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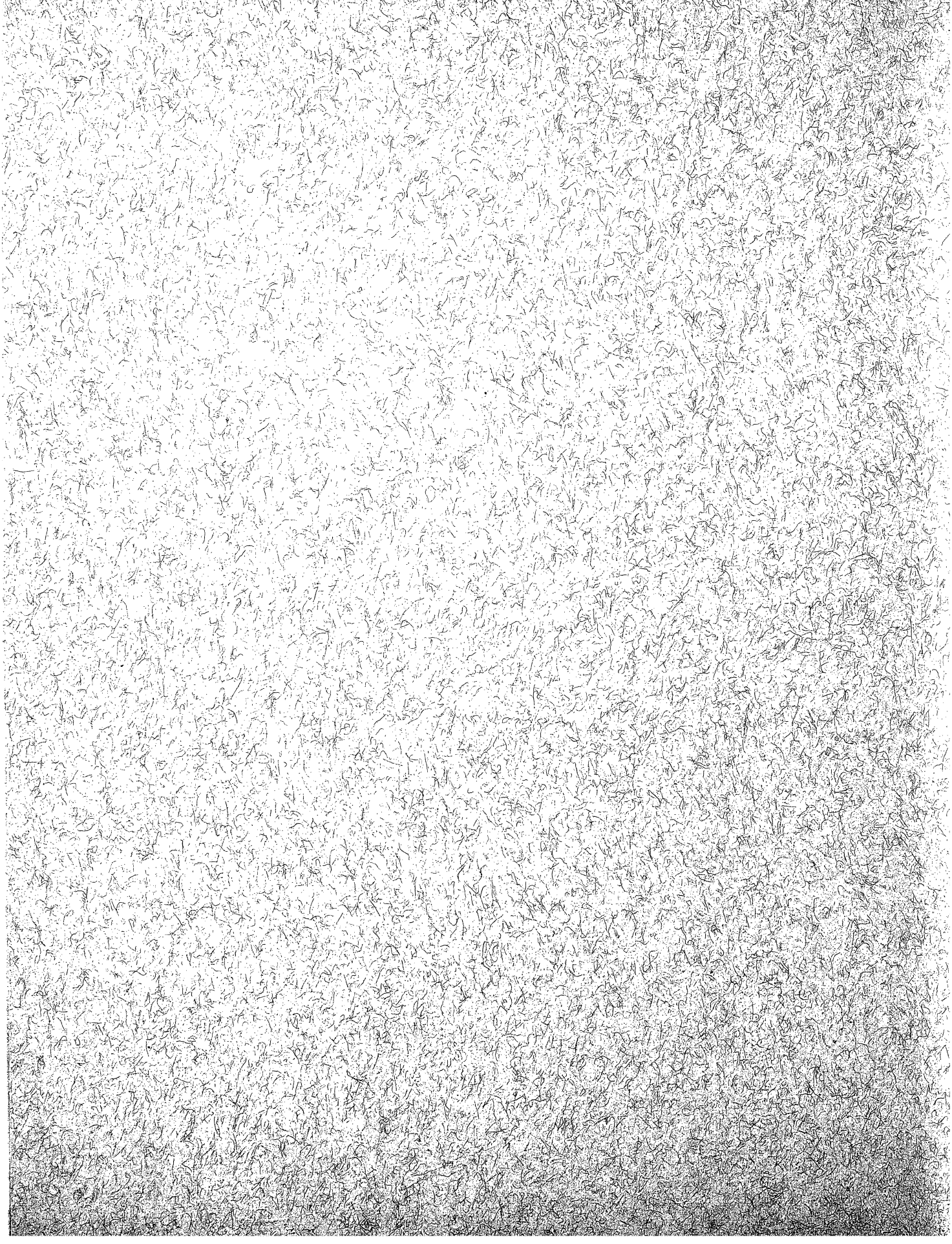

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GEORGE VAN BIESBROECK

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THE DEFINITIVE ORBIT OF COMET MOREHOUSE 1908 III

The bright Comet Morehouse, which has been so extensively studied from the point of view of its physical development, has not had its orbit computed in a definitive manner. It was discovered at the Yerkes Observatory on September 2, 1908 on a plate exposed by Morehouse the previous night. This was a six hour exposure with the Bruce telescope running from September 1, 15^h35^m to 21^h40^m Greenwich Astronomical Time. Both the 10-inch and 6-inch lenses were used simultaneously as part of Barnard's program of Milky Way studies. The nucleus of the comet made a long trail and the tail was spread out in a wide band. The exposure being centered at 2^h20^m and 60° the comet was so far from the center that only the 6-inch plate showed the object completely, while on the 10-inch plate the nucleus was out of the field and only the blurred image of the tail appeared.

The period of accurate observations started September 3 and the comet was followed by many observers. The brightness was such that measures could be made even in moonlight, so that the record is continuous until well into December when the object was lost in the evening twilight. It was picked up in the southern hemisphere in January, 1909, and followed until May 10, the last observation being by Ristenpart and Jungk at Santiago, Chile. The true anomaly varied from -94° to +101° during this interval of 249 days.

Several orbits were computed from short arcs showing that the parabolic solution gave a good approximation. The best system of elements published is the parabola by Kobold in A. N., 179, 273, obtained by variation of geocentric distances utilizing two normal places for September 3 and November 24 and several intermediate positions.

T = 1908 Dec. 25.82297 M.T. Berlin	ω = 171°.63081	
q = 0.9447494	Ω = 103.16406	1908.0
	i = 140.18128	

That this was not a final solution was already evident from the systematic run in the residuals both in longitude and in latitude given by Kobold. Towards the end of the measures

the corrections of the ephemeris based on the above elements ran as follows:

1909	April	22	$+1^m\ 3^s$	-34!6
	April	27	+0 41	-30.9
	May	10	+0 16	-22.6

Starting from Kobold's approximation (Elements I) I improved the orbit by variation of the geocentric distances so as to represent the three positions:

			(1908.0)		
1908	Sept. 3.4558 M.T.B.	$3^h19^m34^s.9$	+67°15'51"	Rome-Padua
1908	Dec. 15.2476	18 50 6.3	-14 56 19	Uccle
1909	May 10.6214	9 10 18.5	-38 15 29	Santiago

This gave the Elements II referred to the plane of the equator 1908.0:

T = 1908 Dec. 25.79413 M.T.B.	ω = 202!11009
q = 0.9452815	Ω = 125.17500
e = 1.0007038	i = 130.28365

Table 1 gives the comparison of the individual observations with this orbit from which a daily ephemeris was deduced. The residuals are surprisingly erratic for such a bright comet. The difficulty evidently comes from the uncertainty of the location of the nucleus in the very bright large coma. Observers record at various times that the nucleus is located eccentrically in the head. This will account for some of the systematic deviations, especially for the smaller instruments.

Table 2 gives the list of observers witn the references to the publications and also the a-priori weights assigned to each. These weights resulted from the inspection of a graph representing the O - C in both coordinates: The amount of scattering of the results for each observer give an indication as to the internal reliability of the measures. Maximum weight one was attributed to the best series. The number of measures made by each observer is also listed in Table 2, which gives further the number of observations that were discarded owing to inadmissibly large deviations which could not be accounted for. Not included in this list are the measures by Gori (9, 8) in Palermo, Kritzinger (1, 1) in Berlin, Milowanov (1, 1) in Kasan and Morehouse (11, 11) in Des Moines, which either through inferior instrumental equipment or other causes gave such erratic large residuals that their inclusion could only have damaged the better data. Thus of the total of 1399 observations in α and 1391 in δ, respectively, 98 and 94 were omitted for various reasons so that the solution is finally based on 1301 measures in α and 1297 in δ.

On the whole the representation by Elements 2 shows that this orbit should be amply accurate enough for the computation of the planetary perturbations. These were established in rectangular coordinates and included all the planets, none of which came close to the comet at any time. As usual the influence of Jupiter was by far the dominant one.

