FEEDING RHYTHM OF THE SWIMMING CRAB *Arenaeus cribrarius* (LAMARCK, 1818) (CRUSTACEA, PORTUNIDAE) IN UBATUBA, SÃO PAULO, BRAZIL

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RESUMEN – El presente estudio evalúa el ritmo alimenticio del siri *Arenaeus cribarius*, en la región de Ubatuba, São Paulo, Brasil. Los animales fueron recolectados mensualmente durante dos años (mayo/91 a abril/93), siendo analizados en cuanto al grado de repleción estomacal. Fueron recolectados 1921 animales, de los cuales 62,3% presentaron el estomago lleno o medio lleno (repleción estomacal >50%). Se verificó que las hembras no ovigeras presentaron mayor intensidad de ingesta de alimentos que los machos y hembras ovigeras, probablemente por la gran intensidad reproductiva, mientras las hembras ovigeras ingirieron menores cantidades de alimento probablemente por su hábito mas críptico. En la etapa de pre-muda los animales mostraron una reducida actividad alimenticia, ocurriendo lo contrario con aquellos en post-muda, indicando la existencia de una expresiva dependencia entre la frecuencia alimenticia y las etapas de muda de este cangrejo. Los individuos jóvenes mostraron mayor actividad alimenticia que los adultos, no habiendo sido observada una variación estacional del ritmo alimenticio. La cantidad de alimento ingerido estuvo íntimamente relacionada al requerimiento energético producto del crecimiento somático y de reproducción, ocasionando diferencias en una comparación intersexual o entre las etapas del ciclo de muda.

Palavras chaves: Crustacea, Brachyura, Portunidae, Ritmo Alimentar, Ubatuba
Key words: Crustacea, Brachyura, Portunidae, Feeding Rhythm, Ubatuba

Studies on the feeding rhythm of brachyuran crabs are important to understanding the relation between feeding activity and life cycle, as well as the species position of the crabs in the trophic organization of the marine community. Crabs affect the abundance and distribution of the prey population (Seed, 1980), mainly due to their high abundance, as mentioned by Sumida & Pires-Vanin (1997) in Ubatuba region.

Natural diet variations related to sex, season, size and molt stage were observed for portunid crabs (Freire, 1996; Mantelatto & Christofoletti, 2001; Mantelatto *et al.*, 2002). Studies that aims to promote a better knowledge about diet rhythm and composition are very important to understanding of the biology of the species. Portunidae crabs have been focused about this subject, because these organisms have ecological and economic importance, particularly in aquaculture (see Mantelatto & Christofoletti, 2001 for review)

Arenaeus cribrarius lives in marine shallow waters, frequently buried in the sand sediment. There are few studies about this species, with the most important ones carried out in Ubatuba region related to distribution, reproduction and relative growth (see Pinheiro & Hattori, 2002 for review). Besides the

ecological position in marine benthos, *A. cribrarius* is a very important fishery resource widely accepted as food in the northeast region of Brazil (Fausto-Filho, 1968).

The objective of this work was to determine the feeding rhythm of the swimming crab *A. cribrarius* in Ubatuba region, analyzing the stomach fullness and its variation in relation to sex, size, molt stage and season. Crabs were collected monthly from May/1991 to April/1993 with a shrimp fishery boat equiped with "double-rig" nets, at Ubatuba (23°30'00"S - 45°03'00"W), northern coast of São Paulo state, Brazil.

In the laboratory, the specimens were sexed, with registry of the presence of eggs carried by females (ovigerous females). The carapace width excluding lateral spines (CW) were measured with calipers to the nearest 0.05 mm. The individuals were classified according to molt condition (stage A = initial post-molt; B = intermediate/advanced post-molt; C = inter-molt; D = pre-molt). Months were grouped to seasonal analysis as follows: Spring (October, November, December), Summer (January, February, March), Autumn (April, May, June), and Winter (July, August, September).

A visual estimate of the stomach fullness was made immediately after its removal, by percentage of the stomach replenishment (Reigada & Negreiros-Fransozo, 2001): *empty* (0-25%); *partially full* (25-50%); *half-full* (50-75%);and *full* (75-100%). Differences between sexes, size classes, molt stages and seasons were verified by the one-factor ANOVA using the average percentage of stomach fullness, that was calculated using 12.5, 37.5, 62.5 and 87.5 points to stomach in empty, partially full, half-full and full classes, respectively.

A total of 1,921 individuals of *A. cribrarius* were collected during the studied period. The replenishment degree of stomachs revealed that 62.3% of the crabs had more than 50% of the stomach capacity occupied by food. This pattern represent the important role of this species in the trophic chain of the benthonic region like an active predator. Similar pattern was observed for *Callinectes ornatus* in the same region (Mantelatto & Christofoletti, 2001).

In relation to sex, non-ovigerous females had a feeding rhythm significantly higher than males and both of them higher than ovigerous females ($P<0.01$). The higher amount of food ingested by females can be due to the energetic requirement promoted by faster growth and intense reproduction, whereas when in the ovigerous condition these females showed a cryptic habitat to protect the eggs, with decrease of the food ingestion, as observed by Norman & Jones (1992) and Freire (1996) for others portunid crabs.

