

series reporting the results over a number of years of surgical and X-ray treatment of cancer of uterus and breast. Million-volt therapy appears to have no inherent advantages over 200 kV. therapy, though for technical reasons it may sometimes be more efficient.

On the physical side the report shows that considerable effort is being made in a number of centres to provide the facilities and equipment necessary for the clinical use of radioactive isotopes, which have been available from the Medical Research Council for therapeutic purposes since September 1948. Among the new instruments for detection and measurement of radioactive isotopes on which work is being carried out is the scintillation counter. Several centres report investigations on the possibilities of cobalt-60 as a replacement for radium in various therapeutic applications.

A survey is given in the report from St. Bartholomew's Hospital on the clinical results with the million-volt plant over the last eleven years. Measurements that have been made on very high energy X-radiations are reported from the Royal Cancer Hospital, where a 30-million volt synchrotron is now being installed.

Three centres report on the investigations on dosage and protection requirements with 10-gm. radium units. Of particular interest is the report from the Leeds General Infirmary, where the shielding of the unit is provided by uranium metal.

Critical studies of problems in dosage measurement are reported from several centres, particularly with regard to the energy absorption occurring in or near bone. Geometrical methods of estimation of dosage within patients appear to be giving way to some extent to methods of direct measurement on the patient during treatment, and the design and construction of various instruments for this purpose are reported on.

The chemical effects of radiation are being further investigated. A report from the Christie Hospital and Holt Radium Institute describes continued work on 'protection' phenomena, and at the Royal Victoria Infirmary, Newcastle, further investigations have been carried out to test the free radical theory. As a result of this latter study it has been possible to develop methods of dosage measurement based on chemical effects which may be of considerable importance in dosimetry studies with radioactive isotopes.

Related to these experiments on the chemical effects of radiation, a report from Mount Vernon Hospital states that it has been demonstrated that the sensitivity of the broad bean root to X-radiation is very dependent on the oxygen concentration of the water in which the root is immersed.

In the field of experimental radiology, reports on whole body irradiation of mice and localized irradiation of rat tumours show that in each case the effects of the radiation depend on the protein diet of the animals.

Possibilities of the therapeutic applications of microwaves of wave-lengths 1-100 cm. are reported from two centres. The work done so far has been on the absorption and dielectric properties of water and various types of tissue.

The report from the Dominion X-Ray and Radium Laboratory, Christchurch, gives an interesting account of the development of a radio-physical advisory centre in New Zealand, and of the particular problems involved in such a country with a small and relatively scattered population.

INSTITUTION OF ELECTRONICS (N.W. BRANCH) JH FOURTH ANNUAL EXHIBITION

AFTER a modest beginning, the exhibition of the Institution of Electronics (N.W. Branch) now appears to be firmly established as an annual affair. Each succeeding year has seen a widening in scope and variety of the apparatus exhibited, until this year there were sixteen firms represented, the floor space occupied being considerably greater than at any of the previous exhibitions. On show this year, in addition to the standard measuring and communications apparatus, were several instruments of improved design, and others in which new features were incorporated.

Dawe Instruments, Ltd., showed a Swiss product which is now being manufactured in Great Britain under licence. The apparatus measures the moisture content of warps and fabrics and affords a continuous drying control over the entire width of the material. The measuring principle is based on the fact that the magnitude of the electrostatic charges which develop on fibrous material in motion depends to a large extent upon the degree of moisture of the material. These charges are collected by means of small insulated concave riders, which act as brushes, and are transferred to a measuring instrument of new design which is capable of detecting extremely small electrostatic charges.

A high-power stroboscope for use in the examination of heavy machinery operating at speeds within the range 20-3,000 r.p.m. was also shown by the same firm. The instrument, which can be operated remotely, has a variable-phase control so that any required part of the machine can be examined.

W. Edwards and Co., Ltd., showed a new relay for vacuum control in which variation in conductivity of the gas with pressure causes a long heated filament to operate electrical contacts. The ranges of pressure are between 0.001 and 10.0 mm. mercury, with differential according to requirements. New types of rotary pumps and a range of oil diffusion pumps were also exhibited.

A novel feature demonstrated by Everett Edgumbe and Co., Ltd., was a valve demonstration panel for educational purposes. It is designed for laboratory use to facilitate the plotting of valve characteristics with direct potentials, and comprises an a.c. power pack with voltage controllers, voltmeters and ammeters in each electrode circuit. A mimic diagram embraces the controllers, indicators and external terminals.

Ferranti, Ltd., showed two new instruments: a cold-cathode voltage stabilizer having a running voltage of 60.5 volts with a current-range from 2.5 m.amp. to the unusually low value of 120 μ amp., and an electronic impulse counter. In the counter, a photoelectric cell amplifier is connected either directly or by way of a frequency-dividing network to a mechanical recording counter. Light flashes at rates of up to 8,000 per minute can be accurately observed.

