

THE DISTRIBUTION OF OSTRACODA IN THE FLEET

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INTRODUCTION

Ostracods are small bivalved Crustacea, usually between 0.4 and 1.0 mm in length, which live in all manner of aquatic environments. Although the chitinized appendages of the animal quickly disintegrate on death, the calcareous valves are usually preserved and ultimately are readily fossilized, and thus ostracods have become very important to geologists, not only in the dating of rocks (they have evolved rapidly through time), but also in reconstructing past-environments. The present study was indeed initiated as a means of gathering more ecological information in order to assist in such reconstructions.

Until the survey of the Mollusca (Seaward, 1980), my study of the Ostracoda (Whittaker, 1972) had been the only one undertaken on any group of invertebrates on the Fleet. The collecting, from a final maximum of over 80 stations, was carried out on a seasonal basis between 1967 and 1969. Three assemblages were recognised, these corresponding almost exactly to the divisions of the Fleet suggested on the basis of the salinity regime (Whittaker, *ibid*).

ASSEMBLAGE 1 - THE EAST FLEET 'RESTRICTED MARINE' FAUNA.

The first assemblage is characterised by large numbers of marine 'phytal' (living on fronds of algae and Zostera) species which slowly die out northwestwards with distance from the sea, lowering of salinity and disappearance of most marine seaweeds. The western boundary, at the head of Butterstreet Cove (Figure 4), corresponds with the limit of effective tidal influence and the westernmost limit of the last brown-alga to survive the diminution of salinity, Fucus vesiculosus. No difference in the faunas was found between the deeper-water channels, characterised by luxuriant algae, and the shallow areas of Littlesea, characterised by Zostera, although ostracod populations in the former tended to be more plentiful. Assemblage 1 is termed 'restricted marine' because in comparison to Weymouth Bay there is a lower diversity of species. Nevertheless whatever it may lack in species (though over 10 species per station were present in East Fleet in most seasons), the number of individuals in this sheltered environment is very large, 500-1000 specimens per sample on algae (usually 25-30 gms wet) being commonplace.

Phytal species - twenty species were found living on the fronds of algae (mainly green and red filamentous weeds), on Fucus (and its epiphytes), on the epiphytes of Laminaria-holdfasts and on the sea-grass Zostera angustifolia, as follows:

C	<u>Xestoleberis rubens</u> Whittaker
C	<u>Hirschmannia viridis</u> (O.F. Müller)
C	<u>Paradoxostoma pulchellum</u> Sars
C	<u>Paradoxostoma sarniense</u> Brady
C	<u>Loxoconcha rhomboidea</u> (Fischer)
C	<u>Propontocypris pirifera</u> (G.W. Müller)
M	<u>Hemicythere villosa</u> (Sars)
M	<u>Cythere lutea</u> O.F. Müller
M	<u>Paradoxostoma fleetense</u> Horne & Whittaker
M	<u>Sclerochilus gewemuelleri</u> Dubowsky
M	<u>Xestoleberis nitida</u> (Liljeborg)
R	<u>Callistocythere littoralis</u> (G.W. Müller)
R	<u>Semicytherura tela</u> Horne & Whittaker
R	<u>Basslerites teres</u> (Brady)
R	<u>Paracytherois</u> sp.
P	<u>Paradoxostoma variabile</u> (Baird)
P	<u>Callistocythere badia</u> (Norman)
P	<u>Paradoxostoma</u> sp.
P	<u>Aurila convexa</u> (Baird)
P	<u>Pseudocythere caudata</u> Sars

In the above list and elsewhere in this paper, 'C' is a common species (usually making up 25-100% of the fauna at most stations); 'M' is moderately common (5-24%); R is rare, and 'P' means present (only a few live individuals have ever been found).

The commonest ostracod in East Fleet is X. rubens, a remarkable local phenomenon; not only is it a new species (Whittaker, 1978), but it has also yet to be recorded elsewhere in Britain (it has recently, however, been found in France). It is replaced in Weymouth Bay by another xestoleberid, X. aurantia (Baird). During the period, early summer to late autumn, X. rubens is the dominant species in Assemblage 1, during the remainder of the year, H. viridis predominates. Two other ostracods, S. tela and P. fleetense are new species, whilst P. pirifera and S. gewemuelleri have not been previously recorded from British waters. X. nitida, the characteristic ostracod of the lower-salinity Assemblage 2 (see below) is found only in Littlesea on Zostera, where the population co-exists with X. rubens, then gradually replaces it northwestwards.

Benthic species - a further twelve species live either in the non-toxic sediment along the landward shore, in the sediment trapped by the holdfasts of algae, or in the extensive rootmass of the Zostera plant. Nothing can live in the highly reducing organic silts that floor most of the bed of the Fleet above the Narrows. Only 10-20 specimens per sample were found, very low in comparison to the phytal populations; these benthic ostracods, it is thought, feed off algal detritus.

