11OR.6

HASLEA OSTREARIA-LIKE DIATOMS OR 'LA VIE EN BLEU'

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The genus *Haslea* is a taxonomic unit of marine pennate diatoms defined by R. Simonsen in 1974, which refers to fusiform or lanceolate cells, the frustule of which is made of two valves, each presenting two layers assembled in a typical bi-layered structure. *Haslea* frustule valves present characteristically a totally different aspect when comparing their external and internal surfaces. The former presents continuous longitudinal fissures, the latter is perforated by areolae, square to rectangular openings, forming grate-like bars. The genus *Haslea* type species is *Haslea ostrearia*, a tychopelagic/benthic/epiphyte organism that produces marennine, a water-soluble blue pigment. Marennine is a bioactive compound with antioxidant, antimicrobial, and allelopathic effect against other diatoms. It is also responsible for the greening of oysters in refining ponds in Western France, however, the greening of bivalves or other invertebrates' gills occur naturally elsewhere in the world (*e.g.*, USA, Australia). For decades, any record worldwide of a blue diatom or green-gill bivalves was assigned to *H. ostrearia*. However, recent works on the blue *Haslea* using scanning electron microscopy and molecular approaches have enlightened unexpected biodiversity of this taxon, with the description of new species, *H. karadagensis* collected in the Black Sea, *H. provincialis* in the Mediterranean Sea, and *H. nusantara* in the Java Sea. Some progress has been made regarding our knowledge about the formation of blue *Haslea* blooms in natural environments, the possible consequences of the amount of marennine-like pigments produced and released in seawater, and the chemical nature of these pigments. NMR spectroscopy has revealed that the scaffold of marennine is a complex polysaccharide, probably with an aromatic aglycon as chromophore. The composition of the carbohydrate has been determined quantitatively after hydrolysis.

6PO.16

ANALYSIS OF THE METHODS USED TO CLEAN SOFT-BOTTOMS DIATOMS SAMPLES

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This study aims to identify the main methods used to clean samples of benthic diatoms and discuss the advantages and drawbacks of these methods. We performed a bibliographic search in the Web of Science database and selected 98 studies involving "microphytobenthos" or "benthic diatom" that took sediment samples and mentioned frustules morphological identification. Cleaning approaches were classified as: the use of acid(s) only, oxidant only, a combination of acid(s) + oxidant, density-based isolation, cremation, and other non-chemical approaches, such as traps and sieving/filtering. The category acids only represented 22.4% of the studies, followed by acids + oxidant (22.4%) and oxidant (12.2%). The other categories combined represented 12.2% of the studies. The most common oxidants used were H_2O_2 and $KMnO_4$. The most common acids used were HNO_3 and HCl. Oxidants are used to degrade

organic matter and should be preferred over the acids. Acids like HCl promote higher dissolution of silica surfaces and should be used when carbonates are relevant in the sample. Thus, the choice of the method must be done in accordance with the nature of the study area, but authors seemed to neglect this aspect. Moreover, 20.4% of the papers gave inconsistent information about the methodology used to clean the samples or did not use any type of method, and even the papers that specified which chemicals were used, did not inform the protocol in a way that allow replication. The reasoning for the use of reagents must be stressed in the studies to improve, facilitate and encourage future studies in this field.

7PO.47

FIRST *EX SITU* OUTPLANTING OF THE HABITAT-FORMING SEAWEED *CYSTOSEIRA AMENTACEA* VAR. *STRICTA* FROM A RESTORATION PERSPECTIVE

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In the Mediterranean Sea, brown algae belonging to the *Cystoseira* genus play a valuable role as foundation species. Due to evidences of regression/loss of the habitats of these species caused by the interplay of human and climatic disturbances, active restoration measures have been encouraged by EU regulations. In particular, nondestructive restoration techniques, which avoid the depletion of threatened species in donor populations, are strongly recommended. In the framework of the EU project ROCPOP-Life, the first ex situ outplanting experience on *Cystoseira amentacea* var. *stricta* has been implemented in the Cinque Terre Marine Protected Area (northwestern Mediterranean). A total of 400 clay tiles, hosting approximately 3 mm-long germlings of *C. amentacea*, were fixed to the rocky shore with screws: the tiles were monitored for the next two months by photographic sampling, and survival (presence/absence of juveniles on the tiles), cover and growth were assessed. Additional sampling was performed 6 months after tile deployment, after which an unprecedented storm surge severely affected the restoration performance. After two months, over 40% of the tiles were covered with *Cystoseira* juveniles, which reached approximately 8 mm in total length. The tiles that survived the storm hosted 3-6 cm-long juveniles. The high cover (> 25%), assuring moisture and shading, and the appropriate size of the juveniles, to avert micro-grazing, at time of deployment were key to the survival and growth of the outplanted juveniles, increasing the potential for restoration success.
Our finding show that outplanting of midlittoral canopy-forming species is a feasible approach for restoration efforts, with particular attention given to the early phases: i) laboratory culture, ii) transport, and iii) juveniles densities. These results are strongly encouraging for the implementation of restoration actions for *Cystoseira amentacea* on a large scale, in light of EU guidelines.

W1PO.3

PHOTOSYNTHETIC PHYSIOLOGY OF THE HAPTOPHYTE *EMILIANIA HUXLEYI*: MAJOR ENVIRONMENTAL DETERMINANTS AND SIGNATURE OF VIRAL INFECTION IN THE FIELD.

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The determination of the relative influence of genetics, abiotic parameters and biotic interactions on photosynthesis in the marine environment is one of the current major challenges. This issue was explored during a bloom and demise of the haptophyte *Emiliania huxleyi* in a field-based mesocosm (Bergen, Norway). We followed the daily and diurnal evolution of a large set of photosynthetic parameters including photosystem II characteristics (Fv/Fm, absorption cross section, connectivity), photosynthesis versus intensity curves (maximal electron transfer rate, saturation light intensity) as well as high light responses (extent and dynamics of photoprotective mechanisms, photoinhibition). Using a statistical approach, we tested the correlation between photosynthetic variables and abiotic and biotic parameters (temperature, light irradiance, phytoplankton composition, bacterial and viral counts…) and revealed the roles of temperature and light in the regulation of photosynthesis in this haptophyte. We also highlighted a specific photosynthetic signature of its viral infection during bloom demise.