SCIENCE NEWS

EXPEDITIONS OBSERVING THE ECLIPSE

Science Service

ASTRONOMERS from all over the world were stationed on Monday at advantageous points along a 100 mile wide strip in California and Mexico ready for the total eclipse of the sun. Massive and expensive telescopes, cameras and other apparatus were erected at advantageous points, corps of scientists were carefully drilled and many days were spent in preparation for the event. All this was done in order that the totally obscured sun might be observed for about three minutes.

SCIENCE goes to press before it is possible to receive any news of the results, but it may be of interest to give some information in regard to the location and plans of the various expeditions.

Point Loma, near San Diego, Cal.—The Mount Wilson Observatory's main eclipse observing station, equipped with two 30 foot cameras, one 15 foot camera, various telescopes and spectrographs, is located here under the direction of Dr. Walter S. Adams, director. Both the corona and the Einstein effect will be studied.

Leander McCormick Observatory of the University of Virginia has an expedition under the leadership of Dr. S. A. Mitchell, equipped with powerful Loucan grating spectrographs that are located near here at the center and edge of moon's shadow in order to determine the vapors constituting the sun's atmosphere and the height to which the vapors ascend. Two stations are being occupied for the purpose of photographing different layers of the solar atmosphere.

Prof. Charles Le Morvan heads a French expedition located here to study the sun during the eclipse.

Scientists from the Department of Terrestrial Magnetism of the Carnegie Institution will make elaborate magnetic observations in connection with Mount Wilson Observatory observations.

San Diego, Cal.—Army and Navy aviators are ready to attempt for the first time eclipse observation from airplanes. Lieut. John A. Macready, holder of the world's altitude record, and Lieut. A. W. Stevens, expert aerial photographer, plan to photograph surface features and the moon's shadow from an altitude of 20,000 feet. If clouds prevent observations from the surface, they will photograph the sun itself. Navy pilots at the request of the U. S. Naval Observatory will make photographs of the northern and southern edges of the path of the shadow cast on the earth during the eclipse to allow checking of computations of eclipse time. They will also photograph the "shadow bands" that pass across the landscape just before totality.

Santa Catalina Island, Cal.—An expedition from Yerkes Observatory of the University of Chicago, under direction of Dr. Edwin B. Frost, will make motion pictures of the eclipse, obtain large scale photographs of the corona with a 60 foot telescope, and make spectroscopic observations at a station located 1,300 feet above sea level. Santa Catalina Island is off the coast of California opposite Los Angeles.

Lakeside, Cal.—A second party from the Mount Wilson Observatory will study spectrum of gases in the sun's lower atmosphere.

Ensenada, Lower California, Mexico.—Lick Observatory of the University of California has an expedition located near here under the direction of Dr. W. W. Campbell, president and director. Observations will be concentrated on the corona problem and the party is equipped with large cameras, telescopes and spectrographs. Many of the astronomers connected with the party were members of the Lick Observatory, Australian expedition, that observed the eclipse of last year.

Lowell Observatory, located at Flagstaff, Ariz., will locate its party near here under the direction of Dr. V. M. Slipher, and extensive observations are contemplated.

Parties from the University of Indiana and De Pauw University will also be located here. Ensenada is 75 miles southeast of San Diego.

Hermosillo, Sonora, Mexico—A party headed by Dr. A. E. Douglass, director of the Steward Observatory, Tucson, Ariz., is located here with a five-inch lens of 39 feet focus and several other instruments. In the party are a number of amateur astronomers.

Yerbaniz, Mexico—The principal expedition from Mexican National Astronomical Observatory of Tacubaya, under direction of Prof. Joaquin Gallo, will photograph the sun's corona with two cameras of long focal length, and observe the sun's spectrum with special apparatus. A cinematographic camera will also be used. The personnel includes an engineer, calculator and mechanic.

Senor Rosendo Sandoval of the Mexican Magnetic Observatory will make special magnetic observations here.

