

Relative Importance of Ship Hull Fouling as Alien Species Introduction Vector into Europe

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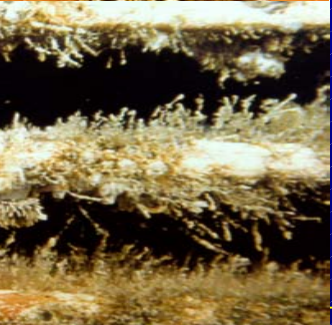
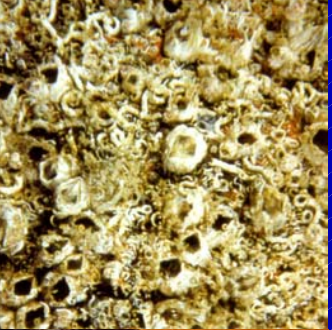
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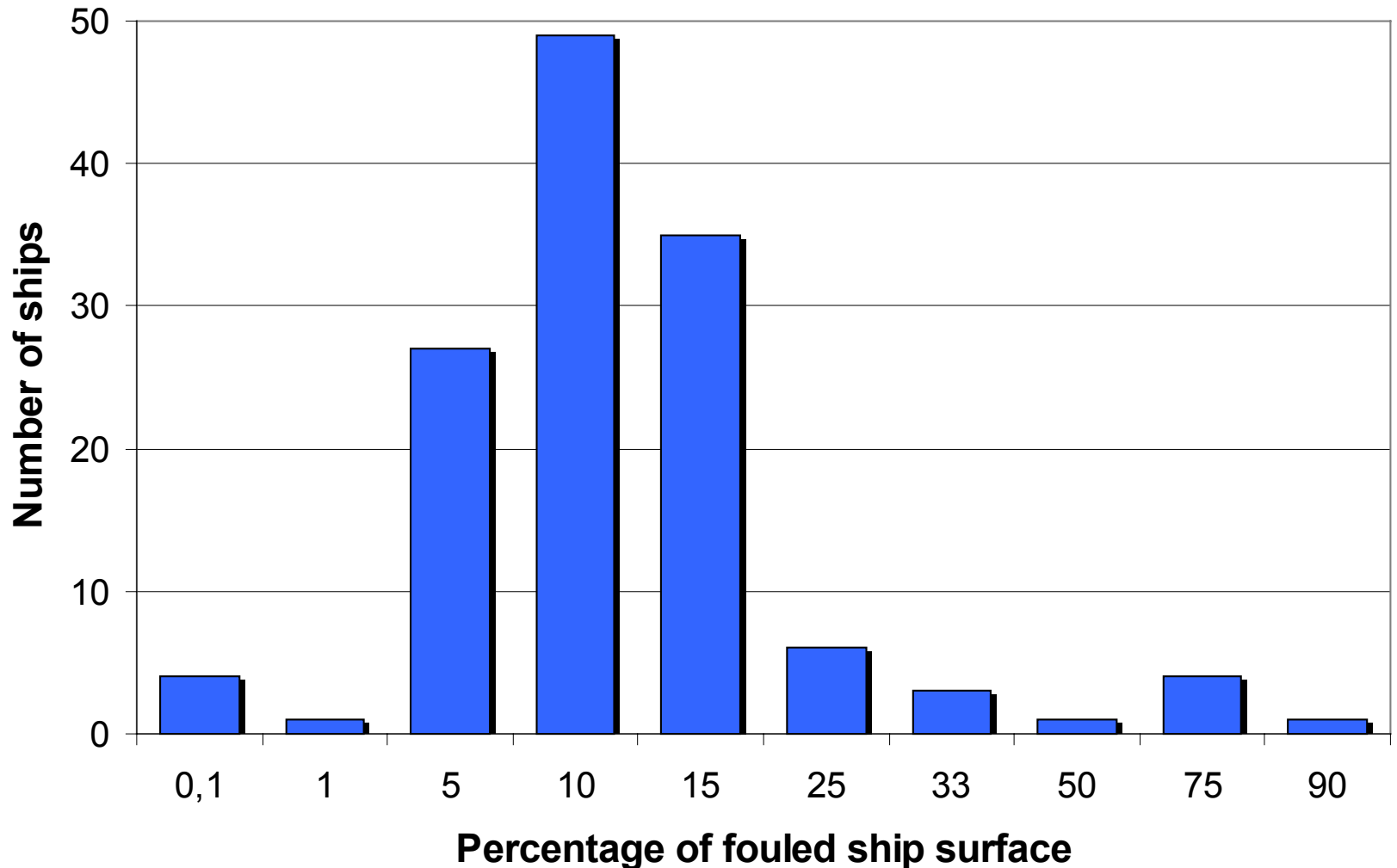
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Content

