SCIENCE NEWS

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THE ECLIPSE OF THE SUN

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FOR the first time in eight years, on Sunday, April 7, the entire United States will be able to see an eclipse of the sun. This coming solar display will be a partial eclipse over the whole nation. The nearer one lives to southern Texas and the Gulf States the larger will be the apparent "bite" which the moon will take out of the sun's disk.

In the 150-mile wide band that enters southern Texas, follows the Gulf of Mexico coastline and passes over northern Florida, will occur one of the unusual and pleasing annular, or ring, eclipses. For times varying from over 6 minutes to 5½ minutes, observers in this band will see the black shadow of the moon nearly covering the sun's disk. The moon's diameter will cover 92 per cent. of the sun's diameter, to be exact.

This means that observers, during the eclipse, will see the sun as a thin ring of light instead of its flaming disk.

Farther north, outside of the annular band, observers will see a partial eclipse. Far to the north and west in Oregon and the state of Washington the moon will block out 40 per cent. of the sun's diameter. Other sections of the nation will see the partial eclipse as shown on the adjacent map. The symbols at the left show the relative size of the sun's disk that is covered.

The exact direction in which the moon will start to block out the sun's disk is not given on the map correctly for all observers because this direction differs for every locality.

The longest time in which the moon will nearly cover the sun's disk will be in southwestern Texas, where the duration of the eclipse will be 6 minutes, 37.6 seconds according to calculations at the U. S. Naval Observatory in Washington. As the eclipse progresses eastward along the annular band the duration becomes shorter and will be only 5 minutes, 38.8 seconds at the line marked off the coast of Florida.

For all those who view the eclipse smoked glasses, or a piece of photographic film exposed and densely blackened, are necessary. Serious damage can be done to the eyes by a glance at the sun's flaming surface without this aid.

There was a time when annular, or ring, eclipses such as that of April 7 were almost entirely without scientific interest. The progress of research, however, and advances in scientific instruments have made possible useful scientific observations on the coming solar event.

With special thermocouples and infra-red filters an expedition of the University of Chicago and the University of Texas will go from McDonald Observatory at Mt. Locke, Texas, down into better observing position and seek to study the faint light on the sun's limb (its outer edge) which is normally obscured by the much more brilliant rays from the center of the sun's disk. At McDonald Observatory, itself, will be set up the television apparatus invented by Dr. A. M. Skellett, of the Bell Telephone Laboratories, for viewing the sun even when an eclipse does not occur. This device works well even when the sun's light is not blocked off by the moon. With an eclipse of about 90 per cent. magnitude scheduled for McDonald Observatory it is believed that even better pictures can be obtained because of the moon's help.

Journeying from Washington to near San Antonio, Texas, will be the expedition of the National Bureau of Standards and the National Geographic Society which will study the eclipse by radio signals and the behavior of the ionized reflecting layers far above the earth. With trailer-mounted equipment scientists will study the time of the radio "echo" signals during different stages of darkness.

At the Kensington Laboratory of Carnegie Institution's Department of Terrestrial Magnetism, Dr. L. V. Berkner will also investigate these radio reflections during the entire day of the eclipse. From the lower reflecting layers (at heights of 60 and 130 miles above the earth) it is hoped that data can be secured which will tell how fast the ions in the atmosphere recombine. In upper regions of the ionosphere (at heights of 220 miles) the general behavior of the reflections during the eclipse will be studied. Past investigations seem to show that there is no general pattern for this behavior during the previous eclipses. The eclipse at Kensington, just outside Washington, will be about 65 per cent. total.

Amateur astronomers can aid science by observing the time of first and last contact of the moon and the sun. To take this information so that it will have meaning, it is necessary to have an accurately calibrated chronometer for noting the time, and the exact geographical location where the observation was made. One can not simply go out in the backyard with a watch and do the job. Science Service will gladly forward the data obtained by amateurs to astronomical centers for study and possible use.—ROBERT D. POTTER.

HIGH PRESSURE

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SCIENTISTS stand at the threshold of experiments which should enable them to duplicate pressures encountered 745 miles down inside the earth, and double present world's record pressures of 3,000,000 pounds to the square inch and over.

The record high pressure, equaling pressures more than 100 miles within the earth, has been obtained by two scientists of the Carnegie Institution of Washington, Dr. Roy W. Goranson, of the Geophysical Laboratory, and Ellis Johnson, of the Department of Terrestrial Magnetism, with a "cascade bomb" apparatus. Their results virtually duplicate the high pressure of 3,000,000–3,500,000 pounds per square inch reported by Professor P. W. Bridgman, of Harvard University, in the *Physical Review* late last month.

