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Seasonal fluctuations of *Phtisica marina* Slabber (Crustacea: Amphipoda: Caprellidea) in estuarine zone of southwest Spain

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Abstract

The annual cycle of the population of *Phtisica marina* Slabber inhabiting the perennial algae *Cystoseira usneoides* (L.) Roberts and *Sargassum vulgare* Agardh was studied during 1999 in the infralittoral community of the estuarine zone of El Portil, Southwest Spain. The density of *P. marina* during winter and spring (January-May) was more than 10 times higher than during summer and autumn (June-December). The fluctuations of *P. marina* during the favourable period were different depending on the algae. The density of *P. marina* attached to *Cystoseira* increased from January to May, while in *Sargassum* decreased. This suggests that the density of caprellids could be influenced by the life cycles of algae.

Key words: Amphipoda, Caprellidea, *Phtisica marina*, estuary, seasonal fluctuations

1. Introduction

Existing research on caprellids' life cycles in Europe is limited to a few species: *Pseudoprotella phasma* (Hughes 1978), *Caprella acanthifera* (Costello, Myers 1989) and *Caprella equilibra* (Sconfietti, Luparia 1995). Although *Phtisica marina* is an almost cosmopolitan caprellid (Bellan-Santini, Ruffo 1998) there are no ecological or behavioural studies on this species. In general, there are only few studies on the family Phtisicidae (Takeuchi 1993).

In the present work we studied the seasonal fluctuations of *Phtisica marina* inhabiting *Cystoseira usneoides* and *Sargassum vulgare*. Both algae are the dominant species in the infralittoral community of the estuarine zone of El Portil, Southwest Spain.

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2. Material and methods

The area studied covers the mouth of the River Piedras in an area called El Portil in Southwest Spain (Fig. 1). The place is subject to important fluctuations in salinity and temperature and strong tidal currents.

Sampling took place every month from January 1999 to January 2000. Five replicate samples of algae *Cystoseira usneoides* and *Sargassum vulgare* were taken each month being preserved in 4% formalin seawater solution. Caprellids were later sorted and stored in 70% ethanol. Sex was determined on the basis of presence-absence of either oostegites or penes. When the sexual features were not recognisable, the specimens were classified as juveniles.

Volume of each sample of *C. usneoides* and *S. vulgare* was estimated by water displacement in a graduate cylinder (Sánchez-Moyano, García-Gómez 1998). Each sample of algae was desiccated at 110°C for 24 hours and subsequently weighed. Along with sampling, data on salinity and temperature were recorded.

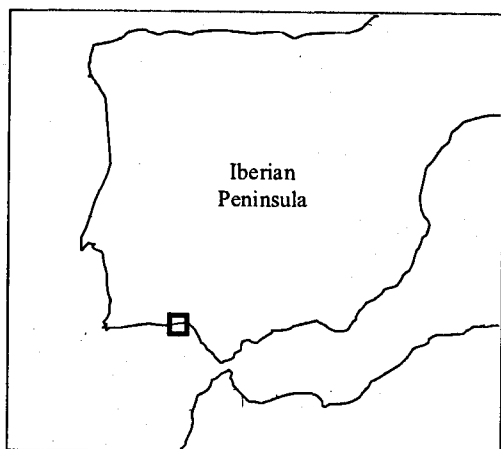


Fig. 1. Location of the studied area in the Iberian Peninsula

3. Results

Volume and dry weight of algae collected along the year were significantly correlated (*Cystoseira usneoides*: $r=0.99$, $p<0.001$, $n=65$; *Sargassum vulgare*: $r=0.98$, $p<0.001$, $n=65$).

Phytisica marina Slabber was the dominant species of the Caprellidea in *Cystoseira usneoides* and *Sargassum vulgare* from El Portil. However, also the species *Pseudoprotella phasma* Montagu was found during the months May and June (Fig. 2).

The total density during winter and spring (January to May) was over 10 times higher than during summer and autumn (June to December). Furthermore, there was a complete cessation in the reproduction of *Phytisica marina* from August to November (Fig. 3) although the algae *C. usneoides* and *S. vulgare* had not disappeared during this period. Along the favourable season for *P. marina*, the caprellid density was different depending on the substrate; total

density was decreasing in *S. vulgare* and increasing in *C. usneoides* from January to April (Fig. 3). This tendency was observed for males, females and juveniles. On the other hand, male density was higher than female density in *S. vulgare* but lower in *C. usneoides*. Temperature and salinity showed important fluctuations along the annual cycle (Fig. 4) reaching the maxima values (24°C and 36.5‰ respectively) in August.

