

of hog mucin 'A-substance' and of preparations of A- and B-substances isolated from the saliva and gastric juice of persons belonging to groups A, B and AB will be discussed elsewhere.

Overnight incubation (37°) of the enzyme preparation with the blood-group substances in the presence of toluene destroys almost completely their specific serological characters as measured by the usual iso-agglutination inhibition technique. It was observed, however, that whereas the enzyme preparations after heating for one hour at 56° fail to decompose the gastric mucin A-substance or the human A- and B-substances, they nevertheless rapidly and completely destroy the O characters of the hog mucin preparation and of the human O-substance. It would appear, therefore, that there are at least two enzymes present in the partially purified and concentrated *Cl. welchii* filtrates, one of which is thermolabile and decomposes the A- and B-substances; the other is thermostable and attacks and destroys the O-substance only.

One *Cl. welchii* filtrate examined was found to decompose the A- and B-substances but to be without action on the O-substance. Under controlled conditions of growth and heat inactivation, it is therefore possible to obtain an enzyme preparation which will destroy either the A- and B- or the O-characters of the blood-group substances.

The destruction of the serological activity of the A- and B-substances by the enzyme preparations is prevented by an anti-serum produced against *Cl. welchii* filtrates. An anti-serum of this kind contains α -antitoxin, θ -antitoxin, anti-hyaluronidase and anti-collagenase, and almost certainly possesses antibodies against other unidentified antigenic components present in the original culture filtrates. The anti-serum, however, fails to inhibit the action of the thermostable enzyme responsible for the destruction of the O-substance. This is conceivably due to the poor antigenic quality of the enzyme when in competition with the antigenically active α - and θ -toxins, hyaluronidase and collagenase.

Certain preparations of *Cl. welchii* α - and θ -toxins have been examined which have had no action on the specific serological characters of the A- and B-substances, and it may be accepted, therefore, that these toxic components have no action *per se* on the A- and B-substances. Preparations of α - and θ -toxins, however, which decompose the O-substance, continue to do so after these toxic components are completely neutralized by α - and θ -antitoxin respectively. The α - and θ -toxins have, therefore, probably no action on the serologically specific O-character of the O-substance of human or animal origin. A preparation (1,000 v.r.u. per ml.) of *Cl. welchii* hyaluronidase kindly supplied by Dr. Rogers was found to be without action on the A- and B-substances, but rapidly and completely destroyed the serological activity of the O-substance, presumably by virtue of the heat-stable enzyme that is common to most *Cl. welchii* filtrates and not by the action of hyaluronidase, for preparations of streptococcal, staphylococcal and testicular hyaluronidase fail to decompose the A-, B- or O-substances.

It has been found that most of the enzyme preparations fail to destroy the A-activity of the human or animal A-substance when this character is measured by the hæmolytic inhibition test. The hæmolytic test is generally believed to measure the 'Forssman' or heterophile component of the A-agglutinin, and is accepted as measuring a different,

although closely related, serological property of the A-substance from that determined by the iso-agglutination inhibition technique.

A number of preliminary observations have been made on the chemical changes brought about by the action of a mixed enzyme preparation on the 'A-substance' derived from commercial hog gastric mucin, which is composed of A- and O-substances. The optical rotation of the material changes from a dextro rotation, $[\alpha]_{5461} + 11^\circ$, to a lævo rotation, the reducing power, expressed as glucose, rises from less than 0.5 per cent to about 10 per cent, and there is a rapid fall in the relative viscosity (η) of the solution from 2.9 to a value only slightly greater than the enzyme buffer mixture (1.0). The enzymic inactivation of the A-substance is accompanied by an increase in primary amino-groups, estimated by van Slyke's procedure, from a value less than 1 per cent of the total nitrogen of the preparation to about 13 per cent in the hydrolysed material. Similarly, α -amino-acids, equivalent to rather less than this amount of the total nitrogen, are liberated during the decomposition.

The experiments are being extended in an attempt to relate the different chemical changes observed with the action of single enzymes, and the specific serological characters with known chemical constitution. The use of enzymes to degrade other serologically active mucopolysaccharides and mucoids is under investigation.

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THE NUFFIELD FOUNDATION

THE first report of the trustees of the Nuffield Foundation, covering the three years ended March 31, 1946, recapitulates the main objects of the Foundation, and indicates briefly the general policy and procedure which have governed the drawing up of the programme for the years 1944-45 to 1949-50 covering five main fields: the medical, the natural and the social sciences, fellowships and similar awards and the care of the aged poor. Total grants made by the Foundation during these three years amount to £882,820, and the policy and details of grants in the particular fields are described further in separate sections of the report.

