Preface

Modern marine microbial ecology can be considered to have started in the 1970s, when it was shown that most respiration in the oceans was in the bacterial size fractions and that bacteria ere very abundant. Before that time, microbes were not even considered in the ecology of the oceans. Now-a-days, however, marine microorganisms are nown to be responsible for half of the total primary production on the planet, and the 1030 icrobial cells present in the oceans account for more than 95% of the total respiration. The hange of perspective, therefore, has been spectacular.

The application of genomic approaches to marine microbial ecology in the past few years has caused a kind of Copernican revolution. Thanks to such techniques, novel functions have been discovered, a large diversity of microorganisms has been uncovered, and the meaning of concepts such as pecies, genome, and niche has been challenged This article reviews the different genomics-based approaches relevant for marine microbial ecology and uses one example from each to demonstrate their tremendous possibilities.

The Microbial Habitat Group investigates the structure, dynamics and evolution of microbial habitats. This includes research on the physical and chemical characteristics of microbial habitats, such as transport processes between marine sediments and the water column, and energy fluxes across oxic/anoxic hemoclines, between light and dark environments and from solid to solute and gaseous phases. Together with the observation of physico-chemical characteristics we analyze their ecological

consequences, and develop models for these processes. Our research is accompanied by advances in marine technologies to resolve the spatial and temporal dynamics of microbial habitats in situ as well as in experimental set-ups.

Among the microbial habitats currently investigated are detritus particles, coral exudates, sandy sediments, intertidal flats, shallow- and deep-water hydrocarbon seeps, mud volcanoes, gas hydrates. Our research is tightly linked to the characterization of the microbial populations dominating individual habitats (by the department of Molecular Ecology and Microbiology), as well as to the analysis of their function and contribution to carbon flow (by the Biogeochemistry and Microsensor group).

The microbial habitat describes as the physical location and type of environment in which a population of microorganisms lives. Hence, this research group studies the physical, chemical, geological hydrological and biological characteristics of distinct microbial habitats. The goal of our research is to understand structure and change of microbial ecosystems, the formation of niches for microbial populations and to investigate environmental dynamics and their consequences on the occurrence, biodiversity and distribution of microbial populations. The uniting topics to all researchers in the group is to obtain: (1) "true" quantitative insight to ecosystem structure, dynamics and biogeochemical fluxes based on *in-situ* measurements; and (2) insight into the related variations in microbial biodiversity on relevant spatial and temporal scales.

– Author