

On page 157 of the article in the *JOURNAL*, Professor Chant gives nine values for the height, with a mean of 33.8 miles, after deducting half the estimated altitudes. I find that on computing from the same data, and correcting for earth's curvature, the mean comes out 35.8 miles, and I cannot explain the discrepancy. If one-third instead of one-half of the altitudes is deducted, the mean height is 51 miles, which certainly appears too great.

With regard to the thunder-like detonations, it is to be feared that endeavors to deduce the height from the time intervals elapsing between the appearance of the meteors and the reports, cannot lead to very certain or exact conclusions. The velocity of sound in ordinary air at 32° Fahr. is 1,088 feet per second or 12½ miles per minute, but we do not know accurately the velocity in the upper, colder and rarer regions of the atmosphere. We know that sound travels slower at low temperatures, and that loud explosions travel faster than faint ones. If computed on the basis of temperature at the earth's surface, the distance and heights of meteors determined from the noise of their bursting would be much too small.

At Mount Hamilton, California, a detonating fireball was very accurately observed in 1894, (July 27), and it was concluded that the sound was transmitted through an air medium with a mean temperature of — 193° Fahr. and sound velocity of 800 feet per second. The meteor exploded at height of 28 miles. The distance from Mount Hamilton was 59.25 miles and the noise occupied 390.7 seconds in reaching the observatory.

Mr. John Butterfield, at Toronto, heard the rumbling or thunder-like sound at 9^h 12^m on February 9, or seven minutes after the big leader of the meteor swarm had passed. If it was 38 miles high the observers distance from it was 47 miles. From the experiments made and knowledge gained, with regard to the decrease of temperature relatively to height it appears probable that the velocity of sound would not be more than 640 feet per second for a mean height of 19 miles which would give a distance of 51 miles — nearly agreeing with that observed by Mr. Butterfield. The data upon which these conclusions are based

cannot, however, be said to afford anything more than a rough approximation to the truth.

The radiant point of the meteors is uncertain. We know the direction of flight in azimuth, when the meteors were first seen from Mortlach and Pense, but do not know the inclination at which they were descending. If they were moving horizontally even at that probably very early period of their display, the point about 328°, + 9° — a few degrees east of ϵ Pegasi, was on the horizon in the direction 15° north of west indicated by the "trace" given by Professor Chant. If the meteors were in view before coming within range of the observer at Mortlach, it is certainly strange that there are no records from westerly towns in Alberta and British Columbia.

I draw the inference that the meteors first became visibly luminous in the region of Mortlach, Saskatchewan. As seen there, if they were falling a little towards the earth, the radiant must have been in the western region of the Square of Pegasus. I saw a meteor with extremely slow motion and a yellow train directed from this point on February 8 last, about 30 hours before the great display, and the fact has some interest as suggesting that there was certainly a meteoric shower in Pegasus at the time. But I can find no mention in former records of such a shower or of any fireballs from this quarter in the second week in February. The region sets soon after the sun.

Meteoric astronomy has, however, been sadly neglected in the past, and there are comparatively few accurate data available for reference. Of the myriads of fireballs which are annually displayed in the earth's atmosphere, not more than about a score are well observed and properly investigated.

There are probably more than a million meteors brighter than Venus appearing every year in the night skies of various parts of the world. If but twenty of these are subject to proper study we may form some conception as to the very few drops we gather of the great and continuous storm of meteoric fireballs.

February is becoming a notable month for abnormal meteors. Though August brings us its abundant Perseids, and November