Plankton-benthos coupling at different time scales

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Project Summary

Sediments host a reservoir of dormant stages – e.g., cysts, spores, resting eggs - of uni- and multicellular organisms. Results produced using new methods based on High Throughput Sequencing (HTS)-metabarcoding show that the diversity of taxa that produce resting stages is still underestimated. These dormant stages constitute a sort of 'seed-bank', a strategy to cope with adverse or highly fluctuating environmental conditions and to allow the persistence of the planktonic population in a certain area. It has been shown that resting stages can be preserved in the sediments for decades, thus providing an archive of past populations.

This project aims to assess the abundance and composition of resting stages of marine protists, copepods and cladocerans using classical methods based on the identification in light microscopy as well as HTS metabarcoding at two sites: the Long Term Ecological Research station in the Gulf of Naples, monitored for phyto- and zooplankton since 1994, and a nearby area that has been impacted by pollution during the second half of the past century. Both surface sediment and sediment cores samples will be analyzed to explore the composition over time scales spanning from seasons to several decades.

The integrated morphological and molecular approaches will allow us to shed light on the components of planktonic communities that produce dormant stages (contribution to biodiversity assessments). The planktonic and the benthic life phases of the same species are linked together but the implications of dormancy for the population dynamics at both short (seasonal) and long (multiannual) scales has been poorly explored. This gap will be addressed by the analysis of long-term patterns of target phyto- and zooplankton species that produce resting stages together with relevant environmental parameters. This study will provide information to test the hypothesized advantage of seed-banks under changing environmental conditions. Upon germination/hatching of resting stages stored in deeper layers of sediment cores, strains/individuals of different ages can be obtained. They represent ideal material for 'resurrection ecology' approaches aimed to test specific adaptations to past and future environmental conditions.