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Distribution and variability in abundance of *Schistomysis spiritus* (Crustacea: Mysidacea) in the Bristol Channel in relation to environmental variables, with comments on other mysids

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Abstract

Mysids are important components of the zooplankton biomass of estuaries and coastal regions. Twelve species were identified from the Bristol Channel and Severn Estuary (British Isles). The most abundant species was *Schistomysis spiritus* (Norman), the majority of which occurred in the Channel within a salinity range of 27 to 34‰ S. The seasonal distribution and numerical abundance of this species are described over the period November 1973 to February 1975. The peak of abundance of *S. spiritus* occurred in the Inner Channel in September (mean of 14 individuals m^{-3}, ca. 250 individuals m^{-2} for this sub-region) when it represented 76% of the omnivore biomass ($\mu g\ C\ m^{-3}$); for the 364 d from 4 November 1973, the species contributed 43% of the total integrated omnivore standing stock. This peak of biomass was the product of the development of the juveniles from the reproductive period in the spring. Correlation analyses were carried out between *S. spiritus* biomass and 10 physical and biotic variables for 2 mo, November 1973 and September 1974. Temperature and salinity, which are simple indices of seasonal change, exhibited significant correlations with the mysid's abundance in both months. These correlations do not necessarily imply causal relationships or mechanisms between the distribution and abundance of the species and these variables. Clearly, in such a complex environment as an estuarine ecosystem a single variable is unlikely to control the abundance of a species, it is more the result of the combined influence of a number of variables acting in concert.

Introduction

Mysids are an important component of zooplankton biomass of estuarine and coastal regions around the British Isles. Makings (1977) lists 29 species of Mysidacea from British coastal waters of less than 20 m depth. The majority of mysids are known to be omnivorous in feeding habit and consume a wide variety of food items, often indiscriminately (Tattersall and Tattersall, 1951; Mauchline, 1967, 1970, 1971, 1980). Their rôle in estuarine ecosystems has been recognised in studies of North American estuaries (e.g. Hopkins, 1965; Heubach, 1969; Wigley and Burns, 1971; Williams, 1972; Fulton, 1982 a, b), although the group has been rather neglected in estuarine studies in the United Kingdom.

Mysids are common in the Bristol Channel and Severn Estuary and make a considerable contribution to the biomass of the region (Williams, 1984). The distribution of the estuarine and marine assemblage of zooplankton (Collins and Williams, 1982), with its large mysid component, will be altered by the proposed construction of a barrage across the mouth of the Severn Estuary (Energy Paper No. 46, 1981). The objectives of this study were (a) to identify the mysids in the Bristol Channel, (b) to describe their geographical distribution, (c) to investigate the seasonal changes in numerical abundance and biomass of the dominant species and (d) to relate (c) to specific environmental variables.

Materials and methods

The study area, the 58 sampling sites and the arbitrary sub-divisions of the region are shown in Fig. 1. Eleven surveys covering the period November 1973 to February 1975 have been used to study the main seasonal features of distribution and abundance of mysids in the Bristol Channel and Outer Severn Estuary. Samples were collected with a Lowestoft 50.8 cm (20″) high-speed plankton sampler (Beverton and Tungate, 1967; Harding and Arnold, 1971) fitted with a nylon net of 280 μm mesh. The sampler was deployed on double oblique hauls for approximately 1.85 km at a ship speed of 1.5 m s^{-1} (3 knots) (Collins and Williams, 1981).

To investigate the distribution of mysids living on or close to the sediment, a single survey was carried out in September 1975 using the Macer near-bottom plankton sampler (Macer, 1967) at sites with muddy or sandy substrates.

A survey of the Inner and Outer Estuary was carried out in cooperation with the local Regional Water Authorities (Severn-Trent, Welsh, and Wessex) from May 1975 to June 1976. Samples were collected over the period of a tidal cycle at 14 d intervals using hand nets at a site off Portishead (marked by asterisk in Fig. 1). Occasional samples were also collected at intervals up to the head of the tidal river, approximately 59 km above the Severn Road Bridge. Positions for all samples were corrected for state of tide using Admiralty tide data to predict their hypothetical high- and low-water positions.

The mysids were identified to species and sorted into two size classes, less than and greater than 5 mm total length. Each size class was given a mean carbon value (41 and 316 μg C, respectively) based on our own carbon determinations from frozen material. All the zooplankton entities identified from the samples were given mean biomass values (μg C m^{-3}) and allocated to trophic types, i.e., carnivores and omnivores (Collins and Williams, 1982), to derive total carnivore and omnivore biomass for each sub-region.

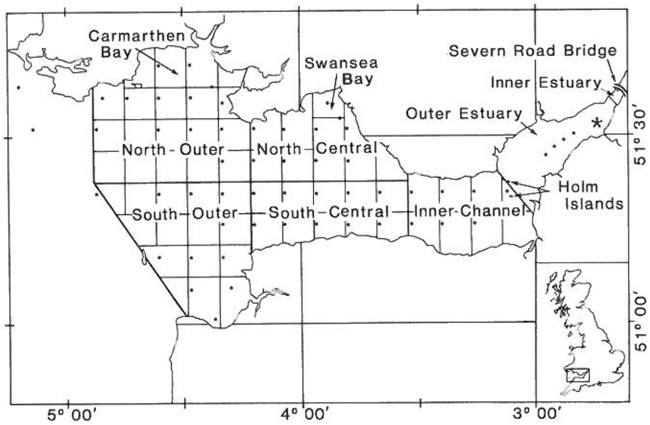

Fig. 1. Bristol Channel and Severn Estuary showing 58 sampling sites (●), site of 1975–1976 special survey (*), 5-mile grid, and arbitrary sub-regions

Vertical profiles were made at each station for Secchi disc depth, suspended particulate load, temperature, salinity, chlorophyll *a*, and phaeopigments (Collins and Williams, 1981, 1982).

