U.S NATIONAL ACADEMY OF SCIENCES

ELECTIONS TO MEMBERSHIP

AT the recent annual meeting of the U.S. National Academy of Sciences, Dr. Lloyd V. Berkner, president of Associated Universities, Inc., in New York City, was elected to a four-year term as treasurer of the Academy. Prof. G. Evelyn Hutchinson, Sterling professor of zoology, Yale University; and Dr. Robley C. Williams, professor of virology and research biophysicist, University of California, were elected members of the Council of the Academy in succession to Dr. Frederick Seitz and Dr. Harry L. Shapiro.

Also at this meeting, thirty-five new members were elected as follows:

Prof. H. L. Anderson, director of the Enrico Fermi Institute for Nuclear Studies;

Dr. A. V. Astin, director of the U.S. National Bureau of Standards since 1952;

Prof. N. Bloembergen, professor of applied physics, Harvard University;

Prof. A. T. Blomquist, professor of organic chemistry, Cornell University;

Prof. H. G. Booker, professor of electrical engineering, Cornell University;

Prof. A. C. Braun, professor of bacteriology, Rockefeller Institute;

Prof. O. Chamberlain, professor of physics, University of California;

Prof. N. R. Davidson, professor of chemistry, California Institute of Technology;

Prof. W. Feller, Higgins professor of mathematics, Princeton University;

Dr. Herbert Friedman, superintendent, Atmosphere and Astrophysics Division, U.S. Naval Research Laboratory.

Dr. R. Galambos, chief of the Department of Neurophysiology, Walter Reed Army Institute of Resea rch;

Prof. M. Gell-Mann, professor of theoretical physics, California Institute of Technology;

Prof. D. R. Griffin, professor of zoology, Harvard University;

Prof. H. S. Gutowsky, professor of physical chemistry, University of Illinois;

Prof. B. Haurwitz, professor of astro-geophysics, University of Colorado;

Prof. H. D. Hedberg, professor of geology, Princeton University;

Prof. K. F. Herzfeld, professor of physics and head of department, Catholic University of America, Washington, D.C.;

Prof. C. I. Hovland, Sterling professor of psychology, Yale University;

Dr. R. J. Huebner, chief of the Laboratory of Infectious Diseases, U.S. National Institute of Allergy and Infectious Diseases;

Dr. A. B. Kinzel, vice-president in charge of research, Union Carbide and Carbon Corporation;

Prof. S. E. Luria, professor of microbiology, and chairman, Microbiology Committee, Massachusetts Institute of Technology;

Prof. D. Mazia, professor of zoology, University of California at Berkeley;

Prof. S. Moore, professor of biochemistry, Rockefeller Institute;

Prof. T. T. Puck, professor of biophysics and head of department, University of Colorado Medical School;

Prof. R. W. Sperry, Hixon professor of psychobiology, California Institute of Technology;

Prof. W. H. Stein, professor of biochemistry, Rockefeller Institute;

Prof. W. S. Stone, professor of zoology and director of gene research, University of Texas;

Prof. G. J. Stork, professor of chemistry, Columbia University;

Dr. R. N. Tousey, head of the Rocket Spectroscopy Branch, Atmosphere and Astrophysics Division, U.S. Naval Research Laboratory;

Prof. J. B. Wiesner, director, Research Laboratory of Electronics, Massachusetts Institute of Technology;

Prof. G. R. Willey, Bowditch professor of Central American and Mexican archæology, Harvard University;

Prof. C. M. Williams, professor and chairman, Department of Biology, Harvard University;

Dr. O. C. Wilson, astronomer, Mount Wilson and Palomar Observatories;

Prof. C. N. Woolsey, Charles Sumner Slichter research professor of neurophysiology, University of Wisconsin;

Prof. A. Zygmund, professor of mathematics, University of Chicago.

'EIDOPHOR' TELEVISION TECHNIQUE

A DEMONSTRATION of the 'Eidophor' system of projection television was given during the week beginning May 2 by Messrs. Ciba Clayton, Ltd., at Belle Vue, Manchester. A studio was set up in the technical service laboratories, and the programme was transmitted 'live' a distance of 1½ miles to Belle Vue by micro-wave link. The aim was to demonstrate the use of the new system to enable lecture demonstrations to be given to very large audiences. The organizers are to be congratulated; it was a most impressive demonstration.

The essential feature of the 'Eidophor' system is a special cathode-ray tube which modulates a beam of light derived from a high-power xenon arc. In principle, therefore, the limit to the size of screen used and the brightness of the picture is set only by the light output of the lamp, and not, as in most other systems, by the characteristics of the phosphor of a projection tube. A screen of up to about 800 sq. ft. may be used for black-and-white projection with the system in its present state of development; there is necessarily some diminution in brightness in colour television, but even then screens up to about 200 sq. ft. may be used.