- Results of German shipping study
- Sessile vs. mobile fauna
- Number of invaders in Europe
- Relative vector importance worldwide
- Hull fouling on cleaned ships
- Summary



Dimension of Hull Fouling



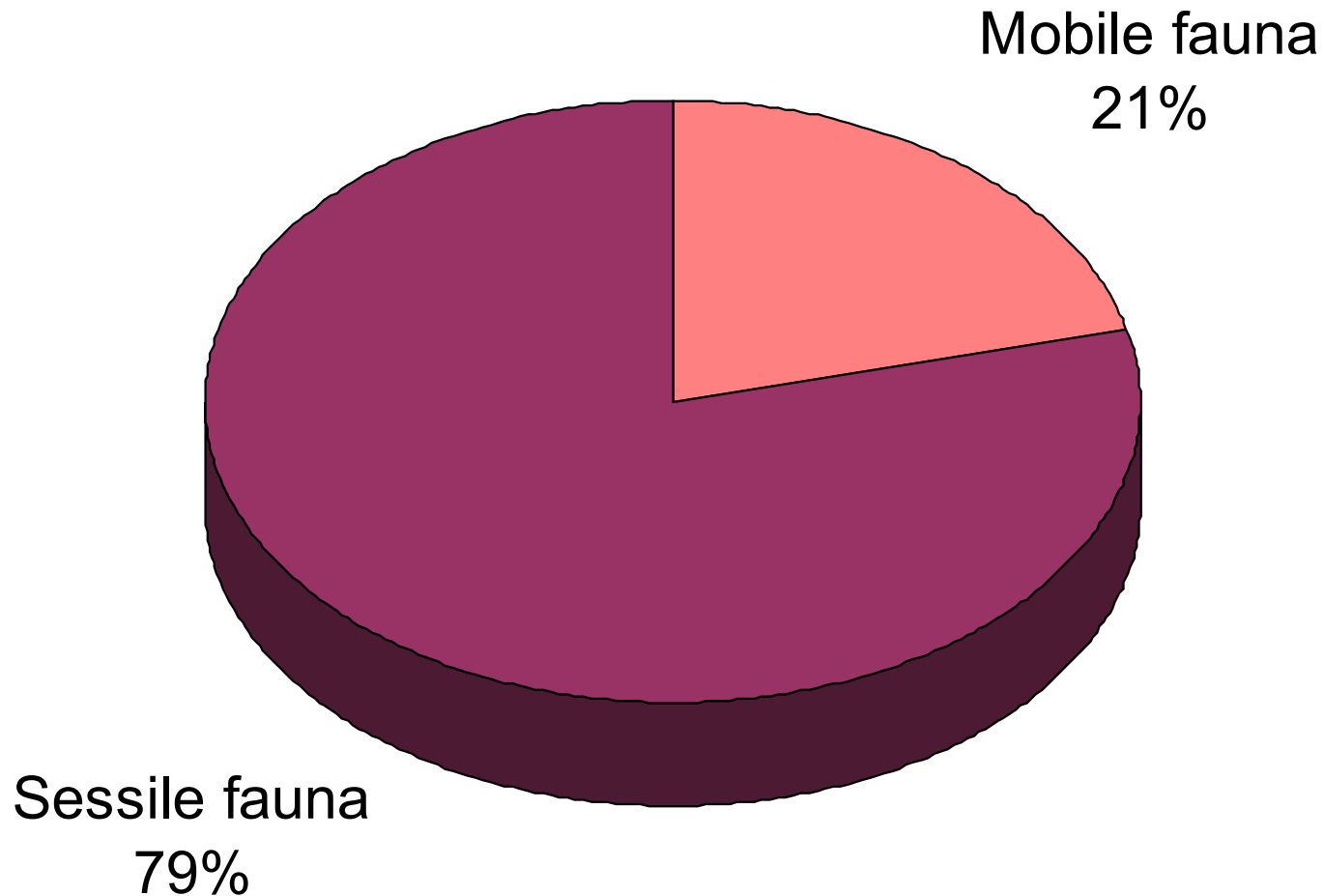
Overall Results

- All ships sampled carried living organisms

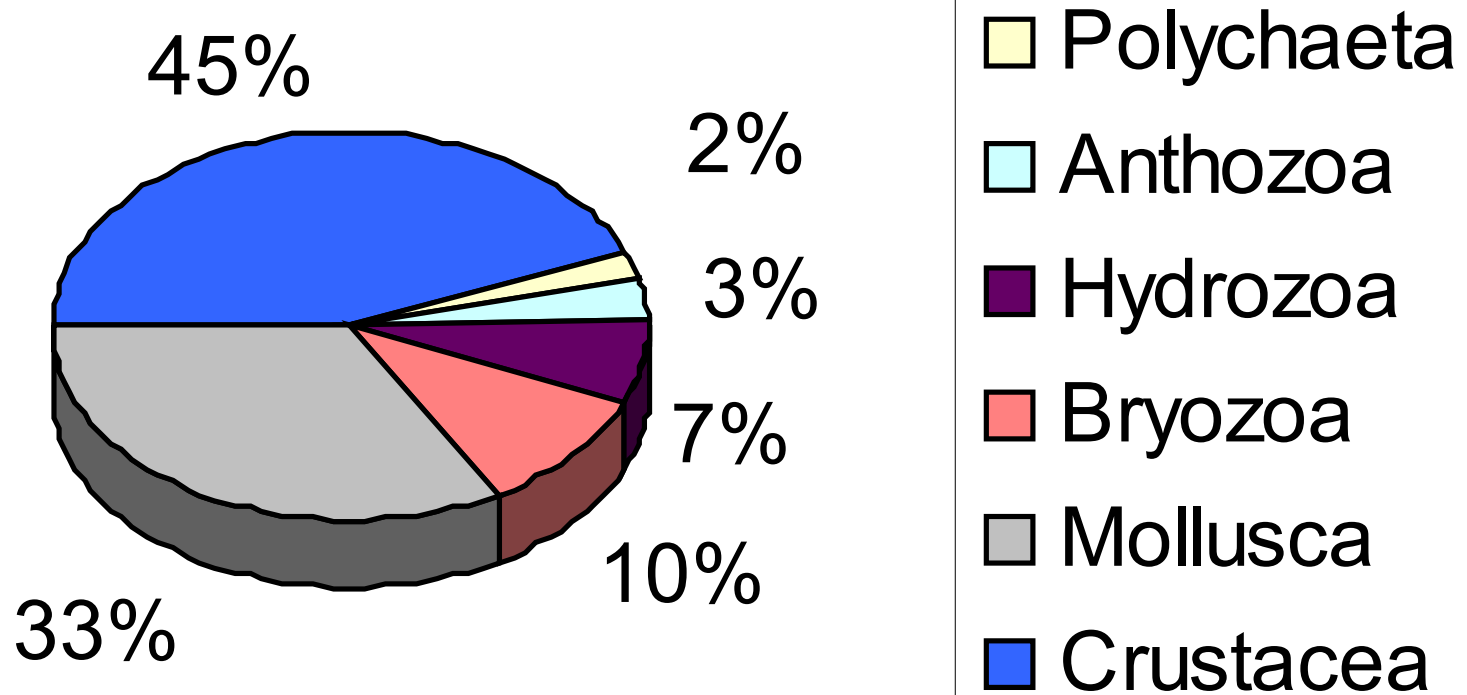
Sample	Number of samples	All species	Non-native species	Maximum species richness	Samples with non-native species [%]
Ballast water	132	98	37	12	38
Tank sediment	71	110	50	25	57
Hull fouling	131	110	83	15	98

- Highest number of aliens in hull fouling samples
- 98 % of the hull fouling samples contained at least one non-native species
- Max. 107 barnacles + 64 mussels per 100 cm²
- Max. 12.2 kg wet weight per m²

