On Comet II, 1881.

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[*Read before the Royal Society of N.S.W., 7 September, 1881.*]

I SUBMITTED to the Astronomical Section of the Royal Society, at their last meeting (August 5), an approximate determination of the orbit of the Comet which visited us in May and June last. That determination was founded on the observations made at my observatory on May 22, June 1 and 11, but, owing to the limited time at my disposal previous to the meeting, I was unable to reduce the residuals for the middle place within the limits of errors of observation. The elements thus arrived at confirmed my previous statements in the daily papers that our late visitor could not be either the second comet of 1819 or the great comet of 1861, and at the same time pointed to the probability that it was identical with the great comet of 1807. I have now much pleasure in presenting to the General Monthly Meeting of the Society more accurate elements than those referred to. They were forwarded some time ago to the Royal Astronomical Society and to Professor Krüger, of Kiel, and will, I believe, represent within a few seconds of arc all the observations taken in the southern hemisphere. In juxtaposition with them I have presented for comparison Bessel's elements of the great comet of 1807, the longitudes in both systems being referred to the mean equinox of 1881·0.

	Comet II, 1881.	Comet, 1807.
	d.	d.
Perihelion passage, G.M.T. ...	1881, June 16·30995	1807, Sept. 18·75
Longitude of perihelion	264° 56′ 15″·5	271° 57′
Longitude of ascending node	270 54 0·2	267 49
Inclination of orbit	63 27 14·0	63 10
Perihelion distance	0·7357075	0·6461
Motion	Direct	Direct

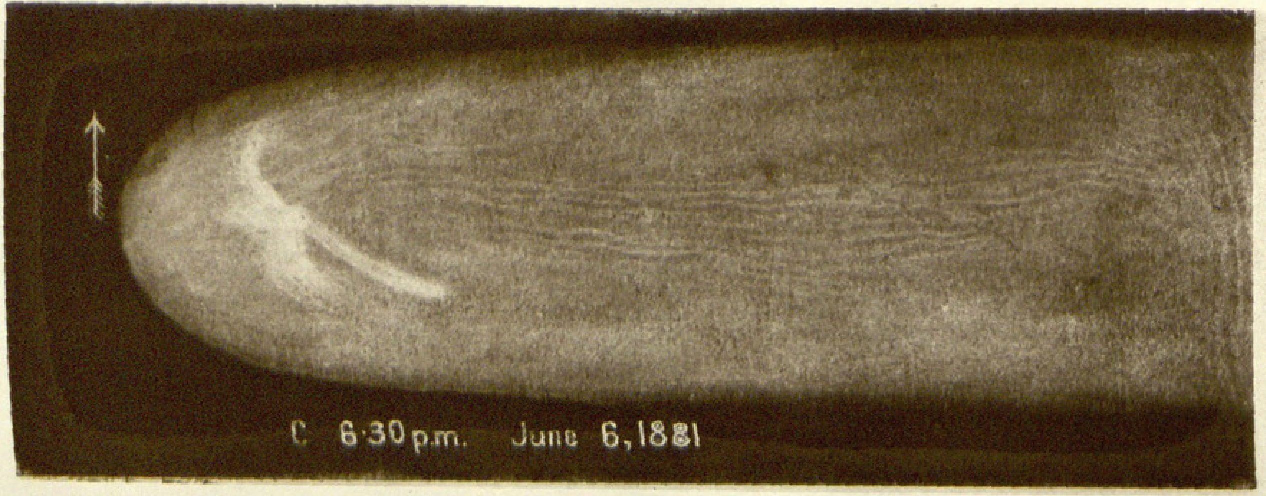
But the recent fine comet is not the only one which has been suspected to be a return of the great comet of 1807. On the 16th December last a comet was discovered by Pechüle at the Observatory of Copenhagen. It was observed for some time in the northern hemisphere, and its orbit has been computed by several astronomers.

