SCIENCE NEWS

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CAUSE OF THE NIGHT GLOW OF THE SKY

THE soft glow of the sky at night is not just starlight and moonlight, but is due to the magnetic activity of the earth and its atmosphere. Definite evidence to support this fact has been reported at the Lick Observatory. Donald R. Barber, a British astronomer who has been working at the observatory for the past year on a fellowship, conducted the research. Astronomers have long speculated on the cause of the night glow, which is visible even on moonless nights. Those who attempted telescopic photographs have often had their photographic plates clouded by this eerie light which varies from night to night and from hour to hour.

Astronomer Barber systematically measured the night glow in a small area near the north star, a part of the heavens that is always conveniently situated for observation. Systematic measurements of the earth's magnetic field were made simultaneously, and comparison of these measurements proved a direct relationship between the two. Magnetic currents which ceaselessly flow around the earth are probably stimulated by radiations from the sun, principally active during daylight hours. The readjustment of the night atmosphere from solar disturbances of the day before probably are the cause of the heretofore unexplained night glow.

Mr. Barber's finding not only gives an answer to another of the mysteries of the heavens, but will be of practical use to future study. By scientific observation of daylight magnetic conditions, the intensity of the coming night glow may be predicted, assuring greater success for long exposure photography by the choice of less bright nights.

THE STUDY OF COSMIC RAYS

INVESTIGATORS from seven institutions will gather this summer on top of Mt. Evans, near Denver, 14,259 feet above sea-level, to study the mysterious cosmic rays from space. Scene of their convocation will be the Cosmic Ray Laboratory of the University of Denver, the Massachusetts Institute of Technology and the University of Chicago, now in its fourth season.

Already at work, or soon to arrive, are parties from Washington University, St. Louis; Kenyon College, Ohio; the University of Chicago; the Bartol Research Foundation of the Franklin Institute of Philadelphia; Cornell University, Colorado State College and New York University. Each group is bringing a special type of equipment.

That of Kenyon College, a portable laboratory in a bus, using cloud chamber equipment to trace the course of the rays through air filled with water vapor, is already at the top of the peak. It is directed by Dr. Wilson Powell, working under a Guggenheim fellowship.

Dr. E. J. Shremp and M. L. Yeater, of Washington University, St. Louis, also are operating their device. It is a "Ferris wheel" six feet in diameter, with 72 Geiger counters mounted on the rim. It is turned slowly, and as it turns it records the arrival of cosmic rays from eighteen directions at once. An automatic camera photographs the counting panel at regular intervals. It was built last fall and operated in St. Louis. Now it is at the University of Denver, 5,200 feet above sea-level, and next season will be taken to the top of Mt. Evans, if there is a sufficient electrical supply there—it draws a heavy current.

Dr. Joy C. Stearns, head of the physics department of the University of Denver says it is planned to have a Diesel engine at the Mt. Evans laboratory next season. Cornell has indicated it will share the expenses of the laboratory with the other institutions. Its interest is due to Dr. Bruno Rossi, of Cornell University, who has been conducting experiments on Mt. Evans for two seasons, and is returning this summer. His problem is to determine the "life period" of mesotrons. He is also making observations from Denver and from Echo Lake, 10,800 feet high.

Dr. Arthur H. Compton, of the University of Chicago, one of the founders of the laboratory, will come in August from the Andes, where he and a party are now conducting cosmic-ray research.

These investigators can live near their instruments this summer in the new turtlebacked hostel being completed on the summit of the mountain, about 100 yards from the laboratory. In previous years they had to drive back and forth eleven miles from Echo Lake Lodge, 5,000 feet below. The road is also being oiled to the top of the mountain. It is the highest oiled road in the United States.

MEASURING THE HEIGHT OF AIRPLANES

Two methods of radio distance measurement, enabling pilots of airplanes to tell not only their distance above the ground, but also, in the case of one of the inventions, that from some reference station as well, are included in patents recently issued by the U. S. Patent Office.

To Dr. Ernst F. W. Alexanderson, engineer of the General Electric Company, who has made many inventions pertaining to radio and television, was granted patent 2,248,599, which he assigned to his employers.

Frequency modulation, which is making possible static-free broadcasting, is used in this system. However, Dr. Alexanderson describes it as "a new and fundamentally different method" for distance measurement. Very simple apparatus, compared with some of the complicated devices that have been used for a similar purpose, is required.

From the airplane is sent out a high frequency radio signal, which is reflected back from the ground so as to create a series of standing waves below the aircraft. The frequency, or rate of vibration, of the transmitted wave is varied with great rapidity—so fast, in fact, that when the reflected wave has turned to the plane, and is picked up by a receiver, the frequency change has made a complete cycle. The transmitter is then sending out signals

of the same frequency as when the wave left—or at least of some definitely related frequency. The farther away the ground, the longer it takes the reflected wave to return, and the more slowly need the frequency be changed. The receiver picks up both the original wave, which has traveled but a few feet, and the reflected one. If the two frequencies are the same, there is none of the beat frequency between them that would occur if the two were out of step. In use, the control knob of the transmitter is graduated in terms of altitude. It is turned until the beat disappears, and then the height above the ground is indicated.