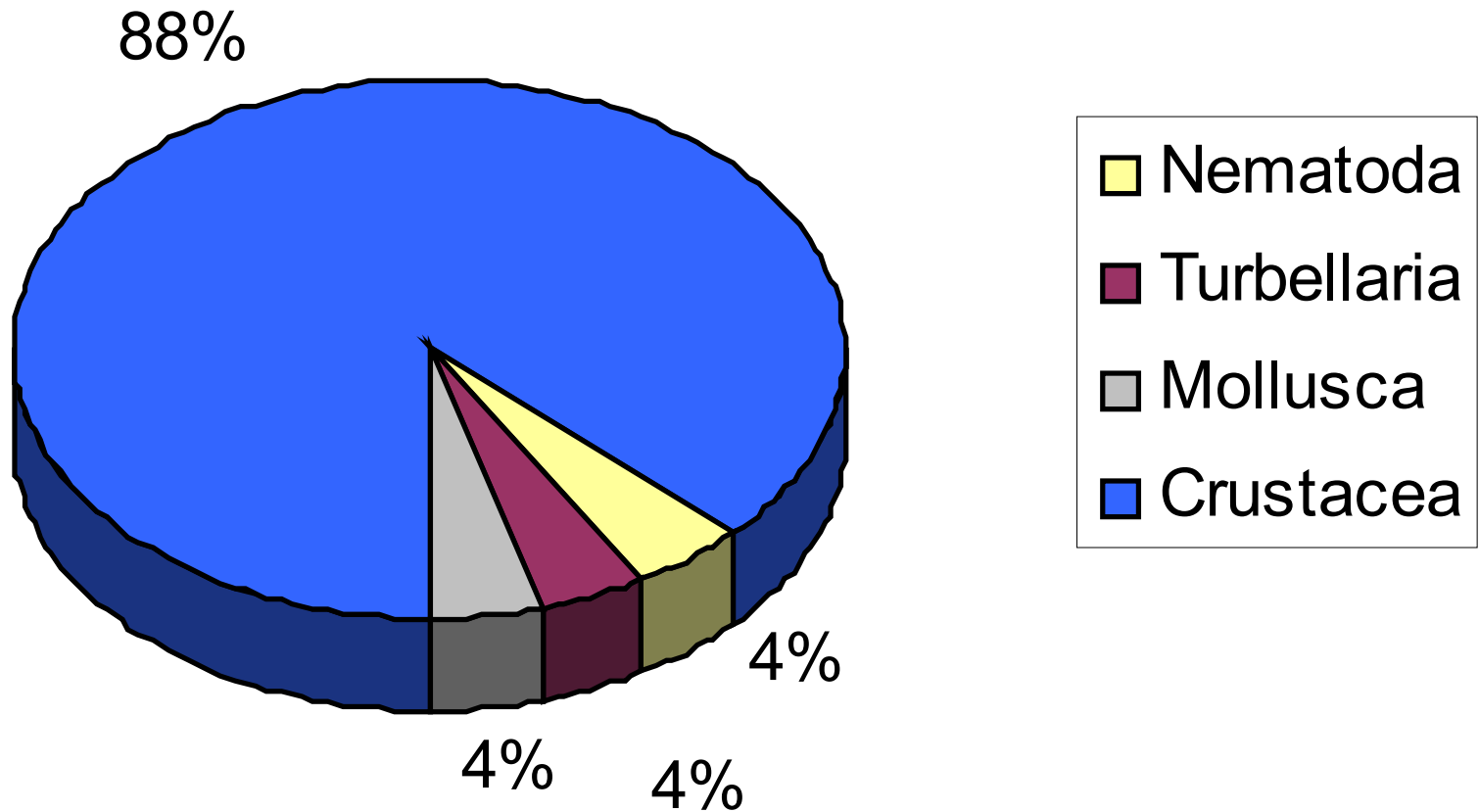
Sessile vs. Mobile Fauna in Hull Fouling Samples



