SCIENCE NEWS

Science Service, Washington, D. C.

CARBON DIOXIDE IN THE ATMOSPHERE OF VENUS

DISCOVERY that carbon dioxide is probably present in the atmosphere of the planet Venus, next-door neighbor of the earth toward the sun, has been announced by the Carnegie Institution of Washington.

Speculation as to the existence of life on the earth's twin sister planet will be revived by the studies of the infra-red or heat spectrum of Venus made with the world's largest telescope, the 100-inch reflector, at Mount Wilson Observatory, California, by Dr. Walter S. Adams, director, and Dr. Theodore Dunham. The reported discovery is also notable because it is the first time that a gas of any kind has been detected upon any planet except the earth.

For years it has been known that Venus is covered with an atmosphere of considerable extent. Upon the rare occasions of the transit of Venus, when it passes in front of the sun, the planet is surrounded by a ring of light when it is in line with the edge of the sun. This light aura is due to refraction of the sun's rays by the atmosphere of Venus. Clouds cover the surface of Venus so completely that it is believed that astronomers seldom, if ever, see its real surface and the thickness of the atmosphere below the clouds is estimated to be about 4,000 feet.

Drs. Adams and Dunham used a powerful telescope and spectroscope on the infra-red sunlight reflected from Venus and discovered that three bands of invisible heat-light were missing. These were absorption bands that they concluded were due to carbon dioxide in the Venus atmosphere cutting off these particular wave-lengths as the light passed through the planet's atmosphere.

Previous searches for Venus gases, such as oxygen, water vapor and carbon dioxide, all essential to life as we know it on earth, were fruitless.

Carbon dioxide is the gas given off by animal and plant breathing and used by plants in the making of starches and sugars. Its discovery on Venus will justify renewed discussion of the possibility of life of some sort on that planet. Research has shown that the surface temperatures of Venus are somewhat like those of the earth although probably warmer. If future researches should show oxygen and water present, life on Venus might be considered more probable.

The Mount Wilson discovery of carbon dioxide on Venus will undoubtedly encourage those who like to believe that the earth is not the only life-bearing speck of dust in the universe.

THE SUN AS THE ORIGIN OF COSMIC RAYS

BY DR. VICTOR COFMAN

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EXTREMELY fast electrons, coming from the sun with a speed practically identical with that of light, may be responsible for the production of the cosmic radiation, whose origin is still uncertain. Dr. Alexandre Dauvillier, of the Institut des Hautes Etudes of Paris, puts forward this view in a theory that links together in an attractive manner several happenings of the sky.

"My theory," stated Dr. Dauvillier during a lengthy interview, "gives definite shape to a view which has also been suggested by Lord Rutherford, namely, that very fast electrons accelerated in very weak cosmic electric fields may account for the formation of cosmic rays."

The source of the electrons, according to the new theory, is to be found in the bright spots ("faculae") which are seen on the sun's surface. They represent regions where the temperature reaches seven thousand degrees centigrade. The negatively charged electrons stream out of these hot regions with relatively slow velocity, but are enormously speeded up as they move through the positively charged "atmosphere" of the sun. This atmosphere consists mostly of hydrogen and calcium atoms, positively charged because the ultra-violet radiation from the sun knocks out some of their electrons. The electrical field surrounding the sun thus resembles that around the earth.

The speeded-up electrons coming from the sun are deflected in the form of arcs by the earth's magnetic field as they approach our planet. They strike the upper atmosphere and produce secondary electrons, which are responsible for the luminous effects seen as auroral arcs —first observed by Nordenskjöld in 1878. From the curvature of these arcs one may calculate the velocity and the energy of the original fast electrons, whose course was bent by the earth's magnetism. The velocity is found to be only 30 centimeters per second less than that of light. Hence the electrons need only a few minutes to reach the earth, and arrive practically at the same time as the light itself. This may explain a few remarkable cases of bright flashes on the surface of the sun accompanied immediately by electro-magnetic disturbances upon the earth. The earth is so completely surrounded by traces of these swift electrons, that the cosmic radiation seems to be coming from all parts of the sky.

The energy of the fast moving electrons corresponds very closely to that of the cosmic rays, and Dr. Dauvillier believes that there is no need to look elsewhere for an explanation. He brings in support of his view another set of calculations, based upon the frequency of the auroras seen at different latitudes.

FLOWER SURGERY

DELICATE surgical operations on parts of flowers are used by three investigators at the Station for Experimental Evolution at Cold Spring Harbor, New York, to control the heredity of the plants in their breeding experiments. The experimenters are Dr. J. T. Buchholz and C. C. Doak, of the University of Illinois, and Dr. A. F. Blakeslee, of the Carnegie Institution of Washington.