The only reason the Carnegie experiment was stopped at 3,000,000 pounds per square inch, or 200,000 atmos-

pheres, was that the pressure gauge used was not calibrated beyond that point. The pressure equipment itself potentially may be capable of doubling this pressure. If this can be done, it will produce a pressure equal to that inside the earth at depths of 745 miles and permit important studies of the properties of matter at these pressures.

Announcement of the Carnegie's new cascade bomb equipment was a dramatic highlight of the Conference on Theoretical Physics sponsored annually by the Carnegie Institution and George Washington University. Those present heartily applauded the new high-pressure achievement which was performed in an intensive all-night research by Dr. Goranson and Mr. Johnson. It was at this same conference, just a year ago, that the dramatic announcement was made to America that science had found a way to split uranium atoms with neutrons and make them yield enormous amounts of atomic energy. A friendly race between Harvard and the Carnegie Institution appears to be in progress to attain world's record high pressures.

The secret of the amazing pressures attained by the Carnegie experimenters is the use of cascade bomb apparatus. This device consists of two pressure chambers arranged one inside the other so that the inner one is surrounded with a kerosene-like oil known as varsol under a pressure of 17,000 atmospheres, or 255,000 pounds to the square inch.—ROBERT D. POTTER.

NEW TYPE RADIO SETS

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WITHIN a year new types of radio receivers for detecting the crystal clear frequency modulated (FM) radio transmission will be selling for $33, was predicted by Major Edwin H. Armstrong, radio inventor and professor of electrical engineering at Columbia University, at hearings of the Federal Communications Commission in Washington. The present price of such receivers is $65 but is based only on production of 1,000 receivers. Major Armstrong testified that the price can be cut in half with greater production, and that this reduction should come within a year.

Major Armstrong told the FCC that if these receivers were plugged into console radio-phonograph receivers now in use, through the jack for the phonograph record-playing, greatly superior performances could be achieved. The large-sized speaker in these console sets, he indicated, allowed present receivers to utilize the added tone brilliancy and fidelity possible with FM reception. A small-sized loud speaker, used with FM receivers, would permit some gain in performance but not very much.

Under examination before the FCC it was brought out that Major Armstrong has received $755,000 from the sale of his three outstanding radio patents: the regenerative circuit, the super-heterodyne circuit and the super-regenerative circuit. All this money, he testified, he has poured back into the development of his new FM system.

It was disclosed that Major Armstrong receives no royalties from the manufacturers of FM transmitters but only a lump sum payment which ranges from $300 for a small 250-watt transmitter to $5,000 for the largest power. If the transmitter manufacturer will promise to spend a sum for research on FM equal to this amount Major Armstrong waives his fees and receives nothing for licensing the transmitter manufacturer. The FCC commissioners carefully questioned Major Armstrong on his assertion that with FM radio and directive antennas it is possible to separate two stations broadcasting on the same frequency when the ratio of their signal strength is only two to one. In present type of broadcasting a signal ratio of 20 to one is needed for this feat.

Major Armstrong has received 15 patents, dating from December, 1933, on the new frequency modulated radio system, but he has studied it, off and on, for the last 20 years.—ROBERT D. POTTER.

OPTICAL TESTS FOR DETERMINING THE PRESENCE OF CANCER

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A NEW optical test that tells whether a person has cancer and whether after operation that cancer has been successfully treated is claimed by Dr. M. W. Mettenleiter, New York surgeon, connected with St. Clare's Hospital. In a preliminary series of 325 cancer cases, the test is reported to have proved 96 per cent. correct.

Developed from German studies reported over the last thirty years, the Mettenleiter test involves the measurement of the densities of a number of samples of the person's blood serum by use of an interferometer. The blood serum from the patient is mixed with an extract of human cancer cells from a patient known to have carcinoma of the breast.

Varying amounts of the suspected patient's blood serum are placed in four test-tubes containing equal amounts of the cancer extract. After incubation and settling, the densities of the four dilutions are obtained, and plotted out graphically. The curves are reported to show a characteristic difference between cancerous and the non-cancerous blood serum.

Dr. Mettenleiter believes that the test will prove of assistance in the early diagnosis of cancer and in determining the course of a case. He finds that a curve indicating cancer slowly changes to a normal curve after a successful operation. He reports that it changes again from a normal to a cancer curve in the earliest stages of recurrence. A cancer curve, it was found, does not change postoperatively if metastases or spreading of the cancer have already or are about to take place elsewhere in the body.

The test reaction failed to appear when serum of a pregnant woman or of a person with tuberculosis, syphilis or numerous other diseases was used, it was reported. However, as was to be expected, fever and intensive x-ray treatments influenced the serum so as to make the test uncertain. Extract of normal organs, for example, fibroid tissue, failed to show any reaction.

Dr. Mettenleiter made known his researches through a communication to the British science journal, *Nature*. He is a fellow of the American Medical Association and

of the American College of Surgeons. Born and educated in Germany, he has practised in New York since 1927.

