

ZOOPLANKTON OF THE SUAPE AREA (PERNAMBUCO-BRAZIL)¹MARYSE NOGUEIRA PARANAGUÃ²Departamento de Oceanografia da
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RESUMO

Neste trabalho são apresentados os resultados relativos a análise de 120 amostras de plâncton coletadas no período de um ano em 11 (onze) estações fixas localizadas na baía de Suape, estuários dos rios Massangana, Tatuoca e Ipojuca. São discutidos aspectos relativos à distribuição qualitativa e quantitativa da população zooplanctônica. Dentre os organismos representados na área podem ser citados os Copepoda *Paracalanus crassirostris*, *Euterpina acutifrons*, *Centropages velificatus*, *Macrosetella gracilis*, *Corycaeus giesbrechti*, *Acartia lilljeborgi*, *Temora stylifera*, *Oithona hebes*, *O. oswaldocruzi*, *Notodiaptomus*; os Cladocera *Bosmina* spp., *Daphnia* spp., os Rotifera *Brachyonus plicatilis*, *B. falcatus*, *Mytilina ventralis*, *Rotaria rotatoria*; Hydromedusae; Siphonophora e *Dolium* sp., *Lucifer faxoni* e larvas de Copepoda, Polychaeta, Bivalvia (*Mytella charruana*, *M. guyanensis*), Brachyura, Natantia, Echinodermata e Peixes.

ABSTRACT

One hundred and twenty samples of plankton were studied in 11 fixed stations, located in Suape Bay and in the estuaries of Massangana, Tatuoca and Ipojuca Rivers. The quantitative and qualitative distribution of the zooplanktonic population is discussed. The better represented organisms in the studied area were: the Copepoda *Paracalanus crassirostris*, *Euterpina acutifrons*, *Centropages velificatus*, *Macrosetella gracilis*, *Corycaeus giesbrechti*, *Acartia lilljeborgi*, *Temora stylifera*, *Oithona hebes*, *O. oswaldocruzi*, *Notodiaptomus*; the Cladocera *Bosmina* spp. and *Daphnia* spp.; the Rotifera

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Brachionus plicatilis, *B. falcatus*, *Mytilina ventralis*, *Rotaria rotatoria*; Hydromedusae; Siphonophora; *Doliolum*, *Lucifer taxoni* and larvae of Copepoda, Polychaeta, Bivalvia (*Mytella charruana*, *M. guyanensis*), Brachyura, Natantia, Echinodermata and Pisces.

INTRODUCTION

An industrial port complex is being built by the State Government in Suape Bay, situated between 08°14' and 08°29'S (Northeastern Coast of Brazil), which will inevitably cause environmental changes in the surrounding areas. For this reason, an ecological study was carried out so as to relate the present conditions with the possible future effects on the implementation of the project. The study puts forward proposals and suggestions in order to reduce the negative effects on the environment. Samples were collected for physico-chemical study of the water and for analysis of the plankton and benthos (CONDEPE, 1983).

The main object of this paper is to characterize the quantitative and qualitative distribution of the zooplanktonic population.

Among the published papers relative to estuarine zooplankton on Pernambuco Coast, the following merit attention: PARANAGUÁ (1966), PARANAGUÁ (1985), PARANAGUÁ et alii (1979), PARANAGUÁ and GUSMÃO (1980), PARANAGUÁ and NEUMANN-LEITÃO (1980, 1981) and NASCIMENTO (1981). PARANAGUÁ and NASCIMENTO-VIEIRA (1984) however, for the Suape area there are only few data published by CAVALCANTI et alii (1980), CONDEPE (1983) and NEUMANN-LEITÃO (1986). The present work is a contribution to the knowledge of the zooplankton of the Suape area.

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DESCRIPTION OF THE AREA

Localization: The studied area is located on the Pernambuco State coast (Northeastern Brazil) between 08°14' and 08°29'S (Fig. -1).