TABLE 1

Comparison (O - C) with Elements 1

Dates	O - C α	O - C δ	Weights	Obs.	Dates	O - C α	O - C δ	Weights	Obs.
1908					1908				
Sept. 2.78	0s.00	- 6".5	0.5	17	Sept. 12.31	- 1s.16	- 2".2	1.0	44
3.45	- 0.60	+ 4.5	1.0	44	12.33	- 0.71	+ 0.9	1.0	77
3.46	- 1.53	+ 1.5	0.5	2	12.35	- 2.02	- 4.0	0.4	7
3.47	- 0.50	+ 0.6	0.6	22	12.41	- 1.09	+ 1.0	0.8	14
3.49	- 0.51	- 0.3	1.0	77	12.44	- 0.41	- 2.7	0.8	14
3.74	- 1.21	- 3.0	0.5	17	12.60	+ 1.84	+ 1.9	0.0-0.8	19
4.42	- 0.74	+ 2.4	1.0	44	13.35	- 1.82	+ 6.2	0.6	61
4.44	- 0.24	+ 0.7	1.0	77	13.35	- 2.90	- 2.2	0.0-0.6	15
4.45	+ 0.78	- 0.8	0.8	50	13.42	- 0.37	- 0.6	0.8	14
4.46	+ 2.03	- 4.6	0.2	22	14.33	- 2.78	+ 1.4	0.0-0.6	15
4.48	----	+ 7.4	0.8	32	14.33	- 0.01	- 2.5	0.6	1
4.48	- 2.43	+ 6.9	0.4	15	14.35	- 2.46	+ 3.2	0.0-0.8	69
4.50	- 0.01	- 2.9	0.8	50	14.40	- 0.90	+ 3.0	1.0	77
4.50	- 0.01	---	0.8	32	14.41	- 0.99	+ 2.5	0.8	10
4.52	+ 0.10	+ 6.7	0.6	1	14.41	- 1.54	+ 3.2	0.6	1
4.64	+ 0.33	+ 2.0	0.5	2	14.41	- 0.28	+ 0.8	0.6	1
4.64	- 1.28	+ 4.0	0.8	67	14.42	+ 1.30	- 1.9	0.8	38
4.64	- 0.16	- 0.8	1.0	27	14.42	- 1.81	+14.3	0.5	45
4.66	- 0.35	- 0.8	1.0	27	14.43	- 0.05	+ 0.8	1.0	27
4.69	- 1.47	+15.1	0.2	17	14.45	- 0.34	+ 1.5	0.6	68
4.69	+ 0.41	+ 0.6	1.0	36	14.45	- 0.06	---	0.8	52
4.80	- 0.73	+11.7	0.8	4	14.45	----	+ 4.3	0.8	52
5.40	- 1.30	- 3.2	1.0	49	14.49	- 1.48	+ 2.9	0.6	61
5.42	+ 0.89	+ 6.4	0.6	76	15.33	+ 0.07	+ 0.2	0.6	1
5.44	+ 1.32	- 5.0	0.6	76	15.34	- 0.84	+ 6.5	0.6	61
5.45	+ 0.17	+ 1.4	0.6	22	15.35	- 0.62	- 3.6	0.5	7
5.49	+ 0.51	+ 1.3	0.8	50	15.38	- 0.15	+ 2.9	0.5	7
5.51	- 1.43	+ 7.5	0.6	15	15.42	+ 0.76	- 2.5	0.6	40
5.55	+ 0.88	+ 1.8	0.8	10	15.45	- 0.41	- 1.0	1.0	77
5.67	- 0.26	+27.8	1.0-0.0	36	15.48	- 1.25	- 2.3	0.6	42
5.87	- 0.17	- 1.1	0.5	17	15.53	- 1.45	+23.9	0.6-0.0	68
6.44	- 2.67	- 1.6	0.0-0.6	15	15.56	+ 0.05	- 0.9	1.0	49
6.54	- 0.26	- 0.4	1.0	27	15.60	- 0.42	---	1.0-0.0	19
6.55	+ 1.29	---	0.6	61	15.65	- 2.29	+ 7.1	0.2-0.8	4
6.58	----	- 1.0	0.6	61	16.29	- 2.16	---	0.2	26
6.63	+ 1.05	+ 2.9	0.5	2	16.29	----	+10.4	0.2	26
6.63	+ 0.67	+ 7.6	0.5	7	16.35	+ 1.61	- 3.5	0.0-0.4	7
6.65	- 1.04	+ 7.9	0.6	1	16.40	- 1.28	- 0.1	0.5	2
6.65	- 0.71	+ 8.1	0.6	1	16.42	+ 0.92	- 4.8	0.8	57
6.68	- 1.75	+12.9	0.8	25	16.43	- 1.14	+ 3.0	1.0	54
6.72	+ 0.79	+13.9	0.5	4	16.47	- 0.06	+ 2.7	1.0	54
6.78	+ 1.11	- 0.5	0.2	17	16.48	- 0.41	- 0.3	1.0	77
6.81	- 0.17	+ 6.9	1.0	19	17.35	+ 0.53	+ 3.0	0.6	68
7.42	- 0.19	- 3.1	0.6	76	17.36	+ 4.81	+ 0.7	0.0-0.5	63
7.57	- 0.09	+ 2.3	1.0	27	17.37	+ 2.00	+ 2.8	0.0-0.5	7
7.61	- 0.09	- 7.6	0.6	40	17.43	- 0.39	- 3.0	1.0	77
7.63	- 1.09	+ 2.9	0.6	61	17.43	- 0.19	+ 2.9	0.8	10
7.63	- 1.10	+ 6.9	0.5	7	17.43	+ 0.40	+ 0.5	1.0	45
7.65	- 0.56	+ 2.4	0.5	2	17.43	- 1.05	+ 0.2	0.6	22
7.65	- 1.27	+ 1.3	0.6	1	17.43	+ 1.27	+ 2.0	0.8	57
7.66	+ 0.45	+ 9.7	0.8	25	17.46	- 1.32	+13.8	1.0	24
8.41	- 1.09	- 6.7	0.8	50	17.49	- 0.01	+ 0.2	1.0	27
8.45	+ 0.12	+ 4.2	0.6	61	17.55	- 0.68	- 2.0	0.8	32
8.61	- 0.27	- 1.2	1.0	27	17.56	+ 8.16	- 2.4	0.0-0.2	52
8.66	+ 0.16	- 0.9	0.5	2	17.63	- 1.06	- 3.0	0.8	65
8.67	- 0.61	- 1.4	0.6	1	18.33	+ 0.58	+ 7.8	0.6	1
8.67	- 0.71	- 0.6	0.6	1	18.40	- 2.61	+ 4.8	0.0-0.6	22
8.68	- 0.03	- 0.5	1.0	54	18.42	+ 0.48	- 3.8	0.6	57
9.40	- 0.13	+ 3.6	0.6	68	18.42	+ 1.51	+ 1.2	0.4	61
9.54	+ 0.34	---	0.6	59	18.43	- 0.68	- 2.2	1.0	44
9.54	----	- 2.9	0.6	59	18.43	+ 1.11	- 3.6	0.4	32
9.70	- 1.30	+ 3.9	0.8	64	18.43	+ 0.15	- 0.5	0.8	14
10.37	+ 0.98	- 4.4	0.6	68	18.44	- 1.56	- 0.2	0.6	22
11.38	- 1.35	+ 3.2	0.5	7	18.44	- 1.70	+ 3.1	0.8	65
					18.45	- 0.22	+ 2.1	1.0	77

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.	Dates	O - C α	O - C δ	Weights	Obs.
1908	s	"			1908	s	"		
Sept. 18.46	- 2.44	+ 2.0	0.0-0.6	40	Sept. 25.37	- 0.70	- 1.1	0.6	42
18.47	+ 0.11	---	0.8	10	25.38	+ 0.12	- 1.2	0.8	5
18.47	----	+ 8.1	0.8	10	25.40	- 0.53	- 0.2	1.0	27
18.48	- 0.16	- 1.4	1.0	54	25.40	+ 0.61	+ 1.0	0.8	32
18.48	----	- 0.5	0.8	9	25.42	----	+ 3.5	0.8	25
18.48	- 1.11	---	0.8	9	25.42	- 0.07	+ 4.2	0.8	57
18.50	----	- 1.2	0.6	42	25.43	0.00	---	0.8	25
18.51	+ 0.62	---	0.6	42	25.44	- 0.85	+ 1.2	1.0	77
18.52	+ 0.33	+ 1.5	1.0	27	25.55	----	+ 5.8	0.8	9
18.53	- 1.11	---	0.8	52	25.55	- 1.37	---	0.8	9
18.53	----	- 2.3	0.8	52	26.39	- 2.88	+ 2.9	0.0-0.6	68
18.66	+ 0.47	+ 1.2	0.6	1	26.39	- 1.70	+ 2.5	0.6	1
19.33	+ 3.17	+ 2.5	0.0-0.6	15	26.41	- 1.46	+ 1.8	0.6	22
19.35	+ 1.35	+ 2.5	0.6	1	26.44	- 0.91	+ 8.3	0.6	1
19.37	----	+ 3.5	0.6	42	26.46	- 0.22	+ 2.7	1.0	77
19.41	0.00	- 3.5	0.8	10	26.50	- 0.91	---	0.8	9
19.41	+ 1.41	+ 0.6	0.5	41	26.52	----	- 0.7	0.8	9
19.43	- 0.36	- 3.5	0.6	22					
19.43	- 0.39	- 0.8	0.5	2	Sept. 27.35	- 1.20	- 3.2	0.6	68
19.45	----	- 2.7	0.6	52	27.45	- 0.01	+ 1.0	1.0	77
19.46	- 0.11	+ 2.3	0.6	61	27.55	- 1.93	+ 3.2	0.6	68
19.46	- 0.64	- 0.2	1.0	77	27.99	- 1.19	+ 5.8	0.6	23
19.52	- 0.54	+ 1.1	0.8	32	28.32	- 1.25	0.0	0.6	1
19.53	----	- 2.4	0.8	9	28.32	- 1.12	- 2.1	0.6	1
19.53	+ 0.33	---	0.8	9	28.37	- 1.20	+ 2.4	0.6	1
19.56	- 2.29	+ 1.7	0.4	68	28.37	- 0.71	+ 3.5	0.6	1
20.32	- 0.93	+13.1	0.6	15	28.41	+ 1.03	+ 1.0	0.8	57
20.34	- 0.99	- 2.3	0.6	68	28.42	+ 0.28	- 2.8	0.8	5
20.41	- 0.29	- 1.9	1.0	77	28.44	- 0.08	- 3.6	1.0	77
20.41	- 0.61	+ 2.2	0.5	2	28.68	- 1.45	+43.1	0.8-0.0	53
20.43	- 0.02	+ 2.4	0.8	65	29.32	- 1.92	+ 2.2	0.6	1
20.46	- 0.40	- 0.6	1.0	45	29.32	- 1.78	+ 1.8	0.6	1
20.60	- 0.95	+ 0.6	0.6	61	29.34	- 1.49	- 3.2	0.6	68
21.32	- 2.73	- 0.2	0.0-0.6	15	29.35	+ 1.26	+ 4.0	0.6	71
21.32	+ 0.51	+ 1.2	0.6	1	29.36	- 0.76	+ 6.9	0.8	38
21.33	- 0.29	- 9.1	0.6	68	29.36	- 0.46	+ 1.9	0.6	1
21.34	+ 0.36	+ 6.4	0.8	69	29.36	- 0.20	+ 1.0	0.6	1
21.35	+ 0.93	+ 8.2	0.6	42	29.37	- 1.36	---	0.5	3
21.35	+ 0.46	+ 3.8	0.6	1	29.37	---	+ 8.9	0.5	3
21.36	+ 0.37	- 4.1	0.8	49	29.38	- 0.60	+ 4.3	1.0	41
21.36	+ 0.57	- 0.6	0.8	25	29.41	- 0.09	+ 1.9	0.8	32
21.37	- 0.98	+ 0.1	0.5	2	29.46	- 1.18	+ 6.8	0.8	57
21.37	+ 0.29	- 0.1	1.0	27	29.46	- 0.88	+ 1.2	0.8	10
21.38	- 0.37	+ 1.0	0.8	32	29.47	- 0.17	---	0.8	52
21.39	- 1.11	+ 1.2	0.8	5	29.47	----	- 1.2	0.8	52
21.44	- 0.48	+ 0.6	1.0	54	29.51	- 0.20	- 0.4	1.0	77
21.44	- 1.42	+ 1.4	0.6	61	29.51	-13.50	- 2.5	0.0-1.0	27
21.45	- 0.77	- 0.7	1.0	77	29.53	- 0.86	---	0.8	9
21.55	- 0.07	+ 0.4	0.6	68	29.53	----	- 0.2	0.8	9
22.26	- 2.20	+ 4.3	0.4	3	29.53	- 0.31	+ 0.7	1.0	67
22.34	+ 2.26	+ 0.4	0.0-0.6	42	29.63	- 1.30	- 0.4	0.6	68
22.38	- 1.53	+ 3.1	0.8	32	29.75	- 0.59	- 1.9	0.8	6
22.47	- 2.19	+ 4.1	0.0-0.6	61	30.07	- 2.67	+11.3	0.0	23
22.49	- 1.77	+ 6.6	0.4	22	30.31	+ 1.29	+12.2	0.6	1
22.62	+ 0.92	+ 3.3	1.0	19	30.31	+ 1.03	+10.3	0.6	1
23.42	+ 1.27	+ 2.7	0.8	5	30.34	+ 0.79	+ 7.0	0.6	15
23.43	+ 0.06	+ 0.2	0.8	25	30.35	- 0.38	+ 4.6	0.6	71
23.43	+ 0.60	+ 3.4	1.0	41	30.36	+ 0.10	+ 0.7	1.0	67
23.45	- 0.26	+ 2.4	1.0	77	30.39	- 0.31	- 1.3	0.6	68
24.38	- 0.50	- 1.2	0.8	38	30.40	+ 0.76	+ 3.6	0.6	5
24.40	- 0.03	+ 1.4	0.8	25	30.41	+ 0.68	- 1.5	0.5	2
24.40	+ 0.49	- 0.2	0.8	32	30.43	- 0.43	+ 3.1	0.8	25
24.43	- 0.35	+ 0.6	1.0	77	30.45	- 0.58	- 6.0	0.6	42
24.47	- 1.31	- 0.4	0.8	10	30.45	- 0.44	- 0.2	0.8	10
24.51	- 0.18	+ 4.5	0.6	71	30.45	- 0.29	- 3.7	0.8	57
24.51	- 1.83	- 0.4	0.8	47	30.47	+ 0.17	- 1.4	1.0	77
24.75	+ 0.96	- 7.8	0.4	23	30.57	- 0.76	- 2.9	0.6	68
24.79	+ 0.52	- 7.9	0.6	23	30.98	- 0.45	+ 2.4	0.6	23

