

Land Plant Studies

1. Mapping, description and discussion of the plant communities of the northeastern half of Rongelap Island has been completed by James D. Kimmel and accepted as a Master's Thesis at Ohio State University.
2. A Key to the land plants of Rongelap Atoll has been prepared for use by the nonbiologist as well as the botanist. It is revised where appropriate following each field trip.
3. Food plants have received priority in analyses. A complete radiochemical analysis for gamma and beta emitters has been completed for all Pandanus and Tacca (arrowroot) samples collected.  $Cs^{137}$ ,  $Mn^{54}$ , and  $Zn^{65}$  have also been determined in Breadfruit, Squash and Coconut samples.  $Sr^{90}$  analyses of these samples are in progress.

$Cs^{137}$  is the predominant isotope in all plants accounting for 70% - 99% of the total activity.  $Sr^{90}$  accounts for all or most of the remaining activity.  $Mn^{54}$ ,  $Zn^{65}$ , and  $Ce^{144}$  are found in minute amounts ( $\leq 1\%$  of the  $Cs^{137}$  activity) in plants from the more highly radioactive northern islands.
4. All plant samples collected through 1959 have been counted for gross beta activity. There are definite geographical and species

differences in levels of activity but no obvious seasonal variations or changes with time.

5. The mobility of  $Cs^{137}$  and  $Sr^{90}$  have an important bearing on sampling. Results of the 1958 collections and greenhouse tests indicated a marked difference in  $Sr^{90}$ ,  $Cs^{137}$ , potassium and calcium content of terminal and basal leaves. Wherever possible the 1959 collections have included both terminal and basal leaves.  $Cs^{137}$  moves into the terminal leaves more readily than  $Sr^{90}$  and appears to be less mobile than potassium. Material has been collected but analyses remain to be done to determine possible effects of potassium content of the various soils in this regard. Fertilization plots and greenhouse tests indicate a depression of  $Cs^{137}$  uptake with the addition of potassium. However, a similar depression has been observed with nitrogen and phosphorus amendments.

6. Wherever possible plant samples are taken in the immediate vicinity of the soil plots. Certain trees have also been marked so that repeated collections can be made from the same individual.

7. In conjunction with the soils studies greenhouse tests have been conducted using Rongelap soils and various amendments. Fertilizer plots have been established in the field in both uncultivated and cultivated areas. Mr. Niel Morriss, Trust Territory Agricultur-  
alist, has been especially cooperative in establishing plots in a

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coconut plantation.

8. Seeds of various plants have been collected and germination tested in the greenhouse at Seattle. It is hoped that some of these plants may prove suitable for study of radiation effects (note: it is not proposed that such studies be undertaken at the University of Washington. Dr. Sparrow, BNL has verbally expressed interest in running such experiments).

Seedlings of Messerschmidia argentea are currently being tested for salinity tolerance in Na Cl solutions at 0.5, 3, 10 and 20 atmospheres.

9. A search for atypical plants was made at most islands in September 1959. Photographs were taken of the atypical plants found.

Multiheaded or branched coconut palms were found at Naen and Yugui islands. A single double headed palm about three feet high was observed at Jabwan on this south end of Rongelap Island. This was said by the natives to have been caused by mechanical damage. In a visit to Seattle in September 1960, Mr. Niel Morriss, Trust Territory Agriculturalist reported finding two multiheaded palms at Ujelang Atoll, which lies southwest of Eniwetok Atoll.

Twisted fronds were found on Rongelap, Kabelle, Gejen, Lomvilal, Yugui, Aerik and Naen Islands. They occurred with much greater frequency on the northernmost islands which received the most fallout.

Dying coconut palms were found wherever coconut trees were found but again with greater frequency at the northern islands.

Tapering stem or "pencil point" was observed wherever there were coconuts but most notably at Eniaetok and the northern islands (Eniaetok is about midway on the island chain in a north-south line).

Dead or partially dead Suriana, Guettarda, Scaevola, Messerschmidia, and pemphis were notably more prevalent at the northern islands. However, apparently typical plants were also growing nearby.

A strikingly aberrant plant of Messerschmidia was found on a sand spit at Lomvilal Island. The plant was largely defoliate with a few small, chlorotic terminal leaves.

In general the vegetation at the northern islands was in poorer condition than along the eastern chain and in the south. The northern islands received about ten times the amount of fallout as the southern islands. It is tempting therefore to attribute the differences in the plants to radiation effects. While it is probable that there have been some radiation effects it also seems probable that other factors have had perhaps a greater effect.

The best soils of the northern islands are much less well developed than in other parts of the Atoll. For example, the average per cent nitrogen in the best soil type in the northern islands is 0.26 while it is 0.57 and 1.71 in the prevalent soils of other islands.

This would also indicate that there has been more sparse vegetation in the north for some considerable period of time. There is evidence of recent washing over of portions of the islands, particularly at Lomvilal.

All of the conditions seen in the coconut palm have been reported in the literature from other parts of the world (cf. K.P.V. Menon, and K. M. Pandalai. The Coconut Palm, a monograph, Indian Central Coconut Committee, Ernakulam - S. India, 195 p.).

It seems clear that the only reasonable way of assessing radiation effects alone on atoll vegetation is by controlled experiments.