than a wave-length there are two notable methods, namely, multiple-beam interferometry which can be applied to a wide range of surfaces, both transparent and absorbing, and, for specialized applications, phase-contrast methods. Both these methods enable a very high resolution normal to the surface to be attained.

Although much information may be obtained by a detailed analysis of the state of light reflected from a surface, methods suitable for non-destructive testing tend to be restricted to those which are reasonably simple to make and to interpret.

The third formal contribution, by Dr. Stephens, was devoted mainly to suggesting future possible extensions of techniques. It was pointed out that, as a general assessment, the application of optical reflexion methods is mainly dependent on the provision of good reflecting surfaces. Since for opaque materials the light-wave penetrates only to depths of the order of a few hundred angstroms, considerable care is necessary to avoid any treatment of the surface which might alter appreciably its physical characteristics as compared with the bulk material. The use of obliquely incident light minimizes the effect of small surface blemishes, and radiation wave-length is another factor at our choice. In testing for a high surface polish, it would be desirable to use the shorter ultra-violet wave-lengths; but when the object is to standardize the material itself, then longer wave-lengths are to be preferred. Dr. Stephens then directed attention to the recent advances in infra-red detectors—the photoconductive cells with their very small time-constants which provide new possibilities in non-destructive testing. Moving farther along the electromagnetic spectrum to the microwave region, the use of these centimetre waves offers an advantage in reflectivity measurements from the aspect of less exacting requirements in surface smoothness, and furthermore, by changing the frequency, the effective depth of penetration can be conveniently varied. Dr. Stephens here emphasized the advantage of such studies over methods using visible light, which are confined effectively to surface layers.

Recent work on the fundamental properties of surface electromagnetic waves has indicated another possible line of approach to the investigation of surface properties. These, Sommerfeld or Zeeneck waves, are attenuated both in the direction of propagation and normally to the surface to an extent dependent on the reactance of the surface, and are thus sensitive to geometrical irregularities and surface composition. Another approach in surface testing which Dr. Stephens thinks may merit attention is to investigate optically the effect of applying a second physical agency to the specimen, for example, a magnetic field, as in the Kerr magneto-optic rotation effect.

The three formal surveys were succeeded by a lively discussion to which many of the audience contributed. An appreciable fraction of the available time was taken up with a discussion of the reliability of replication methods, contributions being made by Dr. J. Thewlis, Miss K. B. Day and also Prof. Tolansky, who expressed the view that he has experimentally established that some materials can be used for making replicates with very high fidelity in extension, but yet simultaneously with appreciable uncertainty in depth. Mr. J. C. Kelly raised the issue of the relative perfection of contour of vacuum-deposited silver and vacuum-deposited dielectric multilayers. This matter received appreciable discussion.

The novel surface-penetrating methods proposed by Dr. Stephens aroused much interest and several queries about such procedures were posed.

Several members present were surprised at the extreme sensitivity of the polarization methods advocated by Dr. Heavens.

It was clear from the vigour of the discussion that the symposium had justified itself and focused attention in a practical way on a wide variety of techniques available to those who must needs examine metals in a non-destructive fashion.

PHOSPHOLIPIDS IN FOODS

A CONFERENCE on recent advances in the knowledge and uses of phospholipids in foods, arranged jointly by the Food Group and the Oils and Fats Group of the Society of Chemical Industry, was held in London during February 9–10 at the Wellcome Research Institution. The opening session, under the chairmanship of Prof. T. P. Hilditch, was concerned with the chemistry and physical chemistry of phospholipids. Papers were presented by Prof. T. Malkin and Dr. B. A. Pethica. The afternoon session, at which Dr. K. A. Williams took the chair, was devoted to consideration of methods of separation. Dr. June Olley described methods of counter-current distribution, and Mr. D. N. Rhodes chromatography. A third paper, on deteriorative changes in food phospholipids, was presented by Dr. C. H. Lea. During the first half of the second day, two papers were presented: one by Dr. J. A. Lovern on phospholipids in fish, and the other by Dr. F. Aylward on plant phospholipids, the chairman being Dr. A. J. Amos. The final session, under the chairmanship of Prof. A. C. Frazer, was also introduced by two papers: Dr. J. N. Hawthorne spoke on animal phospholipids, and Mr. H. H. Hutt on the large-scale production and industrial uses of phospholipids.

The papers were full of interesting information and covered a wide range, from relatively abstruse and detailed chemistry and physical chemistry to technical points concerned with large-scale production. Discussion was lively and varied in each session. It was apparent that things are moving on the chemical side. A wider range of pure synthetic phospholipids is likely to be available in the near future. This should lead to greater and more accurate knowledge of the physical chemical properties of this group of substances. Once this information begins to become available, many fascinating problems in the biological field, especially those associated with the structure and functions of lipoproteins, are likely to open up. The importance of close co-operation between chemists, pharmacologists, biochemists and nutritionalists in this field cannot be over-emphasized.

