SCIENCE NEWS

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THE NANTUCKET MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY

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"There is probably vegetable life on Mars, but the presence of animals and intelligent beings is not proven." With this "Scotch verdict," Dr. Henry Norris Russell, professor of astronomy at Princeton University, summed up what scientists think of the question as to whether or not Mars is inhabited, in an address before the American Astronomical Society, meeting at the Maria Mitchell Observatory.

When the scientist speaks of "life in other worlds," he said, he must necessarily confine his attention to worlds of whose existence he knows. There are hundreds of millions of stars, but as these are all shining by their own light, they are far too hot to support life in any form remotely resembling any in human experience. As the sun is a star, differing from the others in the sky merely by the fact that it is much closer, some of these hundred million may also have planets revolving around them, but even if they did, we have no means of detecting them.

"Alpha Centauri, the nearest star, is so far away that its light takes more than four years to reach us," said Professor Russell. "If the earth were to be suddenly removed from the neighborhood of the sun to the region of Alpha Centauri, we shouldn't notice a very great difference, because it is very much like the sun. And then, if we were to look back towards our present sun, we should only see a bright star, and could not see Jupiter, Mars, or any of the other planets."

This leaves only the bodies that revolve around the sun as possible abodes of life, he stated, but most of these are also excluded, for at least three of the four elements of the ancients—earth, fire, air and water—are necessary for living organisms. Water is required, as moisture, air, as oxygen, and fire in the form of an equable temperature, something between the freezing and boiling points of water. Earth, or a solid surface, is not necessary, but it is doubtful whether life could originate in the sea.

The moon, then, can not have life, because it has no moisture or air, the thousand asteroids or tiny planets are all so small that they could not hold on to any air if they ever had it. The great outer planets, Jupiter, Venus, Uranus and Neptune, are not suitable, neither is Mercury, the closest to the sun, because it always keeps the same face to the sun, making that side intensely hot, and the other extremely cold. Venus has been shown by means of the spectroscope to have no oxygen. This leaves Mars which now shines brilliantly with its reddish light late in the evening in the eastern sky.

In 1924, when Mars was closer to the earth than it had been for many years, elaborate studies were made of it, so that now it is possible to state that it has the necessary conditions for life as we know it. As large green areas on the planet can be seen to change with the Martian seasons, Dr. Russell thinks it probable that there is vegetable life on the planet.

As for the so-called canals, Professor Russell disagrees with opinion that the marks are mere optical illusions, for he declared that actual photographs had been made of them at the Lowell Observatory in Arizona. "The marks are there," he said, "but they may not be thin straight lines as they have sometimes been represented."

Sounding a warning that discussions of life on other planets were speculations, Professor Russell quoted from what he termed "an otherwise rather poor paper" of one of his students, who said "The earth is the only planet that we can say with certainty is inhabited."

When a brilliant shooting star flashes across the sky, astronomers want to know about it, and even a lucky observation of it by a layman may give the desired information, but astronomers must aid in collecting this material. This was the essence of a report to the society by its committee on meteors.

The ultraviolet rays of the sun, which cause sunburn, cure rickets in children and act on the films in our cameras, are increasing and have been since 1924, members of the society were told in a paper by Edison Pettit, of the Mt. Wilson Observatory in California.

But despite this increase, there is no danger that we are all going to get sunburned without going to the seashore, for the increase is in accordance with the increase in sunspots which has occurred in recent months, and which follows an eleven-year cycle.

In his studies, Dr. Pettit has passed the light of the sun through thin sheets of silver and gold, which remove certain parts of its radiation, leaving those which he wished to measure. Another thing which he has found out is the effect of ozone. This gas is a form of oxygen, which consists of three atoms to the molecule, instead of two, as in the ordinary kind of oxygen molecules that make up a quarter of the earth's atmosphere. High above the earth's surface there is a larger percentage of ozone than at the surface, and so it has been suggested that this may absorb some of the ultraviolet light.

However, Dr. Pettit placed a long tube containing ozone in front of his instrument so that the sun's light had to pass through it before being measured, and he finds that the effect is very small. "In fact," he said, "an increase of 100 per cent. in the ozone in the upper atmosphere would cause only a five per cent.

increase in the amount of ultraviolet light reaching the earth, while if all the ozone could be removed, we would get about three per cent. less ultraviolet light."

Thus variations in ozone are acquitted as the cause of variation in the radiation of energy from the sun, but that the variation does occur was shown in a paper presented by Dr. C. G. Abbot, of the Smithsonian Institution. For some years the institution has been making regular determinations of the "solar constant," in which the solar radiation is expressed, but as the atmospheric conditions vary so greatly it is difficult to detect actual solar variations. A little more or less moisture will produce a much greater effect.

