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Symposium

Microbial biogeography and diversity patterns: extending classical ecology theories or defining new paradigms?

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Despite the prominent role of microorganisms in biogeochemical cycles and ecosystem functioning, still is there a lack of knowledge concerning major ecological rules governing their diversity patterns at different spatial and temporal scales. In particular, it remains unclear (i) at which spatial scales diversity patterns are structured, (ii) to which extent the spatial distribution of microorganisms is controlled by environmental filtering, spatial isolation, or both, (iii) whether general biogeographical and macroecological patterns such as the latitudinal diversity gradient and the decay of community dissimilarities with geographic distances or area can also be observed in microbial communities in different realms. For several decades, scientists have in fact believed that microbes did not have any biogeography or meaningful ecological patterns, because of their small sizes, yet large population sizes, and seemingly ease of dispersal. This was conceptually formulated for bacteria in 1934 by Lourens G. M. Baas Becking in his now famous dictum: 'everything is everywhere but the environment selects'. Yet, molecular data, combined whenever possible with sexual reproduction data, have shown that microbial diversity has been underestimated by several orders of magnitude. Hence, the application of the morphospecies concept as in classical ecology to the microbial case may likely result in an underestimation of the real biodiversity of the latter and may potentially mask macroecological and biogeographical patterns. The recent development of molecular methods (e.g. metagenomics, high-throughput sequencing) now enables the description of the distribution of microorganisms in both the marine and the terrestrial realms at the regional and global scales at an unprecedented rate, and it is therefore timely to determine points of convergence and divergence between microbial patterns and patterns described in classical ecological studies. This session thus aims at bringing together scientists dealing with the macroecology and biogeography of prokaryotic and eukaryotic microbial communities and at assessing their congruence and disparity with patterns found in multicellular organisms.

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