

to the firmness of binding in the lattice. His points were illustrated by a number of interesting slides.

Dr. W. Betteridge, commenting on this paper, referred to results he has obtained in examination of thicker deposits of chromium. He believes that conditions at the interface would not influence the properties of the outer layers of a thick deposit. Dr. T. Ll. Richards considered that Goldschmidt's experiments explain the mechanism of adhesion rather than enhanced wear resistance and hardness. The explanation of these properties is not, however, one of the simpler problems confronting the X-ray worker.

The next paper introduced other difficult problems. This paper was by Dr. A. H. Jay⁴ under the provocative title of his successes and failures in X-ray applications. He began with four failures. The first was lack of success in detecting the graphite in cast iron; this he attributed to the erosion of the graphite on preparing the cast iron surface and the formation of pits into which the incident X-rays did not sufficiently penetrate. The second was the failure to estimate the amount of silica in zircon flour to nearer than 2 per cent; a task, however, which, his hearers might have thought, would have been expected to be troublesome. The third was the difficulty of estimating quantitatively the constitution of iron ores, because some constituents, for example, goethite or limonite, gave such poor X-ray reflexions that they could be present to an appreciable amount and remain undetected. The fourth was the failure of X-rays to detect any difference of structure in a steel when it was in the tough condition and when it was in the 'temper brittle' condition. Dr. Jay then tempered the breeze by referring, though more briefly, to his successes. He quoted two: first, his establishing the difference in structure between steel in the tempered and the annealed condition, the former exhibiting partial recrystallization only of its constituents and the latter full recrystallization; secondly, a successful determination of the desirable chemical changes in refractory bricks during manufacture, and the light thrown on the mechanism of failure which might occur during firing. It is well known that he could have quoted others.

The Conference concluded with a paper by Prof. G. I. Finch on the rather different, but complementary, field of surface structure covered by electron diffraction. Prof. Finch⁵ set out to show the type of problem to which this technique could be usefully applied, and illustrated his points by slides showing a fascinating series of electron diffraction patterns. He began by a group demonstrating the use of the technique for studying the degree of order of the atomic arrangement in a surface of thin film, the diffraction patterns ranging from the diffuse halo of the disordered state to the sharp rings or diffraction spots characteristic of crystallinity. He then illustrated his experiments on the Beilby layer associated with polished surfaces of metals and inorganic crystals, and demonstrated the interesting point that the amorphous layer, though undoubtedly produced during polishing, did not always persist as a disordered layer but might spontaneously crystallize to the structure of the substrate, particularly on well-defined cleavage planes. Prof. Finch ended by showing electron patterns obtained during his later researches on the mechanism of crystal growth and the manner in which minute crystals were influenced by the structure of the surface on which they were deposited. In

conclusion, he certainly succeeded in making his hearers 'electron-diffraction conscious'.

W. A. WOOD

¹ "The Intensity Relations of Debye-Scherrer Powder Diffraction Lines", A. J. Bradley.

² "The Application of X-Rays to Study of Internal Stresses and Deformation", W. A. Wood.

³ "An X-Ray Investigation of Electrodeposited Chromium", H. J. Goldschmidt.

⁴ "Some Successes and Failures in the Application of X-Rays to Industrial Problems", A. H. Jay.

⁵ "The Surface Structure of Metals", G. I. Finch.

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DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, NEW ZEALAND

ANNUAL REPORT

THE twentieth annual report of the Department of Scientific and Industrial Research, New Zealand, covers the year 1945-46 (Wellington: Gov. Printer, 1947). Mr. D. E. Sullivan, Minister responsible for the Department, refers in his introductory statement to the way in which the Department has kept abreast of scientific developments overseas during the later years of the War, instancing the use of radar to assist coastal navigation and of antibiotics to assist the control of plant and animal diseases. The necessity of maintaining close personal contact with laboratories and research stations in other countries has led to a policy of sending young men of science abroad for varying periods to gain experience and provide a reserve of trained personnel to meet the increasing demand for scientific services. The secretary's report refers to the grouping of the Department's activities into the Auckland Industrial Development Laboratories, which has made good progress during the year. It is hoped that new activities sponsored in the Laboratories may ultimately be taken over by units of industry and serviced therefrom, leaving the Laboratories to concentrate on further research and development, and to undertake only such specialized services as are essential to industry and yet unlikely to be provided in New Zealand by private firms. It is also anticipated that the policy and organisation in relation to secondary industries of the Dominion Physical Laboratory, the Auckland Industrial Development Laboratories and the Defence Development Section, Christchurch, will do much to strengthen the link between research and secondary industries. During the year the Radio Development Laboratory and other sections in Wellington have been absorbed into the Dominion Physical Laboratory, and the chemical, physical and engineering activities have been grouped to meet more readily the requirements of the secondary industries.

