leading to compare materials having different effects. It is also most dangerous to predict the toxicity of the materials by chemical analogy.

In presenting the second section of the paper, Dr. Gage pointed out that, unlike studies of atmospheric pollution in towns, the nature of the hazardous material is usually known within the factory. He stated that the requirements of a method for general use in a factory are that it should be unobtrusive, inexpensive and self-contained; it should give an immediate result and be sufficiently simple to be used by a laboratory assistant or foreman. Also, it has to be adequately accurate and specific. Sampling equipment of this type is particularly suitable for the testing of air purity before men are permitted to enter a tank or enclosed space. Dr. Gage outlined the main types of methods available and gave a demonstration of an indicator tube for carbon monoxide; this is a very simple procedure which he thinks should be extended to other gases. Reference was made to more complex instrumental methods—for example, the mercury vapour detector using ultra-violet light absorption, or the infra-red analyser which could be used for a number of different materials. These instruments are capable of giving a written record of atmospheric concentrations over a long period of time and can be designed to give an automatic warning if safe limits are exceeded, but their use in occupational hygiene is limited.

Dr. B. M. Wright, of the Pneumoconiosis Research Unit, presented a paper entitled "The Measurement of Dust Exposure for the Control of Pneumoconiosis", in which he said that it is essential to study both the incidence and severity of pneumoconiosis and the level of exposure to dust. The former is affected by the duration of the exposure and the concentration and composition of the dust. Once a relationship is established, then the safe limit will depend on what incidence and severity of pneumoconiosis is considered permissible. To make such studies possible, it is essential that general agreement should be reached on the methods of making the measurements, and then these methods will have to be applied on a wide scale.

The only instrument in common use that enables an estimate to be made of the concentration of respirable dust (between 5 and 1 μ in size) is the thermal precipitator. This collects the dust without breaking up aggregates but, owing to its comparatively short sampling period, its use becomes exceedingly laborious when long-term exposures are to be determined. The essential requirements of a suitable sampling instrument are: to enable an estimate to be made of the concentration and composition of airborne dust particles and aggregates in the respirable size-range; to yield a sample which can be assessed reasonably easily and accurately; to be capable of integrating its exposure over at least one working week; and to be cheap, robust, light, portable, self-contained and automatic. Until such an instrument has been produced and used over a period of many years, safe limits of dust exposure cannot be established with any precision. After his lecture, Dr. Wright displayed several new pieces of sampling apparatus, including a double aspirator for the thermal precipitator, an automatic sedimentation cell, and a selective mass-sampler. He said he hoped that the latter two instruments would make it possible to assess the level of exposure more accurately and less laboriously than has been possible hitherto.

Dr. W. G. Marley, head of the Division of Health Physics, Atomic Energy Research Establishment, Harwell, read a paper on "Permissible Levels of Exposure to Ionizing Radiations and Radioactive Materials". At the beginning of his paper he said that, with the introduction of a wide range of isotopes and the ever-increasing use of equipment emitting X-rays and gamma-rays, it has become necessary to re-examine early information on permissible levels of exposure and to extend their applicability. At the 1953 meeting of the International Congress of Radiology, the International Commission on Radiological Protection drew up a list of recommended values for the maximum permissible body burden of a wide range of isotopes, and of the corresponding levels in air and drinking-water. This is soon to be published. Dr. Marley discussed the derivation of some of these recommended values. From prolonged and wide experience of X-rays and gamma-rays, it has been possible to arrive at a basic tolerance of 0.3 r./week in the tissue, which corresponds in certain circumstances to approximately 0.5 r./week measured with back-scatter on the surface of the body. Experience of radium ingestion by radium dial painters has enabled another basic tolerance to be set, namely, 0.1 μ gm. radium fixed in the skeleton, and this is thought to be safe over a working lifetime.

By making allowance for the 'relative biological effectiveness' of the different types of radiation or isotopes, it has been possible to determine permissible levels of exposure to a wide range of substances. The 'relative biological effectiveness' is usually determined from animal experiments, but there is also a limited experience arising from accidental exposure of men. Parameters that affect the calculation of permissible levels include the fractional uptake from lungs or gut, the metabolism of the element, the organ of concentration, the biological half-life and the overall relative toxicity. The recommended levels are based on occupational exposures, when only a small fraction of the population are exposed. Dr. Marley stressed that, should an appreciable part of the whole inbreeding population be exposed, then genetic effects would have to be considered. He also discussed the effects of exposure, either by accident or in an emergency, to much more intense radiation for short periods.

R. J. SHERWOOD

DISTRIBUTION MAPS OF THE BRITISH FLORA

THE British Isles are probably as well known botanically as anywhere on the earth's surface; the long unbroken tradition of field botany as a hobby, traceable from the seventeenth century, has resulted in the accumulation of a mass of information on the occurrence of higher plant species, much of which has been systematized during the past hundred years on the 'vice-county' recording system due to H. C. Watson. This system, which constituted an important advance in the recording of plant distribution at the time of its inception in 1852, has naturally revealed inadequacies since that time, and at a conference in 1950 the Botanical Society of the British Isles reviewed the whole question of aims and methods in the study of distribution of British plants, in the light of the requirements of modern botanical research. At this conference recent methods of mapping in use in other countries were discussed,

and Prof. A. R. Clapham outlined a project for preparing and publishing a set of distribution maps which should be comprehensive, accurate and readily available to botanical workers in Britain and elsewhere. A special committee was set up to inquire into the practicability of such a scheme, and the project, eventually made possible by a grant of £10,000 from the Nuffield Foundation, was launched at the Society's conference held recently in London.

