*Journal of Micropalaeontology*, **14**: 96. 0262-821X/95 $07.00 

# MICROPALAEONTOLOGY NOTEBOOK

## Preliminary observations on living *Krithe praetexta praetexta* (Sars, 1866), *Sarsicytheridea bradii* (Norman, 1865) and other marine ostracods in aquaria

STEFAN MAJORAN[1] & STEFAN AGRENIUS[2]

[1] Department of Marine Geology, University of Göteborg, Earth Sciences Centre, S-41381 Göteborg, Sweden.

[2] Kristineberg Marine Research Station, S-450 34 Fiskebäckskil, Sweden.

More than fifty years ago, Elofson (1941) showed that it is fully possible to maintain living cultures of marine ostracods in aquaria. He concentrated particularly on determining the generation length of several species. In this study, we provide some preliminary observations on the mode of life and morphological variations of marine ostracods kept in aquaria. They derive from a water depth of 40 m in the Gullmar Fjord (58°17'N and 11°29'E), west coast of Sweden. The dominant species are *Krithe praetexta praetexta* (Sars, 1866) and *Sarsicytheridea bradii* (Norman, 1865). Other species housed in the aquaria are: *Jonesia acuminata* (Norman, 1865), *Palmoconcha guttata* (Norman, 1865), *Palmoconcha laevata* (Norman, 1865), *Cytheropteron latissimum* (Norman, 1865), *Pterygocythereis jonesii* (Baird, 1850), *Acanthocythereis dunelmensis* (Norman, 1865), *Robertsonites tuberculatus* (Sars, 1866), *Elofsonella concinna* (Jones, 1857) and *Argilloecia conoidea* (Sars, 1923).

### MATERIAL AND METHODS

The study was carried out at the Kristineberg Marine Research Station, west coast of Sweden, from July of 1992 to June of 1994. Sediment from a depth of 40 m in the Gullmar Fjord was sieved to remove the macrofauna and frozen, then thawed to constitute a 10–20 mm thick sediment layer in two 50 l aquaria. The sediment consisted of 8 % sand (>63 $\mu$m), 44 % silt (>3.9 $\mu$m) and 49 % clay (<3.9 $\mu$m), and with a water content of 71% ± 5% ($\sigma$ = 2.4). Ostracods from the ≥250 $\mu$m sieve fraction of the dredge sample (from a depth of 40 m) were added to the aquaria. They were kept in a continuously flowing, open system, pumping water from the intermediate watermass (Svanson, 1984) of the fjord (from which the ostracods originate). This system is intended to reproduce approximately the natural variation in physico-chemical conditions. During the study, the salinity varied between 32–34‰, the temperature between 4–15°C and the oxygen content between 4 and 7.3 ml $l^{-1}$ (measured at a depth of 40 m in the Gullmar Fjord by the Swedish National Pelagic Monitoring Program).

The vertical distribution of living ostracods in the sediment of the aquaria were estimated in each of 16 samples. A millimetre-graded hollow cylinder with a diameter of 8.7 cm was pressed through sediment to efficiently isolate a small volume. A siphon was passed over the sediment surface within the cylinder to remove thin layers which were sieved through 250 and 125 $\mu$m and picked for living ostracods.

### RESULTS AND OBSERVATIONS

**Notes on reproduction and ontogenetic development.** Most individuals of *S. bradii, K. praetexta praetexta, A. conoidea* and *J. acuminata* were juveniles (A-1 to A-4) at the end of the experiment. We also recorded living juveniles A-2 and A-1 of *R. tuberculatus* and *A. dunelmensis*, respectively. This implies that ostracods moult, grow and reproduce in the aquaria. Elofson (1941) estimated the total lifespan for *S. bradii, R. tuberculatus* and *A. dunelmensis* to be 2–3 years. The generation length of *K. praetexta praetexta* is unknown. Our infrequent sampling is insufficient for such estimates, although the many juveniles of this species in June 1994 could hardly have remained unchanged since July 1992. The population density (*c.* 1000 individuals per $m^2$) and species composition of living ostracods at the end of the experiment were similar to the natural environment at 40 m in the fjord.

