SCIENCE NEWS

Science Service, Washington, D. C.

EXPERIMENT ON THE MOTION OF THE EARTH THROUGH THE ETHER

THE failure of a tiny mirror, half an inch in diameter, to turn a certain amount when Dr. Carl T. Chase, of the Norman Bridge Laboratory of Physics at Pasadena, was performing an experiment may prove to be strong evidence in support of Einstein's theory of relativity. It differs from results obtained by Dr. Dayton C. Miller, which have been interpreted by authorities on the subject as antagonistic to Einstein's ideas.

In Dr. Chase's experiment he repeated one performed by two English physicists about twenty years ago, which was repeated in Germany within the last two years. According to the older ideas, which relativity has changed, all space is filled with a hypothetical medium called the ether, which is stationary, while the planets, including the earth and other astronomical objects, move through it. If this were the case and a small condenser, similar to that used in radio sets, were on the earth, moving through the ether, and were hung freely so that it could turn, the motion through the ether would tend to twist it. In the previous attempts no such rotation was found.

According to Dr. Chase, however, the way the experiment was done previously was such that even if the condenser had been moving through the ether no twisting could have taken place. In the German experiments, conducted by Dr. R. Tomaschek, of the University of Heidelberg, connection of the condenser with the electrical apparatus required to charge it was made through the fine upper wire by which it was hung, and through a wire hanging from it and dipping into an acid solution. Dr. Chase has repeated this arrangement and has found that the friction of the wire in the liquid is so great that the top of the suspending wire can be deliberately twisted through two or three complete revolutions without turning the condenser or the mirror attached to it by means of which the rotation is measured.

In Dr. Chase's apparatus, the condenser and the mirror are hung on a wire of phosphor-bronze a yard long and a two thousandth of an inch in diameter. A duplicate of this wire, fastened at the bottom, provides the other connection while the condenser itself is enclosed in a steel cylinder nine inches high, 3½ inches in diameter, with walls ⅝ of an inch thick. Long brass tubes from the top and bottom contain the supporting wires. The steel cylinder prevents heat currents within and electrical disturbances from without. The condenser was about an eighth of an inch thick, weighed about a third of an ounce and had a capacity of .04 microfarad.

To make the observations, readings had to be taken of the apparatus, by means of light reflected from the tiny mirror, every five minutes for twenty-four hours at a stretch. No evidence of any turning corresponding to a motion of the earth through the ether was found even though apparatus is believed to be delicate enough to have detected a motion of 2½ miles a second, much less than the motion was supposed to be.

PHYSIOLOGICAL EFFECTS OF INAUDIBLE SOUND WAVES

DEATH to lower, cold-blooded animals, and a marked break-down in the blood of higher forms, have been brought about by means of extremely short and rapid sound waves produced from electrically driven quartz crystals by Professor R. W. Wood, of the Johns Hopkins University, who described the experiments performed by himself and Alfred Loomis, of Tuxedo Park, N. Y., in a radio talk.

Waves of this character, produced by a different kind of apparatus, were being tried as submarine detectors in France during the World War, when it was noticed that fish in the testing tanks were sometimes killed. When peace brought time for quiet experimentation, Professor Wood and Mr. Loomis went to work on the problem in the private laboratory which the latter had built on his estate near New York City.

It was found that the microscopic animals that swarm in stagnant water could be quickly killed by a short "raying" with these inaudible sound waves, and that small fish, after a few minutes of convulsive struggle, likewise died.

It was then decided to try the effects of the waves on blood, first outside of the body and then in a living animal.

"Our first experiments were made with human blood, much diluted with water in which a proper amount of salt had been dissolved," said Professor Wood. "The number of corpuscles in a cubic millimeter of this solution was determined with a blood-counter, and the solution subjected to the sound waves for a minute. The number of blood corpuscles was found to have been reduced by one half. Another minute's exposure reduced them by about one third, and another minute by one quarter, a number being reached at the end of ten minutes beyond which it was impossible to go, even with prolonged treatment. We had started out with 4,000,000 corpuscles, and ended up with 20,000. This decrease in the percentage destruction with increasing time indicated that the corpuscles varied greatly in their ability to resist the destructive forces of the vibrations, the 20,000 which remained at the end being the tough ones, which would survive any length of treatment with waves of the intensity employed in the experiment.

"We now decided to try the experiment on a small, warm-blooded animal, to see whether the blood corpuscles could be destroyed within the arteries and veins of the animal without other disastrous results. The subject of the experiment was a mouse, swim-

ming about in a small vessel of water which was immersed in the oil bath above the quartz plate. To our surprise the mouse did not show the slightest objection to the treatment, which had appeared to cause the fish considerable annoyance. At the end of five minutes a small drop of blood was taken from the tip of the tail, and the corpuscles counted. A marked decrease in the number was found, and we continued the experiment for fifteen minutes, at the end of which time the mouse was removed from the bath and put back in the cage. He appeared much weakened and very dejected, and his blood count had fallen to nearly one half of its normal value. At the end of half an hour, however, he appeared quite happy again, and was busy making his toilet with his fore paws.

