Dynamics of microbial communities across the three domains of life in the Bay of Biscay with emphasis on marine mucilage

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Abstract

Microorganisms are widely distributed in all marine habitats, from subseafloor to sunlit surfaces and throughout the entire water column. There are associated in more or less complex communities comprising bacteria, archaea, protists and fungi. Despite recent methodological advances our view of microbial diversity of marine ecosystems across time and space is still fragmented. Since all microorganisms of any domain may be intimately linked, it is important to consider communities as a whole. However integrated approaches considering the three domains of life are scarce and preclude a comprehensive and holistic understanding of the functioning of marine ecosystems. In coastal areas marine microbial communities are impacted by human activities and submitted to important environmental variations that may affect the natural equilibrium between the memberships of the communities. Thus over the oceans, various mucilaginous materials have been repeatedly observed in coastal areas, whether or not they reflect natural population cycling is not clear. In the South of the Bay of Biscay such phenomenon, termed the "Liga" has been observed recurrently over this last years. To get a better understanding of the causes of appearance, the dynamics, and the respective role of microorganisms in mucilage formation we targeted the microbial component across the three domains of life and compare the mucilage community with that of surrounding environmental compartments. We use molecular fingerprinting to characterize over one year the microbial community dynamics in the mucilage and in two additional compartments: the seawater where marine mucilage arose and the Adour River water a few kilometers upstream of the mouth, in order to evaluate the role of continental inputs. We demonstrate that the Liga constitutes an ecological niche for some microorganisms in the Basque coastal ecosystem. It is a transitory ecosystem that derived from marine communities in response to nutrients input from the Adour River.

Key words: microbial communities, molecular fingerprinting, mucilage, seasonal dynamic