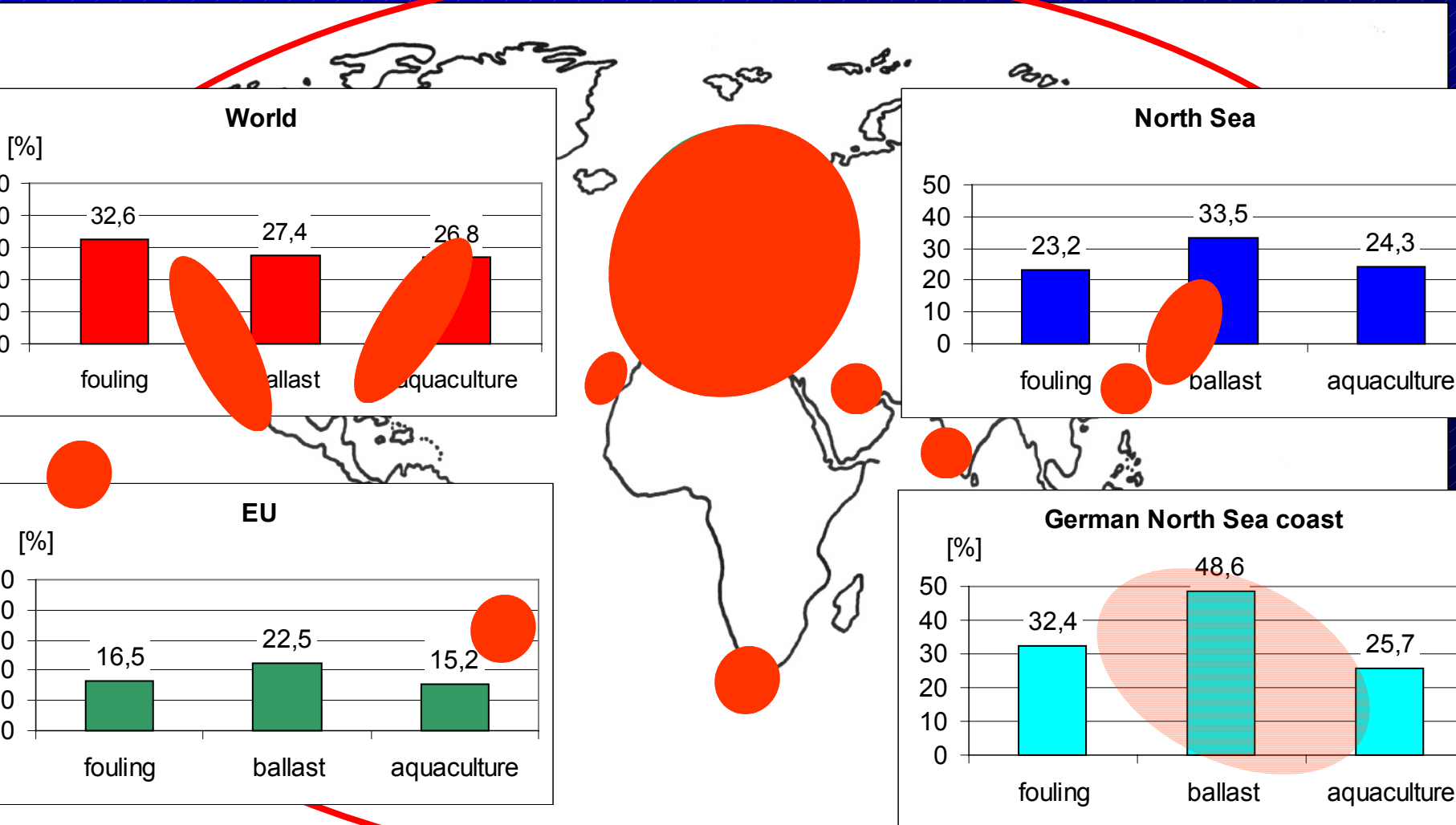
Sessile Fauna



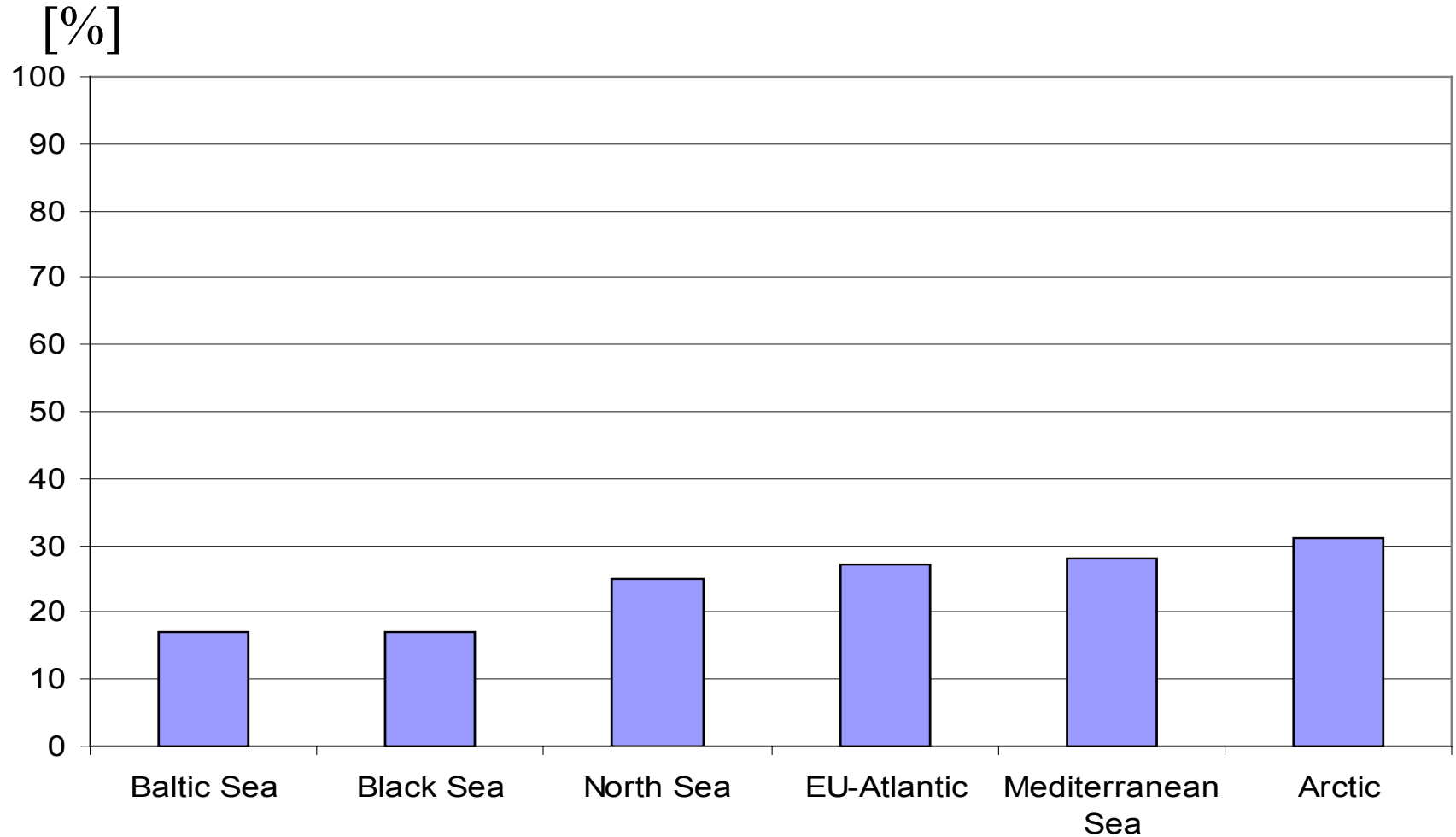