When pollen grains are deposited in a flower, they adhere to the sticky end of a long, slender projection called the "style" which rises from the seed-bearing part called the ovary. Each grain then sprouts a slender tube that grows downward through the style until it reaches the ovary. This is a real race among the males, and speed of growth determines which shall possess the limited number of females, the egg cells, waiting below and which shall be parents to new plants.

Professor Buchholz and his associates found that some of the pollen-tubes, the hereditary effects of which they especially wished to study, were sluggards in the race and arriving late found no unfertilized females and therefore had no opportunity to leave offspring to bear the particular hereditary qualities which they carried. The differences in growth rate of pollen-tubes defeated the end of the experiment.

Not to be outdone the investigators next conceived the idea of cutting a piece out of the base of the style, decapitating the faster-growing tubes while leaving the slower-growing ones intact. The shortened style was then re-united and the pieces held in place with a splint consisting of a hollow grass straw. Arriving at the cut the slow-growing tubes crossed this barrier and proceeded on in the race without the handicap of having to run against faster competitors.

In practice the method should prove valuable to plant breeders, for its success has been proven by the heredity of plants thus produced. Other scientifically valuable seeds obtained by this method are available for planting during the present growing season.

SELLING GAS BY THE POUND

Do you pay for your domestic gas by the cubic foot, by the pound, or by the "therm"? It depends on the kind of gas you get—old-fashioned or modern. Two new gases, propane and butane, have become cheaply available from gasoline refineries. The new fuels, produced in large quantities, are a godsend to gas companies serving scattered districts. Unfortunately they are a source of worry to the accounting department. The public, accustomed to old-fashioned artificial gas at sixty or eighty cents a thousand feet, doesn't understand that it is fair to pay a much higher price per cubic foot for the new fuel.

Heretofore a gas company has been compelled to build a costly gas manufacturing plant, or a long and expensive pipe line to serve a town far removed from the metropolis. Propane and butane, on the other hand, can be liquefied and shipped economically by rail to a distant small town. One cubic foot of propane will yield as much as three hundred cubic feet of excellent fuel gas upon evaporation. These new gases are extremely rich, running from 2,500 to 3,200 on the heat unit scale in contrast with the 600 units from common city gas. Such fuel is obviously worth two or three dollars per thousand cubic feet of gas.

Unfortunately, the gas company, like the plumber and the tax collector, is a conventional object of public distrust. Hence, if the gas company decides to junk the old town gas plant and sell butane at three dollars a thousand, long and loud is the wail of protest to the utility commission.

California gas authorities, anxious to escape this unpopularity, in some cases are selling the new rich gas by the pound. The uninitiated do not understand whether the price is high or low, and have to be contented with the realization that the money figures on their bills are the same as ever. One company mixes its high-powered fuel with five volumes of air before delivery. This quantity of air is insufficient to make the gas explosive, but brings its cubic-foot price down to a point which pleases the customer.

Best of all is the new custom of selling gas by the "therm." This new unit of measure, like the kilowatt-hour of the electric utilities, deals neither with meaningless volume nor weight, but with real heat value—the thing we pay for. One therm is enough gas to heat about 600 pounds of water to the boiling point. In certain eastern cities, where future gas prospects are uncertain, a consumer knows exactly what he is getting by paying a fixed price per therm. As the quality of gas rises or falls, the customer gets less or more, respectively, by volume for his money.

PRECAUTIONS AGAINST THE SPREAD OF YELLOW FEVER

TRAVELERS from countries where yellow fever exists, particularly those traveling by air, should have certificates based on blood serum tests showing that they have acquired resistance or immunity to the disease, Dr. B. J. Lloyd, assistant to the director of the Pan-American Sanitary Bureau, told the Conference of State and Provincial Health Authorities of North America, meeting in Washington.

Dr. Lloyd pointed out that yellow fever is still a menace to life and particularly to commerce in the Americas. He quoted a statement of Dr. F. F. Russell, of the International Health Division of the Rockefeller Foundation, to the effect that, because of the very rapid development of air travel, population centers which once had yellow fever but have now been freed of it are again threatened with reinfection with the disease unless persistent, continued effort is made to keep it within bounds.

Recent discoveries of a method of testing for immunity to yellow fever and of vaccinating against it make possible the certificate-method which Dr. Lloyd suggested. By this means it would be possible to tell definitely whether or not a person desiring to leave a yellow fever community would endanger the country to which he was going. If the test showed that he had immunity to the disease, that would mean that he had either had yellow fever or had been vaccinated against it. In either case, he would not introduce it into a yellow-fever-free country by developing it soon after his arrival.

Dr. Lloyd recommended in addition that aerodromes in infectible territory be kept continuously and absolutely free from mosquitoes which carry yellow fever, and that fullest cooperation be maintained between nations, health authorities and transportation companies

in order to prevent reinfection of former yellow fever areas and consequent disruption of air schedules.

