

# Sea-quence



## Generating core genetic data for corals from the Great Barrier Reef and Red Sea, helping to guide management responses in the face of climate change.

The world's coral reef communities are incredibly diverse and a source of livelihood for an estimated half a billion people. Climate change places corals at risk through warmer water temperatures and more acidic oceans.

Our knowledge of coral resilience and their capacity to adapt is extremely limited. Bridging this knowledge gap is critical for reef managers who want to maintain the diversity and function of coral reefs and need to develop and implement innovative management approaches in order to do this.

The ReFuGe 2020 consortium has come together to help address this gap, drawing on national and international expertise from reef management and the coral reef, medical, agricultural and terrestrial genomics fields.

### The ReFuGe 2020 Consortium

The Consortium brings together leaders in coral reef science and management, including: The Great Barrier Reef Foundation, James Cook University, the Australian Institute of Marine Science, the University of Queensland, the Great Barrier Reef Marine Park Authority, the King Abdullah University of Science

and Technology (Saudi Arabia) and the Australian National University.

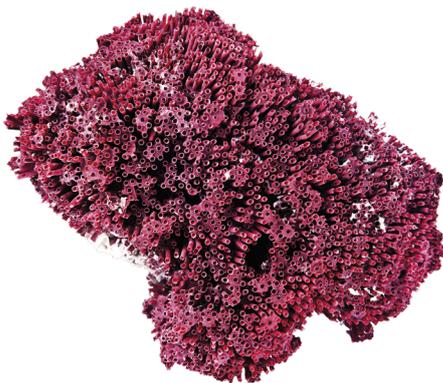
### Sea-quence

The first phase of this work is the Sea-quence Project, an initiative of the ReFuGe 2020 Consortium, convened by the Great Barrier Reef Foundation, and supported by funding from Bioplatforms Australia, Rio Tinto and a family foundation, to deliver core genetic data for a suite of corals from the Great Barrier Reef and the Red Sea. The project will be delivered in two parallel but connected parts – one in Australia and one in the Red Sea.

The Sea-quence project will:

Sequence data for 10 coral host species across 6 different coral types on the Great Barrier Reef, providing five times the currently available data;

- Sequence data for 4 algal symbionts (none currently exist);
- Develop a new suite of microbial symbiont sequence data;
- Sequence a suite of 'sister species' data for the Red Sea. This work will be undertaken by the King Abdullah University of Science and Technology of Saudi Arabia.



Great Barrier  
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The data generated will drive research into the capacity of corals to cope with stress and adapt, including the role of symbiotic algae and bacteria in coral health, the role of particular genes and how these genes move across populations of corals. This information will better equip reef managers to respond in the face of the significant threat that climate change poses to our coral reefs.

Generating data across the Great Barrier Reef and the Red Sea will also provide critical comparative information, enhancing our understanding of how and why some corals are more resilient.

The collaborations surrounding this project, together with its scale, make it a world-first.

### Who is involved in the Sea-quence Project?

ReFuGe 2020 consortium partners are investing their expertise and resources to collect and process the coral samples ready for sequencing.

Bioplatforms Australia, with support from the Commonwealth Government Super Science Initiative, is investing in the creation of large scale DNA, protein and metabolite datasets. The Sea-quence project will see Bioplatforms Australia facilities, such as the Australian Genome Research Facility, work with the coral research community to deliver much needed coral DNA data repositories.

Rio Tinto, in line with its global approach

to climate change mitigation and adaptation is providing cash investment, through the Great Barrier Reef Foundation to the Sea-quence initiative.

The further support of a family foundation will help to progress outcomes.

### Interesting facts

- The first coral genome from the Great Barrier Reef, a branching coral (*Acropora millipora*) from Magnetic Island, was sequenced in 2011, led by researchers from James Cook University.
- To date, only this coral and one other (*Acropora digitifera*) have been sequenced globally.
- It is possible for exactly the same coral species to live at both the northern and southern tips of the Reef – in waters that are on average 2 degrees different in temperature. However, both will bleach if the water temperature varies from average.

### Progress

- The genome from 4 coral species has been sequenced (*Porites lutea*, *Galaxea fascicularis*, *Goniastrea aspera* and *Fungia fungits*).
- Two coral symbionts have also been sequenced.
- Method development for extracting the bacteria and viruses from the corals has been completed and the first viral and microbial samples have been sequenced.

ReFuGe 2020 is a collaboration between



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Australian Government  
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