AN ANCIENT WINDOW PANE OYSTER BED IN GOA WITH COMPARATIVE NOTES ON THE OYSTER IN AN EXTANT BED

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ABSTRACT

A bed consisting of a large quantity of semifossilised shells of window pane oyster *Placenta placenta* (Linn.) was discovered accidently in a paddy field by the side of the river Mandovi in Goa. Subsequent investigations lead to the conclusion that there was a flourishing population of window pane oyster in this area prior to the 16th century, and that this rich population perished subsequently as a result of indiscriminate intervention by way of reclamation. This population is compared with that which exists at present in the Zuari estuary of Goa. Attempts are also made to compare the incidence and distribution of boring sponges among the window pane oyster, both ancient and extant.

INTRODUCTION

The shells of window pane oyster, *Placenta placenta* (Linn.), which adorn the windows of the bungalows constructed by the erstwhile Portuguese regime clearly indicate that there was a glorious past for this fishery in Goa. But, unfortunately, no information is available on the nature, extent or the past of this fishery in Goa or the reasons, either direct or indirect, which lead to the destruction of these erstwhile rich grounds. This fishery at present is quite insignificant and disorganised as the returns are no more encouraging.

The present discovery of the remnants of an ancient window pane oyster bed is of great significance since it throws considerable light, not only of the nature and extent, but also of the indiscriminate activity of man on the banks of the river Mandovi which culminated in the total destruction of this ancient bed.

MATERIAL AND METHODS

Semifossilised shells collected from the site of the new Bus Terminus at Panaji (marked X in Fig. 4) and the living shells collected from the beds of Zuari were utilised in the present study. Details on the sequences of reclamation on the banks of the river Mandovi were obtained from 'Iconografia das Cidades Portuguesas do Ultramar.' Sponges were identified after Thomas (1972), and commensal crabs, after Chhapgar (1957).

Window pane oyster from the ancient bed

Semifossilised shells were fairly well represented all along the different parts of this 5-hectare plot where the New Bus Terminus is located. These shells were seen buried at a depth of 1-15 m, and the number per square meter varied from 3-12. Both the valves of the oyster were intact in about 95% of the shells unearthed, and the area representing the soft parts of the shell was fully charged with soft mud. These clearly indicate that these specimens got buried alive in the process of reclamation. Smaller shells were rather brittle whereas the larger ones retained their natural shape. Complete absence of specimens below 60 mm (height) may indicate that these might have gone completely distintegrated due to very long subterranean existance.

The size (height) of the shells ranged between 61 and 145 mm with the mean at 108.33 mm. Though three modes were represented in the population, only one at 106-110 mm was dominant. Specimens measuring above 140 mm contributed only 3.9% in the population (Fig. 4).

Window pane oyster from the extant bed

This resource is at present being tapped by drivers around Jacinto Island (Fig. 4) during April-May period and are sold at 2 ps. per specimen for household consumption. The shell is utilised for making window panes, but those which cannot be used for this purpose are converted into good quality lime.

The size-frequency-percentage distribution of 359 shells collected at random from this ground is presented in Fig. 4. The size of the specimen ranged between 56 and 105 mm with mean at 75.6 mm. Two modes were represented in the population, the one at 66-70 mm was dominant.

Comparative account of sponge infection

Presence of bored shells in the ancient population indicates that boring sponges were active in the estuaries of Goa in olden days also. Though the attempts to extract spicules from these shells were futile, the nature and pattern of boring bear close resemblance to those produced by *Cliona vastifica* Hancock on window pane oysters collected from Jacinto beds (Fig. 1).

The percentage of incidence of boring sponges noted in the ancient bed is only 10.53. The sizegroup-wise analysis of incidence reveals that it is confined to some size groups coming in between 91 and 125 mm with a peak in 116-125 mm size groups.

Examination of shells from the Jacinto bed shows that practically all size groups are infested by boring sponges. Only one species, *C. vastifica,* occurs in this bed and bores in a characteristic linear and reticulate pattern (Fig. 1). It can tolerate low salinities, and hence has succeeded in colonising the estuarine

realms posing a serious threat to the molluscan population in our estuaries. This species is rather widespread in the Zuari estuary and about 62.9% of the window pane oysters are infected. Size group-wise analysis revealed that all size groups are equally vulnerable, and in some size groups the rate of infection is 100%.

It is found in all these cases that the upper flat valve is infected; and in some even multiple infection is noted. The borings are often confined to the thickest part of the shell, but in the case of older infection the ramifications may reach up to the edge of the shell.

