

## Discussion

A. P. DRUCE said the speakers were aware of the importance of the concept of habitats, but it was apparent that marine and freshwater ecologists were far ahead of land ecologists since they based their habitat classification on the physical environment. Dr. Forster based his habitat classification on vegetation, but what is the habitat, say, of tussock grassland? Reference must eventually be made to the physical environment, but difficulties arise where there is apparently one habitat on physical criteria but more than one distinct community. For land environments the actual communities must be considered together with physical factors.

K. E. LEE said he was taking part in a project directed at measuring the physical and chemical changes in soil in relation to climate. The measurements were only relative and it is not possible to measure precisely any physical characteristic of soil or climate except as it applies to one specific point which must be chosen and is not necessarily typical of a larger area. This is probably true not only of the soil environment.

DR. M. MAYER referred to Mr. Dell's distinction between descriptive and interpretative classification. Description is insufficient. No two habitats are identical and generalisation, which is necessary in any classification, is interpretative.

MR. DRUCE thought that the aim of classification was to classify places in order to get a clear picture of what grows there. Floristic similarity is only suitable for small areas but floristically dissimilar communities may have other common characteristics. Dr. Philipson mentioned communities in New Zealand and Southern France, physiognomically similar but floristically different; the habitats could be compared despite the floristic differences. Dr. Forster referred to animals tightly bound to a specific habitat (river bed, forest floor) so that the habitat could be described in terms of those animals alone. This concept is termed fidelity.

DR. PHILIPSON agreed that patterns of vegetation are most important, but similarity of pattern often masked great differences.

For plants, which are mostly stationary, the environment of a species might be defined but it would be necessary to treat each species separately. For animals the problem would be more difficult.

MR. DRUCE said that a species sometimes developed differently in different habitats. Botanists can readily locate and define the plants in their habitats, but for zoologists the problem is more difficult. Some definition of a habitat independent of the community concept is required.

MISS L. B. MOORE thought a classification which would draw together similar habitats in different countries was needed. Animal forms related to similar plant life-forms may have some characters in common; for example, similar flying or sucking organisms may be common to such similar habitats. The similarity in fauna between beech and rain forest was peculiar since the two types of forest had few species in common.

DR. FORSTER said that there is a certain difference connected with food plants, but in the forest community as a whole there is uniformity, particularly in the leaf mould fauna. Probably if the animals were larger greater differences might be found, but for small animals moisture seems to be very important and their range of food materials may be very wide.

DR. R. H. THORNTON, referring to micro-organisms, said that except for some fungi, there is generally no geographical limitation. A single cellulose fibre might provide a suitable environment.

DR. R. A. FALLA questioned Dr. Forster's assertion that the habitat classifier in New Zealand is forced to use the invertebrate fauna. He thought that birds and reptiles, which are reasonably well known, might be used.

DR. FORSTER thought birds were not very useful; most are forest dwellers, some are sub-alpine, but there are few open country birds. There are some restricted to riverbeds. We have some very typical bush lizards, tree lizards and so on, from bush to

open country, but they cannot be used as indicators of habitats.

MR. DRUCE disagreed with Dr. Forster's statement that open country was ephemeral compared with forest. Both types have existed for a long period.

DR. FORSTER said he had not meant to give this impression. It is possible that grasslands in particular areas have not been as permanent as forests. The forest seems to be a reservoir for forms which have populated open country and there is no very distinctive open country fauna.

T. RINEY asked Mr. Allen what was the difference between his concept of "habitat" and the generally accepted definition of "ecological niche."

MR. ALLEN replied that he did not know the generally accepted definition of "ecological niche." His concept of a habitat is a place where an animal lives. It supplies the animal with its requirements and does not present any conditions it cannot tolerate.

MR. DELL said that "habitat" could be as wide or as narrow as was required.

DR. PHILIPSON said he recognized two distinct meanings of the word habitat. Environment could be subdivided into small parcels called habitats. An animal may not always live there; if it does then it is that animal's habitat. Classification may be approached from the other end. He believed that it was better to stick to the organism and define its habitat. Some creatures have complicated life histories; their habitat includes their whole life cycle and a definition would be difficult. Some animals, for instance a bird of prey, might live in very different circumstances in one day.

A. M. BURNET appealed for a consideration of the physiological angle. There may be an optimum of, say, temperature, but an animal may tolerate a range of temperatures around the optimum. If all the optimum conditions were described that would be a description of the habitat. At the other extreme, where an animal is living beyond its optimum, description from physical characteristics would cover a range of possible ecological niches which the animal could inhabit more or less successfully.

MR. ALLEN said that there must be, within the range of an individual animal, all the conditions that it needed throughout its life cycle.

DR. J. H. DARWIN said that though most features of an animal's environment are not measurable, a number of them are, and, by measuring different sets of conditions under which it survives, one might achieve some sort of function of the conditions as a basis for classification.

J. T. HOLLOWAY, called on to sum up the discussion, said that all would agree that we envisage a habitat classification for our own particular species and purposes. Probably none of us would wish to apply someone else's methods to his own problems. The discussion of the meaning of the term habitat shows a lack of any fundamental agreement as to what people are after. The main point is what is the use of a common classification. The perfect classification would be very useful, but probably could not be obtained without resorting to a complicated terminology, which would be most undesirable. He felt it was completely impracticable in view of our own human limitations.

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