Sproul Observatory of Swarthmore University has an expedition under the leadership of Dr. John A. Miller located here with its principal object the study of the corona of the sun. A camera of 65 foot focal length and other instruments are erected ready for the total eclipse. This expedition has taken out a policy for $10,000 insuring the securing of corona photographs of scientific value.

Yerbaniz is a small railroad station, located midway between Durango and Torreon.

Berrendo, Mexico—Second party from Mexican National Observatory is located here under direction of Prof. Jose Maria Chacon, who is accompanied by another astronomer, a mechanic, and Francisco Estanol, photographer and artist. Motion pictures will be taken and the artist will sketch the total eclipse. This party is also equipped with a photoheliograph and several telescope cameras. Berrendo, in the state of San Luis Potosi, is located a few kilometers north of Charcas in the same state.

Pasaje, Mexico—A German expedition under the leadership of Dr. Ludendorff, director of the Potsdam Observatory and brother of the general, assisted by Prof. Richardo Shorr, director of Bergedorf Observatory, and A. Kohlshutter, A. D. Dolberg and W. Herman, are en-

camped near this station where they will make extensive observations of the sun. Pasaje, near Cuencame, is a few kilometers north of Yerbanis.

Teoloyucan, Mexico—The Mexican Magnetic Observatory here will make special magnetic observations during the eclipse of the sun. Teoloyucan is twenty-two miles north of Mexico City.

PAST AND FUTURE ECLIPSES

Science Service

FAMOUS eclipses have been as follows:

Oct. 22, 2136 B. C. First recorded eclipse observed in China.

May 28, 585 B. C. First eclipse known to have been predicted, a mathematical feat performed by Thales of Miletus.

Aug. 30, 1030. Red light of corona of eclipsed sun frightened soldiers in battle at Stiklastad, Norway.

May 30, 1612. First eclipse seen "through a tube" or telescope.

October 27, 1780. First American eclipse expedition from Harvard University.

July 8, 1843. This eclipse marked the beginning of physical research on the sun.

July 28, 1851. First photograph of eclipse made in Germany.

Aug. 18, 1868. Janssen, French astronomer observing in India, determined from spectrum of solar prominences that they are enormous masses of highly heated gaseous matter. Observation revealed spectral line of helium, not discovered on earth until nearly thirty years later.

December 22, 1870. French astronomer, besieged in Paris, escaped by balloon carrying parts of telescope only to have observations spoiled by clouds. Prof. C. A. Young discovered "flash spectrum" and also line in corona spectrum attributed to hypothetical element "coronium."

May 29, 1919. Photographs by two British expeditions showed bending of light rays from stars as predicted by Einstein.

September 21, 1922. Lick Observatory party in Australia confirms Einstein effect.

Total obscurations of the sun during the next five years will take place:

Jan. 24, 1925, visible in New York City and eastern United States.

Jan. 14, 1926, visible in eastern Africa, Sumatra and Philippines.

June 29, 1927, visible in England and Scandinavia.

May 19, 1928, visible in Antarctic Ocean.

CAUSE OF THE JAPAN EARTHQUAKE

Science Service

THE devastating earthquake in Japan undoubtedly originated in part in the sea off the the coast of that island empire, Prof. Andrew C. Lawson, of the University of California, who has just gone to Washington to head the National Research Council's division on geology and geography, explained to a *Science Service* representative.

A great break in the ocean bottom occurred, allowing one side to slip past the other and drop for probably a dozen feet, carrying with it many millions of tons of sea water. The ocean rushing into the vacated space set up the so-called tidal waves that, oscillating back and forth like water in a tub, swept the Japanese coast. The violent shaking of the earth that caused destruction and started the fires was a result of the slipping of two portions of the earth's crust past each other.

