SCIENCE NEWS

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ULTRA-SHORT RADIO WAVES

DRS. C. E. CLEETON and N. H. Williams, of the University of Michigan, are using the shortest radio waves ever produced by radio tubes. These radio waves are less than a half inch long, as compared to the previous low of well over an inch and to the commonly used radio waves of about 1,500 feet.

The waves are produced by electrical oscillations inside a tiny vacuum tube. The anodes or positive plates of the tube are made from graphite cylinders only three tenths of an inch in diameter. The length of the radio waves produced by the tube depends upon the time it takes the electrons to travel from the filament in the center to the inner walls of the cylinder.

The whole vacuum tube is placed in a strong magnetic field, which also influences the wave-length of the waves produced. The stronger the magnetic field, the shorter the waves.

The lengths of these ultra-short radio waves were measured by reflecting them from two brass mirrors, three feet in diameter, to concentrate the energy, and spreading them out in a spectrum by means of a grating or set of finely ruled lines on a polished surface. The waves, after being focussed by the second mirror, fell on a crystal detector that amplified their electrical energy.

Perhaps the most striking thing about this experiment is the partial closing of the gap between the far infra-red rays and the shortest radio waves. This gap has so far been the most difficult for the experimenter to close and this advance has decreased the radio waves by at least two octaves on a frequency scale.

The production of these ultra-short waves was but a part of the result of the experiment. The waves were passed through a rubberized cloth bag full of ammonia gas which absorbed a certain wave-length of the band of waves to an abnormal degree. From measurements on this absorbed wave-length it was possible to show that the ammonia molecule has an apparent diameter of about 3½ hundred millionths of an inch (0.000000035 inch). That is, 100,000,000 ammonia molecules in a chain would be only 3½ inches long.

METEORS AND RADIO RECEPTION

During the November shower of Leonid meteors, Drs. R. Minohara and Y. Ito, of the Naval Experiment and Research Establishment in Tokyo who were at work on a series of experiments for determining the height of the Kennelly-Heaviside Layer, the radio reflecting area of the upper atmosphere, made observations upon the effect of meteors on the transmission of radio signals.

Meteors speed through the upper air at the rate of 26 miles (42 kilometers) a second or more, the investigators stated in a report to the Radio Research Committee of the National Research Council of Japan. The friction caused by these objects hurtling through the atmosphere produces ionization in their pathways before the meteors are heated to incandescence and become visible. Small meteors serve to ionize the upper atmosphere, while the larger ones penetrate to and ionize relatively lower altitudes.

Air or any other substance is said to be ionized when through any cause the molecules, atoms or other particles of which it is composed have electrons knocked out of them, leaving them positively charged.

Even in the day-time, meteors affect radio waves, causing irregularities in reception. Those of relatively long wave-lengths are affected comparatively little, because long wave-lengths are reflected at the lower surface of the sun-ionized region of the atmosphere. Shorter waves penetrate farther and may be reflected by "ion clouds" formed by the meteors or by an upper ionized layer formed by the smaller meteors.

At night, when the ionizing effect of the sun is not so great, the effect of the meteors is relatively greater.

THE TOTAL ECLIPSE OF THE SUN

DR. WILLI M. COHN, leader of the American Eclipse Expedition, sends the following statement by radio from Losap Island. "Perfect conditions and completion of my observing program made entirely successful the St. Valentine's Day total solar eclipse which I observed from this little coral island to-day. The sky in the vicinity of the sun was perfectly clear. There was no wind. The "seeing" was good. The entire routine of observations that I had planned and rehearsed carefully was accomplished without a hitch. Naturally I am much pleased.

"The corona flashed out in its radiance when the sun was blotted out. This halo around the sun was the type that is characteristic of the time of minimum sun-spots. The coronal rays extending from the sun's equator predominated and the short polar rays were sharply defined. There were two coronal streamers. If the sun is thought of as the face of a clock with 12 o'clock at its vertex, these streamers extended from positions corresponding to one and seven o'clock.

"Only from this little island, one of two situated in the path of total eclipse, were scientific observations made. The parties of Japanese astronomers here seem to have made successful observations.

"I have not yet had time to develop my photographic plates, but my two cameras of sixty-inch focus with quartz prisms were aimed at the inner and the outer corona. A polariscope measured the sky light close to the sun. The color distribution of the corona was studied by photographs taken through color filters. Spectrum photographs were also made of the sky light during eclipse and the sun's photosphere layer which lies close to its surface."

THE CONTROL OF WEEVILS IN RICE

COATING rice with mineral dusts, to keep down heat generation during milling, also discourages the breeding of insects that infest the stored grain, according to Dr. E. R. de Ong, consulting entomologist of San Francisco.

Weevil injury to stored stocks of rice becomes very severe at times since much of the crop must be carried through the hot weather of summer until the harvest in late fall. Insect breeding is rapid at summer temperatures and a light infestation in the spring, if unchecked, may result in almost complete destruction of the stock of rice by fall.