During the year the Soil Bureau, Grasslands Division and Botany Division have combined in investigations covering areas where soil erosion is in progress or threatens. Over considerable parts of the Dominion the decrease of soil fertility through erosion can now be measured, and means for checking the losses indicated. The Grasslands and Botany Divisions have carried out surveys and initiated investigations, on hill country in both Islands, designed to conserve soil fertility. Other work of the Soil Bureau has covered soil chemistry, physics

and biotics, while the Botany Division of the Plant Research Bureau has continued to investigate weed problems, some of which, such as *nassella*, constitute a serious threat to good pastoral land. The Grasslands Division continues to breed, test and multiply improved strains of grasses and clovers, while studies of the best utilization of these by the animal, direct and through conservation, as silage or hay, are proceeding. Similar investigations on arable supplementary fodder crops, both alone and in association with pastures, are in progress in the Agronomy Division, which also continues to produce high-quality seeds for certification. The Entomology Division has focused its attention on the grass-grub, the major insect pest affecting pastures, but has completed its study of the control of cheese-mites, in co-operation with the Dairy Research Institute, which established the value of dichloroethyl ether for this purpose. The Plant Diseases Division, in dealing with a wide range of diseases affecting crops, has included numerous trials of new insecticides such as D.D.T. and 'Gammexane' as well as investigations on proofing canvas, etc., against fungal attack and the control of moulds which stain plaster walls.

Much of the work of this Division has been carried out in collaboration with other divisions, for example, the Plant Chemistry Laboratory, where an investigation of the value of antibiotics for control of plant and animal diseases and the exploration of New Zealand flora for new strains has been initiated. The Plant Research Laboratory has also investigated hormone weed-killers such as 2:4-dichlorophenoxyacetic acid; while investigations by the Plant Diseases, Botany and Soil Survey Divisions of the yellow-leaf disease of *Phormium* (New Zealand 'flax') indicate that the disease occurs on soils where other plants suffer from mineral deficiency. The relation of phormium to shortages of trace elements is being examined, and the Botany Division has amassed much information on the management of phormium plantations which should be valuable in placing the industry on a sounder basis.

Work at the Wheat Research Institute has led to the breeding of a new high-protein wheat giving excellent baking quality, and the wheat and flour-testing services of the Institute have been used to keep damage to flour through unfavourable harvest conditions at a manageable level. A new milling machine devised by the Institute to give an 80 per cent extraction without loss of nutritive quality in the flour has proved satisfactory in commercial trials. Tobacco research has revealed a variety which possesses good resistance to black root-rot, a disease which is now appearing in certain types of soil, and promising results have been obtained in trials of a new type of curing-kiln conducted in collaboration with the Chemical Engineering Section of the Dominion Laboratory. Fertilizer experiments, nutritional studies and a soil survey of tobacco blends are other activities in this field.

Investigations under the Dairy Research Institute have included land-ress taint in cream and butter, the use of 'Parchfoil' and 'Pliofilm' for wrapping butter packed in *Pinus radiata* boxes, trials of a method of wrapping matured cheese in 'Pliofilm', the use of transparent wrapping materials for packing skim-milk powder and the formulation of a specification for parchment for wrapping butter. Final reports of the work on the effect of mastitis as indicated by the Hume modification of the bromthymol blue test on the composition and cheese-making properties of the

milk have been forwarded for publication, and work on starters for cheese manufacture, the cleaning of milking machines and on dairy cow nutrition has continued. The Dairy Research Institute has also undertaken to compile, at the request of a committee on which the various other bodies, such as the Wheat Research Institute, the Dominion Laboratory, the Plant Chemistry Laboratory and the Otago Medical School, also concerned with research on food for human consumption, are represented, the information already in existence on the composition of the main classes of dairy produce. Fruit cold-storage research has continued on similar lines to those described in the previous report, and some notes are included on manual investigations in the research orchard at Appleby, and other investigations under the Plant Diseases Division, Auckland, and the Cawthron Institute, Nelson.

