

# Phenotypic traits of macroalgal populations at their southern margins

(Caraterísticas fenóticas de populações de macroalgas no seu limite sul de distribuição)

Tese de Doutoramento

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Understanding the factors that determine species geographical ranges is a fundamental issue in ecology and evolutionary biology. Species geographical distribution reflects the range with suitable conditions for their persistence beyond which organisms' tolerances and capacities are presumably constrained. At peripheral locations, where habitats are often fragmented, population persistence frequently relies on the differentiation of life-history traits either by phenotypic plasticity or local adaptation. This capability is particularly relevant for species with limited dispersal of propagules and living in variable physical environments as is the case of many marine macrophytes. In this study the variables population structure, dynamics, demography and investment in fitness-related phenotypic traits were investigated at the margin and center of the distribution of *Ascophyllum nodosum* and/or *Fucus serratus*. These are two ecologically similar and phylogenetically related brown seaweed species with very different life-spans, growth rates and phylogeographical histories. Additionally, the effects of different sources of disturbance on marginal populations of both species were experimentally evaluated.

Overall, the results show that *A. nodosum* marginal populations have high capability

for differentiation of life-history traits and seem to be able to cope with the environmental conditions experienced at its southern edge location. On the contrary, *F. serratus*, although exhibiting a similar population structure in central and marginal locations (at more benign intertidal levels), shows very variable population growth rate which might be indicative of its higher sensibility to environmental variation. These differences between marginal populations of both species are likely related to their different life-history characteristics and distinct genetic backgrounds. Furthermore, the results of this study show that perturbations negatively affecting both species at their southern limits, like human trampling for *A. nodosum* and grazing for *F. serratus*, might disrupt population dynamics and threaten the persistence of populations at these locations

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