RESEARCH ITEMS

Electrical Phenomena in Heart Muscle During Activity

J. A. E. EYSTER, in a paper read at the Autumn Meeting of the U.S. National Academy of Sciences held during October 13–15, dealt with the electrical potentials which develop in the heart in the interval immediately preceding and during the contraction of the organ, and their relation to the contraction process. Potential-time curves of two types, unipolar and differential, are recorded by means of direct current amplifiers and cathode ray oscillographs, along with a constant reference curve. The characteristics of these curves and their relation to each other and to the onset of contraction in the various localized regions of the heart will be discussed. The electrical phenomena are characterized by their polar distribution. Regions of positive and negative potentials arise simultaneously, undergo growth and decline, and a certain shift in their spatial relations during the action potential period. It is shown that the onset of contraction in any region is coincident with the maximum flow of electrical current in the region, established by neighbouring regions in which the potentials are respectively above and below the potential of resting muscle.

Defective Fat Metabolism and Arteriosclerosis

THIS was discussed by L. R. Drogstedt in a paper read at the Autumn Meeting of the U.S. National Academy of Science held during October 13–15. Arteriosclerosis is not a necessary part of the ageing process, since not all old people develop it. The following evidence suggests that it may represent a metabolic defect associated with disturbed fat metabolism. The feeding of cholesterol in excessive amounts produces arteriosclerosis in rabbits that resembles very closely the human disease. The incidence of arteriosclerosis is abnormally high in patients with diabetes mellitus and occurs not infrequently in young individuals. Diets rich in fat are especially apt to produce arteriosclerosis in diabetics, and conversely, low fat diets have a protective effect. A similar high incidence of arteriosclerosis is found in depancreatized dogs in which a disturbance in fat utilization is produced by deprivation of lipocaic.

Origin of the Temperate Floras of South America

THIS was discussed by D. H. Campbell in a paper read at the Autumn Meeting of the U.S. National Academy of Sciences during October 13–15. The continents of North America and Eurasia have very similar temperate floras and have always been more or less closely united. The climate is a continental one with great extremes of temperature. There is in the northern regions a preponderance of conifers and deciduous angiosperms. In South America, the temperate regions are very limited in extent, and the climate is much more temperate, with no such marked differences between winter and summer. The vegetation has little in common with the north temperate floras, but in the extreme south has many types common to New Zealand and Australia, and to a less degree to South Africa. As shown by fossils from the tertiary of Argentina, there is a large element derived from the tropical regions of Brazil, while at the south the 'sub-antarctic' flora predominates. It is evident that the modern floras differ but little from the tertiary ones. It seems likely that the northern and southern temperate floras have always been separate, and they have probably been distinct since the late Palæozoic.

Foot-Rot in Sheep

THE spreading destruction of superficial parts of the underlying epithelium of the sheep's foot, leading to detachment of the horn, is a disease hitherto very prevalent in the moderate rainfall areas of southern Australia. The primary causal agent has now been shown by Beveridge (Bull. 140, Australian Council for Scientific and Industrial Research, 1941) to be a newly discovered bacterium for which the name *Fusiformis nodosus* (n. sp.) is suggested. It is a large, anaerobic, Gram-negative, non-mobile, rod-shaped organism, usually with enlargements at both ends. Probably *Spirochæta penortha* is a specific accessory causal agent, while a mobile fusiform is a constant secondary invader, doubtless playing some part in the pathogenesis of the disease. Except in artificial culture, *F. nodosus* cannot survive for more than a few days apart from lesions, of which there are three different types. It has now been possible to elaborate a plan of control of the disease which has been applied to several large sheep stations. Not only was foot-rot eradicated from these stations, but also they remained free during an epizootic in the neighbourhood.

Lamp-brush Chromosomes

PRE-TREATMENT with sodium hydroxide and urea on the salivary gland chromosomes of *Drosophila melanogaster* has been used by M. Kodani (*J. Hered.*, **32**, 147; 1941) to induce the lamp-brush effect previously obtained in the chromosomes of other organisms. The author finds that there are definite achromatic regions which contain little nucleic acid. By marking the *X*-chromosome with inversions it was possible to construct a lamp-brush chromosome map. The chromatic regions correspond with the chromosomes of Heitz in mitotic prophase and were considered to contain active gene loci. Heterochromatin within euchromatin regions differs from the heterochromatin at the proximal end. The heterochromatin in euchromatin regions corresponds in position with regions of the salivary gland chromosomes which contain few and small bands, and it is believed that mutant loci are located in the euchromatin region which is characterized by thick bands with a condensation of nucleic acid.

Earthquakes Registered in Australia

DURING the months of April, May and June 1941, seventy-two earthquakes were registered at the Riverview College Observatory, New South Wales. There were twenty-eight in April, twenty in May and twenty-four in June. The seismograms for all these have been interpreted. The greatest shock in April was on April 29 from an epicentre near 27° S., 118° E., which gave a ground amplitude of about 1/7 mm. at Riverview. In May the greatest shock was on May 17, which gave a ground amplitude of near 1/4 mm. at Riverview. The epicentre has been

provisionally estimated to be at 11° S., 166° E. The shock of May 4 was felt at Finke in central Australia, and another shock on May 4 also had its epicentre in central Australia. In June the greatest shock was on June 27, which also was felt at Finke in central Australia. The epicentre was at a distance of 1,680 km. from Riverview, where the maximum ground amplitude attained was near 1/4 mm. Microseisms hindered the interpretation of some of the records.

