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The effect of transplantation experiment on the shell morph of the shell fish *Tympanotonus fuscatus fuscatus*

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The shellfish, *Tympanotonus fuscatus* is a brackish water prosobranch, gastropod common in most creeks, estuaries and mangrove swamps within Port-Harcourt and its environs. The genus is endemic to West Africa (Nickles 1950). Its shell characteristics and anatomy was studied by Johanson (1954), while Binder (1968) investigated its limits of penetration into the freshwater. Plaziat (1977) studied its polymorphism and distribution in Camaroun estuaries. Obazee (1980) investigated its biology, reproduction and nutrient values in Lagos. He observed that the shell apex gets decollated. This paper on the effect of transplantation experiment on its shell morph intends to contribute to the knowledge of its ecology and reactions to change of environment. *T. fuscatus fuscatus* is a variety of the shellfish with spines on its shell, while. *T. fuscatus var. radulla* is the variety with smooth or granular shell pattern. Both types are found at the inter-tidal zone usually one variety predominates in a particular creek or shore as is the case in the two environments studied. The *radulla* variety predominates at Abua creek, while the *fuscatus* variety predominates at the Degema shore.

Abua creek, is a high inter-tidal peatflat with a lot of stunted mangrove plants, specifically *Phizophora* species, *Lagancularia* and few stands of *Drepanocapus* species. The peatflat is always exposed (dry, at low-tide). The creek is situated at 4°56′ N. Lat, 6°40′ E Long (Fig. 1). Degema shore, particularly where the shellfish is found, is an inter-tidal peatflat. There are few stands of *Avicennia* and *Laguncularia* species. The peat flat is exposed (dry) at low-tide. The shore is situated at 4°53′ N lat 6°43′ long (Fig. 1).

200 individuals of the shellfish were collected from Degema shore, marked with white enamel paint and transplanted to Abua creek. The salinity was measured by the silver nitrate method as described by Harvey (1945). Results obtained were cross-checked with readings from a water refractometer/salinitometer. Hydrogen-ion concentration was estimated in the field with pH-indicator paper (pH, 1-11 range) and then more accurately determined in the laboratory with the Griffin model 890/7285 pH-meter, after it was calibrated with the appropriate buffer solution. Organic content of mud samples from the study areas was determined by the ashing method.

Calcium content of water samples was estimated by the EDTA titration method. Specimens 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), Vermeulen (1999) and Standard method for the examination of water and waste water were used (APHA 1995).

7 weeks after transplant, a distinct change in the shell morph was observed. The new shell growth was found acquiring the radulla (fine granulation appearance instead of their original *fuscatus* (spiny) morp (Fig. 2). Measurements after 5 months of transplant showed an increase of 5-20