The extremely deep portions of the oceans seem to be associated with the areas where earthquakes are most frequent, Prof. Lawson pointed out. Just off the east coast of Japan is a long depression in the ocean's floor called the "Tuscarora deep." Similar depths of the sea, found off Chile, the Philippines, Jamaica and the Aleutian Islands in Alaska are regions where earthquakes are frequent.

Earthquakes occur when strains in the earth's crust become too great and find relief in slips and breaks, Prof. Lawson said. He likened the crust to a board that when stressed by a weight will finally give way with a sudden crash. The rocks of the earth are elastic like steel and will stand a certain amount of strain before they are relieved by sudden movement.

Japan is noted for the progressive piling up of strains that result in earthquakes. Prof. Lawson recalled the quake of 1891 in Japan that left an abrupt cliff as high as eighteen feet in some parts of the zone.

Scientists know that there are various regions of the world, like Japan, the coast of California, the Alaskan coast, Chile and New Zealand, where the earth's surface is unstable and where adjustments are now in progress.

Eventually it may be possible for scientists to predict earthquakes, Prof. Lawson believes. Extensive investigations are now under way by the U. S. Coast and Geodetic Survey in California that show that there is a crustal creep there of about three feet in ten years relatively to the Sierra Nevadas. Several years ago the National Research Council pointed out the need of seismologic study and the Carnegie Institution with the cooperation of other scientific bodies is making an intensive study of California, which was selected because of the work previously done on the San Francisco earthquake of 1906. The U. S. Coast and Geodetic Survey has had survey parties in the field for the last two years to determine the rate of movement there. Prof. Lawson considers this slow displacement as a strain creep, which accumulates till relief is effected by a sudden slip or a rupture in the earth's crust.

"After years more of such research," said Prof. Lawson, "I believe that it may be possible to predict about when the strains that are indicated by these movements will be released and cause an earthquake, but exact prediction is not likely to be obtained. We can not draw conclusions from our present data because we do not know how earthquakes, often very slight in one part of the area, affect the strains in another part."

The deep-seated reason for earthquakes remains a mystery to science. The most plausible theory, according to Prof. Lawson, is that deep in the earth the rocks, while remaining hard and very dense, act like a fluid and tend

to flow from one part of the earth to another, carrying the upper crust with them. The strains that produce earthquakes at the surface are caused by these deeper movements.

PREDICTION OF THE JAPANESE EARTHQUAKE

Science Service

THE recent devastating Japanese earthquake was predicted nearly two years ago, according to F. Tondorf, S.J., director of the Georgetown University Seismic Observatory at Washington. He pointed out that Prof. F. Omori, head of the Imperial Earthquake Investigation Committee of Japan, in March, 1922, forecast the occurrence of severe shocks within six years.

This prediction was based on the number of quakes in the years immediately preceding. The Japanese scientist noted that when earthquakes were many and often severe shocks were unlikely to follow, but when the small earth movements were relatively few and far between over a long period, earthquakes were liable to be more serious later. On account of the comparative absence of quakes preceding his forecast, Prof. Omori predicted that serious quakes would occur within a period of six years.

Through his study of rainfall in the northern part of the islands, he was able to point out an apparent connection between the precipitation and earthquakes, showing that when the rainfall was exceedingly heavy in this section it would be followed by earthquakes.

Omori believed that the primary cause of the earthquake is the breaking of the earth's crust, but that the cause of this break is the additional pressure furnished by the added weight of air and water as shown in rainfall and barometric measurements.

Prof. Omori also predicted the great Chilean earthquake of August 17, 1906, using data worked out in regard to the earthquakes of his native islands. He held that the stress applied along one of the great earthquake belts, on finding relief by an earthquake movement, will not for a time affect that neighborhood; but when next the stress finds relief, it will be at a distant point along the belt. Upon the basis of this law he made the prediction shortly after the California earthquake of April 18, 1906, that the next great earthquake in that belt would occur in South America south of the equator. Immediately after this prediction came the Chilean quake.

