ROYAL SOCIETY OF CANADA

ANNUAL MEETING

THE annual meeting of the Royal Society of Canada was held at McMaster University, Hamilton, Ontario, during May 25–27. The scientific sections of the Society held their meetings in the Science Building of the University and the general meetings took place in Convocation Hall. The president of the Society, Prof. J. B. Collip, presented the medals at the evening meeting on May 25. The Flavelle Medal was awarded to Prof. B. P. Babkin, research professor of physiology at McGill University, for his outstanding work in analysing the secretory mechanisms of the digestive glands. Prof. John L. Synge, professor of applied mathematics in the University of Toronto, received the first award of the Henry Marshall Tory Medal for outstanding contributions to applied mathematics; and the Willet G. Miller Medal, also awarded for the first time, was presented to Prof. Norman Levi Bowen, distinguished service professor of petrology in the University of Chicago, in recognition of his contributions to geology. Following the presentation of the medals, Dr. Collip read his presidential address on "Science and War". After briefly reviewing the part played by science in former conflicts, Dr. Collip emphasized the important contributions of physicists, chemists and other men of science in the present War. He dealt in some detail with aviation medicine and the co-operation between the men of science and the armed forces in solving many of the problems which modern warfare presents. He referred to the recognition and support that scientific workers are now receiving as an integral part of the war effort, and pointed out that much of this research work is producing results that will be equally important in the post-war period.

A further feature of the meeting was the symposium, held after the dinner on May 26, on "Medical Investigations as Applicable to the Armed Forces", at which Surgeon Captain A. McCallum, medical director-general of the Royal Canadian Navy, spoke in general terms of the organization for research in this service and of the work already accomplished. Surgeon Commander C. H. Best, director of the Royal Canadian Naval Medical Research Unit, gave a more detailed account of some of the results achieved in connexion with nutrition, night-vision and similar problems. Brigadier J. C. Meakins outlined briefly the medical research going on in the Army, and Group Captain J. W. Tice, director of Medical Services (Air), spoke of some problems of interest to the Air Force in particular. This was followed by Squadron Leader K. A. Evelyn, who discussed in further detail many of the special problems in aviation medicine, at the conclusion of which he showed a special moving-picture film entitled "Oxygen". This film was shown as a feature, permission for which had been specially granted. It was prepared under the auspices of the Associate Committee on Medical Research of the National Research Council for use in training enlisted aircrews in the essentials of physiology and the effects of high-altitude flying, pointing out the importance of the special precautions required.

Prof. J. K. Robertson delivered the presidential address in Section III (Chemical, Mathematical and Physical Sciences) on "The Role of Physical Optics in Research", in which he reviewed the discoveries into the nature of light, atomic and molecular structure and in astronomy which have resulted from the application of physical optics in spectroscopy, interferometry and diffraction. This historical account was followed by an address on "Chemical Reactions of Excited Atoms" by Dr. E. W. R. Steacie, and a paper on "Molecular Spectra and their Applications" by Dr. Andrew McKellar, who spoke particularly of applications in astronomy. Thirty-eight papers were presented to the section, the majority of which were read by title. Owing to the pressure of war work, few physicists and chemists were in attendance, but mathematics and astronomy were well represented. Among those papers which were read, mention may be made of a few of some general interest. Prof. Lachland Gilchrist and J. W. Britton gave an account of further experiments on the use of drill holes in electrical methods as an aid to the location of mineralized bodies and rock structure. Dr. J. A. Pearce announced the orbital elements of *H.D.* 222107 λ Andromedæ as revised on the basis of recent measurements and also the orbital elements of the spectrographic binary *H.D.* 34333. A paper of particular interest was given by Dr. L. M. Pidgeon on the production of light metals, in which he reviewed the methods for the separation of magnesium and the difficulties which had to be overcome. He gave an account of his own experiments, which resulted in the present method used in obtaining large quantities of magnesium metal in Canada since the outbreak of hostilities. Dr. H. F. Manske and L. Marion reported the isolation of eight alkaloids from *Lycopodium annotium* L. Several papers were presented by Dr. Paul E. Gagnon and his co-workers, among which mention may be made of one in which the isolation of some new sulphamides was announced. Perhaps the most interesting paper presented to the section was one of those given by Prof. E. F. Burton, in which J. H. L. Watson showed how stereoscopic photographs had been taken with the electron microscope, and exhibited several examples. This new technique enables one to view the objects photographed so as to bring them out in three dimensions, thus adding depth to the pictures and revealing new features in the structure of smoke and metallic particles. At the conclusion of the sectional meetings, Prof. T. Thorvaldson was elected president of the Section for the year 1943–44.

In Section IV (Geological Sciences), Prof. M. B. Baker gave the presidential address and spoke on "Gold and Iron Prospects in Canada". This address was followed by sixteen papers on various geological investigations. Among these, Dr. E. A. Hodgson delivered a very interesting paper on the "Rock Burst Experiments at Lake Shore Mines, Kirkland Lake". He outlined the programme of the investigations carried out since 1939 and gave some of the results already obtained. Equipment has been designed to pick up, amplify and record the small subaudible snaps which occur in a rock under pressure and which increase in number as the pressure increases. The records of a severe rock burst which occurred on January 29, 1943, show conclusively that the method clearly delimits the area under pressure to within a hundred feet or less. So far, attempts to predict bursts as to time have not been successful; but it is hoped that further work will result in some measure of time prediction.

