

Ioapa Marsters, who assisted in the transplanting operation, holds some of the pearl shell planted in Rakahanga lagoon in 1955 by Mr. van Pel, Fisheries Officer to the South Pacific Commission.

Pearl Shell Transfer In The Cook Islands

Last September an experiment took place in the Cook Group that could prove of great commercial significance to all Pacific islands where suitable conditions exist for the growing of pearl shell. It was the transplanting of some two thousand live pearl shells from Manihiki to Pukapuka and Rakahanga lagoons. The transfer was made under the supervision of Mr. Ronald Powell, of Rarotonga, who describes below how it was carried out.

By RONALD POWELL*



THE very lucrative pearl shell industry of the Cook Islands is centred on the lagoon island of Manihiki. As this small atoll has yielded nearly £500,000 during the last five years, it seemed worth while to find out whether pearl shell could be

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grown in other atolls of the Cook Group. In the latter there are over 120,000 acres of lagoon water, much of which could be suitable for growing pearl shell, trochus or sponges.

It is known that the Japanese have transplanted pearl shell successfully. Once established it needs only a minimum of attention, while it yields a hand-

some reward for the man with the physique to dive to the required depth. The price of pearl shell has risen steadily during the last ten years, due to a universal shortage of shell, for over-fishing seems to have depleted most of the world's pearling beds. The trochus shell industry seems to have run a parallel course.



Above: Two Manihiki divers wearing wooden goggles show typical clusters of pearl shell. These shells were brought into shallow water a few days before the "Charlotte Donald" arrived. Right: Loading the shells under water into half-drums, which were then brought ashore.



Above: The shell was re-packed into other drums, each of which was covered with palm fronds and carried across the island. At this stage the shell had to travel in a minimum of water. Right: When the ship arrived the drums, which had been sunk in shallow water on the outer reef at Manihiki, were rowed out to the ship six at a time for loading.

Very little is known about past transfers of live pearl shell in the South Pacific region, though it is well known that Lever Brothers *did* transfer some gold-lipped shell from Torres Straits to Suwarrow Lagoon early in the century. Although this venture was not a financial success at the time, due to a devastating hurricane and a World War, the shell did survive, and some excellent gold-lipped shell has been fished there last year.

Little information is available about the methods used for this successful transfer over such a distance. All other attempts within the Group have failed, mainly because the distances are too great to carry the shell without a continuous sea-water circulating system.

During September 1956 I carried out a transfer of live pearl shell (*Pinctada Margaritifera*) from Manihiki to both Rakahanga and Pukapuka, at the request of the Cook Islands Administration. Mr. van Pel of the South Pacific Commission was to have carried out this work during the time he was in the Cook Group in 1955, but it was not found possible to arrange for a suitable local vessel to make this passage in the course of a normal trading voyage. He did, however, transfer some 300 shells across to Rakahanga by keeping the water continuously changed by draw buckets.

Continuous Sea-Water Circulating System

When he left the Group he gave instructions which later enabled us to construct a tank fitted with six wire-netting trays, and the pipes and valves required to keep sea water in circulation. Several difficulties were encountered, and the final fitting had to be left until we were sure of the particular vessel which could carry this gear. Three times it was all assembled during the following year but each time the vessel was re-routed.

Finally the *Charlotte Donald* of Messrs. A. B. Donald Ltd. was due to sail on this route, and the tank and fittings were installed aboard her. The owners were unwilling to have holes bored through the ship, so the pipes, tank and engine were all installed with blocks and wedges. The gasoline engine, direct-coupled to a centrifugal pump, was installed three feet above the deck and a cover made to protect it from rain and spray. The intake pipe was finally braced against the side of the ship with wires leading fore and aft. This was all made up so that it could be re-assembled in Manihiki.

There was still some doubt about the large area of copper sheathing which covered the bottom of the ship. It was known that small quantities of copper could kill pearl shell, but it was a risk which had to be taken. (We found after only four days' immersion alongside this area of copper that the galvanized pipe became badly pitted, while the flexible wire and galvanized fittings were so corroded they had to be discarded.)

We called in at Palmerston Island on the way north, and I was fortunate in having Ioapa Marsters with me for the duration of the passage. (We are now attending the South Pacific Commission's fisheries training course in Nouméa.)

Then, when everything was ready, an epidemic of influenza laid the people of Manihiki low, and it seemed for a while there might be no one available to collect the pearl shell from the lagoon in time. It was not until a few days before the arrival of the *Charlotte Donald* that enough small shell could be collected and stored in shallow water against the arrival of the ship. This was done by people of the villages of Tukao and Tauhunu.

Particular care had to be taken in collecting shell for this transfer. Nor-

mally shells are torn off the rock without worrying about any damage to the foot hairs, or byssus. However, once the latter is badly damaged it is unlikely that the oyster will be able to re-attach itself before it dies.

The shells we selected varied in size from about three to five inches. Shell was chosen which was still firmly attached to pieces of dead coral, tridacna shell or another pearl shell.