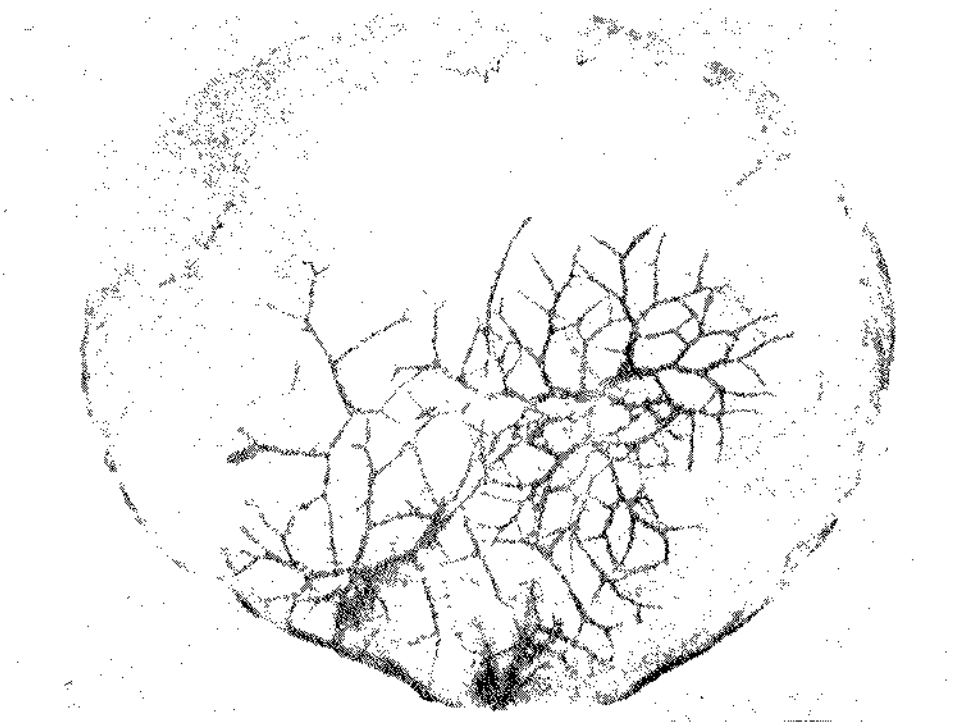

FIG. 1. A shell (upper valve; outer view) of window pane oyster from Jacinto bed infected by the boring sponge *Cliona vastifica*. Note the linear and reticulate pattern of boring

The heavy incidence of boring sponges on window pane oyster is due to the fact that the upper valve which is smooth and flat provides suitable conditions for the larvae to settle. And this valve, since always kept in motion for physiological purposes, the chances of silt settling on to it are practically nil, and this may prove congenial for boring sponges to grow and proliferate. The upper valve which is flat and free of sponge infection is in great demand

as window panes, but when it is bored by sponges in a linear and reticulate pattern it can no longer be used for the purpose as it is liable to go into pieces while cleaning.

Since all the size groups, especially the larger ones, are infected by boring sponges these shells are no longer esteemed for making window panes, and this may be attributed as the main reason for the lack of demand for this commodity in Goa at present.

Commensal Crab, *Pinnotheres placunae* Hornell and Southwell, was present in 2% of the window pane oyster examined.