The species are as follows:

C	<u>Cytherois fischeri</u> (Sars)
C	<u>Leptocythere castanea</u> (Sars)
C	<u>Leptocythere lacertosa</u> (Hirschmann)
M	* <u>Leptocythere macallana</u> (Brady & Robertson)
M	* <u>Semicytherura sella</u> (Sars)
M	* <u>Leptocythere porcellanea</u> (Brady & Robertson)

- R Leptocythere psammophila Guillaume
- R *Semicytherura cornuta (Brady)
- R *Elofsonia baltica (Hirschmann)
- R *Elofsonia pusilla (Brady & Robertson)
- R Cytherois sp.
- P *Pontocythere elongata (Brady)

Those marked with an asterisk are marine benthic forms and probably cannot withstand salinity reductions below 25⁰/oo, the remainder are typical estuarine species and are known to tolerate salinities from normal marine down to almost freshwater. The distribution of C. fischeri in Littlesea is curious as it appears to be confined to sediment in the landward littoral fringe, whilst in the West Fleet Assemblage it is very common throughout, associated with Zostera.

ASSEMBLAGE 2 - THE WEST FLEET FAUNA

This assemblage, covering an area from beyond Butterstreet Cove to Shipmoor Point, is characterised by a smaller number of species, both phytal and benthic, and by few individuals except in the summer months. Here the main limiting parameter is the lower salinity (generally 12-30⁰/oo). It is the realm of the Zostera and Ruppia beds, with their associated mat of 'flannel weed' (Burrows, *ibid*). The ostracod population is at its maximum in summer, but when the sea-grass dies back in late autumn, very little microfauna can survive except in a few areas of stable oxygenated sediment and green-algae, mainly along the landward shore. In winter the main population of X. nitida appears to migrate into Littlesea, where the salinity is lower than normal, the algae are richer and the competition is less.

Phytal species - there are only two indigenous species which live on the Zostera fronds and their epiphytes in West Fleet, these are:

- C Xestoleberis nitida (Liljeborg)
- C Cytherois fischeri (Sars)

However in late spring and summer, when salinities are higher, several phytal species from the East Fleet fauna (Assemblage 1) migrate into West Fleet, though never in large numbers, they are:

- Xestoleberis rubens Whittaker
- Hirschmannia viridis (O.F. Müller)
- Loxoconcha rhomboidea (Fischer)
- Propontocypris pirifera (G.W. Müller)

Benthic species - Five species live in the Zostera rootmass and non-toxic sediment along the landward shore:

- C Cytherois fischeri (Sars)
- C Leptocythere castanea (Sars)
- C Leptocythere lacertosa (Hirschmann)
- M Elofsonia baltica (Hirschmann)
- R Cyprideis torosa (Jones)

C. fischeri, therefore, lives both in the flannel-weed of the Zostera-beds and

in the sediment of the shore. Of the two species of Leptocythere, L. lacertosa is confined entirely to the landward shore, as it is throughout the Fleet, extending even into the Abbotsbury Embayment (see below), while L. castanea, in comparison, lives associated with the Zostera community.

ASSEMBLAGE 3 - THE ABBOTSBURY BRACKISH FAUNA

The ecology of the Abbotsbury Embayment, with salinities between 3 and 25⁰/∞, large expanses of deoxygenated mud, Phragmites reedbeds, and perennial freshwater dilution from the Millstream and associated drainage channels, is most like a typical estuary of any of the environments found in the Fleet. It is therefore, not surprising that the ostracod fauna is marked by the appearance, for the first time in large numbers, of the truly brackish estuarine species, Cyprideis torosa and Leptocythere ilyophila (for a review of the ecological significance of these species, see Whittaker, 1981). Seven species were present in Assemblage 3, as follows:

- C Cyprideis torosa (Jones)
- C Leptocythere ilyophila (Hirschmann)
- C Leptocythere lacertosa (Hirschmann)
- C Elofsonia baltica (Hirschmann)
- R Leptocythere castanea (Sars)
- P Cytherois fischeri (Sars)
- P Xestoleberis nitida (Liljeborg)

None of the marine benthic forms of Assemblage 1 had survived, while exclusively phytal species (e.g. X. nitida) were at a minimum.

In such an environment the puzzling omission of the low-salinity brackish species, Loxoconcha elliptica Brady, found virtually ubiquitously in estuaries throughout Europe (Whittaker, 1981), is hard to explain. This is particularly so since thousands of its calcareous shells and disarticulated valves have been found in the sediment of the Abbotsbury Embayment and the shore stations of West Fleet. It has never been found live at the present day despite a close search for its possible habitat. A clue to its disappearance may lie in a similar more widespread presence of dead shells of C. torosa, in comparison to its live distribution. Perhaps at some time in the historic past the Fleet presented a much more widespread brackish environment, at least in West Fleet, than today. Whether this can be placed as recently as before the building of Portland Harbour (pre-1850), when the tidal inlet at Smallmouth may have been perhaps more susceptible to silting is debatable. Under such conditions, the Fleet could have been cut off for long periods from the sea, becoming brackish, even hypersaline and stagnant. There is, however, no written evidence, as far as I am aware, to support this hypothesis.