Dr. Abbot has been able to overcome this difficulty, however, by selecting several series of observations made at the same time of the year, when the weather conditions and all the other variable factors were the same, thereby eliminating their effect, and he finds that variation of the sun actually occurs. He announced that a new observatory of the institution in South Africa would be in operation by next month, and with its results combined with those of the other stations in other parts of the world more accurate data should be forthcoming.

When a brilliant shooting star or meteor flashes across the evening sky, astronomers want to know about it, so that they can determine its path, and the cooperation of various observatories in collecting this data for the report of the society's committee on meteors was requested by Dr. Charles P. Olivier, of the University of Virginia, of which he is chairman. A society of amateur astronomers, the American Meteor Society, has collected a large amount of valuable information, it was stated, even though most of the members use no telescopes or other optical aid found in the observatories.

This is not the only organization of laymen that is aiding astronomers, for Leon Campbell, of the Harvard College Observatory, told of one of the results of the work of the American Association of Variable Star Observers. This concerns a star known as V Hydrae, in the constellation of Hydra, which appears low in the southern sky. As a result of the amateur observations it has been found that this star undergoes great variations. When brightest, it is of the 6th magnitude, bright enough to be seen with a keen eye, but every 17 years, as in 1908 and again in 1925, it fades out to the 12th magnitude, which is only perceptible to a large telescope.

In the year 1610 the Italian astronomer, Galileo, discovered the satellites, or moons, of the planet Jupiter.

Many years later a Danish astronomer by the name of Roemer found out from the differences in times of their eclipses when they were near or far from the earth that light from them, as from all astronomical bodies, takes an appreciable time to reach us.

A paper by Dr. Joel Stebbins, secretary of the society and professor of astronomy at the University of Wisconsin, told of some of the work that he has been doing in the past summer at the Lick Observatory in California, by means of which the light from Jupiter's satellites, hundreds of millions of miles away, may help astronomers to solve the problem of how the sun's light varies.

The difficulty in measuring the variations in intensity of the sun's radiation by ordinary means comes from the fact that variations in the conditions of the earth's atmosphere produce a greater effect than any change in the sun. Dr. C. G. Abbot told how he had found evidences of solar variation by selecting measurements made on days when the atmospheric conditions were similar, and Dr. Stebbins's method may afford an additional check on his results.

Dr. Stebbins has been using a photoelectric cell, attached to one of the Lick Observatory's telescopes. With this apparatus, the light from the Jovian moon is concentrated on a tiny bit of the metal potassium sealed in a glass bulb. This results in a minute electric current, which is measured with a delicate galvanometer, and the strength of this current affords a measure of the brightness of the moon. The light from several stars is used as a standard with which the light from the satellite can be compared. A large part of this light consists of reflected sunlight. Though this is affected by the variations in the earth's atmosphere, the light from the comparison stars is likewise affected, so changes in the difference between the brightness of the satellite and of the stars gives a clue to the measurement of the solar variation.

That the sun, and all the other near-by stars, may be parts of a loose cluster of stars surrounded by clouds of nebulous matter was the suggestion of Professor Edward S. King, of the Harvard Observatory. The Pleiades, seven stars of which can be seen with the naked eye, form a loose cluster, and long exposure photographs with large telescopes show that its members are surrounded by a faintly luminous cloud, or nebula. Professor King thinks that we may live in something of the same kind. If so, it would explain why, as he has observed, the average color of stars which are relatively near-by is more reddish the farther away they are. Just as a sunset may appear ruddy because a heavily dust-laden atmosphere absorbs some of the other colors from its light, so would a star appear reddish the farther its light had to travel through such a nebula. Stars completely outside the nebula, however, would not suffer this same reddening with distance, because they would all be affected in the same way.

THE TRANSMUTATION OF HYDROGEN INTO HELIUM

THE metal palladium was the agent that effected the transmutation of hydrogen into helium in the experiment reported by Professor F. Paneth and Dr. Peters, of Berlin University.

Palladium is a rare and heavy metal, similar to platinum, and has in a spongy state the peculiar property of absorbing a thousand times its volume of hydrogen gas. The hydrogen when so condensed in the pores of the finely divided metal is in an unusually active condition, perhaps because the hydrogen, which

ordinarily consists of atoms joined together in pairs, is here broken up into separate atoms which then unite eagerly with atoms of other elements such as oxygen. This reaction is so quick that a tiny bit of palladium put into a mixture of hydrogen and oxygen will explode it and form water.

