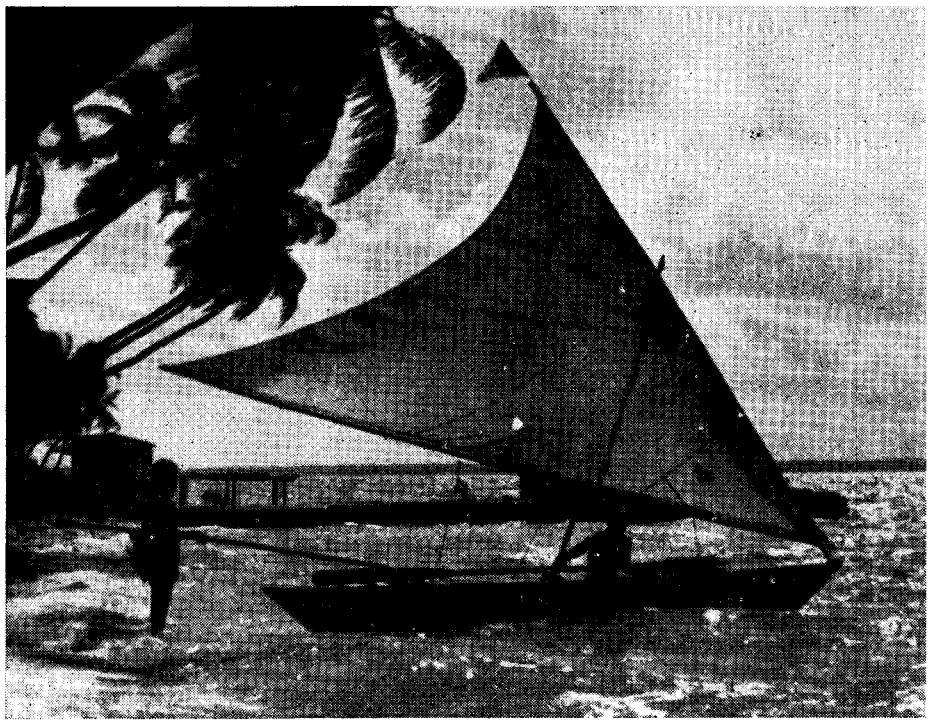
Pearl Shell Investigation In The Cook Islands



In the past ten years pearl shell to a total value of £850,000 has been exported from the Cook Islands. A practical investigation is now in progress there, with the main objectives of protecting and expanding this valuable industry.

By J. L. NOAKES*

A sailing canoe on Manihiki Lagoon. It is typical of dozens of pearling craft used by skin divers in the Cook Group.

A PRACTICAL investigation into the pearl shell fishery of the Cook Islands is now in progress. It is being undertaken by Mr. Ronald Powell, Fishery Officer, Cook Islands, who has supplied the information and photographs for this account of his work.

It is not definitely known when the fishery commenced, but it is generally associated with George Ellis, an English boat-builder who settled in Manihiki Island of the Cook Group and owned a fleet of small cutters about 80 years ago.

Manihiki Island, a small lagoon atoll of about 1344 acres, has always been the centre of the Cook Islands pearl shell fishery and has always yielded the greatest returns. The lagoons of Penrhyn and Suwarrow Islands have also been worked, but with less success. Recently shell was planted in the lagoons of Pukapuka, Rakahanga and Palmerston Islands. This work will be described later.

Since 1948, the total value of pearl shell exported from the Cook Islands has been about £850,000, most of it being purchased in the United States. The price has risen from £100 a ton in 1945 to a maximum of £1000 with irregular variations. The present price is about £500 a ton.

The raft for the experiment, made from sawn timber and galvanized iron oil drums, all suitably processed to withstand the action of salt water.

