School of Life, Health and Chemical Sciences

Doctor of Philosophy (Ph.D.)

Phylogenetics and Phylogeography in the Planktonic Diatom Genus *Chaetoceros*

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Abstract

The initial aims of this thesis were to assess the systematics of the planktonic diatom genus *Chaetoceros* and the phylogeographic patterns of selected species in this genus across spatial and temporal scales. As expected in every experiment, some initial ideas have been pursued as they were; others have taken a different route and led to different questions. Consequently, the systematics of *Chaetoceros* has become a multigene phylogeny and a revision of the classical taxonomic scheme for the family Chaetocerotaceae (Chapter II). Then, the phylogeographic approach, initially meant as a Sanger sequencing of a few genes from specimens collected around the world, turned into the analysis of the *C. curvisetus* cryptic species complex by using an approach which combines haplotype networks and metabarcoding data (Chapter IV). The mapping of this complex against a temporal metabarcoding dataset (MareChiara, Gulf of Naples, IT) has become a story of concerted evolution and has been extended to different *Chaetoceros* species and supported by a single strain 18S-V4 high throughput sequencing (Chapter V). Amid these experiments, the potential of metabarcoding data for biological recording was explored and tested in the whole genus *Chaetoceros* to assess diversity and distribution (Chapter III). Such data were integrated with classical ones from public repositories and literature and used to produce, among the other results, distribution maps of *Chaetoceros* species.