"Blood counts made on the mouse on succeeding days showed that the return to normal was very rapid. This gives us a means of measuring the rate at which an otherwise healthy animal, in which a condition of extreme anaemia has been produced artificially by purely mechanical means, is able to manufacture and throw into the circulation new blood corpuscles."

THE PLANET MARS

MARS not only is closer than it will be again until 1941, but it is in opposition with the sun, which means that it rises in the east just as the sun sets in the west, and remains a conspicuous object until sunrise, when it retires behind the western horizon. These same hours are now being kept by many astronomers who are watching it, for with the planet a mere 43,000,000 miles away from us, they are not losing any chance of adding to our knowledge of this neighbor world.

The planet is not quite as close now as it was in August, 1924, because then it was only 34,000,000 miles from us, just about as close as it can ever be, but then it was far down in the southern sky, well placed for observatories in Australia, Africa, South America, and other south temperate regions. However, most astronomers of the world work in the north temperate zone, and for them it was near the horizon, where the greater mass of the earth's air through which its light had to pass had a worse effect on its visibility than does the extra 9,000,000 miles now, when it is much higher in the sky.

Last week, on October 27, the planet was nearest the earth, then being 42,624,200 miles away, and now it has slowly begun to recede. The actual date of opposition, when the earth is directly between the sun and Mars, is on November 4, at 4:00 a. m. On October 21, 1927, the planet will be in conjunction, when the sun is directly between the earth and Mars, and so that planet is lost in the solar glare.

At the Yerkes Observatory of the University of Chicago, on the shores of Lake Geneva, in Wisconsin, the planet is being studied and photographed through the great 40-inch refracting telescope, the largest of its kind in the world. At the Lick Observatory of the University of California, the next largest such instrument of 36 inches aperture is turned on it, but it is at the Lowell Observatory in Flagstaff, Arizona, where the most intensive studies are being conducted. Their staff has been augmented for the occasion by the presence of Dr. W. W. Coblentz, of the Bureau of Standards of Washington, who, with Dr. C. O. Lampland, is measuring the heat on the planet with the observatory's 40-inch reflecting telescope, while their 26-inch refractor, in the hands of Dr. E. C. Slipher, is being used to photograph the planet. The remarkably clear air over the 7,000 foot high plateau on which this observatory is located makes it unsurpassed for planetary study.

THE STUDY OF IMMUNITY TO MEASLES

WITH a practical means for preventing scarlet fever to its credit, the John McCormick Institute of Infectious Diseases of Chicago has a good start on the solution of the problem presented by measles.

Skin tests that throw valuable light on the nature of immunity to tuberculosis and gonorrhea are likewise among the accomplishments of his fellow research workers described by Dr. Ludvig Hektoen, chairman of the medical division of the National Research Council, at the opening of the new medical school at the University of Rochester on October 25.

Thanks to the work of Drs. George F. and Gladys H. Dick, of the McCormick Institute, scarlet fever is no longer the bugaboo of parents with young children that it used to be. A toxin can now be given safely in large enough doses to prevent children and adults known to be susceptible from contracting the disease.

A small round germ of the sort called a coccus has been shown by Dr. Ruth Tunnicliffe to be present in the blood in the early stages of measles. In animals it produces a disease like measles, and the blood of goats that have been injected with the cocci acquires immunizing properties that act as a preventive of the disease in people. For it has been found that this goat serum when injected into susceptible persons not later than the fifth day after exposure to measles will in about 90 per cent. of the cases prevent the onset of the disease. From these results the prospect for improved and practical means of preventing this common bane of childhood looks promising.

Drs. R. D. Herrold and C. C. Saelhof have found that the germ of tuberculosis when grown in broth produces a substance that when injected in small quantities into the skin of people who are not tuberculous causes a red patch around the point of injection. Tuberculosis patients, however, show no change when so treated. This reaction or rather lack of reaction has been interpreted, according to Dr. Hektoen, as indicating that the blood of a tuberculosis patient contains a specific that neutralizes the toxic element from the germ. This observation may lead, he stated, to a new knowledge of means for prevention and cure for the white plague.

Dr. Herrold has found that the germ causing gonorrhea also produces a toxic substance when grown in the laboratory that reacts in the same way. When injected under the skin of persons who have had gonorrhea as short a time as one or two weeks it fails to produce skin changes though a decided irritation appears on the site of injection in healthy people.