CARBON MONOXIDE IN TOBACCO SMOKE

THE much mooted question as to whether the carbon monoxide present in tobacco smoke constitutes a hazard to the smoker in confined indoor spaces seems to have been settled as a result of tests just completed by the Department of the Interior at the experiment station of the Bureau of Mines at Pittsburgh, which demonstrated the danger to be negligible.

The tests, which were performed in the course of general studies of the Bureau of Mines relative to gas hazards in mines, were made on three men confined in a closed chamber whose dimensions were 1,000 cubic feet. The three subjects puffed merrily for the space of an hour and a half at cigarettes of every variety, Turkish, Egyptian, the old Virginia brand, and the type wherein the smoker "rolls his own." Following this, the smokers drew energetically at an infinite variety of cigars—cheroots, Pittsburgh stogies, black Manilas and Havanas of choice degree. Finally they puffed frantically at pipes, at pipes of clay and cob, at pipes of meerschaum and briar. At the conclusion of the performance the air of the closed chamber had become so smoky that it was impossible to see across the room. The atmosphere was so irritating to the eyes that it was necessary to wear goggles.

Samples of the atmosphere and blood samples of the smokers were then taken for analysis. It was found that in no instance did the carbon monoxide content of air exceed 1/100 per cent. The maximum blood saturation was 5 per cent. Some of the subjects supposedly inhaled their smoke, but the tests indicated that such inhalation, though it may have extended to the bronchial tubes, did not penetrate throughout the lungs. The tests indicate that carbon monoxide hazard from smoking indoors or in mines is negligible in itself, though the Bureau of Mines investigators consider that it may add to the smoker's hazard should he be caught by carbon monoxide from sources such as occur in the mining industry.

CAUSES OF DEATH IN NEW YORK STATE

NEW low records for diphtheria and typhoid fever, contrasted with epidemic prevalence of measles yet with very low death rates for that disease and for scarlet fever were the outstanding features of a report on the communicable diseases of New York State exclusive of New York City for the first half of 1923, made public by Dr. Matthias Nicoll, Jr., state commissioner of health.

"Measles," said Dr. Nicoll, "was the most prevalent disease for this period. Early this year it was recognized that after the low records in recent years a high wave of measles was due. The State Department of Health, through its Division of Communicable Diseases under the direction of Dr. Edward S. Godfrey, accordingly began a campaign to keep down the measles mortality, particularly in institutions for small children where the fatality is usually extremely high. These efforts included energetic promotion of the new method of treating children exposed to measles with serum from convalescent cases. Although during the first five months of this year measles found entrance to twelve of forty-one upstate institutions harboring children under four years of age, only two deaths occurred in institutions, less than 2 per cent. for the period, as contrasted with 20 per cent. for 1922."

Up to July first of this year 36,663 cases of measles were reported to the State Department of Health as compared with 13,383 for the same period last year. Twenty per cent. of the 274 deaths this year were of children less than one year old, while sixty per cent. of the measles mortality was among children under three

years of age. The measles fatality rate this year was 75 deaths per 10,000 cases as compared with 95 in 1923 and 90 for the average during the last five years.

Diphtheria showed 2,819 cases for the first half of this year as against 4,030 for the same period last year and 4,365 for the five year average, according to the report. There were but 221 deaths compared with 310 last year and a five year average of 367. "The decline in diphtheria is especially encouraging," said Dr. Nicoll. "Since 1916 the diphtheria death rate has been higher each year than the average from 1912 to 1916 despite all the efforts of local and state health authorities. While the record for last year was better the rate still failed to drop to the level of these earlier years. The outlook from the figures so far this year leads us to believe that the Schick test and toxin antitoxin campaigns begun last year and intensified this year are beginning to show very definite effects. The incidental education of the public has been perhaps even a more potent factor in the reduction than the active immunization of susceptible children.

"There were twenty fewer cases and eight fewer deaths from typhoid fever during the first six months of this year than were ever previously recorded for the period. But since about two thirds of the annual total of typhoid cases ordinarily occur during the first half of the year, we feel that the gratifying record so far should be taken as an incentive to greater effort to keep down this disease for the rest of the year."

