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Rocky shores of the North-east Atlantic: a long-term and broad-scale perspective on pattern and process

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The phylogeography and biogeography of the British Isles and the wider North-east Atlantic are briefly outlined in the context of the Trans-arctic Interchange approximately 3.8 million years ago and changes since the Last Glacial Maximum. Post-glacial re-colonization processes have led to the different assemblages seen today on both sides of the Atlantic. With re-colonization coming from the east, several taxa are absent from North America. Limpets of the genus Patella are absent from North America.

The role of limpet grazing in determining the balance between large seaweeds that dominate in wave-sheltered bays and filter-feeding barnacles and mussels on wave exposed headlands was shown by manipulative field experiments. Shores of intermediate wave exposure tend to be patchy and fluctuate over time. Subsequently limpets have been shown to be keystone grazers on exposed rocky shores throughout Europe. The processes leading to domination by dense canopies of seaweeds were explored by factorial canopy removal/grazer removal experiments.

Changes in intertidal species in relation to climate fluctuations and more recent global warming over the last 60 years are described. Temperature has both direct and indirect effects modulating competitive interactions. Projections using different climate scenarios are made into the future. The functional significance of these changes is then outlined. Differences in behaviour of closely related species can have major consequences for the whole assemblage. In the future British rocky shores will resemble those in Portugal, with less large seaweeds and primary production and dominated by filter-feeding secondary producers such as barnacles.