

produced. The discussion was confined to social processes in existing communities, and nothing whatever was said about any historical considerations. It may be assumed that in dealing with 'culture-change', which was his main theme, Dr. Firth would not consider that the historical evidence of contact between European and non-European peoples in the past few centuries is entirely irrelevant, but he certainly implied that the evidence of earlier 'culture-changes', including all in the archaeological sphere, might be disregarded by the student of the modern problem.

If social anthropology is restricted in this way, then there is obviously a gap in the system. Who is to study the world-wide history and development of social institutions? British anthropologists of earlier generations supposed that this is the major task of the social anthropologist, so that he would make contact with the archaeologist on one side, and on the other he would interpret existing forms in terms of evidence of a historical kind. Generalizations regarding these matters which were widely accepted at one time have since been discredited. It may be supposed that a revolt against 'evolutionary' theories of social development was one of the factors which made many social anthropologists concentrate on the study of existing societies; and it may be suggested that neglect of historical evidence makes them less anthropologists and more students of comparative sociology. This would have been the conclusion of their predecessors.

Another, and more decisive, factor which may be presumed to have disposed social anthropologists of the modern school to neglect historical evidence has been the desire to make their researches applicable immediately to practical affairs. In recent years appreciation of the value of applications of knowledge gained by students of the life of 'primitive' peoples has been increasing. In his address to the anthropologists at their centenary meeting, Lord Hailey said that those concerned with Colonial affairs feel that study of the way in which social groups originated has little relevance to administrative problems. But they have far more interest in the recently developed anthropological school which concerns itself not with the origins but with the way in which the groups function. Lord Hailey advocated the encouragement of this school in our universities in the interests of the Colonial Service. But if their numbers and resources are not augmented, there is a danger that all the energy of the academic workers in question might be absorbed in dealing with the practical need. It may be suggested, in the interests of science, that if the Colonial or any other Government Service expects to receive such assistance, then it should be prepared to pay for it, either by subsidizing universities for the purpose, or else by founding a State-controlled institute. If this is not done, the gain to the State will be a cultural loss to the country.

The same issue between pure and applied anthropology has affected the physical branch of the subject. Some students of it—particularly in the United States—have devoted themselves to problems having an immediate bearing on practical questions. In so far as such researches are not intended to throw light on any historical topic, it may be questioned whether they can rightly be called anthropological. Alternatively, they may be supposed to come within the scope of human or social biology, or human genetics, or eugenics. In Sweden the issue has been

resolved in a satisfactory way: "The Swedish State Institute for Race Biology"—to which title "Human Genetics" was added later—was established in 1921. Its first major activity was an anthropometric survey of 47,000 conscripts. The satisfaction of the anthropologist in seeing a type of research which he initiated carried out in such a way must be entirely unqualified.

At the meeting with which this article deals, Prof. Forde remarked that a centenary celebration may be considered as a ritual death and rebirth. It is a time for taking stock of the past and preparing plans for the future. It may be suggested that there are two matters which the Royal Anthropological Institute might well consider at the present juncture. The first concerns the definition of the science of anthropology as a whole, and of the branches into which it can be most conveniently divided in this age of specialization. The relations between these branches might be considered at the same time. The second matter concerns the applications of the science to practical affairs, and the general policy of the academic workers concerned regarding the allocation of their resources to further practical needs, on one hand, and the progress of their 'pure' science, on the other.

GEOGRAPHY AND INTERNATIONAL SETTLEMENT

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INTEREST in the contribution of geography to knowledge has been greatly stimulated through the influence of war. It is realized that the organization of the war effort in Great Britain depends on a very careful estimate of the resources of all the belligerent powers. Moreover, in preparation for peace, the planning of community life in its proper relation to environment is now accepted as worthy of serious study. At the next peace conference statesmen will undertake a vast experiment in political geography. The framework of frontiers which they then erect will prove its worth in so far as it meets local needs within the boundary zones and at the same time promotes equilibrium in international relations.

In the application of political geography to the study of international affairs the following arguments, briefly outlined, emerge:

(1) Geography establishes a close relationship between types of human organization and their environments; and the particular objective of political geography is an investigation of the extent to which the nature of States, together with their organization and interrelations, is influenced by, and adjusted to, conditions of geography.

(2) The political pattern of the world is subject to ceaseless modification, and for two main reasons: (a) The factors of physical environment on which the pattern largely depends are themselves subject to processes of change which are beyond man's control. Thus, to take an illustration from the Middle East of the Old World, desiccation of climate in past times had the effect of destroying the prosperity of States, and, indeed, of denuding whole regions of all organized life. (b) In the political, as also in the social and economic, evolution of mankind—the adjustment of life in all its varied manifestations—to environ-

ment is itself in process of continuous change. This adjustment is, in part, a conscious selection by man of opportunities offered by Nature. It is not solely a matter of geographical influence, much less of geography acting as an agent of determinism. Man assists in designing his own environment, and does so in the light of experience and of his estimate of the opportunities which the physical environment has to offer. Thus the stage of civilization reached is a factor of primary importance in shaping the character of the adjustment. Moreover, the communities of mankind greatly vary in their methods of response to environment, although care is taken not to attempt a comparison between peoples in respect of their innate capacities. Such an investigation is certainly not for the geographer.

