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Ecological spectrum of the Spiny Spider Crab (Maja squinado)

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RESUME'

Dans cette communication le spectre écologique du crabe Araignée de mer (*Maya squinado*) est considéré. Ses limites de tolérance par rapport à la température, la salinité, la profondeur, le substrat, la communauté et la nourriture sont analysés.

Having carried out long-term autecological investigations of the spiny spider crab (*Maja squinado*) this is a good occasion to make out a synthesis of all results related to its environment in the ecological spectrum form. The ecological spectrum (according to Stankovic, 1962) includes an assemblage of all tolerance limits (niche breadth by American authors or ecological valence by European ones), i.e. ranges of ecological factors within which the species can exist. Each ecological valence includes "cardinal points of life" (Vouk, 1939), i.e. minimum, maximum and optimum. Knowledge of the ecological spectrum enables the understanding of the presence and spatial-temporal distribution of the species in a given environment. During the study of the spiny spider crab relationships of the following ecological factors were analyzed.

Temperature. The spiny spider crab tolerates a temperature range between 4 and 35 °C (Stevcic, 1971). It is also an eurythermic species. Judging from distribution and maximal density near the northern boundaries of its area (Channel Islands, west Istrian coast), as well as opposite trends between migrations and temperature (Stevcic, 1973), it can be concluded that it is a microeurythermic species, i.e. its optimum lies in colder waters.

Salinity. Physiological studies suggest that the species is poikoloosmotic, while isoosmotic with sea water. Consequently, it is a strictly marine organism, not entering brackish or hypersaline waters. In relation to salinity it is also a mesostenohaline species.

Depth. The spiny spider crab lives between 0 and 170 m depth, being also an eurybathic species (Stevcic, 1969). However, the depth minimum varies seasonally since it exhibits inshore-offshore migrations so that its optimum is different in various seasons.

Substrate. *Maja squinado* occurs in various types of bottom such as rock, sand, mud and mixed substrates (Stevcic, 1968). Accordingly, it is an eurysubstratic species. However, it prefers harder substrates and avoids mud, in particular silt. Its tolerance to various bottom types is a consequence of its seasonal displacements.

Communities. Being a migratory species it crosses various community types, and it is more frequent in communities developed on harder bottoms than in muddy ones, as, for instance, it was rarely sampled in the "*Nephrops norvegicus - Thenea muricata*" community. Respectively, it is an eurycoenose species.

Food. The species feeds on different food items such as sedentary and motile organisms (algae, shells, crustaceans, brittle stars, sea urchins, etc.) (Stevcic, 1967). It is a typical euryphagic species.

The above data show that the spiny spider crab has a wide tolerance range to a majority of analyzed ecological factors and only a narrow salinity range. In constant salinity conditions it is also an euryoecious species, i.e. tolerant to a wide range of habitats and environmental conditions. These features explain its wide distribution in the area.

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Morphometric characters in Nephrops norvegicus (L.) from Adriatic (Vinodol Channel) : growth differences in male and female Chelipeds

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RESUME: Caracteristiques morphometriques du Nephrops norvegicus (L.) de l' Adriatique (Chenal de Vinodol), differences de croissance des chelipedes masculines et feminines. Les etudes sur la taille des chelipedes du Nephrops norvegicus (L.) ont montre que les differences signifiantes de cette taille - parmi les sexes - ont apparu avec les longeurs du corps depassant 8.5 cm et que les chelipedes en sont evidemment plus longues chez les males et evidemment plus largues chez les femelles.

INTRODUCTION. The Norway lobster, Nephrops norvegicus (L.) is commercially remarkable in many coastal countries of Europe, and therefore one made the studies on the correlations of its body length/weight (FONTAINE and WARLUZEL 1969, GIBSON 1967), and recently also for its sexes separately (FARMER 1974). HOSSAIN et al. (1987) intended to find the differences in the weight/length of its sexes, with and without the chelipedes, expecting a significant difference by the elimination of chelipeds. Thus our studies intended to detremine the differences of the cheliped sizes in correlation to the lobster body size and its sex, and to find why in the papers of FARMER (1974) and of HOSSAIN et al. (1987) was not presented a significative difference of the weight/length correlations in lobster sexes, although the male chelipeds were evidently major.

Our morphometric studies have been carried out on the lobsters from north-eastern Adriatic Sea (Vinodol Channel). The parameters measured were the body length, and the lengths and widths of the chelipeds separately for the each sex. The statistical processing of the significance of differences in the length and width of chelipeds between both sexes, under and above 9 cm of body length, we carried out after WARDLAW (1985).

RESULTS. These studies demonstrated that the length of chelipeds (Fig. 1) is minor, and their width (Fig. 2) is major in males than in females up to their body length of approximately 8.5 cm, but these differences are not significative. Since this, the length growth in the male chelipeds is significantly major, and in the female ones the width growth became more significative (Table 1). These changes in the cheliped growth appear by their lengths above 4.5 cm and this is correlated with the lobster body length above 9 cm.

After the obtained results one concluded that the chelipeds in N. norvegicus may be a typical morphometric indicator of sexes also from their early ages, and that the correlation of cheliped length/width in both sexes persist subequal to 8.5 - 9 cm of body length, and that above this body size in N. norvegicus of NE Adriatic appear the characteristic sex differences. The minor chelipeds in the early age of males may be perhaps interpreted as a biological adaptation useful for the conservation of the female part of its population in a canibalistic struggle for existence. The significantly longer and also significantly narrower chelipeds of the males, probably are but not significantly heavier than the female chelipeds, and thus they do not essentially contribute to the general body weight of the males.

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TABLE 1. Significance of the differences in the cheliped size between the sexes of Nephrops norvegicus

Body length of lobster	Body length under 9 cm	Body length above 9 cm
Length of chelipeds	t = 1.08558 df = 8 10% > P	t = 3.7833 df = 7 1% > P > 0.1%
Width of chelipeds	t = 0.00635 df = 8 10% > P	t = 3.31775 df = 7 2% > P > 1%

LEGEND OF FIGURES:

Fig. 1. Correlation between the lengths of body and chelipeds
Fig. 2. Correlation of the length of body and width of chelipeds

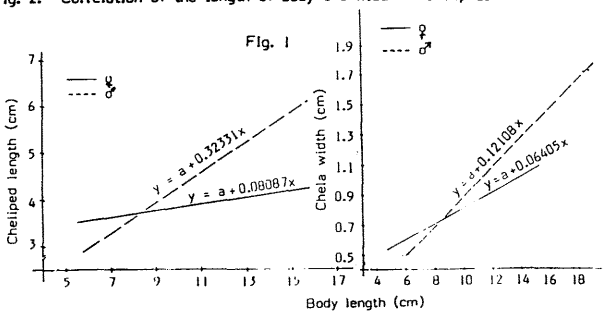

Fig. 2

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