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STUDY OF THE MICROBIAL DIVERSITY IN THE HYDROTHERMAL VENTS OF THE PESCADERO BASIN IN THE GULF OF CALIFORNIA

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Deep-sea hydrothermal vents represent unique ecosystems on our planet due to their extreme conditions. They are one of the most suitable places to study the limits of life on Earth. This kind of studies is of high interest to Astrobiology because the possibility of the presence of hydrothermal vents in the icy bodies of the Solar System (frozen satellites with liquid water inside), and also because hydrothermal vents represent a possible environment for the origin of life on Earth.

The exploration of the seafloor in the late 70s led to the discovery of hydrothermal vents and a bast number of microorganisms supporting life around these vents (Ballard, 1977). In October and November 2018, an oceanographic cruise expedition was carried out to the southern Gulf of California. The objective was to investigate the geology, physicochemical conditions, and microbiology in the recently discovered hydrothermal vent fields in the Pescadero Basin at 3800 meters depth (Goffredi et al. 2017). This work aims to study the microbial diversity inhabiting the sediments around the hydrothermal vents under extreme conditions, like temperature, pressure, pH, anoxia, and nutrients availability.

By using SuBastian (the submersible ROV, Figure 1), ten sediment cores of approximately 30 cm were collected and processed later in the lab. Subsamples of the sediments were taken to perform DNA extraction, 16S rRNA gene amplification, sequencing, and genomic analysis using the QIIME2 bioinformatics program. So far, representatives of the Archaea and Bacteria domains have been found. These are prokaryotic groups expected for marine ecosystems like hydrothermal vents. For example, hyperthermophiles, acidophiles, sulfate-reducers, sulfur oxidants, nitrifiers, methane oxidants, among others.

Fig. 1. The remote operation vehicle ROV SuBastian used for the exploration of the seabed and the collection of sediment cores during the 2018 oceanographic campaign.

Finally, hydrothermal vents have been proposed as sites where life originated on Earth and possibly elsewhere. Such as in the frozen moons of Enceladus (Saturn) and Europa (Jupiter). Whether or not these bodies of the Solar System contain hydrothermal vents have not been confirmed yet, but if so, the study of terrestrial hydrothermal vents is of great importance for the Astrobiology field (Hand et al. 2007).

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