Contour charts of distribution were prepared using the program SACM (Surface Approximation and Contour Mapping; Applications Consultants, Houston, Texas, USA). To derive means of chlorophyll *a*, mysid and omnivore carbon for the sub-regions of the sampled area, the data were corrected for state of tide, contoured at high- and low-water positions and averaged to produce values for each 5-mile square (Fig. 1). The data for each of the eleven surveys were weighted according to the water volume of each 5 mile square and these values were then used to derive means for the sub-regions for each survey.

Correlation analyses were carried out on the data for 2 mo, November 1973 and September 1974, when *Schistomysis spiritus* was abundant. For each 5-mile square (Fig. 1) *S. spiritus* biomass (μg C m^{-3}) was correlated against the following variables; Secchi disc depth, suspended particulate load, temperature, salinity, chlorophyll *a*, phaeopigments, total carnivore biomass, total omnivore biomass, sediment type (coded on an arbitrary scale) and average water depth.

Results

Twelve mysids were identified from the Bristol Channel and Severn Estuary, and these are listed in Table 1. *Schistomysis spiritus* was the most abundant species followed by *Mesopodopsis slabberi* and *Gastrosaccus spinifer*. The distributions of these three species in September, the month when they were most abundant, are shown in Fig. 2. The three species have geographical distributions which overlap within the Channel, with *G. spinifer* being more abundant in the North Central Channel (Swansea Bay). The remainder of the species were localised in their

Table 1. Mysid species found in the Bristol Channel and Severn Estuary

Species	Remarks[a]
Anchialina agilis (G. O. Sars)	Coastal predominantly pelagic
Gastrosaccus spinifer (Goës)	Littoral, burrower on sandy beaches, pelagic at night
Leptomysis gracilis (G. O. Sars)	Coastal, hyperbenthic, 30 – 150 m, pelagic at night
Leptomysis mediterranea G. O. Sars	Littoral expatriate offshore
Mesopodopsis slabberi (Van Beneden)	Littoral, euryhaline, expatriate offshore
Neomysis integer (Leach)	Estuarine, littoral, brackish water < 20‰ S
Paramysis arenosa (G. O. Sars)	Littoral, sandy beach species
Praunus flexuosus (O. F. Müller)	Littoral, sandy beach species
Schistomysis kervillei (G. O. Sars)	Littoral, sandy beach species
Schistomysis ornata (G. O. Sars)	Coastal, hyperbenthic, 50 m, caught pelagically in winter
Schistomysis spiritus (Norman)	Littoral, sandy bay species, pelagic at night
Siriella clausi G. O. Sars	Coastal, pelagic at night, probably rare resident

[a] (From Mauchline, 1980)

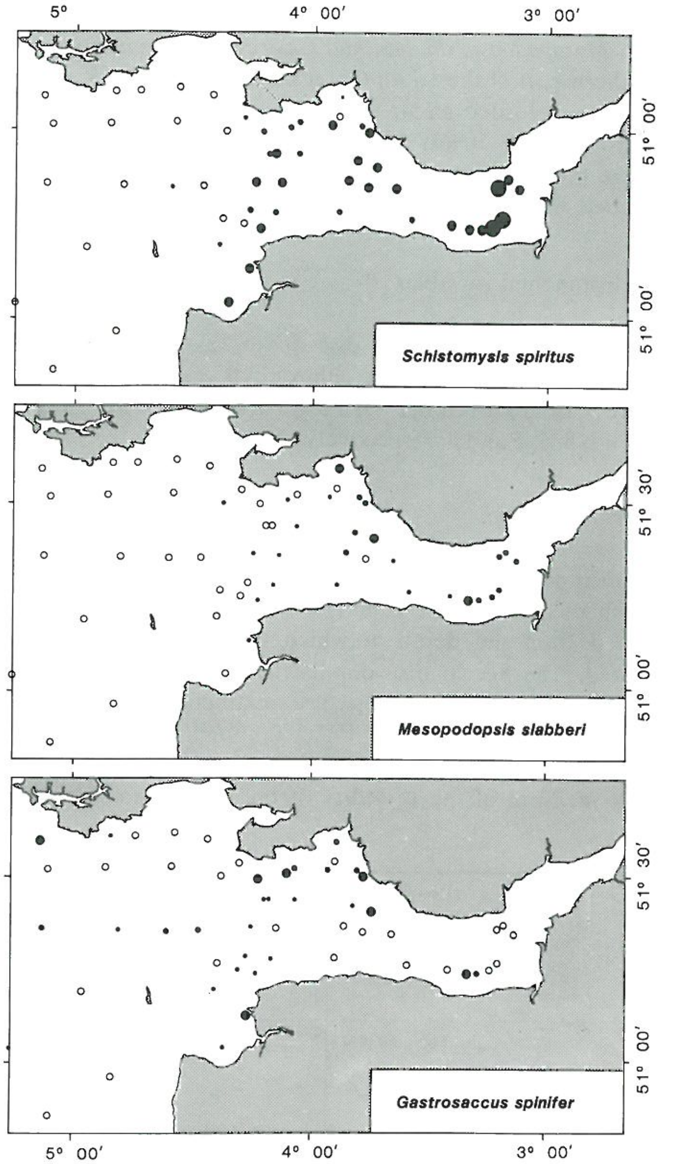

Fig. 2. *Schistomysis spiritus, Mesopodopsis slabberi* and *Gastrosaccus spinifer.* Distributions of three mysids in September 1974. Abundance levels, represented by size of filled data points, are: 0.01–<0.1, 0.1–<1.0, 1.0–<10 and ≥ 10 m^{-3}; ○=absent

distributions especially to the lower salinity areas (Outer Estuary) and two species, *Leptomysis mediterranea* and *Siriella clausi,* were restricted to single observations. Because *Schistomysis spiritus* was the dominant species in the mysid assemblage in the Bristol Channel the remainder of this paper concentrates on this species.

