NOTES AND NEWS

OCCURRENCE OF PELAGIC JUVENILES OF *MUNIDA GREGARIA* (FABRICIUS, 1793) (ANOMURA, GALATHEIDAE) IN SAN JORGE GULF, ARGENTINA

BY

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Munida gregaria (Fabricius, 1793), known as squat lobster or lobster krill, is a decapod of the family Galatheidae restricted to the Southern Hemisphere. It is found in the southern part of South America and around the coastline of Australia, New Zealand (Vinuesa, 2005) and the Subantarctic Campbell Islands (Bailey & Sorensen, 1962). The species has two morphotypes, the "*gregaria*" type with a pelagic juvenile stage and the "*subrugosa*" type with an epibenthic post-larval stage. The species was first described by Fabricius (1793) as *Galathea gregaria*, and then transferred to the genus *Grimothea* by Leach (1820). The term "grimothea" was later used to refer to the post-larval and juvenile pelagic stages (Matthews, 1932; Rayner, 1935). The taxonomic identity of the morphotypes, which were regarded as separate species until recently, has long been a subject of controversy (see Matthews, 1932). The validity of the morphotypes was supported by genetic evidence (Pérez Barros et al., 2008). The resulting morphology may depend on environmental factors (Williams, 1973) and on the duration of the post-larval stage (Chilton, 1909).

Large shoals of the pelagic juvenile have been documented at numerous sites within the distribution range of the squat lobster. They have frequently been recorded in the southern Pacific Ocean (Thomson, 1898; Chilton, 1909; among others). More recently, this phenomenon was observed in coastal waters of New Zealand almost every year during summer (Williams, 1980; Zeldis, 1985). In the Atlantic Ocean, large shoals of juveniles and adults of squat lobsters were

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reported between 1927 and 1929 from Bustamante Bay, San Jorge Gulf, and the coasts of the province of Santa Cruz, Argentina (Matthews, 1932). Massive shoals were also sighted off the Chilean coast (Tabeta & Kanamaru, 1970), and in shallow waters around De los Estados Island, Argentina (Kawamura, 1976). This phenomenon was also observed by fishermen in the Beagle Channel (Tapella, 2002). Nevertheless, the *subrugosa* form was the only morphotype recorded in San Jorge Gulf over the past decades (Vinuesa, 2005).

Large shoals of juveniles were, however, detected in shallow, coastal waters near Comodoro Rivadavia during the first half of 2009, followed by mass arrivals on beaches and rocky shores. They were observed superficially in areas from 1 to 73 m in depth and at a distance of up to 14 km from the coast, occupying soft- or hard-bottom subtidal environments along a coastal fringe of about 50 km. In New Zealand, the grimothea shoals are found in coastal waters associated with estuaries, tidal fronts, and bays (Jillett & Zeldis, 1985). The gregaria morphotype is also more abundant in Lapataia Bay in the Beagle Channel, with large amounts of fresh water and suspended material (Tapella, 2002).

The juveniles were sampled shortly after a stranding event, or from boats, over the first half of 2009, except for April. In the laboratory, the carapace length (CL) of the juveniles was measured from the posterior edge of the orbit to the posterior mid-dorsal edge of the carapace, as in adults. Mean CL was 5.61 mm in January and 10.53 mm in July. According to Williams (1980), the juveniles would undergo two or three moults during this period. These results are in agreement with the size of post-larvae from Argentina and New Zealand (Rayner, 1935). In the Beagle Channel it takes one year to reach a maximum size of 10.53 mm (Tapella, 2002), probably due to the low temperatures. The pelagic specimens sampled in January may correspond to the first of the two spawning cohorts described previously (Vinuesa, 2007), as suggested by the presence of zoeae III and IV during November (M. Varisco, unpubl.).

Chilton (1909) suggested that the time of permanence of post-larval stages in the water column depends on appropriate conditions linked with an availability of settlement sites. Following the idea of Chilton, Williams (1973) suggest that food availability also plays a key role in the duration of the pelagic phase. On this basis, a hypothesis is proposed that the large shoals occurring in San Jorge Gulf may have resulted from increased food availability in the water column, which delayed post-larval settlement. To test this hypothesis, the concentrations of chlorophyll-*a* (CC*a*) in the Gulf were analysed between January 2006 and June 2009. Data of CC*a* were obtained fortnightly using 30 randomly-selected points of a grid covering the surface of the gulf (Antares, 2009); values near the coast were disregarded to prevent interferences. The CC*a* values estimated in the period between January and June were compared among years using the Median

