Investigating the role of connectivity in diatom ecology and evolution

Director of Studies: Daniele Iudicone
Department Integrative Marine Ecology

Investigating the role of connectivity in plankton ecology and evolution by genomics

The Stazione Zoologica of Napoli, Italy and Genoscope in Evry, France propose a PhD internship to study how the oceanic connectivity affects marine ecosystem diversity using environmental genomics approaches.

An enduring challenge is to comprehend how marine plankton has developed and maintains its relatively large diversity, characterised by a complex web of interactions, while living in a largely unstructured environment. As the local composition of plankton communities are controlled by ocean circulation and resource delivery, together with organismal acclimation and adaptation, understanding the relation between the local distribution of species and the large scale oceanographic patterns becomes crucial. At this regard, since the 1930s, the hypothesis that "everything is everywhere but the environment selects" has shaped theories of marine biogeography, questioning the possibility of an actual endemicity for plankton species. However, recent progresses in genomics allowed to acquire and to compare data from different types of wild marine organisms at ocean scale. In particular, genomics data from the expedition *Tara* Oceans provide the possibility to address the question of physical connectivity between organisms by ocean circulation at DNA level.

In this project, with the student we will bring together expertise in theoretical ecology, genomics and oceanography to explore how the physical connectivity between oceanic regions may contrast the stable coexistence of many species, and favour the establishment of new species. We will pay particular attention to the hypothesis that on ecological time scales gyres and main current systems do actually isolate the species into local populations. We will develop and use models to test specific hypotheses on plasticity, adaptation, microevolution, speciation and collective processes.

The position will be held in Napoli, Italy with multiple stays at Genoscope near Paris, France. Daniele Iudicone (Director of Studies), Remo Sanges and Olivier Jaillon (Supervisors) will supervise this work. Numerous interactions with other members of *Tara* Oceans consortium are to be considered.

Ideal candidate will have a strong background in one or several of following skills: oceanography, marine ecology, numerical ecology, evolutionary genomics, comparative genomics. The student work will be computational. A desirable asset would be knowledge of the linux operative system, a scripting language, sequencing and functional genomics data and biological and bioinformatics databases and tools.