Mobile Fauna

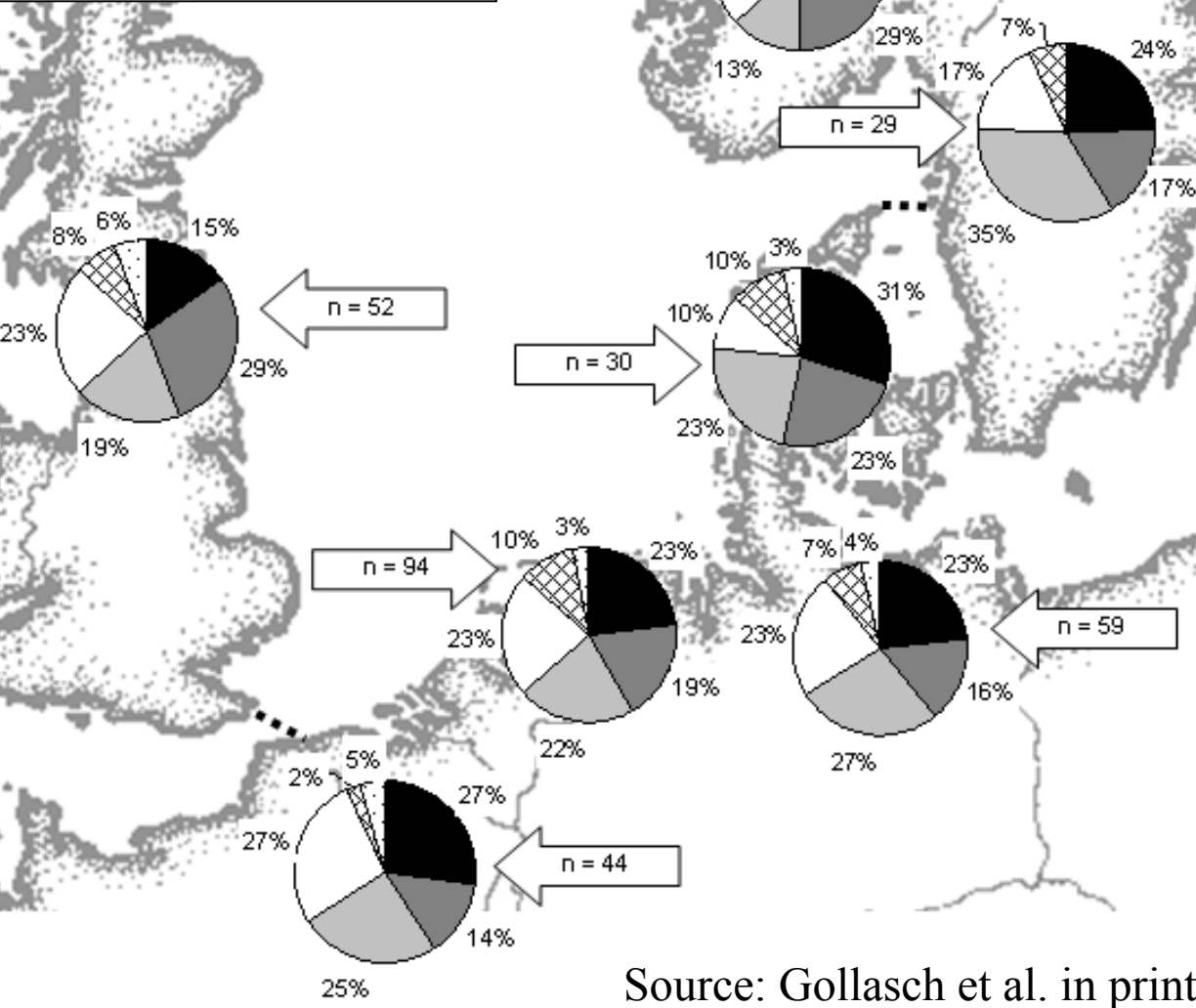
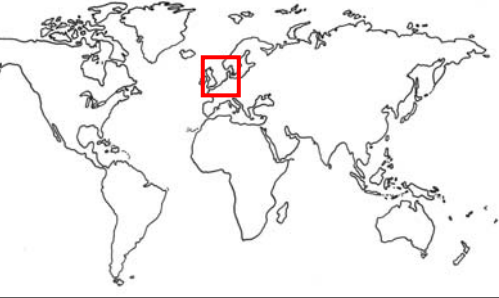


