E. W. Brandes, sugar plant specialist, which will use an airplane in searching the unexplored wilds of New Guinea for disease-resistant varieties of sugar cane that may prove valuable to the industry in Louisiana and other parts of the South. Dr. Brandes will sail from San Francisco April 12, accompanied by Dr. Jakob Jesweit, who was formerly chief of sugar-plant breeding work in Java and now of the University of Wageningen, Holland, and Richard K. Peck, who will pilot the plane. They will be joined at Honolulu by C. E. Pemberton, entomologist of the Hawaiian Sugar Plant Association Experiment Station, and proceed to Port Moresby, the base of the expedition on the southeast coast of New Guinea.

LECTURES will be given during April and May at the New York Botanical Garden on Saturday afternoons at 4:00 P. M. as follows: April 7, "Beauties from the Flower Shows," Kenneth R. Boynton; April 14, "On the Long's Peak Trail," Howard H. Cleaves; April 21, "Gladiolus, Wild and Cultivated," Dr. Forman T. McLean; April 28, "Insects of Shade Trees and Ornamentals," Dr. E. P. Felt; May 5, "Daffodils," B. Y. Morrison; May 12, "Farming for Bouquets on the Cote d'Azur," Mrs. Wheeler H. Peckham; May 19, "How to Study Ferns," Professor Henry J. Fry, and May 26, "Chinese Asters," Professor Roland H. Patch.

THE summer school for engineering teachers which was established by the Society for the Promotion of Engineering Education in 1927 is to continue its sessions during the coming summer. Two schools will be held: one for teachers of physics and the other for teachers of electrical engineering. As in 1927, when mechanics was the subject studied, the purpose will be to study the principles and methods of teaching rather than to review actual content of subject-matter. The session on the teaching of physics will be held at the Massachusetts Institute of Technology, under the directorship of Dr. S. W. Stratton, president of the institute. The session on electrical engineering will be held at Pittsburgh, under the joint auspices of the University of Pittsburgh and the Westinghouse Electric and Manufacturing Company. Dr. F. L. Bishop, of the University of Pittsburgh, secretary of the Society for the Promotion of Engineering Education, and Professor Charles F. Scott, of Yale University, chairman of the society's board of investigation and coordination, will serve as codirectors of the Pittsburgh session of the school. Professor H. P. Hammond, associate director of the society's investigation of engineering education, is in general charge of the school. Both sessions will be of three weeks' duration and will begin shortly after July 4.

THE Rockefeller Foundation has taken action converting its previously made pledge to an appropriation of $312,500 for the support of fellowships in physics, chemistry and mathematics by the National Research Council during the years 1928 to 1930, inclusive, at the rate of $125,000 a year for 1928 and 1929, and $62,500 for the year 1930.

UNIVERSITY AND EDUCATIONAL NOTES

DARTMOUTH COLLEGE will receive about $1,500,000 from the estate of the late Edwin Webster Sanborn.

PHILIP S. BIEGLER, professor of electrical engineering at the University of Southern California, has been appointed acting dean of the college of engineering just created at that institution.

PROFESSOR LESTER S. GRANT, dean of the faculty and professor of mining engineering at the Colorado School of Mines, has resigned.

PROFESSOR A. I. KENDALL has left the medical school of Washington University to become research professor of bacteriology at Northwestern University.

DR. CLARENCE ERROL FERREE, of Bryn Mawr College, has been appointed resident lecturer at Wilmer Institute at the Hopkins Medical School and director of the research laboratory in physiological optics.

DR. ERICH BRENNECKE, of the Geodetic Institute in Potsdam, has been called to the professorship of geodesy at the Berlin Institute of Technology.

DISCUSSION AND CORRESPONDENCE

THE AURORA OF MARCH 28, 1928

THE peculiar combination of an aurora with a lunar halo as visible in Cambridge on the night of March 28 is such an unusual occurrence that the event seems deserving of more than passing mention.

The lunar halo first attracted my attention about 11 P. M., Eastern Standard Time. A few minutes later the halo bore a fringe strikingly suggestive of a solar corona. By 11:30 a well-defined auroral fan was centered at a point on the horizon directly under the moon (at first quarter) with a streamer extending from the horizon directly past the moon and vertically upward. Oblique streamers arranged themselves approximately symmetrically about this line. One of these passed above Capella and at 11:50 P. M. extended across Polaris, and between Vega and Hercules to the eastern horizon.

