

PROPOSALS FOR A SHELL-FISH CULTURE SCHEME IN CARONI SWAMP

by **Peter R. Bacon**

The first sanctuary for the protection of the Scarlet Ibis was proclaimed in 1953, and since that time no one can doubt the benefits that this conservation effort has brought to Trinidad. However, the beauty of the Ibis appears to be blinding us to the other valuable resources present in Caroni Swamp. During the course of research on the ecology of the Swamp the author conducted some experiments on three food species which are abundant there, i.e. the oyster, the mussel, and the 'black conch', and it is the intention of this report to suggest ways in which these shell-fish could be cultured economically.

THE OYSTER

1 Biology

The edible oyster, *Crassostrea rhizophorae* (Guilding), Fig. 1a, grows attached to the roots of the red mangrove, *Rhizophora mangle* (Linn.), beside tidal channels and lagoons. In Trinidad it is found in the estuaries of mangrove swamps and is collected at all seasons of the year for food. In some other Caribbean islands it is cultivated, as it is in neighbouring Venezuela. The oyster settles readily on any solid substrate, (living and dead mangrove, bamboo, timber, earthenware flower pots, and porcelain have all been used), and is ready for market in a few months. The estuaries of the Caroni and Southern Oropouche Swamps provide good growing conditions, with good standing crops of phytoplankton, adequate currents, and a small temperature range, which allow rapid and uninterrupted growth. Spawning and settlement are probably continuous.

2 The present position.

The present methods of collection are both wasteful and destructive. Selected mangrove roots are cut at low tide, and the oysters are later removed from them, and the small ones discarded. This means that:—

- 1 Many young oysters are destroyed.
- 2 Mangrove roots are lost. The mangrove trees do, of course, produce new roots, but not quickly enough to replace those being cut. The available area for settlement is, therefore, being reduced daily.
- 3 Cutting the roots increases erosion of the river banks.
- 4 Most of the collecting must be done at low tide.

In addition, as no attempt is made to preserve the oysters collected, those not eaten within a few hours are wasted, although they will keep indefinitely when refrigerated and their palatability is not affected.

3 Proposed methods.

Approximately 1,500 acres of the Caroni Swamp is occupied by a

shallow, open lagoon which averages three feet deep, but has many deeper channels crossing it, and has a fringing belt of red mangrove in addition to many islands of mangrove trees. The method suggested is that part of this lagoon should be turned into an artificial mangrove woodland to increase the available area for oyster settlement. All that is needed is that six foot long stakes, of mangrove or bamboo, should be stuck firmly in the mudflats in lines, spaced so that a small boat can pass between them, and several passages left so that boat traffic can pass through the 'farm'. The stakes provide a similar substrate to mangrove roots and the oysters will grow on them over a zone about 3 ft. wide between the tide marks, and can be removed for market when large enough leaving space for further settlement. Stakes, and old mangrove roots, could also be placed in the river banks among the existing roots, thereby increasing the natural growing space.

In many parts of the world rafts, with hanging ropes or wickerwork are used to encourage oysters, but these are expensive to build and maintain, and are impractical where there is considerable boat traffic. The above method is simple and economical, and has the following advantages :

1. Stakes are easily and cheaply obtained. Mangrove can be cut from within the swamp itself, although care must be taken not to damage the woodland.
2. Mangrove and bamboo last from two to three years immersed in the brackish water of the Caroni lagoon.
3. Oyster collection can be done at high tide also, as the stakes can be raised from the mud, examined, and then replaced.
4. Large oysters can be removed by hand, as they do not cement themselves as firmly as on the living mangrove, and the young ones can be left.
5. The oyster crop can be thinned if required to promote growth.
6. With a known number of stakes it would be possible to estimate the potential crop, and to control the harvesting.

4 Anticipated problems.

1 Because of the productive environment there is considerable competition for space on the mangrove roots, especially during the dry season when sponges, hydroids and tunicates invade the whole swamp. Barnacle settlement is heavy at all seasons. It would be possible, however, to clean the stakes during the periodic inspections.

