

the research laboratory. The bombardment of specimens with high-speed electrons produces changes in protoplasm, and in molecules. Entomologists have remarked on shrinkage, evolution of gas, discoloration, and increased friability of their specimens. As the specimen for study must be placed in a high vacuum it must, therefore, be dry. Great difficulty is experienced in viewing anything but 'dead' specimens, and in consequence, movement must inevitably be 'frozen', and require a number of successive and similar operations to show progressive action. The objects to be examined must be extremely thin.

### Some Further Developments

Due to the very small aperture of the electron rays, the electron microscope shows a surprisingly large depth of focus. Electron stereomicroscopy has been suggested by E. Ruska. M. v. Ardenne<sup>18</sup> has further developed this idea, and introduces in his electron microscope a particular object carrier which can be tilted by a few degrees between two successive exposures. A vivid impression of solidity is produced if the two corresponding photographs are examined under a stereoscope.

v. Ardenne has successfully applied dark-ground illumination and obtained resolving powers down to  $5 \times 10^{-7}$  cm., and he discusses<sup>19</sup> in this connexion the possibility of viewing single atoms, and studying their distribution in the object plane. There are, however, great practical difficulties; for example, the exposure time would have to be increased more than 1,000 times if ultra-microscopical methods were to be introduced.

O. Scherzer<sup>20</sup> discusses the possibility of improving the resolving power of the ordinary electron microscope with direct illumination by an improvement of the electron lenses leading to larger numerical apertures. He mentions in this connexion the practicability

of correcting spherical aberration by introducing space charges into the lens. F. H. Nicoll in his patent proposal of 1936 discusses the introduction of an electron mirror into the instrument. As it is feasible to construct mirrors with negative aberration, a useful opportunity of correcting the mirror-microscope is given.

The most direct method of improving the resolving power is to use appreciably greater electron energies, and thus shorter wave-lengths. There is an upper limit to what we can hope for in this direction.

After the War is ended, there should be great developments in television, and some of this research work will be employed in improving the electron microscope.

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## NEWS and VIEWS

Dr. W. K. Gregory

DR. W. K. GREGORY has recently retired under an age limit from the staff of the American Museum of Natural History. For some forty years he occupied a very special place in that great institution, for his knowledge of comparative anatomy extended over the whole range of vertebrates, both recent and fossil, and his philosophical mind led him to make wide ranging comparisons and detailed analyses of structure which have contributed very greatly to our understanding of structure and especially of the course of evolutionary processes. His early works on Tritubercular teeth and on the orders of mammals were of great importance, and were but the harbingers of many others which have since appeared. During the past twenty years his immense experience of mammalian structure has enabled him to contribute much to our understanding of the significance of the many fossil human skulls which have become known, and he has at the same time devoted much attention to the detailed structure of modern fish. But Dr. Gregory's retirement is only from his formal position; relieved of administration he may, we hope, continue even more actively his own researches.

Prof. James Drever

PROF. JAMES DREVER has recently retired from the chair of psychology in the University of Edinburgh, which he has held since its foundation in 1931. In 1918 he was elected to the Coombe lectureship in psychology at Edinburgh, and in 1924 he became University reader. When lecturer he had eighty students, and an assistant to help him. Shortly before the present War, the number of his students had increased to nearly six hundred, and his staff comprised a reader, two lecturers and four instructors. Prof. Drever graduated in arts in Edinburgh in 1893 and spent two years in studying medicine. Owing, however, to various difficulties he was then compelled to become a schoolmaster. But in 1907 he became assistant to the professor of education at Edinburgh, where he founded the Educational Laboratory, taking a keen interest in problems relating to human instinct, in the treatment of delinquent and difficult children, and in the institution of the degree of bachelor of education and of postgraduate psychological research for students of education. These early efforts led to his later work on the psychological treatment of the psycho-neuroses, on developing performance tests of

intelligence, on colour-blindness, and on instituting university teaching in medical and industrial psychology. His son has been appointed by the University to succeed him in his professorship.

