Although the pearl shell industry in the Northern Cook Islands has been lucrative during the past ten years, very little is known about the optimum conditions of shell growth and many other apparently simple factors on which the continuation and development of the pearl shell grounds depend. Certainly more knowledge is needed before they can be extended.

The SPC Quarterly Bulletin for January 1959 carried a description of the preliminary work started in 1958. This comprised laying out collectors, checking the settlement of spat each month, and estimating the maturity of the gonads of regular monthly samples of oysters. An attempt was made to estimate the growth rate by laying out wire cages in which measured shells were planted.

Little information was available to us when this work was started, and it soon became apparent that a more scientific approach to the problem was necessary before accurate data could be assembled from these preliminary trials.

Marine Biologist Makes Special Study

During 1959 the South Pacific Commission and the New Zealand Government assisted with this project. The former body arranged with the Commonwealth Scientific and Industrial Research Organization in Australia for the services of a marine biologist, Mr. J. S. Hynd, to be made available to us for a period of three months.

Mr. Hynd is the Director of the Fisheries Laboratory at Thursday Island, where the C.S.I.R.O. has been working on a similar project with the Australian goldlip shell (Pinctada maxima J.). His scientific papers are well known, and he was able to bring to bear a lot of sound practical experience gained in the Torres Strait area which will make our present project much simpler and the results more quickly available.

Mr. Hynd arrived in Rarotonga early in April, 1959, and much of the collecting gear was made in Rarotonga just before we left on the M.V. Dobirri later in the same month for Manihiki.

Manihiki is a coral atoll in lat. 10° S., long. 161° W. At first sight most people gain the impression that it is similar to hundreds of other atolls in the eastern Pacific. Whether in fact this is so is now very doubtful.

The climate during most of the year is excellent, with a steady easterly trade wind and a lagoon temperature of close to 85°F. The trades blow quite strongly at times, and there is generally a heavy surf on the weather side of the atoll, but as there is no deep break in the reef there is practically no current in the lagoon. How these conditions affect the water in the lagoon and allow pearl shell to grow so prolifically has not yet been determined.

Spat Collection Difficult

During the first year’s work in 1958 the problem of collecting spat proved difficult. Readers may have read of the work which was done at the beginning of this century by the late C. Crossland, who succeeded in growing pearl shell commercially in the Red Sea. The

Extreme left: One of the new spat collectors made to Mr. Hynd’s design. Each comprises twelve standard frames three feet square made of timber covered with wire netting, the latter being coated with a mixture of sand, cement, and “flintkote”. Left: “Aging” collectors.
Japanese have also succeeded in growing pearl shell on collectors, and it appeared that this might have been comparatively easy in Manihiki. In practice it has since been found that the spat of *P. maculata* are much more numerous than the spat of *P. margaritifera* (the blacklip oyster). The difficulty will be to separate the two varieties.

**New Collectors Built**

Last year, new collectors were built to Mr. Hynd's design. These are made up of units of twelve standard frames. Each frame is three feet square, and is made of timber covered with wire netting, the latter being coated with a mixture of sand, cement and "flintkote". The frames are assembled with long tie rods which allow them to be taken apart easily for the counting of the spat.

The collectors were made up in pairs, and were hung from the same raft that was used in the previous experiments. One pair was hung at the surface, a second pair was suspended on rods at seven fathoms, while a third pair was laid on two concrete beams on the bottom in sixteen fathoms. An area of good shell bottom was chosen.

Mr. Don Bryan, the Resident Agent in Manihiki, has taken a keen interest in the project, and his lagoon assistant, Tekake Williams, who is the best skin diver in the Cook Group, soon learned the practical side of all the work undertaken. Tekake found no difficulty in laying out the concrete beams and attaching the collectors in sixteen fathoms by skin diving. He worked at that depth so easily and so often—apparently without much effort—that there was no difficulty in believing that he had gathered shell quite often from several twenty-fathom patches by skin diving.

**Collectors Changed Every Month**

These collectors are changed every month, and the spat counted. A further fifty shells will be gathered from the
lagoon and the gonads examined and "staged" for maturity. The gonads will be preserved in Bouin's Fluid and blocks cut from them which will be further checked microscopically in Australia each month.

Fifteen hundred shells were collected both by skin and machine divers. These covered the full range of shell that is available above the twenty-fathom curve. Full measurements — twenty-eight per shell — were recorded, nearly 42,000 measurements being taken in all.

