N.Z. ECOLOGICAL SOCIETY

Report of Second Annual Meeting

The second annual meeting of the New Zealand Ecological Society was held in the Biology Block, Victoria University College, Wellington, on Thursday and Friday, May 21st and 22nd, 1953. About 100 members from all parts of New Zealand were present. As in the previous year most of the programme was devoted to discussions on topics of general interest, opened by invited speakers. These topics were "Biological Communities" on the first day, and "The Ecological Significance of the North Island Ash Showers" on the second morning. The final afternoon was made available for contributed papers on a variety of topics. The formal Annual General Meeting was held on the first evening, and was followed by supper and a display of exhibits. On the Saturday after the meeting a well-attended excursion was made to places of ecological interest in the Wellington area.

Biological Communities

Chairman — Dr. W. M. Hamilton

The Historical Factor in Plant Communities

Dr. W. R. Philipson

The history of any botanical community is often as important in explaining its composition as are the environmental factors which form the normal study of ecology. So the ecologist will need to consider problems of plant-distribution, just as the plant-geographer must take into account the ecological requirements of the species.

In a study of a collection of plants made in a rain-forest in central Colombia it became evident that the community could be broken down into a number of geographical elements. Some plants spread far into the Amazon forest, some were confined to the Andean slopes, some ranged north into Central America, and so on.

The most interesting element was a small group of plants characteristic of certain abrupt and isolated mountain systems which stretch across the northern part of South America. They separate the water-systems of the Orinoco and the Amazon, and lie in the Guianas, Venezuela and Colombia. These mountains have been found to have certain floristic resemblances, and as they are all eroded remnants of a former continuous plateau, the attractive theory has been suggested that their floras resemble each other because they are residues of a former widespread plateau flora, now immeasurably reduced.

The mountain system visited was the most westerly of these remnants, close against the Andes, and separated by six hundred miles from the nearest peaks in Venezuela. The discovery of some of the characteristic plateau plants growing here suggested at first that the theory of remnants had been vindicated: but the habitat in which they were growing—dry and crumbling sandstone cliffs—made me doubt if their peculiar distribution was in fact due to historical causes, as the theory would require, and wonder whether it was not due to now-existing ecological effects.

For example, one genus of ferns is known to occur in three places; on Mt. Roraima in Guiana, on Mt. Duida in Venezuela, and on the mountains I visited in Colombia. Between these latter two stations, at least, the country is uniformly flat, with no outcrops of sandstone or other rock, and is covered by two ecological communities, the savana and the rain-forest. Perhaps these ferns occur wherever their requirements are fulfilled, and should not be regarded as static relics of a former vegetation.

That the ecological rather than the historical explanation may be correct, in this case, is suggested by another fern growing on the same sandstone cliffs. It has an even greater dis-

continuity in its distribution, for it is found elsewhere only over 2000 miles away on dry sandstone hills well to the south of the mouth of the Amazon and close to the Atlantic seaboard. The hill systems of south-east Brazil have no common history with those that cap the Guiana Shield, so it seems likely that the fern has spread from one of its stations to the other, there being no place in between which would be suitable to its establishment. Its distribution, therefore, seems to be dictated by its ecological requirements.

Another example drawn from the Amazonian forest may serve to illustrate the opposite relationship between ecology and plant geography. If you fly over this forest the first impression of flat uniformity is soon lost. Three distinct ecological communities can soon be recognized: each is dependent, principally, on the water content of the soil. First, there is the country bordering the watercourses, which is subject to long periods of inundation. Light reflected up from the water can sometimes be seen between the crowns of the trees and the colour of the canopy is greener and its texture different because of the abundance of palms. Secondly, there is the predominant mass of forest, which grows on *terra firma,* or dry land. Thirdly, oddly shaped greyish patches of forest mark areas where a reduced and thorny forest, or *catinga,* grows. Here the soil is so porous that the abundant rainfall is ineffective and rain-forest cannot develop.

There are considerable floristic differences between these three forest types, but the principal woody plants in each tend to belong to the same genera. To take one example only: *Heveas* occupy an important position in each. The true rubber tree, *Hevea brasiliensis,* occurs in the inundated forest where its buoyant seeds are well distributed. On the firmer land *Hevea guianensis* is an important tree from the Atlantic to the Andes. The genus is represented in the dry *catinga* by a shrubby and deciduous species, *Hevea rigidifolia.*

The impression left is that an originally uniform vegetation has become diversified in harmony with diverse habitats. The geological history of the region may bear this out. The continuous plateau of Cretaceous sandstone which I have described previously bordered an inland sea or lake. As this was eroded and the lake silted up to form the Amazon basin, the vegetation may be pictured as descending from the sandstone and invading the new alluvial soil. It is interesting that on the grounds of comparative morphology the most primitive species of *Hevea* is *H. rigidifolia,* which still occupies the area of Cretaceous sandstone.

The tallest trees are all distributed exceedingly sparsely. In a transect of a forest fifteen miles long, I encountered several of these gigantic trees, but rarely came upon the same species more than two or three times. At least three species, all tall trees, were encountered once only. In contrast the smaller trees were relatively abundant, and the shrubs and herbs often sub-gregarious. The large, widely-scattered trees, however, are all widespread species, while many of the smaller trees are local. This significant difference between the ranges of the tallest trees and those of the canopy and lower-storey trees may be due to different dispersal mechanisms, but it may also reflect different rates of evolution due to the considerable differences in the duration of a generation in a medium-sized and a lofty tree.

These features of the Amazon rain-forest illustrate the importance of the past history of any community. The presence or absence of particular species may be explicable on purely ecological grounds, but equally may be due to circumstances no longer operative. A limited experience of New Zealand vegetation suggests that this may be particularly true of some of the communities found here, where the boundaries between important types appear to be unstable. It may be that the present distribution of our forests is not governed by present conditions, but is dictated by the past.

Moreover, in a comparatively isolated land mass like New Zealand, the composition of the flora is determined in part by immigrations which may have taken place by chance. An examination of our flora will show how many families and genera are represented by single or a few species, and that most of these are woody plants with relatives in the tropics. It is possible that these plants are comparatively recent immigrants which have reached New Zealand independently of the main mass of the vegetation of their origin. That the flora of New Zealand is such a mosaic of elements may explain why the study of geographical relationships has always flourished.

The complexity of the forest I have been considering leads me to my final brief theme. There is a greater complexity of organisms and a greater interdependence between them in a part of the community which we are apt to overlook. The micro-biology of the soil is a field of which ecologists are well aware, and which they are increasingly taking into account in their studies. Nevertheless, it still forms a distinct field of study because the methods required are so specialised that they are not available to the general ecologist.