Fantastic beasts and when to find them. Characterization of the dominant mixoplankton in the Belgian Coastal Zone (BCZ) based on molecular biology data

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Mixotrophy is the ability to combine phototrophy and phagotrophy in one single organism, which is now recognized to be globally widespread among marine ecosystems (Stoecker et al., 2009; Zubkov and Tarran, 2008). All marine planktonic eukaryote groups besides diatoms include mixoplankton (Burkholder et al., 2008; Flynn and Hansen, 2013; Sanders and Porter, 1988), however, the understanding of this prevailing trophic strategy and the role of mixoplankton is still in its infancy.

Mixoplankton emerge when strict autotrophs and/or heterotrophs do not dominate, thus in the absence of abundant light, nutrients or prey (Mitra and Flynn, 2010) and they are mainly classified depending upon the origin of the chloroplasts: either constitutive mixotrophs (CM) or acquired from their phototrophic preys; non-constitutive mixotrophs (NCM) (Mitra et al., 2016). Their abundance, diversity and potential ecological role has made marine researchers to highly focus on mixotrophs during last decade.

This study aims to (1) characterize the spatial and temporal variations of the dominant mixoplankton-types, based on molecular biology data -metabarcoding- and (2) to explore the correlation of their abundance and diversity with environmental parameters such as temperature, salinity, nutrients.

In order to address these objectives, an annual monitoring was carried out on the *RV Simon Stevin (VLIZ)* at 5 fixed stations located along a nearshore-offshore area in the Southern North Sea, covering the BCZ . Physical, chemical and biological parameters were measured and DNA samples were obtained. DNA extraction, libraries were prepared and 18S rRNA gene sequenced using Illumina MiSeq technology. Taxonomical annotation of Operational Taxonomic Units (OTUs) was performed using Silva v 1.32 data-base and most abundant ones were BLAST-ed.

Preliminary results (March-July 2018) show that mixoplankton has a significant weight in respect of the spring-summer period sampled in 2018 in the BCZ. Particularly constitutive mixotrophs showed a notable growth in between autotrophic and heterotrophic dominance whereas non-constitutive mixoplankton were less abundant during the timeframe studied. Upcoming results will contribute to comprehend when, where and under which environmental conditions mixoplankton species such as CM and NCM occur.

References
- Burkholder, J. A. M., Glibert, P. M., and Skelton, H. M. (2008). Mixotrophy, a major mode of nutrition for harmful algal species in eutrophic waters. Harmful Algae 8, 77–93. doi:10.1016/j.hal.2008.08.010.
- Flynn, K. J., and Hansen, P. J. (2013). Cutting the canopy to defeat the 'Selfish Gene'; Conflicting selection pressures for the integration of phototrophy in mixotrophic protists. Protist 164, 1–13. doi:10.1016/j.protis.2013.09.002.

- Mitra, A., and Flynn, K. J. (2010). Modelling mixotrophy in harmful algal blooms: More or less the sum of the parts? J. Mar. Syst. 83, 158–169. doi:https://doi.org/10.1016/j.jmarsys.2010.04.006.
- Mitra, A., Flynn, K. J., Tillmann, U., Raven, J. A., Caron, D., Stoecker, D. K., et al. (2016). Defining Planktonic Protist Functional Groups on Mechanisms for Energy and Nutrient Acquisition: Incorporation of Diverse Mixotrophic Strategies. Protist 167, 106–120. doi:10.1016/j.protis.2016.01.003.
- Sanders, R., and Porter, K. (1988). Phagotrophic phytoflagellates. Adv. Microb. Ecol. 10, 167–191. doi:10.1007/978-1-4684-5409-3_5.
- Stoecker, D. K., Johnson, M. D., De Vargas, C., and Not, F. (2009). Acquired phototrophy in aquatic protists. Aquat. Microb. Ecol. 57, 279–310. doi:10.3354/ame01340.
- Zubkov, M. V., and Tarran, G. A. (2008). High bacterivory by the smallest phytoplankton in the North Atlantic Ocean. Nature 455, 224–226. doi:10.1038/nature07236.