

A Study on the *Chironomus salinarius* Population in the Sediment of the Venice Lagoon and during the Emergence Period

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The morphology of the Venice Lagoon is characterized by a complex network of channels starting from the three inlets which permit the tidal water exchange with the Adriatic Sea, and delimiting shallow, water areas (like marshes and mud-flats) with mean depth of about 50 cm. Due to the continual discharge of pollutants from point sources and the drainage basin, stressed environmental conditions may be established in the shallow-water areas where the hydrodynamics slacks, with harmful effects as intense macroalgae growth, anoxic crisis and reduction of the water quality. This situation favours the establishment in the sediment of a few tolerant species to the detriment of others more sensible to the environmental conditions, so reducing the variety of the benthic fauna.

For this reason, during recent years the population of *Chironomus salinarius* (Kieffer) has strongly increased in the sediment of the Venice Lagoon. A particular type of hemoglobin in the hemolymph - with high affinity to oxygen (NOCENTINI, 1985) - renders the larvae resistant to anaerobic conditions and therefore their presence in the sediment is an indicator of low environmental quality. This demographic explosion produces considerable trouble to human activities and health (MARCER *et al.*, 1990) and problems for traffic and touring (CERETTI *et al.*, 1985) during the summer period, when numerous chironomid adults fly.

The environmental division of the Italian National Research Council, in Venice, in collaboration with the Ecology Department of the municipal government started a study on the *Chironomus* behaviour to program interventions to delimit and control the phenomena in their growth stage and from spreading. The research activity carried out in the three test areas (Fig.1) during the 1991 is presented and it regards the two principal stages (larval and adult emergence) of the *Chironomus* biological cycle.

The larval spatial distribution was determined in the densely populated area A (CERETTI *et al.*, 1985). The significance of the number of larvae counted in sites corresponding to the vertex of a 500 meter-wide grid and the causes of sampling errors were evaluated by counting larvae in 44 sediment samples (ZAGO *et al.*, 1991 a). The second test-area B is subjected to an intense macroalgae growth (*Ulva rigida*) and it was previously studied to determine water circulation, grain-size and redox characteristics of the sediment and heavy metals accumulation (ZONTA *et al.*, 1990). The research was aimed to investigate the relationship between population distribution and sediment characteristics, showing that finer particles constitute a preferential habitat for larvae (ZAGO *et al.*, 1991 a). Further, Scanning Electron Microscopy (SEM) permitted to photograph both external and internal morphology of the *Chironomus* larva (AVIGNONE *et al.*, 1991), also showing the presence in the intestinal apparatus of ingested fine-grained particles and micro-organisms constituting the diet of the larval stage.

Finally, the Chironomid emergences were observed in the test-area C, close to urban centres to which adults are attracted by the lights. During the summer period, samples of flying adults were collected in the evening hours, providing information on both the daily and seasonal trend and density of emergences and showing population peaks over a five-day cycle, that may correspond to a strategy increasing the probability of reproduction (ZAGO *et al.*, 1991 b).

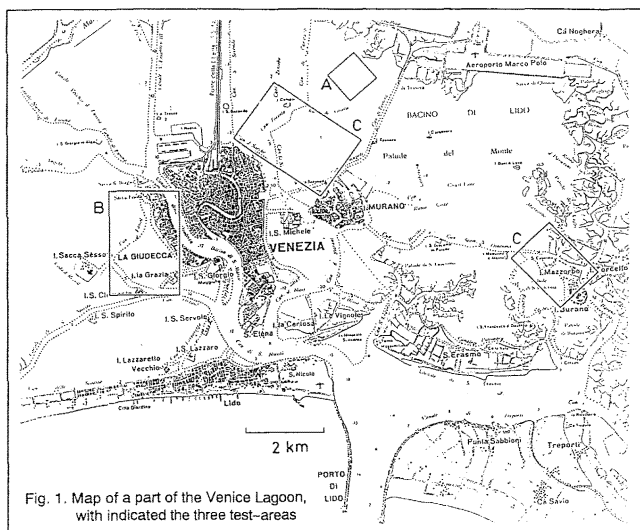


Fig. 1. Map of a part of the Venice Lagoon, with indicated the three test-areas

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REFERENCES

AVIGNONE M.T., COSTA F., RIZZI A., SCATTOLIN M. e ZAGO C., 1991.- Osservazioni al SEM delle larve di *Chironomus salinarius*. ISDGM-CNR, Venice, Technical Note n.138, pp. 16.

CERETTI G., FERRARESE U. e SCATTOLIN M., 1985.- I Chironomidi nella Laguna di Venezia. Risultati delle ricerche 1983-84 e proposte di lotta. Quaderni di documentazione ambientale, n.1. Ed. Arsenale, Venice, pp. 59.

MARCER G. *et al.*, 1990.- Aspetti sanitari dell'infestazione da Chironomidi, Proc. of the Congr. "Chironomidi, Culicidi, Simulidi. Aspetti sanitari ed ecologici", Eds. Regione Veneto and ULSS 16 Venezia, 89-99.

NOCENTINI A., 1985.- Chironomidi, 4 (Diptera: Chironomidae, larve), Guide per il riconoscimento delle specie animali delle acque interne italiane. Ed. National Research Council, Roma, AQ/1/233, pp. 186.

ZAGO C., SCATTOLIN M., ZAGGIA L. e ZONTA R., 1991 a.- Distribuzione e Campionamento delle Larve di Chironomidi nei Sedimenti della Laguna di Venezia. Studio Preliminare. ISDGM-CNR, Venice, Technical Note n.137., pp. 20.

ZAGO C., COSTA F. e SCATTOLIN M., 1991 b.- Valutazione delle Emergenze dei Chironomidi in due Aree Campione della Laguna di Venezia. ISDGM-CNR, Venice, Technical Note n.139, pp. 21.

ZONTA R. *et al.*, 1990.- Geochemical and Chemical-Physical Characterization of a Polluted Mud Flat in the Venice Lagoon. Proc. XXXII CIESM Congr., Perpignan (F) 15-20 October. Vol. 32, F1, 66.

