier Science Program Organization (HFSPO) is backing the three-year project, which aims to mimic the ecology of a coral reef in order to investigate how bacteria impact coral health.

In awarding the Young Investigators Grant (more than $1million US) the HFSPO acknowledged that the research was a "high risk/high gain" proposal that fitted the ethos of the organisation's charter to "support innovative, cutting edge research at the frontiers of the life sciences and to promote international collaboration in the spirit of science without borders."

Dr. Seymour, who is a member of the UTS Plant Functional Biology and Climate Change Cluster (C3), is a principal investigator together with Associate Professor Roman Stocker, Massachusetts Institute of Technology and Dr. Assaf Vardi, The Weizmann Institute, Israel.

"Coral reefs have enormous ecological and economic value but they are under threat from environmental degradation, climate change and disease," Dr. Seymour said.

"It's only in recent years that scientists have started to get a real

understanding of the complex interactions that take place in coral communities and in particular to acknowledge the impact microorganisms like bacteria have on coral health."

Scientists believe that coral health is determined by the stability and function of the coral "holobiont", the complex community of organisms living in partnership with the coral host.

Using the new tool of microfluidics, pioneered by Associate Professor Stocker, and being applied to coral science for the first time, the team aims to create the first microfabricated coral holobiont (MCH) to overcome the inherent difficulties involved in studying the complex physical and biochemical coral environment.

Pathogenic bacteria have been implicated in coral disease and bleaching, yet little is known about their ecology, how infection occurs or how predicted elevated sea temperatures will affect the bacterial infection process.

"The MCH is really an experimental platform, a simplified artificial system that we can control in the laboratory to address fundamental questions on coral disease and test the hypothesis that specific chemical cues released by organisms within the coral holobiont favour colonisation by pathogenic bacteria," Dr Seymour said.

The laboratory research will be complemented by field studies of the chemical ecology of coral-associated microbial communities within two important coral reef ecosystems: the Great Barrier Reef and the Red Sea.

"We are so honoured to get this grant. From hundreds of proposals only twenty to thirty get fully assessed and only eleven got funded," Dr. Seymour said.

"We are excited to think that research over three continents, using expertise as diverse as molecular biology, nanotechnology and fluid dynamics has the potential to provide an entirely novel perspective on the mechanisms behind coral disease, which will ultimately aid in the management of coral reefs in the face of an uncertain future."

Provided by University of Technology, Sydney