

## ROYAL SOCIETY OF CANADA

## ANNUAL MEETING

THE 1944 meeting of the Royal Society of Canada was held at the University of Montreal during May 29–31 under the presidency of Mgr. Olivier Marault, rector of the University.

New fellows presented at the first general meeting included the following in the scientific sections: Section III (Chemical, Mathematical and Physical Sciences): R. C. Dearle, G. S. Field, John T. Henderson, G. de B. Robinson, W. Ure; Section IV (Geological Sciences): J. W. Ambrose, G. V. Douglas, H. B. Yates; Section V (Biological Sciences): J. A. Anderson, W. V. Cone, G. E. Hall, W. F. Hanna, Georges Maheux, D. S. Rawson. Lieut.-General A. G. L. McNaughton, who had been elected an honorary fellow in 1941, while he was absent from the Dominion as Commander-in-Chief of Canada's Army Overseas, was also presented.

The Society's medals were presented at the evening meeting on May 29 as follows: Flavelle Medal to Prof. Velyien E. Henderson, professor of pharmacy and pharmacology in the University of Toronto, in recognition of contributions to knowledge in the fields of pharmacology, physiology and therapeutics, including the discovery of the anæsthetic properties of cyclopropane; Henry Marshall Tory Medal to Prof. Frank Allen, professor of physics in the University of Manitoba, for his contributions to the subjects of optics and acoustics and especially to a border region of physics and physiology; Tyrell Medal to Prof. Harold A. Innis, professor of political economy in the University of Toronto.

Following the presentation of the medals, the presidential address "Montréal: une Synthèse" was delivered by Mgr. Marault. A popular lecture on "War, Peace and Commerce" was given on the evening of May 30 by Dr. B. K. Sandwell.

In Section III, the presidential address by Prof. T. Thorvaldson, professor of chemistry in the University of Saskatchewan, dealt with "The Solid State". It reviewed the various theories of chemical reactions in the solid state and the experimental evidence in support of them. This was followed by a symposium on the same subject, in which Prof. M. A. Peacock described the methods of identification of solid phases by crystallographic means and Prof. E. F. Burton showed some recent photographs taken with the Toronto electron microscope of the forms of solid particles of ultramicroscopic dimensions. The final paper of this symposium, by Dr. G. S. Whitby, was on rubber, and described the chemical constitution and related physical properties of several of the new artificial rubbers now being produced.

Among the thirty-two other papers presented to the Section, mention may be made of one by Prof. Frank Allen, in which results of experiments on the sensitivity of the colour sensations were described. He finds that when the right eye, for example, is adapted to red light, the red sensation is reduced, but in the left eye all three sensations (red, green and violet) are enhanced. If the eye is rested after adaptation for three minutes, a reversal in sensitivity occurs. There is thus an oscillation of sensitivity. A paper on further simplification in thermodynamical calculations along lines previously developed was read by Prof. A. N. Shaw. Dr. J. A. Pearce and E. C. Walker reported the orbital elements of  $\lambda$  Andromedæ based on a series of measurements made on high-

dispersion spectrograms taken at Victoria, B.C. Dr. E. C. Beale discussed results which indicate that some new molecular absorption lines recently discovered show characteristics closely similar to atomic lines. It is suggested that their probable origin is to be found in the solid particles responsible for general absorption in interstellar space, and that laboratory investigations of the absorption spectra of such particles as are likely to be present in interstellar space might be fruitful in their identification. A new mechanical height computer for *radio sonde* observations was described and shown by Dr. W. E. Knowles Middleton. Dr. J. A. Pearce, of the Dominion Observatory, was elected president of the Section, and Prof. C. T. Sullivan, Repath professor of pure mathematics at McGill University, vice-president.

In Section IV, the presidential address by Dr. W. A. Bell, palæobotanist of the Geological Survey of Canada, dealt with the use of some floras in Canadian stratigraphy. Fossil floras have proved very useful in subdividing the very thick carboniferous sediments of the Maritime Provinces into six groups, of which three are Mississippian and three Pennsylvanian. The use of the terms Mississippian and Pennsylvanian is more appropriate as regards major floral and tectonic events of the Acadian province than Lower and Upper Carboniferous. The former terms are not synonymous with the latter, for the Mississippian terminated in an early part of Upper Carboniferous time, as in the Mississippian valley region. The group subdivision established mainly on floral evidence is apparently the most natural one, for it is corroborated by tectonic events. Coal formation was not confined to one age as formerly assumed, but took place locally in the Pennsylvanian in each of the three ages represented by the groups of strata.

Nineteen other papers on geological and mineralogical researches were presented. Dr. Madeleine Fritz, Royal Ontario Museum of Palæontology, reported the recent discovery of the bryozoan species *Trachytoechus moniliformis* Fritz, n.sp. in the Gaspé sandstone of Lemieux Township, Gaspé County, in the interior of the Gaspé peninsula. This has provided evidence to substantiate the belief that the rocks in which the specimen was found are of Middle Devonian age. Dr. F. J. Alcock, of the Geological Survey of Canada, presented evidence based on the findings of several striated surfaces and many erratics in central Gaspé which support his already published conclusions that the Labrador ice sheet crossed the Shickshock Mountains. Dr. J. S. DeLury, professor of geology and mineralogy in the University of Manitoba, was elected president of the Section, and Dr. B. R. MacKay, of Ottawa, vice-president.

Dr. H. S. Jackson, University of Toronto, President of Section V, spoke on "Life Cycles and Phylogeny in the Higher Fungi". The discussion centred in a comparison of life-cycles in the rusts with those in the red algæ. It was shown that not only do the normal cycles correspond very closely, but that the same sort of simplified cycles occur in both groups. A life-cycle comparable to that of the ascomycetes also occurs among the simplified red algæ.

