SCIENCE NEWS

Science Service, Washington, D. C.

THE SOLAR ECLIPSE OF JUNE 19

AN expedition to Soviet Russia to observe the total eclipse of the sun on June 19, 1936, will be sponsored by the Harvard College Observatory in collaboration with the Massachusetts Institute of Technology. In charge of the expedition will be Dr. Donald H. Menzel, of Harvard, assisted by Dr. Joseph C. Boyce, of the Massachusetts Institute. Other members of the party have not yet been announced.

The totality belt, about 75 miles wide, starts in the Mediterranean and then swings northeastward across Greece, the Black Sea, Manchuria and northern Japan, ending at some point well out in the Pacific Ocean. The eclipse will not be visible in the western hemisphere.

According to Dr. Menzel, the party's program will be chiefly spectrographic, with particular effort to be directed to obtaining spectrograms of the chromosphere and the corona over a wide range of wave-lengths. Special emphasis will be placed on the infra-red region of the spectrum, where present knowledge is only fragmentary.

The chromosphere, technically the outer layers of the sun, is a rarefied atmosphere enveloping the shining surface. Due to the brilliance of the sun, observations of the chromosphere are best obtained during an eclipse when the sun is hidden and only the rarefied atmosphere protrudes from behind the moon. From the observations to be taken, it is hoped that its chemical composition, the source of its excitation, the nature of its structure and many other problems in connection with the chromosphere may be cleared up.

The solar corona which lies above the chromosphere presents additional mysteries. Although the chromosphere has been spectrographically found to consist of helium, hydrogen, calcium, iron and other elements in their gaseous form, not a single one of the many known coronal lines has been positively identified.

Some believe that the predominant element is a well-known substance, hidden by peculiar conditions existing in the corona. Dr. Menzel and Dr. Boyce have provisionally suggested that oxygen might be responsible, but additional data which may be obtained from the contemplated study of the infra-red coronal spectra are required to settle the question.

The Harvard-Technology expedition will be the guests of Dr. Boris P. Gerasimovic, formerly associated with the Harvard Observatory and now director of Poulkova Observatory at Leningrad. Observations will be made from a point near the town of Ak-Bulak in the southern Ural Mountains. Although Tomsk is a more favorable location, since it lies close to the central totality line and since the sun will be higher in the sky there, collected weather reports indicate that the chances for clear weather are appreciably greater at Ak-Bulak. Totality here will occur at 8 A. M., local time, when the sun is 31½ degrees above the horizon.

Dr. Boyce will sail early in February and will spend two months at the Solar Physics Observatory, at Cambridge, England, before proceeding to Russia. The rest of the party will sail some time in April.

THE HYDROGEN OUTBURST ON THE SUN AND RADIO FADING

A SUDDEN outburst of hydrogen from the sun preceded the diminution in radio intensity on the earth observed on October 24, according to R. S. Richardson, of the Carnegie Institution's Mount Wilson Observatory, who spoke before the American Astronomical Society meeting at Princeton University.

Mr. Richardson's work followed announcement of such fadeouts by Dr. J. H. Dellinger, chief of the radio section of the National Bureau of Standards. Another such eruption of hydrogen occurred on August 30 when a sudden and mysterious fading of short-wave radio transmission was noticed for about fifteen minutes at the National Bureau of Standards. Fadeouts also occurred on March 20, May 12 and July 6, the interval between them being just about twice the period that the sun takes to rotate.

Dr. Dellinger suggested that they might be associated with some sort of solar eruption, and the October 24 photographs were taken as a result of his request that careful observations be made of the sun at the time of the next expected occurrence. Earlier observations were studied as well.

It was found that an eruption, probably rather small, was recorded in July, but no unusual activity was noticed at the time of the first two dates. However, no observations had been made at the exact time of the fading. Such a hydrogen eruption is called a flocculus, and Mr. Richardson reported that "when the sun is observed for half an hour each day at this phase of the solar cycle we may expect to photograph about ten such flocculi in one year."

Beginning on October 21, photographs of the sun were made by the spectroheliograph, which records the light from a single element, hydrogen in this case, at intervals not greater than ten minutes wherever possible. Between that date and October 25 a total number of 323 exposures were made, an average of one every eight minutes during observing hours. A small flocculus was photographed on the first two days without any sign of great activity, until the time of one exposure made on October 24.

"On the next image, taken twenty-one minutes later," said Mr. Richardson, "the flocculus had increased in intensity until it was the most conspicuous object on the disk seen in a hydrogen spectroheliogram. It was stronger than the one photographed on July 6, but never reached the intensity of the one on August 30."

Until this date there had been a general improvement in radio transmission in the short-wave bands and it had reached the highest value ever recorded at the Bureau of Standards on October 24. There was no sudden fadeout such as those noticed before, but the upper limit of

frequency dropped to half of the value on the preceding day, and on the following days returned to the previous high value.

