In search of marine Antarctic cyanobacteria

Lara Yannick[1], Igor S. Pessi[1], Benoit Durieu[1], Gilles Lepoint[2], Annick Wilmotte[1] and Loic Michel[2]

[1] INBIOS- Centre for protein engineering, University of Liège, 4000 Liège, Belgium
E-mail: yannicklara@gmail.com
[2] Laboratory of Oceanology, FOCUS research unit, University of Liège, 4000 Liège, Belgium

Cyanobacteria are among the most ancient prokaryotic phyla present on the planet. They are thought to be responsible of two major geological changes and evolutionary process, the Great Oxygenation Event and the Endosymbiosis, which supported modern Life. In Polar freshwater and terrestrial ecosystems, cyanobacteria often constitute the major carbon fixers and the base of the food web. They are present in a wide range of habitat from hypersaline lakes to cryoconites. Nevertheless, their presence between the Polar front and Antarctic coast remains enigmatic. For a long time, it has been accepted that they were not present in Antarctic waters (Wilkins et al., 2012). However, they were found in low abundances in two publications, which were investigated the water column (Wilmotte et al., 2002; Wilkins et al., 2013). There is still a lack of information regarding their presence and role in Antarctic coastal waters.

In order to investigate the presence of cyanobacteria in Antarctic marine benthos, samples were collected by scuba diving during two expeditions (2015, 2016) in the Lion's channel, (Terre Adélie, Antarctica). Samples were directly frozen, dried or fixed with formaldehyde. DNA was extracted from one frozen sample and two dried samples. Then, 16S rRNA V3-V4 region was amplified using cyanobacteria-specific primers. Amplicons were sequenced using MiSeq Illumina technology. In parallel, fixed and frozen samples were scrutinized by microscopy.

We obtained 14 558 reads, which were related to Cyanobacteria. They clustered into 97 OTUs and belong to six orders (Chroococcales, Nostocales, Oscillatoriales, Pseudanabaenales, Stigonematales, Synechococcales) with a large dominance of Pseudanabaenales. Thirty-one of the cyanobacterial OTUs were 100% identical to sequences of strains isolated from freshwater environment, and air samples from both temperate and Polar regions.

Microscope observations revealed the presence of at least 3 cyanobacterial morphotypes including thin filaments, large Oscillatoriales, and a potential symbiotic or opportunist Nostocales.
Albeit the low abundance of reads attributed to cyanobacteria, it remains necessary to assess their ecological role in Antarctic coastal waters.

References

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