Distribution and seasonal abundance

The distribution of *Schistomysis spiritus* for the 11 surveys is shown in Fig. 3. The adult population declined in numbers over the winter months reaching a seasonal minimum in early spring (April). The increase in May was primarily due to the appearance of high numbers of juveniles, which reached maximum abundance in the Central and Outer Channel sub-regions in this month. In the Inner Channel the numerical abundance of juveniles continued to increase to a peak in September 1974 (mean of 11 individuals m^{-3} or ca. 200 m^{-2} over the Inner Channel). *S. spiritus* reached its maximum numerical abundance of 36 individuals m^{-3} in September in the Inner Channel (mean of 14 individuals m^{-3} or ca. 250 m^{-2} over the sub-region) when the species dominated the biomass (carbon) of the zooplankton. Taking the average depth of the Inner Channel as 18 m, the estimated number of *S. spiritus* in the sub-region in September was 1.9×10^{11} individuals, which is unlikely to be solely the result of "wash-out" from the population in the littoral zones. The contribution that *S. spiritus* made to total omnivore biomass in the Inner Channel, together with the chlorophyll *a* data, is shown in Fig. 4. This mysid represented 76% of the biomass (μg C m^{-3}) of the omnivores in September 1974 and 43% of the total integrated standing stock of biomass for the 364 d from 4 November 1973. The chlorophyll maximum which occurred in June was followed closely, one month later, by the omnivore maximum, composed mainly of calanoid copepods; from July onwards the omnivore biomass was dominated by *S. spiritus* (Fig. 4). The peak of mysid biomass in September was the product of the development of juveniles from the reproductive period in the spring.

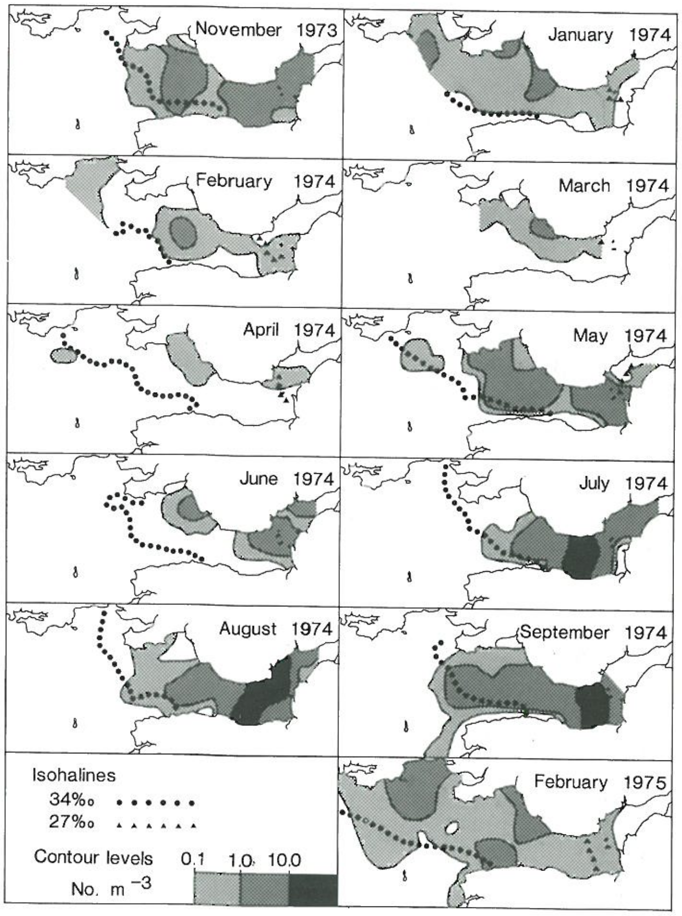

Fig. 3. *Schistomysis spiritus.* Distribution and abundance for 11 surveys from November 1973 to February 1975

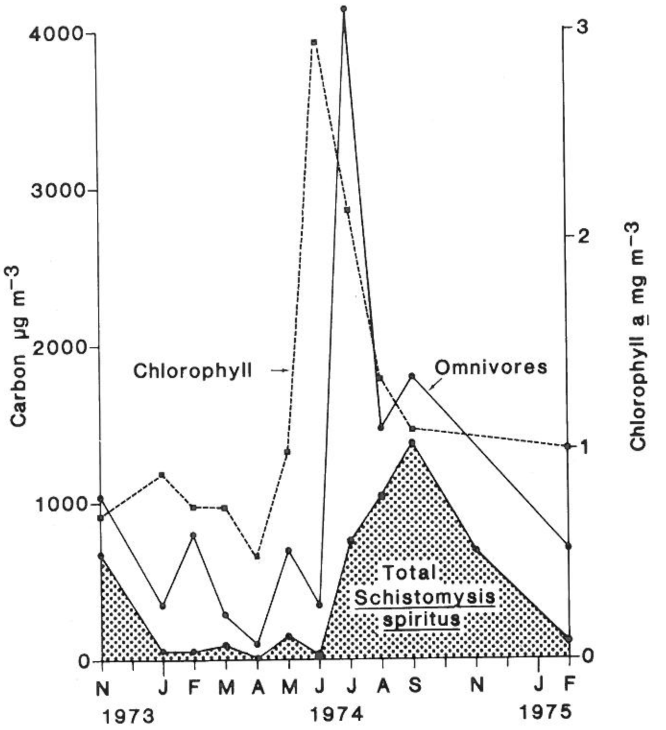

Fig. 4. *Schistomysis spiritus* and omnivore total biomass (µg C m^{-3}) together with chlorophyll *a* (mg m^{-3}) for 11 surveys from November 1973 to February 1975

In September, *Schistomysis spiritus* occurred, along with *Mesopodopsis slabberi* and *Gastrosaccus spinifer* in the southern part of the South Outer Channel (Fig. 2). *S. spiritus* were recorded as far as the Inner Estuary (Fig. 1), to approximately 10 km above the Severn Road Bridge, where they were most abundant from July to October and reached a maximum density of 6 individuals m^{-3}.

Environmental variables

Contour charts of Secchi disc depth (extinction depth), temperature, salinity, and chlorophyll *a* for the eleven surveys from November 1973 to February 1975 are shown in Figs. 5, 6, 7 and 8, respectively.