Earlier observations were examined, as well as records of magnetic storms. One very brilliant cloud of hydrogen appeared on June 5, 1925, while the number of sunspots was low, and a magnetic storm followed four days later. An equally brilliant eruption appeared on December 28 and 29, 1928, when the spots were numerous.

"The magnetic character of the day was calm during the eruption and was very calm and at most only slightly disturbed for a week afterwards," it was stated. "Other examples like these might be cited to show the difficulties encountered in attempting to correlate solar and terrestrial phenomena."

THE ENERGY LINKING ATOMS IN MOLECULE

A NEW experimental step which should aid the development of a better theory of how the atoms in a molecule are linked together was described recently by President James Bryant Conant, of Harvard University, before the Sixth National Organic Symposium of the American Chemical Society.

In previous research, Dr. Conant explained, the energy changes involved in the linkages of the atoms in molecules of organic compounds has been found by burning the compounds and measuring the heat given out. The new Harvard experiments, conducted by Professor G. B. Kistiakowsky with Dr. J. R. Ruhoff, W. E. Vaughan, H. A. Smith and H. Romeyn, obtain the amount of heat liberated directly, said President Conant.

"The first example chosen for study was the reaction of a molecule of hydrogen with a hydrocarbon which is deficient in hydrogen; that is, an unsaturated compound," said Dr. Conant. "When the two molecules come together in the presence of a catalyst they combine and heat is evolved; this heat, which is a measure of the affinity of the carbon compound for the extra hydrogen, is measured directly in the new procedure.

"The values thus obtained are much more reliable than those previously available calculated from the heats of combustion. Because of the increased accuracy, slight differences in the affinity of different compounds for hydrogen were revealed. The explanation of such variations in affinity which occur with changes in the mode of linkage of the atoms in a molecule is a theoretical problem of much importance. When more accurate data are available from the studies in progress, it should be possible to develop to a better stage the fundamental theory of the linkage of atoms in molecules."

Dr. Conant was emphatic in his statement that he himself had not carried out the research program, explaining that the press of administrative duties prevented his active participation. His contribution, he pointed out, was made three years ago when he and Professor Kistiakowsky planned the five-year program financed by the Rockefeller Foundation.

SYNTHETIC PRODUCTION OF MUSK AND CIVET FOR PERFUMES

PRACTICAL synthesis of the organic chemical compounds in musk and civet that give choice perfumes their odor was reported by Dr. Wallace H. Carothers, du Pont chemist, speaking before the recent National Symposium of Organic Chemistry at Rochester, N. Y. Chemists are about to manufacture in the laboratory pure essences such as that of "muscone," which if made from the rare musk animal would cost $40,000 a pound.

A new field of chemistry is opened by the researches of Dr. Carothers and his collaborators, Julian W. Hill and E. W. Spanagel, who have developed theory and method of control of synthesis of what chemists call "large ring" compounds of high molecular weight. These large rings of chemical molecules may also prove of use in medicine, as the Chinese use musk in medicine and investigations may demonstrate scientific medical uses.

Based upon the 1926 discovery of the Swiss chemist, Ruzicka, that the essential principles of musk and civet are chemicals of large-ring type, the du Pont research has aimed to make this discovery practically available. "Muscone", and "civetone" are the only known examples of such chemicals found in the animal world.

Lower grade perfumes have long been made synthetically and there are also synthetic imitations of musk. In fine perfumes the function of musk, although unpleasant in large quantities, is to blend the various odors into a single fragrance as well as to confer permanence on odors that otherwise would be fugitive. The new chemical research has the possibility of bringing to the boudoir new synthetic odors that nature has not imagined.

SCIENCE REVIEW OF THE YEAR

Engineering

A NEW system of ultra-short wave radio transmission, which is less subject to static, was developed by Major Edwin H. Armstrong, professor of electrical engineering, Columbia University.

A commercially practical method of applying noncorrosive coating of aluminum on iron and steel was patented by Professor Colin G. Fink, Columbia University.

"Coaxial" cable, which will carry 240 telephone talks or a high-grade television circuit, was announced by the Bell System.

Electric power transmission by direct current, employing vacuum tubes, was announced by General Electric laboratories.

Maine's Passamaquoddy Bay tide power project was begun.

A new type of color film for 16 mm. home movies, which does not require a special filter and consists of five layers sensitive to red, green and blue-violet light, was introduced by the Eastman Kodak Company.

The liner *Normandie* established new records for crossing the Atlantic, westward on June maiden voyage in 4 days, 11 hours, and 42 minutes, eastward in 4 days and one hour.

The highway bridge at Grand Coulee Dam was the first structure completed on the Columbia River project.

