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## DISCOVERY OF VULCAN.

That hypothetical world—the hitherto elusive Vulcan—must now be taken from that category and assigned a place as a regular and law-abiding member of the solar system, thanks to the total eclipse of the sun of July 29, 1878.

The discovery is an important one, and calls for a recognition from the SCIENCE OBSERVER. At your request, I lay before your readers a brief recital of its discovery.

Anxious as I was to observe all the varied phenomena attending a total eclipse, I was yet willing to forego that pleasure, as I had observed those of the eclipse of 1869; and, therefore, I had, before leaving home, come to the determination to bend all my energies and to devote nearly all of the time of totality to a systematic search for Vulcan. Owing to an accident, which need not be stated here, I was compelled to confine this search to the west of the sun exclusively. After devoting, according to my original programme, twenty seconds to observation of general phenomena, I commenced sweeping for Vulcan, and, almost immediately, ran upon two bright stars, only one of which I was sure was down on our star charts. I at once observed them, as to distance from each other, and from the sun, and also as to color, magnitude, direction, &c. After duly impressing them upon my memory, I renewed the sweeps for others, but I soon found I had the same stars again in field, and again I compared them together as to all the features enumerated above, after which I again swept, but, because of the accident, without much regularity, and in a few seconds I was surprised to see them again in the field, looking as they had on both previous occasions. In my

further sweeps I did not run upon them, but, knowing that my two minutes (the time apportioned for this quest) were about up, I endeavored to get another and last view, but could not, a small cloud preventing.

Two features instantly attracted my attention and elicited surprise, viz.: their excessive redness and large round disks. I at this moment, however, laid not much stress upon either, because abnormal colors predominate on such occasions, and, as to the disks, though round and large,—far larger, in fact, than I had ever seen the spurious disks of stars,—I yet was loth to believe that Vulcan, if Vulcan it were, could, with a power of only 25, be large enough to show a genuine disk. Their exact equality of magnitude is what riveted my attention every time I saw them. With the closest scrutiny, I could not decide which was the brighter. In my own mind there exists no doubt that one of the stars was Theta Cancri, the other an intra-Mercurial planet.

I saw no stars except these two, not even Delta, a little to the east of the sun.

My telescope was a  $4\frac{1}{2}$ -inch, with power of 25, and a field of  $1\frac{1}{2}$  degrees.

Prof. Watson and myself are in correspondence in reference to the identity of the objects seen by us. In declination there is almost exact agreement, but in Right Ascension there is a slight discrepancy, which can, probably, be reconciled when all the observations are discussed.

The disk was so exactly circular that it would be natural to infer that it was approaching superior conjunction, and, of course, presenting a nearly full round luminous face to the earth, instead of, if it had just passed its inferior conjunction, a crescent phase. Notwith-

standing this appearance, I am inclined to think it had just passed its inferior conjunction, and, of course, retrograding, its motion during the interval of time between the observation of Prof. Watson and my own, would account for part of the disagreement in R. A., which, were it approaching superior conjunction, would be aggravated.

Respectfully,

LEWIS SWIFT.

#### THE AUGUST PERSEIDS, 1878.

Read before the B. A. S. S. August 14, 1878.

Moonlight and a succession of cloudy evenings seriously interfered with the observations of this noted annually occurring meteor shower on the 8th, 9th, 10th and 11th, although a clear sky from 13h. to 14h. 45m., Aug. 9, was taken advantage of, and the shower found to be in active operation. Before 14h., the moonlight prevented the recording of faint meteors; and after 15h. 45m., the twilight and a hazing up of the sky put a stop to further watching.

My attention was confined to recording the number seen each quarter of an hour, noting the magnitudes, velocities and other peculiarities, and only relying on eye estimations in determining the centres of radiation, which, however, in two cases at least, were very accurately noted, as will be seen further on.

Centre of observation in Perseus.

There appeared to be a very large percentage of unconformable meteors observed coming from very active radiants in Cassiopeia and Pegasus; the former giving a number of bright meteors, and the latter principally faint members, with very long paths. Only three bright ones were observed conformable to a radiant in Camelopardalis. The meteors, with few exceptions, moved very rapidly, and the tendency to appear in groups of three or four, with long intermissions, was noted, as during former displays.

The following table shows the number

of meteors recorded during the watch of 1h. 45m. :—

Time of Watch.	No. of Perseids.	No. of other met'rs.	Total No. seen.
14. to 14.15	8	7	15
14.15 to 14.30	7	4	11
14.30 to 14.45	11	5	16
14.45 to 15.	8	3	11
15. to 15.15	5	6	11
15.15 to 15.30	7	12	19
15.30 to 15.45	12	3	15
1h. 45m.	58	40	98

Horary No. of Perseids = 33; of other meteors = 229; of all meteors = 56. Per cent. of Perseids = 59.2; of other meteors = 40.8. Of the unconformable meteors, at least 20 per cent. came from Cassiopeia.

The magnitudes of those recorded were as follows :—

	>1 mag.*	—1 mag.	—2 mag.	—3 mag.	—4 mag. & fainter
Perseids,	3	10	21	15	9
Others,	2	2	8	10	18
Total,	5	12	29	25	27

From the above, there appeared to be a preponderance of bright meteors, the greater number being Perseids. One very brilliant meteor equal Jupiter radiated from Cassiopeia, and one of equal splendor from a radiant near Lyræ. The colors of the brighter Perseids appeared to be either orange or yellow, their paths short, and invariably accompanied by streaks. Of the 98 meteors recorded, 85 moved very rapidly, and only 13 with medium velocity. The radiant point of the Perseids was determined from one stationary meteor of the third magnitude, accurately observed at Kappa Persei, R. A. 44°, Dec. 56½° N. and from several short tracks near the focus. The principal radiant from Cassiopeia appeared from a number of foreshortened paths to lie at R. A. 8+55°, between Alpha and Zeta Cassiopeia. Preparations had been made by Mr. Seth C. Chandler, Jr. and myself, for