INVENTORY, DYNAMICS AND IMPACT OF THE TREMATODES PARASITES IN BIVALVES WITH HIGH ECONOMIC IMPORTANCE

The edible cockle, *Cerastoderme edule*, and the wedge clam, *Donax trunculus*, are dominant bivalves in Portuguese and French coastal waters. As bivalves, these species are very important from the ecosystem functioning point of view contributing to ecosystem resilience. They are considered as keystone species, i.e. a species that by virtue of its structural or functional attributes creates and defines an entire ecological community or ecosystem. In Portugal and France, these bivalves represent the basis of important commercial fisheries highlighting their socio-economic importance but also its cultural role. Especially in Portugal, and particularly for *C. edule*, the population hold a deep cockle related activity history, for instance, there are several cockle’s dishes and an annual cockle’s festival and it is even inspiration for some works of art.

In the marine environment, bivalves are concomitantly exposed to abiotic (e.g. temperature, salinity shifts) and biotic (e.g. parasitism) pressures that can seriously interfere with their population dynamics and consequent stock management. Parasites represent 40% of total known species, from which trematodes are the most abundant and prevalent in coastal waters. These parasites have a complex life cycle using different host species. This complexity of the trematode life cycle, namely its multi-host nature, makes trematodes effective indicators of ecosystem diversity and health. In other words, the presence of a certain trematode species in a community is indicative of the presence of the other requisite hosts. Consequently, in this PhD thesis, trematode communities’ composition was successfully used to evaluate the ecological status of the Ria de Aveiro coastal lagoon, detecting some ecosystem’s deteriorating conditions that were imperceptible to other biomonitoring approaches.

However, at the individual level and by definition, the parasite exerts a negative impact on the host and can alter its biological functions. Trematode parasites are usually omnipresent but their pathogenicity is reported as low (little interaction between parasite and host). Occasionally, parasite abundance can reach relatively high values and disrupt basic bivalve’s functions like growth or even causing mortality. During its life cycle, the trematode experiences different habitats with different abiotic and biotic drivers that will affect parasite infection success and consequently its distribution pattern. Therefore, it is of prime relevance to recognize and understand the parasite-host system dynamics in order to better predict potential conservation threats to bivalve populations and to maximize the success of stock and disease episodes management. In the present study,
novel techniques such as transcriptomic analysis and biochemical markers proved to be useful to assess negative effects of trematodes on their bivalve hosts (both as first and second intermediate hosts) and if implemented, these techniques may help to predict organisms’ changes of reproduction and survival in their natural context. Besides, it was shown that the climate change related factors (such as salinity, temperature and pH shifts), forecasted by many models, as well as some emerging contaminants (such as Arsenic) may promote the proliferation of the parasites infective stages in many ecosystems leading to enhanced transmission, especially on temperate regions, that will influence the geographical distribution of some diseases and, probably, the survival capacity of infected hosts.

This work emphasizes the role of parasitism in bivalve’s population dynamics. A simple disease episode in a bivalve population may be able to modulate several population interactions such as predation and competition leading to changes up to the community level and therefore impacting the entire ecosystem. For these reasons, it is important to integrate parasitology into ecological, physiological and ecotoxicological studies of marine organisms.