Secchi disc depth

The extinction depth of light, which is assumed to be the depth of the euphotic zone (1% surface level), was determined from the depth at which the Secchi disc disappeared. The Secchi disc depths measured during the 11 surveys have been converted to extinction depth, contoured and are shown in Fig. 5 (extinction coefficient = 1.7/Secchi disc depth). The extinction depth can be used as a measure of the turbidity of the water and is an in-

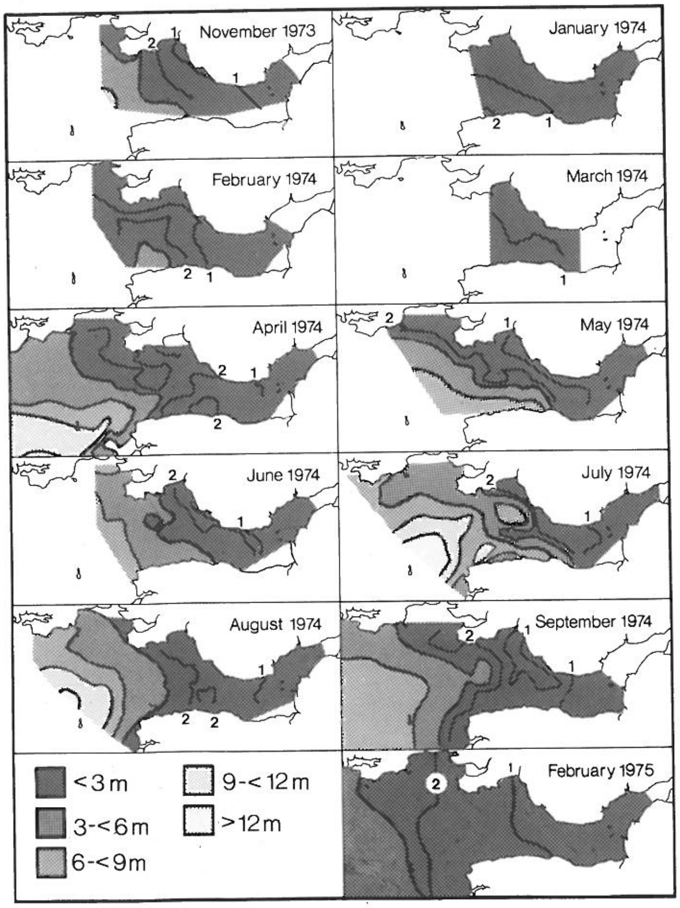

Fig. 5. Extinction depth isophotes as measured by Secchi disc, for 11 surveys from November 1973 to February 1975

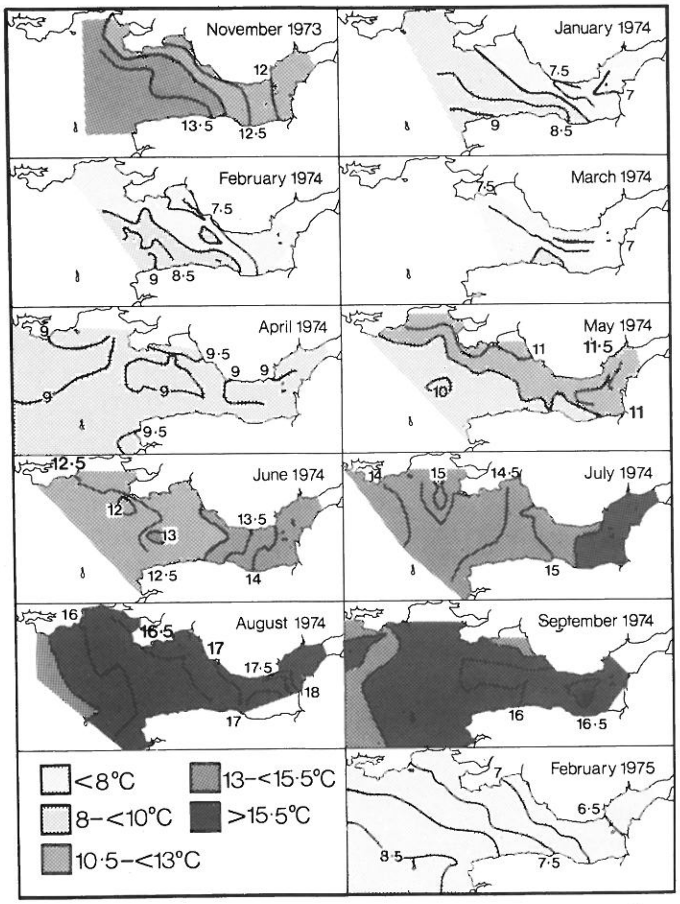

Fig. 6. Temperature isotherms for 11 surveys from November 1973 to February 1975

dication of the particulate load within the Bristol Channel and Severn Estuary.

Extinction depths greater than 12 m were observed in the southwest of the area in July and August (Fig. 5), while values as low as 0.1 m were recorded upstream in the estuary. The turbidity in the Outer Estuary was such that extinction depths were similar throughout the year, with maximum values no more than 0.3 m. In the winter months, depths of 0.5 m were measured in the Inner Channel and 4 m in the South Central sub-region (February 1974).

Temperature

The temperature regime of the Bristol Channel and Severn Estuary is illustrated in Fig. 6. The abundance of *Schistomysis spiritus* against temperature for the eleven surveys is shown in Fig. 9a with November 1973 and September 1974 shown in detail in Fig. 9b. In the winter months there was a positive temperature gradient from east to west in the Channel, with a winter minimum of 6.1 °C occurring in February 1975 in the Outer Estuary. There were two periods, one in April and the other between September and October, when the channel was isothermal. During the summer months there was a reversal of the east to west temperature gradient, with a summer maximum of 18.2 °C in August in the Outer Estuary. The steepest temperature gradient was observed in August with only a 3.4 C° (14.8° to 18.2 °C) difference over the whole of the sampled area.

