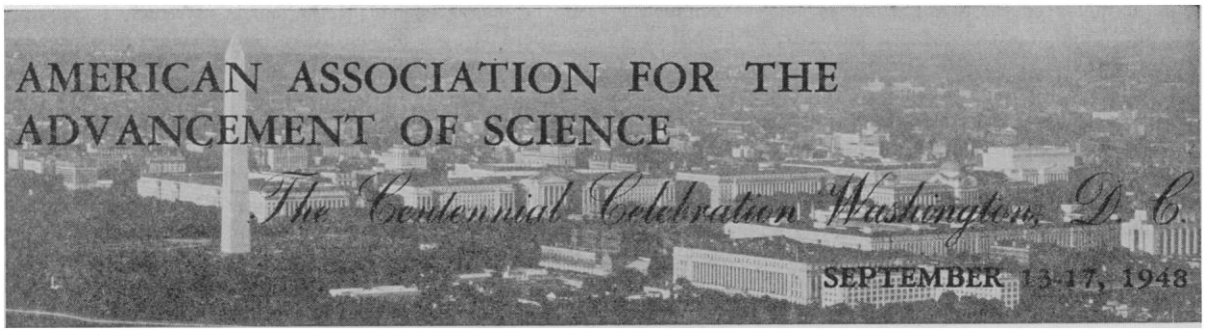

Symposium on Problems of the Earth's Gaseous Envelope

This symposium will feature "The Sun and the Earth," by Donald H. Menzel, of Harvard University, "Meteorology of the Upper Atmosphere," by Carl G. Rossby and Hurd C. Willett, of the University of Chicago and Massachusetts Institute of Technology, and "Cosmic Rays," by Marcel Schein, of the University of Chicago. With respect to the symposium Dr. Menzel writes:

During the past decade interest in the upper atmosphere has been rapidly mounting, for many reasons. For the first time in history, some scientists are able to carry on direct exploration of the higher atmosphere. The V-2 and similar rockets, which reach heights in excess of 100 miles, have carried a wide assortment of instruments for measuring physical conditions in the tenuous air at high levels.

The structure of the upper atmosphere is highly complicated. Scientists have recognized the existence of a number of specific layers, but the composition and nature of these layers change from minute to minute, from season to season, and even from year to year. One of the most significant of these layers, at least from the standpoint of meteorology, is a region that contains a very appreciable amount of ozone. A molecule of ozone, which consists of three atoms of oxygen bound together by chemical forces, strongly absorbs the ultraviolet radiation from the sun. In addition, it cuts out large slices from the solar infrared. The total energy cut out by the ozone layer tends to heat the surrounding volume of gas. Thus, the layer of maximum ozone content is warmer than any of the regions immediately above or below.

The amount of ozone tends to vary with the season and with solar activity. We are still relatively ignorant concerning the precise character of the equilibria of the ozone layer. Nor do we know what role the ozone plays in the over-all problem of atmospheric circulation. Perhaps studies of the ozone layer will contribute to the solution of the problem of long-range weather forecasting. Certainly, the layer acts like a blanket, sending radiation that warms the earth.

Well above the ozone layer lies the "ionosphere," which consists of several layers of electrified gas. Ultraviolet radiation from the sun is again responsible for the electrification. The high-energy radiation pulls electrons away from atoms and molecules in the region. Presumably, each individual ionospheric layer arises from some given chemical constituent of the atmosphere. The lowest layer of the ionosphere, known as the E layer, probably comes from the ionization of the oxygen molecule. The two other main layers, the F_1 and F_2, probably arise from ionization of the oxygen atom and the nitrogen molecule, respectively. Scientists have recently suspected the existence of a still higher layer, the G layer, the existence of which is tentatively attributed to ionization of nitrogen atoms.

The density of electrification in the various ionospheric layers changes diurnally, seasonally, and annually. Superposed on the more or less regular variations are the disturbances, frequently sudden, caused by solar activity. Knowledge of the nature of the ionospheric layers is extremely important for practical reasons. The ionosphere reflects radio waves around the surface of the earth, making possible long-distance radio communication. Advance knowledge of the occurrence of disturbances is important for the planning of communication schedules, especially since some frequencies are more affected than others by the disturbances.

There are numerous other phenomena of the upper atmosphere which are closely related to solar activity. Among these are the problems of the aurora polaris and of the continuous auroral glow that keeps even the darkest of skies from being perfectly black. These illuminations derive their energy directly from the sun, either from converted ultraviolet radiation or, possibly, from high-speed particles ejected from active solar areas.

Thus, the sun becomes an important factor in the understanding of physical conditions in the upper atmosphere. Observations indicate that the 11-year sunspot cycle has associated a variability of many solar features other than spots. These include changes in the activity of prominence explosions, the form and intensity of the solar corona, and—what is perhaps most important from the terrestrial point of view—a marked change in the amount of emitted ultraviolet radiation. New solar programs, to develop improved indices of solar activity, are already under way. These studies should provide information of great benefit to students of atmospheric problems.

