SCIENCE NEWS

THE SOLAR ECLIPSE OF SEPTEMBER 10

Science Service

At two temporary stations and the main observatory, the scientific men of the Mount Wilson Observatory of the Carnegie Institution of Washington will observe the total solar eclipse on September 10, Dr. Walter S. Adams, acting director, said in response to an inquiry by Science Service.

One expedition will be located well within the path of totality, probably at the Military Reservation at Point Loma, near San Diego, California.

The other expedition will be at the edge of the shadow at some point east of San Diego. The observations here will consist mainly of photographs of the sun's atmosphere or so-called chromosphere with spectroscopes of various types. When the moon just covers the sun, the observer, looking at the sun's edge through a spectroscope, sees a vast number of bright spectral lines flash into view. These are produced by the gases which constitute the solar atmosphere and form what is termed the "flash" spectrum. The study of their intensities, the level to which they rise and their exact positions forms one of the most important investigations made at eclipses.

At the central station within the path of totality the observations will cover a wider range. These will include direct photographs of the corona, as the sun's outer atmosphere is called, and of the field of stars in the vicinity of the sun, the latter to be used for determinations of the bending of the rays of light near the sun's edge as predicted by Einstein's theory of relativity. Measurements will be attempted with a delicate thermo-couple of the amount of heat radiated by the corona, and its spectrum will be investigated with several different instruments, including an interferometer. Observations will also be made of the "flash" spectrum, and the attempt will be made to determine the position (wave-length) of some of the bright lines with a high degree of accuracy.

The observatory now has under construction a fifty-foot interferometer intended primarily for the measurement of the diameters of stars. It is hoped that the central section of the large steel beam will be completed in time for use at the eclipse. It will consist of a structural steel framework eighteen feet long, four and one half feet wide and ten feet deep, mounted upon a pier and driven by clockwork. To this can be attached several of the instruments to which reference has been made, and the whole apparatus can be pointed directly at the sun, thus obviating the use of reflecting devices. In addition, a portion of the Snow telescope will be used at the central station, and a smaller reflecting telescope for the station at the edge of the path of totality.

About 98.5 per cent. of the sun's disk will be obscured at Mount Wilson, and it is probable that certain valuable observations can be made with the powerful equipment which is there available.

Assistance to foreign astronomical expeditions coming to Mexico to observe the total eclipse of the sun on September 10 will be given by the Astronomical Observatory of Tacubaya. Dr. Joaquin Gallo, director of the observatory, has secured from the Mexican Meteorological Service data as to what parts of the path of the total phase are most likely to be free from clouds at the time of the eclipse.

From these data it is concluded that one of the best locations is the region of Cuencame in the state of Durango, where little rain falls in September. The region of Berrendo in San Luis Potosi and Matehuala presents also a minimum of cloudiness, although on many days which are cloudless the sky is hazy. Coastal regions on the Gulf of California and on the Yucatan peninsula experience excessive cloudiness. The part of the path of totality lying in the western Sierra Madre mountains suffers from lack of easy communication.

The Tacubaya Observatory hopes to be able to send two expeditions into the path of the total eclipse with the twofold object of making observations and of being of assistance to foreign expeditions there for that purpose. Six expeditions from North America are expected and it is possible there may be one from France, one from England and two from Spain. Passes will be granted for the free entry into the country of the scientific instruments, as well as a discount on railway freight rates on materials used by the foreign expeditions.

The observatory hopes to be able to take a series of motion pictures of the eclipse, to be used for instruction and study. A diffraction grating will be used for a study of the spectrum of the solar corona, and an artist will accompany the expedition to paint a faithful reproduction of the spectacle.

THE GULF STREAM AND THE WEATHER

Science Service

VARIATIONS in the temperature of the Gulf Stream are advanced by Dr. C. F. Brooks, professor of meteorology at Clark University, as a probable cause of the extraordinary weather reported during the past six months from both sides of the Atlantic Ocean. The subject first received attention at the meeting of the National Academy of Sciences in Washington last month when Dr. C. G. Abbot, of the Smithsonian Institution, announced a recent fall in the heat of the sun of some three or four per cent.

A summary of freaky weather conditions recounted by Dr. Brooks includes an extraordinary amount of ice in the western North Atlantic, a very early spring in northwestern Europe, an equally tardy one in eastern America, and unusually cold, rainy weather over northern Africa.

These conditions seem to have resulted, he says, from the presence of a large area of warm ocean water in the eastern Atlantic, causing expansion of the warm, moist air, southwest winds over western Europe, northwest winds over eastern America, and northeast winds over northern Africa, a combination which would result in conditions observed the past six months.

The more remote cause is probably variations in the temperature of the Gulf Stream. Dr. Brooks states that "four to six months after a period of strong northeast trade winds in the eastern Atlantic a body of water warmer than normal is usually found passing through the Florida Straits and flowing northeastwards, while from the eighth to the eleventh month cooler water follows. The warm water heats and supplies the air over it with an abundance of moisture, thereby expanding the air and favoring low pressure. This in turn not only makes muggy, showery weather when winds are on shore, but also tends to draw heavy air in unusual amounts out of the cold north and northeast, thereby creating storms. Later the cooler water makes the air less humid and favors quiet weather with general mild, southerly winds. It will be of exceptional interest to watch for such weather evidences of a warm Gulf Stream from May to July or August, followed by a cooler one from September or October through to February. Already the heavy rainfall of northern and semi-arid northeastern Brazil in February may have been a manifestation of an advancing area of unusually warm water in the equatorial current, which feeds the Gulf Stream."