In regard to medical sciences, the Foundation seeks to assist, first, the proper understanding, definition and maintenance of the optimum conditions of health in varying human circumstances, and secondly, the proper relation between preventive and curative medicine. The Foundation has co-operated in the fulfilment of the University of London's plans for the creation of an Institute of Child Health by endowing the whole-time professorship to be held by the director of the Institute; but, in view of the sums made available by the Government for dis-

tribution by the University Grants Committee in aid of medical education, the Foundation does not propose, for the present at least, to make any further grants in support of such departments. After approaching, early in 1944, the Universities of Durham, Glasgow and Manchester and learning of their plans for developing departments of teaching and research in industrial health, the Foundation decided to offer grants totalling £40,000 each to Durham and Glasgow and £70,000 to Manchester, spread over ten years, to enable the universities to develop their schemes as soon as suitably qualified staffs could be secured. The Universities shared with the Foundation the view that such departments must work in the closest co-operation with the Factory Department of the Ministry of Labour and National Service, the Industrial Health Research Board and local industries. The University of Manchester has now created a full professorial department, and the University of Durham has instituted a Department of Industrial Health as a first step towards the realization of a scheme for a combined department dealing with both social medicine and industrial health in close association with the existing department of child health. At the University of Glasgow, a sub-department of industrial health has been created inside the Department of Public Health. A grant has also been promised by the Foundation towards the research side of the combined industrial health and rehabilitation scheme at Slough, while in the field of dental health grants have been offered to the Sutherland Dental School, Durham, the Guy's Hospital Dental School, the Turner Dental School, Manchester, and the School of Dentistry at the University of Leeds. Grants have also been made to the University of Oxford in aid of the Nuffield Laboratory of Ophthalmology, and for research on nasal catarrh at the University of Manchester and the Manchester Royal Infirmary.

In regard to the natural sciences, the main concern of the trustees is to encourage and assist basic studies in universities by providing resources in advance of normal university standards, and during the present period most attention has been given to the physical sciences. Grants have been made to the Department of Physics, University of Birmingham, in aid of research to be carried out in Prof. M. L. E. Oliphant's department; to the Department of Natural Philosophy, University of Glasgow, for research work which Prof. P. I. Dee is developing in nuclear physics; to Birkbeck College, London, for the research laboratory on biomolecular studies which is being established under the direction of Prof. J. D. Bernal; and to the Department of Physics, University of Manchester, to expand and improve the technical laboratory services for research work on cosmic rays under Prof. P. M. S. Blackett. Grants to the Clarendon Laboratory at Oxford amounting to £64,000 over eight years will be an extra endowment for additional research fellowships, special technical assistants and the purchase of special research equipment and material. A grant of £1,500 a year for five years has been allotted to the Cavendish Laboratory for a special research fellowship for Dr. E. Orowan to enable him to continue his work at the Laboratory and to contribute to the cost of his work on fundamental problems of the metallic state. The Foundation has also placed at the disposal of the University of Cambridge a grant of £10,000 over a period of five years towards the cost of a joint investigation by the School of Agriculture and the

Laboratory of Engineering on the mechanical properties of soil. This grant is intended to meet the salaries of qualified scientific assistants, laboratory assistants and the provision of special material and equipment.

In regard to the social sciences, which the Foundation interprets as implying disinterested scientific study of the structure and operation of human society, of the part played by individuals and groups of individuals in social organisations, and of the impact and effects on individuals of social institutions and relations, the trustees have so far been able to do little more than settle the broad outlines of the policy to be followed. It is intended that the funds earmarked for this purpose shall be used mainly in assisting selected universities to improve their staff and facilities for social and economic research, particularly for the realistic and quantitative investigation of social and economic problems. Where possible, encouragement will be given to investigations involving team-work by experts in different fields. In selecting universities, the trustees will look in the first place for men and women interested in realistic research and capable of building up vigorous research schools. Occasionally support will be given to the teaching and research activities of non-university bodies of high academic repute, and grants promised during the period covered by this report include an annual grant of £3,000 for five years to the general budget of the National Institute of Economic and Social Research, a similar grant to the Population Investigation Committee towards its programme of research into population problems, and grants to a total of £10,000 over five years to be used for scholarships at the National Administrative Staff College to students of merit who, without assistance, could not attend the College.

Describing the policy of fellowships, scholarships and similar awards to which the trustees proposed to devote a substantial portion of the Foundation's income, the report refers to visiting lectureships, seconding and interchange of teachers and others, and collaboration with the Dominion Students' Hall Trust as included in the programme. Schemes already instituted include the Nuffield medical fellowships in social medicine, child health, industrial health, and psychology, Nuffield dental fellowships and scholarships, an offer of £5,000 towards the interchange training scheme of the British Committee for the International Exchange of Social Workers and Administrators, the Colonial Service Scholarships and a similar, limited scheme for officers of the Sudan Government Service, a programme of Dominion medical travelling fellowships to facilitate post-graduate training and experience in Great Britain, awards for six Maltese demonstratorships and for a number of Alderney training bursaries.

In regard to care of the aged poor, the Foundation has sought first to provide itself with a proper basis of knowledge on which to decide future action, and has initiated a survey of the problems of ageing and of the care of aged people, under a committee of which Mr. B. Seeböhm Rowntree is chairman, with a medical sub-committee on the causes and results of ageing under the chairmanship of Dr. A. S. Parkes. A grant of £20,000 has been accepted by the University of Cambridge for an investigation at the psychological laboratory under Prof. F. C. Bartlett, which will deal with the characteristics and changes of human functions associated with different age-groups, with particular reference to adult groups.