Marconi Instruments, Ltd., demonstrated their six-channel electroencephalograph, which has proved reliable over a period of three years. The direct-coupled mains amplifiers have a gain of 10^6 with less than 2 per cent distortion on full gain. The same firm was one of several exhibiting meters for the determination of the moisture content of timber and

of cereals. Percentage moisture content of timber is obtained by relating it to electrical conductivity by a direct-current method. Four needle electrodes are designed to penetrate the specimen to a depth of approximately 5 mm., and the conductance of the wood fibre between the electrodes is compared with known standards within the instrument. Specialized electrodes are provided for use where penetration of the surface must be avoided. Surprisingly enough, for an exhibit at an electronics exhibition, the circuit of the moisture-in-cereals meter is a development of the Wheatstone bridge and is independent of valve characteristics. It is, of course, also independent of voltage variations. The test cell applies great pressure to the specimen, thereby reducing it to a uniform state.

The EM3 electron microscope was shown by the Metropolitan-Vickers Electrical Co., Ltd., which also showed the electrostatic clutch. Another exhibit was an electronic speed-control apparatus, in which the speed of an electric motor is controlled by electronic equipment using thyratrons actuated by a valveless magnetic amplifier. The motor is controlled against a constant torque throughout a wide speed range, the accuracy obtainable being 2 per cent of the maximum speed. Using thermionic amplifiers, the accuracy claimed is 0.1 per cent. A current-limit feature prevents overload.

The same firm has under development a radiation pyrometer for the recording and controlling of temperature. A thermocouple exposed to the heat radiated by the source is used to record the temperature, and the control is exerted by a photo-electric cell which is sensitive to infra-red radiation. The output from the cell actuates a Schmidt trigger circuit feeding a relay which is connected in series with the source supply. Since the thermocouple is not in contact with the source, there is no temperature limit.

Muirhead and Co., Ltd., showed an acoustic strain-gauge; this instrument, which measures strain in structures in terms of the change in frequency of a vibrating wire, is robust and portable. A valve-maintained tuning fork for use as a mains frequency stabilizer was also on view. The frequency is maintained constant to 50 parts in 1 million.

A new industrial viscometer and the ultrasonic generator were exhibited by Mullard Electronic Products, Ltd. The viscometer is for the continuous monitoring of viscosity and operates on the drag disk principle, employing an electronic method of torque measurement. The instrument measures from 0 to 10^6 centipoises in three ranges using three interchangeable heads. The ultrasonic generator is of the high-frequency piezo-electric type developing from 600 watts to 1 kilowatt. As a demonstration experiment a stable emulsion of mercury and water was produced.

The Plessey Co., Ltd., demonstrated its two-stage electromagnetic electron microscope. It also showed samples of a soft magnetic core material having a finely laminated structure; one grade has a maximum permeability of 1,000, whereas another grade, although not having such a high maximum permeability, has remarkable machining properties and high strength.

A new and interesting instrument suitable for many problems of industrial control and measurement was shown by F. C. Robinson and Partners, Ltd. It is the proximity meter by Fielden, and is unique in that it is possible to carry out the operation without physical contact with the specimen. The instrument

may be applied to any problem which may be resolved into a minute change in electrical capacitance relative to earth, and can measure dimensions and distortions of an order not possible by mechanical means. On this stand was also shown a neat and attractively finished high-speed pen recorder. 'Teledeltos' paper is driven by a synchronous motor, and the frequency response of the instrument is uniform up to 60 c./s. The same firm represented the Baldwin Instrument Co., Ltd., which is now developing an X-ray method for the continuous gauging of sheet metal.

It has been possible to mention only a few of the many interesting exhibits, and lack of space precludes any attempt to make more than a passing reference, in conclusion, to the pleasing finish of the products and the attractive way in which they were displayed.

H. STEEPLE

1816

OBJECTIVES IN THE EDUCATION OF COLONIAL PEOPLES

AN afternoon session on September 2 of Section L (Education) of the British Association during the meeting at Newcastle upon Tyne was devoted to a consideration of objectives in the education of Colonial peoples. The session was opened by a paper read by Mr. W. E. F. Ward, deputy educational adviser at the Colonial Office. Mr. Ward pointed out that most of the problems commonly met with in Colonial education—*isolation, malnutrition, parasitic diseases and imperfect communications*—are common to Colonies and Sovereign States. The core of the problem is to educate one race in an alien culture, in order that it may attain full world citizenship. So far as British territories are concerned, responsible self-government is an accepted aim of Colonial policy, and education must accordingly be planned with this in view.

Education for citizenship often presents greater problems than it does in Britain. In all Colonial territories there are indigenous political and social systems and cultures, often ill-fitted to compete with Western ideas; while in many territories there are the special problems of a plural society. Education must be recognized as an instrument of social change, and must make its contribution towards the solution of social and political problems.

It is important to use indigenous culture as a basis for education, since a pupil will be better fitted to appreciate Beethoven or Shakespeare if he approaches them with a knowledge of his own native music or poetry. Education must begin with matter familiar to the child, and must grow gradually towards the unfamiliar and alien culture. Efforts are being made to keep the schools in touch with tribal life in regions where this exists as the basis of society; much damage could be caused if education resulted in a cleavage between the traditional elements of society and the educated youth. The education of women, so important everywhere, is particularly important in countries where social change is going on and where the school is so badly in need of the co-operation of the parents.

Colonial governments are too poor to develop educational facilities as rapidly as they would wish. This being so, it is essential that a developing educational system should within its limitations be a