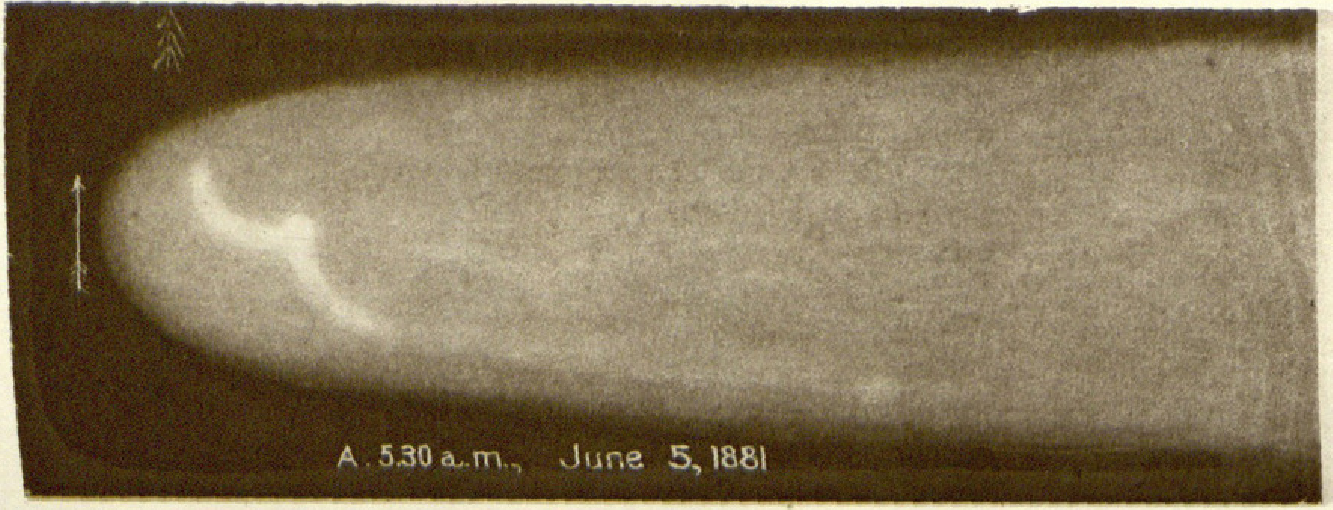
From these calculations I have selected the following, by Herr Ambronn, of Hamburg, as it is based on the longest series of observations :—

	d.	
Perihelion passage	1880, Nov. 9·5320, Berlin M.T.	
Longitude of perihelion	262° 30′ 9″	M. Equinox, 1881·0.
Longitude of ascending node ...	249 35 36	M. Equinox, 1881·0.
Inclination of orbit	60 41 5	
Perihelion distance	0·67406	
Motion..................................	Direct	

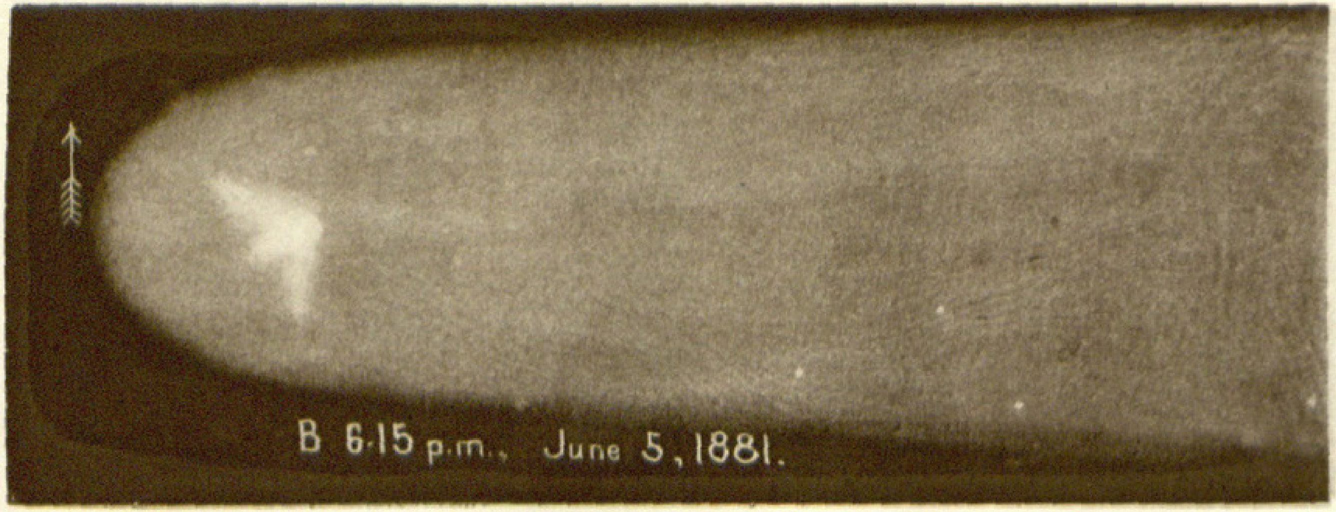
Dr. Holetschek, of the Vienna Observatory, and Mr. S. C. Chandler, of Boston, U.S., have both pointed out the general resemblance of these elements to those of the comet of 1807.