Cosmic rays are another interesting and important phenomenon of the upper atmosphere. The origin and pre-

cise character of these radiations is not yet completely known. They appear to consist primarily of highly energetic particles, coming in from outer space. Thus, in a sense, they are not phenomena of the upper atmosphere. However, the scientists observe them most effectively in that region, and we have the best chance of observing them in their original state at the highest levels. As the rays descend, the filtering action of air molecules changes the characteristics of the powerful primary rays into secondary particles of lesser energy.

Cosmic rays possess sufficient energy to disrupt atomic nuclei. Thus, scientists consider them one of the primary tools for the study of nuclear forces and reactions. The short-lived mesons, whose masses are intermediate between those of electrons and nuclei, are of special interest.

Because of the fact that primary cosmic rays—some of them at least—possess a positive charge, the magnetic fields of the earth and the sun exert a focusing action upon the radiations. For this reason a redetermination of the magnetic field of the sun is extremely important.

There is even a possibility that changes in the solar magnetic field may, in some way, be responsible for the origin of cosmic rays. However, this recently made suggestion is extremely tentative.

The rapidly accumulating knowledge of conditions in the upper atmosphere will be especially useful at the time —which perhaps is not as far away as the more pessimistic have supposed—when jet or rocket planes may fly their way through the ionosphere. There is a decided acceleration of interest in the problems and information that comes from the indirect studies. Meteors, which are high-speed projectiles from outer space, give valuable data concerning the density, temperature, and pressure in the levels. The echoes of radio signals from the ionospheric layers contribute information of great value. Studies of terrestrial magnetism at high altitudes, measurement of brightness of the sky, and studies of solar radiation in general, all contribute to the knowledge.

NEWS and Notes

Leif Verner, who has been head of the Department of Horticulture at the University of Idaho for the past 14 years, will relinquish his administrative duties on July 1. He will be succeeded as department head by **James E. Kraus,** a member of the department since 1941. This change, effected at Dr. Verner's request, will enable him to devote full time to research and teaching in pomology.

Arthur W. Hixson, executive officer of the Department of Chemical Engineering, Columbia University, since 1940, retired this month. He has been succeeded by **Thomas B. Drew,** a member of the department since 1940 and a consultant to Brookhaven National Laboratory.

Charles M. Goss, professor of anatomy, School of Medicine, Louisiana State University, has been elected editor-in-chief of the *Anatomical Record.*

A. Henry Fretz, associate professor of geology at Lehigh University, will retire at the end of this month. Prof. Fretz has been a faculty member at Lehigh for the past 30 years.

Gottfried S. Fraenkel, lecturer at the Imperial College of Science and Technology, London, and widely known student of insect physiology, has been appointed professor of entomology at the University of Illinois.

F. Homburger, chief of the Department of Clinical Investigation and associate of the Sloan-Kettering Institute for Cancer Research, New York City, has been appointed research professor of medicine at Tufts College Medical School, Boston, and director of the newly created Cancer Research and Cancer Control Unit of the Department of Surgery. Beginning July 1 Dr. Homburger will have his office at the Joseph H. Pratt Diagnostic Hospital, 30 Bennet Street, Boston.

Carroll C. Pratt, professor and chairman of the Department of Psychology, Princeton University, received an honorary D.Sc. degree from Clark University at its recent Commencement exercises.

Robert B. Platt, of the Department of Botany, University of Pennsylvania, has been appointed assistant professor of biology at Emory University and will assume his duties in September.

Bryan L. Wade, director of the U. S. regional vegetable breeding laboratory in Charleston, South Carolina, has been appointed head of the Department of Horticulture, University of Illinois College of Agriculture. Dr. Wade succeeds **M. J. Dorsey,** head of the department for the past 8 years, who will retire on September 1.

Ivan E. Miles, director of the Soil Testing Division of the North Carolina State Department of Agriculture for the past 9 years, has resigned to become agronomist with the Extension Service of the Mississippi Agricultural Experiment Station, beginning July 1.

Hans A. Bethe, professor of physics at Cornell University, will join the Columbia University faculty as visiting professor in September. Dr. Bethe will give a graduate lecture course in advanced nuclear physics and a seminar on the theory of mesons. While at Columbia he will also join in the research work with the 400,000,000-volt cyclotron, now being completed at Irvington-on-the-Hudson.

Grants and Awards

A research program in adolescence, recently given support by the W. T. Grant Foundation, is to be carried on at Phillips Academy, Andover, Massachusetts, under the direction of J. Roswell Gallagher, school physician. The investigations will be in the fields of orthopedics, psychology, and physiology. It is contemplated that a yearly grant of $10,000 will be continued for a period of 5 years.