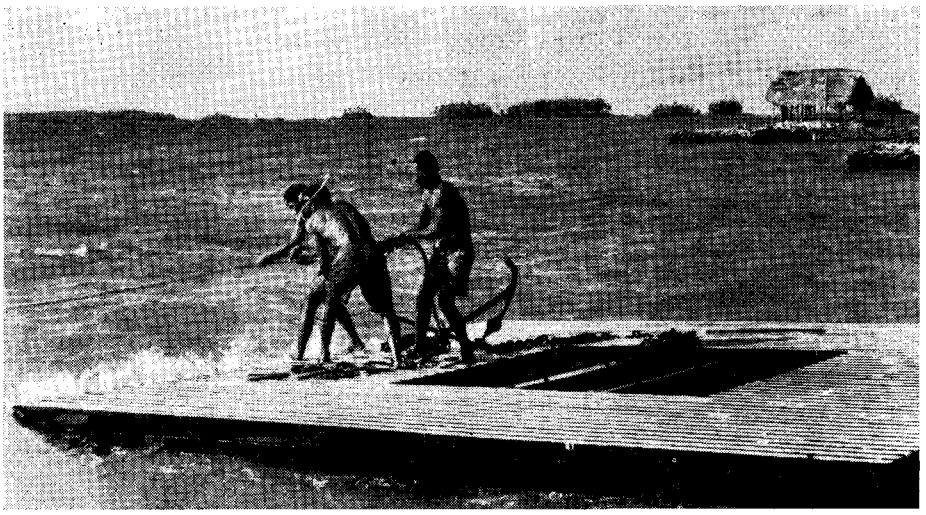
Limits Of Local Knowledge

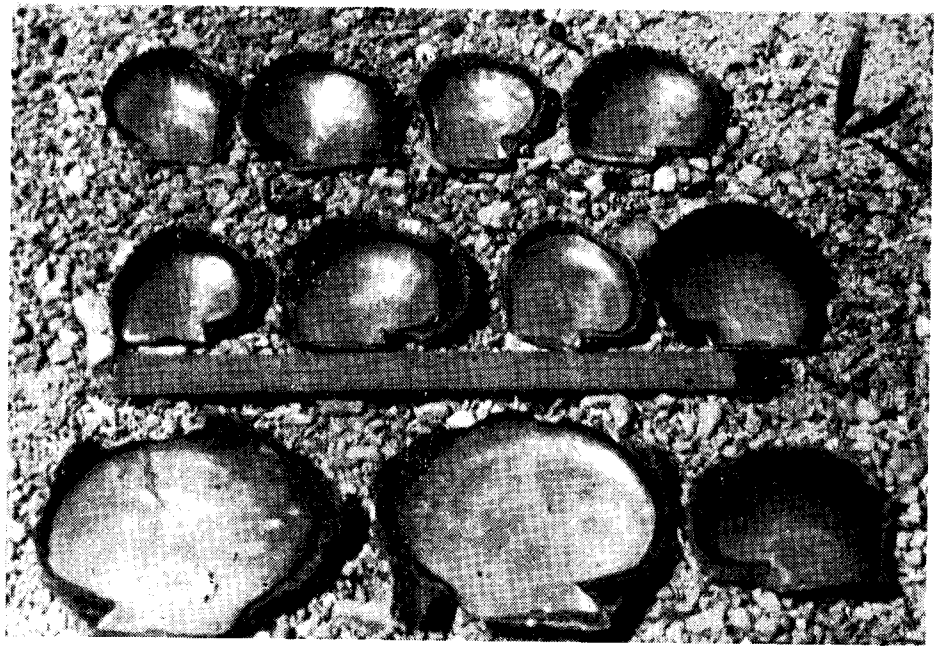
Little is known of the ecology of the pearl shell areas or of the limiting conditions of growth and possible failure of the natural stock from disease. Previously nothing was put back into research to safeguard the stock from disease and over-exploitation, and no replanting was done. The only control enforced was—and still is—in the form of rest periods for those lagoons appearing to have reached the point of depletion, and by limitation in the size of shell collected and exported. The minimum size at present is five inches.

Some of the questions it is desirable should be answered by scientific investigation are:—

What are the optimum conditions of growth in Cook Islands lagoons? This question must include investigations into the food of the pearl shell oyster, the depth at which the oyster grows best, the most suitable salinity of sea water, temperature limits, natural predators

* This article was prepared by Mr. Noakes, Director of Social Development, Cook Islands, in collaboration with Mr. Ronald Powell, Fisheries Officer. Mr. Powell attended the SPC-FAO Fisheries Training Course held at Commission headquarters two years ago, and was appointed to his present post on his return to the Cook Islands.





