SCIENCE NEWS

Science Service, Washington, D. C.

SUN-SPOTS

THE sun-spots have recently been more plentiful. Telegraphic reports of observations made at Mount Wilson Observatory, California, received by *Science Service*, indicate that during the third week in February there were many sun-spots visible on the sun's disc as seen by the aid of the special solar telescopes there. Daily observations showed a peak of 28 spots in five groups on Tuesday, while on other days there were also many spots.

On the first day of February the sun was entirely free from disturbances although usually during the past few months there have been a few spots reported by the Mount Wilson Observatory.

The sun rotates on an axis from west to east just like the earth. The gigantic and complex disturbances in the outer layers of the sun which cause the spots therefore seem to pass across the face of the sun, sometimes reappearing some 13 days later after having travelled around on the other side of the sun.

Sun-spots occur in cycles with a maximum number appearing every eleven years or so. As the last maximum occurred in 1928 or 1929, it is now about half way between a maximum and a minimum. By 1934 the sun's activity should be quiescent.

The effect of sun-spots upon the earth has been one of the most active questions in astronomy for many years. There seems to be good evidence that spots, or the solar conditions causing them, in some way affect radio reception, magnetic disturbances, and that sometimes they put telegraphic lines out of commission by setting up earth currents.

Some spots are very large and visible to the unaided eye when the sun is viewed through heavily smoked glass. Others are very small, the smallest detectable being about 300 miles across. Some of the largest have measured 60,000 miles across. They may last for several months or they may disappear in a few hours.

A NEW PRECISION CLOCK

A NEW precision clock, which varies from correct time not more than one five hundredth of a second in twenty-four hours, has been devised by Professor Max Schuler, of the University of Göttingen. It is described in detail in *Die Umschau*.

The most distinctive feature about Professor Schuler's clock is the addition of a very considerable mass of metal to the upper end of the pendulum, so arranged that its center of gravity is exactly opposite the knife-edge bearing on which the pendulum is suspended. This makes for great steadiness in its swing, and is the principal contributor to the clock's great accuracy.

In order to prevent changes in length of the pendulum so far as possible, the clock is kept in a room in which the temperature is regulated, and any changes that do occur are registered on automatic apparatus. To reduce atmospheric friction to a minimum, the clock is kept within a sealed glass case filled with hydrogen, which is the least viscous of gases.

The clock does not have a face and hands, like ordinary clocks. The function of telling the time is delegated to a second clock which it controls electrically, called a "slave clock." The free-swinging pendulum of this "master clock" does not even touch the electric contacts that drive the slave clock.

This is done by the most delicate and weightless of all possible levers, a beam of light. A lamp on one side of the master-clock case shines on a photoelectric cell on the other. Every time the pendulum swings, it causes a momentary eclipse of the photocell. This causes an electric current to flow for a moment, giving the slave clock the necessary little push to keep it going.

The "slave clock," thus admonished to accuracy from second to second, repays by closing a circuit with each swing of its pendulum, which supplies a momentary electromagnetic impulse to the master-clock pendulum, keeping it swinging.

X-RAY DETECTION OF DISEASE

DR. B. R. KIRKLIN and Dr. H. M. Weber, of the Mayo Clinic, Rochester, Minnesota, have announced results of new work in the X-ray detection of disease. Dr. Kirklin's work has been on the gall bladder and Dr. Weber's on the large intestine.

The X-ray picture, as is well known, is a shadow, cast in varying density, according to whether the rays can or can not pass through the tissues. The stomach, intestines, normal gall bladder and their normal contents, allow the rays to pass easily, and therefore do not cast good shadows on the X-ray film. Shadows of gallstones which would stop the passage of X-rays have been seen on films for many years. However, not all gallstones are satisfactorily opaque to X-rays.

The story of the development of methods for getting X-ray pictures of the gall bladder is a long record of brilliant achievement. Briefly, the method is as follows: The patient is given a harmless dye through which X-rays will not pass, and which is gathered up in the gall bladder; then pictures are taken at different intervals for a number of hours.

Using this method, until recently it has been considered impossible to distinguish between the shadows of gallstones of low calcium content and papillomas, which are little wart-like growths. However, Dr. Kirklin found a number of features that were characteristic of papillomas and not of gallstones. For instance the shadows of the papillomas were in the same position on all the films, whereas the shadows of gallstones might be in different places on different films; moreover, the shadows of papillomas were not immediately at the bottom of the gall bladder, whereas the stones would be likely to be there, like marbles in the bottom of a bag.

