

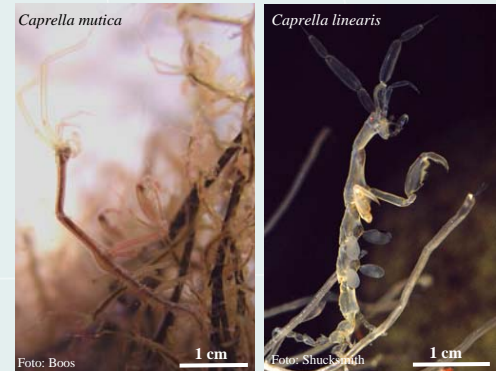
# Density dependent interference competition and displacement: non-native vs. native caprellids (Amphipoda, Crustacea)

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The non-native Japanese skeleton shrimp, *Caprella mutica*, has successfully established thriving populations on artificial structures in European coastal waters. Densities may reach several 10,000 to 100,000 individuals m<sup>-2</sup>.

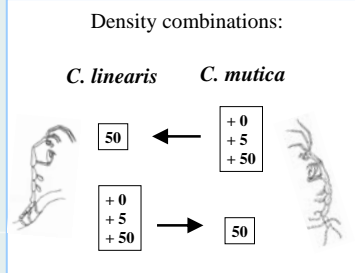
Prior to the arrival of *C. mutica* at Helgoland (German Bight, North Sea), its European congener, *Caprella linearis*, was regularly found in densities of approx. several 1,000 to 10,000 individuals m<sup>-2</sup> on artificial structures of Helgoland's harbours, e.g. pontoons and marina constructions. The nowadays overall absence of *C. linearis* from these structures is hypothesised to be the outcome of a competitive interaction with *C. mutica*.

In the present study, the outcome and mechanism of density dependent competition for space between *C. linearis* and *C. mutica* was studied in laboratory-based aquarium trials.



The two species were placed together in 1 ltr aquarium tanks on a plastic mesh of 50 cm<sup>2</sup> to test for an interspecific effect of one species on the other (N = 5).

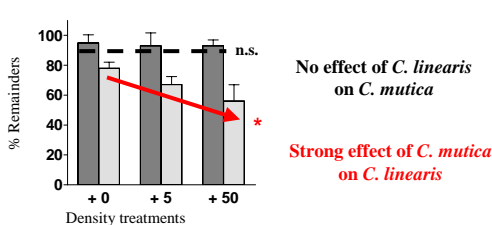
Two experimental densities were chosen representing actual numbers in the field:  
**low (5)** = 1,000 ind. m<sup>-2</sup> and  
**high (50)** = 10,000 ind. m<sup>-2</sup>:



### Data ascertainment after 24 h of interaction:

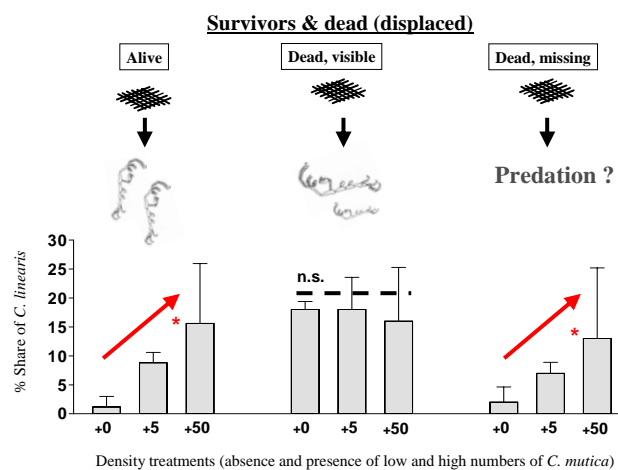
- The number of:
- Remainers on mesh (persistence)
  - Survivors & dead (displacement)

### Remainers on mesh (persistence)



- *C. mutica* was never affected by *C. linearis*
- *C. linearis* was increasingly displaced by aggressive and predateous behaviour of *C. mutica* when densities increased
- The mechanism of displacement is direct interference (interference competition)
- *C. mutica* suffers from high intrinsic mortality (largely not affected by *C. mutica*, but probably because of low stress tolerance)

To explain the decline of remaining *C. linearis* and, thus, the displacement of natives by the non-native, we ask: what happened with those *C. linearis* not on mesh?



The results give strong indication, that over time or even with higher densities of *C. mutica*, *C. linearis* will vanish from the meshes entirely. Therefore, the nowadays overall absence of *C. linearis* from space-limited artificial structures around Helgoland's harbours probably is the outcome of a competitive encounter with *C. mutica*.

While *C. mutica* is rather scarce in natural habitats as opposed to artificial structures, competitive encounters between the two species may be reduced in such habitats. However, because of the rather few and patchy occurrences *C. linearis* populations in natural habitats, the overall persistence of *C. linearis* in the southern North Sea may be at higher risk than previously assumed.