### Industrial Relations and the Cost of Living Index

A BROADSHEET "Wages and the Cost of Living Index" (No. 220) issued by Political and Economic Planning gives a useful brief review of the cost of living index itself and of the wage systems in the building and civil engineering, railways, iron and steel, coal and cotton industries and the Civil Service in Great Britain. The broadsheet forms part of a report on industrial relations which P E P is preparing, and does something to meet the need for a study of wages and other aspects of industrial relations which such innovations as 'pay-as-you-earn' have intensified. In addition to its descriptive part, the broadsheet includes the general conclusion, first, that if wage policy were sufficiently well co-ordinated between workers and employers and between different industries, it could be arranged that wages should not fall as much as prices during the down-swing, and that in return they should not be pushed up so much when prices are once more rising. Such a policy has been put into practice in Sweden with results that open up a vista of possible 'trade-cycle bargaining', under which the application of sliding scales as we know them would be inappropriate. From the workers' point of view it would be wrong to peg wages to the cost of living and thus stabilize real wages when their productivity is increasing and prices falling, for this would mean that their share in the product of their labour would be declining. One may expect that if post-war employment succeeds in producing a steadily rising national income, workers in most industries will prefer to rely on their bargaining power rather than on automatic scales. Part of the dynamic of a full employment policy must be the general striving for an uninterrupted rise in the standard of living, and therefore in real wages.

Where the workers in an industry have little expectation of increasing their standard of living, they may decide that the sliding scale will at least help to maintain their real wages. What is good for one industry, however, may not suit another; and the different sliding-scale schemes have different effects on the internal wage structure of the industries concerned. Cost of living calculations will remain of the greatest importance whether or not an automatic sliding scale is used. The minimum or subsistence allowance, in terms of money, for example, fails of its purpose unless it is adjusted to cover changes in the prices of the goods needed for subsistence, and for this purpose the sliding-scale method will continue to have an obvious justification. It would seem, however, that the avowed purpose of the index, to estimate changes in "the cost of maintaining unchanged the pre-war (i.e., pre-1914) standard of living of the working-classes" has not much relevance to present-day requirements, and that separate indexes are required for various income groups and for different localities. If authoritative indexes of this kind could be provided, much that is at present contentious guesswork in wage negotiations would be based on measurement and calculation, and the application of an accurate series of cost of living indexes would not be confined to wages but should form an essential part of national statistics.

### Sunspots and Human Affairs

Two papers by W. G. Bowerman (*Pop. Astron.*, 52, March, April, May, 1944) discuss the rather indefinite subject of the relations between sunspots and terrestrial conditions. The first illustrates a close parallelism between sunspot numbers and the total mortgage loans on residential property in the United States. This held during 1923-38 but broke down in 1939, presumably owing to the disturbance caused by the War. The second and longer paper describes in a 'popular' manner the quasi-periodic nature of outbreaks of sunspots and a good deal of recent American literature on relations between sunspot numbers and extremes of temperature and precipitation, as well as such indirect effects as industrial activity, forest fires and outbreaks of tropical diseases. The author accepts the views of Ellsworth Huntington and C. A. Mills that the major economic and cultural cycles of historical times result from long-period oscillations of solar activity, acting through average temperature, which in turn controls both the spread of disease organisms and the power of man to resist or cope with them. Within the 11-year cycle there is a 'sharp upthrust' of temperature near sunspot minimum, but the relations are complicated by volcanic eruptions.

The whole subject of the reaction of man with his environment is of considerable interest and importance to students of human affairs; but it is far too complex for superficial or partial studies to have any value. For example, the author refers casually to the effect of air-conditioning of hospitals in counteracting climatic control of disease; but he overlooks Major Markham's hypothesis that the poleward march of civilization is a function of the efficiency of house-warming. There is room here for a new system of philosophy, but the first necessity is to verify and comprehend the facts.

### Structure and Classification of Bees

THE *Bulletin of the American Museum of Natural History*, 82, 1944, contains a very comprehensive memoir on the above subject, written by C. D. Michener, an assistant curator of the Museum. The method which the author has adopted is to make a detailed study of the morphology of a single species of bee, for example, *Anthophora edwardsii*, and then to compare numerous other bees with this species. Finally, with these comparisons as a basis, the author gives an account of the interrelationships of the various groups of bees followed by a general scheme of classification. The latter deals with all groupings, from families to genera, represented in America north of Mexico. The memoir is one intended for the specialist on the order Hymenoptera. The anatomical section is concerned with external organs and parts only; the internal organs and musculature being outside the scope of the work. A certain number of new terms are used including the expressions mesosoma and metasoma for the regions commonly referred to as thorax and abdomen respectively. Six families of bees are recognized. The Colletidae and Halictidae are the two oldest groups. The next in order of antiquity are considered to be the Andrenidae and Apidae followed doubtfully by the Megachilidae. The last family—the Melittidae—is too imperfectly known to suggest its position in the series. The largest family is the Apidae which is held to include a large number of bees usually considered to be outside its limits. The author mentions that cer-