

SCIENCE NEWS

*Science Service, Washington, D. C.*SOME PAPERS PRESENTED AT THE
PHILADELPHIA MEETING

THE four bright moons of Jupiter, like the moon of the earth, rotate once on their axes in the same time that it takes them to revolve around their parent planet, and so they keep the same face towards Jupiter at all times, Dr. Joel Stebbins, professor of astronomy at the University of Wisconsin, told the American Astronomical Society. He made this discovery while working last summer at the Lick Observatory in California. Dr. Stebbins made use of the 12-inch refracting telescope of the observatory and a photo-electric photometer, by means of which the light from a star, planet or moon is focused on a film of metallic potassium. This results in a minute electric current which can be measured with a delicate electrometer and so the brightness of the object can be accurately determined. The chief difficulty is in keeping the brilliant light from Jupiter itself off the cell, but Dr. Stebbins has overcome this by the use of a small diaphragm with a hole through which the light from a satellite can shine, but not the planet. All these satellites were discovered by Galileo in 1610 and can be seen with a small telescope. In addition, there are five others which require a large instrument to make them visible. Moons I, II, III and IV take 1 day, 18 hours; 3 days, 13 hours; 7 days, 4 hours, and 16 days, 18 hours, respectively, to revolve around Jupiter, and Dr. Stebbins finds that the variation of the light of all of them also follows these periods. This, he explains, is probably due to their being bodies like our moon and unequally bright over their surface, so that as a greater or less area of the bright surface is exposed to the earth their light is greater or less, because this is largely reflected sunlight. In order to check the photo-electric cell, Dr. Stebbins compares the light of the satellites with near-by stars whose light is constant and he suggests that this may be used as a possible check on the variation of sunlight. Direct measurements of sunlight vary greatly because of variations in atmospheric conditions, but since these would affect alike the brilliance of the satellites and of the comparison stars, a variation in the difference between satellites and stars would indicate an actual variation of sunlight.

Two dark lines in the rainbow-like spectrum of certain very hot stars, obtained by passing their light through the prisms of a spectroscope, indicate the presence of calcium clouds in space and not directly connected with the stars, according to a paper by Dr. Otto Struve, of the Yerkes Observatory. He has attempted to learn whether these so-called "detached" calcium lines reveal any of the properties of the calcium clouds. For this purpose he has studied their intensity in many spectral photographs, mostly of stars whose surface temperatures are greater than 17,000 degrees. He has found that the lines are much more pronounced in stars farther away

from the sun than in our nearby neighbors, up to a distance of about 700 or 800 parsecs, a parsec being the astronomer's unit of measurement. It is equal to about 206,000 times the distance of the earth and the sun, or about nineteen trillion miles. Beyond 700 or 800 parsecs, however, the indications are that the lines are weaker, as in the nearer stars. This distance at which the lines are most intense is about the same as the distance of the boundaries of the local cluster of stars, of which our sun is a member, near its center, so that his results indicate that these calcium clouds are most abundant near the borders of our local star cluster.

If any people live on the planet Mars in the equatorial regions, they enjoy a temperature of as much as 86 degrees Fahrenheit, according to tentative estimates of Martian temperatures presented by Dr. W. W. Coblentz, of the U. S. Bureau of Standards. Last autumn, when Mars was unusually close to the earth, Dr. Coblentz worked at the Lowell Observatory at Flagstaff, Arizona, in collaboration with Dr. C. O. Lampland, of the observatory's staff. This was similar to work that they performed in 1924, except that they used an improved form of apparatus, which made it possible for the first time to measure an area of only one one hundredth of the total visible area of the planet. The measurements were made about a month after the beginning of summer, according to the Martian calendar, and they show that the south pole is warmer than the north at such a time. At the south pole of Mars, says Dr. Coblentz, the temperature was from 5 to 14 degrees Fahrenheit. In the south temperate zone it was from 68 to 77 degrees, in the torrid zone 68 to 86 degrees, the north temperate zone, 32 to 68 degrees and at the north pole from 12 degrees below to 40 degrees below.

ELECTRIC arcs, using a current of a thousand to two thousand amperes, more than ten times as much as the arcs in the projectors of large movie theaters, have been used to obtain the spectra of atoms from which one or more of their electrons have been lost, according to Dr. Arthur S. King, who presented his paper at the meeting of the American Physical Society. Dr. King is in charge of the physical laboratory of the Mt. Wilson Observatory in Pasadena, Calif., where he performed his experiments. By means of these arcs, obtained by passing the high current between small metallic rods in a vacuum, extremely high temperatures are obtained so that the electrons in the atoms are made to jump from one path to another. Such electron jumps, according to modern physical ideas, occur whenever energy, whether light or heat, is given off from a substance; but in the high-power arc, jumps occur that are ordinarily rare because so much energy is obtained to displace the electron. Sometimes, in the arc, the electrons leave the atom completely and the spectrum, obtained when the light is passed through

the prisms of a spectroscope, reveals these changes. Previously it was not possible to obtain these characteristic spectrum lines in great intensity, but now they are obtained on a large scale. These experiments may help astronomers to understand better peculiar effects in star spectra.