**Life position in the sediment of the aquaria.** Of a total of 59 living specimens of *K. praetexta praetexta* and *S. bradii*, all except one individual of *S.bradii*, were found at depths below 2 mm in the sediment and down to the bottom of the aquaria (≤20 mm). A total of 14 specimens of *A. conoidea* and a few specimens of *R. tuberculatus* were found at the surface and several millimetres down in the sediment. Most of the individuals of the remaining species were found at or near the surface of the sediment. Our observations are largely consistent with Elofson (1941) who listed *J. acuminata, P.guttata* and *P. laevata* among forms predominantly living on the surface of the sediment, whereas *K. praetexta praetexta, S. bradii* and *R. tuberculatus* were listed as endobenthic or infaunal species. Elofson (1941) regarded *A. conoidea* as mainly infaunal, although the present study indicates that this species is equally common close to the sediment surface.

**Size variation.** The mean length and height of the left valve (LV) of two adult females of *K. praetexta praetexta* recorded living after 22 months in the aquaria (in May–June 1994) are 695 and 360 $\mu$m, respectively. The corresponding values for three adult males are 675 and 323 $\mu$m, respectively. These dimensions are significantly smaller than those of adult specimens obtained from dredge samples of May 1988 (McKenzie *et al.*, 1989), and April and July of 1992. The mean length and height of the LV of adult females from this database ($N$ = 77) are 779 (±5.1; 95% confidence interval) and 400 (±6.9) $\mu$m, respectively. The corresponding values for males ($N$ = 38) are 772 (±7.3) and 359 (±4.6) $\mu$m, respectively. A few living adults of *R. tuberculatus* and *P. guttata*, respectively, after 22 months in the aquaria were also significantly smaller in average than specimens of the dredge sample of July 1992. A corresponding size reduction was not observed in *S. bradii*.

### DISCUSSION

The oxygen penetration rarely exceeds 10 mm in sandy shallow water sediments (Revsbech *et al.*, 1980; Rasmussen & Jörgensen, 1992). It is dependent on the porosity of the sediment, the diffusion coefficient of oxygen in the sediment and the oxygen concentration at the sediment surface; there is also an inverse relationship between oxygen penetration and oxygen consumption in the sediment (Revsbech & Jörgensen, 1986). Representatives of *K. praetexta praetexta* and *S. bradii* were found at depths > 10 mm in the sediment of the aquaria. This could be explained by the high porosity (water content) of the sediment which may allow a greater penetration of oxygen. The intensity of bioturbation may also influence the oxygen penetration and the vertical distribution of species in the sediment. A juvenile, infaunal macrofauna was inevitably enclosed along with the ostracods at the beginning of the experiment, which together with a supply of pelagic larvas through the pumping system have developed into an actively bioturbating fauna during the course of the experiment. Infaunal burrowing polychaetes (mostly *Diplocirrus glaucus*) were common.

One possible explanation to the size reduction observed in *K. praetexta praetexta, R. tuberculatus* and *P.guttata* is that the temperature became higher in the aquaria during the summer than in the fjord. Another explanation is possibly reduced food supply. Despite having an open circulating system without any kind of filter, the supply of plankton is considerably lower in the aquaria than in the natural environment (Granmo, pers. comm.). The nutritive value of the aquarium sediment may differ from the natural environment involving a difference in the microbiota. The size reduction in three species but not in *S. bradii* is possibly explained in terms of different susceptibility to thermal variation and/or different feeding strategies.

### ACKNOWLEDGEMENTS

We are grateful to Kristineberg Marine Research Station for facilities to perform the study; to Dr T. Correge, Bordeaux, for encouraging us to present the results; to Michal Kucera and to Ursula Schwarz for laboratory assistance; to Dr R.A. Reyment, Uppsala, Dr K.G. McKenzie, Melbourne, Dr Bjorn Malmgren and Dr D.J. Horne, London, for comments on the manuscript. Financial support: grant (G-PD 6656-302) from the Swedish Natural Science Research Council.

**Manuscript received September 1994**
**Manuscript accepted April 1995**

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