Commercial pearl shell taken from Manihiki Lagoon. Note variations in shape.

and suitability of varying lagoon bottoms for settlement.

What are the conditions governing maturity of the oyster? This question includes investigation into the size at which the shell is sexually mature, the seasons of the year in relation to optimum spat fall, the minimum size of shell to be picked to ensure that the remaining stock survives and multiplies, the size of a colony necessary to ensure multiplication, and the limits a colony can reach before ceasing to multiply.

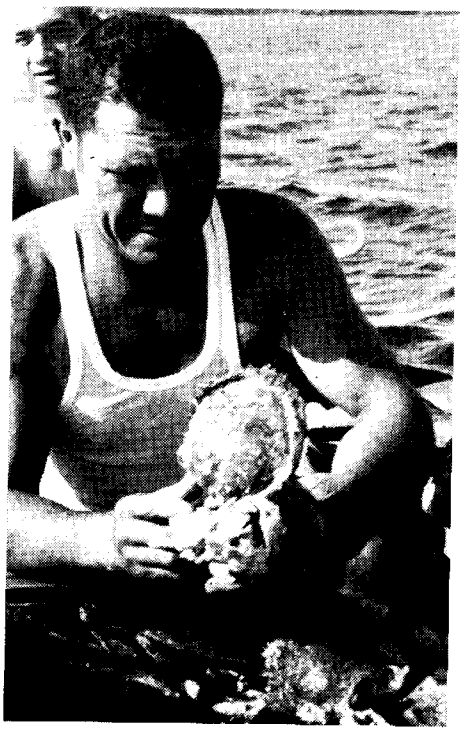
What are the diseases likely to affect growth of the oyster and how can they be controlled? Little is known in the Cook Islands about such diseases, although one disease at present in Manihiki Lagoon seems to be what Hornell describes as "yellow disease", caused by the overcrowding of shells on natural rock bottom.

The two main hazards appear to be disease and hurricanes. The first—already mentioned—may be held in check and perhaps even eliminated with better knowledge. Probably nothing can be done to protect the fishery from hurricanes, but these are hazards which apply to every other primary industry in the Cook Islands.

Mr. van Pel of the South Pacific Commission transplanted some pearl shell from Manihiki to Rakahanga Lagoon in 1955, and in 1956 Mr. Powell added some more. Also in 1956 Mr. Powell transferred shell to Pukapuka Lagoon, and in 1957, he did the same in Palmerston Lagoon.

In every case the transplantation was successful and the shells are showing satisfactory growth rate, but it is still too early to express an opinion on reproduction.

If shell grows in these new areas but does not form colonies, then it is likely, other ecological conditions being suitable—that the lagoons have not sufficient clean bare rock for the attachment of young spat when it is ready to fall, because it is known that there is enormous competition for suitable bottom among coral sponges alone. This, it is thought, is the main reason why pearl shell has not grown naturally before in these lagoons, and not so much because of lack of foodstuffs, unfavourable water temperature, the presence of predators, and so on. Yet all this only goes to show the need for scientific investigation.



Fisheries Assistant Ioapa Marsters holding a young pearl shell, the first to appear from the transplantation to Rakahanga Lagoon made in 1955 by Mr. van Pel, SPC fisheries officer.

Survey And Investigation At Manihiki

It was decided to commence a preliminary survey and investigation to collect data, and plans were made to do this work in Manihiki Lagoon. Experiments were carried out between May and June, 1958, these months being the most suitable for the purpose.

It is standard procedure, in surveys of this type, to create artificial conditions to facilitate observation of the pearl shell over a suitable period. The best way is to construct a strong, serviceable raft, moor it firmly in a suitable place in the lagoon, suspend "collectors" from it at varying depths in the sea water, and provide means to ensure that oyster spat is made available under natural conditions for the collectors. Observations are made from time to time, and in this way scientific data is obtained.

Pre-cut timber and galvanized iron oil drums were assembled in Rarotonga and taken to Manihiki, where the raft was built on the water's edge. Fifty men from the village made light work of the launching, and the only motor launch on the island towed it out to a pre-arranged site where it was firmly moored with iron chains to a large coral head near the lagoon bottom.

