

Effects of local and global stressor on canopy-forming algae and their microbial community

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From whales and dolphins over sharks and clown fishes to sea stars, since we were children we have been fascinated by the amazing and colourful variability of the creatures present in the oceans. Thousands of publications in the last century have studied a lot of aspects of these organisms. However there is a hidden world that is completely invisible from our eyes and for which there is a growing interest by researchers. Amazing microscopic organisms most of them bacteria inhabit this world. There are about one million of bacteria per millilitre (less than one teaspoon) of water in the coastal ocean. This means that in a little water tank we could find as many bacteria cells as there are people on earth. Although so tiny, lots of these bacteria play a fundamental role in nutrient turnover in the oceans. However, they are also subject to the same mechanisms that govern the macroscopic world such as environmental conditions and anthropogenic activities.

Human activities could alter the normal functions of marine ecosystems. In the last century stressors like pollution, invasive species and climate change are affecting the resilience and productivity of marine ecosystems. The present study focuses on the interactions between bacteria and important coastal habitat composed by brown algae of the genus *Cystoseira*. These algae are denominated canopy-forming and constitute an important component of the intertidal and subtidal rocky shores of the Mediterranean Sea. Their presence creates a habitat with high biodiversity since they provide biogenetic structure, food and shelter for many organisms including invertebrates, arthropods and fishes. Canopy-forming algae are crucial to maintain high levels of biodiversity of the coastal ecosystem. At present these habitats are threatened in different parts of the world by human activities.

This study aims to understand if the increase of nutrients (caused by human pollution) and the increase of air temperature (caused by climate change) could affect the composition of the microbial community that grow on *Cystoseira compressa*. Secondly, I'm also interested to explore the interaction between these two players. Between June and October 2014 I carried out a factorial experimental design to assess the direct and indirect effect of nutrient enrichment and increasing temperature on intertidal *C. compressa* and its associated microbial community. During these months the photosynthetic activity of the algae and the epibiotic bacterial community were collected. To analyse the composition and the possible variations of the bacterial community a DNA barcoding technique is used.

Preliminary results reveal a significant effect on nutrient levels in the tissue and the photosynthetic activity of the algae. The photosynthetic activity during the simulated heat wave reveals that, while the increase of temperature has a significant effect, no significant effect is observed from the interaction of the two stressors. However the exposure time seems to be important. The analysis of the bacterial community is still ongoing. Their results will allow drawing a more complete conclusion of the work.