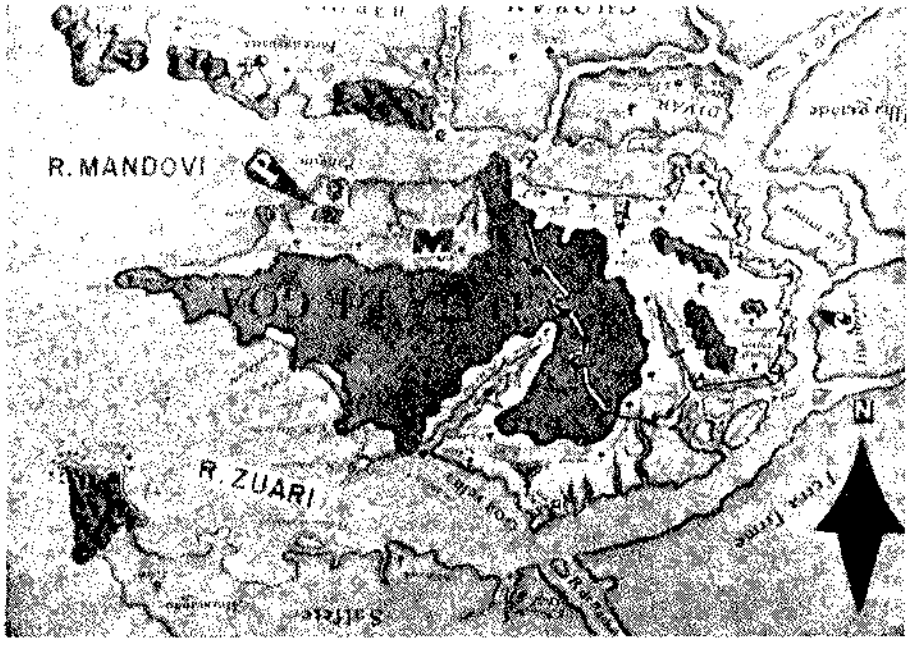

FIG. 2. A 16th century map of 'Ilha de Goa' (Island of Goa) with its northerly projecting 'Rebander Peninsula' (R) and 'Islet Pangim' (P). Extensive mudflat (M) is seen west of 'Rebander Peninsula.' The Cumbarjua Canal (C) connecting the rivers Zuari and Mandovi is also shown.

Historical account of the Reclamation of the Mandovi Banks

The reclamation which effected on the banks of the river Mandovi through centuries may be summarised as follows. The rivers Zuari and Mandovi are interconnected by a channel called "Cumbarjua Canal" (marked 'C' in Figs. 2, 3 and 4) and hence the landmass west of this canal is practically an island (shown as 'Ilha de Goa' = Island of Goa in Fig. 2 or simply as Ilhas as in Fig. 4). This Island has a penisula projecting northward at its eastern

island (Ilha de Goa) this 'causeway' was used mainly in connecting the then capital, Ville de Goa, with the interior parts of 'Ilha de Goa.' Later Pangim was linked with Ilha de Goa, and by AD 1811, a port was established. These changes gave considerable importance to the 'causeway' and simultaneously it was converted into a road connecting the port (Pangim) with the Capital (Ville de Goa).

The present collection of semifossilised shells came from this mud flat, very near to Ponte de Linhares (marked 'X' in Fig. 4) and hence represent a population which thrived in this mud flat some 300 years ago.

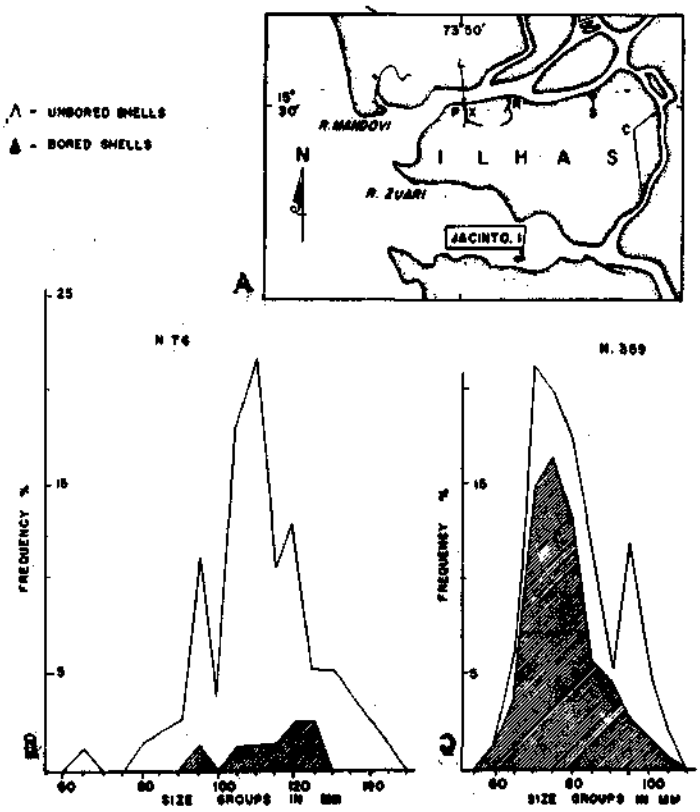

FIG. 4. A: recent map of the area. Ilhas represents 'Ilha de Goa' in fig. 2; S. - Old Goa (Ville de Goa in fig. 3); L - Ponte de Linhares; P - Panaji; R - Ribander, C - Cumbarjua Canal; X - location of the new bus terminus. B: Size-frequency percentage of bored and unbored shells of window pane oyster from fossilised bed. C: size-frequency percentage distribution of bored and unbored shells from the extant bed at Jocinto.

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** Year not specified. Collection of Maps which are not numbered.