Prof. Velyien Henderson, the Flavelle Medal winner, presented a paper by invitation entitled "Studies in Anaesthesia with the Cyclopropane Group". Prof. A. T. Cameron, professor of biochemistry in the University of Manitoba, outlined the results of his researches on the relative sweetness of certain sugars and mixtures of sugar. If a solution

contains known concentrations of two or more sugars, a means has been found for calculating the sweetness of this mixture in terms of that of a specific concentration of sucrose or of glucose. It has been demonstrated that the sweetness of 25 per cent sucrose is not more than (and is probably less than) 3.3 times that of 5 per cent sucrose. Forty-three other papers on various phases of biological and medical sciences made up the programme of Section V. Dr. Robert Newton, president and formerly professor of plant biochemistry in the University of Alberta, is the new president of the Section and Prof. B. P. Babkin, research professor of physiology in McGill University, vice-president.

Prof. J. K. Robertson, professor of physics in the Queen's University, Kingston, Ontario, is the new president of the Society, and Prof. E. S. Moore, professor of geology in the University of Toronto, vice-president. J. R. DYMOND.

## THE ROYAL OBSERVATORY, GREENWICH

### ANNUAL REPORT

THE annual report of the Astronomer Royal to the Board of Visitors covers the period May 1, 1943–April 30, 1944, and describes the work done during the year at Greenwich and the various out-stations which together constitute the war-time Royal Observatory. Until the last-named date, no further damage by enemy action had been sustained at Greenwich. On the observational side, a restricted astronomical programme on the Airy transit circle has been maintained, solar work has been continued on the photoheliograph and spectrohelioscope, and the routine meteorological observations have been made as in normal times. Work at the out-stations includes the maintenance and improvement of the time service, which still operates from two undisclosed locations, the rating and supply of chronometers and watches for use in H.M. Forces, the production of the *Nautical Almanac* and various ancillary publications, and the regular magnetic observations made, as in previous years, at Abinger.

Fundamental observations of position made on the Airy transit circle include about a thousand transits of stars, the sun, and the planets. Collimation observations, which have hitherto been possible only in daylight and then only with difficulty, are now facilitated by artificial illumination. A surprising feature revealed by the level observations of the last twenty-one years is that in that time the east pier of the instrument has steadily sunk by about  $\frac{1}{2}$  in. relative to the west pier, though no such subsidence had occurred before in the seventy-two years of its previous history.

A discussion of the preliminary tests on the new reversible transit circle, based on observations made between its installation in 1936 and 1940, shows that the annual variations in level and azimuth are satisfactorily small. The diurnal changes in azimuth are small; those in level are of more consequence but can be reduced by better lagging of the piers; but those in collimation are disconcertingly large when the ambient temperature is unsteady. At present there seems no escape from the conclusion that a large amount of observing time must be used on observations of collimation in order to provide a

satisfactory control of the variations. Latitude results on the Cookson floating zenith telescope relating to the period 1936–40 have also been derived, and the observations are examined with the view of tracing to their source the occasional large residuals shown, especially by recent observations. No certain conclusion is reached, though anomalous surface tension effects and wind effects are suspected.

The solar work calls for little comment. Sunspot frequency has slowly fallen, no spots being recorded at all during February, and only one very small spot during April. The epoch of minimum activity has apparently been reached, and the first high-latitude spots of the new cycle appeared in May 1943. Geomagnetic activity was considerable, however: one great storm and twenty smaller ones occurred, some of these latter falling in a 27-day cycle characteristic of storms at solar minimum. It is surprising that one of the five short-wave radio fade-outs which occurred during the year did so when no spot was visible on the disk. Fade-outs of this type have hitherto been attributed to solar flares ('chromospheric eruptions'), which are associated almost exclusively with sunspots. It will be interesting if positive spectroscopic evidence can be obtained that this is an instance of a flare occurring unassociated with a spot.

The Nautical Almanac Office continues its routine computational work involved in the production of the *Nautical Almanac*, the *Abridged Nautical Almanac*, the *Air Almanac* and the *Astronomical Navigation Tables*. A large increase in the work of the Office has occurred, and still more is forecast, as a result of the formation of the Admiralty Computing Service early in 1943. The Nautical Almanac Office forms the nucleus of this body, performing all the centralized computing and advising on tables, methods and machines. Some forty pieces of computation have been undertaken, none of them of an astronomical character, and about half of them have already been completed.

A major section of the Astronomer Royal's report is devoted to the work of the Time Department, which is evidently still expanding rapidly. The time service has been operated, as in previous years, from duplicate stations, each a self-contained unit itself capable of providing the whole service. The change-over from pendulum clocks to quartz crystal clocks, forecast in the last report, is now under way. Three quartz clocks have been installed during the year, one at each station being equipped with a phonic motor having a 60:61 gearing to provide the vernier time signals. These signals are now operated solely from phonic motors, and the accuracy of spacing of the signal pulses has greatly improved. Errors of as much as five milliseconds due to the unfortunate habit of pendulum clocks of 'wandering' between final correction and signal transmission have also been eliminated by this substitution. The new clocks are not yet used as primary standards, since the quartz crystals are not sufficiently 'aged', so the long-term performance of the time service has not yet been materially improved by their installation. But in short-term performance a marked improvement has already occurred: the uncertainty of individual 24-hour intervals defined by successive 10<sup>h</sup> GBR signals has decreased from  $\pm 5$  to  $\pm 1.2$  parts in 10<sup>8</sup>. Improvements in long-term performance are predicted for the near future as a result, first, of the transference to floating-battery operation of the primary standards maintained outside the Observatory (their performance has hitherto suffered from