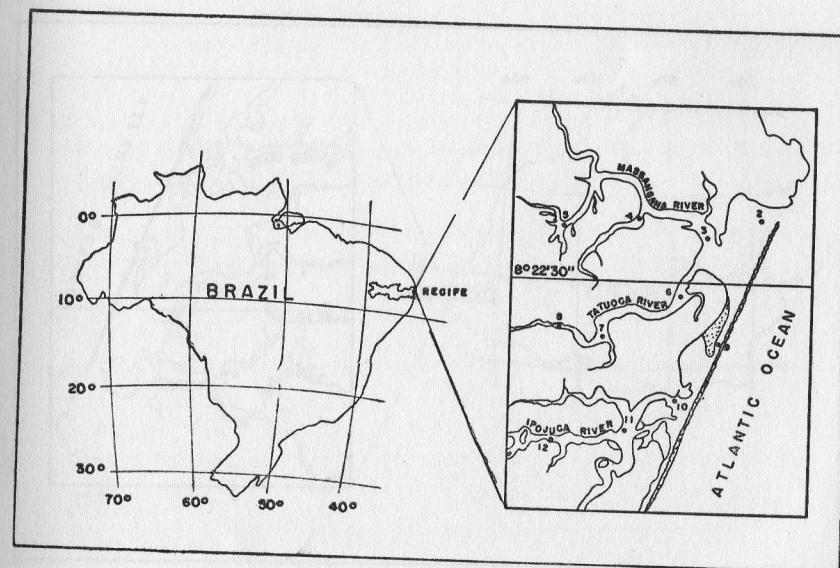


Fig. 1 - Studied area and Station location.

Climate and Rainfall: The area presents an As' type of climate, which is considered by ANDRADE and LINS (1971) as warm "pseudo-tropical" showing a dry season (rainfall less than 100mm/year) between September and February and a rainy season from March to August with rainfall between 1850mm/year and 2.364mm/year (ANDRADE, 1978).

The maximum air temperature was 34°C the minimum 20°C and the average value corresponded to 27°C (ESKINAZI-LEÇA and KOENING, in press).

Hydrography: Many hydrographic basins are within the area with higher concentration at the south of Santo Agostinho Cape. The main rivers draining the region are Massangana, Tatuoca and Ipojuca, all of them converging to Suape's Bay. The Ipojuca River is considered perennial in all its course and it is the one that discharges the largest water volume having, therefore, a strong influence on all the Suape Bay.

Hydrology: Studies carried out by CAVALCANTI et alii (1980) and CONDE PE (1983) showed the following hydrological characteristics for the region: the temperature was stable both horizontally and vertically and varied from 26°C to 29°C. The salinity showed the widest variation, ranging from that of a true marine environment (salinity > 30‰) to a limnetic one (< 0,5‰).

MACEDO and CAVALCANTI (1979) established for this region, three distinct salinity regimes which can be summarized as follows:

- euhaline-polyhaline regime (salinity between 35‰ and 18‰) at the Suape Bay and the proximity of the rivers' mouth (station 2, 3, 4, 6, 9 and 10).
- mesohaline regime (salinity between 18‰ and 0,5‰) in the middle estuary of Massangana, Tatuoca and Ipojuca Rivers (stations 5, 7, 8 and 11).
- oligohaline-limnetic regime (salinity < 0,5‰) found only in the upper estuary of the Ipojuca River (station 12) and eventually at the stations located upstream of Massangana and Tatuoca Rivers.

The limits of these regimes can vary according to the season and the tide dynamics.

The dissolved oxygen level in the water varied from 2 to 5ml/l, the lowest value observed at the Massangana River estuary and mainly in the estuary of Ipojuca River when it reached 0ml/l during some periods (CAVALCANTI et alii, 1980).

MATERIAL AND METHODS

One hundred and twenty samples of plankton were studied, collected according to the tide regime, every two months at 11 fixed stations. These samples were collected with a net 65µm mesh size, horizontally hauled at the surface during 5 minutes. After the collection the samples were preserved in 4% Formalin buffered with sodium borate. The organisms were counted in subsamples of 2ml removed with a stempel-pipette. The frequency of occurrence was calculated from the percentage of samples in which each organisms occurred in relation to the total number of samples. The following nomenclature was used:

- > 80% - very frequent
- 80% — 30% - frequent
- 30% — 10% - not frequent
- ≤ 10% - sporadic

RESULTS

The zooplanktonic population of the studied area is represented by several organisms indicated in the figure 2. A brief comment on some of these organisms follows.

Foraminifera: generally benthic. However there are some important species in the plankton. Although not abundant they presented a frequency superior to 50%. Among the identified genera *Globigerina*, abundant in tropical seas, called attention.

Radiolaria: exclusively marine. They occurred in the stations located at the bay and in the estuaries of Massangana and Tatuoca Rivers, and very seldom in the Ipojuca River, at high tide.

Tintinnida: very common in tropical seas, they were dominant during some periods of the year. Their frequency of occurrence was 28%, in the bay stations and estuaries of Massangana and Tatuoca Rivers, but they were sporadic in the station at Ipojuca River.