Prof. G. B. Reed, president of Section V (Biological Sciences), spoke on "Wound Infections and Local Chemotherapy". This paper dealt with the treatment of wounds with the sulpha drugs and emphasized the necessity of applying the drug as soon as possible

after the wound had been inflicted in order to obtain the greatest benefit. Fifty-six papers were presented to this Section, many of which will appear in scientific journals. Space permits the mention of the two invited papers only. That by Dr. Babkin, on "Secretory Mechanism of the Digestive Glands", contained a survey of the work of his laboratory on this subject. Briefly, it may be stated that the investigations have established that the mucous, demilune and myo-epithelial cell groups of the submaxillary gland each have a separate innervation, and that the surface epithelium cells of the gastric mucosa and the mucoid, peptic and parietal cells of the gastric glands are under independent nervous or humoral control. The conclusions to be derived from this work were stated and further analysis of the secretory function of the digestive glands given. The second paper, by Prof. G. W. Scarth on "The Mechanism of Frost Resistance", contained an account of the modes of frost injury to plant cells and of the protoplasmic changes which accompany frost-hardening. He also discussed how the different hardening changes afford protection. The new president of this Section is Prof. H. S. Jackson.

At the general meeting, Monsignor Olivier Maurault, rector of the University of Montreal and a fellow of Section I, was elected president of the Society, and Prof. J. K. Robertson was elected vice-president.

DAVID A. KEYS.

HERMIT CRABS FROM THE JOHN MURRAY EXPEDITION

DR. E. F. THOMPSON has published some interesting facts in the report referred to below* of collections obtained by the John Murray Expedition. The stations at which the Pagurids were taken are confined to the Gulf of Oman, the south Arabian coast, the Gulf of Aden, the East African coast, the Zanzibar region and the Maldive area, that is to say to the coastal regions and the two Gulfs.

The littoral and shallow-water forms are related to those of the rest of the Indo-Pacific region. The deep-water forms may be divided into those living at mid-depths, which have considerable affinity with those of the North Atlantic, and the only truly abyssal form *Parapagurus pilosimanus*, which occurs at great depths around the edges of every ocean basin in the world. Nothing is known of the life-history of this species. It has always been recorded as housed in a typical zoophyte growth. In the present collection this was not the case; a number of different shells were used, the most frequent being Ianthina. The zoophyte house begins around a shell, and the author has found in two specimens examined from the North Atlantic that this basis was also on Ianthina.

Paguropsis typica, hitherto only known from the Philippines, the Gulf of Martaban and Cape Comorin, was found in the Zanzibar region, thus extending its known distribution another 2,000 miles round the world. Its range in depth is only 32 metres, although its geographical distribution is so wide.

The one new species described is a Sympagurus, *S. burkenroadi*. The suggestion that the three specimens of Glaucothoe, attributed to *G. hendersoni*, found in the collection may be the larvæ of *S. burkenroadi* is most interesting. Whether the large symmetrical deep-water pagurids known as Glaucothoe are adults or larvæ is now practically settled in favour of the latter view, but it is still a matter of controversy as to whether they are abnormal or normal larval forms—the larvæ of small pagurids which have failed to find a shell and consequently have continued to grow in a larval state, or merely natural larvæ of large forms. The latter solution appears most likely to be the correct one, and Dr. Thompson has brought the matter further by finding these Glaucothoes inhabiting shells, with the abdomen twisted, but still with paired abdominal appendages and a symmetrical tail fan. Thus they are further developed towards adult pagurids than any specimen previously recorded. If they are normal larvæ, they must belong to large adults. In the present case the adult is very probably a Sympagurus, and the characters, except for those which are purely larval, agree very closely with those of *S. burkenroadi*. Moreover, one was found inhabiting the same species of shell. We are certainly well on the way to solving the 'Glaucothoe problem'.

* Paguridæ and Cœnobitidæ. By Dr. E. F. Thompson. (The John Murray Expedition 1933–34, Scientific Reports, 7, No. 5, 1943.) (London: British Museum (Natural History).)

HIGH CRYSTAL HARMONICS FOR OSCILLATOR CONTROL

AN article on this subject by I.E. Fair (*Bell Lab. Rec.*, 21, No. 8; April, 1943) points out that stability is one of the major requirements for oscillators controlling the frequency of radio transmitters. In ultra-high-frequency transmitters it assumes particular importance because a very small percentage change in the frequency of the controlling oscillator may shift the transmitted band many thousands of cycles. At 100 mc., for example, a 0·01 per cent change in frequency means a change of 10 kc., which is as much as the entire width of a broadcast band. Stability in oscillators is secured by some form of tuned circuit. The reactance of such a circuit changes slowly with frequency except over a narrow band in the region of resonance, where a small change in frequency is accompanied by a very large change in reactance, this latter enabling the resonant circuit to act as a frequency stabilizing element. Quartz crystals are eminently suited to control in this way because of their very sharp resonance, which is due to their low values of coupling and dissipation. Their characteristics change only slightly with variations in temperature and voltage, and thus high stability under all conditions is more easily obtained with them than with elements having higher dissipation or greater sensitiveness and voltage.

With the type of crystal most commonly used for oscillators, the frequency of resonance is inversely proportional to the thickness of the crystal. At 10 mc., for example, the thickness of the crystal is only about 6½ thousandths of an inch. Before being used in an oscillator, the crystal must be ground accurately to have parallel faces and to the desired thickness; satisfactory grinding becomes impracticable for crystals appreciably thinner than this. For transmitters requiring higher frequencies it has been almost universal practice to use a crystal with its fundamental resonance below 10 mc. and to employ a harmonic generator to secure the desired high frequency. So far as stability is concerned, this method is satisfactory, but it requires a very appre-