

whether economics can be 'wertfrei' or whether it is necessarily value 'impregnated'. After re-stating the usual meaning of 'wertfrei', Mr. Klappholz argued that the claims of "inevitable value impregnation" are quite irrelevant to it. The problem is 'Wertfreiheit'—in the logical sense—is a pseudo-problem. The paper briefly examined the problem of interpersonal comparisons of utility and its relation to value judgements, and the problem of value-free, that is, hypothetically-imperative, advice. In conclusion, Mr. Klappholz urged that the widespread desire to exclude normative questions from academic economic discussion is misguided and unnecessarily inhibiting.

Prof. W. C. Kneale (Corpus Christi College, Oxford) was chairman of the final symposium. Dr. G. T. Kneebone (Bedford College, University of London) argued the formalist's point of view of mathematical logic as a theory of the structure of logical relationships, adequate for the exhibition of the deductive form of traditional mathematics and for a formal analysis of mathematical concepts. While the deductive form of scientific theories is suitable for logical analysis, their empirical content ensures that such analysis cannot be exhaustive. Dr. M. H. Löb (University of Leeds) pointed out that mathematical logic is one of the most active areas of mathematical research and that fruitful pursuit of the philosophy of mathematics necessitates constant reference to tech-

nical work in logic because many concepts relevant to investigations in the foundations of mathematics have been explained in formal terms. Thus not only has mathematical analysis replaced the philosophy of mathematics but also is similarly applicable to the philosophy of science. Prof. Kneale succinctly summarized three points for discussion and then guided and stimulated the ensuing discussion.

There was general agreement that this was the most successful of the Society's conferences so far. There was considerable participation in the discussions by most members, with continuous subsequent development of themes initiated in earlier sessions. The unusual nature of these conferences, in which working scientists, philosophers, logicians and historians join in incisive and mostly good-natured mutual criticism, should perhaps not be allowed to pass unnoticed.

In a closing address, Prof. S. Korner (University of Bristol) thanked the conference secretary and Dr. H. R. Post for their efforts on behalf of the conference, the bursar of St. Hugh's College, Miss E. A. M. Major, for the care taken by her staff and herself for the comfort of participants, and the Department of Biology as Applied to Medicine, Middlesex Hospital Medical School, for secretarial assistance.

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## BRITISH TECHNICAL ASSISTANCE OVERSEAS

THE extent and character of technical assistance from the United Kingdom came under some criticism in two recent debates in the House of Commons, when it was again urged that the Department of Technical Co-operation should not be excluded from responsibility for financial assistance. On February 3, in moving the second reading of the International Development Association Bill, the Chief Secretary to the Treasury, Mr. J. Boyd-Carpenter, said that the purpose of the Bill was to approve Britain's commitment of £34.5 million over the three years covered by the Association's second plan, since in the autumn of 1963 it was agreed that the provisional pledges then given would become binding when 12 countries, contributing in all 600 million dollars, had formally notified their intention to contribute. Mr. Boyd-Carpenter said that when the Association was started in 1960, 750 million dollars was made available over a 5-year period, but expenditure had been much slower than commitments and only 130 million dollars had been expended although 600 million dollars had been committed. The new proposals agreed in autumn 1963 would provide a further 750 million dollars over a three-year period and Britain's contribution would be 13 per cent of the total, comparing with 8 per cent from France and 9.5 per cent from Germany.

Of the 550 million dollars committed up to September 30, 1953, 70 per cent went to Asia and the Middle East, 12 per cent to Latin America, 6 per cent to Africa and the remainder to the Far East and Europe. India had so far taken the largest proportion—54 per cent, followed by Pakistan. About 30 per cent of the projects were concerned with roads, about 20 per cent with other forms of transport, 20 per cent with irrigation and the remainder was divided between electric power, communications, industry, water and education.

