

## Breeding period of the arrow crab *Stenorhynchus seticornis* from Couves Island, south-eastern Brazilian coast

Valter José Cobo

NEBECC—Group of Studies on Crustacean Biology, Ecology and Culture, Laboratório de Zoologia, Departamento de Biologia, UNITAU, Pça. Marcelino Monteiro, 63, CEP 12030-010, Taubaté, (SP) Brasil. E-mail: vjcobo@uol.com.br

This study focused on the breeding period of *Stenorhynchus seticornis* (Brachyura, Majidae, Inachinae) in the south-eastern Brazilian coast. Monthly collections were accomplished from January to December of 2000. A catch effort of approximately 4 h was allocated to each monthly survey. The breeding intensity was determined as the percentage of ovigerous crabs within the whole adult female population. A total of 204 adult females were obtained, from which 74.5% presented eggs attached to their pleopods. Ovigerous females were observed year-round, usually comprising more than 60% of sampled adult females. The ovigerous frequency was not found to be correlated with either temperature or salinity.

Several authors pointed out the importance of major climatic factors as regulators of the breeding period. Yet, they also agree that such an influence is the result of a combined effect of a group of environmental variables, maximizing the influence of isolated factors. The seasonal variation of water temperature and daylight duration are considered as the most important variables determining the breeding period of brachyuran crabs (Wear, 1974; Pillay & Ono, 1978). In general, it is admitted that the timing of reproductive events are usually controlled by some environmental factors that determine the recruitment of juveniles during favourable periods for their survival (Booolootian et al., 1959).

The arrow crab *Stenorhynchus seticornis* (Herbst, 1788), is a majid crab, commonly found in rocks, corals, calcareous algae and over sand, from beaches to great depths. Its geographical distribution is restricted to the Occidental Atlantic, from North Carolina to Argentina (Melo, 1996).

This work provides information on the extension of the breeding period of *S. seticornis*, and the eventual effect of water temperature and salinity in the determination of the reproductive season in a population located in the south-eastern Brazilian coast.

Monthly collections were carried out from January to December 2000. The sampling area was a rocky area at Couves Island, São Paulo State, south-eastern coast of Brazil (23°25'25"S and 44°52'03"W). Each month, crabs were collected using SCUBA diving, over a standardized period of (catch effort) 4 h approximately. The specimens of *S. seticornis* were captured by hand and individualized in plastic bags.

After the collections, the specimens were sexed, measured (carapace width, CW), and, in the case of females, the presence of eggs attached to the pleopods was recorded. The monthly frequency of ovigerous females was determined as their percentage within the overall sample of adult females.

The monthly mean values of water temperature and salinity were provided by the research unit NEBECC—Group of Studies in Biology, Ecology and Culture of Crustaceans, Universidade Estadual Paulista-UNESP.

A total of 204 adult females was obtained, 152 of those ovigerous, representing 74.5% of the adult females recorded during the study period. Average size of sampled adult females was  $9.5 \pm 1.5$  mm CW, ranging from 5.6 to 14.7 mm CW.

Ovigerous females were recorded over the study period, presenting a normal distribution (Kolmogorov–Smirnov;  $P < 0.05$ ). The frequency of adult females was higher than 60% in almost all sampled months, except December, when ovigerous females comprised 52.2% of the adult female population. Highest frequencies were recorded in March and April, respectively 90.3% and 96.9%. The percentage of ovigerous females was correlated with neither water temperature nor salinity (Pearson Correlation,  $P < 0.5$ ) (Figures 1 & 2). Monthly average values of water temperature and salinity did not differ throughout the study period ( $t$ -test;  $P > 0.5$ ).

The ovigerous frequency of *S. seticornis* during the study period indicates a continuous reproduction pattern, commonly observed in marine organisms of tropical and subtropical areas.

Rhythms of continuous breeding along an annual cycle, as observed for *S. seticornis* in the present account, ensure a constant supply of larvae. This feature affects some aspects of the population dynamics, as a pattern of continuous recruitment and stable abundance, thus contributing directly for the maintenance of population size (Conde & Diaz, 1989).

