



UNIVERSITY OF CYPRUS
DEPARTMENT OF BIOLOGICAL SCIENCES

The Department of Biological Sciences cordially invites you to the thesis defense
of the PhD candidate

Louis Hadjioannou
(Dr. Spyros Sfenthourakis Research Laboratory)

entitled

“Ecological and biological responses to environmental changes, in the endemic scleractinian coral *Cladocora caespitosa* (Linnaeus, 1767), in Cyprus”

Abstract

The present thesis explores the ecological and biological responses to environmental changes in the Mediterranean coral *Cladocora caespitosa* in Cyprus. This colonial scleractinian coral species has a patchy distribution along the Mediterranean Sea and holds relatively large communities in Cyprus. We studied colonies at two areas situated in the southeast of Cyprus that hold an abundance of *C. caespitosa* colonies, a naturally oligotrophic site (Kryo Nero) and an anthropogenically impacted eutrophic site (Liopetri).

Through systematic monitoring of colonies in the warmest months of 2014 and 2015, we observed a mortality event of corals that resulted in the decline of ‘Pigmented tissue’ and an increase of ‘Recently necrotic’ areas in corals at both study sites. Coral deterioration was significantly more in 2015, associated with prolonged periods of high temperatures (>29 °C). Differences in effect were observed between the sites and attributed mainly to the elevated nutrient concentrations. In addition, during an extreme winter windstorm, 7% of the colonies at Kryo Nero suffered 50% mortality due to storm-generated waves, which forced boulders to collapse on top of them.

We measured *Cladocora* growth rates (~2.9 mm/yr) to be similar as in the Western Mediterranean. Interestingly, common garden experiments showed that corals collected from the oligotrophic site and transplanted in the eutrophic had, at least in the short term, much larger growth rates (6.2 mm per year) assumingly due to the elevated nutrient conditions.

We assessed the sexual condition and reproductive cycle of *C. caespitosa* at the oligotrophic study site considering some environmental parameters (sea surface temperature and surface primary

production) and compared our results with the ones from Western Mediterranean and Adriatic Sea. We identified *Cladocora* in Cyprus to be gonochoric, with spawning occurring at the end of the summer, much like the ones from Western Mediterranean, but in contrast to the ones from the Adriatic, which have been described as hermaphroditic that spawn at the beginning of the Summer. We found temperature to be an important driving factor for gamete development and spawning, but no association with primary production had been detected.

We collected samples of colonies from both sites (eutrophic vs oligotrophic), maintained under the right nutrient conditions in aquaria and exposed to temperature increase in order to investigate the role of the nutrient history in influencing the response of *Cladocora caespitosa* to thermal stress. Colonies grown in nutrient-poor conditions bleached and significantly decreased their protein content and rates of net photosynthesis. On the contrary, colonies grown under nutrient enrichment presented no sign of bleaching and no change in their overall metabolism. Our results show how nutrient history can influence the response of scleractinian corals to thermal stress. In addition, they suggest that corals with a high success in eutrophic nutrient rich environments are likely those with a high heterotrophic capacity.

Continuous and systematic monitoring should be conducted on *C. caespitosa* colonies covering all regions in the Mediterranean, in order to identify the long-term effects of extreme climatic events and anthropogenic intrusions, such as elevating nutrient concentrations. The results will be valuable to the identification of solutions and directions towards proper management and conservation.

Wednesday, May 8, 2019 at 10:00
Building ΘΕΕ02, Room B230 (Panepistimioupoli Campus)

The presentation is open to the public.