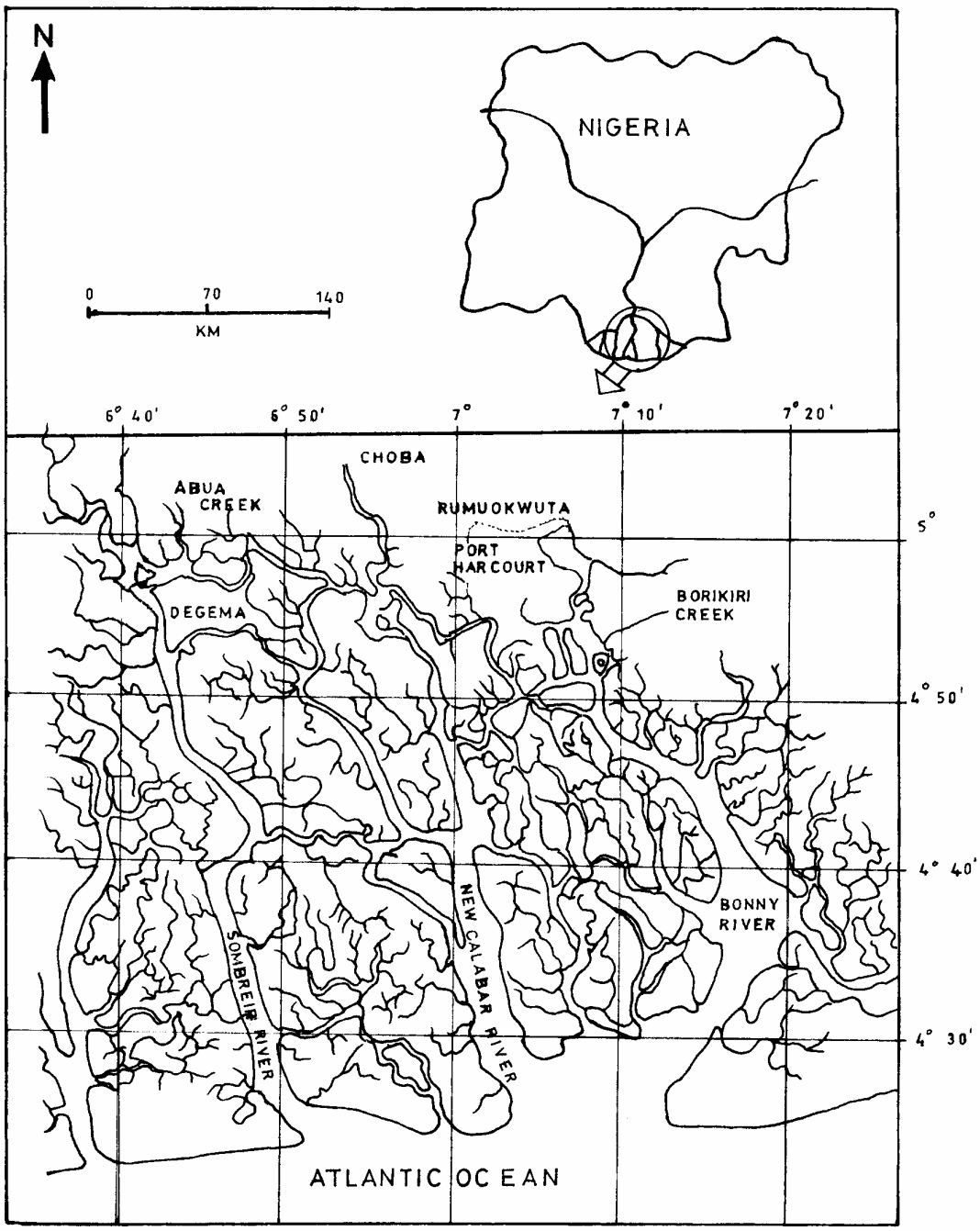

Fig. 1. Map showing locations of study areas.

mm, shell growth along length of whorl for the smaller sized ones (i.e. 15-20 mm shell length), while bigger ones (25-30 mm shell length) showed less increase (5-12 mm).

The observed change in shell morph of *T. fuscatus fuscatus* following a transplant to a new environment can be explained in terms of nutritional factor, and especially abiotic conditions of the two environemtns, since there could be genetic control by abiotic factors (Plaziat 1977). Also according to Younge (1955), the shell formation in most marine molluscs is a function of organic content and cal-

