

of Western Europe) is to convey to the small firms generally a sense of the urgent need for a technological approach to the problems with which they are confronted. That, indeed, must be a first step before there can be any significant change in the situation in which, after allowing for the differences in the sizes of the labour forces and the population of the two countries, the United States are turning out and employing three times as many scientists and technologists as Great Britain. It should be taken while the plans for the expansion of technological education are being completed and put into operation, so that the demand is effective by the time the increased output of trained men is available.

The debate in the House of Lords gives a clear lead to the Government as to what is required and the urgency of the whole matter. Nor was the Government left in any doubt that the measures required will be costly, and that sacrifices will have to be made elsewhere in the national economy if anything effective is to be achieved. Success will not be attained by taking some of the £20 millions already allotted to the universities for the next quinquennium. On this point Lord Cherwell did not give the assurance for which Lord Falmouth had asked. None the less, the Government cannot fail to have noted the perspective in which the whole problem was placed in this debate, or the way in which it was urged that science and invention are unlikely to be harnessed as effectively as our international position demands while fiscal policy curbs so strongly pertinacity and initiative in industrial development. That the debate contributed little that is new does not make it any the less useful a stimulus to the constructive thought required on the part of Government, industry and the universities if an adequate policy for technological education and research is to be formulated and effectively implemented. The debate is also valuable for its contribution to the task of public education, which the Advisory Council on Scientific Policy has recommended as a prelude to the formation of a climate of opinion favourable to the effective utilization of science in industry.

## THE AMERICAN GEOGRAPHICAL SOCIETY

### Geography in the Making

The American Geographical Society, 1851-1951. By John Kirtland Wright. Pp. xxi + 437 + 31 plates. (New York: American Geographical Society, 1952.) 5 dollars.

THE nineteenth century was a time of great voyages and striking discoveries in all parts of the world. Huge areas of Africa, Asia, America and most of the polar regions were unknown and were a lure to adventurers, prospectors, traders and colonists. The civilized world was eager for knowledge of remote and unfamiliar lands and seas. Both in Britain and the United States, wealthy men were willing to subsidize journeys that promised gain in trade and raw materials. Africa and the polar regions were special attractions to both sides of the Atlantic. The natural outcome was the grouping of these interests into geographical societies in both London and New York.

In its early days, the American Geographical Society was interested mainly in exploration, statistics and descriptions of new lands. Patrons were not wanting, and the Society grew in numbers and influence, and as quickly gave the impetus to American geography. It has had only some three directors in its life-time, and each has made marked impressions on its activities, especially the twenty years of Isaiah Bowman, who was appointed early in the First World War. Bowman tried to apply geographical thought to outstanding human problems. His was no narrow view of geography, and he was not concerned with defining and limiting its scope. One of his avowed aims was an intensified search for authors who would present geography in its diversity. He changed the *Bulletin*, the Society's publication, to the *Geographical Review*, broadened its scope and increased its originality, without reducing its value. In fact, it became one of the chief geographical publications of the day and did much to raise the value of the geographical outlook and the dignity of the subject. But Bowman did more. He started the preparation of research monographs covering a wide field, and, most ambitious of all, the Million Map of Latin America. This was in conformity with the International Million Map and covered 107 sheets. It took twenty-five years to compile the first edition, of which 61 sheets were published during Bowman's administration. The cost was close on half a million dollars.

The Society has no narrow outlook; it has adhered to a few simple leading principles, and has never accepted the doctrine that a sharp line should be drawn between geography and what is not geography, or that its interests should be confined within an academic definition of the subject. It may well claim to have raised the standard of achievement in geography in the past hundred years.

The book under notice, a heavy volume of nearly 500 pages, goes into details concerning the work of most of the officials connected with the Society. It is copiously documented, has a long list of publications and is illustrated by many portraits of officials and other geographers. It is a story of American geography as well as the life-history of the American Geographical Society [see also p. 98].

## EXTENSIONS OF THERMODYNAMICS

### Thermodynamics of Irreversible Processes

By Prof. S. R. de Groot. (Selected Topics in Modern Physics, 3.) Pp. xvi + 242. (Amsterdam: North-Holland Publishing Co.; New York: Interscience Publishers, Inc., 1951.) 17.50 f.

THE laws of 'reversible' thermodynamics lead to relationships between the 'equilibrium' properties of substances, for example, specific heats, compressibility, coefficient of expansion, etc., such relationships following from the consideration that small disturbances of an assembly in equilibrium can, in principle, be regarded as reversible. These deductions can ultimately be justified by appeals to statistical mechanics—that is, they are consequences of the fact that a macroscopic assembly contains a very large number of atoms. It was long regarded as certain that similar relationships between transport coefficients, for example, heat conductivity, diffusivity, etc., could be found from general con-