A similar brilliant streamer mounting from the auroral center extended southward, passing Procyon and Regulus in Leo. These two streamers crossed the

lunar halo very nearly on the same circle of altitude as the moon and the crossing points were marked by exceptionally brilliant patches of auroral light. The outstanding feature of the phenomenon was the existence of horizontal streamers extending several degrees through the patches and diverted away from the moon as an apparent radiant point. These horizontal streamers with an apparent radiant at the center of the halo made angles of 20°–30° with the long auroral streamers but gave every appearance of a true auroral effect. The distance of one of the bright patches from the moon was observed with a sextant and found to be 25°, thus fixing the radius of the lunar halo. The large halo vanished at 11:50 P. M., whereupon a smaller ring of 4° radius appeared about the moon. This in turn vanished at midnight. At 12:10 A. M. the large 25° halo returned for about five minutes and at 12:20 A. M. a symmetrical cross with horizontal and vertical beams appeared across the moon's disk. Shortly after 1 A. M. a light cirrus stratus had developed and the aurora faded. The temperature was 30° F. There had been a fall of 33° F. since the day previous.

The combination of the optical effects in an all but invisible cirrus stratus with a true auroral glow gave a suggestion of the problem encountered in a study of the solar corona, where we may very well have light from electrical excitation mixed with an optical corona formed from minute particles comprising a circulating circumsolar cloud.

The effect of the auroral streamers at presumably an altitude of four or five hundred miles, combined with optical phenomena in a layer of cirrus at an altitude of four or five miles gives one food for thought.

On examining our sunspot photograms the following day a spot of marked intensity passed within 5° of the sun-earth line on midnight, Eastern Standard Time, March 28–29. The field strength of WBBM as measured on the automatic radio recorder 9–10 P. M., March 28, was exceptionally low and the static heavy.

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"WASHBOARD" OR "CORDUROY" EFFECT DUE TO THE TRAVEL OF AUTOMOBILES OVER DIRT AND GRAVELED ROADS

SEVERAL articles have appeared in SCIENCE[1] dealing with the subject of washboarding of highways and there are some confirmations and some new ideas I would like to present.

In regard to the washboards themselves, the term is in common use in the Pacific Northwest where practically every graveled road is inflicted with them. In the semiarid regions, during the drier seasons, these corrugations develop to considerable size and the maintenance of roads is a very difficult problem. No sooner is a newly graveled road opened to traffic than the washboards develop and there they stay, increasing in size until the grading crew removes them, temporarily.

It should be noted that it is the high-speed traffic that causes the washboarding. Horse-drawn vehicles do not develop these road-waves, nor do heavy trucks, which pound a road into many spring-breaking chuckholes. It is the pleasure car with its pneumatic tires and high rate of speed that appears to do the damage. Tires with new treads can throw loose pieces of road metal with considerable violence, in fact the writer was recently in a car which had its windshield broken by a passing car throwing a small pebble.

Loose gravel does not appear to develop washboarding until a portion of the surface has become hard enough to wave. This is of importance in road maintenance, for dirt binders are frequently added to pack the crushed rock, and thus automatically increase the liability of washboarding.

The writer was employed by the Washington State Highway for some time. Washboarding was an important maintenance problem, in fact one of the biggest. The opinion was reached that when the rear wheels of the car hit a small bump they begin vibrating. The resultant spin of the wheels while they are in the air digs out small depressions when they hit, and the corrugations grow in the line of travel with each succeeding car. On roads covered with loose gravel, an experienced driver can frequently find relief by driving a few inches to one side of the well-packed rut and thus escape part of the vicious, neck-breaking vibrations. However, he simply widens the washboarding and soon they extend across the road.

With this idea in mind, the following experiment was performed on a newly graded and graveled road between Yakima and Ellensburg, Washington, under the direction of Max L. Mook, District Engineer for the state highway department. The road grade had been allowed to settle for a year, then dragged and graded and treated with fine crushed basaltic rock to which a small amount of dirt binder had been added. The road was opened in perfect condition. The in-

[1] Dodd, L. E., "'Washboard' or 'Corduroy' Effect due to the Travel of Automobiles over Dirt Roads," SCIENCE, September 2, 1927, 214–16.

Ruckmick, Christian A., "'Washboard' or 'Corduroy' Effect due to the Travel of Automobiles over Dirt Roads," SCIENCE, November 18, 1927, 481–82.