Salinity

The salinity regime for the eleven surveys is shown in Fig. 7. The steepest gradients of isohalines were observed in the winter months (January, February 1974; February

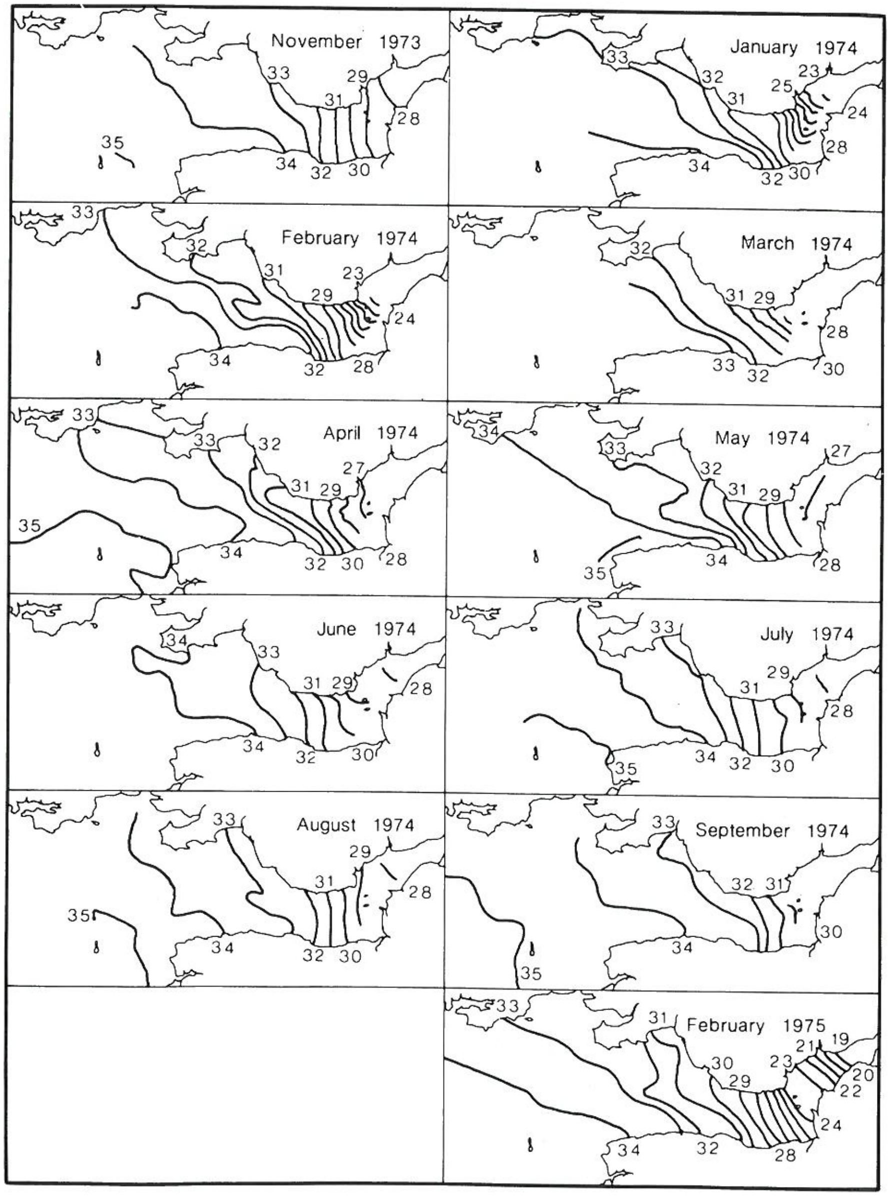

Fig. 7. Salinity isohalines for 11 surveys from November 1973 to February 1975

1975) when high river run-off displaced the isohalines in a northwest to southeast direction (Fig. 7). In the summer months, when river run-off was lower, the orientation of the isohalines was more north to south (Fig. 7). The variability in salinity is largely due to the variations in freshwater input (Uncles, 1984). The Severn Estuary contributes 60% of the total freshwater flow into the Channel, with the run-off from the Welsh coast contributing a further 30%. The large freshwater input in the northern region lowers salinity in the north relative to that in the south (Fig. 7), although detailed salinity structure within the Channel will depend on mixing by tidal and residual currents (Uncles, 1984). The orientation of the isohalines (Fig. 7) was similar to that of the isotherms (Fig. 6), particularly in winter and spring when there was high river run-off.

The population of *Schistomysis spiritus* in the Bristol Channel occurred in a salinity envelope characterised by the 27 and 34‰ S isohalines (Fig. 10). The *x*-axis in this figure has been transformed by $-\log_e[(36\text{-salinity})/36]$ and the *y*-axis has been transformed by $\log_e(1+\text{abundance})$. However, it must be remembered that sampling in water of less than 27‰ S only occurred in three of the eleven surveys (January, February 1974; February 1975).

Chlorophyll a

The contoured data for chlorophyll *a* at 1 m depth in the Bristol Channel and Severn Estuary is shown in Fig. 8. There were no vertical differences in the chlorophyll *a* values observed down the water column as a result of the vertical mixing process (Joint and Pomroy, 1981). Values were low (<1 mg chlorophyll *a* m^{-3}) over the whole region until April, when increases were observed in the two northern bays (Swansea and Carmarthen Bays) and in the southwest of the sampled area. These bays showed higher chlorophyll *a* values (2 to 4 mg m^{-3}) than the remainder of the Channel throughout the summer months, with the exception of the central region in June. The peak of chlorophyll *a* observed in the Central and Inner Channels in June was due to a large bloom of *Phaeocystis pouchetii* (Hariot) Lagerh. These blooms occur most years in the Bristol Channel and make a considerable contribution to the standing crop as represented by chlorophyll *a*. A comparison of the chlorophyll *a* values in June 1973, a year in which a bloom did not occur, with those of June 1974 is given by Joint and Pomroy (1981), their Fig. 4). By July 1974, the *P. pouchetii* in the Channel had disappeared, leaving higher chlorophyll *a* concentrations in the bays of the northern coast and in the Outer Channel.