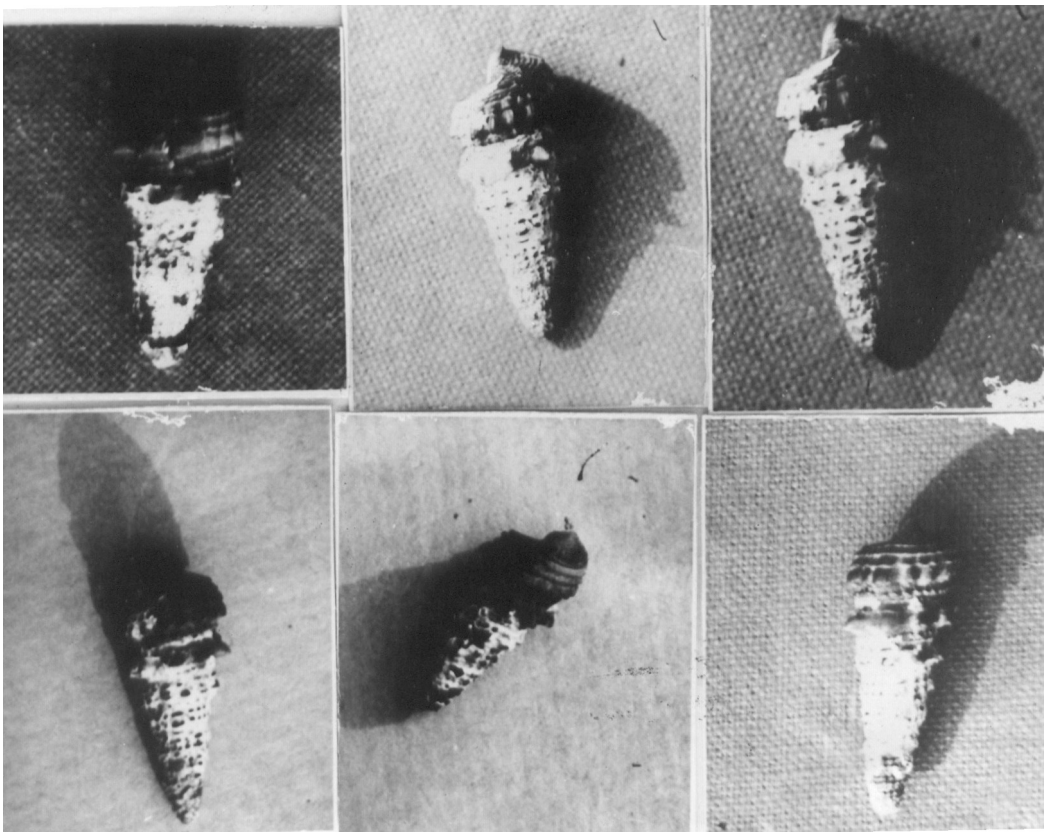

Fig. 2. Photographs of *Tympanotonus fuscatus fuscatus* showing different stages in the change of fuscatus (spiny) shell morph to the *radulla* (granulated) shell morph.

cium content of the environment, and their amount within the body of the mollusc, thus the high organic content of the mud at Abua creek implies more organic nutrients available to the

Table 1. Biotic and abiotic factors at two different sites.

S. No.	Parameters measured	Degema shore	Abua creek
1.	Salinity	5.6‰ – 10.6‰	1.6‰ - 11.6‰
2.	pH – range	6.5 – 6.8	6.1 – 6.5
3.	Organic content of mud	5.3%	7.5%
4.	Calcium content	108.4 m/L	34.4 mg/L
5.	Associated fauna	*Pachymalania aurita* *Pachymelania fusca* Var *qouadriserieta* *Neritina owenii* *Clibanarus* sp. *Pachygrapsus* sp.	*Neritina owenii* *Seserma elegans* *Parhymelania fusca* Var *quadriseieta (with decollated shell apex)* *Pachygrapsus* sp. *Cyrenoide* sp.
6.	Associated flora	*Aviacennia africana.* *Laguncularia* sp.	*Prepanocarpus* sp. *Laguncularia* sp. *Rhizophora racemosa* *R. mangle* *Bostrychia* sp.

snails than at Degema shore (Table 1). Wide range in salinity values at Abua creek implies high fluctuation of salts available to the snails than at Degema shore. Relatively low calcium content of water and longer period of tidal exposure at Abua creek, implies little quantity of calcium available to the snails which could affect shell formation and ornamentation. The result thus shows that the two varieties are not two different subspecies, but are simply ecotypes. Routillet (1979) also suggested that the two varieties could be ecotypes when he studied the ecology of the snails in the delta of Senegal. He observed that the *radulla* variety changed to the *fuscatus* form in a new environment, but he did not perform the reverse experiment, which has been considered here. The experiment also provides another way of carrying out growth studies on the snails, especially if the shell apex gets decollated, because the new shell growth is seen looking quite different from the old one.

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