When these have been analysed statistically, much data will be available, and it will be possible to determine the best age at which to fish the shell without depleting the stock. This will be a big improvement on the present system of over-fishing, alternated by completely closing the lagoon for several years to effect a recovery.

"The earlier difficulty of devising a practical way of measuring shell has now been overcome, and a new approach to the problem of growth adopted.

In 1958, we planted shell in cages. However, it was found that it does not grow very well under these conditions: in fact, a number of shells were actually smaller at the end of a year than they were when first planted. This surprising condition was caused by the handling which stopped the growth process without killing the shell. A new growth process then started inside the old one, and the shell then appears smaller as the old growth breaks off.

**Thousand Shells Measured And Tagged**

This year a thousand shells were measured and tagged with small serially-numbered plastic tags, attached with stainless steel wire. The shells were then spaced out on nylon ropes. Instead of being hung from the raft the ropes were anchored separately. A glass buoy two fathoms under the surface keeps the nylon tight. This has the advantage that it avoids the continual movement that comes from a raft pitching in rough water. These shells will all be measured again in twelve months.

We found that there had been a remarkable re-growth of shell, although in 1958 the lagoon seemed to have been almost fished out. The new shell appeared to come from the shell stock below the twenty-fathom curve, which is beyond the range of both skin and machine divers. But although there is obviously much young spat in the lagoon, it is difficult to find until it reaches nearly 3". We hunted underwater by skin diving and with the machine suit, but there is no way to tell whether it is present or not, although the visibility under water is exceptionally good.

**Hydrographic Survey Carried Out**

To attempt to estimate the present shell population of the lagoon it was necessary to know how much "good shell bottom" existed. Local knowledge here proved very unsatisfactory, and it soon became obvious that no one really knew what area of the lagoon could be fished as no chart had ever been made.

We started a hydrographic survey and covered roughly one-third of the lagoon area, taking widely-spaced soundings over the other two-thirds as well. It appears that about half the lagoon is beyond the reach of hand-operated diving machines. It will be necessary to know whether the shell does grow much below twenty fathoms, and it is hoped that some assistance may be available from the Royal New Zealand Navy in 1960.

Shell samples taken from this deep water, rather than from the area affected by fishing, would give more information on the natural mortality rate.

It will be interesting to know more about such conditions as the change in salinity which possibly occurs in a deep basin with but little tidal flow, and where high evaporation takes place. The oxygen content, the change in temperature with depth, and the many related factors which make this a good shell-producing lagoon will all be valuable information which we hope to gather in 1960.

Commission Reviews Work Programme (Continued from page 26)

The Commission's fisheries officers will continue to visit territories as requested, and to supply technical information and advice on marine and inland fisheries. They will also continue the introduction and study of fish species suitable for inland waters of the region.

The Commission will invite the Food and Agriculture Organization to collaborate with it in 1961 in running a sub-regional training course, either in Papua and New Guinea or the British Solomon Islands, on fishing methods, fish preservation, care of nets, and use of small, powered fishing vessels. The possibility of holding similar courses later in 1961 in other parts of the region will also be investigated.

**Nutrition And Diet**

Last February a nutrition economist from Manila, Miss Manuela G. Mamba, arrived in Nouméa to work for one year on the Commission's nutrition programme, now directed towards the practical application of the results of the Commission's earlier research on nutrition of Pacific island peoples.

Miss Mamba visited Fiji for discussions with nutrition specialists of the South Pacific Health Service, and has since studied nutrition problems in the United States Trust Territory of the Pacific Islands, Papua and New Guinea, and Netherlands New Guinea. Her main task is to suggest ways of gearing local food production to suit the nutritional needs of the people.

**Research Council Meeting In 1960**

The health members of the Commission's expert advisory body, the Research Council, will meet in 1960. They will give special attention to public health, health education, mosquito-borne diseases, nutrition and tuberculosis. Two specialist consultants, one in the field of nutrition, the other in that of public health, will be invited to attend.

**New Commission Appointments**

During the twentieth session, the appointment was announced of Dr. T. K. Abbott as executive officer for health, succeeding Dr. Emile Massai, who retired last April after ten years of service with the Commission. Dr. Abbott's last post was that of Assistant Director of Medical Services in the Department of Public Health, Papua and New Guinea.

At the closing meeting on October 23, the chairman paid high tribute to the work of Dr. A. H. J. Kroon, retiring executive officer for economic development, during his seven years with the Commission. He was succeeded by Dr. Jacques Barrau, previously SPC plant introduction officer.