2 Increasing the oyster crop might encourage predators. No oyster predator has been found in the Caroni Swamp, although an oyster 'drill' is present in Tobago.

3 The large amounts of detritus, and the strong currents, might displace the stakes. Care must be taken in the siting and anchoring of the posts.

4. The swamp is a holiday and tourist area so that attention must be paid to the positioning of the culture area so that it does not become an eye-sore. The project would not be detrimental to the swamp fauna, would probably encourage the growth of many interesting species, and need not be placed in any prohibited area.

5. Interference from unauthorised personnel. This is almost certainly the greatest deterrent to any scientific research or conservation work in Trinidad, and would need serious consideration.

THE MUSSEL

At the present time this species is eaten by very few people. *Modiolus americanus* (Leach), Fig. 1b, grows to over two inches, and is found in the Caroni Swamp on mangrove roots, and buried in the mud. It can be prepared for the table in the same way as the 'chip chip', *Donax* sp., but has the advantage that it is larger, and the gut does not contain sand which must be removed. The mussel will grow readily on the same roots and stakes as the oyster, but appears to prefer certain regions of the swamp. It could, therefore, be cultured by the same method, either separately or together with the oyster.

THE 'BLACK CONCH'

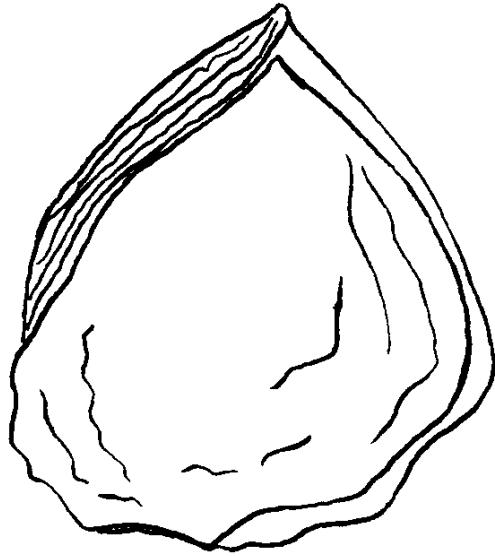
The marine snail, *Melongena melongena* (Linn.), has a spiral shell, Fig. 1c, which may be six inches long, and is collected by hand during the few hours of low water near the mouths of the swamp rivers, or on the soft mud flats where it is difficult to move without sinking. The egg cases, which are easily found among the mangrove roots, can be kept in aerated tanks of swamp water where the young will hatch and metamorphose. If released as young snails they have a better chance of survival. Breeding and releasing methods need further study, and can best be carried out where laboratory facilities are available. So far little is known of their breeding age, breeding season, best size for harvesting, or their feeding habits (it has been suggested that they feed on oysters, although this author has no evidence of this, so that before serious culture is started this must be investigated). Some 'boffin' might also invent a simple ski, allowing speedy movement across the soft mud flats, to facilitate collecting.

Conclusions.

It must be stressed that these suggestions are only provisional, and that a great deal of research and planning are still needed. But it is thought that by these simple methods the present oyster crop could be greatly increased, with little capital expenditure and labour, and that mussels and conches could become regular items of the local diet. In the absence of an informed and active fisheries department it is difficult to suggest who should organise such a project. The large number of people dependent on the swamp for their livelihood shows how important it could be, and it would probably be most successful if the present shell-fish collectors were involved in the scheme by the leasing of areas of the shell-fish farm to them. They would then do the little work involved, safeguard their own property, and reap the benefits directly.

There may be those who are worried that areas near to our most successful wild life sanctuary should be proposed for cultivation. There is no reason why any of the protected species should suffer, and many of the species not protected would certainly benefit. Besides there is no better way to conserve our natural marine animals than to grow them.

Zoology Dept., U.W.I., St. Augustine.



a. OYSTER.



b. MUSSEL.



c. CONCH.

FIG. 1.