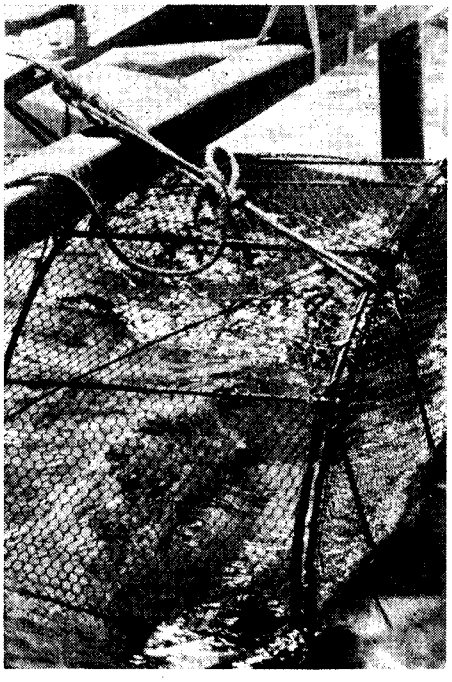
Three kinds of collectors were prepared and suspended at varying depths below the raft using stainless steel wire, and a fourth kind was placed on the lagoon bottom below the raft.

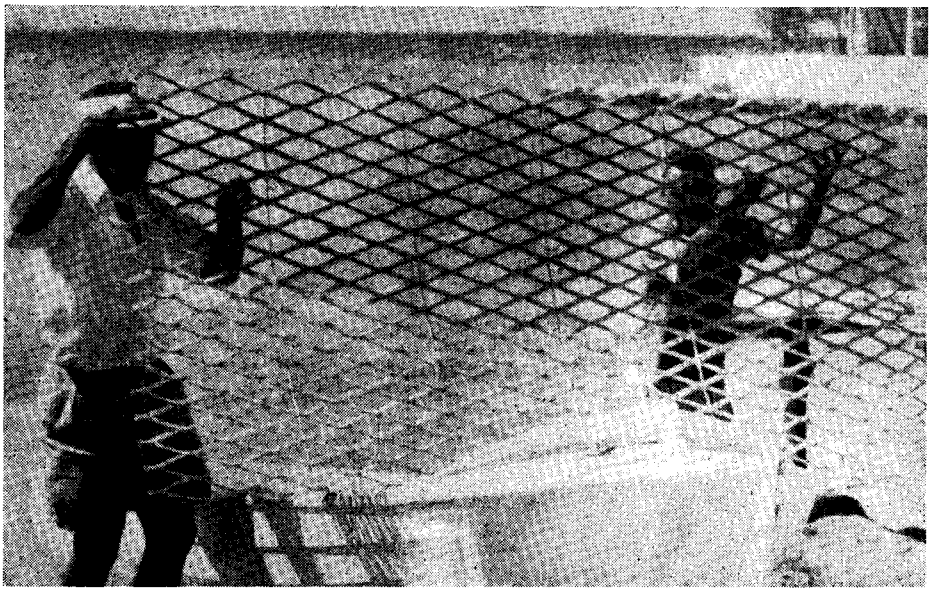
The first suspended type was made of sheets of Durabestos, one foot square, grouped into frames. There were two frames each of ten squares, one of eight, one of six and one of two.

The second suspended type of collector was made by lacing together three sheets of expanded metal (three sheets, because no single sheet could be obtained with apertures sufficiently small) suitably treated—as was everything else used—to resist salt water.

The third suspended type of collector was a chain of thirty-six paua shells strung on a stainless steel wire and separated one from another by means of bamboo and lead.

In order to ensure the presence of oyster spat, three wire frame cages were





Left: A wire frame cage containing live pearl shell graded for size. It is being transferred by canoe to the raft site. Note that the live shells are kept below the surface of the water. Above: One of the three sheets of expanded metal which were laced together and suspended from the bottom of the raft to act as a spat collector.

