or premium royalties or options is necessarily irregular from year to year, and in 1953 was no more than £2,129 compared with £3,029 in 1950.

As regards development projects, electronic digital computers were still the largest single commitment. Commercial orders, including one for export, have been received for three of four large machines similar to that designed by Prof. F. C. Williams in the University of Manchester, and deliveries were scheduled to be made during 1953–54. The prototype of a smaller machine has been temporarily installed in the Mathematical Laboratory at Cambridge for trials. Development of the Packman potato harvester during 1952–53 was concentrated on the criteria necessary for a successful potato harvester as stated by the judges in the open competition of the Royal Agricultural Society of England. Development of the inventions in the field of hydrocarbon synthesis at the Imperial College of Science and Technology, London, proceeded without setbacks; but rapid progress was not at that time expected. Prototypes of a light steam-engine were being developed to suit the findings of a market survey in India and Pakistan. Development on both the aural microscope and the chick sexer was completed during the year, and a substantial number of chick sexers were sold in Britain and abroad.

Results of the pilot-scale production in East Africa of hecogenin from sisal juice have encouraged further contracts for supplies; the crude concentrate was being purified in the United Kingdom and pure hecogenin acetate was being made available for the synthesis of cortisone. Prototypes of the Burns inhaler for the administration of trilene and other volatile analgæsics were about to be delivered for clinical trials. Resin-based formulations containing insecticides have been the subject of patent applications in the United Kingdom and of overseas and licence agreements made with several British paint manufacturers. Commercially produced formulations are becoming available on an increasing scale. Increased interest in a group of some thirty inventions in the plastic structures field, which originated in the Royal Aircraft Establishment, Farnborough, is attributed to growing realization of the importance of phenolic-impregnated asbestos felts as constructional materials, and polyurethane and furan resins for foams and adhesives, respectively. A special study of the process of shock-curing of plastic laminates was being carried through so that the results could be made available to industry, and the construction by the Corporation of a plastic structures demonstration laboratory was proposed. The prototype of a novel machine for the liquefaction of atmospheric gases on a scale considerably smaller than that of conventional machines, invented at the University of Reading, was being built, and a programme of development of a regenerative system of mechanical transmission, known as the 'Gyreacta' system, has been inaugurated. This is of particular application to public-service vehicles.

Of the 692 inventions communicated to the Corporation during the year, 273 were from Government departments and research councils, 6 from industrial research associations, 16 from Commonwealth official organizations, 48 from universities and 314 from British private firms and individuals. Of the 257 patents or patent applications, the assignment or transfer of which to the Corporation was registered during the year, 185 were from Government departments and research councils, 22 from industrial research associations, 36 from universities and 11 from British private firms and individuals. Of the Corporation's total holdings of patents and patent applications at June 30, 1953, 501 were United Kingdom granted patents and 498 United Kingdom patent applications, the corresponding overseas figures being 227 and 998, respectively.

IMPERIAL FORESTRY INSTITUTE, OXFORD

ANNUAL REPORT FOR 1951–52

THE annual report of the Imperial Forestry Institute, University of Oxford, for 1951–52* shows that the Institute has expanded beyond all recognition from its early beginnings at the inception of the late Lord Lovat, the first chairman of the Forestry Commission. The idea then, as it still is, was to give postgraduate courses to forestry graduates who had been nominated as forestry probationers by the Colonial Office, and to offer refresher courses to members of the Colonial Services on leave. This latter course was attended during the year under review by sixteen forest officers from Nigeria (five), Gold Coast and Tanganyika Territory (two each), and Sierra Leone, Northern Rhodesia, Uganda, British Guiana, Trinidad, Fiji and Sarawak (one each). In addition, an Indian forest officer (Bengal) and one Pakistani forest officer (Punjab) attended the course arranged for them. As evidence of the wide nature of the courses offered at the Institute, five forest officers (Gold Coast, Nigeria, Trinidad and Sudan) attended a special aerial survey course during the Michaelmas term. In addition, the sylviculturist from the Agricultural Research Institute, Wad Medani, Sudan, and a German student from the forestry school of Göttingen attended the Institute for periods. It is of interest and importance to learn that nine students successfully sat the Final Honours School of Forestry. Of these, one Ceylon scholar took up a post in his country, another Gold Coast scholar took a post in the Gold Coast Forest Service, a third forestry scholar has returned to Uganda and two of the others obtained posts in the Colonial Forest Service.

The importance of the wide departure from the original conception of the Institute may lie in the future with the changing administrative policies in the British Colonies. Although little alluded to, forestry must play an important part if the forest services are eventually to be managed by the native administrations concerned. It is not possible, at present at any rate, to train fully the officers required for the higher forestry administrative posts in the Colonies. A final course in Europe may be regarded as indispensable to study European forest management which has been in force for so long a period. At the Institute such advantages are provided and other facilities are available to give the final training. For this reason alone the future importance of the Institute cannot be too strongly emphasized. The report deals fully with the various lecture courses given and the practical courses in the forests of France, Switzerland and Denmark, and also in Great

* The Imperial Forestry Institute, University of Oxford. Twenty-eighth Annual Report 1951–52. Pp. 28. (Oxford: Holywell Press, Ltd., 1953.)

Britain in both Forestry Commission areas and on private estates. Advantage can be taken of courses in every branch of forestry, including saw mills and utilization generally, soil science and other research.

