E-II9

Size variations of Sphaeroma serratum (F.) (Crustacea Isopoda) along a North-Adriatic estuarine gradient

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From November 1984 up to November 1985 four different populations of *Sphaeroma serratum* (F.) were studied monthly in the middle zone of the Dese estuary throughout the northern Lagoon of Venice (fig. 1), where this species is one of the main component of the Peracarid community.

When captures were sufficient, at least 100 random subsampled "not males" were measured every month in each site. Males were not measured, because they are usually too rare to allow a significant statistical comparison.

Different sex-ratios among the collecting sites might have altered the mean sizes, as males are usually bigger than female.

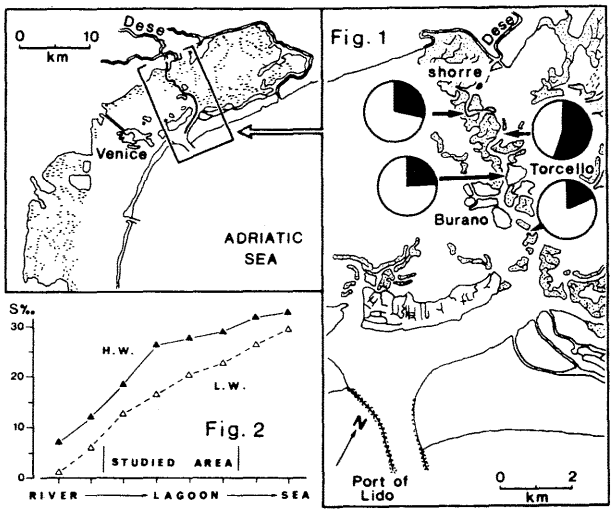

Fig. 1 - The lagoon course of the river Dese. The pie-diagrams show mean percentages of *S. serratum* on total Peracarids within the investigated area.
Fig. 2 - Mean salinities at low and high water at the surface.

Except for the reproductive period in summer, when the juvenile lengths were homogeneous in all population, the minimum sizes were found in the upstream population, the maximum in the downstream one (fig. 3), with highly significant statistical differences. Life cycles show parallel dynamics.

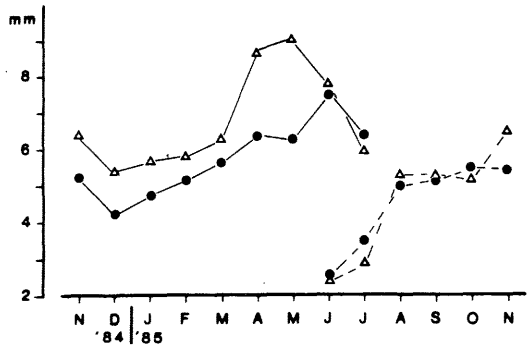

Fig. 3 - Seasonal variations of the mean sizes of *S. serratum* "not males" at the opposite ends of its distribution range: ● upper site; Δ lower site.

In the upper limit of the range of *S. serratum* distribution, dwarf sizes are probably due to the low salinities at low water (fig. 2), that cause a remarkable osmotic stress in the Isopod and strongly reduce its growth rate. In fact in the upstream portion of the investigated area, where salinity is very low (fig. 2), the "marine" species *S. serratum* is rare or absent, the macrobenthic community being only characterized by true estuarine species, i.e. the Hydrozoan *Cordylophora caspia* (Pallas) and the Bryozoan *Victorella pavida* s.l. Saville Kent (SCONFIETTI & MARINO, in press), together with the Amphipods *Echinogammarus pungens* (M. Edwards), *Leptocheirus pilosus* Zaddach, *Corophium orientale* Schellenberg, and the Tanaid *Heterotanais oerstedi* (Kröyer) (SCONFIETTI,1987). Here *S. serratum* is replaced by *S. hookeri* Leach.

On the contrary, in the lower portion a better vivification from the sea through a wide and deep navigable canal, allows the settlement of an almost marine community, and favours the reaching of maximum sizes in *S. serratum*, no longer stressed by unfavourable salinity patterns (GUNTER, 1961).

However, though the chemical-physical features are near to the physiological optimum for *S. serratum*, its population density is there reduced by an increased interspecific competition.