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.	Dates	O - C α	O - C δ	Weights	Obs.
1908					1908				
Oct. 1.33	- 0.41	+ 2.0	0.6	1	Oct. 3.50	- 1.84	- 5.9	0.8	57
1.33	- 0.47	+ 1.6	0.6	1	3.50	- 1.65	- 3.2	0.8	57
1.34	- 2.12	+ 1.7	0.0-0.6	15	3.50	- 1.58	- 1.4	0.8	57
1.34	+ 0.04	- 1.8	1.0	67	3.50	+ 0.12	+ 1.3	1.0	77
1.35	+ 0.25	+ 0.5	0.8	32	3.50	- 1.17	- 3.8	0.6	68
1.35	+ 0.38	- 4.7	0.6	1	3.59	- 1.23	+ 4.4	1.0	53
1.35	+ 0.55	- 4.1	0.6	1	3.59	- 1.25	+ 3.0	1.0	53
1.38	+ 0.35	+ 0.4	1.0	49	3.60	- 1.52	+ 1.7	0.8	20
1.39	- 1.00	+ 4.2	0.6	68	3.62	+ 0.32	+17.8	0.8-0.2	27
1.41	+ 0.38	- 1.2	0.8	57	4.36	- 1.73	+ 6.3	0.6	68
1.42	+ 0.60	- 0.9	1.0	44	4.40	- 0.83	- 1.4	0.6	31
1.42	+ 0.16	- 1.4	0.8	10	4.48	- 0.83	+ 1.9	1.0	77
1.43	+ 0.64	- 0.9	1.0	77	4.63	- 0.48	0.0	1.0	67
1.45	+ 0.32	+ 1.7	0.6	42	4.67	- 0.58	+13.0	1.0-0.2	21
1.49	- 0.03	---	0.8	52	4.96	- 0.74	+ 5.5	0.6	23
1.49	----	- 3.8	0.8	52	5.30	- 0.53	+ 0.9	0.6	1
1.53	- 0.15	- 0.7	1.0	27	5.32	- 0.41	- 1.6	0.6	1
1.53	- 1.05	0.0	0.6	68	5.33	- 0.99	- 2.1	0.6	22
1.55	+ 1.48	---	0.5	72	5.39	- 0.28	-11.1	1.0-0.4	67
1.61	- 1.08	+ 1.6	1.0	53	5.40	- 0.22	+ 0.5	0.8	25
2.31	- 0.12	+ 0.3	0.6	1	5.41	0.00	+ 0.5	1.0	8
2.31	- 0.06	+ 1.4	0.6	1	5.42	- 0.25	0.0	1.0	44
2.31	- 0.15	- 0.6	0.6	15	5.44	- 0.46	+ 2.0	0.6	58
2.33	- 0.68	+ 1.8	0.6	1	5.46	- 0.50	+ 2.2	1.0	77
2.33	- 0.22	+ 2.6	0.6	1	5.49	- 0.97	+ 4.7	0.8	57
2.35	- 0.73	+ 0.9	1.0	67	5.50	- 0.04	- 0.3	0.5	72
2.36	- 1.09	+ 0.7	0.5	7	5.51	- 0.45	+ 0.1	0.8	10
2.36	- 0.59	+ 1.1	0.8	25	5.53	- 0.37	- 0.5	0.5	2
2.38	- 0.39	+ 0.7	0.8	32	5.53	- 0.54	+ 2.5	0.6	68
2.38	- 0.94	- 1.5	0.6	68	5.61	- 0.40	- 5.6	1.0	53
2.39	+ 1.27	-10.1	0.5	21	5.72	+ 0.35	+ 4.5	0.6	6
2.39	+ 0.28	+ 4.9	0.6	5	5.74	+ 0.16	- 1.2	1.0	27
2.41	- 1.49	- 0.6	0.5	2	6.30	+ 0.03	+ 1.8	0.6	1
2.42	- 0.32	---	0.8	10	6.31	+ 0.51	- 0.6	1.0	67
2.43	- 1.21	+40.5	0.6-0.0	42	6.32	+ 0.76	+ 2.7	0.6	1
2.43	----	+ 1.1	0.8	10	6.42	+ 0.03	- 1.2	1.0	27
2.45	- 0.27	- 1.6	1.0	27	6.43	- 0.52	+ 2.2	0.8	10
2.48	- 1.35	+ 3.3	0.6	58	6.48	- 0.79	- 7.6	0.6	58
2.48	+ 0.05	+ 4.9	1.0	77	6.51	- 0.77	- 1.7	0.8	57
2.50	----	+ 2.4	0.8	9	6.53	- 0.84	- 0.8	0.6	68
2.52	- 1.73	+ 5.8	0.6	58	6.73	- 0.56	+ 7.9	0.8	6
2.53	- 0.37	---	0.6	71	7.30	- 0.23	+ 5.5	0.6	1
2.54	+ 0.22	- 1.2	0.6	31	7.30	- 0.70	+ 5.0	0.6	1
2.55	- 1.10	---	0.8	52	7.32	- 0.84	- 0.9	1.0	41
2.55	----	- 2.0	0.8	52	7.33	+ 0.23	+ 4.1	0.6	1
2.55	----	- 2.7	0.6	71	7.33	+ 0.06	+ 4.2	0.6	1
2.68	- 0.83	+ 6.0	0.8	20	7.36	- 0.63	+ 1.3	1.0	67
2.70	- 0.59	+ 2.5	0.8	6	7.37	- 0.51	- 2.1	0.6	42
3.31	- 1.36	+ 9.0	0.5	15	7.40	+ 0.57	+ 2.8	1.0	44
3.33	- 0.80	+ 3.3	0.6	1	7.43	- 0.27	- 2.6	0.8	8
3.33	- 0.63	+ 0.8	0.6	1	7.43	- 0.67	+ 6.0	1.0	51
3.34	- 0.38	+ 1.3	1.0	67	7.46	- 0.13	---	0.8	52
3.35	-18.19	+ 0.4	0.0-0.6	71	7.46	----	- 0.3	0.8	52
3.35	- 1.14	+ 1.7	0.6	1	7.46	- 1.13	- 8.2	0.4	58
3.35	- 1.14	+ 3.5	0.6	1	7.48	- 0.33	+ 8.0	0.8	57
3.36	- 0.01	+13.3	0.5	7	7.50	+ 0.18	---	0.8	9
3.36	+ 1.24	-13.1	0.5	72	7.50	----	- 6.0	0.8	9
3.41	- 0.91	- 0.8	0.5	2	7.68	- 0.65	+ 2.5	0.5	2
3.43	- 0.05	+ 2.7	1.0	54	8.35	- 0.62	+ 2.8	1.0	67
3.44	- 2.50	- 1.4	0.0-0.6	58	8.36	- 0.98	+ 6.0	0.8	25
3.44	- 2.55	- 1.6	0.0-0.6	58	8.41	----	- 0.4	0.8	9
3.44	- 2.56	+ 0.3	0.0-0.6	58	8.41	- 1.32	---	0.8	9
3.45	- 1.00	---	0.8	52	8.43	- 0.63	+ 1.7	0.6	58
3.45	----	- 6.6	0.8	52	8.45	----	- 2.6	0.8	52
3.47	- 1.51	+ 3.7	0.8	10	8.45	- 0.65	---	0.8	52
3.49	----	- 6.3	0.5	9	8.45	- 0.77	+ 5.0	0.8	57
3.49	- 1.17	---	0.5	9	8.48	- 1.46	+ 8.9	0.8	64

