THE SIXTEENTH ANNUAL MEETING OF THE AMERICAN GEOPHYSICAL UNION

THE sixteenth annual general assembly of the American Geophysical Union and the meetings of its seven sections were held on April 25 and 26, 1935, at Washington, D. C., in the building of the National Academy of Sciences and National Research Council.

The papers presented at the general assembly were devoted to a symposium on the earth's outer atmosphere. These concerned recent developments in atmospheric absorption of light and its relation to ozone, in atmospheric ionization, in the correlation of radio transmission with solar phenomena, in the theory of the ionosphere, in the conditions resulting from the study of meteor-trains, in the contribution to atmospheric ionization by cosmic radiation, in the relation of ultra-violet solar radiation and ozone and in the relations of the aurorae and night-sky spectra to the upper atmosphere. Five reports were presented from special committees relating to geophysical and geological studies of oceanic basins (with five appendices developed from the committee's work) and of continents. As a matter of record, a complete statement regarding the cosmic-data Ursigrams and codes used was added in the transactions. Among the 16 resolutions adopted were: Three relating to suitable vessels for magnetic and oceanic surveys and for bathymetric charts; three relating to data in geophysics, geology and hydrology obtained by the federal government and to the coordination of the results; one recommending the publication of a manual of hydrology; three on the establishment of mountain stations, on the use and design of radio meteorographs and on the coordination of snow-surveys in mountain regions; and three on the establishment of additional seismograph-stations in the United States.

In the Section of Geodesy eight papers and reports dealt with time-service present and future developments, surveys in Canada and Mexico, mapping of the United States, international standardization of baseline tapes and wires, absolute gravity at Washington and progress of geodesy in the United States.

The Section of Seismology devoted particular attention to deep- and shallow-focus earthquakes in three papers, to subsurface exploration by earth-resistivity and seismic methods in one paper, to instrumental designs and studies in three papers, to propagation of waves in two papers, to motion of a viscous fluid under surface load in one paper and to a progress-report of cooperative seismological research during the year.

The rapid development and improvement in meteorological research in the United States was evidenced by the 13 papers before the Section of Meteorology. Among the subjects discussed were: Use of cloud-observations in forecasting snow-storms; methods of physical weather-analysis; hurricane-warning service and its reorganization; cyclone-frequency in the tropics and distribution and frequency of tornadoes in the United States; meteorological periods; theoretical study of wind-velocity and wind-direction; upper-air research involving use of ultra-high frequencies in tracking meteorological balloons, of the radio meteorograph and of the airplane; observations on mountain peaks, and auroral observations at the International Polar Year Station Point Barrow.

In the Section of Terrestrial Magnetism and Electricity, one paper dealt with the correlation of auroral and magnetic activities at Little America as observed by the second Byrd Antarctic Expedition; two with earth-current results, particularly during the International Polar Year; two with the application of, and instrumentation for, magnetic methods in determining subsurface geological features; and one each with earth-magnetic analysis of primary cosmic radiation, theory of rain and thunderstorms, relation of ozone-measurements and solar cycle, purpose of further atmospheric-electric measurements in the troposphere and stratosphere and the need for more detailed magnetic observations shown by the increasing application of results. Progress-reports on magnetic and electric work were received from nine governmental and private organizations in North America, including Canada, Mexico and the United States.

The Section of Oceanography heard six progress-reports on oceanographic research accomplished in Canada and the United States. Six papers dealt with the continental margin on George's Bank, seasonal temperature-variation in the North Atlantic, the natural regions of the world ocean according to Schott, California submarine canyons, hydrographic relations between the Gulf Stream and the Gulf of Mexico, and submarine daylight; and one paper dealt with the design, construction and use of a marine coring-instrument.

Three meetings of the Section of Volcanology were devoted to the presentation and discussion of 11 papers bearing on rock-types and vulcanism of southeastern and interior Alaska, of the southern Appalachians, of California, of Colorado, of southeastern Idaho, of central Montana, of New Mexico, of Nevada, of eastern Pennsylvania and Maryland, of Wyoming and of Ontario. One paper treated of the equilibrium-relations between feldspathoids, alkali-feldspars and

silica. One paper reported on the vestige of a Pleistocene thermal activity in Iceland.