Work on phospholipids in foods is still in a formative stage, but methods of isolation and identification are rapidly developing. The importance of phospholipids in relation to deteriorative changes in food is well recognized. They may also play an important part in relation to some of the attractive properties of foods that technologists may wish to retain or enhance. This conference concerned itself mainly with the chemical and physical chemical background, with the occurrence of phospholipid in natural

materials and the technological uses to which phospholipids may be put. There is clearly considerable scope for the use of phospholipids in food technology. However, the biological effects of separated and prepared phospholipids used in food out of their normal context will require careful examination. With increasing knowledge and improving techniques in this field, it should soon be possible to make a more accurate assessment of the importance of phospholipids in the diet to health and nutrition. We may confidently expect considerable advances in this field during the next ten years, and it is encouraging to see such a wide interest taken in the subject at this early stage.

FULBRIGHT PROGRAMME IN GREAT BRITAIN AND COLONIAL TERRITORIES

FIFTH REPORT

THE fifth annual report on the Fulbright Programme in Britain and Colonial Territories* takes the form of a review and appreciation of the work of the Commission during 1949–54. To this Senator J. W. Fulbright himself contributes a foreword, while there are reviews from the American side and from the British side by Herbert Agar and Dame Lillian Penson, respectively, an article on "Orientation" by Sir Alexander Gray describing what is done to introduce the newly arrived scholars, and a series of articles on special features of the Programme. Sir Raymond Priestley deals with the Colonial programme, Mrs. L. M. Cochrane with the "Special Categories", Dr. S. C. Roberts with the American Studies Conference and Dr. E. A. Ford with the Interchange of Teachers Programme. There are also the usual general appreciations of the work of the British scholars in America and of American scholars in Britain, this year by Dr. F. A. Young and Dr. A. L. Goodhart, respectively, followed by comments from selected lecturers, advanced research scholars, supervisors and graduate students. Besides a summary of awards since 1949, there are appended a directory of Fellows for 1949–54 and an analysis of fields of study and research during 1953–54.

Of the 674 awards in 1953–54, compared with 732 in 1952–53, 329 were to United States and 345 to British citizens, the 1952–53 figures being 349 and 383, respectively. Of those to United States citizens, twelve were to visiting lecturers to British universities, eighteen to advanced research scholars and 163 to graduate students; eleven awards were made in the special categories group; fourteen for visiting lecturers, research scholars, school teachers or graduate students in the British Colonial Territories, and a hundred travel grants were again made to primary and secondary school teachers for exchange under the Anglo-American Teacher Interchange, the remaining eleven awards being to lecturers for the American Studies Conference. The travel grants to British citizens likewise included one hundred to school teachers under the Anglo-American Teacher Interchange, seventy-eight to advanced research workers, visiting lecturers and teachers and 167 to graduate students. The anticipated 350 awards to United States citizens and 384 to British citizens in 1955–56 will bring the cumulative total since 1949 to 4,842. Analysed by fields of study and research, the subjects claiming most awards in 1953–54 were chemistry (26 British and 13 American), education (13 and 3), history (16 and 23), literature (16 and 44), mathematics (11 and 4), physics (12 and 6), medicine (20 and 2), engineering (23 British) and dentistry (12 British).

Originally, the prime concern was to place the scholars in the universities of the United Kingdom; but it was contemplated from the beginning that there should be a counterpart to the reception of American university teachers and students in British universities in the form of travel grants for British lecturers and students to go to the United States, and on both sides applications have always vastly exceeded the number of possible awards. Nevertheless, the Commission has not been prevented from branching out in new directions, and in her review Dame Lillian Penson stresses the particular value of the creation, as a result of Sir Christopher Warner's proposal, of a Special Citizens' section in the Commission's budget which has enabled the Commission to spend a part of its resources in effecting contact between such groups as social workers and extra-mural tutors. The grant towards the expenses of the teachers in secondary schools exchanging with one another under the scheme for teachers interchange is another development from the original programme, as is the grant made annually for the past three years towards the organization and maintenance of an American Studies Conference at either Oxford or Cambridge in late July or early August to discuss aspects of academic disciplines of interest on both sides of the Atlantic.

Dame Lillian, moreover, lays special stress on the gradual development during recent years of the Colonial programme, in which there is still room for further growth and experiment. The Colonies themselves have welcomed with enthusiasm the seconding to them of the American scholars, and Dame Lillian believes it would be difficult to exaggerate the importance, at this stage of evolution, of the presence of American scholars in these centres of research or teaching. Reviewing this programme in more detail, Sir Raymond Priestley notes that the Commission has now decided to increase to more than 25 per cent the 10–15 per cent of the annual budget expenditure previously devoted to this purpose. Reports made by the American visitors to the Colonies show how significantly these visits are serving the general aims of the Fulbright Programme in promoting international understanding; and although it is too early to assess the contributions to learning which have stemmed from the visits, it is not too early to record the indebtedness of Colonial institutions to the services rendered by their guests. The Royal University of Malta, for example, has profited greatly from the teaching in English literature and in history by a series of Fulbright professors. The administrative problems of the Colonial programme are well on the way to solution in view of the enthusiastic response from the Colonial schools and teacher-training colleges to the initiation in 1952–53 of grants for American school teachers to work in schools and training colleges in the Colonies, and the Commission has decided to use a substantial part of the increase in its Colonial budget for this purpose.

* Fifth Annual Report of the Fulbright Program in the United Kingdom and Colonial Territories, 1949–1954. Pp. 184. (London: United States Educational Commission in the United Kingdom, 1955.)