Further Consignment To Rakahanga

As the *Charlotte Donald* was making another passage across to Rakahanga we took the opportunity to transfer a further consignment of shell across, as Mr. van Pel had done. We were very keen to see how the shell he had planted had survived the past twelve months. Rakahanga Lagoon is quite different from Manihiki, although the two islands are only about thirty miles apart. Being almost landlocked there is not the same flow of water through it and the general appearance of the coral, fish and marine life is quite different.

The local people were not very optimistic about the chances of success of this transfer, and were offered so many conflicting opinions, all in good faith, that it became obvious that we would have to make our own survey. It was with some doubt that we looked for the first shell. Two local divers were engaged and, wearing their small wooden spectacles, they swam down quite easily in the chosen area.

Their first effort was successful, and they brought up a stone from ten fathoms which had three quite large shells attached to it. These had nearly doubled in size in the past twelve months.

As by using a waterbox it was not difficult to follow the movements of these divers in the clear water after the first dive, we were content for them to

point out the other clusters of shell, which all showed healthy growth. They spent some time looking for shells which might have died. These generally show up well in clear water, but they could find none at all.

We planted a further 380 shells in this same area, which varied in depth from six to ten fathoms. When we returned to Rakahanga village later we found the people were very interested in these results. They will keep us informed when the first young shell is noticed in the area.

The Transfer From Manihiki

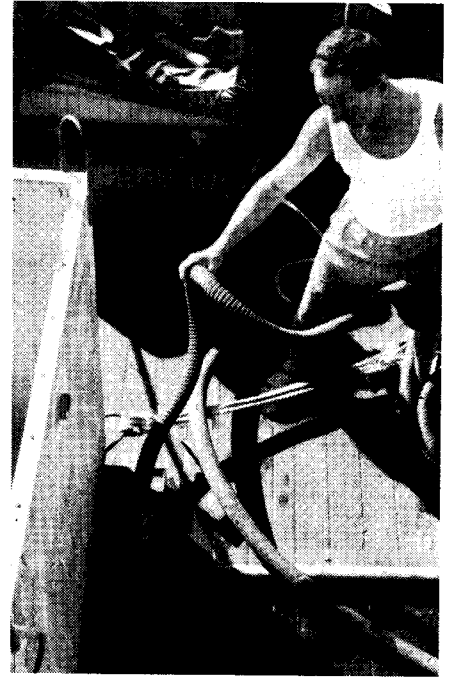
We returned that night to Manihiki and the following morning at daybreak started to get our gear assembled. The best of the young shell was loaded into half-drums slung on poles, each being carried by two men across the island. Here the shell was again submerged in shallow water until it could be carried out over the reef to the ship.

On board, the pumping gear was rigged, the tanks well scrubbed out, and finally the shell brought aboard and loaded into the six trays. Full, the tank held about 1,200 shells. A further 400 were carried in the half-drums, which we stowed alongside the large tank. With each roll of the ship the surplus water in the tank overflowed, and by changing the drums round continually we kept the water fresh in them too. The motor ran well for four days, being stopped only for re-fuelling and oil changing.

At Pukapuka the shell was sent ashore in the half-drums. Fortunately the reef landing was good, and the shell was all carried in and left in shallow water overnight.

The following morning two whale-

The author making the connection between the sea water intake pipe and the pump by a length of 2-inch armoured suction hose.



Trial Trochus Planting Also

boats were manned and the shell was loaded into six half-drums in each boat. At this stage it was practically impossible to keep the water changed but the drums were covered over with palm fronds and the boats rowed to an area near Motu Ko.

This place was selected as being the most sheltered spot the Island Council members could find, but it has very poor bottom for planting shell. The lagoon is deep, from ten to twenty fathoms in parts, but there are large patches of brittle coral which has overgrown the Tridacna clams in many places.

A compromise had to be made, and with the help of a Manihikian diver we finally located some good ground where there was plenty of dead coral and shells and Tridacna clams already growing. The shell was planted in depths of from six to ten fathoms. Out of about 1,600 shells, only four failed to survive the passage.

Pukapuka has always had good yellow shells, but they always grow singly and are so uncommon that many of the natives did not think they existed at all. I understand that shell had been worked in this lagoon at the beginning of this century, but whether it died out from overfishing very small beds or was destroyed by a hurricane is not known.

If the shells we transplanted take hold and survive the next twelve months they may form the nucleus of a pearl shell industry for the island. Naturally, however, it will take many years before they can be fished commercially.

Mr. van Pel has also recommended a trial planting of trochus shell in Aitutaki, where the lagoon is apparently too shallow for the growth of pearl shell. At the time of writing, arrangements have been made to transfer an experimental batch of trochus to Aitutaki by air. If this first test is successful more will be added later, and a colony established.

Our tests have shown that trochus shells can withstand forty-eight hours out of water. Transferring them from Fiji to Aitutaki should not be very difficult. We look forward with keen interest to this next transfer, which may mean much to the Cook Islands.



Above: After the first tray had been placed in the tank the latter was filled with shell, which was kept just awash with sea water. Right: When the last tray was loaded the water was allowed to rise to the top of the tank and the bottom valve was so adjusted that a steady flow of water passed downward through the trays. Along with the overflow from the top caused by the rolling of the ship, it was then directed into the extra drums shown in the bottom right-hand corner. The palm fronds at left were brought from Manihiki to cover the tank.