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Ecology and growth of the Shellfish, *Tympanotonus fuscatus* Linnaeus 1758 in the Mangrove Swamp of Warri River, Nigeria

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ABSTRACT: The ecology and growth of the shellfish, *Tympanotonus fuscatus* was studied in a mangrove swamp of the Warri River, Abiotic and Biotic factors such as temperature, salinity, hydrogen ion concentration, nature of substrate, associated fauna and flora, micro – habitat were investigated. Weight/Length relationship of the shellfish was measured to determine the growth rate. Results showed a low range (27.5°C – 31.0°C) in temperature variation and high range (0.3% - 7.1%) in salinity variation, while pH values were between 6.5 – 7.8. The substrate consists of 50% peat particles which is due to the effect of the root system of the white mangrove, *Avacennia Africana* that is associated with the environment. Weight/Length relationship showed that the growth is negatively allometric which implies that the weight increases faster than the length.

Key words: Ecology and Growth, Shellfish, Warri River.

Introduction

Studies on shellfish is a subject of continuous research because the shellfish constitute a relatively cheaper source of protein when compared to beef or fin-fish. Nickles (1950) studied the occurrence of the shellfish, *Tympanotonus fuscatus* along the West African Coast and reported that the genus is endemic to West Africa. The shellfish, *Crassostrea gasser* was studied and found to have high aquacultural potential in the Niger Delta area (Affinowi, 1980). Olomu et al (1990) analysed the deshelled meat of *T. fuscatus* and found that it has 81.6% animal protein. Reece et al (2004) studied the shellfish, *Crassostrea virginica* and found the occurrence of null alleles and non-Mendelian Segregation ratio in its cell division. A commercial – scale sperm cryopreservation has been achieved in the shellfish, *Crassostrea Gigas* (Dong et al., 2005).

The shellfish, *T. fuscatus* is commonly seen in most brackish water creeks and mangrove swamps along the Nigerian coast. They are eaten and cherished by both rich and poor in these coastal communities. They also make up a significant proportion of the benthic epifauna and so could be used in monitoring the impact of pollution. There is need therefore to study their ecology and growth which would be useful in such pollution studies as well as to aquaculturist who may want to culture the shellfish. A search on the internet

shows that there is no published work on their ecology and growth. This paper intends to provide information on the ecology and growth of the shellfish.

Materials and Methods

Study Area

The study area which is located between Lat. 5°30' – 5°40'N and Long. 5°40' – 5°50'E is marked (X) in Figure 1. It is a Mangrove swamp of the Warri River near a coastal community called Ejere.

Procedure

Abiotic and biotic factors such as temperature, salinity, hydrogen ion concentration (pH), nature of substrate, associated fauna and flora, micro – habitat were studied from April 2004 to March 2005. Weight/length relationship of the shellfish was measured to determine the growth rate.

Temperature was measured with the centigrade thermometer by Gallenkamp. The silver nitrate method (After Harvey, 1945) was used for salinity determination. Hydrogen ion concentration (pH) was determined with pH – meter model, JENWAY 3305. The soil nature (nature of substrate) was determined by the Davidson (1953) classification of soil fraction. Samples of associated fauna and flora were collected from the field and brought to the laboratory for identification by some taxonomists. Keys and works of Nickles (1950), Binder (1968), Dutta (1970), Penguin (1976), Routeillet (1979), Eisenberg (1981) were used. For the weight/length relationship, 30 individuals of the shellfish of various sizes were collected, cleaned and oven – dried at 105°C for 48 hours during which the dry weight was constant. A top loading balance (Mettler E200), was used and length was measured to accuracy of 0.1cm.

Results

The results of some abiotic factors are shown in Table 1.