The Industrial Psychology Division has completed its investigation into the attitudes and problems of the girl worker in industry, and a report is being published. Reports are also in preparation on social and welfare activities in industry and on an investigation on music in New Zealand factories. An investigation concerned with the personnel function of management in the smallish firms, with the view of ascertaining what techniques of management are meeting with success and the underlying attitudes of mind or philosophy, is in its initial stages. Surveys and investigations were carried out for nineteen firms and organisations, as well as vocational examinations involving the use of psychological tests for seven firms and one Government organisation. The New Zealand Leather and Shoe Research Association continued investigations on the quality of sole leather, the effect of perspiration on upper leather, and shoe comfort; and during the year a pilot drying plant suitable for the conveyor system of shoe manufacture was designed and erected. An investigation of the curing of calfskins was commenced during the year.

The Manufacturers' Research Committee has no scientific or technical officers of its own, all industrial projects being carried out in departmental or research association laboratories, and as further trained staff and equipment become available it is hoped to extend the scientific services and testing organised under the Committee and available to the large number of small units in New Zealand which are unable to provide such facilities for themselves. In particular, it is hoped shortly to offer service in fuel technology. The Committee has during the year sponsored the formation of a research association for the pottery and ceramic industry. The Woollen Mills Research Association in its first year of work carried out many tests on unshrinkable finishes, and has studied laboratory methods of dyeing after-chrome blacks, as well as metachrome dye-baths in dye-houses, by means of pH measurements; it was discovered that under commercial conditions the use of ammonium sulphate was an unreliable method of neutralizing alkali in scoured wool or for controlling the pH of the dye-liquor. Tests have also been made of D.D.T. and 'Gammexane' for the protection of wool against carpet beetles.

In addition to the work of the Plant Research Bureau already noted, there may be mentioned its garden pea breeding work, maize-breeding project, linen flax investigations, studies of the toxicity to farm animals of indigenous and exotic plants, and on medicinal plants as well as seaweed investigations. Valuable work on different aspects of tomato pro-

duction and on the use of small applications of cobalt sulphate for the control of bush sickness has been carried out at the Cawthron Institute. Research work at the Canterbury Agricultural College on the control of house-flies, on sheep dips, the pre-emergence decay of peas and, at the Massey Agricultural College, on plant propagation, drainage and the improvement of mutton and wool, is also noted in the report, which reviews further the activities of the Dominion Laboratory in physical chemistry, ceramics, paint and building research, chemical engineering, metals and corrosion, oil, bitumen and tar and coal survey. The work of the Dominion Observatory in time service and seismology continued on the usual lines, and that of the Dominion Physical Laboratory has been replanned in accordance with post-war needs.

FORTHCOMING EVENTS

(Meeting marked with an asterisk * is open to the public)

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Saturday, December 28

ROYAL INSTITUTION (at 21 Albemarle Street, London, W.1), at 3 p.m.—Prof. H. Hartridge, F.R.S.: "Colours and How We See Them" (Christmas Juvenile Lectures, 1).*

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

LECTURER IN PHYSICS MEDICINE AND TOXICOLOGY, and a LECTURER IN HYGIENE AND PUBLIC HEALTH—The Secretary, Charing Cross Hospital Medical School, 62 Chandos Place, London, W.C.2 (December 31).

ASSISTANT LECTURER (Grade IIB) in MECHANICAL ENGINEERING—The Secretary, The University, Edmund Street, Birmingham 3 (December 31).

RESEARCH ASSISTANT, Milk Utilization Department, Auchincruive, Ayr—The Secretary, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow (December 31).

DIRECTOR OF A PUBLIC HEALTH LABORATORY in the Southern Rhodesia Government Service—The High Commissioner for Southern Rhodesia, 429 Strand, London, W.C.2 (December 31).

READERSHIP IN GEOGRAPHY, and the READERSHIP IN GEOLOGY, tenable at Queen Mary College—The Academic Registrar, University of London, Senate House, London, W.C.1 (December 31).

EDUCATIONAL PSYCHOLOGIST in the Ipswich Education Department—The Chief Education Officer, 17 Tower Street, Ipswich (December 31).

ENTOMOLOGIST to carry out fundamental research on bees, and a BIOLOGIST to assist in the research work of the Bee Research Department—The Secretary, Rothamsted Experimental Station, Harpenden, Herts (December 31).

