SCIENCE NEWS

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PAPERS PRESENTED AT THE CLEVELAND MEETING

THE human eye can see stars about five or six times as faint as the faintest that can be detected with the photoelectric cell, according to the results obtained by Dr. Joel Stebbins, professor of astronomy at the University of Wisconsin, presented before the astronomical section of the American Association for the Advancement of Science. The photoelectric cell yields an electric current when light falls on it. Dr. Stebbins and others have used it to measure the brightness of stars, by measuring the current when the starlight, concentrated by a telescope, shines on the cell. To test the sensitivity of the cell, Dr. Stebbins took it off his telescope and pointed it at a standard candle actually placed a mile away across the lake at Madison. The cell was able easily to detect the light, and Dr. Stebbins estimated that the candle could have been detected if as far as three miles away. The eye can see a candle at six or seven miles, and Dr. Stebbins thinks that the cell could detect it at this distance if the light were white in color, like some of the stars, instead of yellowish. Therefore, the unaided eye is just about as sensitive as the photocell. But the pupil of the eye is about a quarter of an inch in diameter, and when the light is concentrated by a ten-inch telescope lens, the light-gathering power of the eye is increased 1,600 times. The opening of the photocell, however, is about an inch in diameter, so that the same telescope only increases its power about a hundred times. Therefore, in practice, the eye can see fainter stars than can the photocell through the same instrument.

AN apparent influence of the position of the moon in the sky upon radio transmission on the earth has been detected by Dr. Harlan T. Stetson, director of the Perkins Observatory, at Ohio Wesleyan University. Dr. Stetson presented his hypothesis that the hour angle of the moon, that is, its distance from the meridian, is associated with the height of the Kennelly-Heaviside layer. This is the ionized layer in the upper atmosphere that is supposed to reflect radio waves downwards, and so make long-distance transmission possible. For some years Dr. Stetson has studied the reception of the carrier wave from a Chicago broadcasting station and has found good evidence of a connection between the transmission and the number of sun-spots. He attributed this to differences in the height of the reflecting layer. Now his latest studies give evidence that the moon is also involved. The main cycle of variation for sun-spots is about eleven years, but Dr. Stetson's researches have shown a shorter one of about 15 months. It was pointed out that this period corresponds closely with the recurrence of certain arrangements of Venus and Mercury, thus suggesting a possible tidal effect. Dr. Stetson also stated that the maximum of the last sun-spot cycle had occurred about July 1, 1928, while the last two months have shown the rise of a secondary maximum. This, he said, should be over in a few months, and by the end of 1931 spots will be fewer than since 1925. This will mean an improvement in radio transmission. Last summer's time of minimum activity on the sun had been associated with exceptionally good radio connections, quite contrary to the popular idea that long-distance radio reception is bad in summer.

THE chemist now knows that such a complex mixture of hydrocarbons as occur in petroleum may be obtained through chemical reactions starting with a single, simple mother substance. Dr. S. C. Lind, director of the school of chemistry of the University of Minnesota, in a paper read before the association stated that just how these reactions are brought about in nature is not yet known, but the fact that they can be accomplished in the laboratory indicates their possibility as natural processes. This is a step toward the solution of the great mystery of the origin of the oil in the crust of the earth. But it does not settle the question as to whether the processes of nature manufacture petroleum from a vegetable, animal or inorganic source. By application of heat and pressure, or by bombardment with the alpha rays from radioactive substances, it is possible to obtain from a single simple hydrocarbon a synthetic petroleum that is probably just as complex as petroleums occurring in nature. The simplicity of such a mechanism may lend indirect support to the old idea of an inorganic origin from one or a few hydrocarbon gases such as might be produced by the action of water on metallic carbides in the earth's interior. On the other hand, it does not preclude animal or vegetable origin, but strongly suggests that the primary material, whether gaseous, liquid or solid, is later subjected to thermal or ionic agents or both which produce the complexity found in nature.

