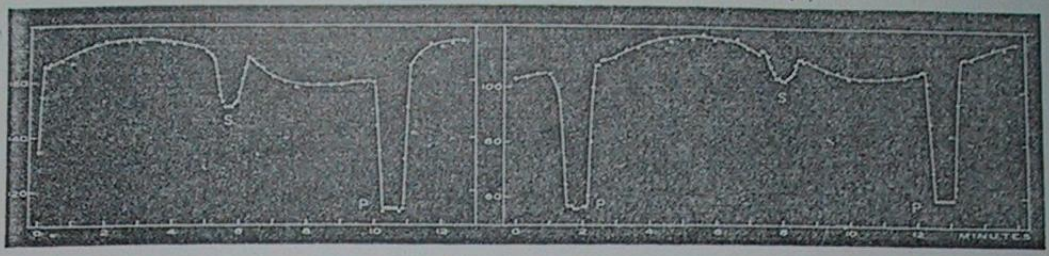
SKY & TELESCOPE vol. 11, March 1952



Sample light curves from the Calder apparatus. At the left one star is an opal enlarging bulb; the other star is smaller and fainter. The secondary minimum is at S, with the small star in front of the larger. The round bottom shows the limb darkening of the large star. The primary minimum is at P, with the small star totally eclipsed; the minimum is flat. At the right, the small star's brightness has been increased, and S becomes shallower. In both cases, the orbit is somewhat eccentric, as indicated by the difference in time from P to S, compared with S to P. Superimposed on the curve is the sine curve of the change in distance (inverse-square law of brightness) caused by the sensible difference in the distance of the small star from the observer as the star revolved. The ordinates are microamperes.

ing light curves reveal effects in addition to the usual behavior of eclipsing stars. Variation between minima is due to reflections, lack of voltage regulation of the lights, and even to the fact that the moving star is a foot nearer at one point in the orbit than at the opposite. Later improvements bring the light curves into more nearly traditional form.

TERMINOLOGY TALKS.

J. Hugh Pruett

What Was the "Great Meteoric Procession"?

After the excitement about the meteors described last month was over, the question arose among astronomers as to the nature of this unusual meteoric display. Was it a meteor shower something like the Perseids of August, only of shorter duration? In that case, the objects seen near Bermuda and farther southeastward surely were not the same as those observed from Saskatchewan. Dr. Chant, writing during the next few years in several numbers of the RASC *Journal,* seemed sure the display had none of the characteristics of a shower. Had it been a shower, it seemed most likely it would have been witnessed far more widely.

The calculations of Dr. Chant convinced him that the fireballs were traveling almost parallel to the earth's surface. He surmised that they had been encircling the sun in a regular orbit, but had come so near the earth that they had been "captured" by it, and when seen by earth dwellers, were moving about our globe as actual satellites. It can be computed from the balance between gravitational attraction of the earth and the centrifugal force (some prefer centrifugal "tendency") of a moving body that a bullet fired horizontally near the earth's surface with a velocity of 4.9 miles per second would continuously encircle our world as a satellite — if the atmosphere were not present. (At 1,000 miles above the surface this velocity becomes 4.4 miles per second.)

Dr. Chant computed the height of the fireballs over Canada as around 26 miles. In a later article he raised this to 34 miles. He thought their speed, as referred to the earth's surface, was greater than five miles and less than 10 miles per second. At that time of night, meteors coming from the west were catching up with the earth in its orbital motion, so the apparent velocity was low. Had they been coming from the east, the ground speed would have been many times greater. The present writer has encountered both types in his meteor tracing.

W. F. Denning, of England, from calculations from the original observations, decided the meteors were at a height of about 38 miles when over the vicinity of Toronto and were traveling eight miles a second. He thought the bodies were probably not over 10 feet in diameter. Dr. Chant had placed their size far greater. Denning was convinced that at the beginning and ending of the visible flight the objects were higher than when nearer the midway point. The reports from the two ships previously mentioned were not obtained until long after many articles had been written on the subject. These later reports seemed to lengthen the known path from 2,500 miles to over 5,000.

Prof. W. H. Pickering, in four articles in *Popular Astronomy* of 1922 and 1923, agreed quite well with Dr. Chant. He was sure there were no shower characteristics detectable in the heavenly parade. He wrote that it was "a procession of fireballs in the same sky path going from horizon to horizon." He was fully convinced that the meteors seen off the eastern tip of Brazil were the same, or remnants of the same, as observed from Saskatchewan. He made the entire visible flight 5,659 miles and believed it continued several thousand miles farther. He considered them a "bunch of temporary satellites" which were "finally buried in the South Atlantic."

In *Popular Astronomy* of 1928, Willard J. Fisher raised the question as to whether the celestial visitors were the same bodies everywhere. He suggested that, on the contrary, the apparitions might have been local, and that too many uncertainties entered to be sure the bodies seen over Saskatchewan actually passed over other North American observers, Bermuda, and the ships.

Finally, in *Popular Astronomy* of 1939, Dr. C. C. Wylie, of Iowa State University, came out flatly against the long-flight, earth-satellite theory of some of the earlier writers. He showed that the data given by the more intelligent observers proved the event was a meteor shower, and that entirely different bodies were seen from widely separated localities. His calculation of the flight of what he calls the "detonating meteor" seen over Canada gave it a ground path of only a little over 100 miles. He considered that no clusters were seen to go "from horizon to horizon"; few if any bright meteors dropped below the skyline.

Professor Pickering had calculated that the atmospheric density at a height of 35 miles was only 1/1,024 of its value at sea level, so the resistance to meteoric flight would not be great. But Dr. Wylie showed that this is not the case, and proved that no single object could long endure at such heights in the atmosphere, thereby bringing an end to further speculations on the "great meteoric procession" of 1913.

The references consulted in preparation of this discussion include: *Journal* of the Royal Astronomical Society of Canada, 1913, articles beginning on pages 145, 404, 438, 443; 1914, 108, 112; 1915, 287; 1916, 294. *Popular Astronomy,* 1922, page 632; 1923, 96, 443, 501; 1928, 398; 1939, 291; the last is Dr. Wylie's article.