Hydromedusae: they played an important role as biological indicators, and although not frequent, they were characteristic of the marine-polyhaline regime environment.

Rotifera: common organisms in freshwater environments, they were

found in station 10, 11 and 12, being very abundant in Ipojuca River. In December they reached more than 100.000 individuals in the total sample. When present in great quantity, they can quickly consume all the available food.

Gastropoda: with a frequency of more than 80% they were found in nearly all stations and during all tide.

Cladocera: exclusively planktonic, they inhabit the surface layer. The genus *Penilia* was frequent at the stations with euhaline-polyhaline regime. The genera *Daphnia* and *Bosmina* were frequent at the stations with a oligohaline-limnetic regime. Members of these genera are capable of living in a low dissolved oxygen concentration.

Copepoda: This was the most expressive group among the crustaceans, and numerically the most important of the zooplankton. Among the identified species the following were more important *Paracalanus crassirostris*, *Calanopia americana*, *Euterpina acutifrons*, *Acartia lilljeborgi*, *Oithona hebes*, *O. oswaldocruzi* and *Diaptomus* spp.

Other groups: species of the genus *Appendicularia* (Chordata) and species of the genus *Sagitta* (Chaetognatha) were frequent at the stations located in the bay and estuaries of Massangana and Tatuoca Rivers. Species of these genera are important as biological indicators.

The meroplanktonic larvae had an important role. At the Suape area, many organisms were found, especially those of economical importance such as fish, molluscs and Decapoda Crustaceans. Among the Decapoda larvae, shrimps and crabs were more abundant. The bivalvia larvae were represented by *Crassostrea rhizophorae*, *Mytella charrua* and *M. guyanensis*. The frequency of 57% of these Bivalvia larvae occurred mainly during the high tide in all stations except in stations 11 and 12 of the Ipojuca River the other very frequent organisms (Fig. 2) were the Copepoda, the Polychaeta, and the Cirripedia larvae. The Oligochaeta, fish larvae, Ostracoda, Insecta, Pteropoda, Bryozoa, Echinodermata larvae, Turbellaria, Siphonophora, *Dolium* and *Lucifer* were not frequent and rare.

DISCUSSION AND CONCLUSIONS

It is well known that estuarine regions are characterized by their unstable salinity because they are a dynamic system which receives a continuous discharge of freshwater, and where the denser water is pushed from the coastal to the inner parts of the estuary (CASPER, 1967; JEFFRIES, 1967; TUNDISI, 1970).

The Copepoda abundance is characterized by 4 or 5 dominant species a fact observed in different estuaries by such authors as RILEY (1967); TEIXEIRA et alii (1973); PERKINS (1974); RODRIGUEZ (1973), NASCIMENTO (1981) and ROCHA (1986).

In the studied area, the differences in the zooplankton abundance and composition were conditioned mostly, by the influence of the tide and of the freshwater brought in by the rivers.

The zooplankton of the stations located in the Suape Bay (Fig. 1) was qualitative and quantitatively more abundant; dominated the typical forms of an environment with an euhaline-polyhaline regime. Among the Copepoda *Paracalanus crassirostris*, *Euterpina acutifrons*, *Centropages velificatus*, *Acartia lilljeborgi*, *Macrosetella gracilis* and *Temora stilifera* were frequent. According to BJÖRNBERG (1980) *P. crassirostris* is abundant and frequent in island and coastal water, its abundance therefore to be expected in the area. Species of *Sagitta*, *Oikopleura* and Rotifera with *Brachionus plicatilis*, besides Echinodermata larvae were frequent also.

In the stations of the middle estuary, especially, of the Massangana and Tatuoca Rivers organisms were dominant which characterize environments with a polyhaline-mesohaline regime. Therefore those just mentioned were found in a smaller frequency. Among the copepoda, the most frequent were *Oithona hebes* and *O. oswaldocruzi*. FONSECA and BJÖRNBERG (1976) report that *O. oswaldocruzi* is more abundant in low salinity. MONTU and GOEDEN (1986) cited this species as euryhaline in the Patos Lagoon.

In the stations located at the Ipojuca River the association of organisms was quite distinct, characterized mostly by forms of an oligohaline-limnetic environment. The zooplankton was qualitatively poor. Among the Copepoda, species of *Cyclops* and *Diaptomus* were found the Cladocera were represented by *Daphnia* and *Bosmina*. Among the Rotifera *B. plicatilis* can be cited as more abundant in saline waters, *B. falcatus* and *B. quadridentatus* in limnetic environments and *Mytilina ventralis* and *Rotaria rotatoria* in more polluted areas. According to NEUMANN-LEITÃO (1986), these species in the Suape

area are bioindicators for saline, limnetic and saprobic environments respectively, which the present results confirm.