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.
1908				
Oct. 8.53	- 0ˢ.42	- 0″.9	0.6	61
9.31	- 1.18	- 2.1	0.6	22
9.32	- 0.94	+ 0.4	0.6	61
9.34	- 0.76	+ 3.1	1.0	67
9.34	- 1.61	- 2.3	0.6	68
9.41	- 0.25	+ 0.8	0.8	8
9.41	- 1.03	+ 6.1	1.0	54
9.43	- 1.09	---	0.8	52
9.43	----	- 4.6	0.8	52
9.44	- 0.47	+ 0.9	0.6	58
9.48	- 1.02	+ 1.9	1.0	47
9.50	- 1.71	+ 4.1	0.6	68
10.32	- 0.65	+ 1.7	0.6	61
10.33	- 1.56	+ 2.2	0.8	32
10.37	+ 0.22	+ 7.1	0.4	75
10.42	- 0.79	+ 4.5	1.0	51
10.45	- 0.52	- 5.2	0.6	76
11.29	+ 0.16	+ 2.9	0.6	61
11.35	- 0.62	- 3.1	0.6	68
11.58	- 0.49	+ 2.8	1.0	67
11.74	- 0.27	- 2.3	0.8	4
Oct. 12.30	- 0.81	- 2.9	0.5	2
12.30	- 0.74	+ 2.3	0.8	10
12.33	- 0.69	- 4.2	1.0	67
12.34	- 0.39	+ 0.7	0.6	61
12.38	- 0.96	+ 0.2	1.0	51
12.40	- 0.62	- 6.4	0.6	76
12.42	- 0.70	+ 0.7	0.6	58
12.44	- 0.59	- 8.9	0.8	57
12.47	- 1.07	+14.7	0.6	58
12.47	- 1.03	- 0.6	1.0	47
12.52	- 0.57	+ 1.5	0.6	68
12.60	- 0.33	+ 4.4	1.0	53
12.64	- 1.01	- 3.3	0.8	20
12.71	- 0.97	- 4.3	0.8	6
13.29	- 0.43	- 1.3	0.6	37
13.30	- 0.73	+ 3.3	1.0	67
13.30	- 1.30	+ 5.8	0.8	10
13.33	- 0.66	+ 3.7	0.8	10
13.34	- 0.40	- 2.8	0.6	61
13.34	- 1.01	+ 0.7	0.6	22
13.38	----	+11.3	0.6	3
13.39	- 0.61	---	0.6	3
13.40	- 0.57	- 9.4	1.0-0.4	51
13.41	- 1.19	+ 1.7	0.8	57
13.43	- 0.16	+ 3.5	1.0	44
13.44	- 2.61	- 9.3	0.0-0.6	58
13.45	- 0.93	- 5.3	1.0	77
13.47	- 1.28	---	1.0	47
13.50	- 1.54	- 0.9	0.8	32
13.63	- 0.43	+ 2.5	0.8	20
13.69	- 0.54	+ 3.5	0.8	6
13.69	- 0.56	+ 5.0	0.8	23
13.76	- 1.62	+10.0	0.8	23
14.02	+ 0.18	-10.4	0.4	46
14.27	+ 0.26	+ 0.3	1.0	41
14.29	- 0.46	- 0.1	0.8	37
14.31	+ 0.06	+ 3.6	1.0	54
14.32	- 0.05	+ 1.9	0.8	10
14.33	- 0.15	+ 1.4	1.0	67
14.35	+ 0.63	+ 5.3	0.5	11
14.36	- 0.30	+ 0.9	0.6	71
14.37	----	+ 8.2	0.4	75
14.37	+ 0.37	---	0.4	75
14.37	- 0.13	+ 1.7	0.8	32
14.38	+ 0.23	+ 0.3	1.0	27
14.38	- 0.18	---	0.6	26
14.38	----	+ 5.4	0.6	26
1908				
Oct. 14.39	- 0ˢ.05	+ 2″.3	0.6	76
14.44	----	+ 4.5	0.8	9
14.44	- 0.03	---	0.8	9
14.46	+ 0.15	- 9.5	0.5	18
14.47	----	- 2.7	0.8	52
14.47	- 0.31	---	0.8	52
14.66	- 0.40	+ 3.9	0.8	6
14.67	- 2.11	+ 4.1	0.2-0.8	20
15.24	+ 0.53	+ 5.6	1.0	41
15.29	+ 0.23	+ 1.1	0.8	37
15.31	+ 0.27	+ 0.8	0.6	1
15.31	+ 0.25	+ 1.5	0.6	1
15.33	- 0.36	- 0.7	1.0	47
15.33	- 1.92	+ 3.1	0.4	75
15.33	- 0.25	+ 3.8	0.8	10
15.33	- 0.14	- 2.1	1.0	41
15.34	- 0.25	- 1.0	0.6	1
15.34	- 0.11	+ 0.2	0.6	1
15.35	- 0.07	+ 1.3	1.0	27
15.36	- 0.42	- 0.2	0.6	22
15.39	- 0.25	+ 1.8	0.6	76
15.39	----	+ 1.5	0.6	61
15.39	- 0.23	---	0.6	61
15.40	- 0.25	- 7.9	0.6	71
15.41	- 0.50	---	0.8	52
15.41	----	+ 1.4	0.8	52
15.44	- 0.30	+ 0.6	1.0	67
15.44	----	+ 3.8	0.8	9
15.44	+ 0.15	---	0.8	9
15.54	+ 0.64	+ 4.9	0.5	11
15.62	+ 0.04	- 2.6	1.0	19
15.73	- 0.46	+ 4.2	0.8	6
15.99	+ 0.40	- 2.5	0.4	46
16.02	- 1.96	- 1.9	0.4	46
16.27	+ 0.37	+ 5.7	0.6	1
16.28	- 0.36	+ 0.7	0.8	37
16.31	+ 0.63	+ 1.7	0.6	1
16.31	+ 0.02	+11.4	0.5	11
16.31	- 0.43	- 1.2	0.6	22
16.31	- 0.57	+ 2.0	1.0	54
16.36	- 0.59	+ 1.9	0.6	68
16.37	- 0.39	+ 1.4	1.0	67
16.37	+ 0.15	- 0.6	0.8	10
16.39	- 0.49	+ 0.6	0.6	61
16.45	+ 0.07	+ 4.7	1.0	21
16.46	- 0.49	+ 5.0	0.6	58
16.47	+ 0.26	+ 4.2	0.5	11
16.49	- 0.31	+ 3.0	0.8	57
16.68	- 0.66	+ 7.8	0.8	6
16.69	- 0.46	+ 3.6	0.8	20
16.75	- 0.05	- 0.2	1.0	19
17.26	- 0.91	+ 2.9	0.8	3
17.28	- 0.13	+ 1.7	0.8	37
17.28	+ 0.19	+ 0.9	0.6	1
17.28	+ 0.07	+ 0.4	0.6	1
17.29	- 0.78	+ 1.4	0.6	22
17.30	- 0.08	+ 3.6	0.6	61
17.31	- 0.72	+ 0.1	0.6	15
17.32	+ 0.60	- 0.3	0.5	11
17.33	+ 0.36	- 1.1	0.6	1
17.33	+ 0.28	+ 0.2	0.6	1
17.33	- 0.78	+ 4.6	1.0	54
17.37	- 0.28	+ 1.2	1.0	51
17.39	- 0.39	+ 2.0	0.6	71
17.42	+ 0.36	-53.5	0.6-0.0	58
17.45	+ 0.02	- 2.9	0.8	57
17.45	- 1.78	+12.8	0.6	16
17.53	- 1.00	---	0.8	52
17.54	----	- 0.4	0.8	52

