

THE following promotions have been made in the department of physics of the University of California: From assistant to associate professor, Frederick S. Brackett and Leonard B. Loeb; from instructor to assistant professor, J. J. Hopfield and V. F. Lenzen.

DR. WOLFGANG KOEHLER, professor of psychology in the University of Berlin, as has already been stated in *SCIENCE*, has been appointed visiting professor of psychology in Harvard University for the first semester of the year 1925-26. He, however, remains during this period visiting professor in Clark University, where he has been since February of this year.

DR. HAROLD A. WILSON, F.R.S., professor of natural philosophy in the University of Glasgow, has accepted reappointment to the professorship of physics which he held at the Rice Institute from 1912 to 1924 inclusive.

## DISCUSSION AND CORRESPONDENCE PHOTOGRAPHING THE SHADOW BANDS

PREVIOUS to the recent solar eclipse great interest was displayed in the problem of photographing the shadow bands. The conditions were unusually favorable, and very many persons must have made attempts to photograph the bands. It was therefore to be expected that many such photographs would be taken and that some of them would find their way into the newspapers and magazines. However, up to the present moment I have neither seen such pictures nor seen in print any mention of their having been secured. It may therefore be of interest to know that a photograph of the shadow bands was secured by a photographer of this locality.

The negative is four by five inches in size and shows in the foreground five shadow bands on a plane snow surface. Unfortunately, the exposure was too short and the picture is therefore "thin." It could scarcely be reproduced for magazine or newspaper printing, but photographic copies are sufficiently clear to be of scientific interest. The only object in the picture serving to fix the size is a footprint in the snow. It is therefore difficult to estimate the size of the bands. Each shadow appears to be about eighteen inches long, three or four inches wide and separated from its neighbor by about ten or twelve inches. This agrees with the observations made by the writer at a point not much more than a mile from the photographer's station.

In all characteristics the photographs appear to represent wave phenomena. In length, width, relative position and shading, the shadows in the picture exactly imitate a water surface rippled by the wind. In fact, in looking at the picture one can not escape the feeling that the surface of the snow is thrown up in

waves, so perfect is the illusion of wave form. This agrees well with the suggestion that the shadow bands are caused by the light shining through a rippling surface of contact between two layers of air of differing density. This is supported by the observation made by the writer that the bands were moving in the same direction as the lower air currents (northeastward) and at approximately the velocity of the air movements.

The gentleman who made the photograph is Mr. Glen Lowry, a professional photographer, of Stroudsburg, Pa. He kindly supplies the following photographic data:

Location, three miles north of Port Jervis, N. Y., on road leading to Huguenot. Graflex camera, Eastman super-speed film, F 4.5 aperture, 1/1000 second exposure, exposure made just one minute after close of totality. The exposure might well have been five to ten times longer:

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## THE GERMINATION OF BARLEY UNDER LATE SPRING MALTING CONDITIONS IN INDIA

THE malt houses of India are not equipped with the elaborate control apparatus found in many of our American plants. The summers are very hot and no malting is done in midsummer. To secure a longer malting season malt houses have been established in the hills at some elevation. I visited one of these at the time the last malt of the spring was on the floor. The temperature at this season is high and the air dry. Some peculiarities of germination under these conditions seem worthy of noting.

The barley is a very fine grade of grain with an unusual uniformity of development and soundness. In midwinter practically perfect germination is secured. The best malting conditions probably obtain in December. At this time the temperature of the malting floor is about 60° F. and the air sufficiently humid to grow the grain with no additional water after the soak. In June, however, when the last malting is done, the floor is actually hot to the touch. Daily sprinklings are given the grain. Yet at this time with high temperature (74° F.) the grain remains on the floor for twelve days or longer. Under fast malting conditions in the United States the plumules are often protruding in five or six days. The plumule of the high temperature malt of India has hardly started at the end of twelve days. The Royal Pilsen malt of Austria, which is commonly regarded as the world's best, is characterized by a growth of plumule two thirds the length of the grain in practically every kernel. The plumules of Ameri-