A METHOD for cutting off three-inch pieces from a beam of light, though the light moves at 186,000 miles a second, was described by Dr. Ernest O. Lawrence and Dr. J. W. Beams, of Yale University. Though light travels so fast that it can encircle the earth seven times in a second, Dr. Lawrence and Dr. Beams made use of a shutter that turned the light on and off with such rapidity that each "piece" of light was only about three inches in length. Each flash lasted a hundred billionth of a second. The investigation was undertaken in an endeavor to measure the length of what are called "quanta" of light, for according to modern ideas, light is transmitted as separate pulses, each of which is called a quantum. Physicists have been uncertain as to how long these quanta are, but by some it was believed that they were as much as a yard in length. These extremely short flashes of light were measured by a very delicate photoelectric cell, which gives off an electric current when illuminated, and they found that so long as the total amount of light reaching the cell was the same, the resulting current was not affected by the length of the individual flashes. One three inches long produced as much effect as a piece of light many miles or more in length, and this shows, say the investigators, that the individual quanta are less than three inches in length.

STUNTED thyroid glands, held responsible for so many things including idiocy in children and dwarfishness in animals, have a further effect. Experiments with mice show that the younger generation suffers from thyroid deficiencies in the mothers. Dr. Charles B. Davenport, of the genetics department of the Carnegie Institution of Washington, told the American Society of Zoologists that injury to this gland in a mother mouse will stunt the growth of her babies or of babies of normal mice suckled by her. Such an injury evidently modified the mother's milk and also her other secretions necessary to produce normal offspring. Dr. Davenport was assisted in his work by Professor W. W. Swingle, of the zoology department of the University of Iowa. Another addition to thyroid knowledge was made by Dr. F. E. Chidester, of the zoology department of West Virginia University, and W. M. Insko, Jr., assistant in animal husbandry. In experiments with chickens, rats and rabbits they found that light doses of thyroid bring about marked elongation of the bones and increased weight. It was proved some time ago that heavy doses of thyroid cause loss of weight with an accompanying nervousness.

How much does the lack of a thyroid gland slow up growth? Working with 700 thyroidless white rats, Dr. Frederick S. Hammett, of the Wistar Institute, has attempted to show some of the things that happen to the animals' physiology when the much-discussed gland is

removed. At a symposium on growth in health and disease held by the American Association for the Advancement of Science, Dr. Hammett said that the results from his experiments showed considerable variation. Slowing up of growth when the thyroid is removed is not a simple proportionate affair, he continued. Modification is produced which results in shifts in bodily proportions. As these variations occur in the different organs their functions are proportionately intensified with consequent influence on the process of development. "The thyroid is the most variable organ in the body," declared Dr. Hammett, "responding by changes in size and functional activity to changes in both external and internal environment. It is therefore not going far from the path of scientific rectitude to suggest that long-continued modifications of thyroid activity in environment or habit, voluntary or enforced, may be a cause of species differentiation within a genus, or at least of variety production within a species. If the inheritance of acquired characteristics is possible, there is here available a mechanism by which this possibility could be realized. For it would be absurd to deny the possibility that such profound alteration of differential development as is shown in these animals, with the consequent alteration of relative functional intensity, should have no modifying influence on the germ plasm."

THE evolution of modern plants and of modern climates began together at the North Pole some six or seven million years ago, when the last of the dinosaurs were still lumbering about the earth. It continued with increasing speed through the Tertiary age which followed, until the comparatively recent time of the glaciers. It was during this time, according to the record of the rocks, that the plants of the earth began to show evidences of being divided into growth zones influenced by climate; until then, all the earlier plants were of types such as now grow in the tropics and they were distributed evenly over the whole earth, indicating the prevalence of a uniformly warm climate. At the meeting of the American Botanical Society, Dr. Arthur Hollick, of the New York Botanical Garden, outlined the evidence for his theory that the first temperate zone plant life evolved in the polar regions. The higher forms of flowering plants, he said, are primarily adaptations to a climate of alternating warm and cold seasons and their final invasion of the still uniformly warm tropics has been recent and is a matter of competition with the plants they found there rather than a response to a climatic urge. And it is in the tropics to-day that the only relics of the vegetation of an earlier world, the cycads and similar plants, remain to contest with the late-coming modern plants for a foothold. Plant fossils of Tertiary age from the tropics are very little different from the living plants of the same regions, whereas Tertiary fossils from the regions of the earth where winter comes show evidences of radical and rapid evolution.