Among the freaks of the weather listed by Dr. Brooks are the warm spring in England which caused the appearance of spring flowers there in February; heavy rains in the northern Sahara desert, so that stream beds at Biskra that have been empty three years were reported full; and wide variations in the snowfall in the United States with heavy falls in May in many sections.

THE PERIODICAL CICADAS

Science Service

THIS is a seventeen-year-locust year. In fifteen states east of the Mississippi River these remarkable insects, more properly known as the periodical cicadas, will emerge from the underground homes which they have inhabited for seventeen years, and the males will fill the woods with their shrill love songs. The females are dumb. The first cicadas may be expected to appear above ground within a week.

The states in which they will be heard and seen this year are Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. Not all parts of the states mentioned will be affected, the distribution of the cicadas being decidedly local in character.

Periodical cicadas appear somewhere within the range of their general distribution nearly every year. This is in agreement, however, with their periodical character as it has been found that they all belong to swarms which regularly reappear at intervals of thirteen or seventeen years. More than one swarm may inhabit a given locality, causing an apparent return of the insects at less regular intervals. This year's swarm is of the true seventeen-year variety.

It is probably the second largest of all the swarms and one of the most widely distributed. It has also historic interest in that it is the identical swarm which was first observed by Europeans in America. Colonies of the insects around Massachusetts Bay attracted the attention of the early white settlers in 1634 and mention of their appearance is to be found in books published some time later. Their direct descendants in the seventeenth generation will be heard near Plymouth and at Barnstable within a few days.

Periodical cicadas are growing less numerous in many localities owing to the cutting down of the forests. The eggs are laid in the tender twigs of trees and if no trees are available for propagation is largely prevented. Birds are enemies of the insects, especially the English sparrow, a fairly recent importation from the old world.

The insects cause no permanent damage to mature trees, but may seriously injure young trees or nursery stock. No remedy is practicable against them in large numbers over large areas,

but orchards and shrubs may be partly protected by thorough hand-picking, dusting with pyrethrum powder when the insects have just emerged from the shells in which they emerged from the ground, or spraying with kerosene emulsion at about the same time.

A NEW ARSENICAL DRUG

Science Service

A NEW drug for general paralysis and locomotor ataxia has just been reported to the American Medical Association by Drs. W. F. Lorenz, A. S. Loevenhart, W. J. Blackwen and F. J. Hodges, of the University of Wisconsin.

The new drug is an arsenical, called "tryparsamid," and it has been found more effective than any other treatment used in early forms of general paralysis and in other kinds of syphilitic infection of the nervous system.

Out of forty-two far advanced paretic cases in a hospital for the insane, twenty-one were discharged after tryparsamid treatment and were able to go to work, the investigators report. In the twelve cases of the early type, seven fully recovered their normal mentality and five seemed mentally able to earn their living, but still presented signs of the disease as shown by laboratory investigation.

An official of the American Medical Association said: "The physicians' conclusions seem modest in view of the results they report."

Most of the patients treated by the Wisconsin investigators were insane and had been for long periods in an institution for the care of such patients. There were also included twelve fairly early cases which had not degenerated greatly and who showed instead of mania merely excitable disorders. There were also fourteen patients entirely free from mental symptoms, but in whom laboratory examination revealed signs of the early development of this disease. Finally, there were ten cases of locomotor ataxia and nine cases in which the nervous system was involved by syphilis without having developed either locomotor ataxia or general paralysis.

The patients made a decided gain in weight and their general state of health seemed remarkably improved. A complete investigation shows that a combination of the new remedy with mercury is more effective in the treatment of general paralysis than any method thus far outlined.

Tryparsamid is another of many combinations containing arsenic as the factor depended upon to kill the infecting germs of syphilis. It is similar to the famous "606," salvarsan, the first successful syphilis treatment. The chief value of the new drug is not so much in its direct effect on the infecting parasites as in its action on the ulcers or other forms of inflammation caused by them. Tryparsamid was first made by Jacobs and Heidelberger, American chemists, in 1915. In 1919 workers at the Rockefeller Institute tested it on infections in animals.

The only drawback to the treatment is the possibility of injury to the eye with this preparation as with the well-known "606" or the earlier preparations described by Ehrlich, the discoverer of the first arsenical remedies of this kind. There is a possibility of seriously affecting the nervous tissues associated with vision and the Wisconsin investigators caution physicians against the employment of dosages sufficient to bring about such serious results.

Approximately five per cent. of those infected with the venereal disease, syphilis, later develop general paralysis, and from thirty to forty per cent. of persons with this serious venereal disease later show evidence that the disease has reached the spinal fluid.