As in the transactions of 1934, the annual reports submitted to the Section of Hydrology from its nine permanent research committees comprise significant digests of progress and development in investigations on snow, glaciers, evaporation, absorption and transpiration (including extended list of terms and definitions), rainfall and runoff (with five appendices of experimental studies and results), soil-moisture, underground water (with two appendices on the relations with oil fields and on active projects in California, Oregon and Washington), dynamics of streams and chemistry of natural waters. Nineteen papers and reports cover many diverse fields of hydrological research, both experimental and theoretical; they serve to emphasize the wide-spread activity in hydrology in the United States and the need for further support by state and government in this field. Three meetings of the section were held.

As in previous years the proceedings of the meetings of the Union have been edited by the general secretary for publication by the offset method. These "Transactions" will be in two parts. Part I (364 pages) will include papers and reports given at the General Assembly and at the meetings of the sections of Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Oceanography and Volcanology. Part II (165 pages) will include papers and reports submitted to the Section of Hydrology. The many requests being received from geophysicists in all parts of the world evidence the value of the "Transactions" in disseminating the progress of work done in America and in forwarding that international exchange of data and thought so essential to the science of geophysics and its steadily growing interpretation, utilization and application.

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General Secretary

WASHINGTON, D. C.

SPECIAL ARTICLES

A CURVE OF EXPERIMENTAL EXTINCTION IN THE WHITE RAT

PSYCHOLOGICAL studies present many examples of curves which show the progress of forgetting as a function of the time which has elapsed since learning was completed. There are, however, very few graphic representations showing the progress of the experimental extinction of a conditioned response as a function of the time which has elapsed since the completion of conditioning.

Kleitman and Crisler[1] present extinction curves, parabolic in form, for the salivary reflexes of three dogs. The curves show a decrease in the quantity of secretion, with an increase in elapsed time. Skinner[2] has studied extinction in the rat under conditions where food is the reinforcing agent and where the frequency of response is determined by the rat and not by the apparatus, as is usually the case. An inspection of his curves indicates that there is a progressive wave-like decrease in the frequency of the conditioned response during a one-hour period when no reinforcement is given. Switzer,[3] in a study of the galvanic skin reflex (GSR), studied the progress of experimental extinction to the point where two or three conditioned stimulations failed to elicit the conditioned response. The extinction curve is presented in the form of a Vincent curve, showing the decrease in the magnitude of the GSR in successive tenths of the extinction period. This curve is essentially linear, and therefore differs markedly from the curve of Kleitman and Crisler and also from such typical forgetting curves as those of Ebbinghaus and Ballard for verbal responses. It should be pointed out, however, that the usual forgetting curves (and those of Kleitman and Crisler and of Skinner) are not Vincent curves representing the amount forgotten, or eliminated, during successive equal parts of the total forgetting time; rather the usual forgetting curves represent the average amount of retention (or elimination) after selected periods of elapsed time. Further note should be made of the fact that Piéron[4] holds the sudden initial drop in the Ebbinghaus curve to be an artifact. Hilgard and Marquis,[5] working with the conditioned eyelid response in the dog, found that the frequency and amplitude of the response decreased during experimental extinction. The percentage frequency of response plotted against time gives a gradual almost linear decrease of frequency.

Although Hull[6] cautions against identifying forgetting and experimental extinction, nevertheless something can be said for an attempt to relate these

[1] N. Kleitman and G. Crisler, *Amer. Jour. Physiol.*, 79: 571–614, 1927.

[2] B. F. Skinner, *Jour. Gen. Psychol.*, 8: 114–129, 1933.

[3] St. C. A. Switzer, *Jour. Gen. Psychol.*, 9: 77–100, 1933.

[4] H. Piéron, *L'année psychol.*, 19: 91–193, 1913.

[5] E. R. Hilgard and D. G. Marquis, *Jour. Comp. Psychol.*, 19: 29–58, 1935.

[6] C. L. Hull, "Learning: the factor of the conditioned reflex," in "Handbook of general experimental psychology," p. 438. Worcester, Mass.: Clark University Press, 1934.