The work is to be centred in Cambridge and is to take five years. Essentially, it consists of the accumulation in a convenient form of data of two main types—namely, individual species records (principally from the main public herbaria and the published literature), and field lists compiled by reliable workers—and the subsequent transference of these data to standard base-maps. Many possibilities of mapping were considered, and the final decision was to indicate by means of a conventional symbol the presence of each species within each 10-km. square of the Ordnance Survey National Grid. Such a map of the British Isles, reproduced at a size about 6 in. by 4 in., would reveal by a pattern of dots the broad features of distribution and its correlation with climate or geological formation; moreover, the basis of any individual dot could be readily found by reference to the records.

There are some two thousand species of vascular plants in the British flora (an approximate figure including apomictic micro-species, but excluding most casuals), and there are more than 3,500 10-km. grid squares. This may mean that a reasonably complete survey would accumulate 2,500,000–3,500,000 individual records, a formidable undertaking for which a mechanically sortable punched-card system is clearly desirable, if not essential. Careful investigation of such systems revealed that not only did they possess great advantages in ease of handling and sorting, but also that it was possible to tabulate mechanically the individual maps from the set of cards referring to a particular species.

A Powers-Samas 40-column card installation has been chosen, by means of which data relevant to a particular record are coded, punched on to a small card and put in a permanent card index. This card index will be used not only for the immediate preparation of the maps, but also to provide the basis of a recording scheme for the Nature Conservancy, which, in addition to giving direct grants to the maps project, is financing this recording and mapping machinery. An incidental advantage in the use of punched cards is that quick and easy production of 'interim maps' during the working of the scheme is thereby made possible; this can be a most important stimulus to further effort, as it can immediately reveal gaps in the existing records.

In addition to the great mass of information stored in literature and herbaria, it is hoped to utilize, particularly for the commoner species, the help of a great many amateur and professional botanists, who are being approached directly through universities, schools, national and local scientific and natural history societies. It is probably true to say that in helping in this scheme the field botanist can make a larger and more valuable contribution to accurate scientific knowledge than ever before.

Information on the scheme in general, and on the type of observations required from field botanists willing to co-operate, can be obtained from B.S.B.I. Distribution Maps Scheme, Botany School, Downing Street, University of Cambridge. S. M. WALTERS

ROCKEFELLER FOUNDATION GRANTS

THE following grants to institutions and persons in Great Britain have been made by the Rockefeller Foundation, New York, for the first quarter of 1954.

Medical Research Council of Great Britain: an appropriation of 125,000 dollars for fellowships in the medical sciences.

National Institute of Economic and Social Research, Great Britain: an appropriation of 60,000 dollars (to provide up to £20,000) for a study of the economic experience of the United Kingdom during 1945–53.

Royal Institute of International Affairs, London: an appropriation of 31,500 dollars (to provide up to £10,500) for the Institute in support of a study of race relations in Central Africa, under the direction of Mr. Philip Mason.

Royal Institute of International Affairs, London: 3,100 dollars to enable Miss Lois Simpson, press librarian, and Miss Helen G. Liddell, head of the Information Department, to visit the United States and Canada in connexion with their work at the Royal Institute.

University of Liverpool: 1,500 dollars toward travel and/or living expenses of foreign delegates invited to participate in a symposium on the comparative endocrinology of vertebrates to be held at Liverpool in July.

King's College, London: 8,000 dollars toward research in electrophysiology under the direction of Dr. Donald M. MacKay.

University College, London: 1,525 dollars to enable Prof. George C. Allen to renew his acquaintance with economic conditions and scholarly work in Japan and the United States in connexion with bringing up to date his work on the history of Japanese economic development.

University of London: an appropriation of 24,000 dollars for the purchase of an electron microscope to be used in King's College for research in biophysics under the direction of Prof. J. T. Randall.

Prof. F. W. Rogers Brambell, University College of North Wales, Bangor: 1,150 dollars toward travel and living expenses while extending his stay in the United States after taking part in the Cold Spring Harbor symposium on fetal physiology to be held in June.

Dr. John R. Ellis, sub-dean of the London Hospital Medical College: 2,150 dollars to permit him to visit medical schools in the United States to observe developments in medical education.

Prof. H. J. Eysenck, director of the Psychological Department, Institute of Psychiatry, University of London: 2,700 dollars for travel and expenses to visit centres of research in psychology in the United States and Canada.

Dr. F. P. Glees, lecturer and university demonstrator, Laboratory of Physiology, University of Oxford: 800 dollars to permit him to visit laboratories of neurophysiological research in the United States.

Dr. Hilde T. Himmelweit, London School of Economics and Political Science: 1,150 dollars to enable her to visit major research and training centres of social and clinical psychology in the United States.

Prof. Irene Manton, Department of Botany, University of Leeds: 700 dollars toward travel and