Table 1: Some Abiotic Factors

Year	Months	Temp. (°C)	Salinity (%)	pH
2004	April	30.0	7.1	7.0
	May	29.5	6.5	6.8
	June	29.0	4.8	7.1
	July	28.5	0.3	6.8
	August	29.0	0.4	6.5
	September	29.0	0.5	7.0
	October	28.5	0.8	7.4
	November	29.0	2.0	7.4
	December	28.0	4.2	7.6
2005	January	27.5	5.4	8.0
	February	29.0	6.0	7.8
	March	31.0	6.5	7.2

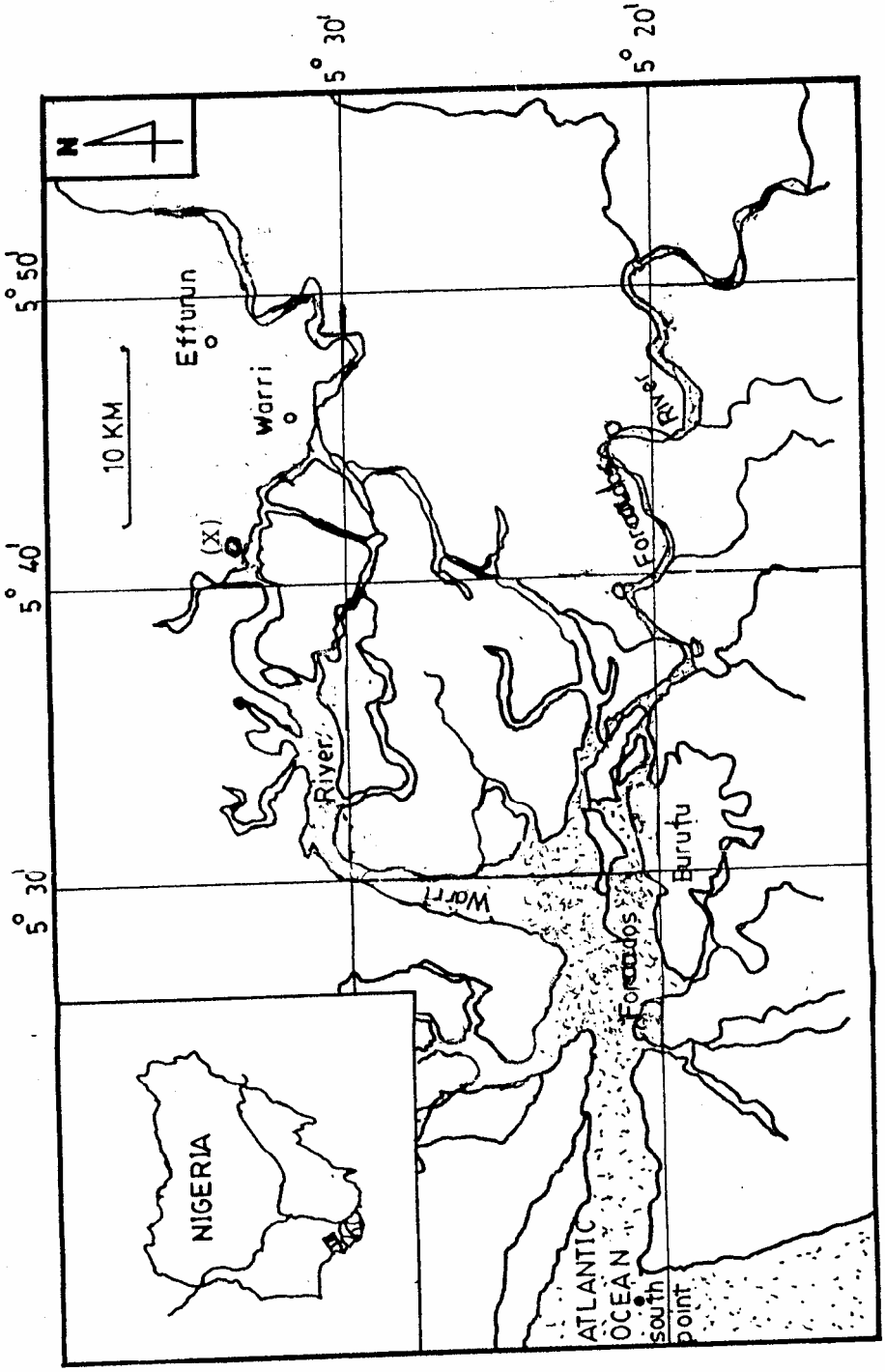

Fig. 1: MAP of Warri River showing location of Study Area.