PROVINCIAL SUPERVISOR of the National Milk Testing Service in the Bristol province under the Ministry of Agriculture and Fisheries—The Advisory Bacteriologist, 22 Berkeley Square, Bristol 8 (December 31).

SENIOR LABORATORY TECHNICIAN in the DEPARTMENT OF PATHOLOGY at Broadgreen Hospital, Edge Lane Drive, Liverpool—The Medical Officer of Health, Hospitals Department, Gordon House, Belmont Grove, Liverpool 6, endorsed 'Laboratory Technicians' (December 31).

DEPUTY CITY ANALYST—The Medical Officer of Health, Public Health Department, Leeds, endorsed 'Deputy City Analyst' (January 3).

HEAD OF THE DEPARTMENT OF CHEMISTRY AND BIOLOGY—The Clerk to the Governors, South-East Essex Technical College and School of Art, Longbridge Road, Dagenham, Essex (January 3).

LECTURER IN CHEMISTRY—The Clerk to the Governors, South-East Essex Technical College and School of Art, Longbridge Road, Dagenham, Essex (January 6).

LECTURER IN THE DEPARTMENT OF ANIMAL HUSBANDRY, and a LECTURER IN BIOCHEMISTRY—The Bursar and Secretary, Royal Veterinary College and Hospital, Royal College Street, London, N.W.1 (January 11).

METALLURGIST as Chief Officer of the Liaison and Technical Service Department—The Secretary, British Non-Ferrous Metals Research Association, 81-91 Euston Street, London, N.W.1 (January 11).

PRINCIPAL SCIENTIFIC OFFICER in the Radar Research and Development Establishment of the Ministry of Supply—The Secretary, Civil Service Commission, 6 Burlington Gardens, London, W.1, quoting No. 1721 (January 13).

CHAIR OF GEOGRAPHY, tenable at King's College—The Academic Registrar, University of London, Senate House, London, W.C.1 (January 14).

SENIOR ASSISTANT OBSERVER—The Director, The Observatory, Cambridge (January 15).

RESEARCH OFFICER, and an ASSISTANT RESEARCH OFFICER, in the Personnel Research section of the Leather Industries Research Institute, Rhodes University College, Grahamstown, South Africa—The Secretary, Office of the High Commissioner for the Union of South Africa, South Africa House, Trafalgar Square, London, W.C.2 (January 17).

LECTURER (Grade I) in THE DEPARTMENT OF CHEMISTRY—The Secretary, Royal Technical College, Glasgow (January 18).

CHAIR OF ELECTRICAL ENGINEERING, and a LECTURER IN MATHEMATICS, at Canterbury University College, Christchurch, New Zealand—The Secretary, Universities Bureau of the British Empire, 24 Gordon Square, London, W.C.1 (January 31).

LECTURER IN ARCHITECTURAL CONSTRUCTION at Auckland University College, Auckland, New Zealand—The Secretary, Universities Bureau of the British Empire, 24 Gordon Square, London, W.C.1 (January 31).

CHAIR OF MATHEMATICS tenable at the Imperial College of Science and Technology—The Academic Registrar, University of London, Senate House, London, W.C.1 (February 6).

OFFICIAL FELLOWSHIP IN CHEMISTRY—The Rector, Lincoln College, Oxford (February 8).

CHAIR OF PHYSIOLOGY—The Bursar, Royal Veterinary College, Royal College Street, London, N.W.1 (March 1).

CHEMIST AND BACTERIOLOGIST—The Chief Engineer, Mid-Wessex Water Company, Frimley Green, Aldershot, endorsed 'Chemist and Bacteriologist'.

CHIEF LABORATORY TECHNICIAN—The Medical Superintendent, Selly Oak Hospital, Birmingham.

DIRECTOR OF THE SOUTH AFRICAN FISHERIES RESEARCH INSTITUTE in Cape Town—The Scientific Liaison Officer, South Africa House, Trafalgar Square, London, W.C.2.

LECTURER IN MECHANICAL ENGINEERING—The Registrar, King's College, Newcastle-upon-Tyne.

PLANT BREEDER in the Hop Research Department—The Secretary, Wye College, Wye, Ashford, Kent.

DIRECTOR OF RESEARCH—The Secretary, Institute of Brewing, Goring Hotel, Grosvenor Gardens, London, S.W.1.