The other radio distance device won patent 2,248,215 for Horace T. Budenbom, who assigned his rights to the Bell Telephone Laboratories, of New York City. Instead of using a high frequency, or short wave, he uses a low frequency, with a very long wave. The wave, in fact, is somewhat longer than the distance to be measured. By receiving it with two different receivers, each with its own special aerial, it is possible to determine the distance between the transmitter and the receivers, in terms of the length of the wave. The indications are made on a phase indicator, of which various types can be used. This can be calibrated in terms of one or more of the wave-lengths used at the transmitter so as to show directly the actual distance.

In a modification of the device, the airplane sends out a signal from a transmitter, to a receiver on the ground. This automatically retransmits it, and it is received back at the plane. Then the apparatus tells the time that was taken. In one form of Mr. Budenbom's invention, the altitude as well as the distance from the ground station are given with the same receiver. Since the ground-reflected wave that tells height comes back much sooner than the retransmitted one for distance measurement, it is possible to separate them by electrical filters, so that each is indicated on its own dial.—JAMES STOKLEY.

PEELED WHEAT BREAD

BY eating whole wheat bread instead of white bread you get more proteins for energy and tissue building and more minerals as well as more vitamins, was discovered by Dr. John R. Murlin, of the University of Rochester, as a result of diet studies with a squad of ten young men as voluntary subjects. The studies were reported briefly to the recent National Nutrition Conference in Washington.

Dr. Murlin stated that "if the peeled wheat bread were consumed by the average man of this diet squad instead of white bread for one year, on the calorie basis he would save enough total calories to supply him for approximately thirty-six days."

Peeled wheat bread is made from wheat prepared by the Earle flotation process which removes only the thin epidermis of the wheat berry constituting not more than 2 per cent. of the whole grain.

In addition to the 36-day calorie supply saved in a year of eating the peeled wheat bread, the man "would get 24/100 lb more calcium, 1.1 lb more phosphorus, and one-quarter of an ounce more iron, besides all the vitamins native to the wheat and a significantly higher biological value of the protein." The biological value of the protein indicates the amount digested and actually absorbed by the body, not merely the amount in the food eaten, some of which may be lost from the body.

The young men on the diet squad ate a standard diet in which whole egg furnished most of the protein for six days, then ate the same diet with the protein furnished chiefly by a so-called "100 per cent. whole wheat bread," then the egg diet for six days, then a diet with the peeled wheat bread, back to the egg diet, and finally a diet in which the whole wheat product was shredded wheat biscuit. The whole period covered seventy-six days.

Taking egg protein as 100 per cent. the three whole wheat products had biological values of 77.8 per cent. for the so-called 100 per cent. whole wheat bread; 79.6 per cent. for the peeled wheat bread; 81.6 per cent. for the shredded wheat biscuits; and 75.3 per cent. for white bread. The differences between the white bread and the two highest whole wheat products were statistically significant. Differences with respect to the utilization of starches and fat in the white and whole wheat breads were not significant.

ITEMS

DR. W. Z. HASSID and R. M. McCready, of the University of California, have sent the following correction: "In the issue of SCIENCE for July 4 under Science News Supplement, p. 12, an item appeared crediting us as being the first ones to produce starch synthetically. We wish to correct this erroneous impression. Due credit for this important achievement should be given to C. S. Hanes, of the University of Cambridge, who first synthesized starch from the Cori ester by the action of potato phosphorylase and reported this work in *Nature, 145,* 348 (1940).

"We prepared synthetic starch by using Hanes's method and made a comparative study of the molecular constitution of this synthetic compound with that of natural starch. A full report of these results will appear in the August issue of the *Journal* of the American Chemical Society."

ACCORDING to officials of the U. S. Public Health Service there were 187 cases of infantile paralysis throughout the nation during the week ending July 12. This is an increase of more than a hundred cases over the previous week and is about fifty cases above the expected figure shown by the five-year median. Whether an epidemic is beginning can not yet be determined. One authority has pointed out that in years of serious epidemics, the number of cases usually started to rise abruptly in June. The largest number of cases, and the biggest increases, occurred in the South. Georgia reported forty cases, Alabama had forty, Kentucky ten.

WATCH out for sun-caused trouble with radio and telegraphic communications toward the end of July. This is the possibility pointed out by astronomers at the Carnegie Institution's Mt. Wilson Observatory at Pasadena based on the fact that the sun revolves every twenty-seven days. A flare-up in the atmosphere of the sun caused severe magnetic disturbances and interruption to radio circuits on July 4. When the same region of the sun is turned toward the earth about July 29 or a few days later, these disturbances may be repeated. There may then be auroras as well as disturbed radio and telegraphic communication.