First traffic was begun over the Zambesi River railroad

bridge in Africa which has a length of 12,064 feet, said to be the longest in the world.

The new automobile traffic tunnel beneath the Hudson River at West 39th Street, New York City, was "holed through."

The "voice mirror," which records speech on a magnetic tape and immediately plays it back to the speaker, was demonstrated by Bell Telephone Laboratories.

Talking around the world was at last accomplished when speakers in adjoining rooms in New York conversed over a wire and radio circuit.

A new alloy of iron, aluminum, nickel and cobalt, and named Alnico, was announced by General Electric as a powerful permanent magnetic material.

Electrification of the Pennsylvania Railroad from New York to Washington was completed.

A new type of heavy tungsten alloy was developed in England for making more compact "bomb" shields for radium in place of the lead shields now used.

New sound detectors invented for the U. S. Army were claimed to detect an airplane 12 miles away.

Construction was under way in Great Britain on a new non-magnetic ship to replace the lost *Carnegie* of the Carnegie Institution of Washington in the field of world-wide marine magnetic surveys.

A new type of telephone transmitter with low noise level and freedom from line noises was developed by the Bell Telephone.

A machine with a "memory," which makes complete records of such quick happenings as lightning strokes before, during and after they occur, was developed at the General Electric Research Laboratory.

A system of high detail television was begun experimentally by the Radio Corporation of America.

A new high temperature for commercial electric furnaces, 3,000 degrees Centigrade, was obtained in the new rotating type developed by M. Henri George, Electrothermal Laboratory, Paris.

A process of printing from rubber plates was developed by the B. F. Goodrich Rubber Company.

New developments in the construction of secondary highways for light traffic included the use of salt as a binder and of cotton webbing to prevent wrinkling of the surface.

A garbage grinding device which aids disposal of kitchen waste down the sewer drain was introduced by the General Electric Company.

Waterproof wood, embalmed clear to its center with wax, was developed at the U. S. Forest Products Laboratory.

Patent No. 2,000,000, which is for the construction of rubber tires for railroad trains, was awarded by the U. S. Patent Office.

ITEMS

A JOINT expedition to observe the next total eclipse of the sun—scheduled to sweep across Asia on June 19—will be sent to Soviet Russia by Georgetown University and the National Geographic Society, it is announced by the two sponsoring organizations. Dr. Paul A. McNally, S.J., director of the Georgetown College Observatory, will be leader of the expedition, accompanied by five others to be chosen from the staffs of the university and the society. They will leave sometime in April and return in July. Observations will be made from a point near Orenburg, Soviet Russia, because past weather records show that this region offers one of the best promises of clear weather along the path of the eclipse.

PHOTOGRAPHIC films and plates have been much improved, in German manufacturing establishments, through the use of "supersonic" waves—sound waves vibrating so rapidly that they are inaudible to human ears. It has been found that the minute particles of silver bromide, which form the light-sensitive part of the photographic emulsion, are distributed more evenly over the surface, and do not tend to clump together, when the emulsion is treated with these extremely rapid vibrations. Effects of supersonic waves on emulsions were first studied in the United States some years ago by Professor R. W. Wood, of the Johns Hopkins University, and A. L. Loomis, working in the latter's private laboratory at Tuxedo Park, N. Y.

DR. FREDERIC E. CLEMENTS, botanical ecologist on the staff of the Carnegie Institution of Washington, told Science Service last spring that a study of weather cycles indicated that the great drought might be expected to break during the present year. This was after the early months of 1935 had brought a recurrence of the terror-inspiring dust storms of 1934. Now, at the end of the year, Dr. Clements can look back and see a record of heavier-than-ordinary rains. There is still a drought area, but it has dwindled to a mere patch of the Great American Desert of the several preceding years.

A CONNECTION between cancer and sex hormones appears in researches by Drs. Charles F. Geschickter and Dean Lewis, of the Johns Hopkins Hospital and University, as reported in the *American Journal of Cancer*. Hormones from both male and female sex glands and the sex hormone of the pituitary gland were found in one type of cancer known medically as tumors of connective tissue. No conclusions can be drawn from these findings, the investigators state, except that the sex hormones probably are "concerned in the physiology of the tumor." Tumors of connective tissue seem to have the power to concentrate or hold both the gonadotropic substance of the anterior pituitary gland and oestrogenic substance which is secreted by both ovary and testicular tissue. These hormones are not merely stored in the tissue but have a definite influence on its growth, experiments showed.

THE reason for black boiled potatoes has been determined by Professor W. E. Tottingham, of the College of Agriculture of the University of Wisconsin. Through his experiments he has proved that this discoloration is the result of the formation of pigment products which appear when the potatoes are grown in soil having a lack of potash fertilizer. The lack of potash in the soil causes the formation of certain organic compounds known as amino acids. These compounds oxidize to form the color pigments that discolor the potato.