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.
1908				
Oct. 17.59	- 0.48	+ 2.2	0.8	20
17.67	- 0.80	+ 5.8	0.8	6
18.29	+ 0.02	+ 2.4	0.8	5
18.30	- 0.71	+ 7.3	0.6	15
18.32	- 0.36	+ 1.4	0.8	10
18.33	- 0.31	+ 1.8	0.8	32
18.39	----	- 0.7	1.0	55
18.39	- ----	- 0.6	1.0	55
18.40	- 0.20	---	1.0	55
18.40	- 0.07	---	1.0	55
18.41	- 0.04	+ 5.1	1.0	41
18.44	- 0.23	-14.4	0.6	16
18.62	- 0.20	+ 0.3	1.0	19
19.26	- 0.04	+ 0.9	1.0	55
19.27	+ 0.25	+ 3.2	1.0	41
19.27	- 0.37	- 0.9	0.6	1
19.27	+ 0.10	+ 0.3	0.6	1
19.29	- 0.20	- 3.4	0.6	1
19.29	+ 0.09	- 1.0	0.6	1
19.30	- 0.56	+ 4.0	0.8	32
19.30	- 1.01	+ 5.2	1.0	67
19.38	- 0.39	+ 1.8	0.8	10
19.39	- 0.37	- 3.2	0.6	40
19.40	- 0.67	- 0.4	0.6	68
19.41	----	- 2.4	0.6	40
19.42	- 0.04	+ 1.1	0.6	76
19.44	- 0.71	+ 4.8	0.5	11
19.44	- 0.50	+ 4.6	1.0	77
19.48	- 0.43	+ 2.6	0.6	61
19.54	- 0.78	- 1.5	0.6	68
19.64	- 0.71	-10.7	0.8	20
19.72	- 0.46	+ 5.6	0.8	6
20.14	- 0.05	+ 2.7	0.4	46
20.22	- 0.83	---	0.8	3
20.23	----	+ 5.3	0.8	3
20.30	- 0.72	+ 3.4	0.8	32
20.31	- 0.82	+ 1.8	1.0	67
20.34	- 0.85	+ 0.9	0.6	28
20.36	- 0.38	+ 6.9	0.6	28
20.37	- 0.68	+ 6.0	1.0	54
20.38	- 0.24	+ 1.7	0.8	10
20.38	- 0.23	+ 1.0	0.6	28
20.40	- 0.55	+ 0.1	0.6	28
20.40	- 0.54	+ 5.5	0.6	76
20.42	- 1.32	+ 6.6	0.5	72
20.45	- 0.75	+ 0.7	0.6	59
20.48	- 0.27	- 0.3	0.6	61
20.48	- 0.80	+ 2.1	0.6	68
20.50	- 0.48	+ 2.4	0.6	40
20.60	- 0.17	+ 1.5	1.0	19
20.66	- 0.47	+ 1.2	0.8	20
20.69	- 0.93	+ 0.9	0.8	6
21.29	- 1.07	---	0.6	15
21.29	- 0.95	- 4.1	0.6	15
21.32	- 0.82	- 0.7	1.0	67
21.38	- 0.11	+ 4.9	0.6	76
21.39	+ 0.14	+20.8	0.8-0.0	21
21.40	+ 0.20	+16.0	0.6-0.0	54
21.41	+ 0.60	- 5.4	0.8	21
21.42	- 0.57	+27.1	0.5-0.0	72
21.43	- 0.43	+ 4.1	0.6	68
21.47	+ 0.18	+ 3.5	1.0	27
21.51	- 0.65	+ 2.3	0.6	61
21.56	+ 0.16	- 8.5	0.6	56
21.72	- 0.13	+ 4.8	0.8	6
22.11	- 0.96	+ 0.7	0.4	46
22.13	- 2.09	+15.1	0.4	46
1908				
Oct. 22.26	0.00	+ 0.2	1.0	41
22.27	- 0.92	- 0.3	0.6	15
22.28	- 0.01	+ 2.0	1.0	55
22.37	- 0.35	+ 1.4	0.8	33
22.38	- 0.89	- 2.3	0.6	68
22.38	- 0.36	+ 4.2	0.6	76
22.40	- 0.67	+ 3.1	0.8	10
22.40	- 1.08	---	1.0	67
22.40	----	+ 4.8	1.0	67
22.42	- 0.03	- 0.9	0.5	11
22.43	- 0.43	+ 1.0	0.6	61
22.44	----	- 1.1	0.8	52
22.44	- 0.59	---	0.8	52
22.48	- 0.84	---	0.8	9
22.48	----	+ 3.9	0.8	9
22.69	+ 0.17	- 8.0	0.4	6
23.25	- 0.17	+ 0.3	1.0	55
23.26	+ 0.01	+ 3.1	1.0	41
23.30	+ 0.35	+ 2.0	1.0	41
23.31	- 0.73	- 1.2	1.0	67
23.32	+ 0.22	- 3.3	1.0	41
23.35	- 1.37	-12.1	0.4	16
23.36	- 0.03	+ 1.5	1.0	27
23.37	- 1.30	- 1.1	0.6	3
23.39	- 0.12	- 3.7	0.6	76
23.39	- 0.54	+ 1.1	0.8	10
23.39	- 0.31	+ 5.7	0.6	61
23.40	- 1.09	- 0.4	0.6	71
23.43	- 0.50	+21.3	0.5-0.0	72
23.43	- 0.90	---	0.8	9
23.43	----	- 3.3	0.8	9
23.43	- 1.01	+ 1.2	0.6	22
23.44	- 0.44	- 3.2	0.6	68
23.48	----	- 0.5	0.8	52
23.48	- 1.26	---	0.8	52
23.57	----	- 3.5	1.0	56
24.21	- 0.73	+ 7.1	0.8	3
24.28	+ 0.30	- 0.2	1.0	41
24.29	- 0.82	- 0.3	0.8	32
24.32	- 0.68	+ 8.1	0.6	61
24.33	- 0.96	---	1.0	43
24.34	----	+ 7.3	1.0	43
24.34	- 0.20	+ 1.1	1.0	27
24.36	- 0.64	---	1.0-0.0	67
24.37	- 0.46	+ 1.8	1.0	51
24.38	- 0.04	+ 1.8	1.0	55
24.38	- 0.47	+ 2.3	0.8	10
24.41	- 0.10	- 2.0	0.6	68
24.44	- 1.79	+ 0.5	0.6	58
24.46	- 0.31	- 7.0	0.8	57
24.52	- 0.68	+18.4	0.5-0.0	72
24.57	----	+11.1	0.6	56
25.01	- 1.50	+ 0.8	0.4	46
25.02	- 1.69	-11.2	0.4	46
25.21	- 0.67	- 2.1	0.8	3
25.24	- 0.56	+ 2.3	1.0	55
25.25	+ 0.45	+ 1.1	1.0	41
25.27	- 0.54	+ 0.7	0.6	61
25.47	- 0.88	-11.8	1.0-0.4	77
25.48	- 0.43	---	0.6-0.0	59
Oct. 26.07	- 0.85	+ 8.6	0.4	46
26.08	- 1.18	+ 0.4	0.4	46
26.21	- 0.40	+ 3.3	0.8	3
26.27	- 0.23	+ 0.1	1.0	41
26.27	- 0.15	-29.8	1.0-0.0	55
26.29	- 1.79	---	0.4	43

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.	Dates	O - C α	O - C δ	Weights	Obs.
1908					1908				
Oct. 26.31	- 0^s.28	- 2$''$.7	0.5	11	Oct. 29.31	- 0^s.44	- 4$''$.2	0.6	58
26.31	- 0.43	+ 2.0	0.6	61	29.32	- 0.10	- 4.9	0.6	1
26.31	----	+13.5	0.4	43	29.32	+ 0.01	- 3.5	0.6	1
26.32	- 0.55	+ 3.1	0.8	32	29.33	- 0.25	- 2.6	0.6	1
26.37	- 0.73	- 0.4	0.6	18	29.33	- 0.28	- 3.1	0.6	1
26.38	- 0.44	- 6.5	0.6	59	29.34	- 0.43	- 2.9	1.0	67
26.39	- 0.12	+ 0.8	0.8	76	29.34	- 0.60	+ 1.6	0.6	68
26.40	- 0.10	+ 2.5	1.0	27	29.34	- 0.93	- 0.3	0.6	70
26.47	- 0.16	+ 6.3	0.8	57	29.35	- 0.43	+ 1.5	0.4	75
26.47	- 0.31	- 0.3	0.8	10	29.35	- 0.33	+ 8.9	0.5	72
26.50	- 0.48	-12.1	0.6	58	29.35	+ 0.41	+ 5.6	1.0	21
26.57	----	+ 3.0	1.0	56	29.36	- 0.02	+ 2.0	0.6	71
27.27	- 0.68	+ 3.1	0.8	32	29.36	- 1.65	- 1.2	0.4	75
27.27	+ 0.21	- 1.8	0.6	1	29.37	- 0.33	+ 5.0	0.8	5
27.29	- 0.91	+ 6.2	0.6	18	29.39	- 0.35	+ 1.7	0.8	10
27.30	- 0.49	- 2.0	0.6	71	29.40	- 1.00	+ 2.2	0.6	22
27.30	+ 0.17	- 3.9	0.6	1	29.41	- 0.27	- 3.7	0.5	11
27.30	- 0.56	+ 2.7	1.0	67	29.57	- 0.93	---	1.0	56
27.33	- 1.02	- 5.0	0.5	11	29.58	----	+ 7.6	1.0	56
27.35	- 1.09	- 6.0	0.6	15	30.22	- 0.16	+ 0.2	0.8	3
27.38	- 1.66	+18.0	0.4	76	30.26	- 0.82	+ 1.3	0.6	15
27.38	- 0.20	+ 2.3	0.8	10	30.28	+ 0.08	+ 0.8	0.6	1
27.38	- 0.57	---	0.6	61	30.28	+ 0.02	+ 2.0	0.6	1
27.39	----	- 0.3	0.6	61	30.28	- 0.26	+ 4.9	1.0	44
27.39	- 0.69	---	0.5	72	30.29	- 0.54	+ 1.8	1.0	67
27.40	- 0.04	+ 3.9	1.0	27	30.29	- 0.06	+ 0.6	1.0	27
27.41	- 0.26	- 1.6	0.8	14	30.30	- 0.68	---	0.8	52
27.41	- 0.96	+ 0.7	0.6	22	30.30	----	+ 2.9	0.8	52
27.42	- 0.53	- 3.1	0.6	58	30.30	- 0.48	+ 2.9	0.8	64
27.44	- 0.32	- 1.5	0.8	57	30.31	- 0.48	+ 1.5	0.6	28
27.45	- 0.33	+ 1.8	0.6	68	30.31	- 0.11	- 7.5	0.6	1
27.47	- 0.08	+ 4.6	1.0	77	30.31	- 0.25	- 5.3	0.6	1
27.59	+ 0.69	+12.5	0.4	56	30.33	- 0.49	- 1.5	0.6	28
27.60	- 1.34	- 1.7	0.8	20	30.35	- 1.06	-19.8	0.4	16
27.64	- 0.82	+ 3.0	0.8	6	30.35	+ 0.06	- 0.5	0.5	11
28.21	- 1.08	---	0.8	3	30.36	- 0.22	+ 1.3	0.6	68
28.26	- 0.72	- 2.3	0.6	1	30.41	- 0.34	- 0.5	0.8	10
28.26	- 0.37	- 3.3	0.6	1	30.41	- 0.22	- 1.8	1.0	77
28.26	- 0.53	- 0.6	0.6	61	30.43	- 0.28	+11.1	0.8	57
28.26	- 1.25	- 2.8	0.6	15	30.44	- 0.89	+ 7.7	0.5	72
28.27	- 0.08	+ 3.5	1.0	44	30.45	- 1.03	+10.0	0.6	58
28.28	- 0.48	-10.0	0.6	1	30.57	----	+ 6.9	1.0	56
28.28	- 0.16	-11.0	0.6	1	30.59	- 0.58	- 1.3	0.8	20
28.30	- 0.69	- 3.2	1.0	67	30.65	- 0.25	+ 2.2	0.8	6
28.31	- 2.49	+ 9.2	0.6	16	30.71	- 0.53	+ 3.5	1.0	35
28.31	- 0.97	+ 3.8	0.6	28	30.72	- 0.39	- 0.8	1.0	35
28.33	- 0.99	+ 6.6	0.6	28	31.24	+ 0.09	+ 1.2	1.0	41
28.36	- 1.36	-24.6	0.4-0.0	75	31.25	- 0.76	- 1.6	0.6	15
28.36	- 0.85	+ 1.4	0.8	32	31.27	- 0.47	- 9.4	0.4	3
28.37	+ 0.05	+ 0.9	1.0	21	31.27	- 0.67	0.0	0.6	15
28.38	- 0.15	+ 0.6	0.8	76	31.27	- 0.15	+ 2.0	0.6	1
28.38	- 0.54	- 2.1	0.8	10	31.27	- 0.19	+ 1.9	0.6	1
28.41	- 0.68	+ 3.7	0.8	57	31.28	- 0.43	+ 4.3	1.0	47
28.42	- 0.81	+ 2.2	0.6	58	31.29	+ 0.29	+ 1.1	0.6	1
28.43	- 0.39	+ 0.7	0.8	14	31.29	+ 0.28	+ 2.6	0.6	1
28.44	- 0.88	- 5.7	0.5	11	31.32	- 0.69	+ 1.5	0.6	28
28.44	- 1.33	---	0.8	52	31.33	- 1.00	- 5.7	0.6	12
28.45	----	- 1.0	0.8	52	31.34	- 0.33	+ 1.0	0.6	28
28.46	- 0.37	- 1.4	0.6	71	31.36	- 0.50	- 0.6	1.0	67
28.50	- 0.91	+ 2.1	0.5	72	31.37	- 1.54	+14.4	0.4	16
28.55	- 1.63	---	0.6	56	31.38	- 0.42	+ 2.2	0.6	68
29.28	- 0.25	+ 0.4	1.0	44	31.39	+ 0.25	- 4.5	0.5	11
29.28	- 1.10	- 5.9	0.6	15	31.39	- 0.09	+20.0	0.6	10
29.29	+ 0.01	+ 3.4	0.8	57	31.41	- 0.09	+ 3.3	0.5	72
29.29	+ 0.19	+ 0.5	1.0	27	31.42	- 0.55	- 4.8	0.6	40
29.30	----	+ 1.4	0.6	18	31.42	----	+ 2.3	0.8	9
29.30	+ 0.39	----	0.6	18	31.42	- 0.45	---	0.8	9