In spring, especially in May, there were similarities in the orientation of the contour lines in a northwest to southeast direction for all the variables shown (Figs. 5, 6, 7, 8), which possibly indicate a common association with the hydrography of the region; this is apparent to a lesser extent in other months.

The results of the correlation analysis are shown in Table 2.

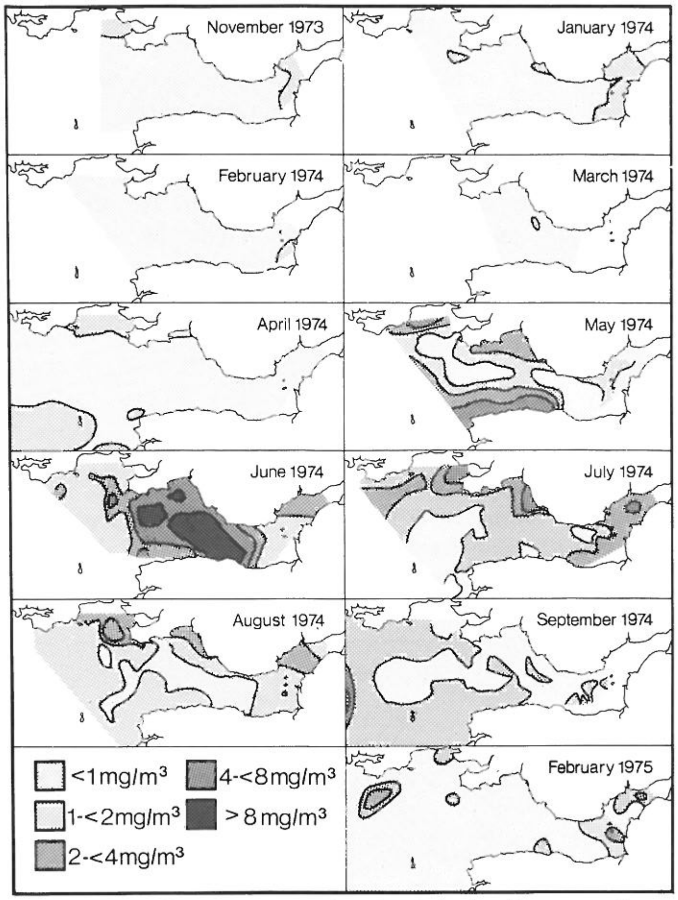

Fig. 8. Chlorophyll *a* concentration isopleths for 11 surveys from November 1973 to February 1975

Discussion

Our results demonstrate that mysids are an important constituent of the zooplankton biomass of the Bristol Channel and Severn Estuary. The sampling methods have underestimated the abundance of littoral mysids in the sampling squares adjacent to the shoreline (Fig. 1) because we were unable to sample close inshore. However, we consider our estimates of numbers offshore, outside the littoral zone, to be realistic. It is well known that many mysid species are hyperbenthic, i.e., living close to or burrowing into the sediment, becoming pelagic at night (e.g. *Gastrosaccus spinifer, Leptomysis gracilis*) and some are known to form dense shoals close to the water's edge, especially over sandy substrates (e.g. *G. spinifer, Mesopodopsis slabberi, Schistomysis spiritus*). Liao (1951) and Mauchline (1967, 1980) have reported that *S. spiritus* aggregate into dense shoals near the water's edge and swarm in the vicinity of the low-mater mark at dawn and dusk. Liao (1951) and Tattersall and Tattersall (1951) also observed aggregations of *S. spiritus* close to the sea-bed, with dispersion of the population throughout the water column after dark.

Although *Schistomysis spiritus* occurs in high densities (10 to 1 000 individuals m^{-3}) in the littoral zones of sandy

Table 2. Correlations analysis of data for November 1973 and September 1974. Variables are, in order given: Secchi disc depth, suspended particulate load, temperature, salinity, chlorophyll *a*, phaeopigment, carnivore biomass, omnivore biomass, sediment type, *Schistomysis spiritus* and average depth. Number of observations and significance levels at 1% are also shown. *S. spiritus* correlations are underlined

	Secchi	Part. ld	*T*	Salin.	Chl *a*	Phaeo.	Carn.	Omniv.	Sed. t.	*Sch sp*
November 1973										
Part. ld	−0.234									
T	0.291	−0.653								
Salin.	0.261	−0.687	0.820							
Chl *a*	−0.028	0.143	−0.338	−0.234						
Phaeo.	−0.256	0.595	−0.860	−0.744	0.325					
Carn.	0.182	0.003	−0.011	−0.041	−0.051	0.018				
Omniv.	0.064	0.110	−0.107	−0.145	−0.018	0.063	0.572			
Sed.	0.039	−0.203	0.082	0.121	0.187	−0.057	0.102	0.080		
Sch sp	−0.171	0.584	−0.611	−0.728	0.054	0.577	0.050	0.184	−0.215	
Av. dep	0.243	−0.575	0.693	0.589	−0.445	−0.699	0.169	0.091	0.090	−0.394
No. obs.	44	52	52	52	52	52	33	32	52	52
Sig. lev.	0.37	0.35	0.35	0.35	0.35	0.35	0.42	0.42	0.35	0.35
September 1974										
Part. ld	−0.660									
T	−0.259	0.478								
Salin.	0.692	−0.541	−0.378							
Chl *a*	0.023	0.066	−0.025	0.186						
Phaeo.	−0.551	0.652	0.364	−0.415	0.187					
Carn.	0.532	−0.584	−0.559	0.546	0.000	−0.623				
Omniv.	0.349	−0.162	−0.134	0.354	0.129	−0.193	0.262			
Sed.	0.160	−0.290	−0.214	0.084	−0.134	−0.283	0.255	0.050		
Sch sp	−0.373	0.559	0.700	−0.454	−0.034	0.509	−0.605	−0.100	−0.222	
No. obs.	54	54	54	54	54	54	42	43	54	
Sig. lev.	0.34	0.34	0.34	0.34	0.34	0.34	0.38	0.38	0.34	

bays (J. Mauchline, personal communication) we do not consider that the *S. spiritus* we have sampled over the Channel are entirely the result of "wash-out" from littoral communities. High densities (81 individuals m^{-3}) were observed in the sub-littoral zones of the Inner Channel in our Macer sledge hauls and we consider that the sandy sediments of the Central and Inner Channel sub-regions shown by Dyer (1984, his Fig. 1) are potential habitats for *S. spiritus.*

