

THE STUDY OF PLANT-GEOGRAPHY.

RONALD GOOD.

Plant-geography, that is to say the study of the manner in which plants are distributed over the world's surface, has strong claims to be regarded as the oldest of all botanical interests. The character of vegetation has always been one of the chief environmental determinants and the differences observable in plant life from place to place must have been one of the very first features of his surroundings to make an impression upon the wakening intelligence of early man. At first no doubt the impression was but slight, but as the human race multiplied and became more precise in its requirements so the limitations imposed by the distribution of plants became rapidly intensified. Above all it became the directional control when the pressure of human numbers set in motion that endless series of migrations that form the main fabric of human history.

How this control may be effective is seen well in the early history of our own country. A great band of chalk uplands runs like a rampart almost the whole length of England and is flanked on either side by wide areas of marshy lowlands. These latter were covered, in the ancient days, by dense forest, and formed an almost insurmountable obstacle to human penetration. The chalk on the other hand bore a predominantly grass vegetation, which offered no such difficulties. It is therefore not surprising that the first cultures of England are largely confined to this chalk belt and that hundreds of years elapsed before the descendants of these earlier peoples were sufficiently sure of themselves and of their powers to enter and colonise the lowlands.

Actually the importance of the chalk grasslands was two-fold. Not only did they afford an oasis of country suitable for human settlement, but, by their outline and direction, provided a path for human movement far into the north of the country. Thus to the vegetation of the chalk is largely due the great development of some of the ancient British races, and but for it the history, and perhaps the destinies, of the land we now call England might have been very different.

From a more scientific point of view also plant-geography was one of the first subjects to receive attention because of the great differences of the flora and vegetation of various parts of the world recorded by the earlier world-navigators and explorers. Thus began the first phase of scientific plant-geography, the description of floristic and vegetational types and the plotting of the distributions of these and of the chief kinds of plants over the surface of the world as a whole. The painting of this picture of world vegetation, as it may be described, was naturally a long process, and moreover one whose completion had necessarily to await the fulfilment of geographical exploration, and it is in fact still being painted, although more recent work may be justly regarded as giving the finishing touches.

As the more purely descriptive part of plant-geography became more fully understood and more familiar, interest began to shift towards the ecological side, that is to say increasing attention came to be paid to the study of the *conditions* under which different plants occur, and the environments which they occupy. In short, botanists began to consider, not only where certain plants are to be found, but why they are to be found there. This initiated what may be called the second or modern phase of plant-geography. Its aim is to paint, not a picture of vegetation, but one, as complete as possible, of the conditions and factors which determine whether or not a plant shall be found growing naturally in a particular spot—a picture of the causes which underlie the geographical presence and absence of plant species.

As in so many other aspects of human knowledge and activities, the change has been from the extensive to the intensive. A single person may be able to describe the world vegetation fairly adequately, but it is certainly beyond the powers of one individual, and indeed beyond his span of life, to study it all in any appreciable detail. More intensive attacks must be made on a more limited front, and hence it is that much of the most recent work takes the form of detailed investigations into the distribution of plants over comparatively small areas.

But within this intensive work there are still the two aspects, geographical and ecological, and they are very closely connected in the sense that without the former the latter can hardly be considered. To put the point rather differently, it is essential to know what the habitat and environment of a plant is before it can be studied, and this can only be determined when it is known exactly where the plant is to be found. A detailed knowledge of actual distribution is therefore an essential preliminary to any consideration of the reasons for it. The effects must be studied before suggestions can be made as to their causes. Studies in plant-geography therefore involve two quite distinct processes, the first being the collection of adequately detailed information about the actual distribution of the species or other group which is the subject of investigation, and second, the elucidation of the conditions associated with this distribution. It is especially with regard to this double nature of the work that this article has been written.

The love of flowers is a well-known and often-quoted trait of the Englishman, and this trait commonly finds expression either in gardening or in a particular interest in wild plants, and it is perhaps true to say that the number of those who take a real and intelligent interest in their native flora is greater in England than in any other country. Nowhere does the amateur botanist flourish more.

Unfortunately many aspects of botany require so much equipment and such a knowledge of scientific matters in general as to make their study possible only to professional botanists. On the other hand, some aspects of the subject are particularly suitable for amateur study, but for reasons not altogether clear this has been interpreted in the past in rather a narrow sense, and amateur work has been in fact prac-

tically confined to systematic botany, and the British flora has been studied almost exclusively on this basis.