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.
1908				
Oct. 31.45	- 0.85	+ 4.5	0.6	22
31.54	- 0.27	+ 2.3	0.8	6
31.57	- 0.44	+ 8.0	1.0	56
31.58	- 1.13	---	0.5	62
31.58	----	- 1.1	0.5	62
31.64	+ 0.05	+ 3.2	1.0	53
Nov. 1.07	- 0.36	+ 3.0	0.4	46
1.19	- 1.04	- 1.0	0.6	3
1.26	- 0.56	- 0.4	0.6	61
1.29	----	+ 1.8	0.4	47
1.31	----	+ 1.0	0.4	47
1.32	- 0.72	- 8.3	0.6	28
1.32	- 0.06	- 2.9	0.6	1
1.32	- 0.47	+ 1.0	0.8	10
1.34	- 0.49	+ 0.3	0.6	28
1.34	- 0.03	- 4.6	0.6	1
1.60	- 0.67	- 4.4	0.8	20
2.18	- 0.83	+ 2.2	0.8	3
2.26	- 1.01	- 4.6	0.6	15
2.26	- 0.76	- 3.3	0.6	28
2.28	- 0.28	- 0.3	1.0	44
2.28	- 0.59	- 2.1	0.6	28
2.28	- 0.43	- 2.3	0.8	64
2.29	- 0.26	+ 6.4	1.0	77
2.30	- 0.69	- 0.6	0.6	28
2.31	- 0.59	- 8.7	0.6	28
2.32	- 0.52	- 2.7	0.8	10
2.45	- 0.67	- 0.2	0.8	14
2.58	- 1.28	- 9.7	0.5	56
2.60	- 1.30	---	0.5	62
3.25	- 0.34	- 3.7	0.6	28
3.26	- 0.43	- 0.1	0.6	28
3.28	- 0.47	+ 0.2	0.8	10
3.28	- 0.52	+ 2.3	1.0	67
3.30	- 0.32	+ 3.5	1.0	27
3.30	----	+ 3.4	0.8	9
3.30	- 0.58	---	0.8	9
3.34	- 0.69	+ 3.3	0.5	11
3.41	+ 0.31	+ 4.6	0.8	57
3.43	- 0.54	+ 0.3	0.6	58
3.57	- 1.26	+ 6.6	0.4	56
3.58	- 1.75	---	0.5	62
3.63	- 0.49	+ 0.8	1.0	35
3.64	- 0.30	+ 2.3	1.0	35
4.30	- 1.54	---	0.6	18
4.30	- 0.53	---	0.8	52
4.30	----	- 1.9	0.8	52
4.31	----	-15.2	0.6	18
4.32	- 0.33	---	0.8	9
4.32	----	+ 5.9	0.8	9
4.32	- 0.39	+ 3.3	1.0	67
4.40	- 0.30	+ 3.4	0.8	14
4.40	- 0.15	+ 4.8	0.8	76
4.56	- 1.13	- 2.1	0.6	56
4.58	- 1.29	+10.2	0.5	62
4.64	- 0.23	+ 0.9	1.0	35
4.65	- 0.32	+ 2.4	1.0	35
5.23	- 0.35	+ 3.8	1.0	47
5.26	- 0.12	- 9.3	0.6	1
5.26	- 0.41	- 7.5	0.6	1
5.26	----	+ 2.4	0.6	18
5.26	- 0.51	- 0.4	0.6	15
5.26	- 1.46	---	0.6	18
5.27	+ 0.10	+ 6.3	0.6	28
5.27	- 0.12	- 8.1	0.8	69
5.27	- 0.33	- 4.2	0.8	69
5.27	- 0.16	+ 0.6	1.0	67

Dates	O - C α	O - C δ	Weights	Obs.
1908				
Nov. 5.28	+ 0.09	+ 3.5	0.6	28
5.28	- 0.56	- 1.4	0.6	22
5.29	- 0.41	- 2.3	0.8	69
5.29	- 0.63	- 1.3	0.8	69
5.29	+ 0.01	+ 8.9	0.6	28
5.29	- 0.02	+ 1.3	0.8	76
5.29	----	+ 2.2	0.8	9
5.29	- 0.09	---	0.8	9
5.30	+ 0.27	- 5.3	0.6	1
5.30	- 0.09	- 3.9	0.6	1
5.31	- 0.41	- 0.3	0.6	15
5.32	----	- 1.1	0.8	52
5.32	- 0.42	---	0.8	52
5.32	- 0.35	+11.6	0.6	16
5.35	+ 0.01	+15.0	0.5	11
5.35	- 0.32	- 1.7	0.8	5
5.57	- 0.61	+10.5	0.5	62
5.59	- 0.52	---	1.0	56
5.61	- 0.15	+ 1.1	1.0	30
6.18	- 0.38	+ 1.1	0.8	3
6.23	- 0.71	---	1.0	47
6.25	- 0.20	- 0.3	0.6	1
6.27	- 0.45	- 1.4	0.6	61
6.27	- 0.22	-13.7	0.6-0.0	1
6.27	- 0.56	+ 5.6	0.8	33
6.29	- 0.44	+ 0.2	1.0	67
6.29	- 0.82	- 2.6	0.6	28
6.31	- 0.69	- 0.7	0.6	28
6.33	- 0.28	-19.3	0.5	72
6.36	- 0.30	+ 1.8	0.6	68
6.58	- 1.24	---	0.4	56
6.59	----	- 8.6	0.4	56
6.63	- 0.07	- 3.8	1.0	35
6.63	- 0.27	+ 4.6	1.0	35
Nov. 7.25	- 0.03	+ 2.7	0.8	5
7.26	- 0.11	- 4.8	1.0	77
7.26	----	+ 6.4	0.6	18
7.27	- 0.23	+ 2.8	1.0	67
7.28	- 0.36	- 2.3	0.6	61
7.29	- 0.32	---	0.8	52
7.29	----	- 0.1	0.8	52
7.30	- 0.10	+ 2.9	0.8	76
7.37	- 0.65	+ 9.6	0.5	72
7.57	- 0.98	+ 1.9	1.0	56
7.66	- 0.34	+ 2.4	1.0	35
7.66	- 0.01	+ 3.7	1.0	35
8.25	- 0.08	- 1.2	1.0	59
8.27	----	+10.5	0.6	18
8.28	- 0.42	---	0.6	18
8.33	- 0.13	+ 2.4	1.0	27
8.56	- 0.80	---	1.0	56
8.56	----	+ 0.8	1.0	56
8.58	- 1.33	- 2.6	0.6	62
9.27	- 0.40	+ 2.3	0.6	68
9.27	- 0.10	+ 0.9	1.0	67
9.29	- 0.45	---	0.8	9
9.29	----	+ 9.6	0.8	9
9.29	+ 0.01	+ 0.1	0.8	76
9.29	- 0.28	+ 6.7	1.0	77
9.31	- 0.27	+ 2.2	0.8	64
9.32	- 0.14	+ 1.4	1.0	27
9.33	- 0.73	---	0.8	52
9.33	----	+ 2.0	0.8	52
9.34	- 0.04	+20.3	0.5-0.0	72
9.37	- 0.35	+11.0	0.8	5
9.58	- 0.93	+ 1.3	1.0	56