There were, also, other characteristics. Four patients on whom Dr. Kirklin made the diagnosis were operated on, and papillomas were found, as he had predicted, in all four.

The method used by Dr. Weber in taking X-ray pictures of the large intestine was developed by Dr. A. W. Fischer, in Germany, and has been used also by Dr. J. Gershon-Cohen in this country in the X-ray diagnosis of tuberculosis of the large intestine.

It has been customary, in taking X-ray pictures of the large intestine, to give the patient an enema, in which is suspended some barium, a substance through which X-rays will not pass. Thus, a shadow of the barium-filled intestine is obtained, and deformities caused by disease can be seen. The method is good. However, it fails to disclose soft masses that do not cause deformity of the wall of the intestine, but merely project into its cavity.

The new method discloses such masses, including growths called polyps, in which Dr. Weber was particularly interested. The patient takes the enema, as in the old method, but expels it. Then, before the picture is taken, what might be called an air enema is given very carefully. The result is that the polyps, to the surface of which the barium has adhered, are outlined in the air-filled bowel.

To detect the presence of these polyps is important, since they have a tendency to develop into cancer. Also, Dr. Kirklin expects that his discovery that papillomas of the gall bladder can be detected will be extended to the detection of early cancers of the gall bladder. Cancers anywhere in the body, if they can be detected early enough, can be removed before they become dangerous.

CHILD HEALTH

GLANDS, vitamins and bacteria, and their rôle in the life of a healthy child were discussed at the recent meeting of the medical section of the White House Conference on Child Health and Protection.

Before the child reaches the stage of cod-liver oil and sunbaths, of diphtheria toxin-antitoxin or of possible thyroid gland disturbance, the glands, vitamins and bacteria have begun playing their part in making him healthy and strong or weak and susceptible to disease.

The female sex hormones and the pituitary gland have been the subject of much recent investigation. The facts on these vital subjects have accumulated so rapidly that medical opinion has not been able to evaluate them thoroughly and decide just what they mean.

"Additional experimentation and critical analysis of work already completed are urgently needed to clarify the general situation," according to the report of the committee which considered this phase of the situation. The chairman of this committee is Dr. Leslie B. Arey, professor of anatomy at Northwestern University Medical School.

Microbes are not all harmful, the committee pointed out. Some of the non-harmful group are those found normally in the intestines. These establish themselves shortly after birth and by fermenting sugars, produce lactic acid which the committee called nature's preservative. This acid restrains the growth of disease-producing bacteria and adds much to the defense of the infant's vulnerable digestive tract. Along with this protection against intestinal infection goes resistance to respiratory infections, such as cold, bronchitis and pneumonia.

Vitamins begin playing their rôle of protection before the child is born. The vitamin content of the mother's diet has its effect both on mother and on child. Vitamins A, C, D and E are the ones particularly mentioned by the committee because of their importance to the mother's health and the child's development and future well-being.

INFLUENZA IN 1918

THE poorest people of the country were the hardest hit by influenza in the great pandemic of 1918, according to studies just completed by the U. S. Public Health Service.

At the time of that disastrous epidemic, some comfort was taken from the popular observation that the disease attacked rich and poor alike. The disease was very prevalent among all classes but analysis of the records shows that most cases of the disease and most deaths from it occurred among the poor.

"Apparently the lower the economic level the higher was the attack rate," Dr. Edgar Sydenstricker, statistician of the U. S. Public Health Service, reported. "This relationship was found to persist even after allowance had been made for the influence of the factors of color, sex, age and certain other conditions."

This report is based on surveys of 10 cities ranging in size from 20,000 to 500,000 and of several smaller cities and rural areas in Maryland. The families investigated were divided into four economic groups: well-to-do, moderate, poor and very poor.

"After making allowance for differences in the age distribution, it was found that the death-rate was the same in the two highest classes, was over 33 per cent. greater in the class denoted as poor, and was nearly three times as high among the persons classified as very poor." The case fatality rate, or number of deaths per 100 cases, was nearly twice as great among the very poor as among the well-to-do and those classified in moderate circumstances. Among the two lowest classes, there were more cases of influenza among infants and older adults.

The explanation of these observations is not clear. Crowded or congested living conditions among people of the lower economic levels has been suggested as one reason for the greater prevalence of influenza in these levels. The surveys did not support this theory.

"Household congestion, although a concomitant of poverty, is not *per se* the determining factor in establishing the association of economic status and influenza in 1918," is the conclusion suggested by the studies, Dr. Sydenstricker said. The greater fatality among older and very young persons in the lowest level than in the higher economic classes suggests that their resistance, for some

reason connected with their economic status, was lowered. More definite conclusions are not warranted because many conditions unobserved in the course of the survey may have been involved.