From the elements which I have given of our late visitor, it appears that it was, on the evening of discovery, May 22, distant 82,000,000 miles from the sun, and 71,000,000 from the earth. At my last observation, namely, on the morning of June 12, these distances had diminished to 69,000,000 and 33,000,000 of miles respectively. The comet passed through perihelion at 26 minutes past 7 o'clock in the evening of June 16, Greenwich time, and at 20 minutes past noon on June 19, it reached the plane of the earth's orbit at the ascending node. Now it is a remarkable circumstance, as I pointed out indeed in the previous paper, that the earth at the time of the nodal passage was not far from the prolongation of the axis of the comet's tail. Had the comet been delayed 2·75 days in coming to the line of nodes, the earth would have been exactly in a line with the sun and the comet, and the comet would of course have been projected on the sun's disc, as seen from our planet. It does not, however, appear at all probable that had the earth and comet been in the line of nodes at the same time, the earth would have been involved in the matter of the tail. On the 1st June I could just trace the tail as far as a small star, whose distance I measured from the nucleus by means of an ordinary sextant. The resulting length of the tail was 8° 38′, and, adopting my elements before given, this would correspond to a real length of 8,000,000 of miles. Supposing the earth and comet to have been in the line of nodes, the distance between the two bodies would have been 26,000,000 of miles, the comet being that distance within the earth's orbit. It appears, therefore, that the visible part of the tail would not reach the earth by 18,000,000 of miles. Doubtless the diffused matter of the tail extended considerably further from the nucleus than it could be actually seen, but I do not think it at all probable that any portion of it could have reached the terrestrial orbit. Another interesting circumstance in connection with the late comet is its

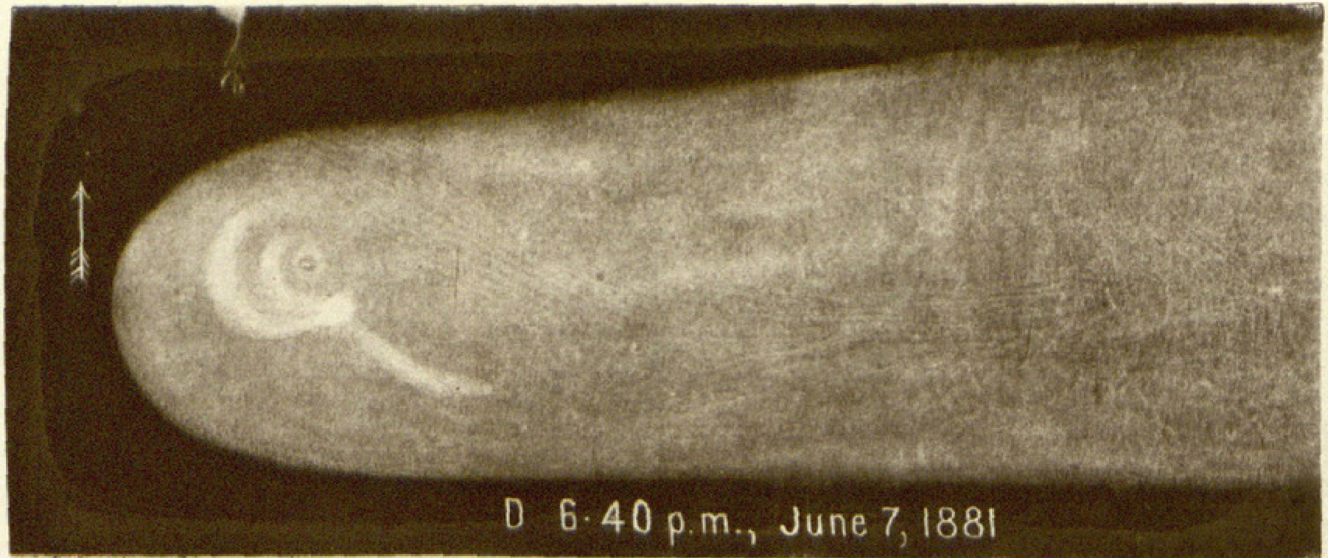

C 6·30 p.m. June 6, 1881



A. 5.30 a.m., June 5, 1881



COMET *b*, 1881, as seen at Sydney.



COMET *b*, 1881, as seen at Sydney.

near approach to the orbit of Venus. The planet itself, however, had passed the point of near approach about seventeen days before the comet arrived at it. Had the two bodies arrived at the point together, the elements of the comet's orbit would have been considerably changed by the excessive attraction of the planet.

In conclusion, I may mention that No. 2377 of the *Astronomische Nachrichten*, the latest date to hand, contains Dr. Gould's announcement by telegraph to Europe of the comet's appearance. The telegram is dated 1st June, and identifies the comet with that of 1807.

I now add the results of my observations of the comet. They will prove useful to any computer who may be desirous hereafter of investigating a definitive orbit from a combination of all the observations in both hemispheres. The differential measures on the morning of June 12th depend simply on the circles of the equatorial, and are therefore only approximate; all the other measures were taken with an excellent filar micrometer. They are corrected for refraction. The positions depending on Lacaille's stars must be regarded as provisional only, as these stars will have to be re-observed in the meridian at the close of the year. The second term in each co-ordinate of the comet is the reduction to the earth's centre, π denoting the equatorial horizontal parallax of the comet in seconds of arc.

