

Scientists collect the world's deepest mesophotic coral: A hope for rescuing shallow-water corals



Ghislain Bardout's diving computer indicates a depth of 172 m. A mesophotic coral had never been discovered at such a great depth! (Image: © Agence Zeppelin, Under The Pole)

*On 4 April 2019, in French Polynesia's Gambier Islands, Ghislain Bardout (cofounder of Under The Pole Expeditions) and two divers from his team brought back the world's deepest mesophotic coral ever collected, *Leptoseris hawaiiensis* (at 172 meters depth). Scientists from CRIOBE (Insular Research Center and Observatory of the Environment) – Laetitia Hédouin, Michel Pichon and Héloïse Rouzé who were present on that day – were able to identify the species and validate this record. In total, 4000 samples of mesophotic corals were collected by the divers during the expedition. This now represents the largest collection of its kind, worldwide. These discoveries contribute to supporting the hypothesis that the mesophotic environment acts as a refuge for shallow-water corals and, therefore, gives hope to restoring these coral types.*

Since July 2018, the team of the expedition Under The Pole III, led by Emmanuelle Périé-Bardout and Ghislain Bardout, has been focusing on the research programme 'DeepHope', a survey of mesophotic corals – found between 30 m and 150 m depths – in partnership with CRIOBE in French Polynesia. It was during this project that a specimen of *Leptoseris hawaiiensis* was collected at 172 m depth.

A unique collection worldwide

Michel Pichon, a world-renowned expert in coral reefs and coral identification who has been studying corals for over 50 years, does not hide his enthusiasm: 'I've been waiting for this kind of discovery for over 40 years. All the samples gathered by the end of the expedition will represent the largest collection of mesophotic corals in the world, especially for samples collected deeper than 90 m. The partnership Under The Pole – DeepHope is the most intense and efficient programme to this day, and the results arising from it, as well as their impact, are of critical global interest.'

Mesophotic corals: a hope for shallow-water reefs

The discovery of *Leptoseris hawaiiensis*, combined with this unique collection, prove that shallow-water corals migrate to greater depths to find shelter and thrive. 'The results represent a robust foundation on which to test the capacity of mesophotic corals to act as a refuge for shallow-water reefs that have been impacted by global climate change, and these corals' ability to play a role in the restoration of those reefs,' said Michel Pichon.

Laetitia Hédouin, who is in charge of research at the National Centre for Scientific Research (CNRS), and an expert in coral biology, concurs: 'We will never be talking about coral reefs anymore without taking into consideration the ocean depths as being a potential survival raft. The mesophotic corals represent a real hope to restore the reefs,' she explains.

Without the contribution of mesophotic coral larvae to recolonise shallow-water reefs, the

chances of shallow-water reefs surviving unprecedented global climate changes would be very slim. By shedding some light on a widely unknown part of the reefs, we hope to contribute to the implementation of management and protection measures to preserve those reefs. These discoveries reveal a completely new vision on how reefs function. They operate as a continuum from the surface to the mesophotic areas, with different coral communities living next to each other. Up until this day, we thought that about 25% of corals could live from the surface down to greater depths. What we have discovered is that this trend is completely inverted, with over 60% of species being present at depth. This is a fundamental discovery and it supports the hypothesis that corals could find shelter in deeper water, where the environment is less impacted than in shallower water environments. The collection of a mesophotic coral at 172 m depth triggers new intriguing questions about the ability of corals to live in hostile environments. The expedition will continue during the next three months, and the results following the completion of this program will have a global outreach and will certainly set the new baseline of knowledge on mesophotic reefs.

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Laetitia Hédouin, a researcher at the National Centre of Scientific Research (CNRS) at CRIOBE. (Image: © Agence Zeppelin, Under the Pole)

‘With the existing ecological urgency, it is critical to do whatever it takes to acquire the knowledge that will help us protect the oceans and manage their resources in a sustainable way.’



Ghislain Bardout, co-founder of Under The Pole Expeditions. (Image: © Agence Zeppelin, Under The Pole)

‘I’ve been waiting for such discoveries for 40 years. These results will constitute the absolutely necessary baseline to test the hypothesis regarding the capacity of mesophotic corals to act as a refuge.’



Michel Pichon, coral reef expert biologist. (Image: © Agence Zeppelin, Under The Pole)

Coral ecosystems: the tropical forest of the oceans

Life on Earth started 3.5 billion years ago. After centuries of scientific expeditions about 2 million species have been discovered, one-third of which come from the oceans. In the oceans, coral reefs occupy an extremely small area, less than 1% of the planet, but they are one of the most diversified ecosystems. They are home to 25% of all marine life and their biodiversity is equivalent to tropical forests. Reefs are one of the last prolific habitats on Earth that remain widely unknown despite feeding over 500 million people and being the basis of a touristic economy estimated at USD 9.6 billion yearly. Coral reefs are not just useful for insular populations, but their impressive marine biodiversity is like an underwater pharmacy with encouraging leads for medical research. Medicines from corals have been already developed to treat cancer, asthma and arthritis.



Collected specimen identification time for Michel Pichon and Héloïse Rouzé onboard the research vessel. (Image: © Agence Zeppelin, Under The Pole)



Collecting samples of mesophotic corals. (Image: © Agence Zeppelin, Under The Pole)

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