Taken together with observations by other speakers, including Prof. K. Bloch, Prof. W. Bartley and Dr. M. G. Macfarlane, Prof. Gurd's and Dr. Green's findings suggest one possible aspect of the 'essential' nature of particular fatty acids. Those acids are prominent in the lipids of the main energy-yielding apparatus of the bacterial, plant or animal cell; perhaps the non-polar regions of certain vital sections of the protein skeleton of this apparatus require specific structures in the hydrophobic 'tails' of the lipids which must be present for full enzymatic activity to be displayed.

G. H. SLOANE-STANLEY

CHARACTERIZATION AND USES OF HUMAN DIPLOID CELL STRAINS

A SYMPOSIUM on "The Characterization and Uses of Human Diploid Cell Strains (HDCS)", sponsored by the Permanent Section on Microbiological Standardization of the International Association of Microbiological Societies, was held in Opatija, Yugoslavia, during September 24–26. Ninety-six delegates from 18 countries attended. The sessions covered the following topics: (1) The management of human diploid cell strains. (2) Biochemical, cytogenetic and immunological studies on human diploid cells. (3) Virus spectrum of human diploid cells. (4) Production of human virus vaccines in human diploid cell strains. (5) Results of clinical trials on the use of vaccines prepared in human diploid cell strains.

Many laboratories receiving the human diploid cell strains reported their success in propagating the cells and attributed most of their early failures in handling these strains to variations in media constituents. The cells showed the classic normal human diploid karyotype until approximately the 40th cell generation.

It was reported that, at least for some loci, cultured diploid cells carry and express the genes of their donor. The human diploid cell strains retain the donor's chromosomal complement; they also maintain biochemical and immunological properties of the donor cells. In a sense these observations are complementary, for they indicate at two structural levels an apparent genetic resemblance between the cultured cells and the somatic tissues of the host.

The numerous attempts to isolate latent viruses from these cells have been unsuccessful. Dangers from extraneous oncogenic viruses, inherent in the use of primary explants of animal tissue, are largely circumvented in the opinion of many workers when human diploid cell strains are used for vaccine production.

Investigations on the virus spectrum of human diploid cell strains indicated their susceptibility to many viruses. These strains were thought to be particularly valuable in work with the rhinoviruses which cannot generally be detected in other cell substrates. Since different human diploid cell strains vary in their sensitivity to rhinoviruses, it was felt important to use the most sensitive strains.

Both live attenuated and killed vaccines for parenteral inoculation or oral administration have been made in human diploid cell strains from poliovirus, rhinovirus, adenovirus, varicella, measles, vaccinia and rabies. Following adaptation to human diploid cell strains, all viruses investigated were said to give yields equal to those in other cell systems. Investigations with poliovirus showed that they retained their genetic markers when propagated in human diploid cell strains.

It was urged that all laboratories using human diploid cell strains for vaccine production limit themselves to a few standardized cell strains, since the use of a well-characterized tissue culture system is as logical and necessary as the use of a well-characterized virus to be propagated in this system.

Clinical investigations on a number of virus vaccines are in progress. It was reported that an oral poliomyelitis vaccine produced in human diploid cell strains has already been successfully tested in a large-scale field trial and that no untoward reactions have been noted in 7,000 subjects who have received vaccine during the past two years. It was also reported that such vaccines proliferated in the gastro-intestinal tract and elicited an antibody response.

On the basis of the investigations suggesting the feasibility of large-scale production of virus vaccines in human diploid cells strains, a sub-committee of the conference drafted "Minimum Requirements for Human Diploid Cell Strains to be Used in Vaccine Preparation". These requirements were presented to the symposium participants and adopted at a plenary session.

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SCIENTIFIC RESEARCH IN NEW ZEALAND

THE report of the Department of Scientific and Industrial Research, New Zealand, for the year ended March 31, 1963*, includes the Minister's statement, the report of the Council, the longer report of the Secretary, to which are attached brief reports from the various Divisions, the Incorporated Research Associations, and on granted-aid research in the Cawthron Institute, Lincoln College, Massey University College of Manawatu, and the Industrial Development Department, University of Canterbury. The fifth annual report of the Ross Dependency Research Committee is appended, to which, as to the Divisional reports, a list of publications is attached. The Council in its report reiterates the view that a much more comprehensive review of research is needed than was given by the Royal Commission on State Services, but supports the proposal to replace the present Council, which is advisory only to the Department of Scientific and Industrial Research, with a National Research Council responsible for advising the Government on all aspects of research in Government Departments. The new Council should be advised by a number of expert committees, but the Department of Scientific and Industrial Research must retain many of the existing expert committees. Research and development expenditure in New Zealand in 1961–62 was still only 0·3 per cent of the gross national product or £1·9 per head of the population, the Department's gross expenditure of £2·19 million being 0·163 per cent of the gross national product. Staff at March 31, 1963, numbered 1,229, including 455 scientific officers, compared with 1,170 and 442, respectively, the previous year. An increase of 60 in the staff has been

* New Zealand. Report of the Department of Scientific and Industrial Research for the year ended 31 March, 1963. Pp. 87. (H. 34.) (Wellington: Government Printer, 1963.) 3s.

approved for 1963–64, as well as re-equipment of the Dominion Physical Laboratory over the next three years at an estimated cost of £120,000.