Nitrosyl Cyanide Salts

A STUDY of the metal carbonyls and nitrosyl carbonyls shows that, for all volatile compounds of this class, the effective atomic number is the same as the atomic number of one of the inert gases. The general tendency of elements to acquire the effective atomic number of the nearest inert gas apparently does not hold in the formation of simple compounds of the heavy metals, but the complex compounds of the heavy metals have an obvious tendency of this kind. This is shown in sodium nitroprusside, Na_2 [Fe $(CN)_4$ NO], and in the unusual manganese nitrosyl cyanide and cyanide salts K_3 [Mn $(CN)_5$ NO] and K_5 Mn $(CN)_6$, in which the existence of the complex ions is related to the stabilizing effect of the effective atomic number of 36 (krypton). These salts were prepared by Manchot and collaborators in 1926–28, and the method of preparation of the nitrosyl cyanide has been improved by A. A. Blanchard and F. S. Magnusson (*J. Amer. Chem. Soc.*, **63**, 2236; 1941), who have also recorded its reactions. Attempts to prepare analogous nitrosyl cyanides of cobalt, K[Co$(CN)_5$NO] and K_2[Co$(CN)_5$NO], were not successful.

Properties of Visual Purple at Low Temperature

THE discovery that visual purple is soluble and stable in a solvent made up of 75 per cent glycerol and 25 per cent water by volume, has enabled E. E. Broda and C. F. Goodeve (*Proc. Roy. Soc.*, A, **179**, 151; 1941) to extend the range for experiments below 0° C. At the temperature of solid carbon dioxide such solutions assume a glass-like consistency and remain perfectly homogeneous and brilliantly clear. Even at liquid air temperatures no crystallization occurs, although the great number of minute cracks developed scatter the light and prevent spectroscopic investigations. At room temperatures the spectrum is identical with that of the aqueous solution. At −73° C. the peak of the absorption curve is higher and narrower than at room temperature and it is shifted towards longer waves. The product of photodecomposition at −73° C. has a spectrum independent of *p*H and is at low temperatures thermostable and photostable. Thermal decomposition to indicator yellow occurs at room temperature. The primary product appears to be identical with transient orange. The quantum yield of the photoreaction at low and at room temperature are of the same order.

The Electronic Charge

A NEW determination of e has been made in the University of Melbourne by V. D. Hopper and T. H. Laby (*Proc. Roy. Soc.*, A., **178**, 243; 1941) using an oil-drop method in which the electric field is horizontal. The oil drops used were larger than those used by previous experimenters, and the velocity of fall and of movement in the direction of the electric field could be estimated with satisfactory accuracy. Assuming $\eta_{23} = 1830 \times 10^{-7}$ c.g.s. units, the value of e obtained was $(4{\cdot}8020 \pm 0{\cdot}0013) \times 10^{-10}$ E.S.U. (see also NATURE, **145**, 932; 1940). In work in progress, it is hoped to improve the precision of measurement of the viscosity of air by using a method suggested by Fabry and Perot. Laminar flow of air between optically flat disks is involved.

A Photographic Survey of Galactic Clusters

IN two earlier papers (*Mon. Not. Roy. Astro. Soc.*, **100**, 387, and **101**, 89) George Alter described his method of investigation of galactic clusters, and a summary of the first of these appeared in NATURE, **141**, 810 (1940). Alter returns to the subject in a third paper with the above title (*Mon. Not. Roy. Astro. Soc.*, **101**, 5, 6) which deals with seven further clusters, six of which are situated in a rich Cassiopeia region. The other cluster, N.G.C. 225, is situated outside and in front of a dark patch, and an absorbing cloud is indicated by its position in a dark patch and also by an irregularity in the range of distant moduli. Some uncertainty concerning the identification and co-ordinates of N.G.C. 133 and 146 is clarified and it is shown that the former is not really a cluster but only an accidental grouping of a few stars, while Arronymous appears on visual comparison as a cluster very similar to its neighbour N.G.C. 146. The distances found in this recent investigation are generally smaller than those previously determined; explanations can be found from the fact that in the latter case the distances were found by mere inspection of the photographs, without knowledge of spectral types or colour index, but with various assumptions as to cluster diameters and magnitudes. Tables have been prepared which show the co-ordinates and photographic and photovisual magnitudes of all measurable stars within the cluster regions under investigation, but unfortunately these cannot be printed owing to shortage of paper. Those who are specially interested can obtain copies by applying to the Norman Lockyer Observatory, Sidmouth.

Stellar Photo-electric Photometry

IN the past decade the attention paid by astrophysicists to spectrophotometry with the photoelectric cell has increased as the importance of the results so obtained became evident. Hitherto, however, the observations have been confined to two broad spectral regions, usually overlapping, and defined somewhat loosely by the characteristics of two colour filters the choice of which has been dictated more by the response of the photo-cell used than by the astronomical requirements. A recent paper by J. S. Hall, however (*Astrophys. J.*, **94**, 71; 1941), describes a method of working in which emphasis is put on the definition of the spectral energy admitted to the cell. From the grating spectra of stars formed in the focal plane of the objective, two movable slits segregate definite wave-length regions which are then reflected into the photo-cell. The paper gives more than 1,300 heterochromatic magnitudes of 67 bright stars measured in this way at as many as 13 spectral regions from 4500 A. to 10,320 A. Such measurements, especially if they can be extended to fainter stars, will give invaluable information on the extent to which colour temperatures depend on the spectral region in which they are measured, as well as on such related subjects as the effect on stellar colours of intrinsic luminosity and of selective interstellar absorption.