

ELECTROPHORETIC PROTEIN PATTERNS OF FARM GROWN AND WILD EDIBLE OYSTER *CRASSOSTREA MADRASENSIS* FROM DIFFERENT LOCATIONS

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ABSTRACT

Electrophorograms of adductor muscle, mantle and gill of farm grown and wild edible oyster *C. madrasensis* exhibited distinct differences. Marked protein pattern variations were also evident between the oysters of Ennore Estuary and Muttukadu Backwater near Madras in Tamil Nadu, India. Tissue, environment and locality specific differences have been discussed in the light of number, thickness and staining densities of protein fractions.

INTRODUCTION

AQUATIC organisms present a striking challenge for applied genetics. Most cultivable species still lack information of their genotype and phenotype. Electrophoretic studies of serum protein, muscle protein, plasma protein and haemoglobin, especially of higher vertebrates have revealed species specific pattern (Connell, 1953; Tsuyuki *et al.*, 1962). Gene variant patterns with frequencies characteristic of particular geographic areas or races have been observed in *Bateygobius* and Pomacentridae (Gorman *et al.*, 1976; Gorman and Kim, 1977). Here an attempt has been made to find out the regional variation of protein pattern of commercially important edible oyster *Crassostrea madrasensis*.

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MATERIAL AND METHODS

Oysters for the present study were collected from three locations, namely the natural beds of Ennore, Muttukadu and Muttukadu oyster farm. The oysters were shucked and the meat was thoroughly washed with cold double distilled water and then blotted dry. The mantle, gill and adductor muscle were dissected out. One gram of each tissue was homogenised with ice cold double distilled water. The homogenate was centrifuged for 15 minutes at 3000 rpm. The supernatant containing dissolved water soluble proteins was used as the sample for electrophoresis. Polyacrylamide gel (7%) electrophoresis was performed, making use of the procedure of Laemmli (1970) at 4°C, 240 volts, 48 mA for 3½ hours. After completion of electrophoresis, gels were stained with coomassie Brilliant Blue. Gels were destained and stored in 7% acetic acid. They were photographed and scanned in ultrascanner.

RESULTS

The results of 17 experiments carried out on tissues from the mantle, gill and adductor

muscle of the edible oyster on the electrophoretic protein fractions have been assigned numbers by keeping in mind the number of crests found to correspond to the number of distinct proteins and the areas under the crests proportional to their concentrations.

Mantle

The mantle tissue of *C. madrasensis* of Ennore Estuary exhibited ten protein fractions of which 3 bands were thick 3 thinner and others were minor bands whereas in the farm bred oyster 5, 6, 7 & 8 th fractions were absent there being only six bands and in Muttukadu specimens 7 th and 8 th fractions were absent there being only eight bands (Fig. 1). Thus six protein bands were common for all the

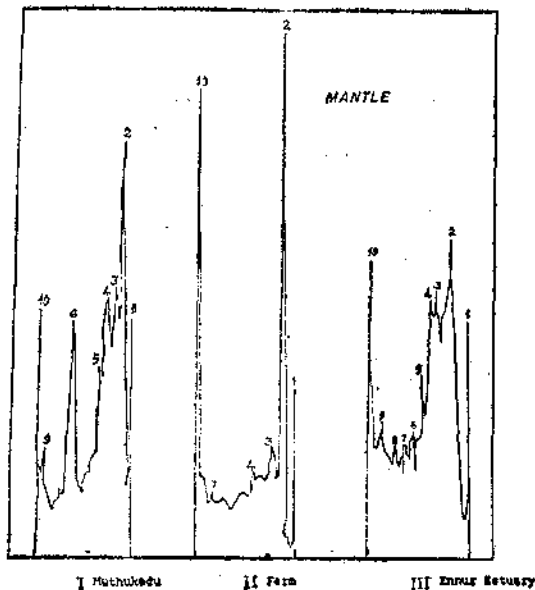


Fig. 1. Electrophorogram of mantle tissue of edible oyster from Muttukadu, Muttukadu Farm and Ennore Estuary.

oysters obtained from the three different localities. The remaining 4 smaller or thinner bands showed variations or altogether absent.

Gill

C. madrasensis of Ennore and farm area expressed eleven protein fractions in the gills tested. In Muttukadu *C. madrasensis* specimens, fractions 6, 8 and 9 were absent. Totally eight common bands were seen in the gill of *C. madrasensis* of different areas tested (Fig. 2).