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.	Dates	O - C α	O - C δ	Weights	Obs.
1908					1908				
Nov. 10.01	- 0ˢ.38	- 6″.7	0.4	46	Nov. 14.26	-ˢ---	- 4″.7	0.6	59
10.23	- 0.58	- 0.5	0.8	3	14.26	- 0.42	- 2.8	0.6	15
10.25	- 0.69	+ 5.4	0.6	68	14.26	- 0.28	+ 0.5	0.6	28
10.27	- 0.36	+ 1.5	0.8	76	14.27	+ 0.22	+ 0.7	0.6	1
10.28	- 0.35	- 4.0	0.6	59	14.27	- 0.04	- 0.7	0.6	1
10.28	- 0.33	+ 1.3	1.0	67	14.28	- 0.17	- 1.6	1.0	44
10.31	----	+ 0.4	0.8	9	14.29	- 0.13	- 1.1	1.0	77
10.31	- 0.37	---	0.8	9	14.31	- 1.16	+11.8	0.4	12
10.32	- 0.14	+ 4.5	1.0	27	14.58	- 0.90	+ 7.5	0.5	62
10.32	- 0.59	+50.9	0.5-0.0	72	14.59	- 1.41	+ 2.7	1.0	56
10.33	+ 0.45	- 5.9	0.5	11	14.61	- 0.22	- 1.9	1.0	35
10.56	- 0.92	---	0.5	62	14.62	- 0.07	+ 1.6	1.0	35
10.57	----	+11.7	0.5	62	14.92	+ 0.09	- 7.5	0.4	46
11.23	- 0.52	+ 5.4	0.8	32	14.93	- 0.10	+ 7.1	0.4	46
11.26	- 0.01	+ 1.7	0.8	10	15.21	- 0.13	+ 5.9	0.8	32
11.27	- 0.29	- 5.3	0.5	11	15.24	+ 0.02	- 7.4	1.0-0.4	49
11.27	+ 0.24	- 0.8	0.8	76	15.25	- 0.28	- 0.3	0.6	68
11.27	- 0.16	+ 2.7	0.8	64	15.25	- 0.21	+ 2.0	0.8	33
11.30	+ 0.86	- 0.3	1.0	21	15.26	- 0.05	+ 0.6	0.6	59
11.32	- 0.43	+ 0.6	0.6	15	15.37	- 0.15	+22.0	0.5-0.0	72
11.34	- 0.56	- 0.9	0.6	15	15.52	- 0.50	+ 6.7	1.0	29
11.58	- 1.43	---	0.5	62	15.57	- 0.68	+ 6.6	1.0	56
12.02	- 0.33	+ 7.0	0.4	46	15.58	- 1.13	+ 4.8	1.0	56
12.25	- 0.56	+ 1.0	0.6	61	15.95	- 0.38	+25.4	0.4-0.0	46
12.26	- 0.74	+27.7	0.6-0.0	15	15.96	- 0.31	- 4.0	0.4	46
12.26	- 0.50	- 2.8	0.6	15	16.24	- 0.44	+ 1.6	0.8	32
12.26	- 0.91	- 0.4	1.0	47	16.25	- 0.42	- 3.5	0.6	59
12.26	- 0.49	- 2.8	1.0	77	16.25	+ 0.31	- 1.1	0.8	76
12.27	- 0.60	+ 3.6	1.0	47	16.25	- 0.53	- 4.1	0.6	15
12.27	+ 0.02	---	0.6	18	16.27	- 0.45	- 0.8	1.0	67
12.27	----	+ 8.9	0.6	18	16.33	- 0.29	-51.2	0.6-0.0	61
12.27	- 0.52	+ 2.0	0.6	1	16.58	- 0.81	---	0.5	62
12.27	- 0.67	+ 1.7	0.6	1	16.58	----	+ 1.2	0.5	62
12.28	- 1.07	- 3.4	0.5	11	16.62	- 0.43	- 1.2	1.0	35
12.28	- 0.53	+ 0.8	0.8	64	16.63	- 0.41	+ 0.6	1.0	35
12.30	- 0.61	- 3.4	0.6	1	16.93	+ 0.06	+ 9.9	0.4	46
12.30	- 0.69	- 3.7	0.6	1	16.95	- 0.12	+ 9.5	0.4	46
12.57	- 0.28	+ 2.7	1.0	30	17.22	- 0.45	+ 4.0	0.8	32
12.93	- 0.48	+ 4.1	0.4	46	17.25	- 0.09	- 4.1	0.6	68
12.95	- 0.52	+19.7	0.4-0.0	46	17.26	- 0.07	- 1.1	0.8	10
13.16	- 0.62	+ 1.5	0.8	3	17.27	- 0.24	+ 3.5	0.8	14
13.21	- 0.12	+ 4.3	0.8	32	17.28	- 0.29	---	0.8	14
13.25	- 0.53	+ 0.2	0.6	28	17.28	----	+ 4.4	0.8	14
13.26	- 0.38	+ 6.5	1.0	77	17.29	+ 0.11	+ 2.9	0.5	11
13.26	- 0.56	- 0.9	0.6	28	17.30	- 0.01	+ 0.3	1.0	27
13.27	- 0.68	+ 1.9	0.6	28	17.52	- 0.09	+ 4.6	0.8	6
13.28	- 0.21	+ 6.2	0.5	11	17.56	- 0.68	- 2.2	1.0	29
13.28	- 0.32	+ 2.0	0.6	22	17.63	- 0.35	- 2.0	1.0	35
13.31	- 0.23	+ 4.9	0.8	5	17.63	- 0.16	- 2.2	1.0	35
13.33	- 0.34	+ 4.7	0.6	1	17.94	- 0.54	- 1.6	0.4	46
13.34	- 0.26	+ 1.7	0.6	1	17.95	+ 0.09	+ 5.1	0.4	46
13.42	- 0.16	+ 3.7	0.8	14	18.02	- 0.47	+ 1.1	0.8	66
13.56	- 1.15	+13.6	0.5	62	18.24	- 0.58	+ 3.4	0.6	18
13.58	- 0.61	+ 9.8	1.0	56	18.27	- 0.25	+ 1.9	0.5	11
13.62	- 0.14	+ 0.5	1.0	35	18.28	- 0.37	- 1.0	0.6	40
13.63	- 0.30	+ 1.4	1.0	35	18.28	- 0.98	+ 3.4	0.6	16
13.92	- 0.45	- 0.7	0.4	46	18.29	- 0.85	+11.5	0.6-0.2	16
14.03	- 0.16	+ 3.7	0.8	66	18.29	- 0.51	- 0.1	0.6	22
14.21	- 0.39	- 2.7	0.8	32	18.29	- 0.88	---	0.6	61
14.23	- 0.52	+ 2.7	1.0	47	18.30	----	+ 0.6	0.6	61
14.24	- 0.29	+ 0.5	0.6	15	18.61	- 0.05	- 0.6	1.0	35
14.24	- 0.36	+ 3.9	0.6	28	18.62	- 0.08	+ 1.0	1.0	35
14.25	+ 0.09	+ 0.7	0.8	76	18.93	- 0.44	- 0.5	0.4	46
14.25	- 0.25	+ 5.0	0.6	59	18.95	- 0.27	+ 5.7	0.4	46
14.25	- 0.20	+ 8.3	0.6	1	19.02	- 0.55	- 1.4	0.8	66
14.25	- 0.31	+ 7.3	0.6	1	19.24	- 0.39	+ 2.5	0.6	61
14.26	- 0.24	+ 2.9	0.6	28	19.25	- 0.23	+ 0.4	0.6	68

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.	Dates	O - C α	O - C δ	Weights	Obs.
1908					1908				
Nov. 19.27	- 0.33	+ 2.4	1.0	67	Nov. 24.29	- 0.88	-10.9	0.8	69
19.31	+ 0.03	+ 2.2	1.0	27	24.29	- 0.24	+ 1.5	0.6	1
19.57	- 0.15	+ 2.3	1.0	35	24.29	- 1.08	- 8.7	0.8	69
19.58	- 0.13	+ 0.1	1.0	35	24.30	- 0.33	- 2.1	0.6	28
19.92	- 0.08	- 5.0	0.4	46	24.31	- 0.41	- 7.0	0.6	28
20.01	- 0.76	- 2.0	0.8	66	24.32	+ 0.05	- 0.2	0.5	11
20.26	- 0.15	+ 5.0	0.8	76	24.58	- 0.18	+ 3.9	1.0	56
20.26	- 0.69	+ 2.5	0.6	22	25.24	0.00	---	0.6	61
20.27	- 0.33	- 0.5	0.5	11	25.24	+ 0.23	+ 4.9	0.6	1
20.29	- 0.24	- 0.6	0.6	61	25.24	- 0.37	+ 0.9	0.6	15
20.57	- 0.21	+ 4.1	1.0	35	25.24	----	+ 3.6	0.6	61
20.57	- 1.17	- 6.4	0.4	56	25.25	+ 0.21	+ 6.2	0.6	1
20.57	- 0.18	+ 4.2	1.0	35	25.25	- 0.19	+13.1	1.0-0.5	67
21.25	- 0.10	+ 4.7	1.0	44	25.26	- 0.03	+ 1.9	0.8	10
21.25	- 0.34	- 1.5	0.6	22	25.26	+ 0.18	+ 5.8	0.6	28
21.25	- 0.26	+ 1.9	0.6	68	25.26	- 0.14	+ 5.3	0.5	11
21.26	- 0.38	+ 5.5	0.6	28	25.27	- 0.32	+ 3.0	0.6	15
21.27	- 0.71	- 2.6	0.5	11	25.28	- 0.19	- 1.8	0.6	28
21.27	- 0.35	+ 2.8	0.6	28	25.29	- 0.26	- 5.5	0.6	28
21.28	- 0.28	+ 4.0	0.6	28	25.29	- 0.04	+ 5.7	1.0	27
21.29	- 0.33	---	0.8	9	25.31	- 0.56	- 3.9	0.6	28
21.29	----	+ 3.5	0.8	9	25.55	- 0.33	+ 7.1	1.0	29
21.30	- 0.16	- 0.4	0.8	64	25.58	- 0.43	---	0.5	62
21.31	+ 0.23	---	0.8	52	26.23	- 0.31	- 0.5	0.6	15
21.32	----	- 0.7	0.8	52	26.24	- 0.08	- 0.4	0.6	15
21.55	- 0.51	+ 7.6	1.0	29	26.24	- 0.22	- 0.2	0.6	1
21.58	- 0.77	+ 6.1	1.0	56	26.25	- 0.52	- 1.6	1.0	77
					26.25	- 0.16	+ 0.3	0.8	10
Nov. 22.01	- 0.36	+ 0.7	0.8	66	26.26	- 0.48	- 0.8	0.6	28
22.17	- 0.46	- 2.2	0.8	3	26.26	- 0.30	+ 0.8	0.6	1
22.24	- 0.20	+ 1.4	0.8	5	26.28	- 0.14	+ 2.7	0.5	11
22.26	- 0.35	---	0.6	28	26.28	+ 0.21	+ 0.2	0.8	5
22.28	- 0.02	- 4.8	0.6	1	26.29	- 0.23	-53.3	0.6-0.0	61
22.28	+ 0.18	- 4.1	0.6	1	26.29	- 0.69	- 3.1	0.6	28
22.28	- 0.36	---	0.6	28	26.57	+ 0.02	+ 8.6	1.0	35
22.29	- 0.43	---	0.6	28	26.57	- 1.37	+ 6.4	0.5	56
22.30	- 0.52	---	0.6	28	26.57	- 0.07	+ 1.3	1.0	35
22.30	- 0.11	- 8.5	0.6	1	26.91	- 0.43	- 8.5	0.4	46
22.30	+ 0.09	- 5.7	0.6	1	27.24	- 0.60	+ 3.4	0.6	61
22.57	- 0.92	---	0.5	62	27.25	- 0.21	+ 0.4	1.0	67
22.58	----	+ 1.9	0.5	62	27.25	- 0.22	- 1.2	0.8	76
22.91	- 0.27	+19.0	0.4	46	27.25	- 0.22	- 6.2	0.6	28
22.92	- 0.24	+15.9	0.4	46	27.26	- 0.20	+ 4.9	1.0	77
23.24	+ 0.53	- 2.2	0.6	1	27.26	- 0.28	- 0.6	0.6	22
23.24	+ 0.41	- 0.9	0.6	1	27.27	- 0.46	-20.5	0.6-0.0	28
23.25	- 0.33	+ 0.6	0.6	68	27.29	+ 0.41	+ 5.4	0.5	11
23.25	- 0.31	+ 1.2	0.8	10	27.29	- 0.41	---	0.8	52
23.26	- 0.53	- 0.8	0.6	15	27.29	----	- 0.2	0.8	52
23.26	- 0.52	+ 0.2	0.6	15	27.30	- 0.44	- 1.7	0.6	28
23.26	- 0.09	+ 4.0	0.6	1	27.32	----	+ 8.3	0.8	9
23.26	- 0.13	+ 3.2	0.6	1	27.32	- 0.27	---	0.8	9
23.28	- 0.35	+ 1.0	1.0	67	27.53	- 0.25	+ 7.1	1.0	29
23.33	- 0.04	- 2.2	0.5	11	27.57	- 0.42	+ 5.8	0.5	62
23.56	- 0.18	+ 1.1	1.0	35	28.23	- 0.01	- 2.6	0.8	5
23.57	+ 0.05	+ 4.5	1.0	35	28.24	- 0.21	+ 1.1	0.6	28
23.57	- 0.92	---	0.5	62	28.24	+ 0.02	+ 3.3	0.6	68
24.13	- 0.34	- 1.0	0.8	3	28.25	+ 0.26	- 1.0	0.6	15
24.24	- 0.17	+ 0.6	0.6	15	28.25	+ 0.14	+ 0.2	0.6	15
24.25	- 0.13	- 0.2	0.8	5	28.25	- 0.43	+ 3.0	0.6	28
24.26	- 0.78	+ 0.6	0.6	22	28.25	- 0.65	- 0.7	0.8	13
24.26	- 0.01	+ 1.7	0.8	10	28.25	- 0.18	+ 4.5	1.0	67
24.26	- 0.25	- 1.8	0.6	15	28.26	- 0.14	+ 1.5	0.8	10
24.26	- 0.22	- 1.1	0.6	15	28.27	- 0.05	+ 3.7	0.6	15
24.27	- 0.38	- 0.7	0.8	76	28.28	+ 0.61	+ 2.1	0.8	64
24.28	+ 0.25	- 5.0	0.6	28	28.29	+ 0.01	+ 0.9	0.8	14
24.29	- 0.40	- 1.0	0.8	64	28.30	- 0.15	+ 1.4	0.8	14
24.29	+ 0.01	- 0.8	0.6	1	28.58	- 0.96	+ 4.6	1.0	56