According to MELO FILHO (1977), about six sugarcane plants and other kinds of industries are responsible for the pollution of this river, justifying the low level of dissolved oxygen observed in the area.

According to PENNAK (1953), species of *Daphnia* and *Bosmina* are capable of living very low concentrations of dissolved oxygen, thus explaining the occurrence of these organisms in this area.

PARANAGUÁ (1972) reports that *Mytella falcata* larvae, although euryhaline, are more frequent in polyhaline-mesohaline environments. In the Suape region, these larvae were frequent in the estuary of Massangana and Tatuoca Rivers and almost absent in the Ipojuca River. This absence is associated to the low salinity and pollution.

In a general way, it can be concluded that the zooplanktonic association seems to characterize the Suape as a very rich estuarine region.

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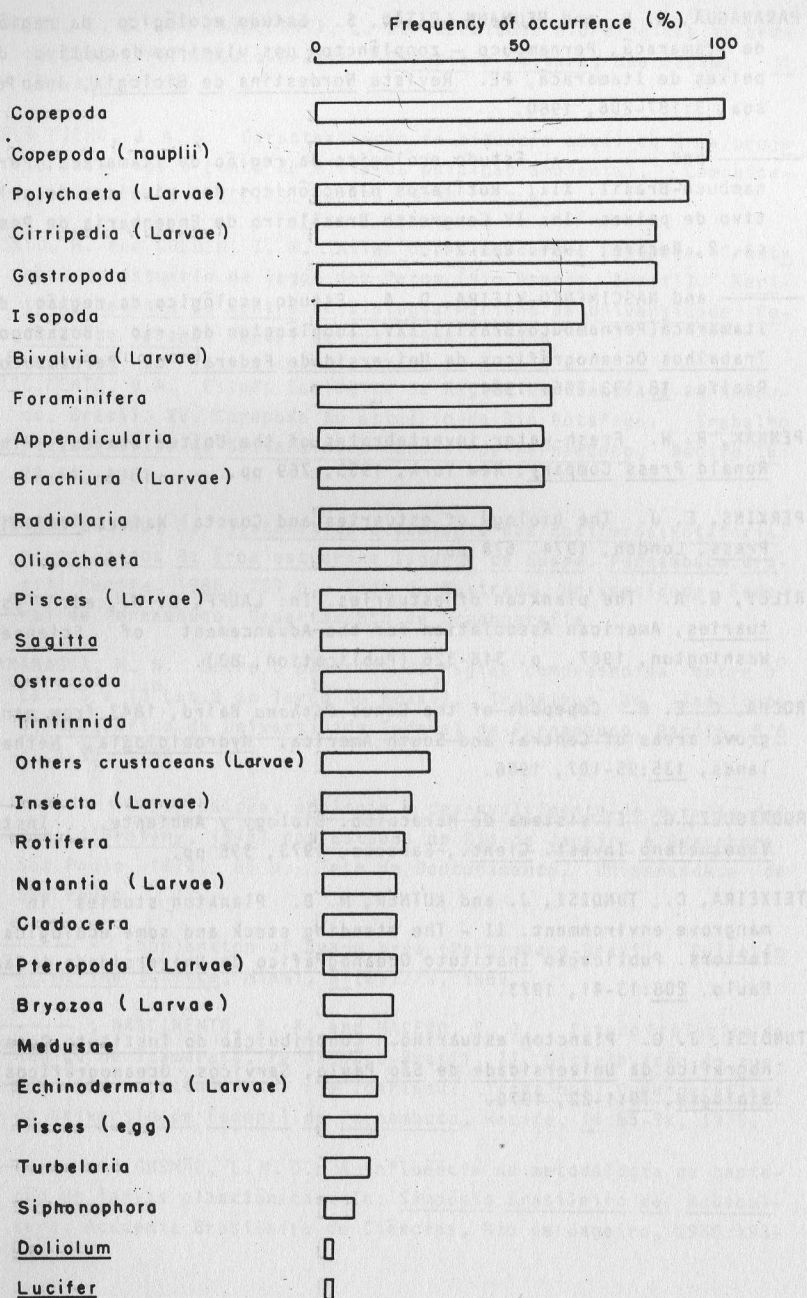


Fig. 2- Frequency of occurrence of the main zooplankton organisms in the Suape area (SE Brazil)