The occurrences of mysids in the Bristol Channel and Severn Estuary have been reported by Rees (1939), Bassindale (1941), Makings (1978) and Isaac (1980). Rees (1939), working at a site 2.3 km off the Welsh coast north of the Holm Islands (Fig. 1), recorded *Gastrosaccus spinifer, Mesopodopsis slabberi, Neomysis integer* (1 specimen) *Schistomysis ornata* (2 specimens) and *S. spiritus. S. spiritus* was present in most months sampled, reaching a peak of numerical abundance in September (1936), which was consistent with our observations in 1973/1974. Bassindale (1941) recorded *G. spinifer, M. slabberi, N. integer, Praunus flexuosus, S. ornata* and *S. spiritus* from various sites in the Inner Channel and Outer Estuary, *N. integer* was also found in the Inner Estuary and the tidal river. Makings (1978) recorded *Paramysis arenosa, Praunus flexuosus* and *S. spiritus,* together with two rare species, *S. kervillei* and *S. parkeri* Norman, from net samples taken along beaches in the North Outer and North Central Channels. *S. kervillei* was recorded occasionally in our surveys, but *S. parkeri* had not been found. Isaac (1980) reported finding *G. spinifer* and *M. slabberi* in samples collected from a pier head in Swansea Bay (North Central Channel).

The three common mysids have been included in a classification of the zooplankton communities of the Bristol Channel (Collins and Williams, 1982). *Schistomysis spiritus* was a frequent member of the estuarine and marine community, *Mesopodopsis slabberi* was included in the estuarine and marine community in April and August and the euryhaline marine community in January, and *Gastrosaccus spinifer* was found in the true estuarine community in January and April and the euryhaline marine community in August. There was no apparent seasonal succession in these three species and all occurred frequently in the same net samples. *G. spinifer* was more variable in its geographical distribution than the other two species, in some months it was almost totally confined to the estuary yet in others it was found west of the Outer Channel.

The results of the eleven surveys have shown that *Schistomysis spiritus* is the most abundant mysid in the Bristol Channel. The frequency distributions of abundance of the mysid, against variables such as temperature and salinity, when viewed over the whole year are essentially bell-shaped (Figs. 9 a and 10 a). Correlation coefficients are

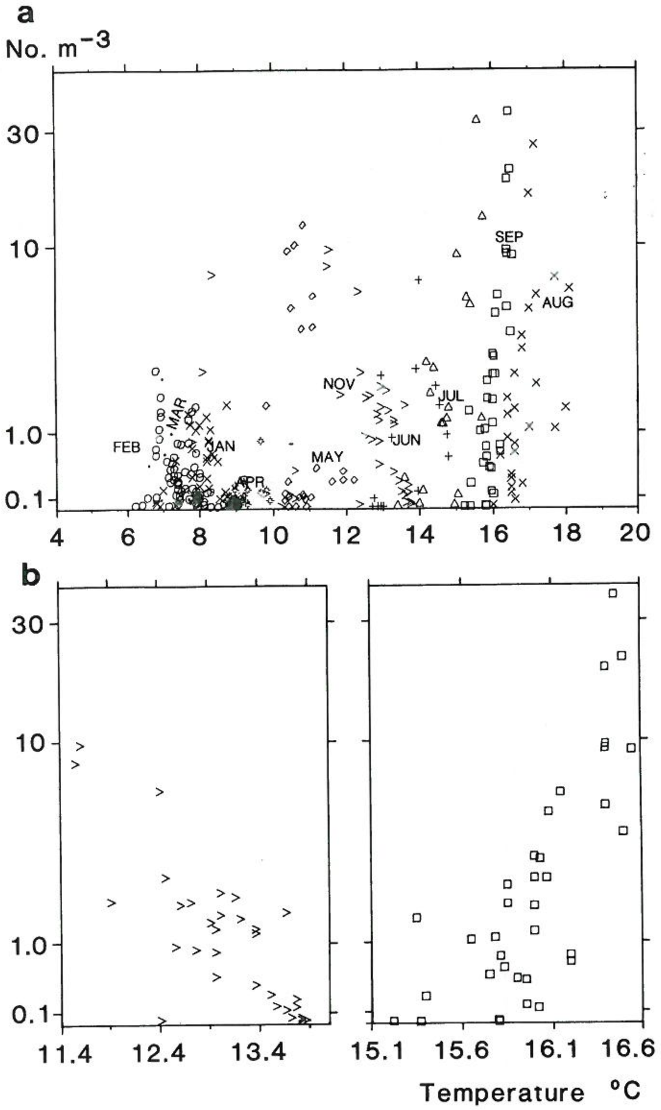

Fig. 9. *Schistomysis spiritus.* (a) Abundance plotted against temperature for 11 surveys from November 1973 to February 1975; *y*-axis has been transformed by $\log_e(1+\text{abundance})$, but is shown back-transformed. (b) Data for November 1973 (left) and September 1974 (right) shown separately on expanded scales

