Microdiversity of cosmopolitan coccolithophores through an oligotrophic gradient in the Mediterranean Sea

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The phylogeography of keystone phytoplankton species has rarely been considered at an infra-specific level in climate change “hot spots”. By providing relevant information about genetic structuring, such studies can shed light upon how environmental changes are impacting distribution and diversity in phytoplankton populations. In this study, we investigated the microdiversity of the *Emiliania* complex in the oligotrophic waters of the Mediterranean Sea during the summer of 2008. We compared environmental libraries of mitochondrial DNA retrieved from samples collected along a west-to-east transect. Most of the sequences clustered either within the ubiquitous Alpha haplogroup or within an unexpected new haplogroup (termed Delta). Alpha haplotypes contributed primarily to the overall genetic differentiation that was reflected in a shift in dominance between two sub-haplogroups, alpha 1 and alpha 2. More prevalent in the eastern stations, alpha 2 was characterized by ultra-oligotrophy and higher light, temperature, and alkalinity, in contrast to alpha 1, which was more abundant in less oligotrophic conditions. Delta haplotypes were associated with western stations that had lower temperatures and higher nutrient and oxygen concentrations. Demographic modeling analyses suggest that the Alpha metapopulation experienced a recent expansion. Because environmental variations shape phylogeographic patterns, global warming and ocean acidification may selectively impact the diversity of this key component of the pelagic ecosystem.