The Council's report also notes the steady improvement in the educational qualifications of the Department's scientific officers, and the present staff now includes 17 with a D.Sc. degree and 99 with a Ph.D. The senior research fellowship programme continues to be most successful, and an increase in the number of awards from two to five is recommended. Grants to research associations in 1962–63 totalled £169,720, to universities and agricultural colleges £37,070, and to the Antarctic Division £126,607. The highest items in the total expenditure of £2,389,000 are £237,000 on the Dominion Laboratory and £238,000 on the Dominion Physical Laboratory. The only other items exceeding £100,000 are £132,000 to the Geological Survey, £154,000 to the Geophysics Division, £114,000 to the Grasslands Division, £105,000 to the Plant Diseases Division, and £137,000 to the Soil Bureau, but £90,000 went to the Crop Research Division.

The Secretary's report stresses the value of geochemical prospecting for mineral resources in New Zealand and gives some details of the iron-sand investigations in North Island. Field trials are demonstrating the excellent performance, under farm conditions throughout New Zealand, of the new hybrid ryegrass developed by the Grasslands Division over the past fifteen years. The Plant Chemistry Division has been seeking to find a culture suitable for bacteria of lucerne, clover and trefoil. Two enzyme systems which hydrolyse or decompose sucrose are now being investigated in some New Zealand soils, particularly under introduced pasture. With the present-day retreat of the Franz Josef Glacier, the opportunity has been taken to examine the microbiology of a series of soils in process of formation from unweathered glacial detritus. Besides investigations on the rate of chemical breakdown, residue and metabolism of demeton methyl, phosphamidon, guthion and dimethoate (Rogor) used to control aphids, a programme of research has been initiated with the view of integrating biological and chemical methods of controlling pests.

An Australian method has been applied successfully in the ripening of peaches for canning to prevent loss from brown rot, and field trials have established the considerable scope for mechanical soil fumigation in New Zealand. Immediate relief from the chironomid midge in oxidative ponds has been obtained by the judicious use of insecticides, and there seems every prospect of a permanent solution of the problem. Reference is also made to the work of the Botany Division in connexion with the control of noxious weeds and on the incompatibility of plants. A review has been prepared of the features of the Antarctic ionosphere during calm and disturbed conditions, and the effect of γ-rays and X-rays on certain sugars has been examined with an electron spin resonance spectrometer. Five narrow-angle Geiger tube telescopes have been installed at the Institute of Nuclear Sciences to investigate the daily variations in the intensity of cosmic rays coming from outer space, while industrial research has shown that high-grade rayon pulp can be made from *Pinus radiata*, which can be used to manufacture dissolving pulps. A simple and effective instrument has been developed for comparing reflexions from opposite surfaces of sheet glass and thus give a measure of its 'waviness' or distorting properties.

TALENT FOR TO-MORROW

A BOW Group pamphlet, *Talent for Tomorrow**, by R. Smith and R. Eddison, arguing that any policy of reform of higher education must be based both on a thorough understanding of the way in which the present system works and on some attempt to estimate what will be required of it in the future, discusses the problem in the light of higher education as a determining factor in the character and effectiveness of primary and secondary education. It is in the universities and colleges that teachers are taught the fundamentals of their profession. Such institutions act not only as a vital factor in our economic potential but also as a means of providing a haven for older men to think as well as for younger men to learn. Educational policy is not simply a matter for Cabinet discussion and a few crucial decisions at the top: it depends on many decisions at many levels, and, while arguing for closer integration of the political machinery at the centre, the pamphlet also insists on the need for considerable devolution in policy making.

Surveying in the first of the four chapters of the pamphlet the national need, the Bow Group maintains that the major problem in the next twenty years, given continuing economic growth, will be that of educating men and women to a high enough level; and, allowing some 7–10 per cent places for overseas students, as at present, it estimates that in 1980 some 630,000 places will be required in full-time higher education, including 320,000 in universities. These figures compare with 560,000 and 346,000 in the Robbins Report (*Nature*, 200, 925; 1963), and would provide an annual entry of about 180,000 home students, including 72,000 to universities, and about 16,000 overseas students.

The present pattern of opportunity is considered in the second chapter, which leans very definitely towards 10,000 as a reasonable maximum size for a university, and stresses the need for careful preparation before institutions are given the right to confer degrees. It suggests that three of the colleges of advanced technology should be selected for promotion, providing, with the Manchester College of Science and Technology, the Imperial College of Science and Technology, and the new University of Strathclyde, six technological universities which could lead the way in trying out new ideas in technological education. The remaining colleges of advanced technology would keep their present status; but no immediate change in the status of the teacher training colleges is proposed. By 1980 the technological universities would have some 70,000 students, and there would be 170,000 in the regional colleges of technology and commerce and 140,000 in the professional and teacher training colleges. In the 1970's the opportunity to found another 6–10 universities would be welcomed as well as more professional colleges and colleges of technology. Emphasis is laid on the danger of drawing staff from secondary schools in this expansion and on the importance of promoting greater mobility of employment between higher education and other professions, including civil servants and industrial management. Lower staff ratios in the universities seem inevitable but could be offset by employing more administrative, clerical and technical staff, by providing better library facilities and by a more imaginative approach to technical teaching aids, especially television. The final chapter considers the financial expenditure involved as a national investment, urging that Britain must revise her scale of priorities where education, and especially higher education, is concerned, and be prepared to spend 1·5 per cent of her national income on higher education. At this rate there would be no difficulty in meeting the cost of the expansion plans advocated in the pamphlet.

**Talent for Tomorrow*. (A Bow Group pamphlet.) Pp. 68. (London: Bow Publications, Ltd., 1963.) 4*s*.