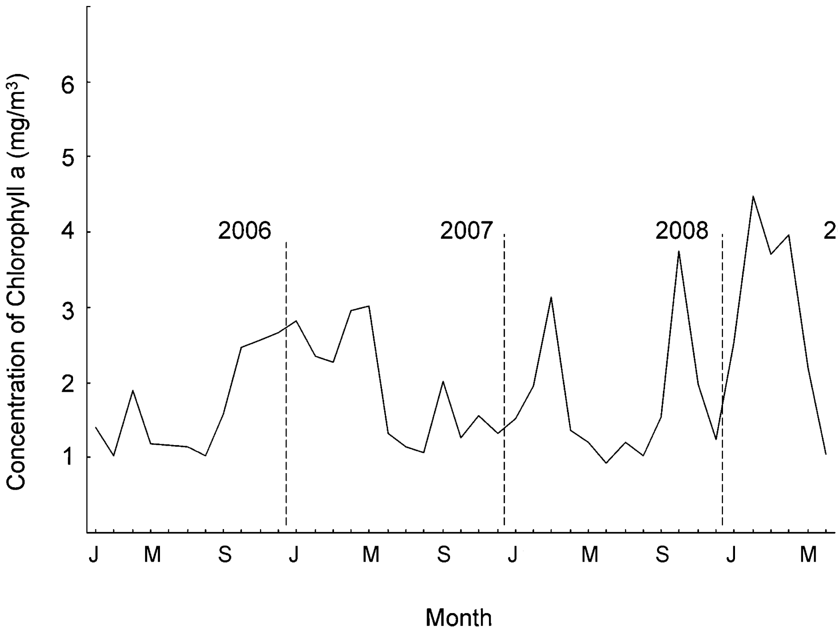

Fig. 1. Monthly mean chlorophyll-*a* values in San Jorge Gulf, Argentina, between January 2006 and June 2009.

test and the Kruskal-Wallis test for a posteriori comparisons, with the Bonferroni correction. The CC*a* values differed significantly among years ($\chi = 115.11$; df = 3; $p = 0.000$), with the CC*a* value in summer-autumn being significantly higher in 2009 (fig. 1).

In order to determine if the juveniles could take advantage of a potential increase in food abundance, the stomach contents of 30 specimens were analysed monthly. The juveniles were dissected to remove their stomachs and the contents were examined under a microscope. A stomach repletion index (RI) was estimated as a percentage of fullness according to the following arbitrary scale: 0 = empty; 1 = 1-24.9%; 2 = 25-49.9%; 3 = 50-74.9%; and 4 = 75-100%). The frequency of occurrence (FO) of the different food items in the diet was determined. There was a high FO and abundance for the dinoflagellate *Prorocentrum micans* Ehrenberg, for diatoms of the genera *Navicula*, *Pleurosigma*, *Licmophora*, copepods, and other crustaceans (fig. 2). Most specimens showed an RI of 3 and 4 (26.08 and 49.2% of the juveniles, respectively). These RI values, together with the high abundance of *P. micans*, suggest that the post-larval stage of *M. gregaria* feeds actively on plankton. Likewise, Kawamura (1976) found a large proportion of specimens with full stomachs containing remains of copepods and diatoms.

The lack of sediment in the stomach of the specimens from January and February suggests that they might have fed principally in the water column.

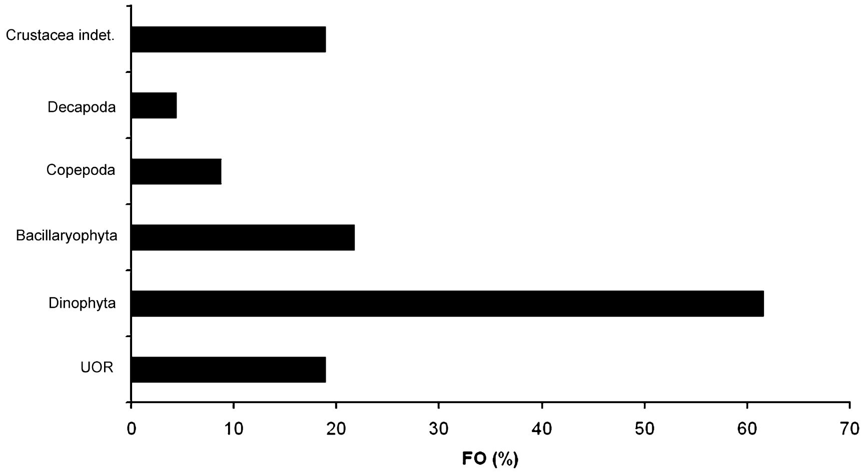

Fig. 2. Frequency of occurrence (FO) of the main food items of juveniles of *Munida gregaria* (Fabricius, 1793) in San Jorge Gulf, Argentina; UOR, unidentified organic rest.

Sediment and particulate organic matter are usually found in the stomach of *M. gregaria* adults (Vinuesa & Varisco, 2007), and their presence in pelagic juveniles would have indicated that they also feed on the bottom.

The appearance of large shoals of *Munida gregaria* pelagic juveniles in San Jorge Gulf was coincident with an increase in CC*a*. The results of this study support the hypothesis of Williams (1973), that increased food availability may delay the settlement of juveniles, thus determining the presence of post-larvae, juveniles, and even adults of pelagic habits.

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