Scarlet fever with 7,634 cases was more prevalent than ever before recorded for this period, the repora said, but the mortality of 105 cases was the lowest since 1919 and gives a fatality rate of only 1.4 per cent., which is the lowest on record for this disease. Whooping cough was also more prevalent than in 1922. There were 218 cases of smallpox as compared with 88 last year and with a five year average of 262.

Most of the cases of smallpox were reported from Niagara Falls and vicinity with Jamestown and Olean next in order, though small outbreaks also occurred in Dunkirk and the rural parts of Cattaraugus and St. Lawrence counties, according to the statement of the department. "It should be noticed," said Dr. Nicoll, "that no cases of smallpox have occurred in any city of the first or second class, due largely to the fact that in such cities the vaccination of school children is compulsory, resulting eventually in a well vaccinated adult population."

ITEMS

Science Service

THE volcanic activity reported in news dispatches as accompanying the Japanese earthquake must be considered secondary to the great "tectonic" or structural disturbance in the earth's crust that has taken place, Dr. H. O. Wood, in charge of the California seismologic investigations of the Carnegie Institution, said in response to an inquiry from *Science Service*. He declared that there is no knowledge regarding the relation of this disturbance to other regions. "No scientific investigation of the disaster is contemplated by American scientists," he said, "since the Japanese Imperial Earthquake Investigation Committee is splendidly equipped and thoroughly competent to study the occurrence and make a full report."

DANGER and delay to steamships under way in Red Sea ports is caused by large jelly fish and it is often necessary to send down divers to cope with these tropical sea creatures, W. Postlethwaite, 2nd officer of the "S. S. Atreus," reports to the Hydrographic Office of the U. S. Navy Department. He recommends a method by which ship masters can avoid the trouble occasioned by the complete choking of the intake of the ship's main water supply system by these simple jelly-like forms. Water for the boilers is completely cut off when these big jelly fish are drawn against the grating over the intake by the main suction pump. In order to cause no risk or delay to the vessel while under way so close to land, he advises that, while the ship is at anchor in these ports, water be taken through the pump which is designed to regulate the water ballast in the hold of the ship and through which the water can be pumped either into or out of the ship. By pumping back, the jelly fish can then be forced off the intake grating without the necessity of sending down a diver to clear it off.

EXPERIMENTS now under way may show that compounds of copper, manganese and zinc, found closely associated with the so-called vitamins in animal and plant tissue, are essential to life, Prof. J. S. McHargue, research chemist of the Kentucky Experiment Station, told the American Chemical Society. Prof. McHargue reported having found appreciable amounts of lead, arsenic, copper, cadmium, manganese, zinc, nickel and cobalt in virgin and cultivated soils from three different geological formations in Kentucky. Plants and seeds growing under natural conditions were also examined and copper, manganese and zinc were found in all cases. In wheat, corn and rice, these three elements and also iron were discovered. The more important organs and tissues of hogs, sheep and cattle were examined and the largest amounts of copper, manganese, zinc and iron were found in the liver of each of these animals.

AFTER eluding all searchers for over sixty years, a nest and eggs of the wandering tattler, a sea bird rejoicing in the scientific name Heteroscelus incanus, have at last been found by O. J. Murie of the U. S. Biological Survey, Department of Agriculture, in the Savage River region of Alaska. The nest and four eggs nave been sent to Washington, where they were transferred to the U. S. National Museum for permanent preservation. Dr. C. W. Richmond, associate curator of birds in the museum, said that the "Wandering Tattler was discovered in Polynesia on one of Cook's voyages, and has since been found on many islands of the Pacific, but always as non-breeding birds. For many years it has been known to occur on our west coast and in Alaska, where it was thought to nest. Many expeditions there in the last sixty years or so have been on the lookout for the nestband eggs of this species, but without success until the present."