EXPLOSIONS of dynamite to create artificial earthquakes, and portable seismographs to record them, will be the tools used by the geologists of Harvard University to study the deposits left by the glaciers that once covered a large part of North America. With such methods, which have already proved of value in locating hidden oil pools, it is expected that the exact depth of the rock surface underlying the débris of these glaciers can be determined. Speaking before the section on geology, Dr. L. Don Leet, who has charge of the Harvard seismograph station, told of the plans for these researches. He pointed out that the success achieved by seismic prospecting, as it is called, in locating valuable minerals, had overshadowed the less remunerative but equally valuable scientific possibilities. The earth waves, he stated, travel more slowly through the loose glacial material than through the more solid underlying rock. The method is to discharge a shot of dynamite at a short distance from the seismograph. The waves then travel to the instrument through the glacial layer

alone. Then charges are set off at increasingly greater distances. Finally a point is reached at which the waves travel partly through the underlying rock, and therefore reach the instrument at a greater speed than before. The exact distance at which this occurs depends on the thickness of the upper layer, and, when it is found, the thickness can be calculated. For the average set of measurements, Dr. Leet estimated that between 100 and 125 pounds of dynamite, discharged along a line 1,000 feet long at 50-foot intervals, would suffice.

THAT several embalmed bodies of gorillas, including the extremely rare mountain gorilla of the Kivu region, are now available for anatomical study by investigators at Columbia University and the American Museum of Natural History, was announced by Dr. William K. Gregory, speaking before the American Association of Physical Anthropologists. The idea of obtaining these specimens was originally put forward by Professor Dudley J. Morton, of the College of Physicians and Surgeons, Columbia University. As a result a joint expedition of Columbia University and the American Museum of Natural History entered the field under the leadership of Mr. H. C. Raven. After prolonged negotiations, the Belgian Government consented to the shooting of two Kivu gorillas, in the area outside of the now rigidly protected Parc National Albert. Mr. Raven succeeded in surprising a huge adult male, which he shot as it charged him, the animal dropping not more than fifteen feet from his rifle. After heroic labor on the part of the Negro porters, the 400-pound carcass was got through the jungle down the mountainside to camp. There it was preserved by injecting embalming fluid into its arteries. This specimen reached New York in excellent condition. A second Kivu gorilla, also a big male, was later shot and embalmed, but the process was not so successful in this case. After securing the two mountain gorillas and making some other studies, the expedition crossed the continent into the French Cameroons, where lowland gorillas live. Dr. Gregory reported that he had just heard from Mr. Raven of good success there, resulting in the addition of several specimens of this second species of gorilla to the collection.

FLOODING rivers in America should not be allowed to continue their careers of rapine and destruction, but should be tamed and exploited for their great resources in land fertility and fish foods. This was the thesis advanced by Professor James G. Needham, of Cornell University, when speaking before the American Association. Professor Needham called attention to the potential wealth in flood waters, as evidenced by the richness of the vegetation on river banks and the abundance of fish in the water. He pointed to China for examples of both the right and the wrong ways of dealing with great rivers. "The condition of the rivers in China shows what has been done and can be done with flood waters," he said. "The contrast in treatment between the Hoang Ho, 'China's Sorrow,' and the Yang Tze, 'China's Sustenance,' is very striking. The Hoang Ho is diked 70 feet above the plain and, breaking over betimes, floods grow more disastrous as the dikes rise higher; but the peaceful Yang Tze is spread out in canals over the plain, dropping its load of silt in the canals, whence the farmers recover it to fertilize their fields and keep them ever productive. They build the land high, they keep the bottom of the canals low, and the fishes developed in these canals provide nearly the whole of their meat supply. "Studies should be made to find out whether the results obtained in China by means of infinite hand labor might not be attained in the flood plains of American rivers by the application of new methods and the use of American machinery."

To be healthy, a plant, like an animal or a human being, must get its share of mineral salts. But to absorb mineral salts from the soil solution it must be healthy. Living cells do not just soak up mineral nutrients passively; they put vital energy into the job, and require the presence of energy sources, including sunlight, to do their work efficiently. These were among the points put forward by Professor D. R. Hoagland, of the University of California, who delivered the annual Stephen Hales Lecture before the meeting of the American Society of Plant Physiologists. Professor Hoagland's researches on the activities of *Nitella clavata*, a water plant, have shown that when its cells are in proper tone and supplied with the necessary energy they will develop in their interior sap cavity a sap solution containing mineral salts in twenty-five times the concentration at which they exist in the surrounding water. Researches along parallel lines conducted by other workers have given comparable results. These discoveries have more than a theoretical value, since they indicate the importance of keeping the soil around the roots of crop plants well aerated and otherwise ministering to the very important absorbing cells down in the soil, which are the gateways through which must enter all the nourishment for man and his domestic animals.

