

## **DANCE- Diapause in copepod eggs: a multi-disciplinary approach**

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### **Abstract**

Diapause is an alternative life-history strategy, a type of dormancy that allows organisms to arrest development to overcome unfavorable environmental conditions and to extend the lifespan enhancing the reproductive success and survival. In marine environments, diapause is a strategy used mostly by copepods, small crustaceans that constitute up to 90% of the zooplankton in these environments, which are key component of the marine food chain and vital for the maintenance of global carbon cycling in the ocean. Depending on the species, and on their environment, copepods can have an “embryonic” or “postembryonic” diapause, entering the dormant state respectively as resting eggs or in the juvenile/adult stages. The resting egg phase is critical for the perpetuation of species year after year, especially those that periodically disappear from the water column. In the recent decades, considerable progress has been made in clarifying proximal mechanisms of metabolic arrest and the signaling pathways that control gene expression patterns in diapausing insects with more recently, evidence for epigenetic contributions to diapause regulation in nematodes, crustaceans and fish. However, more information is needed to paint a complete picture of how environmental cues are coupled to the transcriptional signal that initiates the complex diapause phenotype, as well as molecular explanations for how the state is terminate, in particular in the embryonic stage. This PhD project aims to expand our understanding of diapause in copepods using a multi-disciplinary approach that includes transcriptomics, confocal microscopy and measurement of fatty acid composition. Identifying the differences between diapausing and non-diapausing eggs and the molecular mechanisms that allow an organism to overcome adverse conditions, can have potential application in the field of ecology by predicting organismal resilience to climate change with implications for evolution. Furthermore, since a diapause-like mechanism of resistance has been reported also in stem cells and cancer cells, the findings of this project might also have potential application also in the field of biomedicine and human health.