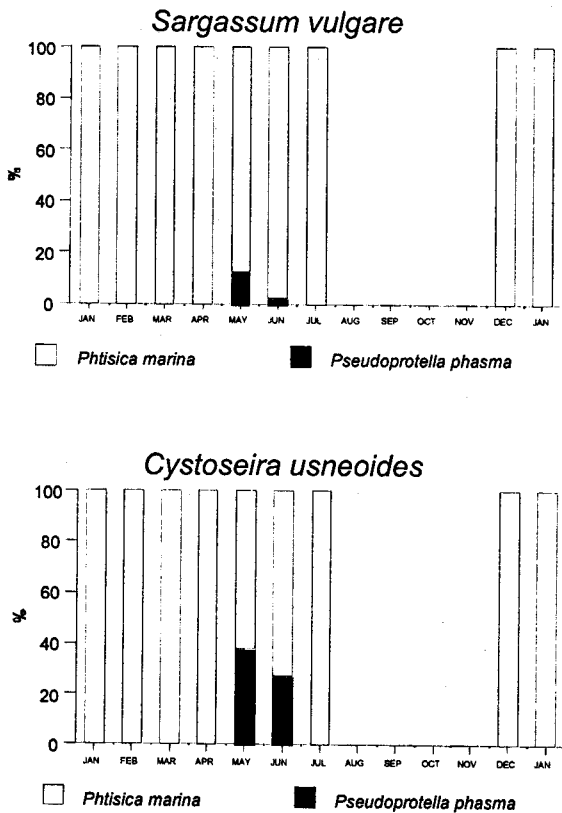


Fig. 2. Seasonal fluctuation in species composition of the Caprellidea associated with the algae *Sargassum vulgare* Agardh and *Cystoseira usneoides* (L.) Roberts from January 1999 to January 2000

4. Discussion

In this study, *Phtisica marina* was found to be the dominant species of the Caprellidea attached to *Cystoseira usneoides* and *Sargassum vulgare*, dominant in the studied estuary. The subtidal zone "El Portil", due to its location at the mouth of the River Piedras, is subject to strong fluctuations in temperature and

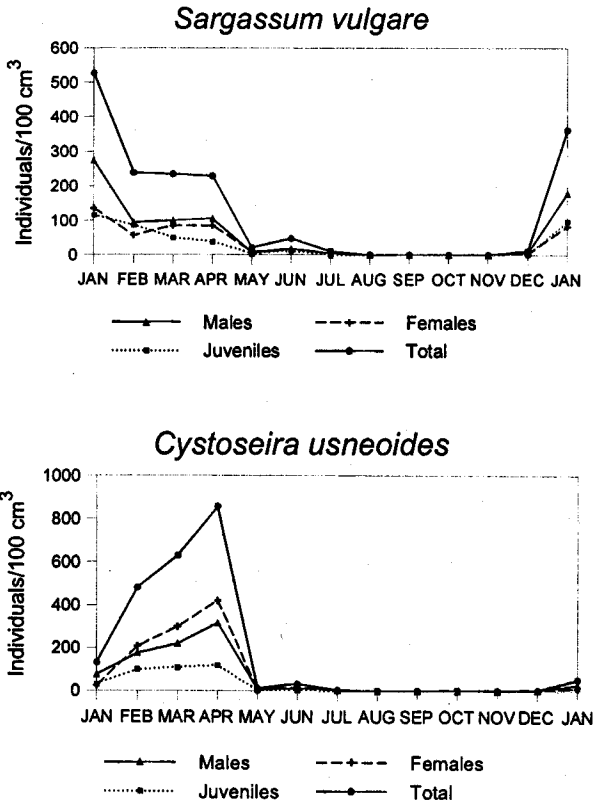


Fig. 3. Seasonal fluctuation in the density of *Phthisica marina* Slabber (males, females, juveniles and total) from January 1999 to January 2000. Density is expressed in terms of individuals per 100 cm³ seaweed volumen

salinity. The high values of these parameters during the summer months could explain the cessation in the reproduction of *Phthisica marina*. This cessation affected the caprellid populations clinging to both substrata, *S. vulgare* and *C. usneoides*. Therefore, summer and autumn are the unfavourable period for *P. marina* in this zone although the substrata (both perennial algae) were present during all the complete annual cycle. However the fluctuations along the favourable period were different depending on the algae. This suggests that life cycles of algae could influence the density of caprellids. Keith (1971) stated that caprellids have a large mobility over their substratum and are able to swim and move from one to the other. The annual cycle for *P. marina* in the estuary of El Portil is similar to the one described by Bynum (1978) for *Caprella penantis* in a North Carolina estuary.

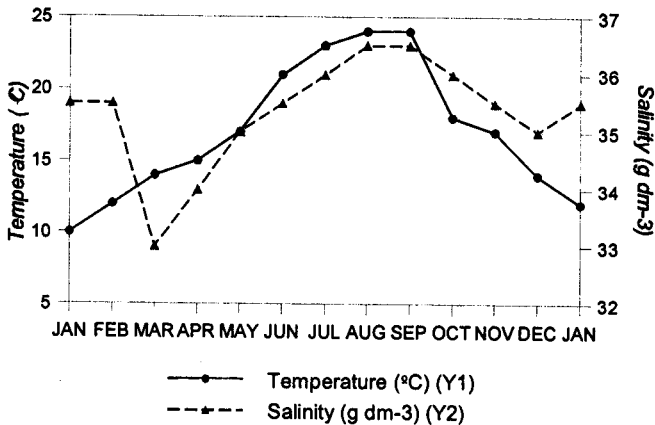


Fig. 4. Seasonal change of seawater temperature and salinity in the studied area

5. References

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