OBSERVATION OF CHROMOSPHERIC OPACITY

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On May 19, 1950, several members of our staff at Boulder, Colorado, visually observed an unusual narrow dark band extending across the base of a bright solar prominence. We saw the effect between approximately 2130 and 2200 UT when the prominence was at 81° heliocentric position angle on the east limb. The prominence was small, uniform, and relatively bright. We think it reasonable to suppose that the band was the sun's chromosphere showing dark in projection against the brighter surface of the prominence behind it. We could not photograph the phenomenon.

We made the observations during a period of intermittent cloudiness when the seeing quality was abnormally good. Our observing instrument was a partly completed flare-recording camera that was being experimentally operated. (See Plate XVIII.) It consists of a small heliostat followed by an achromatic lens system giving a final solar image of 17.5 mm diameter on a 35 mm recording camera. The objective was covered by a square aperture 60 mm on a side. Light passing through the system was filtered by a quartz and calcite birefringent filter designed and partially built by John W. Evans. The filter is supposed to transmit a band of light ½ A wide centered on Hα, but actually the filter spectrum is not very pure at the present, so that the contrast was not quite so good as one would expect from the narrowness of the central transmission. We can use the apparatus visually or photographically, as we choose.

The dark band crossing the base of the prominence of May 19 was probably the image of the sun's chromosphere seen dark against the brighter prominence. The chromosphere probably looked dark because of its large opacity and because its excitation at the depth seen was lower than that of the prominence. The prominence itself was a bright object of uniform surface, roughly triangular in shape, and relatively small. It probably extended right down to the chromosphere. Usually the seeing is so un-
steady at Boulder that the chromosphere is hard to see visually in our 17.5 mm image. On this occasion the atmosphere was very steady and the chromosphere showed quite clearly. Its appearance closely resembled Lyot's excellent photographs (Plate XIX, ApJ., 101, 255, 1945).

As usual, the chromosphere showed much fainter than the adjacent solar disk. The prominence was, however, appreciably brighter than the chromosphere though still fainted than the disk. The dark band we think was the chromosphere showed as a clear, unbroken stripe uniform in height from the limb, separating the small bright prominence from the bright edge of the solar disk. The width of the stripe seemed to be the same or very slightly less than the width of the chromosphere beyond the position of the prominence. The stripe seemed, so far as we could judge, equal in brightness to the chromosphere. The sketch (see Plate XVIII) records the appearance, perhaps idealized, since the drawing was made afterward from memory.

The most probable explanation of the effect that occurs to us is the following: The bright small prominence lay beyond the limb of the sun, so that the limb cut off our view of the prominence somewhere above its base. The narrow dark band was simply the relatively opaque chromosphere, and the emission from the band was the usual chromospheric emission. At this wave length, light from the bright surface of the prominence passing into the chromosphere was obscured by the opaqueness of the chromosphere thus tangentially viewed, while that passing high enough above the chromosphere, where the opacity was negligible, was transmitted undiminished. Other interpretations, of course, are possible.

The band persisted for some time even though the prominence changed appreciably in height and brightness. We had not observed the effect before May 19, nor could we photograph it on this occasion. However, we had not before had an instrumental arrangement that would favor seeing this effect, even if it were reasonably common, as one would expect if our interpretation is correct. During June and July, 1950, we observed a similar effect at least twice.

We hope soon to install apparatus suitable for photographing
it. The effect may be related to the dark-prominence features discussed by Öhman.¹

Robert H. Lee discovered the band phenomenon, and James P. Boratgis checked it at once. The observation was confirmed shortly by half a dozen other staff members and by me. All of us clearly saw the effect. Some, but not all of us, also saw what appeared to be the suggestion of a slight depression in the limb directly below the dark band. It may have been illusion, and there was not clear agreement about its appearance.

The unfinished equipment used for this observation is being developed by members of the High Altitude Observatory staff working at Boulder, Colorado, on a Harvard University research contract with the Air Force Cambridge Research Laboratory of the Air Materiel Command.

THE SPECTRUM OF NOVA PICTORIS 1925

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The spectrum of Nova Pictoris has been observed recently with a 10.5-inch objective-prism camera at the Lamont-Hussey Observatory in Bloemfontein, South Africa. The spectrum appears to be continuous except for a weak and perhaps wide emission line at Hα. This feature appears on three plates of April 16, 19, and 26, 1950. No variation was noted. The dispersion is 450 Å/mm at Hα.

Van den Bos and Finsen¹ from 1928 to 1931 observed two nebulous knots leaving the star in position angles about 70° and 230° and separating at a rate of 0".34 per year. If this velocity were maintained, the knots should now be separated by 8".5 in position angle about 60°, or by 7".4 projected on a parallel of declination along which the spectra were widened, and on plates of this scale (1 mm = 150") should produce a bright line measurably longer than the width of a stellar spectrum. Since the bright Hα line shows no appreciable extent beyond the limits of

¹ Popular Astronomisk Tidskrift Hæfte 1–2, p. 10, 1950.
² Cape Obs. Annals, 10, Part 9, 155, 1931.