

THE PASSING OF THE EARTH AND THE TAIL OF HALLEY'S COMET,

By C. D. PERRINE.

In all of the observations and discussions which I have seen to date from the northern hemisphere of the passing of the Earth and HALLEY'S Comet, I have seen no mention of the great southern branch of the tail which was visible in southern latitudes, and through which the Earth probably passed.

The mornings of May 14, 15, 16 (astronomical reckoning) were cloudy in Cordoba. Observations were secured, however, on the mornings of May 17, 18, 20 and 21.

Following are my notes made at the time.

1910, May 17 (*Wednesday morning*).

Sky clear except for moisture. Night was cloudy from soon after dark until midnight or later. At $15^h 45^m \pm 5^m$ Cordoba mean time, tail of comet was very conspicuous to the east, extending from the horizon to the Milky Way which was then on the meridian or a little west (at the point of intersection). Tail was from 3° to 5° in width at brightest part. No structure could be seen.

$16^h 30^m$ to $17^h 0^m$. Sky examined from roof of main building at intervals. Sky was pure and stars very sharp in all parts of sky except in region around comet's tail, especially to the south, where stars and sky appeared misty. This may be and was probably due, in part, to the zodiacal light, and, lower down near the horizon, to moisture in the air. There may have been some effect from the diffuse portions of the comet's tail.

The comet's tail was considerably brighter than the Magellanic Clouds.

Width of tail *decreased* away from the horizon, *i.e.* was widest near the horizon.

Fog on ground at 6 A.M.

May 18 (*Thursday morning*).

There are clearly two branches to the tail, extending from the horizon fully up to the Milky Way in *Aquila*. The northernmost of these branches is much the brighter, estimated at twice that of the southern branch. The outlines of the northern branch have been located on a map by means of the stars. From this it appears that this branch is about 7° or 8° wide, at its middle. It is narrower and fainter at its extremity near the Milky Way. It widens slowly and brightens considerably towards the horizon.

The southern branch is separated from the northern branch by about the width of the latter. Both branches are sensibly parallel. The southern branch is at least twice the width of the northern one (or about 15°). Both branches are sensibly straight.

θ *Aquilae* is near the axis of the N. branch.

ϵ *Pegasi* is near the N. border of the N. branch.

γ *Pegasi* is near the S. border of the N. branch.

The N. border of the (wide) southern branch passes very near to β *Aquarii*.

The S. border of the S. branch extends almost as far as β *Ceti*.

The middle of the N. branch is intrinsically about as bright as the Nebeculae.

The southern branch is estimated to be about half as bright.

The sky was overcast at $15^h 45^m$. Soon after a band appeared near the horizon in which the comet's tail was seen, and shortly after the sky cleared in the region of the comet. Clear from $16^h 0^m$ to $16^h 54^m$, when clouds came over.

May 19 (*Thursday evening*).

Cloudy. No chance.

May 19 (*Friday morning*).

Drizzling rain. Heavy clouds. No chance.

May 20 (*Friday evening*).

Clouds until ? Clear at $10^h 15^m$. No trace of any streamers at that time. Moon very bright. Think, however, that any streamers as bright as the brighter on Thursday morning would have been seen.

May 20 (*Saturday morning*).

$15^h 45^m$. Moon still up. Could see no trace of comet's streamers.

$16^h 20^m$. Moon has now set and faint streamers are to be seen to the east, similar to those of May 18 (Thursday morning), except: (A) They are both fainter, the northern one being relatively much the fainter. (B) Both are wider and more widely separated.

N. streamer is 10° wide.

S. streamer is $20^\circ +$ wide.

Separation is 10° or 12° .

Both streamers are farther north than on May 18.

α *Pegasi* is on the southern border of the N. streamer.

θ *Aquilae* is not far from the axis of the N. streamer.

γ *Pegasi* is near the middle of the band separating the two streamers.

Venus is not far from the axis (a little to the N.) of the broad S. streamer.

Both streamers extend to the Milky Way but cannot be traced beyond it with certainty. The broad S. streamer passes a little to the N. of the zenith, say 5° , seems a little bright or in the zenith.

May 21 (*Saturday evening*).

Tail traced for 60° with naked eye. Sky good.

May 21 (*Sunday morning*).

17^h 0^m to 17^h 10^m. Moon setting and sky to N.E. sufficiently dark to show cometary band if it existed. Only zodiacal band through *Venus* is visible. This is almost as strong as yesterday morning. Sky good. Air cold and damp.

Photographs were secured on the mornings of May 17 and 18 (among others) with a small single lens which covered a field of about 60° with a light ratio of 1:1½. The bright tail is well shown on two exposures on May 17. No certain trace exists on them of the southern tail. Only one exposure was secured on May 18. The bright N. tail is well shown on this as well as a portion of the broad southern band. Owing to the great angular aperture of this lens and to the size of dome and narrowness of slit the southern side of the field was cut off.

Of the reality of this wide southern branch there is not the slightest doubt. Although very much fainter than

the bright northern branch, it was at once picked up on the morning of May 18. It was also easily and certainly recognized on May 20. Unfortunately this southern branch was almost coincident in position with the zodiacal light, and to this is probably to be attributed the fact that it appears not to have been seen by northern observers.

There appears to be little or no doubt that the brighter portion of the tail passed entirely to the north of the Earth. If the wide southern branch persisted, there is practically no doubt that the Earth passed through it about May 20 or 21, civil time. It should be observed here that the moonlight on the evenings of May 20 and following made it impossible to see any object as faint as the southern branch. It cannot be said, therefore, whether this branch persisted after May 20 (*Saturday morning*).

If the mistiness observed on Wednesday morning (May 17) was in reality due to cometary matter, then it may be possible that the Earth passed through a portion of the tail at about the time that the comet transited the Sun.

Cordoba, 1910 July 25.

ELEMENTS OF MINOR PLANET, J.G. 1909,

By JOSEPH B. REYNOLDS.

This planet was discovered by JOEL H. METCALF, Dec. 11, 1909, and was named by his permission "*Lehigh*." The elements computed from four photographic positions, taken on Dec. 11, 1909, Jan. 2, 1910, Jan. 16, 1910, and Feb. 1, 1910, follow:

Observed *minus* computed for 1st and 4th positions:

$$\Delta\beta = +6''.53$$

$$\Delta\beta''' = +5''.18$$

Epoch, 1910.0, G.M.T.

$$\begin{array}{lcl} M = 57^\circ 55' 7.92'' & & \\ \pi = 24^\circ 54' 36.54'' & \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} & \begin{array}{l} \text{Ecliptic and Mean} \\ \text{Equinox 1910.0} \end{array} \\ \Omega = 88^\circ 54' 34.62'' & & \\ i = 13^\circ 1' 36.53'' & & \\ \phi = 7^\circ 16' 10.83'' & & m_0 = 12^m.8 \\ \log a = .4790764 & & g = 8^m.9 \\ \mu = 678''.2534 & & \text{Opposition, Dec. 26, 1909} \end{array}$$

Lehigh University, 1910 August.

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