The environmental factors, water temperature and salinity, which were addressed in this work, seem to be of no great importance in the determination of the breeding period in *S. seticornis*,

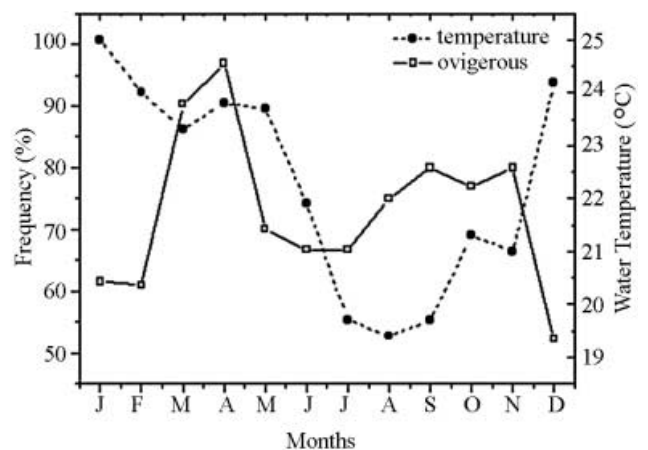
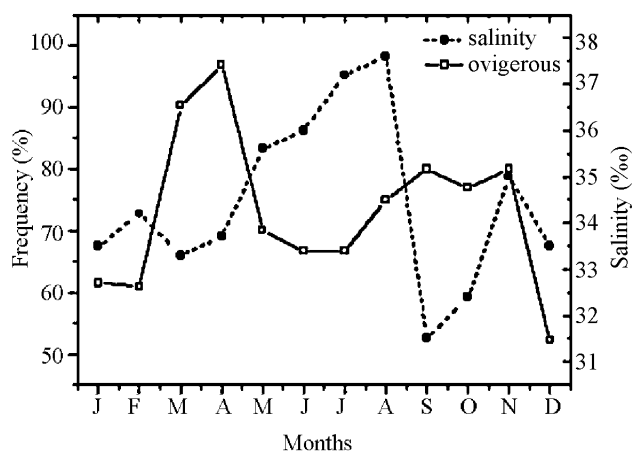


Figure 1. Correlation between monthly percentage frequency of ovigerous females, related to the total of adult female, and monthly mean temperatures (Pearson Correlation,  $P < 0.05$ ).



**Figure 2.** Correlation between monthly percentage frequency of ovigerous females, regarded to the total of adult female, and monthly mean salinity (Pearson Correlation,  $P < 0.05$ ).

since no correlations were found between those factors and the frequency of ovigerous females. There is therefore no evidence of any rhythms associated to the variation of those environmental variables. The factors that regulate reproduction in this species, allowing a continuous breeding pattern, are still to be demonstrated by interpreting proper experiments.

The breeding period of *S. seticornis* indicates a pattern of continuous reproduction, determined by an interaction of external factors. The adequate development and survival of larvae may be ensured year-round due to the relatively constant environmental conditions in the study area, combined to a genetic tolerance facing the variation of external.

I thank the Universidade de Taubaté–UNITAU, for the financial support (P# 251/2001-PRPPG) and OMNI-MARE Dive Center, for the logistical support. In particular, I am grateful to Dr Itamar Alves Martins, for his skilled assistance during the dive sessions.

## REFERENCES

- Booolootian, R.A., Giese, A.C., Farmanfarmaian, A. & Turcker, J., 1959. Reproductive cycles of five west coast crabs. *Physiological Zoology*, **4**, 213–220.
- Conde, J.E. & Diaz, H., 1989. The mangrove tree crab *Aratus pisonii* in a tropical estuarine lagoon. *Estuarine, Coastal and Shelf Science*, **28**, 650.
- Melo, G.A.S., 1996. *Manual de Identificação dos Brachyura (Caranguejos e Siris) do Litoral Brasileiro*, ed. Plêaide, São Paulo, 604 pp.
- Pillay & Ono, Y., 1978. The breeding cycles of two species of grapsid crabs (Crustacea: Decapoda) from the north coast of Kyushu, Japan. *Marine Biology*, **45**, 237–248.
- Santos, S. & Negreiros-Fransozo, M.L., 1999. Reproductive cycle of the swimming crab *Portunus spinimanus* Latreille (Crustacea, Decapoda, Brachyura) from Ubatuba, São Paulo, Brazil. *Revista Brasileira de Zoologia*, **16**, 1183–1193.
- Sastry, A.N., 1983. Ecological aspects of reproduction. In *The biology of crustacea*. Vol. 8. *Environmental adaptations* (ed. F.J. Vernberg and W.B. Vernberg), pp. 1–383. London: Academic Press.
- Wear, R.G., 1974. Incubation in British decapod Crustacea, and the effects of temperature on the rate and success of embryonic development. *Journal of the Marine Biological Association of the United Kingdom*, **54**, 745–762.

Submitted 29 November 2001. Accepted 16 October 2002.