(3) The interrelations of States become ever closer—though not necessarily more sympathetic—as man surmounts the geographical difficulties of distance, climate and terrain. Political isolation is impossible to-day, as all States have been brought to realize.

At times of political re-settlement, such as the period now approaching, the geographical basis of frontiers and their justification receive unusually thorough investigation. It is then realized that the boundaries which divide the sovereign States of Europe are instruments of regional partition which have no sanction in geography. Frontiers in geography are rare, and almost everywhere there is transition from one set of environmental conditions of climate, land-form and vegetation—summarized by Herbertson in the term 'natural region'—to another of contrasted characteristics. Moreover, transition is not confined to the physical environment of man. As all his organized activities—in settlement, economic production, State-building, etc.—are influenced by physical geography, the characteristics of one type of civilization associated with a particular region merge with those of a neighbour-type. Such mergence is at times in defiance of political frontiers which, over long periods, are unable to prevent—though they tend to hinder—the spread of cultural influences from one country to another.

As no sanction for frontiers is found in geography, the term 'natural frontier' cannot claim geographical validity. It is most commonly employed in a military context, and to the soldier signifies a boundary which, of those available, is the most likely to provide an adequate line of defence. Until the advent of air warfare the crest of a mountain-range was considered to be the ideal 'natural frontier'; but configuration is not the only environmental feature which might be the basis of natural divisions. Equally natural would be a line defining the limits of nationality. Similarly, the limit of a coal-field or some other industrial zone is entitled to be termed 'natural'. Obviously, any such line is selected for, and justified by, the particular end which the boundary commissioners have in view, but that is not to say that it is endorsed by geography.

As the world is a whole made up of interrelated parts, political frontiers, however 'natural', are artificial lines of division which obstruct inter-regional co-operation, their purpose being to partition what to Nature is indivisible. Through their influence adjacent peoples are turned away from association with each other, and are led to exaggerate the usually small ethnological and cultural differences which distinguish them. Moreover, as they correspond

more with political ideals than with geographical realities they may be opposed to a satisfactory economic and social adjustment of the community to its environment.

In a Europe of rival sovereignties devotion to frontiers arises mainly through lack of confidence in any safeguard of social and political security other than military defence; and the defence of frontiers is intended to be a guarantee both of the inviolability of individual States and of the stability of the political balance as a whole. There is, however, no possibility of dividing from each other the peoples of the great middle zone of Europe by frontiers which exactly define their limits. The widespread intermingling of populations of various ethnic and cultural origins, which is characteristic of European society, had already occurred before the partition of Europe into nation-States fixed the population of the Continent by restricting inter-regional migration. Further, there is no geographical correspondence between the distribution of nationalities and the distribution of the regions within which population is concentrated. The welfare of the Continent depends on an economic integration of its regions, similar to the economic integration which the United States have attained; but at the same time the autonomy of Europe's many nationally-conscious communities must be preserved. Only on such a basis does European equilibrium seem possible.

If ever the European system of sovereign States should be replaced by the United States of Europe, the nations would relinquish much of their individual claim to sovereignty, while retaining cultural and administrative autonomy. Boundaries would still be required for the purposes of administration, as they are required, for example, in the federations of the Dominion of Canada and the Union of South Africa. Once the idea of national sovereignty is removed from the concept of frontiers, they cease to be the main source of international dispute, and changes affecting them become matters of comparatively simple local adjustment. The principles on which boundary demarcation would then be effected would have more to do with the economic and social welfare of mankind than with the claims of nationalism.

The need of the world is less a partition of territories between the Powers according to this or that formula than an ordered redistribution of population within the habitable regions of the world. The present congestion of certain lands and the emptiness of others does not correspond to the distribution of the world's potential resources. There are vast areas within the temperate and tropical zones the climate, soil and vegetation of which are favourable to human life, but which still lie fallow. Their frontiers are closed to settlement for a variety of reasons, among them the desire for racial exclusiveness and the intention to protect certain economic standards against the intrusion of peoples of low material level. On the other hand, there are large areas of the Old World where densities exceed a thousand persons to the square mile, and where standards of life are greatly depressed by extreme pressure on the available land. Such pressure is, in many instances, increasing because of a prolific birth-rate. In countries where congestion is very acute, not only internal administration but foreign policy also is affected, and the harmony of international society is endangered. Unilateral efforts on the part of individual States to ease the situation within their own borders

cannot be more than partially effective, and the normal outflow of emigrants in search of new homes is prevented by frontier restrictions, which had become increasingly prohibitive before the War. The settlement of the empty, or half-empty, but habitable lands and a corresponding reduction of density in the congested areas, constitute the supreme task of planning now confronting the world. It is a problem to which the geographers should pay continuous attention.

