

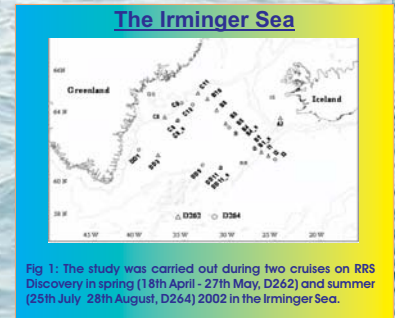
Grazing dynamics of *Calanus finmarchicus* and *Oithona similis* on the microplankton assemblage of the Irminger Sea

Claudia Castellani^{1*}, Xabier Irigoien², Roger P Harris³, Dan Mayor⁴, David Montagnes⁵ and Dave Wilson⁵

¹British Oceanographic Data Centre, Proudman Oceanographic Laboratory, 6 Brownlow Street, Liverpool, L3 5DA, UK, ²AZTI, Herrera Kaia Portualdea, 20110 Pasaia, Spain, ³Plymouth Marine Laboratory, Prospect Place, Plymouth, PL1 3DH, UK, ⁴University of Aberdeen, Oceanlab, Main Street, Newburgh, AB41 6AA Aberdeenshire, UK, ⁵University of Liverpool, School of Biological Sciences Building, Crown Street, L69 7ZB, Liverpool, UK. *Corresponding author e-mail: cxc@wpo.nerc.ac.uk

Abstract

The present investigation compares the feeding rates and prey preferences of different life stages of two key copepod species in the North Atlantic ecosystem, *Calanus finmarchicus* and *Oithona similis*. The feeding experiments were carried out over a wide range of microplankton concentrations and prey composition during three cruises in the Irminger Sea between April and November 2002. Results showed that although the copepods ingested preys overall according to their ambient concentrations, there were significant species and stage specific differences in prey type ingestion and selection. Despite being of comparable size the ingestion rates of *C. finmarchicus* nauplii were always higher than those of the *O. similis* females. Moreover, *C. finmarchicus* nauplii and *O. similis* females fed preferentially on diatoms and ciliates respectively, whereas adult females of *C. finmarchicus* showed limited or no prey selectivity. Negative selection for flagellates by all copepods and high predation rates on microzooplankton in spring may have determined the decline of ciliates and the increase of flagellates in summer. The reported variation in feeding rates and prey selection may reflect behavioral strategies dependent on the energetic and nutritional requirements of the different copepods species and stages.



The copepods



Fig 2: *O. similis* females A) and *C. finmarchicus* nauplii B) were collected at each station using a 63 µm bongo net whereas *C. finmarchicus* females were sampled with a single ring WP-2 net vertically towed from 120 m depth.

Feeding & Prey Selection Experiments



Fig 4: Predator exclusion experiments were carried out in triplicate bottles incubated with controls at *in situ* temperature for 24 hrs on a Plankton wheel

The Microplankton

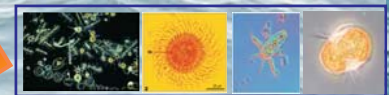
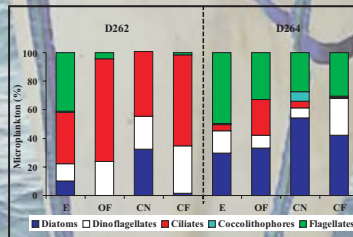
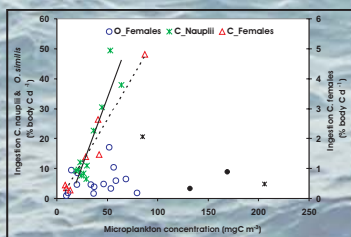
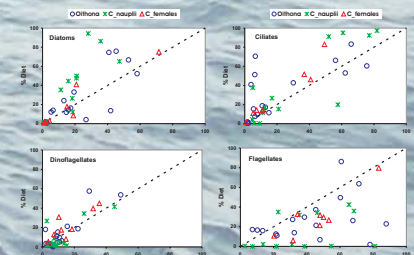


Fig 3: Examples of microplankton organisms found in the Irminger Sea. Microplankton was collected with CTD bottles at different depths (5, 10, 20, 70, 100 and 150 m), fixed with Lugol's iodine 2%, and identified with an inverted microscope. Cell volume was converted to carbon according to Strathmann (1967) for phytoplankton and Puit & Stoeckel (1989) for ciliates.

Feeding Rates



Prey Selection



Summary and Conclusions

Under similar *in situ* conditions, the feeding rates and prey selection of the copepod species and stages studied differed considerably.

The *C. finmarchicus* females were ~200-300 times heavier and ingested between ~10 to 150 and ~9 to 50 times more carbon than *O. similis* females and *C. finmarchicus* nauplii respectively. However, despite being of comparable weight, the *O. similis* females ingested, on average, 25% and 66% less carbon than the *C. finmarchicus* nauplii in spring and summer respectively.

The variation in copepod feeding rates and preferences appear to be the result of species and stages specific prey preferences relative to food availability. This trend probably reflects differences in ecological adaptations of copepods feeding behaviour. To energy requirements.

The relatively unselective feeding behavior of the larger *C. finmarchicus* females reflects the higher energy needs by this stage to meet metabolic losses and to reproduce in a "food diluted" environment.

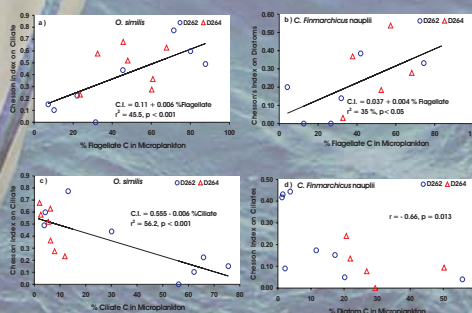
The high feeding selection of *C. finmarchicus* nauplii for diatoms can be attributed to both higher feeding efficiency by these stages on larger non-motile cells and to the high abundance of this phytoplankton in spring in the North Atlantic compared to other microplankton groups.

O. similis females are fast swimming but spend most of their time motionless to minimise hydrodynamical disturbance to conceal themselves from both predators and preys. Therefore, high feeding selection by these copepods for less abundant but highly nutritious preys such as ciliates is probably linked to their lower energetic demand and their ability to capture motile preys efficiently.

To survive and be able to reproduce at the low food concentrations typical of open ocean oligotrophic feeding must display a degree of plasticity and adaptability. Nevertheless, different species have distinctive feeding behavior and prey preferences which can be important determinant of biodiversity, carbon flux and marine ecosystem functioning.

Chesson's Index:

O. similis and *C. Finmarchicus* nauplii



Acknowledgments: This study was funded by the Natural Environment Research Council (NERC) thematic program Marine Productivity grants (NER/T/S/2001/00140) and (NER/T/S/2001/01255). Thanks to Derek Rathbun for analysing the microplankton samples and to Dave Conway and Delphine Bonnet for the analysis of the 200 µm zooplankton samples. Yener Altintas is gratefully acknowledged for his help with the preparation of the figures. Thanks to Robert Smith for his help with reformatting and printing of the poster.