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E-II10

Observations on the Development of Artemia population in the Salt Lake of Larnaca in relation to the abiotic parameters of the Lake

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INTRODUCTION: The purpose of this study was to collect information on the development of the Artemia population inhabiting the Salt Lake of Larnaca. Long term observations were made on the abiotic parameters of the Lake water and the annual cycle of the Lake was described. The development of the Artemia population was correlated to the function of the Lake.

SITE DESCRIPTION: The Salt Lake of Larnaca is the biggest and lowest in a series of lakes situated to the southwest of Larnaca town. It covers an area of 5.1 sq.km and its lowest part lies 2.16m below the sea level. Natural catchment area is about 5.7 sq. km.

MATERIALS AND METHODS: Observations on the abiotic parameters of the Lake started in 1981. Measurements in 10 stations included maximum water depth, temperature, salinity, pH and Dissolved Oxygen.

Artemia were sampled and preserved in formaline. They were then counted under a microscope and categorized under cysts, nauplii, pre-adults and adults. Adults were sexed and females were classified according to their reproductive state. Couples were also counted.

RESULTS AND DISCUSSION: The basin of the Lake is dry and covered with a salt crust in the dry season.Water appears usually in November and evaporates in July or August. The mean monthly values of the 1981-1986 measurements showed that the maximum water depth of the Lake reaches its highest value of 38.2cm in February. Mean monthly temperature for the same period ranges from 19.0°C in November to 13.8°C in February and 32.5°C in August. Salinity decreases from a mean of 177ppt in November to 99ppt in February and increases towards dessication in August. pH increases from 7.56 in November to 7.77 in February and decreases to 6.60 in August.

The fluctuation of the above parameters reveal a pronounced annual cycle of the Salt Lake. This cycle can be divided into two periods:

a) The first period starts when water appears in the Lake and ends when the water depth attains its maximum, in February. During this period the water parameters depend on the water intake. Depth and pH increase, while temperature and salinity decrease.

b) The second period starts in February and ends when the Lake dries. During this period the water parameters depend on the temperature, which creates high evaporation rates. Depth and pH decrease in this period,while water temperature and salinity increase.

Wide deviations from the five-year mean monthly values were observed in the values of the parameters in a given annual cycle, i.e., 1986-87. Maximum water depth reached 75cm in March 1987; at the same month the water temperature decreased to 12.3°C and salinity to 54.8ppt. pH increased from its minimum value of 6.91 in December ,1986 and attained its maximum of 8.12 in March,1987.

The described annual cycle of the Salt Lake and the wide deviations of the parameters, occuring in certain years, create a highly uncertain habitat for the Artemia population in the Salt Lake of Larnaca. As a result, adaptations of the population were developed to ensure its survival in the existing environment.

From the table below it can be seen that hatching occured at the end of December. The pH value was considerably lower than the described as the essential range of hatching 8.0-9.0 (Sorgeloos et al, 1986).Given that the pH values rarely exceed 8.0, the adaptation on this respect ensured the onset of the population's development, the other parameters being relatively favorable.

TABLE: Composition of the Artemia population in the Salt Lake of Larnaca in 1986-87.
Mean numbers per liter are extrapolated to a m3 of water.

Artemia category / Sampling date	Cysts	Nauplii	Pre-Adults	Males	Non ovig. Fem.	Coupl.	Oviger. Femal.
7 Nov., 1986	20300						
17 Nov., 1986	9000						
2 Dec., 1986	10000						
29 Dec., 1986	252400	32400	200				
15 Jan., 1987	15800	1160	500				
3 Feb., 1987	35800	2800	-	400	200		
20 Feb., 1987	14000	40800	14400	200	400		
18 Mar., 1987	27500	15500	2000	1380	1630		
31 Mar., 1987	10670	26330	8220	1890	3560	220	330
14 Apr., 1987	249000	156430	18290	8500	3650	1290	5000
28 Apr., 1987	123000	4670	3160	16830	4330	1000	9670
14 May, 1987	49400	-	2600	17500	3500	600	15200
29 May, 1987	27500	-	-	-	100	-	-

After hatching the development of the population was very slow; for more than a month the population was exclusively composed of nauplii and pre-adults. The slow development of the population can be explained by genetic adaptation in response to environmental factors.

The dominance of cysts in almost all the collected samples reveals selection of the strain against ovoviparity. According to Lenz and Dana (in press) the production of cysts consists a major survival mechanism in populations inhabiting periodically unfavorable conditions. Browne et al(1984) also concluded that oviparity is preferred by bisexual strains inhabiting uncertain habitats.

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