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Seasonality in Cyclopoids (Crustacea; Copepoda) and rainfall variation of the Forcados River, Nigeria

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ABSTRACT: Investigations into the seasonality of cyclopoid (crustacean: copepoda) with regards to rainfall variations were carried out in Forcados river. Samples were collected by towing two plankton nets of 55µm and 100µm mush sizes at 5knots for 5 minutes behind an engine boat. Meterological station in Warri gave the rainfall data. Centigrade thermometer was used for measuring the surface water temperature. Results showed low temperature range (27.5ºC – 31.5ºC), while that of rainfall was high (25.8-602.6mm). Eleven cyclopoid species were identified and they exhibited seasonality due to rainfall variations. High numerical abundance was observed in rainy season months of June to September, with a peak in July. Thus seasonality in the tropics is due to rainfall variations.

Keywords: Seasonality, cyclopoid copepods, rainfall variations, tropical river.

Introduction

Investigation into the occurrence and abundance of cyclopoids (crustacean: copepoda) is of universal interest. This is because they make up part of the permanent zooplankton in the water bodies. The copepods also play important role in the food chains and food webs in the aquatic environment. Some cyclopoid species are known to act as vectors of the guinea worm disease, *Dracunculus medinensis*. In Nigeria, such investigations include the work of Onabamiro (1952) who described four new species of Cyclops S.L. from Western Nigeria. Green (1962) reported the occurrence of six cyclopoid species while studying the crustacean zooplanktonic of Sokoto river. Egborge (1972) identified five cyclopoid species from river Oshun in Western Nigeria during his study of the zooplanktonic organisms. Khan and Ejike (1984) recorded the occurrence of six cuclopoid species from Benue and Plateau waters when they produced a preliminary checklist of the zooplankton. Johnson et al (1990), while studying the incidence of the guinea worm disease (*Dracunculus medinensis*) and its possible vectors reported the occurrence of two cyclopoid species namely: *Thermocyclops hyalinus* and *Thermocyclops nigerianus*. Oronsaye and Okaka (2000) recorded the presence of nine cyclopoid species from a coastal river in souith western Nigeria.

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Elsewhere, Mollman and Koster (2002) studied the population dynamics of some copepods and the implications of their predation by clupeid fish in the central Baltic sea. Manning and Bucklin (2003) worked on the spatial patterns of planktonic copepod abundance in the Western Gulf of Maine, America. Karanovic (2004) described two new cyclopoid species of the genus *Metacyclops* in Australia. A search on the interest shows that no work has been published on the cyclopoid copepods of the Forcados river with regards to rainfall variations. This paper intends to provide such information which would be very useful for further environmental studies in the area. Also since Forcados town is one of the terminals for the export of crude oil from Nigeria, there is need for such a study which would give a baseline information on the cyclopoid copepods of the area.

Materials and Methods

Study Area:

The Forcados river (a tropical coastal river) is the study area which is located within Latitude, 5º25' N and Longitude 5º50' E (Fig. 1). It is denfritic river draining a number of mangrove swamps from the Niger delta area. Six sampling stations were chosen, marked (A), (B), (C), (D), (E), (F), covering a distance of 50km (Fig. 1), from April 2004 to March 2005.

Procedure

The cyclopoid copepods were collected by towing plankton nets of 55µm and 100µm mesh sizes at 5knots for 5 minutes behind an engine boat. They were sorted out and preserved in 4% buffered formalin. Identification was made by using works and keys provided by Onabamiro (1952), Wickstead (1965), jeje and Fernando (1986), Karanovic (2004).

Rainfall data was collected from the Meteororlogical station in Warri. Surface water temperature was measured with centrigrade thermometer by Gallenkamp.

Results

Eleven cyclopoid species were identified, namely:

Eucyclops macrurus (Sars) 1863

Eucyclops serrulatus (Fischer) 1851)

Halycyclops korodiensis (Onabamiro), 1952

Halicyclops troglodytes (Kiefer), 1954

Macrocyclops distinctus *(Richard), 1897*

Macrocyclops ogunnus (Onabamiro, 1957)

Microcyclops rubellus (Lilljeborg), 1901

Microcyclops varicans (Sars), 1893

Oithona nana Giesbrecht), 1892

Thermocyclops crassus (Fischer), 1853

Thermocyclops negletus (Sars), 1909.