CATALYSIS AND THE MOTOR FUEL PROBLEM

A. C. S. News Service

CATALYSIS, that strange principle of chemistry which works in ways more mysterious and inexplicable than almost any other of the many curious phenomena of science, seems to have come to the rescue in the threatened shortage of motor fuels.

Dr. Edward Sokal, of New York, a member of the American Chemical Society, has made a discovery which extensive experiments now in progress may prove to be a great boon and aid in the general effort to get greater economy out of gasoline as used in internal combustion engines.

H. E. Howe, editor of *Industrial and Engineering Chemistry,* the industrial journal of the American Chemical Society, predicts that the words "catalysis" and "catalyst," or "catalyzer," will soon become a general addition to the vocabulary of Americans, in the same manner that "wave-length" and other technical terms suddenly came into use through the wide popular familiarity with the principles of radio.

In some of the most important applications of chemistry, industrially, of the present day, the principle of catalysis is proving of the utmost importance. In the fixation of nitrogen from the air, particularly, this is true, and it seems likely that some of the greatest scientific advances of the future will depend principally upon this odd faculty which some substances possess—the faculty of speeding up the rate of chemical reactions and of acting as a "mixer."

In the particular instances at hand, Dr. Sokal found that certain chemical compounds and elements by their presence increase the rate at which a mixture of gas and air under pressure will burn. This means, simply, that the explosion, which is the basis of power in an automobile engine, is made more rapid and complete by means of the catalyst. The catalyst itself does not participate in the explosion, and remains the same after the fuel has burned as before. The mere fact that it is present in the combustion chamber does the work of accelerating the explosion.

In the case of fixing free nitrogen from the air, the principle works in the same way. Nitrogen is an inert gas and combines very reluctantly with other gases. In making this gas available for fertilizer and other purposes, it must be combined with other elements, and the most successful present-day method is to cause a combination of nitrogen and hydrogen to form ammonia. This can not be done at a satisfactory rate of speed without the use of a catalyst. A special compound of iron and some other metals, in particles about the size of a pea, is one of the most successful catalysts. The passage of the two gases through a tube containing such iron pebbles causes them to unite and nitrogen to be fixed so that it can be converted into fertilizer.

Dr. Sokal's catalyst, acting in the same way, is applied to the interior of the cylinder head or firing chamber of an internal combustion engine, in the form of a refractory paint. Tests made on various types of automobiles show that an increase in power is obtainable with the use of the catalyst, and examination of the exhaust gases of automobiles on which tests are being made indicate that the combustion is more complete. Such cars were able to operate satisfactorily on a much "leaner" mixture—that is, a greater proportion of air and less of gasoline vapor—and thus achieved a considerable economy. The complete results of these tests are not yet available.

Dr. Sokal has not made public the nature of the compound of the catalyst he uses, pending the issuance of patents, but he says that it can be applied to practically all types of internal combustion engines now in general use and that the cost of applying the catalyst will be low.

ITEMS

Science Service

IN order to bring up-to-date feeding methods to the attention of all live-stock raisers in the country, the Bureau of Animal Industry of the U. S. Department of Agriculture is now offering a free individual feeding service. Farmers are furnished with problem sheets with blanks for showing the condition of the animals and how they are being fed. After filling in these blanks, the farmer can forward the sheet to his county agent, state agricultural college or direct to the department at Washington, where the experts diagnose the case from this data, and then advise the feeder whether or not the animals are being given the proper ration. Returns already received indicate, officials said, that many animals are not getting enough protein with their roughage, timothy hay frequently being used instead of the richer alfalfa.

HEAT from a hot spring in the Pyrenees equivalent to a ton of coal an hour is being used by a French fruit raiser to force fruits so that they can be gathered for the market before their regular time.

ADVERTISEMENTS urge us to eat vitamin-containing yeast for the sake of our bodies, but now scientists have discovered that yeast itself must have a new vitamin before it can grow and flourish. Drs. Casimir Funk and Freedman have reported to the Society for Experimental Biology and Medicine that yeast fails entirely to grow when fed on very pure cane-sugar. This specially prepared sugar could not be detected chemically from other pure sugar, but the yeast cells placed on the very pure sweet stuff were latent and presented a spore-like appearance. The scientists concluded that a new vitamin D, not the same as vitamins A, B and C that influence animal nutrition, is necessary to yeast growth and that, moreover, yeast can not synthesize vitamin B, for which it is famed, without this new vitamin D. Drs. Funk and Freedman claim that other investigators in reporting growth of yeast on pure vitamin-free media neglected the presence of infinitely small amounts of this new factor D.

FURTHER development of a system of charts for aerial navigators corresponding to those prepared by the Hydrographic Office for mariners is now being studied by the Board of Survey and Maps. The board is composed of representatives from all the government departments interested in the making or the use of maps. Aerial navigation is developing so rapidly that the charts at present available are not keeping pace with it; hence the need for improvement. The Hydrographic Office is already engaged in this work along the coasts, and has prepared modern aviation charts for about twenty miles inland. The maps do not give the detail ordinarily given in topographic maps. Land and water boundaries are accurately shown as are the principal roads and railroads, while prominent landmarks such as factories or church spires are emphasized.