

Amphipods of the genus *Pontoporeia* as key elements in the Baltic benthos

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The results of our recent studies, partly as yet unpublished, of inter- and intraspecific interactions in the Baltic subthermocline benthic community are briefly reviewed. Two amphipods of the genus *Pontoporeia*, both considered glacial relicts, are thought to be key elements in this species-poor community.

1. Introduction

The uniquely simple below-thermocline Baltic soft bottom community, with only a few macrofauna species, perhaps 30–50 meiofauna species, no invertebrate megafauna and a few species of demersal fish (Elmgren 1976, 1978), provides an attractive subject for an attempt at understanding ecosystem behaviour in terms of the reactions of component species and their influence on ecosystem properties.

The two congeneric, haustoriid amphipods *Pontoporeia affinis* Lindström and *P. femorata* Kröyer are the dominant deposit-feeding macrofaunal species in this community (e.g. Ankar & Elmgren 1975, Elmgren et al. 1984), which is characteristic of large areas of the Baltic Sea. *P. affinis* occurs over the entire Baltic Sea, while *P. femorata* has its northern distributional limit in the Gulf of Bothnia. South of this boundary both

species normally occur together, but with *P. affinis* extending into shallower water. Both species are absent from deep waters of low oxygen content. They are important prey items for fish, and are frequently responsible for most of the macrobenthic secondary production in this almost uniquely simple ecosystem (Ankar & Elmgren 1976, Cederwall 1977), which normally comprises only 3–4 deposit-feeding and 3 predatory species of macrobenthos. *Pontoporeia* is the main prey item of two of the predators, and is eaten also by the third. The *Pontoporeia* spp. may thus be considered key elements in this community.

In our research project, interactions between the dominant macrofaunal species, such as competition and predation, and between macro- and meiofauna, are being tested. We mainly use small experimental aquaria (microcosms: see Elmgren et al. 1986) permitting sufficient replication for statistical testing of the results.

2. Results and discussion

Hypotheses already tested include:

1) The amphipod *P. affinis* causes heavy mortality among newly settled spat of the bivalve *Macoma balthica* (L.) (hypothesis supported); this is due to *Macoma* spat becoming buried in anoxic sediment as a result of amphipod bioturbation (hypothesis rejected); the mortality of *Macoma* spat is caused by direct predation from *Pontoporeia* (supported) (these three tests published by Elmgren et al. 1986);

2) Competition from adult *M. balthica* inhibits recruitment of young *P. affinis* (hypothesis rejected: young *P. affinis* survive and grow better in the presence of adult *Macoma*);

3) The two co-existing *Pontoporeia* spp. divide the sediment spatially by living at different depths (supported); the *Pontoporeia* spp. exhibit interactive niche segregation (partly supported but even apart they utilize slightly different depth zones) (last two tests published by Hill & Elmgren 1987); *P. affinis* growth is food limited at normal field densities (supported); the different depth distributions of the two *Pontoporeia* spp. leads to the use of different food resources (on the whole rejected — they both feed mainly on surface sediment, which they absorb with similar efficiency; see Lopez & Elmgren 1990);

4) The predatory, surface dwelling polychaete *Harmothoe sarsi* (Malmgren) feeds selectively on the more active, shallow-burrowing *Pontoporeia affinis* (supported); this is due to the less active and deeper-burrowing *P. femorata* having a refuge deep in the sediment and thus encountering the predator less often (supported); in contrast, the slow-mowing, deep-burrowing priapulid *Hali-*

cryptus spinulosus v. Siebold feeds preferentially on *P. femorata* (supported); the presence of the amphipods influences the taxonomic composition of the meiofauna (supported; Sundelin & Elmgren unpubl.).

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