The staff of the Institute, excluding the office and library members, now numbers fifteen, including Prof. H. G. Champion, the head of the Institute, with five others from university departments who assist in instructional work. An excellent reproduction of a drawing of the Institute building, by Alan Course of the *Oxford Mail*, is given as a frontispiece.

E. P. STEBBING

PRECAUTIONS IN THE USE OF IONIZING RADIATIONS IN INDUSTRY

THE Factory Department of the Ministry of Labour and National Service has produced an important and interesting booklet which gives a clear warning to the industrial worker using X-rays or the radiations from radioactive substances of the potential hazards and dangers to which he is exposed and of the precautions he needs to take to protect himself*. At the same time it illustrates the wide and rapid spread of the use of these radiations in industry for the examination, testing and improvement of products and processes. In the introduction to the booklet the numerous applications are outlined. These cover X-ray radiography of metals; X-ray fluoroscopic examination of manufactured articles; X-ray diffraction analysis of crystalline compounds; gamma radiography; elimination of static electricity; thickness control and measurement; and radioactive tracer methods to elucidate the mechanism of chemical, physical, engineering and biological processes. It is stated that no industrial processes coming under the Factories Act have as yet been reported in which neutrons, protons and deuterons, which are biologically very dangerous radiations, have been used; but the possibility that these particles may soon find suitable applications, particularly neutrons for radiography and diffraction, cannot be excluded.

It is emphasized in the section dealing with health hazards that experience so far shows that, with proper forethought and care, risks of impairment of the health of work-people in factories where ionizing radiations are used can be countered; but that complete immunity from harmful effects depends on an intelligent appreciation of the properties of the various radiations and of their potential damaging effects on the human body, and on vigilant attention being paid to the necessary precautions. This seemingly calls for specially and technically trained staff; in fact, to appreciate fully the detailed and valuable information given in the booklet the reader must have more than a nodding acquaintance with the terminology of radiation physics and chemistry.

In another section recommended maximum permissible dosage-rates, based mainly on the internationally agreed values adopted at the Sixth International Congress of Radiology 1950, are quoted and explained, and the latter half of the booklet is devoted to recommended precautions, both of a general nature and when using particular apparatus or methods. Under the heading of general precautions, the following categories are dealt with: planning and equipment; inhalation and ingestion precautions; supervision, training and monitoring; flow or dosimeter tests of workers' radiation exposures; and medical supervision. Special precautions are discussed separately for X-radiography, X-ray fluoroscopy, X-ray crystallography, gamma radiography, radioactive static eliminators, thickness gauges, radioactive tracer work and the handling of unsealed radioactive materials. The booklet ends with a valuable comprehensive bibliography of published memoranda on radiological hazards and protection.

The Factory Department of the Ministry of Labour and National Service is to be congratulated on the production of such an informative and timely booklet; it is a work which boldly presents the dangers of the new and powerful methods but yet, by indicating to industrialists how adequate precautions can be taken to safeguard their workers, wisely advocates the introduction and expansion of the use of ionizing radiations in industry.

* Ministry of Labour and National Service: Factory Department. Factory Form 324: Precautions in the Use of Ionising Radiations in Industry. Pp. ii+18. (London: H.M.S.O., 1953.) 2*s*. net.

ISOLATION AND PROPERTIES OF ALPHA-CORTICOTROPIN* FROM SHEEP PITUITARY GLANDS

By PROF. CHOH HAO LI, IRVING I. GESCHWIND, ANTHONY L. LEVY, J. IEUAN HARRIS, JONATHAN S. DIXON, NING G. PON and JERKER O. PORATH

Hormone Research Laboratory, Department of Biochemistry, University of California, Berkeley

IN an earlier communication[1] we described the preparation of a highly purified ACTH fraction (*E*) from an acid acetone extract of *sheep* pituitaries. We wish to report herewith the isolation from fraction *E*, without pepsin digestion, of a peptide (α-corticotropin) which behaves as a pure substance. This hormone is clinically active, and possesses adrenal-stimulating activity according to the results of standard bioassay procedures for adrenocortical function. While this work was in progress, the isolation and properties of corticotropins *B* and *A* from pig glands was reported by investigators from the Merck[2] and the Armour[3] laboratories, respectively.

The first step in a typical isolation of α-corticotropin is the precipitation at *p*H 9·3–9·4 of inactive material from a solution of fraction *E* in 50 per cent dioxane. The supernatant obtained from this step is further purified by zone electrophoresis on starch[4]. An electrophoretic pattern obtained in this manner is illustrated in Fig. 1. The active fraction is eluted from segments 5–7 and then chromatographed on 'Amberlite *XE*-97' resin under the conditions shown in Fig. 2. The contents of tubes 34–49 are combined, desalted, and submitted to 100 transfers in the all-glass counter-current distribution apparatus of Craig and Post[5] using a 2-butanol/0·5 per cent trichloro-

* In accordance with the suggestion of the Merck[2a] and Armour[3b] groups in designating pepsin-hydrolysed pig ACTH as corticotropin *B*, and the unhydrolysed hormone as corticotropin *A*, we have chosen to designate unhydrolysed ACTH obtained from sheep pituitaries as α-corticotropin, since many of its chemical and physicochemical characteristics differ from those described for corticotropin *A*.