THE smallest electric current ever measured—about one three-hundred-quadrillionth of the current required to light an ordinary 100-watt electric bulb—can be detected with the aid of a new vacuum tube developed at the research laboratory of the General Electric Company, under the direction of Dr. A. W. Hull. Such a current consists of a flow of only 30 electrons a second. The number of electrons flowing through the 100-watt lamp in a second can be expressed by a ten followed by 18 ciphers. Speaking before the American Physical Society, Professor L. A. DuBridge, of Washington University, told of his researches with this new tube. In the past, he said, small currents have been measured with an electrometer, which is rather a troublesome instrument with which to work. The new tube can amplify currents smaller than one ten-quadrillionth of an ampere, too minute to operate an electrometer. Dr. DuBridge also pointed out that the tube is much more convenient than the electrometer. With its use, the minute current can be amplified millions of times, so that the actual measurement can be made on an ordinary ammeter.

PROTOPLASM, the jelly-like stuff that is the physical basis of life, can be stretched like rubber, if one employs the proper tools. At the meeting of the physiological section of the Botanical Society of America, Professor William Seifriz and Janet Plowe, of the University of Pennsylvania, reported on tests conducted on this property of the life-stuff. They took hold of bits of protoplasm with ultra-fine needles manipulated under the microscope, and stretched it as far as they could before it broke. Then they treated other cells with various chemicals, and tested the extensibility of the protoplasm after treatment. Some of the chemicals increased the stretchability, others diminished it. Salts of calcium and strontium increased the extensibility, magnesium salts did not affect it, and salts of potassium, lithium and sodium diminished it.

SHORT rations of sunlight for bean plants apparently mean short rations of the protein-making nitrogen captured from the air by the nodule-forming bacteria on its roots. At least, shortened daylight hours impede the development of the nodules themselves, Professor Scott V. Eaton, of the University of Chicago, has discovered. Professor Eaton also reported his researches to the plant physiologists. He grew numbers of soy beans in a greenhouse so arranged that parts of it could be darkened at any time. He shortened the days of various lots of plants to 3 hours, 4 hours, 5 hours, 6 hours, 8 hours, 10 hours. Others he allowed the benefit of the full day, and to still others he gave the added benefit of electric light from 4 o'clock in the afternoon until 10 at night. He also clipped the leaves of some of his plants, to shorten their food supply in this way. Then he harvested them and weighed up tops, roots and nodules, and chemically analyzed the tissues. He found in general that the amount of certain manufactured plant foods present and the weight of the all-important root nodules decreased together, proportionately to the shortening of the daylight hours, and also proportionately to the degree of clipping to which the plants had been subjected.

LIVER extract, successfully used to check the course of pernicious anemia in human beings, has been used to check the analogous yellowing of plants placed in the dark by Professor Oran Raber, of Immaculata College. The activity of liver extract in checking this yellowing, or etiolation, of darkened plants, raises again the question of the possible physiological relationship between chlorophyl, the substance that makes leaves green, and hemoglobin, the stuff that makes blood red. Liver extract keeps red blood in the veins of the anemic, it now appears to keep green chlorophyl in the leaves of plants.

CORN plants bearing none but male flowers, and others bearing none but female, have been produced by Dr. Donald F. Jones, of the Connecticut Agricultural Experiment Station. Dr. Jones described the work at a meeting of the American Association. Ordinary corn plants bear both male and female flowers. The male flowers are in the tassel, the female in the ear with its silk. Two hereditary factors have been found in a strain of corn, one acting to eliminate the tassel, the other to suppress the silk. If one of these unusual one-sexed plants is crossed with one of opposite sex, the offspring are all normal corn plants, bearing flowers of both sexes. But the second generation offspring will throw off further one-sexed individuals.

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