



MOLECULAR ECOLOGY, CLIMATE CHANGE, CORALS, WHOLE GENOME RESEQUENCING, SPECIES DELIMITATION, HYBRIDATION

IDEA / PROPOSAL:

Intraspecific genetic diversity is one of the pillars of biodiversity supporting population resilience and evolutionary potential. Population genetics is at the heart of conservation biology since its early days. The characterization of the patterns of genetic diversity and structure allows to detect hybridization/admixture and to identify populations, which can be used to design evolutionary significant vs. management units, and to assess population size and connectivity, which can inform on stock size and resilience. Through population genetics, the ability of populations to persist and adapt to environmental change can also be estimated. These data are essential to design effective conservation and effective restoration, two of the main nature-based solutions to mitigate on-going biodiversity crisis. Recent improvements in sequencing technologies and bioinformatics are revolutionizing the field of population genetics and accordingly its impact on conservation. They open new avenues for the characterization of the full spectrum of genetic diversity, levels of introgression and inbreeding and importantly, for the identification of candidate genes associated with phenotype and adaptive potential to climate change. The Mediterranean Sea is a hot-spot of climate change, exerting impacts on marine biodiversity through mass mortality events associated to marine heatwaves. Over the past two decades, recurrent climate-driven MMEs impacted thousands of kilometers of coastal habitats across the Mediterranean, affecting around 90 species and driving local populations toward collapse. Habitat-forming octocorals are among the most affected species.

Within this context, my research applies population genomics and molecular ecology approaches, using whole-genome resequencing, to: (i) refine species boundaries and detect potential hybridization among species; (ii) advance our understanding of Mediterranean octocoral ecology, connectivity, and thermal stress responses; (iii) reconstruct demographic histories; and ultimately (iv) contribute to the conservation of these key habitat-forming organisms.

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