THE world wanderings of the cactus were described before the American Botanical Society by Dr. J. N. Rose, associate curator of the U. S. National Herbarium at

Washington. Although exclusively American in origin, the cactus is a great traveler and has found its way into all the dry corners of the earth. It was unknown in Europe before the voyages of Columbus, but soon thereafter was transplanted into Spain from Mexico and thence spread rapidly all around the Mediterranean. It has now become very common in Palestine; and its red, fig-shaped fruits recently provoked from a traveler the remark that "in spite of the parable, it is now possible to gather figs from thistles in the Holy Land." Recent religious art has shown St. John the Divine standing by a cactus bush, and in another picture cacti were shown in the setting of the story of Ruth; but these are only rather comic anachronisms. Until recently practically all the studies that had been made on this very typically American plant were by Europeans, Dr. Rose informed his fellow-botanists, but the cooperation of the Carnegie Institution of Washington, the U. S. National Museum and the New York Botanical Garden has made possible a number of scientific expeditions to all parts of both Americas in a thorough-going survey of the field and a collection of specimens representing over a thousand kinds of cacti. In collaboration with Dr. N. L. Britton, of the New York Botanical Gardens, Dr. Rose has written a monumental work summing up everything now known about these prickly plants.

NEW conceptions of how immunity is developed against germ-caused infections, that may have far-reaching effects on the protection of the human race against disease, were reported to the American Society of Bacteriologists by Dr. Philip Hadley, of the University of Michigan. According to the older views it was thought that all the bacteria of a particular specific kind must necessarily be alike in all their characteristics. Recent work, however, has shown, said Dr. Hadley, that "in one and the same bacterial culture organisms of vastly different potentialities for disease production may exist side by side." At present, many disease-producing species may be divided into two distinct types; one that is virulent that possesses certain individual properties and is called the "S type," and another that is non-virulent, or at least less virulent, that possesses other characteristics, and is known as the "R type." The most important difference between the two types lies in the fact that the "S" form resists the onslaughts of the defensive cells of the blood known as the phagocytes while the other form is readily destroyed by them. Change from one form to the other may be produced artificially in test tubes in the laboratory, Dr. Hadley stated. The most potent factor in inciting such changes has been found to be blood or serum from an animal which has been inoculated with the culture of the organism in question. In the presence of such serum the virulent form "S" passes over into the non-virulent form "R." The importance of being able to bring about such an action in the bodies of animals and human beings suffering from bacterial infection is at once apparent.

REPORTS, both plausible and impossible, as to the earliest prehistoric settlers in America were discussed

by Dr. Aleš Hrdlička, of the U. S. National Museum. "A number of reports in the last two years deal with the probability of other men than the Indian and Eskimo having reached the Americas in pre-Columbian times," said Dr. Hrdlička. "People mentioned in this connection are the Chinese, Japanese, Melanesians, Polynesians and even Australians. There is much probability that some such contacts have actually been realized and that they may have resulted in the introduction of certain practices, implements and even some words. But a satisfactory evidence of this has not yet been produced. Reports of skulls resembling those of other races may be particularly misleading." Among the interesting, but untrue, reports of man having lived in this country in glacial or pre-glacial times, as man is known to have lived on the other side of the globe, Dr. Hrdlička mentioned the case of fossil teeth found in a slab of rock of the Eocene age. These ancient specimens resembled a man's teeth closely enough, so that a prominent dental journal speculated as to their human character. But when a paleontologist cleaned them, the teeth turned out to be from the mouth of a prehistoric horse. Dr. Hrdlička concluded that there is no proof at present that man existed in either North or South America as far back as the ice age.

ONE of the most baffling of psychological problems—how to find out what kind of a mental existence an animal has—was the subject of an address by Dr. Harvey Carr, president of the American Psychological Association. Dr. Carr, who is professor of psychology at the University of Chicago, discussed two methods of approaching the problem. The first, he showed, is to try to find out what goes on in the head of the animal and to envisage the world from the standpoint of the animal's experience. It is both logical and scientific to make inferences regarding an animal's consciousness on the basis of what is known about the emotions and reactions of human beings, the speaker declared. The fact that psychologists disagree and are uncertain about the conscious status of animals be attributed to the defects and uncertainties in their knowledge of man. "I do not think that we have at present a sufficient amount of accurate and generally accepted knowledge of the organic conditions of human consciousness to make any very convincing statements concerning many aspects of the psychic life of animals." The other angle from which animals can be studied is the objective method of the behaviorists, which ignores consciousness, in men as well as in animals. Dr. Carr classed himself as "somewhat of a behaviorist in the field of animal psychology," although he added that he does not class himself as a behaviorist so far as human beings are concerned. In closing, he suggested that inference about animal consciousness might best be made on the basis of the degree of the similarities between men and animals. The more similar to man an animal's reaction might be, the greater the chance that the animal felt similarly. But to work out these degrees of resemblance in exact statistics would be impossible now, he added.