THE FLORIDA FRUIT FLY

THE Senate has passed a bill appointing a Mediterranean Fruit Fly Board to make a thorough investigation of losses suffered by fruit growers in Florida as a result of the campaign of eradication of the fly. The board would make its report, however, only for the sake of giving information to Congress. By terms of this bill its findings would expressly not be binding in any manner upon the Secretary of Agriculture and Congress.

In the second deficiency bill now before Congress, provision is made for making available the unexpended balance of last year's appropriation for fighting the fly, on condition that $80,000 of it shall be available for research work in the Hawaiian Islands, Brazil and the West Indies, and that the remainder (about $375,000) be set up as a reserve fund for use on order of the President, should there be further infestation of the fly which would make its use necessary. As is usually the case with a fund like this set up for a special purpose, if a year or two passes without need for expending the money, arrangements will undoubtedly be made to transfer it to another project.

Mr. Lee A. Strong, chief of the federal plant quarantine and control administration, told the House Committee on Appropriations that the last fruit fly infestation was found in St. Augustine on July 25, 1930. That, he said, proved that the fly could live over a full year, and once it lives over until spring, it can start a large population all over again very quickly.

THE LIFE OF BOOKS

THAT too much heat, certain gases, dust and improper lighting all tend to shorten the lives of volumes on library shelves, is shown by recent studies conducted at the Bureau of Standards of the U. S. Department of Commerce.

Cabinets in which the atmospheric conditions can be varied at will are being used in the experiments. Preliminary findings indicate that the drying out effect of heat is an important cause of the aging of paper.

Harmful effects of sulphur gases on paper are now being measured. It is thought that sulphur dioxide of the air is readily absorbed by paper and changed by chemical reaction to sulphuric acid which hastens the process of decomposition.

Sulphur dioxide in the air has been found to be an important factor in the sudden deterioration of clothing in laundries in some communities, where industrial plants involve the burning of quantities of soft coal. That sulphur gases may have a similar damaging effect on books in city libraries is suggested by the fact that the sulphur pollution in some industrial centers is known to be equivalent to a downpour of 100 tons or more of sulphuric acid per square mile.

As a means of lengthening the life span of books and documents, the government investigators foresee a day when libraries will scientifically control the atmosphere surrounding their shelves. Regulating the heat and humidity, removing the dust and acid impurities from the air circulated in the library and minimizing the chemically active light rays permitted to shine on the shelves are suggested improvements for the future.

ITEMS

AN apparatus that will instantaneously "stop" a whirling electric motor for ten one millionths of a second, long enough to take a picture of it, and then "start" the motor just as quickly has been developed in the laboratories of the Massachusetts Institute of Technology. The new instrument is an improvement of the stroboscope, a type of apparatus that has long been used to study motion. Stroboscopic motion pictures, believed to be the first ever taken, have been made possible by the instrument. They were shown before the recent meeting of the American Institute of Electrical Engineers in New York last week. The unique feature of the new stroboscope is the electrical circuit which causes a condenser to discharge periodically through a thyratron mercury arc tube. An intense blue actinic light of extremely short duration, precisely timed to correspond with the speed of the machine under observation, is produced by a large current through the tube, and makes it possible to adapt the stroboscope for photographic as well as visual observation.

WHITE pine blister rust is such a menace to American national forests and timber stands in the Northwest that $200,000 additional to eradicate currant and gooseberry bushes, which spread the disease, is in the first deficiency appropriation bill, which has passed both houses of Congress. This money will be immediately available to the Bureau of Plant Industry and the Forest Service. As this fight assumes national organization, the bureau will do considerable work, cooperating with individual timber owners and the states, while the Forestry Service will work mainly in the national forests and cooperate with the Bureau of Plant Industry. The agricultural appropriation bill also carries $481,300 for blister rust control work by the Bureau of Plant Industry, as well as substantial amounts for the same purpose to be administered by the Forestry Service and the Plant Quarantine and Control Administration.

THE wild mice of deserts have learned to get along on less water than their relatives of moister regions. That, at least, is the indication of a discovery made by Dr. F. B. Sumner, of the Scripps Institution of Oceanography, and reported in the 1930 Yearbook of the Carnegie Institution of Washington, which has just been issued. He found that the water requirement, per unit of body weight, of desert-dwelling varieties of deer-mice is less than that of other varieties within the same genus that have a wider distribution, living in humid as well as arid habitats. The differences, which have been traced for several varieties, are hereditary.