



Diversity hot spots in the North? – Unexpected haplotype pattern for the marine bivalve *Cerastoderma edule* (L.)

Background and Hypotheses

In coastal sediments, bivalves dominate biomass and are crucial to ecosystem functioning. Although local population extinctions are common, little is known on the connectivity between coastal bivalve populations within and across regions.

We expected homogeneity of genetic structure on smaller distances due to the planktonic larval phase which travels a few weeks with the currents and should enable high rates of genetic exchange. For the sites close to the range margins, we assumed intraspecific differences because of the large distances inbetween.

Material and Methods

Sequences of 582 bp length of Cytochrome oxidase subunit I (COI) of the Common Cockle, *Cerastoderma edule*, were investigated along its distribution range in 10 populations. Sequence data were analysed by DnaSP, ARLEQUIN and TCS.

Results and Discussion

One dominating haplotype (Figure 1+2: ATL, red) occurred at sites in Morocco, Portugal, Ireland and South England which are well connected by Atlantic currents.

The sites in the North Sea region, Sylt and Texel, show another dominating haplotype (Figure 1+2: NSea, green) which is absent in Southern Europe.

Highest haplotype diversity could be shown within the Norwegian populations of Bodoe and Floedevigen, Hd=0.93 and 0.81, respectively.

Due to high abundance of single haplotypes, noticeable mainly in Bodoe and Sylt, we suggest a sudden expansion of this cockle species.

ATL: main Atlantic type	NSea: main North Sea type
atl1-4: shared Atlantic types	ns1-8: shared North Sea types
al1-2: Algarve	kr1-2: Kristineberg
mo1: Morocco	bo1-7: Bodoe
db1-6: Dublin	sy1-9: Sylt
th1-3: Thames estuary	
tx1-2: Texel	

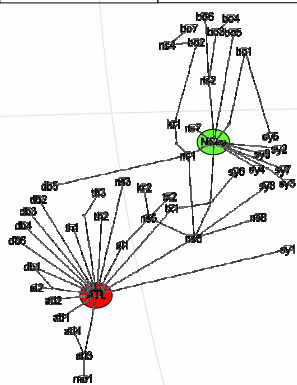


Figure 1: TCS Haplotype network based on COI sequences of *Cerastoderma edule*. Each link represents one mutational step.

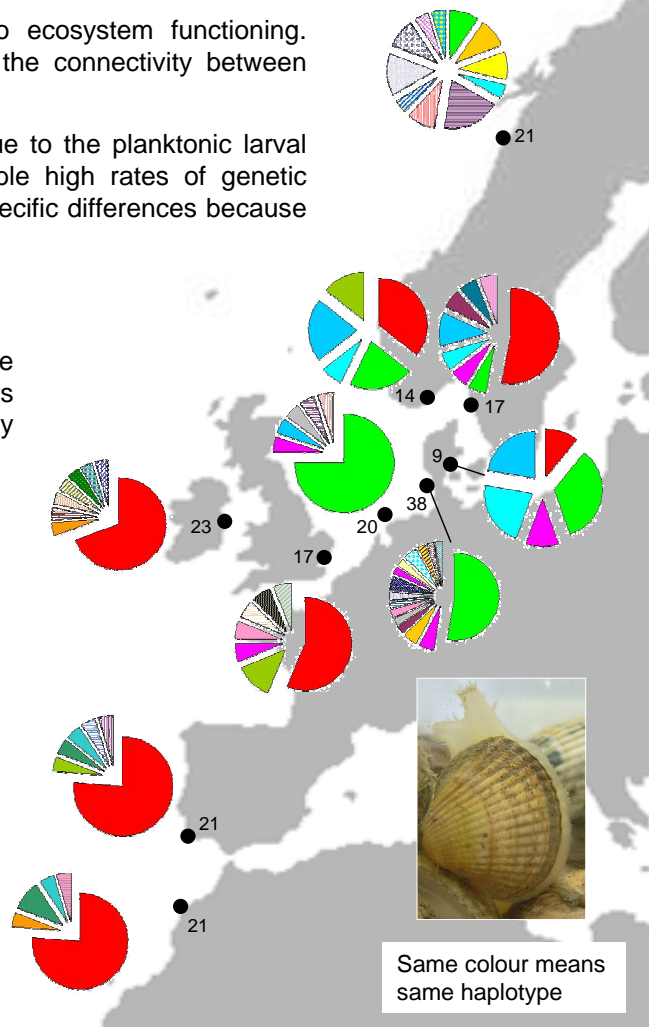


Figure 2: Distribution of haplotypes along the European shoreline. Sampling sites from north to the south: Bodoe, Floedevigen, Kristineberg, Norsminde, Sylt, Texel, Dublin, Thames estuary, Algarve, Morocco. Numbers indicate sampling size. Inserted picture: the Common Cockle *Cerastoderma edule*.

Summary

The marine bivalve, *Cerastoderma edule*, shows low but consistent differentiation in COI sequences grouping in southern and northern populations of European coasts. Highest genetic diversity can be found in the northern populations. There are no identical haplotypes between the range margin populations of Norway and Morocco.

Acknowledgements: For helpful ideas and support with analyses, I thank Dr. Heiko Stuckas (University of Potsdam). Samples were partially provided by partners of the MarBEF network and the TAIPAMOR project. Thanks also to all the helpers in the lab: Gregor Czichy, Judith Kochmann, Viola Liebich, Birgit Regenfuss and Annette Schlüssel!