While the Bill was generally welcomed, there was some criticism that the Association was conceived on too small a scale that it required a world authority and a more satisfactory if not compulsory basis for finance. Mr. R. E. Prentice stressed the importance of multilateral rather than bilateral aid and urged that the work should be ex-

panded and related to the United Nations Development Decade. In replying on the debate the Economic Secretary to the Treasury, Mr. M. Macmillan, maintained that the rate of interest was not the reason for aid not being taken up fast enough; but neither he nor other speakers referred to the factors emphasized by Dr. Dedijer in a recent paper on science in underdeveloped countries (*Nature*, 201, 1153; 1964).

In the debate on Commonwealth trade, technical assistance and Commonwealth links which was opened by the Prime Minister on February 6, Sir Alec Douglas-Home said that private investment in Commonwealth countries was running at about £150 million a year, and under the Montreal Conference system of Commonwealth loans since 1957 Britain had committed £300 million to 14 Commonwealth countries. British aid to Commonwealth countries was running at £120 million a year and £50 million of international funds had been put at their disposal by Britain in 5 years. Under the various technical assistance schemes Britain had 18,000 officers in 39 Commonwealth countries, and of the 1,637 new appointments made in 1962, 542 went into education, 254 into engineering, 219 into health and 97 into agriculture. Of the 42,000 students from Commonwealth countries in Britain's universities and colleges, some 5,000 were assisted by British Government funds. Since the Commonwealth Scholarships Plan was started in 1957, 1,000 scholars had held awards in Britain alone, and Britain was training 400 teachers each year from developing Commonwealth countries and in 1963 sent 600 teachers to Commonwealth countries to train teachers there. Sir Alex also referred to the work of the voluntary associations and to the expansion of British information services in Commonwealth countries.

Mr. H. Wilson, who followed the Prime Minister, referred to the importance of scientific research for the developing countries. His several questions on research contracts with universities and colleges of technology for developing new products to meet the needs of these countries met with no response, nor did his reference to the potentialities of agricultural research for agricultural productivity. Mr.

J. Grimond urged the increase of Government aid to such organizations as Voluntary Service Overseas, while recognizing that this was no substitute for technical aid. However, in replying on the debate the Secretary of State

for Industry, Trade and Regional Development, Mr. E. Heath, made little reference to either technical assistance or voluntary service and Mr. Wilson was the only speaker to refer to overseas research.

## AIDS TO TEACHING UNIVERSITY PHYSICS

THE university teacher of physics at present is having to cope not only with a rapidly growing and much expanded subject, but also with the increased demands on his time, on apparatus and on accommodation, because of larger numbers of students. The many new text-books dealing with the advances during recent years are very often limited to narrow fields, and invaluable though they are to the postgraduate student embarking on research or to the specialist, they are of little help to the undergraduate teacher. Because of financial stringency he may not be able to purchase what he requires of these new texts, and even with access to the books, he will find it most difficult to devote adequate time to their detailed study. He needs assistance in the appropriate selection of material not only for himself, but also in order to advise his students how to avoid the inessential so that the student may still get a good grounding in basic classical physics and yet also become acquainted with recent investigations and problems. Little or nothing so far has been done in Britain to help the university teacher in his attempts to modify and improve the content of undergraduate courses, but in the United States the Association of Physics Teachers has a committee under the chairmanship of Prof. Arons which, with the support of the National Science Foundation, is actively engaged on this work.

The committee publishes a series of "Resource Letters", which are initially printed in the *American Journal of Physics*. These have included Letters on plasma physics (PP-1, July 1961); polarized light (PL-1, October 1961); the Mossbauer effect (ME-1, January 1963); kinematics and dynamics of satellite orbits (SO-1, April 1963) and quantum and statistical aspects of light (QSL-1, May

1963). Each Letter consists of a list of references to books and articles on the subject, divided into sections according to particular aspects and introduced by explanatory notes. The Letter always includes references to, or descriptions of, laboratory experiments and demonstrations and how the appropriate apparatus may be made or where it may be obtained, together with the titles of films or other illustrative material suitable for use by the teacher or students. No Resource Letter is meant to be exhaustive and complete, and in time there may be more than one Letter on some of the main subjects of interest.