THE HOG CHOLERA EPIDEMIC

THE hog cholera epidemic in the central west has assumed such serious proportions that the U. S. Department of Agriculture has issued notice to its inspectors to release preventive serum untested to immunize what hogs have not already succumbed.

Practically all hog cholera serum made in the United States is manufactured under government supervision and is not sent out under normal circumstances until it has been submitted to a period of rigorous testing requiring about three weeks. In the face of the serious epizootic raging in the corn belt this period was shortened to eleven days until the gravity of the situation forced officials in the Bureau of Animal Industry to dispense with the tests altogether in order to save precious time.

The magnitude of the present epidemic which is the worst the country has known in the last 12 or 15 years is attributed by the Department of Agriculture to the low ebb of the disease in recent years. Swine farmers have fallen out of the custom of immunizing their hogs with the preventive serum and since the demand was slight manufacturers have kept only small stocks on hand. The result has been large herds of susceptible animals through which the exceedingly contagious disease has swept like wildfire.

Scarcity of immune pigs whose blood is a necessary constituent of the much desired serum is one handicap under which manufacturers are laboring. The new regulation, however, will make available at once enough serum to treat approximately 700,000 hogs and will continue effective as long as the emergency is considered to exist.

Serious outbreaks of hog cholera in the corn belt have been reported to the Department of Agriculture since the latter part of September. The epidemic has assumed such proportions throughout the whole central west, however, in the last two weeks that all the field forces of federal and state sanitary officials have been called out to cope with the situation. Every precaution in the way of disinfection and quarantine to offset the insufficient supplies of serum is being exercised to hold the epizootic in check.

The economic loss is being felt the most in the sections where the crops have failed due to recent droughts or storms and the farmers are depending in consequence on the proceeds of the sale of porkers to tide them over the winter.

ITEMS

WHAT is described as a new method of making saltpeter, which is used among other things as a fertilizer, from the elements of the air, has been discovered by Professor K. A. Hofmann, of Charlottenburg. Unlike earlier processes, this method does not require the use of large quantities of electricity and extremely high temperatures. In Professor Hofmann's process, ammonia gas, which can be made from nitrogen from the air and hydrogen from water, is mixed with air and passed through a mixture of caustic soda and chalk with burnt clay, to which a small amount of carbonate of copper or nickel is added. This reaction takes place rapidly at temperatures of about 750 degrees Fahrenheit. It is stated that if the gases are compressed the action is hastened, and that between 90 per cent. and 97 per cent. of the ammonia can be induced to form saltpeter.

ELECTRICALLY heated, hot-water jacketed beds help premature babies survive in the cold world for which they are not quite ready. In a new specially designed department at the Sarah Morris Hospital for Children in Chicago there are accommodations for twenty premature infants, according to reports made to the American Hospital Association at the Atlantic City meeting. Electrically heated dressing tables, humidity registering apparatus, special thermometers and quartz lamps furnishing artificial sunlight are ultra-modern aids that help the premature babies to make up the handicap under which they were born. Human milk is their sole article of diet and every feeding is registered on each individual baby's chart by a time clock. Every mother is encouraged to feed her baby herself and salaries for wet nurses are paid from the income from an endowment by the Infant Aid Society of Chicago. Both sick and well premature infants are received from all classes, about 80 per cent. are, however, charity cases. This is the first special clinic of this kind to be established in Chicago.

WHY does a rubber band stretch, and what happens when it does? This is the question that Dr. Paul Katz, of the University of Amsterdam, asked himself, and partially answered at the meeting of the Association of German Men of Science and Physicians meeting at Düsseldorf. The puzzling thing about the stretching of a rubber band is how it can stretch so much, even twelve times its original length, without breaking, when the molecules of which it is made must be sc widely separated. Dr. Katz used the X-ray spectrograph, an apparatus by which it is possible to take photographs which showed the actual arrangement of the molecules and the distances between them. Ordinarily, the X-ray spectrograph only works with substances that are in the form of crystals. Rubber is not crystalline, but amorphous. However, Dr. Katz tried it and has found that when the rubber is stretched it behaves just as if it were crystalline, and returns to the amorphous form when collapsed. So far, he has been unable to explain why this should occur.

SALVARSAN may have a rival in polonium, the radioactive element isolated by Madame Curie, which is now being tried out in treatment of syphilis. This very active element closely resembles bismuth which is a recent and important addition to the list of drugs that have a specific action against syphilis. Its valuable properties suggested to Dr. C. Levaditi, of the Pasteur Institute, the possibility of trying the effects of the allied element on animals inoculated with this disease. X-ray examination of the rabbits used by Dr. Levaditi and his students showed large quantities of polonium concentrated around the syphilitic lesions though the organism that caused the disease was not killed by the injection of the drug into the blood stream.