tufty balls, resembling cumulous clouds. These white heads are invariably bent or turned, as if slightly doubled

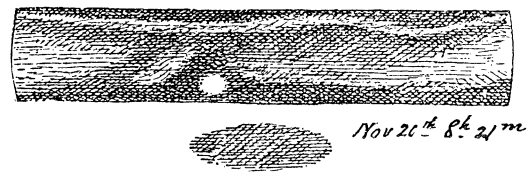

FIG. 1.

under, toward the south, and are generally partially or wholly imbedded in the inner edge of the south portion of the equatorial band. These heads soon become isolated into a regular white spot, the train gradually fading out. All the objects in the equatorial zone move with a very great velocity in the direction of rotation, invariably n a contrary direction to that pursued by the slowly moving red spot, which is really the only object that has a backward motion on the planet. Indeed it would not be a bad comparison were we to compare the red spot to a mighty city built on the shore of a vast and swiftly flowing river, which is constantly being filled with drift, and an occasional glistening mass of ice, tearing its way past the city with a velocity of not less than six thousand

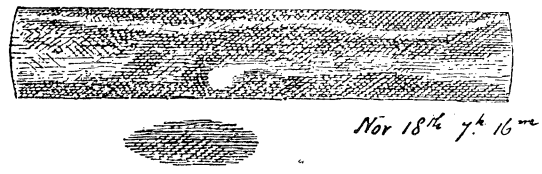

FIG. 2.

miles a day. In such a comparison the city would need be as great in area as three-fourths that of our entire earth, and the river fully sixteen thousand miles in breadth!

One of these swiftly moving bright spots was observed on Nov. 18th (Fig. 1). It had probably existed some few days before that date, but bad weather had prevented observations of the planet.

As it passed very close to the red spot that object afforded a capital means of illustrating its motion.

On the 18th it was situated on a meridian with a part of the red spot about ⅓ its length preceding the following end.

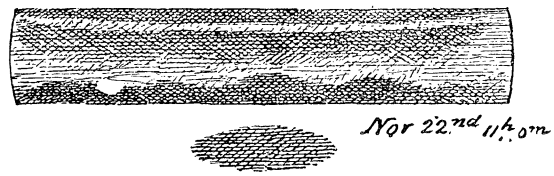

FIG. 3.

This spot was bright with the fainter train following in its wake. On the 20th it was near the preceding end of the red spot (Fig. 2), and had isolated itself more from its train, being partially imbedded in the inner edge of the south band. On the 22d it had left the red spot far behind (Fig. 3), and was smaller and paler, apparently the size of satellite I, then nearing transit. By the 23d it had advanced still further (Fig. 4), and was nearing the west limb when the red spot was central in transit. It was smaller and appeared to vary in brightness.

Bad weather since the 23d has prevented any further observations of this remarkable object.

The pen and ink drawings show the rapid progress of the spot The first sketch was made when the red spot's following end was in transit; the three others when the

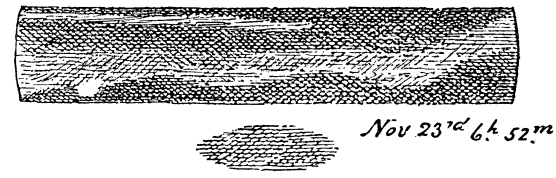

FIG. 4.

spot was central. To save space the sketches only show the great equatorial band and the red spot.

E. E. BARNARD.

Nashville, Tenn., Nov. 29.

THE NOVEMBER LEONIDS, 1880.

BY EDWIN F. SAWYER.

In the years 1846–47 and 1849, at the November 11–15 epoch, meteors were recorded in considerable numbers, doubtless representing the perihelion passage of a minor cluster of meteors in the cometary-meteor orbit. Last year, both in Europe and America, these meteors were found to be unusually numerous from the 11th to the 15th of November, and the earth probably encountered the minor cluster of 1846 at its return to perihelion. In anticipation that the shower would, this year, at the nodal passage, be of some little intensity, preparations were made for observing the same, but owing to cloudy weather observations could only be obtained on the 11th and 12th; but the indications, at these early dates, were that a large number of shooting stars would be recorded on the 13–14th, and as observed elsewhere such proved to be the case. At Cambridgeport on the 11th, during a two hours watch, from 14h. 30m. to 16h. 30m., 14 meteors were recorded, of which 6 were Leonids. On the 12th, during an hours watch only, from 16¼h. to 17¼h., in a sky more than half overcast, 6 others were noted, equal to at least 15 Leonids per hour for one observer in a clear sky. At the Haverford College Observatory, Penn., Mr. Isaac Sharples, assisted by three other observers, recorded 52 meteors in about an hours watch on the 13th from 3h. 30m. to 4h. 20m., of which 28 were Leonids. Mr. Sharples says, that at the end of the watch, when the sky become overcast, meteors were falling at the rate of two a minute and promised much.

From W. F. Dunning, Esq., F. R. A. S., we learn that the weather was generally unfavorable for observing purposes in England at the November epoch, so that the observations as recorded in this country have a special value, being, so far as heard from, the only ones obtained during the dates on which the Leonid shower is in play. As in the year 1849, meteors were also numerous at this epoch, we may expect a return of the Leonids as a minor shower during the next two years.

Cambridgeport, Dec. 5, 1880.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

THE WHITE SPOT ON JUPITER.

To the Editor of SCIENCE:

The white spot seen passing the great red spot on November 18, 20, etc., and situated on the inner edge of the south equatorial band, was observed again on December 2, the first night for observing since November 23. The white spot was in mid-transit some time