It is not proposed to describe in detail the technical aspects of the system except to comment first on its extreme ingenuity, and secondly, on the skill and patience which must obviously have been used in its perfection. The 'modulator' is a mirror over which a thin film of oil is continuously re-formed. The thickness of the oil film is controlled by the electric charge pattern on its surface, and this in turn is controlled by the cathode-ray beam. The variations in thickness are used to control the intensity of the light from the source. The idea is simple in conception, but there are considerable technical difficulties that have had to be surmounted. The 'Eidophor' projector may be fed by signals from a broadcasting network or from a closed-circuit link. The large amount of light available makes possible the use of a simple frame-sequential colour system, and the demonstration at Belle Vue was of this kind. An ordinary television camera is used to provide the signals, but a three-colour rotating filter is mounted in front of the lens. A similar rotating filter—synchronized by special signals—rotates in front of the light source in the projector. The rate of frame repetition is 75 per sec., so that a complete set of three coloured images is transmitted in the normal frame-time of one-twenty-fifth of a second. The colour quality—though not perfect—was quite adequate for technical demonstrations.

A series of short lectures was given, starting with a technical description of the 'Eidophor' by Arthur Garratt and followed by three or four demonstration lectures of dyeing processes and techniques, including paper chromatography. After the lectures the audience was invited to ask questions, and these were answered from the studio over the television link. It was this last feature that demonstrated most clearly the fascinating possibilities of large-screen television. As research becomes more and more concerned with complex apparatus, so lectures with demonstrations become more and more difficult except for very small audiences. A really good colour projector would make it possible for a large audience to see and hear lectures with the same comfort as a single person ; it is possible, of course, to use close-up techniques and even to transmit the images from microscopes and other optical instruments. The 'Eidophor' system brings this idea into the realms of possibility, though as yet, of course, the number of projectors available is small and their cost relatively high.

The demonstration at Belle Vue involved the transportation of two large van-loads of equipment and a team of Swiss experts to Britain, and clearly involved a great deal of work for the organizers ; the result certainly justified the effort. C. A. TAYLOR

INSECTS AND LENGTH OF DAY

STANLEY D. BECK, of the University of Wisconsin, has studied the effect of temperature on the hibernation of the European corn borer, a species of moth that passes the winter not as an egg but as a mature larva (*Sci. American*, **202**, February 1960). The corn borer is a long-day insect. Generation after generation can be reared in the laboratory if the cultures are maintained under any of three different conditions : 16 hr. of light a day, continuous darkness or continuous light. In the absence of suitable photoperiod—that is, in continuous light or darkness—temperature has only a slight effect on the incidence of hibernation. Similarly, if a batch of borer larvæ are exposed to short photoperiods of 10·5–13·5 hr. of light a day, they will go into diapause regardless of the temperature at which they are reared. At photoperiods of 8–10 hr. and 14–15·5 hr., however, temperature exerts a powerful influence on the incidence of hibernation : high temperatures tend to prevent it and low temperatures to increase it.

This sensitivity to temperature is important in the life-cycle of the borer. It explains why two generations of them are produced each season in southern corn-growing areas, while only one generation is produced in northern areas. If photoperiod were the only factor governing their reproduction the opposite would be expected, because on any given day in summer the period of daylight is shorter in the south than in the north. The higher temperatures of the earlier southern growing-season, however, more than compensate for the shorter days.

In contrast to the silkworm and the aphid, which are sensitive to photoperiod only in the early stages of development, the borer remains responsive for a longer time. Present evidence indicates that it becomes sensitive in the later stages of larval development or is uniformly sensitive throughout the entire period of growth.

Photoperiod affects members of the growing generation of corn borers but not their progeny. There is no carry-over to the next generation as in the silkworm and the aphid. In the corn borer the earliest detectable symptom of impending diapause is a failure of the reproductive organs to develop. At a stage when the sex cells are rapidly maturing in borers reared under long photoperiod, these cells have ceased to develop in larvæ reared under short photoperiods. The short-photoperiod borers still feed and grow rapidly, but the growth of their reproductive organs is arrested. Similar gonadal arrest has been observed in a number of other species of hibernating insects, including such diverse types as boll weevils and Colorado potato beetles.

In insects, as in higher animals, growth and gonadal development are controlled by hormones. The insect growth-hormone has been identified as ecdysone, which is produced by glands in the insect's thoracic tissue. Insects in diapause contain no detectable amounts of ecdysone, but if they are injected with it, they soon resume normal development. It appears that the change in photoperiod inhibits the production of ecdysone. How this inhibition is brought about is not known. Perhaps a diapause hormone is responsible, especially in forms like the aphid and silkworm. If this is so, the insects must be sensitive to the hormone only at certain times during their lives.

Another unresolved issue is the nature of the timing mechanism that enables an insect to distinguish between a 16-hr. photoperiod and one of, say, 12 or 13 hr. A light receptor is required, because the insect must discriminate between light and dark to respond to photoperiod at all. Apparently the eyes are not involved, and the shielding of different parts of the insect's body has not located any other organ or nerve ending that is specially sensitive to photoperiod. All parts of the body seem