The difference in weevil infestation of rice coated with calcium carbonate and untreated rice was noticed and experiments made to determine the value of the coating for protection alone. In a jar of uncoated rice, several living rice weevils and bran bugs were placed. A similar number of living weevils and bran bugs were placed in another jar containing rice to which one per cent. of finely ground calcium carbonate had been added. These jars were kept at a temperature ranging from 50 to 75 degrees Fahrenheit, with sufficient moisture added to favor breeding.

In sixty days the rice weevils had decreased 50 per cent. in the coated rice and in the uncoated rice 25 per cent. The striking results, however, came at the end of a year following the higher summer temperatures which had stimulated breeding. The number of weevils in the coated rice had remained absolutely stationary throughout the year. That is, there had been just sufficient breeding to equal the small number dying. In the uncoated rice the weevils had increased more than one thousand per cent. The bran bugs had decreased slightly in both lots of rice, they apparently not finding conditions suitable for breeding.

The weevil attack in the uncoated rice resulted in a loss in weight of 42 per cent., a cubic foot of the coated rice weighing 76 pounds and the uncoated rice 44 pounds. The infested rice also had a very dirty appearance, necessitating the expense of recleaning besides the additional loss of weight.

EARTH LEVEL AND THE INDIAN EARTHQUAKE

DR. J. DE GRAAF HUNTER, formerly director of the Survey of India, explained at a geophysical discussion held at the headquarters of the Royal Astronomical Society in London that the level of the part of India where the disastrous earthquake of January 15 occurred has been rising at an average rate of .06 foot a year, or six feet a century, for the last seventy years at least. The earthquake was associated with this change of level, together with the unique state of internal stress which has hitherto occurred in this region.

Two years ago, when Dr. de Graaf Hunter was endeavoring to reconcile the numerous spirit-level observations made in Bengal between the years 1862 and 1930, he found evidence that the land was rising at a regular rate. He constructed a diagram in which lines drawn on a map of northern India indicated the various rates at which the rise of level was taking place.

The lines passing through places having the same rate of change ran approximately west-southwest to east-northeast. The line indicating zero change of level passed about fifty miles north of Calcutta. The line indicating the maximum change of .06 foot a year ran about thirty miles north of Benares, and passed through the position calculated to be the epicenter of the January 15 earthquake. This position is latitude 26 degrees 8 minutes, longitude 86 degrees 3 minutes.

ITEMS

THE scientific findings of the explorers of the stratosphere in the Soviet "stratostat" USSR are at variance with the theoretical calculations of physicists, it appears from an announcement by Professor A. Wangenheim. Analysis of samples of air taken during the flight last September showed that the oxygen content of the stratosphere 19 kilometers (11.8 miles) above the surface of the earth varies very little from the oxygen content of the air at the surface. The analyses were carried out by a special commission under the leadership of Academician A. A. Chernishev, of the Institute of Physical Chemistry, Moscow. Tests of the samples of air, made in two laboratories, proved identical in their results, which contradict the theoretical calculations of investigators such as Wegener, Shtermer, Humphrey and Gutenberg, which indicated an oxygen content of not more than 15 to 18 per cent. At sea-level the atmosphere contains 21 per cent. oxygen and 78 per cent. nitrogen.

SPECIAL underwater spectacles that allow lifeguards and divers to see clearly beneath the water's surface have been devised by Robert E. Cornish, of the Institute of Experimental Biology of the University of California. The normal human eye, developed for vision in air, is a very poor instrument under water, as every swimmer knows. The reason is that the contact of water with the cornea robs the eye of about two thirds of its refracting power. This trouble is avoided in divers' outfits by keeping water away from the eye and looking through a flat window of glass. If the glass is wet by condensation or splashing it loses its advantages.

JUICE from the turnip is recommended as a good depression substitute for orange juice or tomato juice. Attention is called to its value as a cheap source of scurvy-preventing vitamin C by Dr. E. W. McHenry, of the University of Toronto School of Hygiene, in a report to the *Journal* of the Canadian Medical Association. In Toronto one cent will buy 1,100 vitamin C units from turnip juice, whereas the number of vitamin C units from one cent's worth of lemon juice are 180, from orange juice 220, from tomato purchased as juice 170 and from tomato juice prepared from canned tomatoes 180.

CIGARETTE beetles, tiny but destructive enemies of warehoused tobacco, are successfully fought with a new weapon developed by W. D. Reed, entomologist of the U. S. Department of Agriculture. The trap uses a moderately bright electric light to lure the insects, an electric fan to suck them in, and a glass jar to hold them captive when caught. An ordinary pint jar will hold 150,000 of the beetles; a larger jar can be substituted when the catch is likely to be greater. The whole trap is suspended from the ceiling, out of the way of the warehouse workers.