Nature of substrate (soil)

Analysis of the substrate (soil) showed that it contains 50% peat particles, 40% silt, 8% sand and 2% clay.

Associated Fauna and Flora

The fauna identified to be associated with the shellfish in this study area are: *Pachymalania aurita, Neritina owenii* and *Seserma elagans*. The flora identified to be associated with it are: *Avacennia Africana, Rhizophora racemosa* and *Bostrychia* sp.

Micro-habitat

The preferred micro-habitat of the shellfish at low tide is under the mangrove plant where they are seen feeding voraciously on the organic matter.

Weight/Length Relationship

Table 2 shows Weight/Length relationship, while the graph on Weight/Length relationship is shown in Figure 2. It gave a curve, therefore a log/log relationship was employed in order to know if there is a linear relationship between the two variables. The correlation coefficient for the log weight/log length relationship is 0.8241 which is highly significant for a linear relationship. Figure 3 show a linear graph of log weight/log length relationship. The slope is 2.1120.

From the value of the slope, the growth is negatively allometric, which implies that the weight increases faster than the length.

Table 2: Data on Weight/Length Relationship

Dry Weight (gm)	Shell Length (cm)	Log Weight	Log Length
2.95	3.9	0.4698	0.5911
2.85	3.8	0.4546	0.5790
2.80	4.0	0.4472	0.6021
2.05	3.7	0.3118	0.5682
2.90	3.8	0.4624	0.5798
1.90	3.6	0.2788	0.5563
1.70	3.5	0.2304	0.5441
1.30	3.2	0.1139	0.5051
2.83	4.0	0.4548	0.6021
2.90	3.8	0.4624	0.5798
0.90	2.5	-0.0458	0.3979
1.20	3.0	0.0792	0.4771
1.10	2.8	0.0414	0.4472
1.00	2.7	0.0000	0.4314
1.10	2.8	0.0414	0.4772
0.50	2.2	-0.3010	0.3424
0.75	2.4	-0.1249	0.3802
0.50	2.2	-0.3013	0.3424
0.60	2.3	-0.2218	0.3617
1.30	3.0	0.1139	0.4771
0.25	1.6	-0.6021	0.2041
0.330	1.8	-0.5229	0.2553
0.20	1.5	-0.6990	0.1761
0.29	1.7	-0.5376	0.2304
0.15	1.4	-0.8239	0.1461
0.14	1.3	-0.8539	0.1139
0.40	1.9	-0.3380	0.2788
0.24	1.5	-0.6198	0.1761
0.29	1.6	-0.5376	0.2041
0.35	1.8	-0.4559	0.2553