Relative Vector Importance



Relative Importance of Hull Fouling Invaders



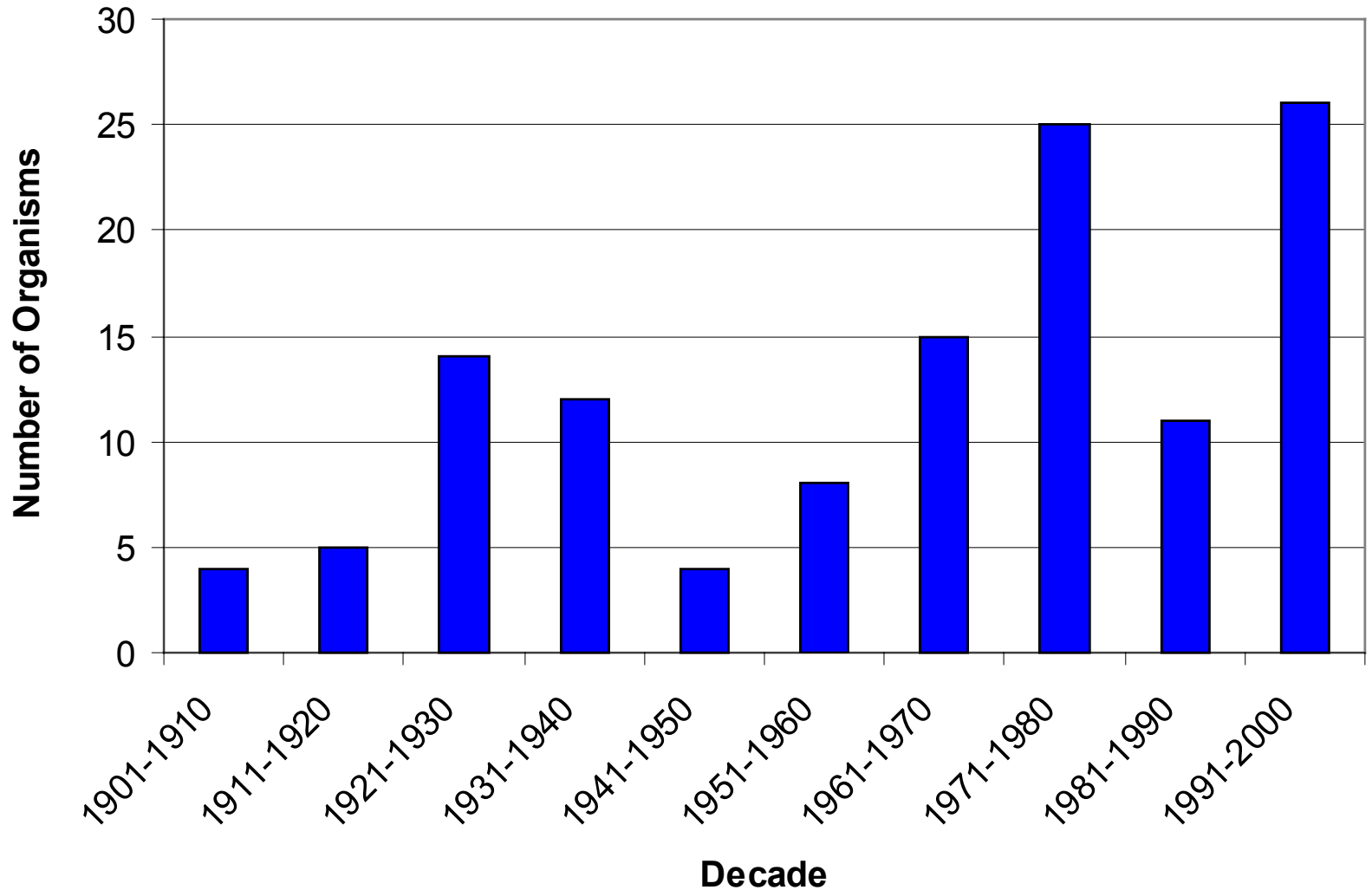


Source: Gollasch et al. in print

Alien Species in the North Sea

- black = hull fouling
- dark grey = aquaculture, stocking
- light grey = ballast water
- white = unclear
- square shaded = unknown
- dot shaded = other vectors

Fouling Invaders per Decade in Europe



Hull Fouling on “Cleaned” Ships

- Even on cleaned and antifouling painted ships hull fouling occurs at docking support strips
- No access during cleaning and painting in dock
- Up to 40 strips are in use
- Each strip measures up to 40 x 150 cm
- 40 strips cover 240 m²



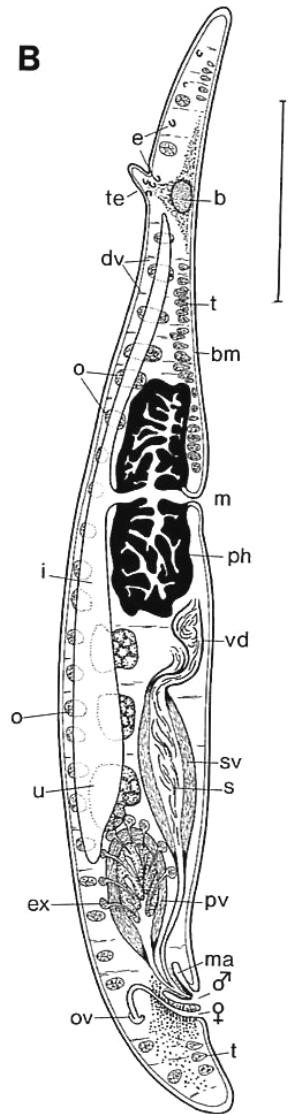
Cryptostylochus hullensis sp. nov.

This turbellar (Polycladida) was found
on car carrier *FAUST* sampled in
Bremerhaven, Germany

Leading taxonomist identified it as
new species!

Named after ships' hull

Native range unclear, vessel operated
(exclusively) on route from the
