ON THE FATNESS OF THE CLAM, *MERETRIX CASTA* (CHEMNITZ)

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ABSTRACT

The quality of the clam *Meretrix casta* from two different localities at Athankarai estuary and marine fish farm at Mandapam was assessed by three methods. It was found that clams inhabiting Athankarai estuary were of better quality than those from the fish farm. The probable cause appears to be the better nutritional conditions in the natural habitat of Athankarai estuary along with the free-flowing water and moderate salinity prevailing there.

INTRODUCTION

During the study of the biology of the clam, *Meretrix casta*, from the marine fish farm at Mandapam and the natural clam beds of Athankarai estuary, about 15 km west of Mandapam, it was noticed that the clams at Athankarai estuary were generally fatter and thus healthier than those from the different ponds of the fish farm.

In order to verify this casual observation, the following three methods were employed to samples from these localities: 1. Determination of the index of condition of clams of approximately the same size; 2. Relation of meat volume to shell volume and 3. Determination of total solids.

The above methods have a general limitation that these should not be carried out during the spawning season. However, in the earlier studies (Durve, 1964) it was found that the percentage edibility in *Meretrix casta* from the marine fish farm does not change appreciably throughout the year. The same also appears to be true in the case of *M. casta* growing in Athankarai estuary (Durve, unpublished). In view of this, it was decided to apply these tests to the samples of *M. casta* of approximately the same size, collected from the above-mentioned two localities near Mandapam, to know their relative fatness.

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OBSERVATIONS

Variations in the index of condition

Samples of about 100 clams of approximately the same size were collected from ponds 1, 3 and 7 of the fish farm and at ferry cross in Athankarai estuary (see Durve and Alagarswami, 1964) and the index of condition (K) was determined by the method of Baird (1958). It was found that in the case of clams from Athankarai estuary, the maximum number (46.67%) were in the index range 30.1 to 35.0 with the average K of 33.40. In the case of fish farm, the majority of clams from ponds 3 and 7 fell in the K range 25.1 to 30.0 and 20.1 to 25.0 respectively. In the case of clams from pond 1, the majority (40.91%) were in the range 30.1 to 35.0. The average K for ponds 1, 3 and 7 was 31.78, 22.95 and 26.16 respectively. It is evident that the clams from Athankarai estuary having the higher index value are fatter than those from the fish farm.

Relation of meat volume to shell volume

For this study, measurements of shell volume and meat volume were independently recorded of 120 clams from Athankarai estuary, 88 from pond 1 and 120 each from ponds 3 and 7. The relation of meat volume to shell volume was found to be linear in all cases. The linear relations are

Pond 1:	$M = 0.5171 + 0.2479\ S$
Pond 3:	$M = 0.2789 + 0.2003\ S$
Pond 7:	$M = 0.8110 + 0.1627\ S$
Athankarai estuary:	$M = 0.4577 + 0.3129\ S$

where, S represents the volume of the shell and M, the volume of the meat.

Since the clams in the marine fish farm are subject to the same environmental conditions (Durve and Dharma Raja, 1965), it was felt that regression relation of meat volume to shell volume may be the same for the clams of ponds 1, 3 and 7. To verify this, comparisons were made by the analysis of covariance with the significance of all tests judged at 5% level of probability. The non-significant F value of 2.45 at 2 and 322 degrees of freedom confirms that there are no differences in the relation of meat volume for the clams of ponds 1, 3 and 7. Having established this, the data from these ponds were pooled together and treated as those of marine fish farm for comparison with that of Athankarai estuary. The linear relation of meat volume to shell volume for the pooled data is $M = 0.3849 + 0.2378\ S$. The analysis of covariance test at 5% level of probability gives a significant F value of 4.43 at 1 and 444 degrees of freedom. This proves that there are differences in the relation of meat volume to shell volume between the clams of marine fish farm and Athankarai estuary. It is observed that the volume of meat is higher in Athankarai than in fish farm, thus indicating that the clams from the former are fatter than those of the

latter. Among the clams of fish farm, clams from pond 1 are of better quality than those of ponds 3 and 7, as the regression coefficient falls from pond 1 to 7.

Variations in total solids

All the above observations were further confirmed by the variations in the amount of total solids in clams of these localities. For this purpose, about 25 clams were opened from each locality, their meat was quickly blotted on a filter paper and blended in a waring blender. A known aliquot of this, in triplicate, was dried in a hot-air oven for 36 hours at 95° C and weighed to constant weight. It was found that the average value of total solids was the highest (28.62%) in the case of Athankarai estuary clams, while it was 27.00, 18.71 and 23.44% in ponds 1, 3 and 7 respectively. These results, thus, further support the earlier inferences.

Probable factors responsible for the differences in the fatness

An attempt was made to find out the factors responsible for this difference in fatness in the case of the clam *M. casta* inhabiting the two different localities of marine fish farm and Athankarai estuary. The results of the chemical analysis of the test samples of the mud and water at both the places showed that the average of total phosphate in mud was the highest in Athankarai estuary (586.40 μg/g) while it was only 65.15, 232.32 and 285.49 μg/g in ponds 1, 3 and 7 respectively. The organic content of the surface mud layer in the case of fish farm was 13.97, 17.14 and 16.12% in ponds 1, 3 and 7 respectively. It was, however, only 5.98% in Athankarai estuary. The mud in the fish farm has been reported to be highly silt laden (Tampi, 1960).

The salinity in the fish farm remains high throughout the year and during summer, the water becomes hypersaline (Tampi, 1960 and Varma *et al.*, 1963). The inorganic and total phosphates were found to be absent in the waters of ponds 3 and 7, while their values stood at 0.125 and 1.10 μg at/l respectively in pond 1. The nitrites were found to be absent in all the ponds. Due to the low concentrations or lack of essential nutrients in the water, the plankton production is low. The water in the fish farm is also more or less stagnant throughout the year with a little replenishment from the sea. The above results more or less agree with those of Varma *et al.* (1963).

In Athankarai estuary, the water is free-flowing for the major part of the year and during summer, it is replaced by the tidal influx. The salinity thereby remains at moderate level throughout the year at least at the place (ferry cross) where the collections for the present study were made. The values of inorganic, total phosphates and nitrites were appreciable in the waters of Athankarai estuary (0.28, 1.60 and 0.15 μg at/l respectively). This produces rich plankton as observed by plankton hauls from the locality (Durve, unpublished).

The better quality of the clam *M. casta* from Athankarai estuary thus appears to be due to the better nutritional conditions, moderate salinity and free-flowing

water with an influence of fresh water. Due to the free-flowing nature of water either by the river flow or tidal influx, the particulate organic matter essential for the nutrition of suspension-feeders like *M. casta* may be easily available to the clams. Besides, rich microflora will also contribute to their food requirements. In the case of the fish farm, the factors are not very conducive in spite of the good percentage of organic content of the mud stated above and the rich bacterial and flagellate flora of mud as observed by Tampi (1960) and Varma *et al.* (1963). The constant high salinity, stagnant water mass, silt-laden substratum, together with the probable absense of suspended particulate organic matter due to the lack of water movement and low phytoplankton production in the fish farm affect the balanced growth of animal communities, especially the stationary suspension-feeders like clams.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. R. Raghu Prasad and Shri. S.K. Banerji for going through the manuscript critically and suggesting improvements.

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