
Plenary Lectures

ALGAL CHANGES IN THE MEDITERRANEAN SEA: DRIVERS, EFFECTS AND POLICIES

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Recent Mediterranean marine flora is the result of an interplay between historical and paleoclimatic events that have taken place during the last 5 million years. Urbanization and eutrophication processes amongst others e.g. climate changes, are now affecting diversity and distribution of benthic macrophytes and especially the slow growing, perennial and habitat forming species. What are the mechanisms responsible for these changes and is it possible to link community patterns with anthropogenic stress? Towards answering these questions quantitative destructive samples were hierarchically collected from the field and stressor-response relationships studied under laboratory conditions. Nutrient and light resource allocation strategies, including plastic and non-plastic responses, seem to be mainly involved in species adaptation across a water pollution gradient. The existence of two basic functional groups (ESG I, late-successional; ESG II, opportunistic) were identified that were hierarchically divided into three and two sub-clusters, respectively: ESG I comprises thick perennial, thick plastic and shade-adapted plastic species, and ESG II comprises fleshy opportunistic and filamentous sheet-like opportunistic species. In agreement with this (1) functional diversity (functional group richness) was found to be a better indicator of water quality degradation in the N. Aegean Sea than species diversity and (2) metal toxicity tests have revealed that benthic macrophytes are relatively resistant, with toxicity depending on the availability of cellular sites and therefore on growth rate. Such an approach,

however, should be also calibrated against the “paradoxical” behaviour of invasive benthic micro- and macro algae as well as against pressures such as herbivory. An array of tools and techniques to measure and monitor water changes within the European Water Framework Directive (WFD) will be presented.

DIVERSITY AND TAXONOMY OF SEaweEDS: AN EVOLUTIONARY PERSPECTIVE

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The principal goals of systematic biology are to determine how species can be distinguished from one another, how they are related to one another, and how species diversity is distributed across the globe. Species and patterns of diversity are produced by evolutionary processes such as speciation, extinction and dispersal. High-throughput technologies will progressively allow us to gather the type of data needed to address questions about taxonomy and diversity patterns from an evolutionary perspective. As we assemble these large datasets, we will be able to test more complex hypotheses about organisms but biology will also become a more computational science. I will discuss a selection of computational techniques to study the key questions of systematic biology in an evolutionary context. We will look at results about algorithmic species delimitation in marine macroalgae based on datasets of DNA barcodes and multigene alignments and show how these techniques can interact with morphological investigations to improve taxonomies. We will see how the diversification of some green and brown seaweed taxa in ecological and geographical dimensions through time has produced their present patterns of biodiversity. I will close with some perspectives about how high-throughput technologies can continue to deliver relevant information about algal systematics and biodiversity.