The demands for 'living-space' raised aggressively by Germany are not derived from an objective study of society and environment. Compared with a number of other countries—some of which she has claimed the right to annex—Germany is not overcrowded. Moreover, it could be shown that the natural endowment of German soil is not inferior to the average for Europe as a whole, and that applied science is capable of raising the productiveness of the more sparsely populated districts of Germany to enable them to support much higher densities without overcrowding.

An unscientific attitude towards 'race', with absurd claims of 'Aryan' superiority and intolerance of their neighbours, combine to explain the German demands for *Lebensraum*. Given the type of mental discipline inculcated by the Nazi creed, such demands are inevitably justified by a philosophy of determinism, which is the sanction of Germany's bid for world hegemony. So is explained the emergence of the pseudo-science of *Geopolitik*, which is little more than the prostitution of the ideas of political geography to the ends of a selfish nation.

It is not on the strictly scientific side of geography—concerned with the accurate location and relationships of phenomena in terrestrial space—that German education requires fundamental revision. Their cartographical, geomorphological and climatological disciplines have nothing to learn from us, and in such respects, it must be admitted, their contribution is not excelled by any other nation. But the Germans have long been under the influence of a mystical conception of the destiny of the Teutonic peoples and of the intention of Providence to grant them a dominating position in Euro-Asia. Their geographical perspective may be unsound; but its error is slight compared with the distortions to which history and anthropology are victims in the hands of Nazi scholarship.

In Great Britain there is little possibility of geographical investigation being tainted with the excessive determinism of the politico-geographical school of Haushofer and his associates. The contacts of British geographers with the Continental philosophers of the subject have shown more appreciation of the enlightened doctrine of Vidal de la Blache—with its insistence on man's freedom of initiative—than of any other. The influence of the German school has been relatively slight; indeed, it is doubtful if the best geographical work in Germany from the time of Ritter and von Humboldt onwards has been adequately studied in Great Britain. So strong has been the refutation by British scholarship of conceptions of economic and geographic determinism, since they were introduced from the Continent by the historian Buckle and others, that the most distinguished of our geographers cannot be charged with proposing any causal relationship between environment and man's aspirations. (This deserves to be known so as to correct an impression which may have been left by a contribution to *NATURE*, 147, 546;

1941.) There is now the possibility that, in constant danger of the charge of materialism as they are, geographers may omit to state with sufficient confidence their conception of the scope and aims of their subject.

SPATIAL ISOLATION OF SEED CROPS

By GORDON HASKELL

THE sudden increase in the acreage of seed crops in Great Britain has brought with it a number of problems. One of the major problems confronting the seed grower is that of reducing to a minimum the amount of contamination of one crop by pollen from an adjacent one.

There are two methods of tackling this. Zoning is now in force for Chenopods, namely, sugar beet, garden beet and mangels, and is shortly to come into force for Brassicas in the Essex seed-growing areas. The second and more usual way of reducing cross-pollination is by spatial isolation, that is, by isolating the crops at certain guaranteed distances from each other. The following account is a survey of recent investigations to determine the safe isolation distances for the vegetable seed crops of Great Britain¹.

Bees are the chief agents of dispersing pollen of *Brassica oleracea* plants, and wind also carries the pollen of kale and kohlrabi. This necessitates keeping crops of any two members of the same Brassica group² at a considerable distance apart. A spatial isolation of two miles is common, and sometimes only one mile for cabbages and kale. Recent experiments at the John Innes Horticultural Institution³ indicate that under natural conditions no crossing, or perhaps slight, occurs beyond 80 ft. intervals between radish plots. The usual isolation is not less than 40 rods. Tedin⁴, working in Sweden, investigated the danger of crossing in turnip seed production. At 27 yd. between crops he obtained a 1 per cent contamination, and there was no perceptible fall in this value for wider separating distances. Tedin decided that the wind was responsible for carrying this small amount of pollen and that a certain number of insects making long flights could also have transmitted it.

With the exception of the broad bean, the Leguminosæ do not require large isolation distances. Soy beans give between 1–2 per cent natural cross-pollination in the field. But crossing between plants of alternate rows is only 0.16 per cent⁵. The recent work of H. Crebert⁶ has shown that broad beans undergo 7 per cent outcrossing in the field and breeders in Great Britain experience 5–10 per cent natural crossing in their crops. Evidence of the correct spatial isolation is not available. Cross-pollination of french beans is effected by thrips, which often occur inside the flowers⁷. Barrons⁸, working in Alabama, found that at 9 yd. apart there was only 2.63 per cent natural crossing in the common bean. In England seed growers consider that in most varieties of beans the cross-pollination is negligible; seedsmen do not generally ask their growers to isolate fields of different varieties. Peas are considered to be self-fertile and only a short distance is required to protect them against crossing. A separation of crops by 40 rods assures complete elimination of cross-pollination.

Investigations on outcrossing among members of the Umbelliferae lag behind those of other groups. It is customary to allow half a mile between different