On the afternoon of August 25 the balloon was followed to an altitude of nearly 20,000 meters. It became faint as in the morning, but as the altitude was not noted exactly it is not known how it was related to the changes in velocity of the balloon. The visibility of the balloon improved afterwards.

The altitude at which distortion or extinction occurred is marked on the graphs, figure 1. It will be seen that the disturbance occurred in each case after a sudden increase in the velocity of the balloon. The interval was small on August 14 (3 minutes), August 24 (1 minute), and August 25 (2 minutes), but longer on September 2 (7 minutes).

In the absence of temperature observations it is impossible to know whether the velocity discontinuity was accompanied by a temperature discontinuity, but if it were, then detached "lenses" of air of different temperature and density may have caused the observed disturbances of refraction.

Leaking would cause extinction of the balloon, and seeming increase in the velocity on account of the failure of the balloon to maintain the assumed rate of ascent upon which is based the calculation of the position of the balloon by the one-theodolite method used at Madison. The intervals of 10 and 14 minutes after the sudden partial extinction noted on August 14 and 24 during which the balloon was followed, and the speeding up of the balloon for 20 minutes before the sudden extinction on September 2, are thought to eliminate the possibility that leaking has caused the phenomenon here reported.

The possibility that the distortion of the balloon image on August 25 was due to eyestrain was eliminated by the change of observers. That it was not due to internal reflections in the optical system of the theodolite is proven by the wriggling motion of the balloon image.

THE RELATION OF TELESCOPIC DEFINITION TO COLD WAVES.

By W. H. PICKERING.

[Mandeville, Jamaica, June 21, 1920.]

Telescopic definition, or "seeing," as it is technically called, depends mainly on the currents located in our atmosphere up to an altitude of 3 or 4 miles. Their velocity is of little consequence, variations in their temperature forming the controlling influence. In the temperate zones a high barometer and cold wave are most injurious to the seeing; in the Tropics, the vicinity of a hurricane. The seeing is measured on a scale of 12, and is at its worst in Jamaica during the winter months, when the circulation of the temperate zone, with its westerly winds, sometimes reaches us. This it is especially liable to do at night.

The seeing is recorded here nearly every night when it is clear, and often several times during the evening. The upper graph in figure 1 represents the seeing during the three months of January, February, and March, 1920. The angles of the shaded regions indicate the dates when it was found to vary. The second graph indicates the readings of our minimum thermometer, and the short vertical lines at the bottom, the dates when a "high" in Florida or Georgia is found on the daily maps of the Weather Bureau.

An examination of the figure shows that there were seven periods when the seeing was inferior. These are indicated by the letters *a*, *a'*, *b*, *c*, *d*, *e*, and *f*. All cases except the second and next to last were followed by low minima on the second graph. In the latter case the minima were quite irregular. It will be noted that everyone of the five cold periods, *a*, *b*, *c*, *d*, *f*, was preceded by bad seeing. It therefore appears, as far as these observations go, that cooler nights can often be foretold about three days in advance by means of the upper air currents through their production of bad seeing.

In January and February every HIGH in Florida and Georgia was preceded by a low minimum in Jamaica. It did not seem necessary to letter all of them. Only 3 dates out of the 15 failed, namely, March 2, 27, and 30. The interval was usually two to three days, but the warning of bad seeing came nearly a week in advance. Whether a HIGH is found on the weather maps during the first four days in April the writer does not know.[1] This investigation suggests that the same general atmospheric drift that carries the hurricanes northerly in these longitudes, into our extreme southern States, carries the HIGHS as well.[2]

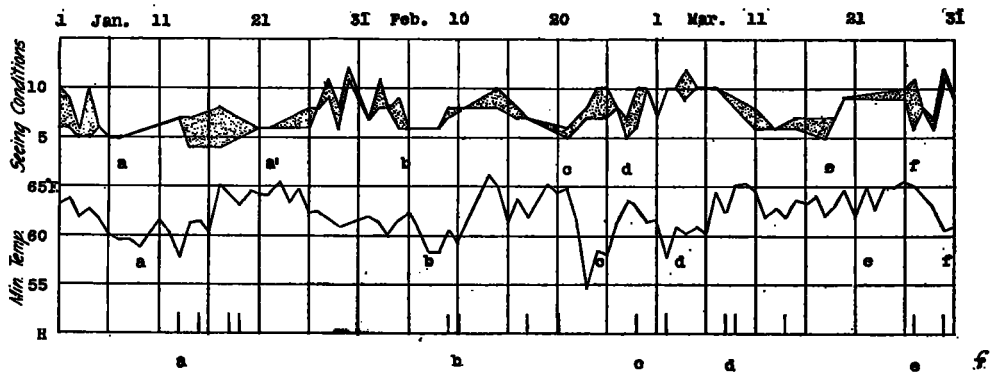

FIG. 1.—"Seeing" during January, February, and March, 1920, at Mandeville, Jamaica.

AN UNUSUAL LUNAR HALO PHENOMENON.

The accompanying figure 1 represents a lunar halo observed by Mr. A. A. Graham, about 8 p. m., September

[1] A weak HIGH moved across the South from the 1st to 3d, and was central in Georgia on the night of the 2d.—EDITOR.

[2] This explanation seems questionable, and the following connections more likely: With the passage of a LOW on the north, the cold winds on the back side first affect the upper levels and produce bad seeing, which is followed in two or three days by the arrival of the slower-moving lower winds at Jamaica, producing the minimum temperatures. In about three days more the HIGH which followed the LOW is, naturally, in the Southeastern States.—EDITOR.