North American eastcoast to Europe



Summary

Sessile species dominate the hull fouling of ships

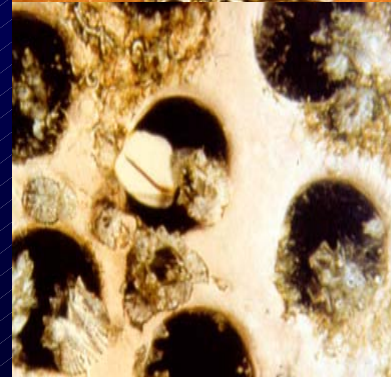
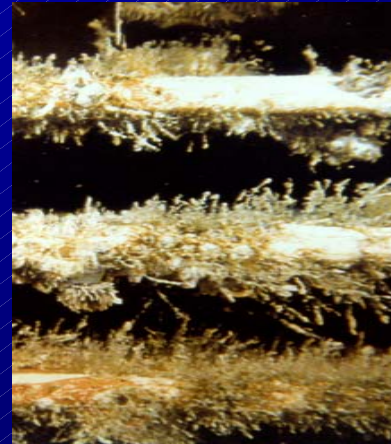
Amphipoda and Decapoda dominate mobile species

98 % of the hull samples contained at least one non-native species

49 % of all non-native species found sampled from hulls

One species new to science was found

Even cleaned ships show hull fouling at docking support strips



Acknowledgments

The 14th International Congress on Marine Corrosion and Fouling

July 27-31, 2008 Kobe, Japan



- German EPA for funding during ship fouling study
- More than 100 taxonomists for species identification
- Port authorities, shipping agents, ship owners and shipping companies
- Special thanks are expressed to GloBallast, DAISIE and ICES/IOC/IMO WGBOSV



Delivering
Alien
Invasive
Species
Inventories for
Europe



**Thank you very much
for your attention !**

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