

principle of dilatancy provides a key to the construction of force diagrams. Nevertheless, Hudson emphasizes the complex character of packings as opposed to the ordered structures of crystallography and the random assemblies of statistical mechanics, and implies the impossibility of deriving a satisfactory theory of packings as an extension of the geometry of ideal ordered or disordered arrangements of equal spheres.

Foraminifera

To British marine zoologists, more particularly those dealing with the North Sea area, Hans Högländ's work on the foraminifera in the Gullmar Fjord and the Skagerak (*Zool. Bidrag f. Uppsala*, 26; 1947) should prove very useful. While it includes only thirteen families of the Foraminifera it has reached formidable size, for in it are discussed in detail 133 species and varieties, and the remaining families are likely to contain nearly as many forms. It is fortunate that the author has had access to Gcös' material, for it formed the basis of our knowledge of the Foraminifera in this area. Since the publication of Gcös' work more than fifty years ago, a great deal has been done on this group with much alteration of classification and taxonomy. In classification, Högländ has adopted a somewhat conservative attitude and has based his upon that of Cushman (1933), but he has been more drastic in the matter of nomenclature. Where the data appeared adequate the work has been carried out quantitatively, and here striking differences resulting from various collecting techniques are manifest. As an example, we have one form, *Bulimina fusiformis*, where the core sampler gave a total of 5,500 specimens and the corresponding sledge-net sample gave only thirty. It is interesting to note that the author was attracted to the study of this group from the ecological point of view, but soon realized that ecology must be based upon sound identification and taxonomy: hence the 32 splendid plates and the 303 figures which illustrate the range of variation within what the author regards as valid species.

Scientific Research in India

A REPORT has been issued, in the *Proceedings of the National Institute of Sciences of India* (11, Pt. 4, 161-370), of a symposium on the centralization of scientific research in India, held on July 23, 1945, which was opened by the president of the Institute, Mr. D. N. Wadia. Mr. Wadia, after referring to the necessity of taking into account the effect of a central policy on the work of various scientific institutions in India, emphasized the benefits likely to accrue from a central organisation for scientific research. Central direction should not involve too much interference or loss of independence in the pursuit of science. Dr. J. A. Dunn supported the liaison and co-ordination of research by a single member and department of a central government as the only course which could be wisely pursued, but he was not in favour of the whole of the country's research being brought under one department. He outlined a scheme for a central council for scientific and industrial research, with provincial and State councils, a committee of central scientific departments and other boards and committees as required. Dr. A. C. Ukil advocated the co-ordination of researches but without power of interference with the findings of the National Research Council, which should be the

supreme central body to organise research throughout the country; no Government department, he said, should be allowed to maintain its separate research section, independent of the guidance of that Council.

Prof. J. N. Mukherjee also emphasized that the different units dealing with various aspects of research need not all be under one authority; centralization of scientific research should not mean centralized control under one government department. The autonomy of universities and other non-official institutions should not be circumscribed. Prof. M. N. Saha strongly supported Prof. Hill's scheme, as did Prof. P. C. Mahalanobis, with some warning on the danger of bureaucracy and departmentalism creeping in. He urged that the National Institute should press for the fullest possible association with the work of the proposed department of the learned societies, universities and scientific institutions. Prof. S. P. Agharkar thought that the real difficulties in India were encountered at the policy-making level. Dr. G. J. Fowler set forth points for and against centralization and urged the need for care lest organisation crippled individual initiative. Dr. Nazir Ahmad indicated some practical difficulties, but supported the co-ordination of research so as to avoid overlapping, to accelerate the pace of research and to use and to train talent to the best advantage. Dr. J. N. Roy considered that the National Institute of Sciences should concern itself solely with the availability of adequate funds for scientific research, and that the question of organisation was outside its sphere. A report of the symposium is being sent to all Departments of the Government of India with an expression of opinion from the fellows of the Institute as to the necessity of there being one Department of the Government of India concerned with the formulation of policy, determination of priority and administration of all funds earmarked for scientific research.

Radio and Electrical Research in Canada

THE National Research Council of Canada has announced the formation of a Radio and Electrical Engineering Division under Mr. B. G. Ballard. This new Division is a consolidation of work formerly carried on in the Division of Physics and Electrical Engineering, and has become necessary on account of the great expansion of research activities in the fields of electronics and electrical engineering consequent upon the advances in radio and related techniques during recent years. There are at present some 230 members of staff in the Division, including about fifty scientific personnel, and their work includes various aspects of radar, radio-physics, high-voltage electrical engineering, and the general application of electronics for military as well as for civil purposes.

Mr. Ballard, the new director of the Division, after graduating from Queen's University, Canada, obtained five years industrial experience with the Westinghouse Electric and Manufacturing Co. at East Pittsburgh. He joined the staff of the National Research Council in 1930, and has been engaged continuously in radio and electrical engineering research. His activities during the War were largely devoted to the development of mine-sweepers for enemy magnetic mines and the protection of ships against these mines; in recognition of his contributions in this field, Mr. Ballard was made an O.B.E. in 1946.