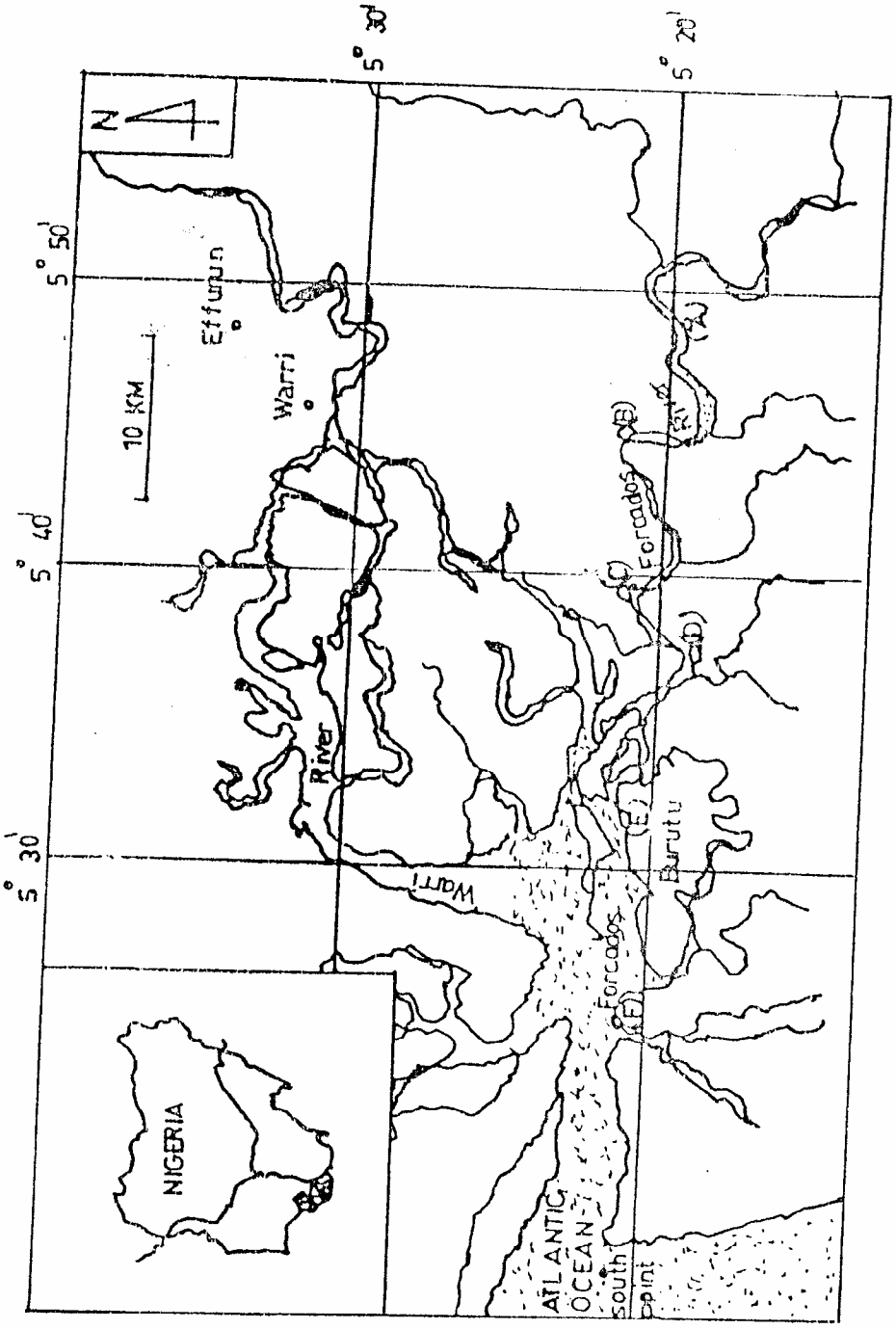

Fig. 1: Map of Forcados river showing locations of sampling stations.

Table 1: Rainfall, Temperature and Numerical Abundance of the Cyclopoids

Months of the Year	Rainfall Values (mm)	Mean Surface Water Temperature values (oC)	Number per 100ml Sample
April	147.4	30.5	148
May	207.1	29.0	252
June	461.2	28.5	280
July	588.4	28.5	345
August	401.8	29.0	335
September	602.6	28.6	315
October	439.8	29.0	285
November	139.1	29.8	215
December	25.8	28.0	102
January	35.9	27.5	115
February	60.8	28.5	125
March	115.6	31.5	136

The rainfall values were also plotted in form of histogram (Fig. 2). The rainy season months are from April to November, while the dry season months are December, January, February and March. The numerical abundance of the cyclopoids was plotted as a line graph and superimposed on the rainfall histograms (Fig. 2). This showed at a glance. The seasonality of the cyclopoids with regards to rainfall variations.

Discussion

Thew occurrence of some of these cyclopoid species have also been reported from other Nigeria waterbodies. Onabamiro (1952) first described *Halicyclops korodiensis* from Ikorodu area in Lagos State. Green (1962) reported the presence of *Thermocyclops crassus* from river Sokoto in northern Nigeria. Egborge (1972) identified *Microcyclops varicans* from river Oshun in western Nigeria.