If the conclusions of Paneth and Peters are correct, then the hydrogen atoms condensed by palladium have also the ability to unite with one another in groups of four, which constitutes the helium molecule. They passed a stream of hydrogen gas over palladium in the colloidal state in which form the maximum amount of surface is exposed, and after twelve hours of absorption they detected the main lines of the helium spectrum. As longer time elapsed the lines increased in intensity. It would require an enormous length of time to produce a sufficient quantity of helium, to be isolated and analyzed, but by using an extremely delicate spectroscope the amount of helium formed artificially by this process was estimated to be from one to ten thousand millionths of a cubic centimeter.

The transformation of hydrogen into helium, if it can be accomplished, would theoretically involve a loss in weight of eight tenths of one per cent. The matter so destroyed would be transformed into energy and pass off as rays of light and heat. Such an annihilation of energy would produce an enormous amount of heat. According to some modern astronomers the rays of the sun and stars originate in such decomposition of matter. In the Berlin experiments no evolution of energy was observed, either because the heat was too small to be noticed or because it passed off in the form of radiation of extremely short wave lengths, like the penetrating rays coming from the sky which have been studied by Kohlhoerster and Millikan.

THE JAVANESE SKULL

THE new prehistoric skull discovery made in Java, which is arousing much speculation, is expected to shed new light on the origin of man, but it is not, as was first reported, the perfect skull for which scientific men have been hoping.

Dr. Aleš Hrdlička, of the National Museum, who possesses more detailed information about the subject which he is not yet at liberty to make public, has informed Science Service that while the specimen is doubtless of great interest and scientific value, it is not a perfect skull, and the very parts for which scientists have been wishing, namely the base of the skull and the facial portion, are probably still missing. Further reliable information on the specimen will soon be forthcoming.

The bank of the Solo River, in central Java, which in 1891 yielded the oldest remains of a man-like creature, was visited by Dr. Hrdlička in the summer of 1925. The spot is marked by a tablet and is almost an archeological shrine, ever since Dr. Eugene Dubois, a Dutch physician, made his celebrated find there of a skull top, part of a jawbone, a thighbone, and three teeth, which have been pronounced 500,000 years old and given the official title *Pithecanthropus erectus*. Dr. Hrdlička's investigation of the site yielded a number of fossil bones, but all of them belonged to animals.

Each rainy season the banks of the Solo River are covered and their contours worn by the rising river, and each summer the dry season leaves the exposed strata, with fossils lying in the dry mud.

After his visit, Dr. Hrdlička stated that "here exists a veritable treasure house for anthropology and paleontology. Further excavation here and in other localities along the river would be relatively easy and a few years of sustained work is one of the great needs of anthropology."

While scientists have been able to reconstruct a skeleton of the primitive being of 500,000 B. C. from the bones supplied by Dr. Dubois and their knowledge of apes and early man, yet they have hoped that a complete skull equally ancient would some day be forthcoming, so that the entire face might be accurately reproduced and the mentality of this ancient two-legged creature be more closely gauged.

ITEMS

NEW laws punishing intoxication, interning habitual drunkards, and making it illegal to sue for debts incurred for alcoholic beverages, are some of the means proposed by the German physician, Dr. P. Schmidt, for fighting alcoholism in the Fatherland. A little less than an ounce of alcohol taken in a weak solution will not hurt even those who never take a drink, Dr. Schmidt says, and twice as much will only cause a slight stimulation. But four ounces of alcohol consumed within two hours will make an unaccustomed person very drunk. Good light wines and beer, he believes, are the best weapons against strong drink. A maximum of 3 per cent. of alcohol for beer and 7 per cent. for wine is his idea of what would be good for Germans. All drinks which contain more alcohol should be highly taxed, and the tax should be levied according to the alcohol content. The most unique suggestion of all is to take credit away from persons who drink, by making debts for liquor uncollectable. If drinking could only be done by cash, he says, the number of people imbibing liquor might be fewer. General anti-alcohol propaganda and the improvement of social conditions would also go a long way toward reducing alcoholism in Germany.

A POCKET-SIZE balloon for short but brilliant air rides has been invented by Norman Meadowcroft, Hammondsport, N. Y. The craft, which can be fitted into a soldier's haversack, weighs only 99 pounds when fully equipped. When filled with gas, the rubberized fabric bag is about 21 feet in diameter. The carrying device for the pilot is supported by ropes attached to the bag. A horizontal propeller is mounted so that it may be turned and maneuvered by pulling on the ropes. Proper manipulation of the propeller will send the balloon over trees and buildings and if desired a saft landing can be made on the other side. The balloon has ascended as high as 840 feet, and has remained in the air for two and a half hours, he says.