

Changes in the composition of planktonic ostracod populations across a range of latitudes in the North-east Atlantic

Martin V. Angel ^{a,*}, Kasia Blachowiak-Samolyk ^b, Inna Drapun ^c, Ruth Castillo ^d

^a National Oceanographic Centre, Southampton University, Southampton SO14 3ZN, UK

^b Arctic Ecology Group, Institute of Oceanology, Polish Academy of Sciences, 81-712 SOPOT, Powstancow Warszawy 55, Poland

^c Plankton Department, Institute of Biology of the Southern Seas (IBSS), Ukrainian Academy of Sciences,
Nakhimov Avenue 2, 99011 Sevastopol, Ukraine

^d University of Bremen, International Studies on Aquatic Tropical Ecology, Germany

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Abstract

A large database representing the bathymetric distribution of 117 species of halocyprid ostracods has been compiled from seven stations forming a transect from the equator to 60°N along 20°W, plus an additional station at 32°N, 65°W. This data base is analysed to examine the latitudinal and bathymetric changes in species composition and diversity of assemblages of this important, yet neglected, holoplanktonic group. At each station stratified sampling of the complete water column from the surface down mostly to 2000 m was carried out both day and night. Each sample resulted from the filtration of at least 2500 m³ of water and was analysed using a consistent protocol. The differences between the day and night profiles are attributable to diel vertical migrations, to local-scale heterogeneity, and possibly to a degree of net avoidance. There is a gradient of increasing species richness and diversity from high to low latitudes. By day, halocyprids are either infrequent or absent from the upper 50 m of the water column, but at night after diel vertical migration they become quite abundant in the epipelagic zone, particularly at low latitudes. Bathymetric profiles show ostracod abundances increase rapidly below the thermocline, reaching maxima at 200–400 m and then declining by at least an order of magnitude at 2000 m. Diversity (both species richness, H' and evenness, J) also increases below the thermocline and thereafter is either maintained or declines only slightly to 2000 m. There are no relationships among diversity, abundance and productivity, but analysis of the whole database shows that the changes in community structure are consistent with Longhurst's [Longhurst, A.R., 1998. *Ecological Geography of the Sea*. Academic Press, San Diego, pp. xiv, 398.] biogeochemical provinces.

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* Corresponding author.

E-mail address: mva@noc.soton.ac.uk (M.V. Angel).

1. Introduction

In many taxa, both in terrestrial and marine environments, species richness shows a clear latitudinal gradient with communities at low latitudes showing greater species richness and evenness (e.g. Ormond et al., 1997). The data-bases for these published observations are mostly compilations from a range of heterogeneous records, many of which are based on purely qualitative records of presence and are not quantitative (see Blachowiak-Samolyk and Angel, 2003). They are the product of a large variety of sampling programmes analysed using a wide range of sampling protocols and subsampling. In addition the identifications have been carried out by several taxonomists, each of whom may have had different concepts of the groups' systematics. For oceanic holoplankton in particular, the sampling has seldom been comprehensive either latitudinally or bathymetrically.

Community composition is expected to reflect environmental conditions. Longhurst (1995, 1998) hypothesized that the large-scale patterns of biogeochemical production in pelagic oceanic environments resulting from ocean climate are influential in determining observed patterns in zoogeographical distribution. This implies that there are linkages between community structure and composition and latitude that are related to the cycles of productivity that are being forced by climatic conditions and advection. Here by examining a latitudinal transect stretching from 60°N to the Equator in the North-east Atlantic, we show that the diversity of a ubiquitous and abundant holoplanktonic group, the Ostracoda, shows the usual increase in species richness and equitability (evenness) from high to low latitudes.

2. Materials and methods

Detailed sampling was conducted during the 'SOND' cruise of RRS *Discovery* in 1965 off the Island of Fuerteventura with the principal object of relating the vertical structure of the planktonic and micronektonic communities (McCartney, 1976) to the acoustic environment. It was highly successful in revealing the detailed bathymetric structure of the micronektonic and macroplanktonic communities. So, between 1968 and 1974 a programme of systematic sampling was conducted by the Institute of Oceanographic Sciences (IOS became part of the Southampton Oceanography Centre in 1995, and was recently renamed the National Oceanographic Centre, Southampton) to investigate the changes in bathymetric structure of the pelagic communities along a latitudinal transect in the North-east Atlantic. Table 1 lists the station data for the observations used in this paper, and the positions of the eight main stations are shown in Fig. 1. The first vertical profiling was carried out in spring 1968, when the sampling was conducted within a 1° square centred near 10°N, 20°W

Table 1
Listing of the series analysed for halocyprids with *Discovery* station numbers, dates, samplers used and range of depths sampled

Series	Discovery stations	Central positions	Dates	Nets	Depth ranges (m)	Previous publications
1	8553–8562	0°23'W	7/1974	RMT1	0–2000	Unpublished
2	6665	10°20'W	2/1968	N113	0–2000	Angel and Fasham (1975) and Fasham and Angel (1975)
3	7089	18°N25°W	11/1969	RMT1	0–1250	Angel and Fasham (1975) and Fasham and Angel (1975)
4	7856	30°N23°W	4/1972	RMT1	0–3000	Angel (1979)
5	8281	32°N64°W	3/1973	RMT1	0–3500	Angel (1979)
6	7406–7478	40°N20°W	10–11/1970	RMT1	0–2000	Angel and Fasham (1975) and Fasham and Angel (1975)
7	7711	53°N20°W	4–5/1971	RMT1	0–2000	Angel and Fasham (1975) and Fasham and Angel (1975)
8	7709	60°N20°W	5/1971	RMT1	0–2000	Angel and Fasham (1975) and Fasham and Angel (1975)

Predominantly the sampler used was the RMT 1 (Baker et al., 1973), but for the earliest series (Station 6665) a modified Indian Ocean Standard Net (N113; Currie, 1963) was used fitted with a catch dividing cod-end device (Foxton, 1963). The data have been archived with OBIS and MARBEF.

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