The study of systematics is as essential to the science of botany as a whole as is any other of its constituent parts, but from the point of view of the British field botanist it has one rather serious handicap. This is that the flora of Britain, and even more so of individual counties, is small, and anyone with sufficient leisure and interest can in a fairly short time reach a stage of familiarity with it and a point at which fresh fields of interest are needed, and it usually happens in these circumstances that the person concerned either begins to specialise on one particular group or genus or else leaves botany for some other pursuit.

The study of plant-geography, especially in its narrower sense, affords an alternative to either of these courses. Our intensive knowledge of the distribution of plants, however complete our extensive knowledge may be, is still very incomplete, and until we know more about this problem of "where" the subsequent problem of "why" cannot be properly attacked.

It is just with regard to the collection of this detailed distributional knowledge that the amateur field botanist is in a particularly favourable position. On the one hand, such work does not require expensive equipment nor specialised knowledge; on the other hand, it does need a working knowledge of the British flora, time and opportunity. This difference is more often than not the difference in situation between the professional and the amateur botanist, and the three requisites mentioned are precisely those most often possessed by the latter. To familiarity with the British flora there should perhaps be added familiarity with maps and map-reading, which is easily acquired: time needs no explanation: opportunity is chiefly that provided by residence in suitable country districts.

It cannot be too much stressed that those possessing these advantages can do a great deal of work on geographical lines which is of real scientific value, and likely to be of the greatest assistance to research workers less favourably situated. The question is how can this work best be done and what are the most pressing problems awaiting investigation? The answer is that there are so many lines open that a decision as to which shall be followed may be made almost entirely a matter of personal inclination. Almost the only general principle to be borne in mind is that the available area should be utilized to the best possible advantage, and that the work chosen should be such as can be most appropriately undertaken in the local conditions. If transport is no problem it may well consist of tracing out the distribution of a number of species over one and the same region so that they can be compared accurately on a geographical basis. A large scale study on these lines is at present being carried out by the writer in the County of Dorset. The distributions of as many species as possible are being traced out over the whole county, which is very varied, and maps are gradually being prepared of these distributions in such a way that they may

be easily and accurately compared. This is being done in the anticipation that this comparison will, when complete, present the geographical differences between the species in such a way as to throw considerable light on the actual factors which are responsible for them. More work of this kind, and it can be done both conveniently and satisfactorily on a much smaller scale, is badly needed. It would, for instance, later on be illuminating to compare the distributions of certain species in Dorset with distributions of the same species in some other English county where the external conditions are very different. Work of this kind can also be done on a parish scale and in different parts of one county.

Alternatively the distribution of a single species over a given area can be worked out in detail. For example, in almost every county there occur specific limits, that is to say lines beyond which a species does not extend, and some counties like those of the North Midlands are especially rich in this way. Where *exactly* do these specific lines run? What really are the limits of the species and how do they compare with conditions within the area?

More intensive methods are equally promising. Very little is known about the constitution of plant populations. In a patch of wood, for instance, how exactly are the different constituent species distributed? Why are some dominant, others local, and still others merely occasional? What are likely to be the factors of importance in determining the ultimate competition between species? The queries are almost endless, and so imperfect is our knowledge that almost any collection of ordered facts will add to it.

Another and rather different direction in which the resident country botanist has special opportunities is in making perennial observations. For many reasons this work is seldom touched and offers a wide field. To take but one point. To what extent do the ranges of species vary from year to year, and what may be the causes of this?

To continue further in this strain is unnecessary, and quite enough has been said to show how much there is to do and how easily something of worth can be done. In short, plant-geography is, in many ways, an ideal subject of study for the amateur botanist who loves wild plants not only for their own sake, but also as a means of scientific expression. In it he will find scope for all those inclinations and interests which attract him to the more purely scientific side of botany, but, in addition, he will find in it an enormous and almost virgin field of investigation and a pursuit in which the acquisition of useful knowledge is almost unlimited.

If the hopes of the writer are realized and this short account of plant-geography and its possibilities as a study induces some of those who read this article to take up its pursuit, he will be only too glad of the opportunity of giving any other information on the subject that may be desired.