To save time in reference to periodicals, and to assist those who do not have easy access to libraries, a series of reprint books each dealing with one of the subjects of the Letters and containing a copy of the Resource Letter together with reprints of a selected few of the articles listed in the Letter have now been published for purchase by the American Institute of Physics\*. The set of booklets have already received a warm welcome in the United States, and indeed a second printing of one of them has been required. They will be equally welcomed in Britain and no university physics department should be without several copies of them for use by the staff engaged in undergraduate teaching. The American Association of Physics Teachers is to be congratulated on this valuable pioneering effort and for its foresight in tackling an important and urgent problem in present-day higher education.

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\* *Plasma Physics—Selected Reprints*. Pp. 119. *Polarized Light—Selected Reprints*. Pp. 103. *Mossbauer Effect—Selected Reprints*. Pp. 127. *Kinematics and Dynamics of Satellite Orbits—Selected Reprints*. Pp. 108. *Quantum and Statistical Aspects of Light—Selected Reprints*. Pp. 92. (New York: American Institute of Physics. Published for the American Association of Physics Teachers, 1963.) 2 dollars each.

## IODINE-131 FALL-OUT IN MILK

"IODINE and milk don't mix": so read the placard carried by a schoolgirl protesting against the proposal to build a nuclear plant in California. So familiar are we with the problem of contamination of milk with iodine-131 from fall-out that there is no need to emphasize the importance of any new assessment of the effect of nuclear-weapon tests on levels of iodine-131 in milk and on the consequent radiation dose delivered to the thyroid glands of those who drink fresh milk. Such assessments inevitably begin by treating the relationship between the amount of fall-out deposited and subsequent levels of iodine-131 in milk. A direct investigation of this relationship in the field ideally requires a situation such that deposition of radioactive material takes place at either a constant rate or over a short period. The latter condition is met within the area of local fall-out from a nuclear test. Dr. H. A. Knapp has endeavoured to make use of measurements made in connexion with the *SMALL BOY* low-yield, ground burst of 1962\*.

The investigation is retrospective and hence has inherent limitations. Milk from two dairies 50-100 miles from ground zero and from an area in north-east Utah some 300 miles downwind had been analysed for iodine-131. The fall-out pattern had been followed by measuring

\* *Iodine-131 in Fresh Milk and Human Thyroids Following a Single Deposition of Nuclear Test Fallout*. By H. A. Knapp. U.S.A.E.C. Document No. TID-19266. Pp. 106. (Washington, D.C.: Office of Technical Service, Dept. of Commerce, 1963.)

levels of  $\gamma$ -radiation over the ground surface although not in the immediate locality of the areas grazed by cattle. By making assumptions with regard to the mode of decay of activity, Dr. Knapp has developed an empirical relationship between the level of  $\gamma$ -radiation from fission products deposited at 24 h after detonation and the maximum concentration of iodine-131 in milk and has then extended this to cover the radiation dose received by the thyroid glands of people drinking fresh milk. Unfortunately the  $\gamma$ -radiation measurements were made with relatively insensitive survey instruments which, although quite adequate for the purpose of overall evaluation of external exposure to  $\gamma$ -radiation—for which they were intended—are insufficiently accurate to give a true indication of the ground deposition: examination of the readings listed in the report reveals that many were only a few times the assumed average background-level. For this and other reasons, Dr. Knapp's interpretation of the data has been under fire from an expert committee convened to review his report. The committee's—somewhat adverse—opinions are included as a preface. The fact remains that the relationship obtained by Dr. Knapp accords remarkably well with what might be expected on theoretical grounds and that, where it was possible to compare predicted thyroidal iodine-131 burdens with actual burdens measured *in vivo*, when allowance is made for more recent information than was available to Dr. Knapp on the