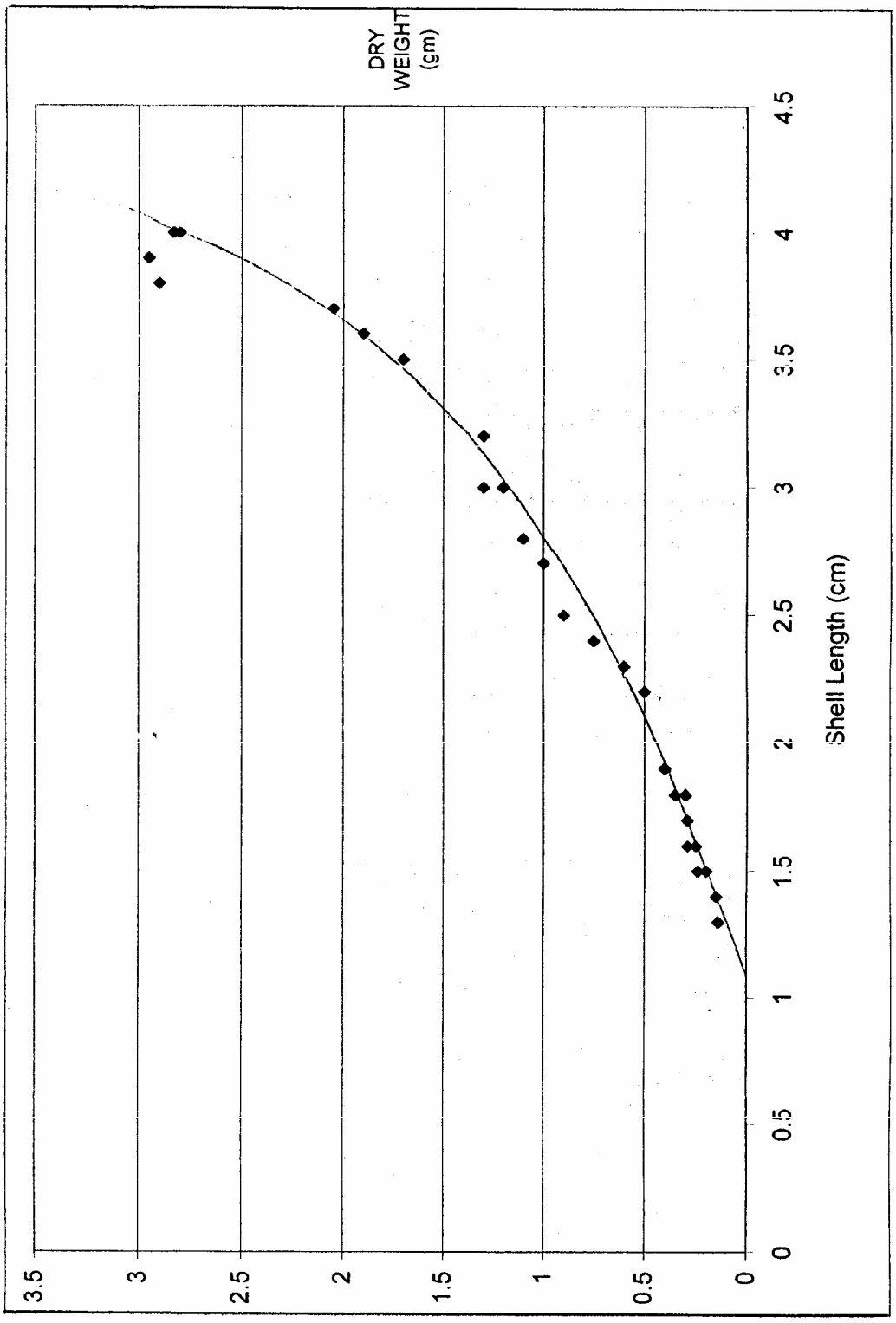

Fig.2. Weight/Length Relationship

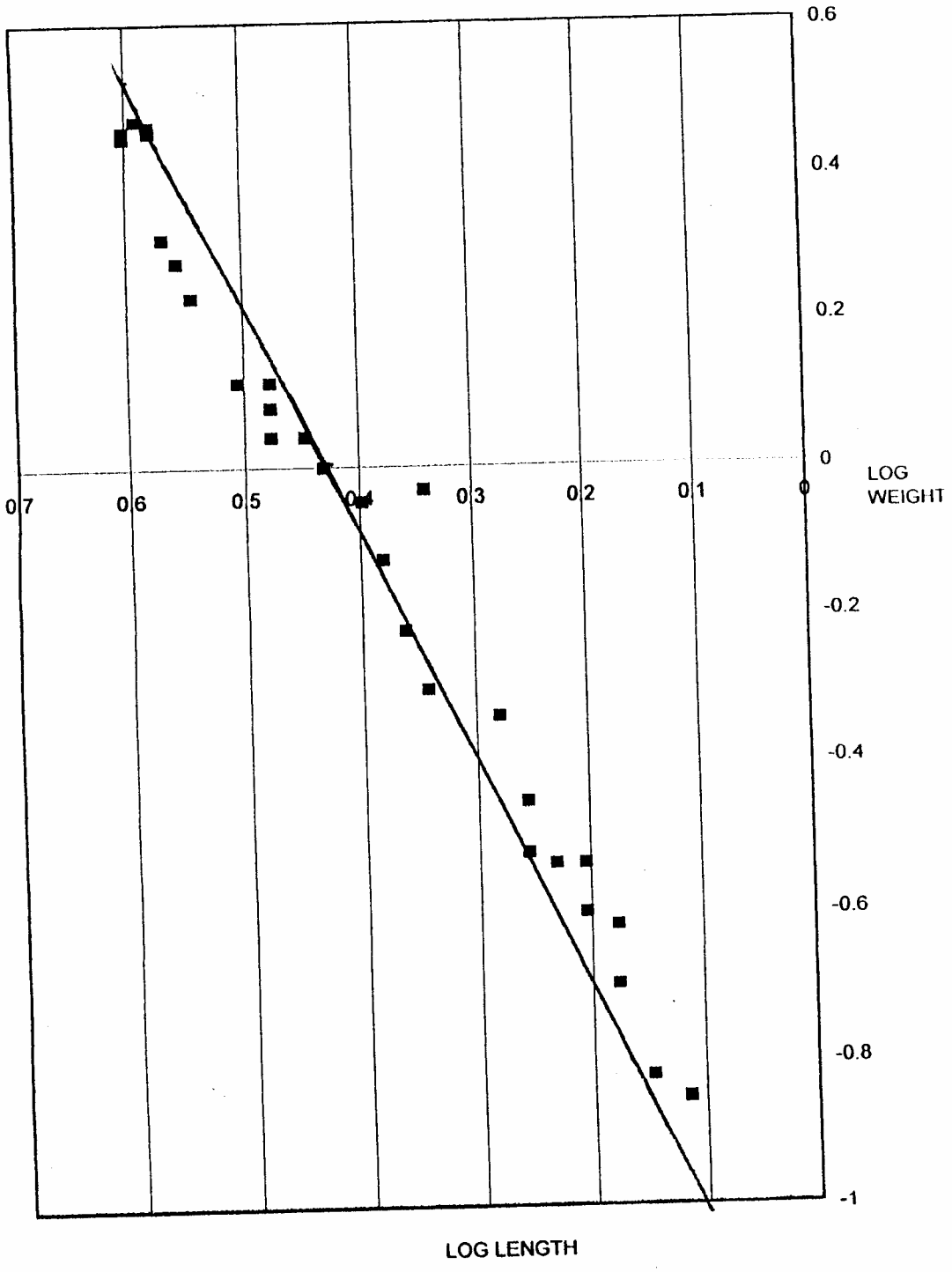

Fig. 3: Log Weight/Log Length Relationship.

Discussion

The result of the temperature determination as shown in Table 1 indicates a low range (27.5°C – 31.0°C) in its variation. Affinowi (1980) recorded a similar low range when he studied the mangrove Oyster, *Crassostrea gasser* in the Niger Delta area of Nigeria. This is due to the tropical nature of the environment studied. On the other hand, the salinity values showed a high range (0.3% - 7.1%) in its variation. This is typical of intertidal zone of the marine environment (Knox, 1963). The pH values gave a low range (6.5-7.8). The substrate nature which is made up of 50% peat particles agrees with the findings of Thom (1967) when he studied the mangrove ecology and deltaic geomorphology. The high percentage of the Peat particles when compared to the other soil fractions is due to the effects of the root system of the white Mangrove plant, *Avacennia Africana* which is associated with the environment. A drastic alteration of any of these abiotic and biotic factors by any form of pollution would adversely affect the population and existence of these Shellfish. The result of the Weight/length relationship which shows that the weight increases faster than the length is a useful information to aquaculturists who would like to culture the shellfish.

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