

understanding of the part science plays in cultural life, including moral and even, perhaps, spiritual issues. In this sense the ideological content of syllabuses will have to be brought under review. Points like these pose difficult

questions for teachers and examiners, but if in their training young scientists are to be treated wholly as specialists they will remain nothing but specialists when they grow up.

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## REPORT OF THE AGRICULTURAL RESEARCH COUNCIL 1963-65

THE Report of the Agricultural Research Council for the years 1963-65 (Cmd. 2792, H.M. Stationery Office, 8s.) describes the work of twelve out of the forty-seven institutes and units for which the council is, in effect, responsible; summarizes some of the major developments in the two years under review; and, in so doing, demonstrates the wide range of modern agricultural research. Thus, in soils, work (some of which may be relevant to public health) on the persistence of organo-chlorine insecticides shows that a single dressing of dieldrin has effectively controlled carrot fly, *Psila rosae*, for nine years, while very low residues of this compound reduced the natural enemies of the cabbage root fly, *Erioischia brassicae*, and thus aided the survival of this pest. If the placement of fertilizers at depths of up to 2.5 ft. can be made practicable, then sub-soil water could be more effectively used by pastures, and irrigation needs reduced.

In crops, the influence of kinins on root growth, germination, bud growth and leaf-senescence (which affects the effective photosynthetic area) is noted, while revolutionary possibilities are opened up by complete chemical control of vegetation which permits 'minimal cultivation' and even brings into question the necessity for ploughing.

In animals, research on the metabolism of clinical disorders associated with calcium, phosphorus, iron, copper, magnesium, zinc and selenium illustrates the biochemical complexities of intensive animal production, while work at the Animal Diseases Research Association in Scotland on that elusive disease of sheep, scrapie, exemplifies the value of multi-discipline research. A link

between reproduction research in humans and livestock is seen in the use, on pigs, of a temporary ovulation inhibitor which opens up the prospect of synchronized 'batch farrowing' by pig producers.

The Council (which now reports to the Department of Education and Science) is, of course, primarily concerned with scientific and engineering research. This may explain why there is no mention of the tentative, but potentially very important, link between scientific and farm management research through the creation, by multi-variable experiments, of the multi-dimensional input-output curves so badly needed for the effective application to farming of modern business mathematics.

The report concludes with administrative and financial data. The total spent each year by or on behalf of the Council is about £10 million in Great Britain. This excludes research at official husbandry farms, on farm management, by agricultural economists, by the official veterinary service, by the supporting chemical and engineering industries and by agricultural scientists at universities. Even if this group spent as much as the Agricultural Research Council, the total research expenditure on and in the agricultural industry would only be about 1 per cent of the value of its gross annual sales. In farming in the United Kingdom, productivity per man is increasing at about 7 per cent per annum—one of the highest rates in the national economy. What further contribution could agriculture make to national economic efficiency if research expenditure was doubled? A. N. DUCKHAM

## ANTIMICROBIAL AGENTS AND CHEMOTHERAPY

VARIOUS aspects of antimicrobial agents, infectious diseases, and chemotherapy were discussed during October 17-21, 1965, in the 237 papers and 11 round tables and conferences presented at the fifth Interscience Conference on Antimicrobial Agents and Chemotherapy—Fourth International Congress for Chemotherapy. This meeting was held in Washington, under the sponsorship of the American Society for Microbiology and the International Society for Chemotherapy, and was organized with the co-operation of the Infectious Diseases Society of America. 1,422 interested scientists attended this meeting; 228, representing 26 countries, came from outside the United States.

The Congress opened with addresses by Prof. E. B. Chain, Prof. S. A. Waksman, and Prof. J. F. Enders, discussing the past 25 years of antibiotic therapy and prospects for the future. This theme of reviewing the accomplishment of the past and problems of the immediate future was carried further in a round table on "Are New Antibiotics Needed?" organized by Prof. M. Finland. The consensus of the panel members, including Profs. W. M. Kirby, H. F. Dowling, A. C. Todd and L. P. Garrod, and Prof. E. B. Chain, Dr. Y. Chabbert and Dr. C. W. Pettinga, was that new and specialized antibiotics are still needed. There are many infections which are not adequately treated by the available antimicrobial agents and there is a need for a 'good' antifungal agent, a better anti-Gram-negative bacterial agent, and agents to treat a host of 'uncovered diseases' including the viral

diseases and those caused by protozoa and other parasites. Other round tables were concerned with "Gram-negative Infections", "Antibiotic Assay Methods", "Bacterial Sensitivity Testing Methods", and the "Chemotherapy of Venereal Diseases". In each of these panel discussions, experts from many countries reviewed their findings in the particular subject being discussed, and presented new information on the prospects for the immediate future. The need for non-toxic and effective antibiotics in the treatment of Gram-negative infections, the fungal infections, and in venereal diseases was repeatedly emphasized.

Among the topics discussed at the 'informal discussions' were: practical methods for handling information on antibiotics and chemotherapy; the activities of the International Center for Antibiotic Information (Liège); antibiotic nomenclature; and ecological roles of antibiotics. The following rules were proposed for choosing antibiotic names: (a) an antibiotic's name should be chosen so that, if it is later shown to be a member of a family, the root-name can be modified to show members of the related series. (b) The name should be based on chemical structure, and, except where the structure is known, the name should be based on the generic class of the producing organism. (c) The name chosen should be euphonious.

A symposium on the chemotherapy of tuberculosis (organized by Dr. G. Brouet, Paris) included discussion of experimental bases of chemotherapy (by Dr. F. Grumbach), therapeutic possibilities with minor antibacterial drugs in infections with *Mycobacterium tuberculosis* (Prof.