With regards to the seasonality of the cyclopoids due to rainfall variations (Fig. 2), the cyclopoids are seen to be more abundant, in the rainy season months, forming a peak in July. Robinson and Robinson (1977) recorded a similar trend when they studied the seasonal distribution of the zooplankton of the Lake Chad basin in Nigeria.

The table on temperature values shows a low temperature range (27.5ºC – 31.5ºC) which agrees with the fact that temperature fluctuation is not high in the tropics. Imevbore (1965) reported similar low temperature range when he studied the planktonic organisms of Eleiyele reservoir in Ibadan, Western Nigeria. On the other hand, the histograms on rainfall (Fig. 2)shows a high range (25.8mm – 602.6mm) and marks two distinct seasons in the year, i.e. rainy and dry seasons. This implies that seasonality in the tropics is mainly due to rainfall variations. This agrees with Lindberg (1957) findings when he studied cyclopoid copepods of Ivory Coast in West Africa.

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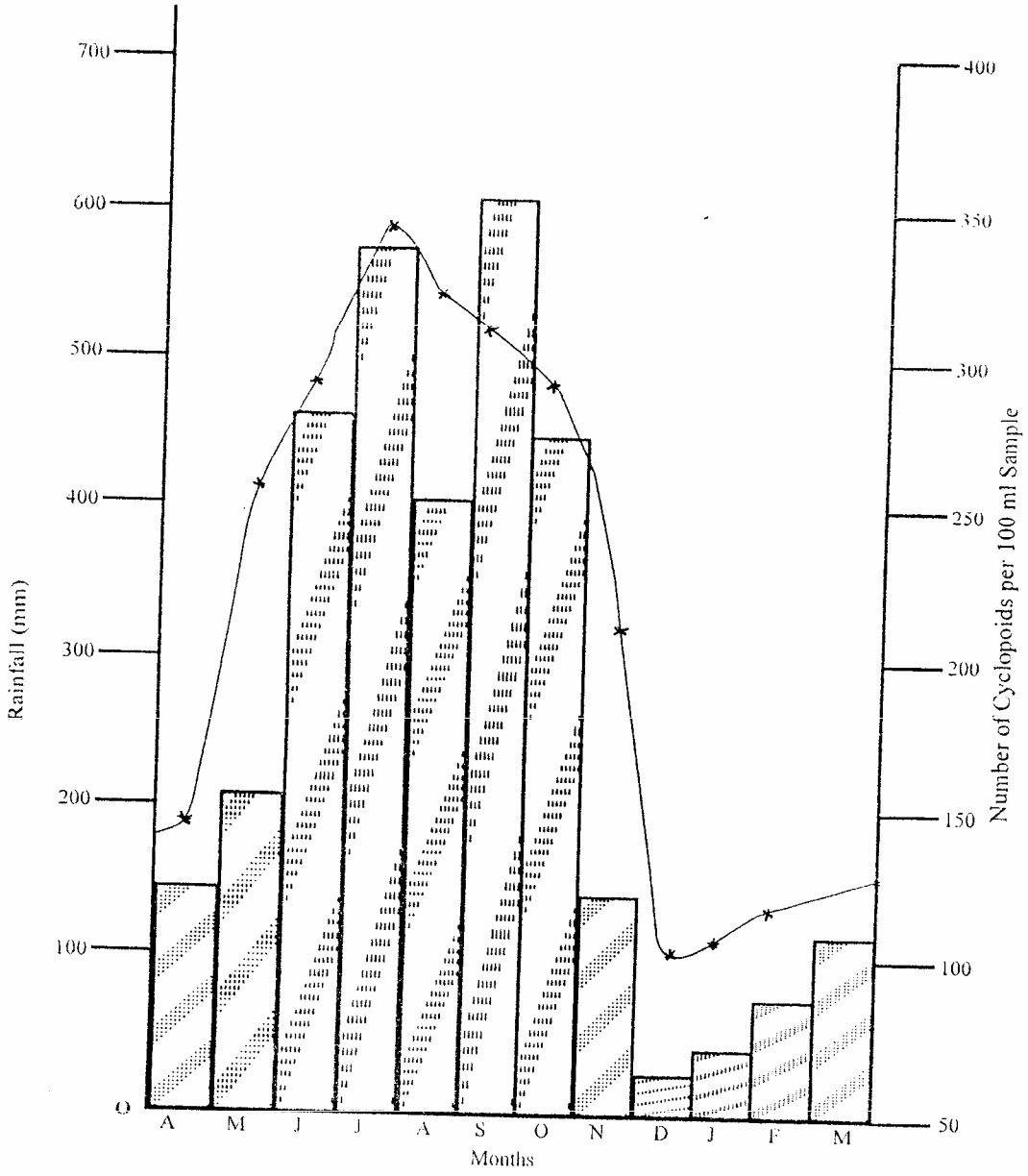

Fig. 2 Rainfall Histograms / Numerical Abundance of the Cyclopoids

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