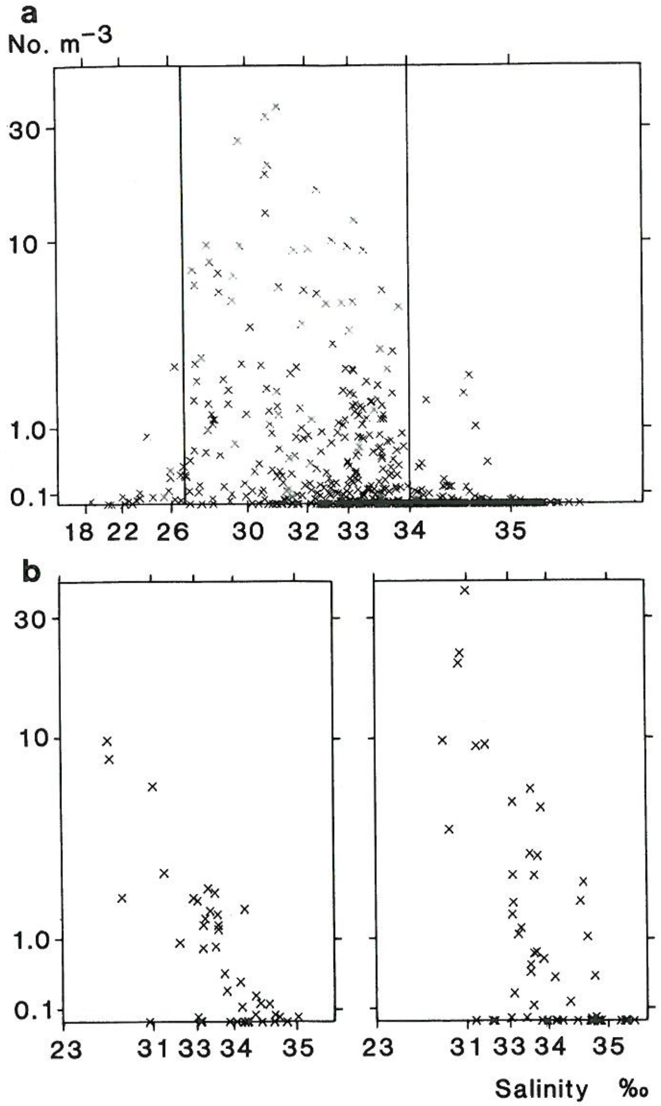

Fig. 10. *Schistomysis spiritus.* (a) Abundance plotted against salinity for 11 surveys from November 1973 to February 1975; *x*-axis has been transformed by $-\log_e[(36\text{-salinity})/36]$ and *y*-axis by $\log_e(1+\text{abundance})$, but the axes are shown back-transformed 27 and 34‰ S values are indicated. (b) Data for November 1973 (left) and September 1974 (right) shown separately on expanded scales

poor measures to infer relationships for this type of frequency distribution and a quadratic equation would be more useful to predict the distribution. To overcome this problem, the data from two months, November 1973 and September 1974, where the relationships between frequency and the variables are approximately linear (Figs. 9b and 10b) were chosen for detailed correlation analyses. For these months, correlation analysis will be a reasonable measure to summarise the relationships. The correlations for the two months are shown in Table 2. These coefficients do not imply causal relationships or mechanisms between abundance of the mysids and the variables. Only when the full effects of a particular variable on the distribution and abundance of a species is understood can causation be invoked. To understand more fully the mechanism for causation, detailed laboratory experiments are required. The correlations given in Table 2 suggest some of the variables which are likely to affect distribution and abundance of the species.

Schistomysis spiritus occurred in a well defined salinity envelope in the Bristol Channel and it was expected that a significant correlation would be found between *S. spiritus* biomass and salinity. The correlation coefficients obtained were −0.728 and −0.454 for November 1973 and September 1974, respectively. A probable explanation of the lower coefficient was that *S. spiritus,* in September, reached a numerical abundance peak in the Inner Channel and declined in numbers further upstream; a similar pattern was not observed in November. Temperature correlated (−0.611 and 0.700) with *S. spiritus* biomass in both months. The change from negative to positive correlation can be explained by the vernal and autumnal temperature reversals which were observed in the Channel. The abundance of the mysid declined with increasing temperature in November 1973, yet the reverse was the case in September 1974 (Fig. 9 b). This reversal implies that other variables besides temperature are affecting the abundance of this species during these months. It is likely that temperature and salinity have a combined influence on the numerical and seasonal abundance of mysids. The biotic variables such as particulate load and phaeopigments have correlation coefficients in excess of 0.5 in both months and were both 0.58 in November 1973 (Table 2).

Predation can be an important factor in determining the seasonal distribution and abundance of species. *Schistomysis spiritus* is an omnivore consuming a wide variety of food such as detritus, phytoplankton, and small copepods. At the same time, young stages of the mysid are preyed upon by chaetognaths, ctenophores, gammarids and fish; fish also consume adult mysids. Total carnivore biomass was negatively correlated (−0.605) with *S. spiritus* in September 1974 (Table 2).

Chlorophyll *a* was not correlated with *Schistomysis spiritus* in either month, but extinction depth did show a small negative correlation in September 1974. However, extinction depth (Fig. 5) showed little change over the area in which *S. spiritus* occurred (Fig. 3), being generally less than 3 m. In the months when chlorophyll *a* was abundant (May to September, Fig. 8) areas of high numerical abundance of *S. spiritus* (Fig. 3) coincided roughly with areas of low chlorophyll *a*. At such times *S. spiritus* may have been feeding herbivorously with other members of the euryhaline marine community, for example *Acartia bifilosa* var. *inermis* (Rose) and *Mesopodopsis slabberi*. The geographical distribution of *S. spiritus* and *A. bifilosa* were similar throughout the eleven surveys (Collins and Williams, 1981).

Clearly, in such a complex environment a single variable is unlikely to control numerical abundance or biomass of a species. We assume that the distribution of a particular species is affected by a number of biotic and physical variables acting in concert. However, it is not unreasonable to assume that certain variables will be more important than others. Although one variable may be insufficient to predict mysid abundance, models based on two such variables may be effective. Models involving more than a few variables become increasingly difficult to interpret and there is the added complication that the variables may not be independent.

Multiple linear regression analyses have been applied to the data from the two months (November 1973 and September 1974). Preliminary results suggest that it is possible to derive up to six reasonable estimates of the standing stock of *Schistomysis spiritus* ($\mu g\ C\ m^{-3}$) for the two months from equations involving combinations of two variables selected from the set of ten. This approach emphasises the problems of deriving models and conclusions from a single set of data collected during one month.

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