THE TREATMENT OF PARESIS BY MALARIA

No appreciable danger of malaria spreading as a result of its use in the treatment of the brain disease, paresis, exists in the opinion of Dr. L. L. Williams, of the U. S. Public Health Service. Dr. Williams explained his reasons for this opinion in a report to the conference in Washington of state and territorial health officers with the U. S. Public Health Service.

Dr. Williams also described the work of his associates in supplying hospitals for the treatment of mental disease with malaria-infected mosquitoes for their work. Most hospitals have only a few cases of paresis a year, and it is hard for them to carry the proper strains of infection along in between cases. So Dr. Bruce Mayne, of the U. S. Public Health Service, working in laboratories of the South Carolina State Hospital for the Insane, breeds the mosquitoes, infects them with malaria germs, keeps them on ice, and when the call arrives from some hospital, ships them by express. He is at present working on the problem of how far he can successfully ship these mosquitoes without their dying or losing their desire to bite upon arrival.

When malaria is used in treating paresis, best results are obtained by letting the paretic patient recover spontaneously from the malarial attack, without giving him quinine for the malaria. This results in the discharge from the hospital of a certain number of malaria carriers, and it is from these carriers that it has been feared malaria might be spread in regions where it no longer occurs.

He does not believe this is at all likely to happen, because the conditions under which we now live are so different from what they were when malaria was prevalent from Canada to the Gulf. Better housing, nearly universal use of screens, draining, and generally improved health and increased resistance of the people all tend to protect them from attacks of malaria. Even those people who do get malaria seldom die of it now-a-days, because their resistance is so much better.

The development of automobile travel during the last ten or twelve years has resulted in great numbers of southern people going north for the summer. Many of them are malaria carriers, yet they have not spread the disease in regions now free of it. Dr. Williams stated that in view of this it was not likely to be spread by the relatively few paretic patients who are malaria carriers.

Some of the alarm over the situation was occasioned, he felt, by the fact that at the same time as the discharge of the first patients treated with malaria, natural conditions in the shape of hurricanes, tornadoes, rains and subsequent drought had upset the living conditions of large sections of the population and also of the mosquitoes in regions recently freed from malaria. A rise in the number of malaria cases followed, and was by some related to the new treatment for paresis. This is unjustified, in Dr. Williams's opinion.

ITEMS

THE earthquake that destroyed part of the city of Eureka, California, on Monday, June 6, was the most severe felt on the Pacific Coast since the Santa Barbara quake of 1925, U. S. Coast and Geodetic Survey investigators told *Science Service*, after examination of data from eleven seismological observatories in the United States and Canada. However, neither Eureka nor any of the other towns that were shaken stood directly over the point of greatest earth movement, for the epicenter was at sea, a short distance off the mouth of the Klamath river. As traced by the Coast and Geodetic Survey, it was in latitude 42 degrees north, longitude 124 degrees west. The time of origin was 3:44 A. M., eastern standard time.

RUINS of a very ancient Indian settlement near Allentown, Arizona, called one of the most remarkable archeological sites in America, are to be excavated this summer by an expedition from the Bureau of American Ethnology. Dr. Frank H. H. Roberts, of the bureau staff, has left to take charge of the work. Dr. Roberts, who explored the site last season, stated that from three to five seasons of work would be necessary to restore the ancient site to something like its original condition. The settlement is of especial importance scientifically because it was inhabited not only by Pueblos of the Southwest, but also by some of the Basket Makers, who preceded the Pueblos. This gives the village a history which began in a very early century of the Christian era and continued into the Golden Age of the Pueblos, which occurred about 900 to 1200 A. D.

AN insect pest apparently new to this country has been discovered breeding in the stems of greenhouse grapes at Oyster Bay, on Long Island, and is reported by E. P. Felt, director of the Bartlett Tree Research Laboratories in Stamford, Connecticut. The insect belongs to the group known as the ambrosia beetles, and was identified by an expert on beetles at the British Museum of Natural History, London, as a species known only from Korea, Japan and Formosa, where it occurs on several native shrubs. It was probably brought to America, half-way round the world, in some plant introduced from one of those countries.

HEADACHES may be caused by hyper-sensitiveness to certain foods, it appears from a report of Drs. Ray M. Balyeat and Herbert J. Rinkel, of Oklahoma City, to the American Medical Association. These physicians studied the various types of headaches due to this cause. They found that women have longer, less frequent attacks, while men have frequent attacks of shorter duration. The symptoms vary in different persons and in different attacks in the same person. Several members of a family may have them. The only way to determine that the headaches are caused by food sensitiveness is by the trial method; avoidance of the offending food will give relief. This is also the best method of treating, or preventing, the headaches.