Among miscellaneous grants, the report refers to one of £9,000 to the Imperial Agricultural Bureau to accommodate the Empire potato collection, and one of £1,500 to the Medical Research Society to permit purchase of the assets of the journal *Clinical Science* and to prevent a rise in price of the journal during the next five years.

UNITED STATES NATIONAL MUSEUM

REPORTS FOR 1944 AND 1945

THE extensive work carried out by the United States National Museum in the interest of the war effort is an outstanding feature of the report for 1944 (Washington, D.C.: Gov. Printing Office, 35 cents). Under the heading, "The Museum in Wartime" the chief of the departmental services rendered are described. Some of these include the following: Dr. Kellogg's preparation (for the National Research Council) of text and illustrative matter relative to monkeys known to be susceptible to infection by malarial parasites; the supply to various organisations of the Services of information regarding the identification and distribution of mammals involved in the transmission of diseases; the provision of information relating to the habits of certain mosquitoes, mites and ectoparasites sent in for identification by various Army and Navy units; the supply (to Army and Navy medical and other training centres throughout the country) of several hundreds of specially mounted specimens of insects and Acarina species involved in human health problems; suggestions for tropical and Arctic clothing; information regarding water supply and population statistics of the Caribbean Islands, house types in Burma, and the degree of western influence in certain Pacific islands and in the Philippines; the provision of information (based on collections in the Department of Anthropology) regarding the resources of certain strategic areas, and so on.

During 1944, Dr. G. A. Cooper concluded his field studies on the stratified rocks of Sonora, and it is reported that the results of his work (to be published shortly) will assist in the location of new mineral areas. Dr. Cooper also finished field-work on a project concerned with the Devonian sub-surface geology of Illinois, and information has been obtained which will be useful for the oil development of that and neighbouring States. Other work connected with the Department of Geology included the continued supervision by W. F. Foshag of surveys for strategic minerals in Mexico.

Under the section of the report dealing specifically with the activities of the Department of Geology, reference is made to the present-day scientific value of plaster casts of type fossils—"in view of the destruction taking place in foreign museums". In this connexion, mention is made of a cast of the English Carboniferous crinoid, *Potriocrinites crassus* Miller, received as a gift from the British Museum (Natural History). The holotype and only specimen of this was housed in the Bristol Museum, which was destroyed by enemy action during the War.

The report ends with a 28-page list of accessions, and a list of the Museum's publications issued during the fiscal year 1943-44.

The report for 1945 of the United States National Museum (25 cents) comments on the necessity for additional housing space if the progressive work of the Museum is not to be hindered. In this connexion, allusion is made to the wealth and utility of the Museum's scientific materials in the future development of American natural resources, agriculture and industry. Congress has already authorized the addition of wings to either end of the Natural History Building as soon as public building projects are possible, and now plans for separate buildings for engineering and industries and for American history have been estimated for authorization. The proposed engineering and industries building would take the place of the present arts and industries building, which is, to quote the report, "an antiquated brick structure . . . no longer suitable for modern installations in museum display".

JOHN INNES HORTICULTURAL INSTITUTION

ANNUAL REPORT

THOSE who were acquainted with the limitations of space under which the John Innes Horticultural Institution has laboured in past years will welcome the forthcoming transfer to its new site at Bayfordbury Park, Hertfordshire, already described in *Nature* (156, 586; 1945).

The thirty-sixth annual report of the Institution, for 1945, covers a very wide field of investigation.

The replacement of existing virus-infected, low-yielding clonal stocks of raspberries is a pressing necessity. M. B. Crane's work on high-yielding F_1 families of seedling raspberries promises to provide a rapid method of producing virus-free seedling stock of sufficient uniformity. He records that the yield of the best hybrid family is 60 per cent higher than that of a selected stock of Norfolk Giant. Further extensive trials of F_1 families planted in 1945 have been bred for greater uniformity, especially in respect to firmness and colour of fruit.

Several investigations on the tomato are in progress; A. G. Brown, working on hybrid vigour, reports in all cases considerably higher yields from F_1 families than from either parent. A breeding investigation aimed at combining high yield with early maturity is in progress. Dr. D. Lewis is endeavouring to obtain a degree of frost hardiness in hybrids derived from crosses between certain wild species of tomato, collected from high altitudes in Peru, and cultivated varieties. Messrs. W. J. C. Lawrence and J. Newall have shown, notably in tomatoes, that earliness and total yield depend to a remarkable degree on seedling treatment designed to avoid any check to rapid development. Factors of great importance are the minimizing of root disturbance by pricking out small seedlings directly into pots, and the employment of pots sufficiently large to allow unrestricted root development. Further experiments show the importance of adjusting the fertilizer balance and concentration in the seedling compost to an optimum level, and the feeding of root-bound plants with a balanced fertilizer prior to transplanting. In winter, however, the influence of reduced light intensity in glasshouses is shown to be of over-riding importance, outweighing all other factors.