Animals in initial and intermediated/advanced post-molt showed a similar ingestion of food being this amount significantly higher than inter and pre-molt stages ($P<0.01$). In the pre-molt 92.7% of the animals showed empty or partially full stomachs (<50%) and were significantly different of inter-molt animals ($P<0.01$). This pattern characterize that crabs cease the food ingestion before the molt, occurring the inverse immediately after this process when they ingested a higher amount of prey. However, animals

in post-molt ingested higher amounts of mollusks and others calcareous preys due to calcification requirements of the animal (Williams, 1982; Mantelatto & Christofoletti, 2001). This items have a slower digestion (Choy, 1986) and remain preserved for more time, causing an accumulate of full and half full stomachs.

The stomach fullness showed few variation in relation to size. However, juvenile individuals (CW<60mm) fed significantly more than adult ones (P<0.01). This difference can be related to nutritional requirement during ontogeny, because juveniles molt with higher frequency and growth faster than adults, whereas these crabs realize the gonadal maturation. Stomach fullness no varied during the seasons, probably due to constant prey availability in tropical regions. The same pattern was observed for *C. ornatus* by Mantelatto & Christofoletti (2001) in this area.

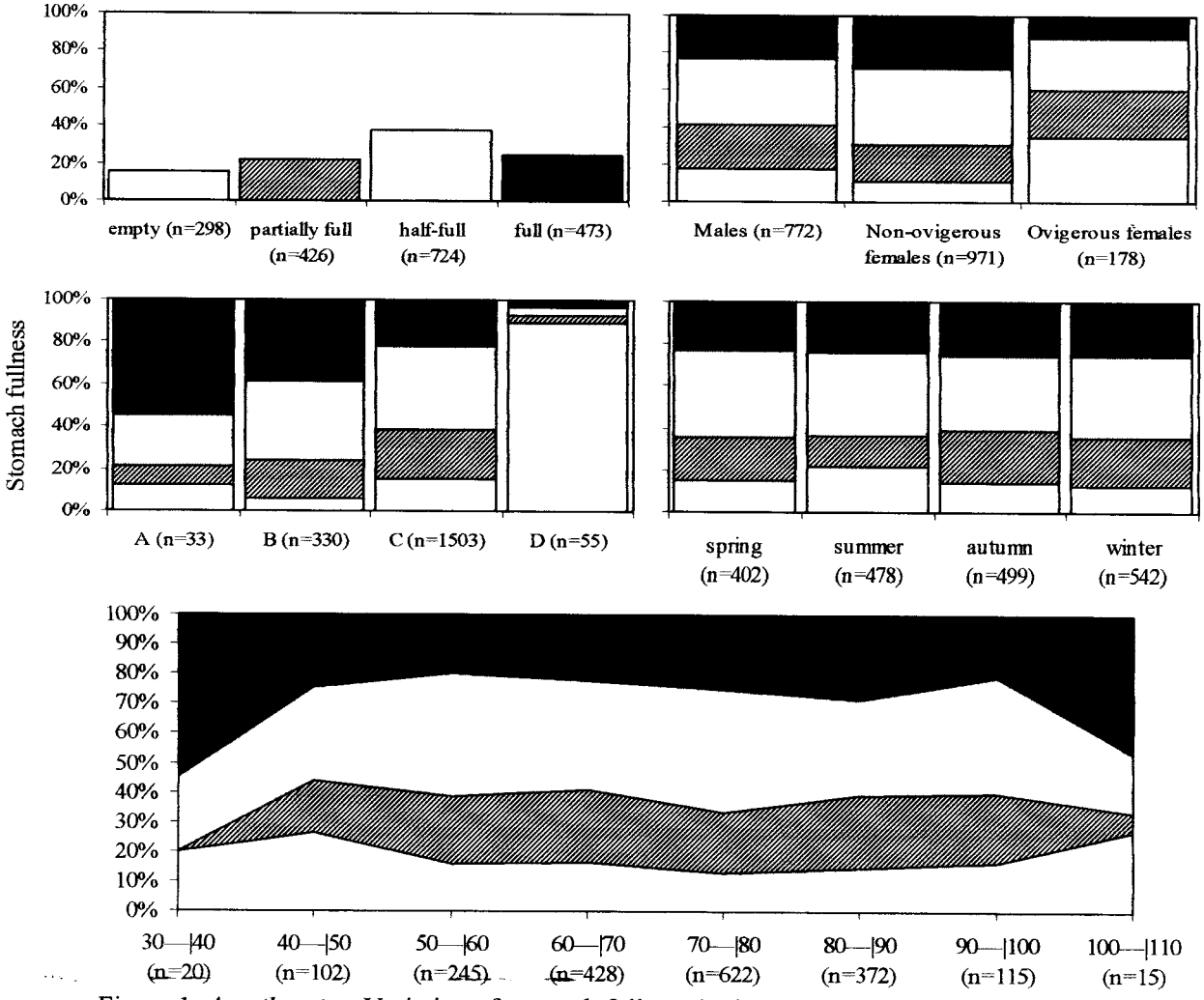

Figure 1. *A. cribrarius.* Variation of stomach fullness in the population and in relation to sex, molt stage, season and size.

Arenaeus cribrarius can be considered an active predator in the Ubatuba region, with great relation between feeding rhythm and life cycle. Besides, this region have a large abundance of others brachyuran crabs which can compete with *A. cribrarius* in the trophic chain. Studies about this trophic competition and stomach contents can be helpful to the understanding the biology of these species and the community relations.

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