Adductor muscle

Totally ten protein fractions were observed in the adductor muscle of *C. madrasensis* (Fig. 3). All the ten protein fractions were observed in the muscle of *C. madrasensis* of farm area. In the muscle of Ennore Estuary area specimens 6th, 8th and 9th fractions were absent and in *C. madrasensis* of Muttukadu 5th and 7th bands were absent. There were common six bands of muscle.

Environmental parameters

The environmental parameters such as salinity, temperature and dissolved oxygen and their annual range in the three different places are shown in Table 1.

TABLE 1. Environmental parameters of three different localities

Place	Salinity (‰)	Temperature (°C)	Dis. oxygen (ml/l)
Ennore	.. 14.52-33.4	28.0-34.0	3.52-5.24
Muttukadu	13.86-39.7	28.1-34.0	3.14-5.82
Muttukadu Farm	.. 6.32-36.0	28.5-34.5	3.00-5.30

DISCUSSION

The edible oyster *C. madrasensis* is widely distributed on the east and west coasts of India. Several view points have been expressed regarding the similarities and dissimilarities of protein patterns of the same species occurring in different localities. Geographical variations in biochemical and serological tests have been

reported due to a variety of physiological processes, activities and tolerances by Menzel (1956), Numachi (1962) and Hilman (1964). Galtsoff (1964) however, observed that the shell

ing the bio-chemical genetics of the blue gill *Lepomis macrochirus*, has suggested that the reason for this type of variation may be the discontinuous nature of aquatic habitat. Janson

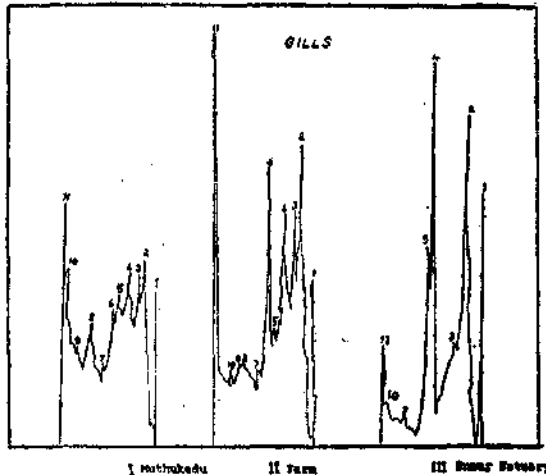


Fig. 2. Electropherogram of gill tissue of edible oyster from Muttukadu, Muttukadu Farm and Ennore Estuary.

morphology was being influenced by local environmental conditions, but did not report any consistent variation among geographically distinct populations.

The present electrophoretic study of the different tissues of the same species from areas suggests that the samples from Ennore, Muttukadu and oyster farm possess distinct protein patterns in terms of the number of bands and also in presence or absence of certain protein fractions. These variations may be brought about by the differences in the environment especially salinity and exposure of the natural beds during low tide, and the resultant physiological stresses. Avise and Smith (1984) study-

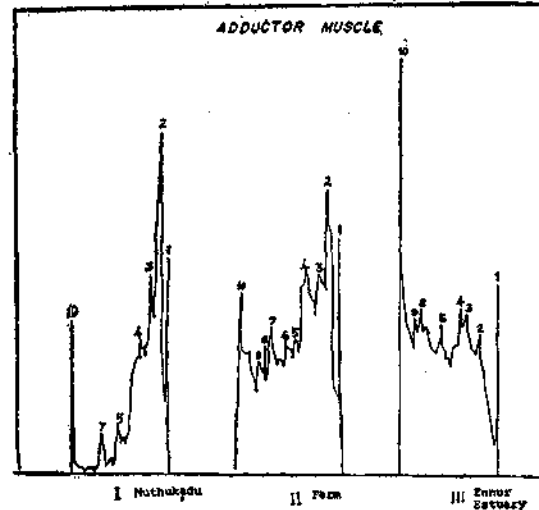


Fig. 3. Electropherogram of adductor muscle of edible oyster from Muttukadu, Muttukadu Farm and Ennore Estuary.

and Ward (1984) has mentioned that the differences in populations occupying different areas separated by physical barriers could be related directly to environmental pressure like exposure during low tide and to substrata occupied by them. A heterogenous environment would enhance genetic variation and a homogenous environment erode variation according to Fujiyo *et al.* (1983).

The results of the present study suggest that the natural oyster beds of *C. madrasensis* which lie in the intertidal area being subjected to tidal amplitude and also facing a complex of environmental changes undergo considerable physiological stresses and this has resulted in the protein band variations as reported here.

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