REPORTS and other PUBLICATIONS

(not included in the monthly Books Supplement)

Great Britain and Ireland

International Committee for Bird Preservation (British Section). Annual Report, 1941-1945. Pp. 36. (London: International Committee for Bird Preservation, c/o Zoological Society, 1946.) [17

Carnegie United Kingdom Trust. Thirty-second Annual Report, 1945. Pp. viii + 44. (Dunfermline: Carnegie United Kingdom Trust, 1946.) [17

Empire Cotton Growing Corporation. Report of the Administrative Council of the Corporation, submitted to the Twenty-fifth Annual General Meeting on June 25th, 1946. Pp. ii + 22. (London: Empire Cotton Growing Corporation, 1946.) [17

Memoirs of the Cotton Research Station, Trinidad. Series A: Genetics, No. 26; (i) The Genetics of 'Corky'—(1) The New World Alleles and their Possible Role as an Interspecific Isolating Mechanism, by S. G. Stephens; (ii) The Crinkled Dwarf Allelomorph Series in the New World Cottons, by J. B. Hutchinson; (iii) Evidence on Chromosome Homology and Gene Homology in the Amphidiploid New World Cottons, by R. A. Silow. Pp. 54. (London: Empire Cotton Growing Corporation, 1946.) 2s. 6d. [17

Imperial Bureau of Soil Science. Technical Communication No. 43: Land Classification for Land-Use Planning. By G. V. Jacks. Pp. iii + 90. (Harpenden: Imperial Bureau of Soil Science, 1946.) 4s. [17

The Effects of the Atomic Bombs at Hiroshima and Nagasaki: Report of the British Mission to Japan. (Published for the Home Office and the Air Ministry.) Pp. vi + 22 + 24 plates. (London: H.M. Stationery Office, 1946.) 1s. net. [27

Nuffield Foundation. Report of the Trustees for the Three Years ending 31 March 1946. Pp. 64. (London: Nuffield Foundation, 1946.) [27

Broadcasting Policy. (Cmd. 6852.) Pp. 28. (London: H.M. Stationery Office, 1946.) 6d. net. [47

Department of Scientific and Industrial Research: Fuel Research. Survey Paper No. 58: Rapid Survey of Coal Reserves and Production; a First Appraisal of Results. Pp. viii + 24. (London: H.M. Stationery Office, 1946.) 9d. net. [167

Ministry of Health. Salaries of Whole-time Public Health Medical Officers: Interim Report of Askwith Memorandum. Pp. 12. (London: H.M. Stationery Office, 1946.) 2d. net. [167

Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences. No. 586, Vol. 232: Smoking and Tobacco Pipes in New Guinea. By A. C. Haddon. Pp. 278 + 7 plates. (London: Cambridge University Press, 1946.) 50s. [167

Imperial Bureau of Plant Breeding and Genetics. The New Genetics in the Soviet Union. By P. S. Hudson and R. H. Richens. Pp. 88. (Cambridge: Imperial Bureau of Plant Breeding and Genetics, School of Agriculture, 1946.) 6s. [167

Proceedings of the Royal Society of Edinburgh, Section B (Biology). Vol. 62, Part 2, No. 24: The Use of Rats for Pressor Assays of Pituitary Extracts, with a Note on Response to Histamine and Adrenaline. By F. W. Landgrebe, M. H. I. Macaulay and H. Waring. Pp. 202-210. 1s. 6d. Vol. 62, Part 2, No. 25: Chemically Induced Mosaicism in *Drosophila melanogaster*. By Charlotte Auerbach. Pp. 211-222. 2s. Vol. 62, Part 2, No. 26: Situs Inversus Viscerum in a White Rat (*Mus norvegicus*). By Dr. R. A. R. Gresson. Pp. 223-224 + 1 plate. 6d. (Edinburgh and London: Oliver and Boyd, 1946.) [167

Royal Society of Edinburgh. Plant Invaders. By Sir William Wright Smith. (Address of the President at the Annual Statutory Meeting, October 22, 1945.) Pp. 8. (Edinburgh and London: Oliver and Boyd, 1946.) 1s. 3d. [167

University of Cambridge: Department of Colloid Science. A List of Papers published during 1912-46 under the direction of Eric Keightley Rideal, F.R.S., presented to him on his Resignation from the John Humphrey Plummer Professorship of Colloid Science, June 1946. Pp. 46. (Cambridge: Department of Colloid Science, The University, 1946.) [177