

Trophic interactions in the open ocean – evaluation through fatty acid profiles

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Trophic relationship of some important species of the pelagic ecosystem on the Reykjanes Ridge (the copepod *Calanus finmarchicus*, the euphausiid *Meganyctiphanes norvegica*, the shrimp *Sergestes arcticus*, and the mesopelagic fishes *Maurolicus muelleri* and *Benthosema glaciale*) were investigated in June 2004. The study is a part of an international exploratory study of the macrofauna of the northern Mid-Atlantic Ocean, (MAR-ECO; Patterns and processes of the Ecosystems of the northern mid-Atlantic).

In the current research project fatty acid compositions were used to evaluate trophic interactions between the target species. Fatty acid compositions in predators show an integration of prey fatty acids within weeks or months, while the traditional approach, i.e. analyzing stomach contents, provides information only on recent feeding. The use of fatty acids as biomarkers is based on the observations that marine primary producers lay down certain fatty acid patterns that may be transferred conservatively to primary consumers. *Calanus* is the only known organism that biosynthesises *de novo* considerable amount of its own, unique monounsaturated fatty acids.

The target species (*C. finmarchicus*, *M. norvegica*, *S. arcticus*, *M. muelleri* and *B. glaciale*) were significantly different in fatty acid compositions. *Calanus* was important in the diet of the larger species. The fatty acids originating from *Calanus* were in relatively lower amounts in the omnivorous *M. norvegica* than in the shrimp and the fish species. Small *B. glaciale* had relatively lower amount of *Calanus* derived fatty acids than large specimens of the same species. The developmental stages of *C. finmarchicus* were significantly different in fatty acid compositions. Relatively high amounts of fatty acids characteristic for dinoflagellates and low amounts of fatty acids typical for diatoms, were observed in young *C. finmarchicus* and this ratio changed with age. In adult females relatively high amounts of diatom fatty acids occurred and low amounts of fatty acids characteristic for dinoflagellates were observed.