Windsor Mean Time. 1881.		Comet—Star.		Comet's Apparent		No. of Measures	Comp. Star.
		R. A.	N. P. D.	R. A.	N. P. D.		
d.	h. m. s.	m. s.	′ ″	h. m. s. s.	° ′ ″ ″		
May 22	6 56 24	− 1 46·60	+ 1 2·0	4 58 20·90 + 0·0684 π	125 39 54·9 + 0·444 π	8	1
,, 23	7 1 17	− 3 16·04	+ 1 58·4	4 58 52·38 + 0·0680 π	125 13 45·0 + 0·464 π	7	2
,, 23	7 35 26	... ...	+ 1 53·8	... ...	125 13 2·8 + 0·535 π	3	3
,, 23	7 39 19	+ 2 18·38	... ...	4 58 52·60 + 0·0667 π	... ...	2	3
,, 25	7 3 37	+ 4 8·03	− 7 2·3	4 59 48·23 + 0·0671 π	124 13 16·7 + 0·488 π	7	4
,, 27	18 9 44	−10 54·96	+ 7 11·2	5 1 3·46 − 0·0656 π	122 45 53·7 + 0·520 π	1	5
June 1	6 22 4	+ 0 28·45	− 2 45·8	5 3 27·15 + 0·0636 π	119 5 16·5 + 0·478 π	12	6
,, 2	6 42 37	−28 32·00	+ 4 22·6	5 4 2·86 + 0·0627 π	118 0 55·7 + 0·524 π	1	7
,, 4	6 46 24	− 6 30·30	+ 5 3·4	5 5 13·65 + 0·0610 π	115 32 55·9 + 0·548 π	3	8
,, 5	6 25 42	− 2 16·13	+ 1 18·6	5 5 53·74 + 0·0608 π	114 7 40·5 + 0·527 π	5	9
,, 6	6 14 30	+ 6 7·49	+ 0 35·6	5 6 33·29 + 0·0602 π	112 32 31·3 + 0·519 π	5	10
,, 6	6 14 30	+ 1 50·59	... ...	5 6 33·22 + 0·0602 π	... ...	5	11
,, 8	6 12 59	− 0 11·72	+ 4 33·7	5 8 0·91 + 0·0586 π	108 46 24·4 + 0·536 π	5	12
....	18 27 36	+ 2 18·11	+87 26·2	5 11 8·08 − 0·0556 π	99 47 52·1 + 0·519 π	3	13

MEAN Places of the Stars of Comparison for 1881·0, and Apparent Places for the Dates of Observation.

Star.	R. A.		N. P. D.		Authority for Star's Mean Place.
	Mean.	App.	Mean.	App.	
	h. m. s.	s.	° ′ ″	″	
1	5 0 7·62	7·50	125 38 49·1	52·9	Wash. Gen. Cat. 1860+Wash. Obs. 1875+Cape Cat. 1860. / 3
2	5 2 8·52	8·42	125 11 42·9	46·6	Lacaille's Cat. 1750, No. 1722.
3	4 56 34·32	34·22	125 11 5·9	9·0	Lacaille's Cat. 1750, No. 1685.
4	4 55 40·27	40·20	124 20 16·6	19·0	Lacaille's Cat. 1750, No. 1681.
5	5 11 58·40	58·42	122 38 39·0	42·5	Lacaille's Cat. 1750, No. 1785.
6	5 2 58·53	58·70	119 8 1·0	2·3	Wash. Gen. Cat. 1860, No. 2173.
7	5 32 34·62	34·86	117 56 28·9	33·1	Wash. Gen. Cat. 1860, No. 2342
8	5 11 43·63	43·95	115 27 51·0	52·5	Wash. Gen. Cat. 1860, No. 2217.
9	5 8 9·50	9·87	114 6 21·0	21·9	Wash. Mural Circle Zone, 156, 1848, No. 11.
10	5 0 25·36	25·80	112 31 56·0	55·7	Nautical Almanac, 1881.
11	5 4 42·20	42·63	....	...	Annales de l'Obs. Royal de Bruxelles, Cat. 1874, No. 116.
12	5 8 12·07	12·63	108 41 50·4	50·7	Oeltzen Argelander, S., No. 3773.
13	5 8 49·11	49·97	98 20 26·1	25·9	Nautical Almanac, 1881.

The mean places of stars Nos. 2, 3, 4, 5, 9 and 12 have been brought up by the Catalogue precessions to the mean dates between the epochs of the respective catalogues and 1881. The precessions have then been recalculated from Peter's elements, and employed in bringing up the places from the epochs of the catalogues to 1881·0. Proper motion from the B.A. Catalogue has been applied to the places of Nos. 1 and 7.

Windsor, Aug. 27, 1881.