A successful, practical test for cancer has been sought by many experimenters. About a score of such tests have been announced from time to time. The Mettenleiter test will undoubtedly be received with interest. Others working on cancer will try it and they must report success before it can be expected to come into use.—WATSON DAVIS.

CANCER AND SUNLIGHT

PREVENTING cancer by sunlight may be possible if more can be learned about how the sun's rays affect the body. Evidence that exposure to sunlight does produce cancer immunity in some cases was presented by Dr. Frank L. Apperly, Medical College of Virginia, at the meeting in Pittsburgh of the American Association of Pathologists and Bacteriologists.

Cancer mortality in the United States and Canada grows less, Dr. Apperly finds, as the amount of sunlight increases across the continent and as more people are exposed to sunshine, for example, where more of the population is engaged in farming or other outdoor occupation.

Differing from some others who believe sunlight holds the key to cancer prevention, Dr. Apperly does not believe it is necessary to have skin cancer in order to become immune to other forms of cancer. Those who hold this view believe cancer deaths might be reduced by enough sunlight to cause skin cancer, which is easily cured, and which might leave the individual with immunity to other more killing forms of cancer.

Sun rays, or something closely associated with them, according to Dr. Apperly, have two separate effects: (1) They produce some sort of relative immunity to cancer in general and, in those localities where the mean temperature is less than about 42 degrees Fahrenheit, even to skin cancer; (2) at mean temperatures above 42 degrees Fahrenheit, sun rays produce more cancer on those parts of the skin exposed to them, in spite of a generally raised immunity.

Besides the statistics of cancer deaths in various climates, Dr. Apperly cited animal studies by other investigators which, though not completely applicable to humans, have a bearing on the question. When mice were given a large dose of x-rays before application of a cancer-causing coal tar chemical, methylcholanthrene, they died at almost three times the rate of animals not previously x-rayed. Small doses of x-rays before the chemical treatment, however, protected the mice against the cancerous effect of the chemical to such an extent that the cancer mortality was only one third that of the non-x-rayed group. "We may be able to reduce our cancer deaths," Dr. Apperly concluded, "by inducing a partial or complete immunity by exposure of suitable skin areas to sunlight or the proper artificial light rays of intensity and duration insufficient to produce an actual skin cancer. The study of the effects of sunlight on the living organism, and of those conditions in the skin which modify its action, may produce results of inestimable value."

ITEMS

THE report of papers presented at New Orleans before the Federation of American Experimental Biological Societies, printed last week, should have been signed Jane Stafford, medical staff writer of Science Service.

SPRING farm work has been delayed a full two weeks in many sections of the East and Central Valley regions, by continuing cold, wet weather, the U. S. Weather Bureau's weekly survey shows. At this time last year, farmers were troubled by an exactly opposite state of things: a persistent spring drought that even made itself severely felt in Florida. Dry weather, however, has prevailed in the nearer Southwest, from upland Arkansas to Texas, where corn planting has had to be postponed in many communities until rains come. Early cotton plantings show poor stands in Texas, and little is up at all in other parts of the western Cotton Belt. In eastern cotton states planting still awaits drier soil and warmer weather. The Plains area reports conditions ranging all the way from a severe dust storm in Oklahoma to unworkably wet fields in Montana. In general, Plains farms have adequate topsoil moisture at present.

THE extreme precision needed in modern airplane manufacture requires the use of rivets which have been kept chilled at the temperature of dry ice. At the works of the Boeing Aircraft Company, at Seattle, Washington, special heat treatment is given to aluminum alloy rivets. They are then placed in refrigerated boxes at dry ice temperature which retards their aging, or hardening, characteristics. As used they are removed from the boxes and quickly driven into place.

THE medical care and health service plan which this nation finally adopts will be that one of the various proposed plans which captures the public's imagination, according to the prediction of J. Douglas Colman, director of the Associated Hospital Service of Baltimore. The most obvious channel through which health services might flow is, of course, that of government, Mr. Colman said in a discussion of medical care at the Johns Hopkins School of Hygiene under the De Lamar Foundation. Other channels are private enterprise, the cooperative movement and local voluntary effort as exemplified "in our voluntary hospital system and more recently in Hospital Service Plans. Already there are indications of markedly increased activity in each of these fields. Probably each one of them will contribute in some measure to an ultimate solution and probably under each one of them a fairly workable program could be developed. Certainly the choice will be made by the public, and in terms of the one which can most capture its imagination. During 1940, the 56 non-profit hospital service plans approved by the American Hospital Association, he reported, will provide their 4,500,000 subscribers with approximately $25,000,000 worth of hospital service. Subscribers to these plans have increased from about 50,000 in 1935 to the present 4,500,000.