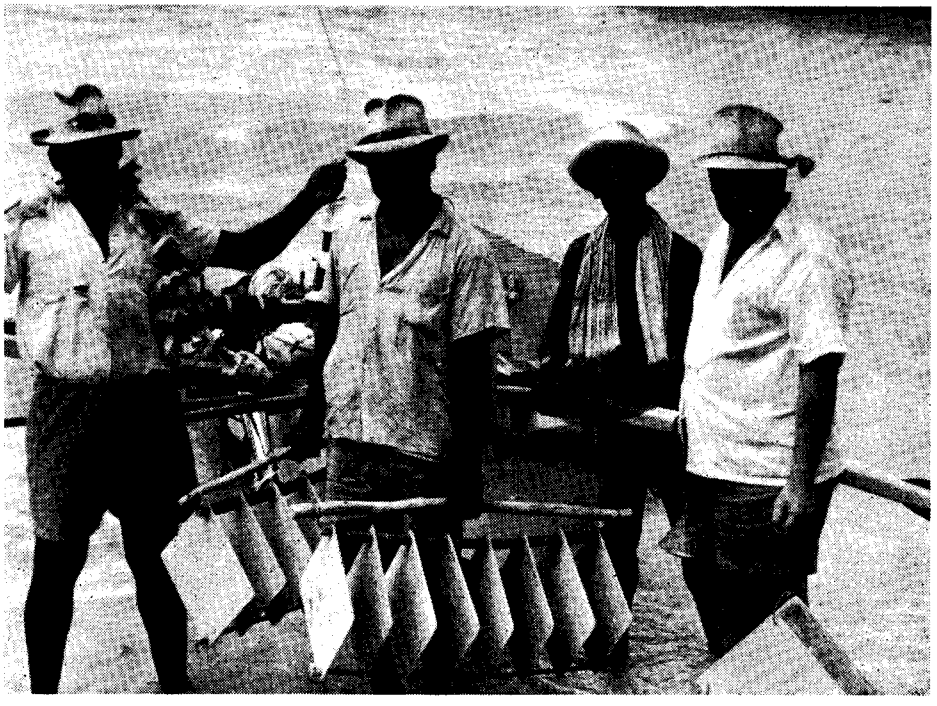
made, 3′ x 4½′ x 2½′, and covered with fine mesh wire, a door occupying one end of each. Live pearl shells were then collected and graded. Shells 2″ across were placed in the first cage, 3″ across in the second, and 4″ across in the third. These cages were placed on the lagoon bottom below the raft.

As well as providing spat, it will be possible to check the growth rate of the live shells from time to time by examining the contents of the cages.

The fourth type of collector—cement tiles—was placed in the lagoon below the raft, starting at three fathoms on coral heads and going down to eight fathoms.

Probably it will be several years before the full results can be assessed of the experiment now under way. Observations will be necessary at fixed intervals, and great patience and care must be exercised to obtain the best results.

Mr. Powell carried out other tests and made other examinations in Manihiki lagoon. As a result he expressed the opinion that without doubt the lagoon had been fished down to a very low level and it would be unwise to do any heavy fishing in it again for at least another year. He considers the Lagoon must be well covered and a much heavier settlement of young shell found again before it will be safe to say that the shell population is high enough to start intensive fishing.



Squares of asbestos wallboard spaced with bamboo and lead and grouped into racks as spat collectors.

LOW-INCOME HOUSING IN FIJI

Low-Income Housing is the title of a report on a visit to investigate low-cost housing schemes, made to the West Indies early in 1958 by Mr. K. R. Bain, Secretary of the Fiji Housing Authority, which was set up in January, 1957, to provide homes for workers in low income groups.

The report is divided into six parts: I—The Background; II—Housing in the West Indies; III—Regional Housing Organization; IV—Aided Self-Help Housing; V—Building Societies; VI—Fiji; Recommendations for Low Income Housing Policy.

Some of the recommendations in the last part are already being implemented by the Housing Authority, which is now engaged in carrying out a construction programme on an area of 43 acres of Crown land in Suva.

Though prepared for Fiji, Mr. Bain's report contains much of value for those working in his field in other territories.

LOW-INCOME HOUSING: Report of a visit to the West Indies to Investigate Housing Scheme for Wage-earners in the Low Income Group, January-March, 1958. By K. R. Bain. Legislative Council of Fiji: Council Paper No. 12 of 1958. Government Press, Suva. Price 2/6.