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.
1908				
Nov. 28.90	+ 0ˢ.04	+ 5″.7	0.4	46
28.91	+ 0.29	+ 3.1	0.4	46
29.13	- 0.25	+ 3.1	0.8	3
29.24	+ 0.16	+ 2.7	0.8	5
29.24	+ 0.04	+ 4.0	0.6	15
29.27	0.00	+ 3.9	0.8	14
29.27	- 0.12	+ 1.7	0.6	28
29.28	+ 0.09	+ 1.8	0.8	10
29.29	- 0.24	+ 6.4	0.6	28
29.90	+ 0.28	+ 5.9	0.4	46
29.98	+ 0.38	+ 0.9	0.8	66
30.25	- 0.32	+ 4.8	1.0	67
30.25	- 0.21	- 1.5	0.6	28
30.25	- 0.75	+ 3.9	0.6	22
30.26	- 0.50	+ 2.9	0.6	28
30.27	- 0.23	+ 0.3	1.0	44
30.28	- 0.32	+ 1.2	0.8	14
30.28	- 0.05	- 1.3	0.8	64
30.28	- 0.70	+ 7.7	1.0	77
30.28	- 0.50	+ 1.7	0.6	28
30.29	- 0.07	+ 2.8	0.8	14
30.57	+ 0.10	+ 4.6	1.0	35
30.58	- 0.30	+ 2.4	1.0	35
30.98	- 0.18	+ 2.2	0.8	66
Dec. 1.23	+ 0.01	+ 2.6	0.8	5
1.25	+ 0.11	+ 2.1	0.8	10
1.25	- 0.31	+ 4.9	0.6	28
1.26	- 0.37	+ 4.1	0.6	28
1.27	- 0.14	+ 2.4	1.0	67
1.27	+ 0.04	- 4.2	0.8	57
1.27	- 0.24	+ 5.9	0.6	28
1.28	- 0.32	- 2.4	0.8	64
1.28	- 0.51	+ 7.7	0.6	58
1.29	- 0.11	+ 4.9	0.6	28
1.51	- 0.47	- 2.7	0.8	6
1.91	- 0.78	+13.0	0.4	46
1.98	- 0.27	+ 1.4	0.8	66
Dec. 2.23	- 0.69	---	0.6	61
2.24	----	+ 4.2	0.6	61
2.25	- 0.10	+ 7.8	1.0	77
2.25	- 0.47	+ 2.5	0.6	22
2.26	- 0.38	+ 1.6	0.6	28
2.28	- 0.47	+ 1.1	0.8	64
2.28	- 0.14	+ 1.5	0.8	14
2.29	- 0.51	- 2.7	0.6	28
2.30	- 0.23	+ 3.9	0.8	14
2.51	- 0.53	+ 7.3	1.0	29
2.90	- 0.36	+38.8	0.4-0.0	46
2.98	- 0.30	+ 2.3	0.8	66
3.24	- 1.09	+13.2	0.4	13
3.27	- 0.33	+ 5.3	0.8	64
3.51	- 0.30	+ 7.9	1.0	29
3.91	- 0.14	+17.0	0.4	46
3.99	- 0.14	+ 1.9	0.8	66
4.23	- 1.24	+11.0	0.4	13
4.24	- 0.16	- 0.2	0.6	28
4.24	0.00	+13.7	1.0	77
4.25	- 0.48	+ 2.4	0.6	22
4.25	- 0.13	+ 0.1	0.6	28
4.27	+ 0.23	- 0.5	0.5	11
4.57	- 0.12	+ 1.7	1.0	35
4.58	- 0.02	+ 6.6	1.0	35
4.90	- 0.38	+23.7	0.6-0.0	46
4.91	- 0.53	+ 8.0	0.6	46
4.96	- 0.32	+ 1.4	0.8	66
5.26	- 0.34	+ 2.5	0.6	11

Dates	O - C α	O - C δ	Weights	Obs.
1908				
Dec. 5.27	- 0ˢ.39	+10″.3	0.8	64
5.91	- 0.13	+30.9	0.4	46
6.24	+ 0.31	- 0.1	0.6	1
6.25	- 0.44	+ 1.5	0.6	28
6.26	+ 0.43	- 2.9	0.6	1
7.24	- 0.13	+ 8.4	1.0	77
7.24	+ 0.11	- 2.5	0.6	1
7.24	0.00	+ 0.2	0.6	1
7.25	- 0.75	+ 2.6	0.6	28
7.26	- 0.04	- 5.6	0.6	1
7.26	+ 0.10	+ 0.4	0.6	1
7.27	- 0.22	+ 4.6	0.8	64
8.23	+ 0.03	+ 2.2	0.8	5
8.25	- 0.71	+ 2.0	0.6	28
8.26	- 0.90	-11.2	0.6-0.0	28
8.26	- 0.01	- 1.4	0.8	76
8.26	- 0.48	- 3.4	0.6	11
8.27	- 0.22	+ 4.3	0.8	14
8.28	- 0.13	+ 3.4	0.8	64
8.91	- 0.39	+ 0.1	0.4	46
9.24	- 0.17	- 3.3	1.0	44
9.24	- 0.22	+ 5.0	0.6	28
9.24	- 0.49	+ 5.7	0.6	61
9.25	- 0.01	+ 4.6	1.0	77
10.23	+ 0.15	+ 6.6	0.8	5
10.57	- 0.17	+ 2.8	1.0	35
10.58	- 0.07	+ 2.0	1.0	35
11.57	+ 0.06	+ 1.5	1.0	35
11.57	- 0.02	+ 3.1	1.0	35
12.25	- 0.19	+ 2.8	0.6	22
12.28	+ 2.07	+ 1.5	0.0-0.8	64
13.23	+ 0.24	+ 1.7	0.8	5
13.25	- 0.06	- 4.5	0.6	28
14.24	0.00	+ 8.5	1.0	77
14.24	- 0.80	- 2.9	0.6	28
15.26	- 0.18	+ 4.0	1.0	67
1909				
Jan. 22.65	+ 0.83	+12.0	0.4	34
22.90	- 0.51	---	0.6	56
22.91	----	+ 5.7	0.6	56
23.91	+ 0.27	+ 8.9	0.6	56
24.63	- 1.08	+10.7	1.0	34
24.64	+ 0.62	+ 2.6	1.0	34
24.64	+ 0.04	+ 2.7	1.0	34
24.64	+ 0.20	+ 7.3	0.8	74
24.65	+ 0.42	+ 8.1	0.8	74
24.65	+ 0.76	+ 3.4	0.8	74
24.89	+ 0.11	+ 4.1	0.6	56
25.91	+ 0.51	+10.4	0.6	56
26.63	+ 0.54	+ 7.2	0.8	74
26.64	+ 0.29	+11.8	0.8	74
26.65	+ 0.27	+ 3.8	0.8	74
26.89	----	+11.1	0.5	62
26.90	- 0.01	---	0.5	62
27.63	- 0.62	+ 3.5	1.0	34
27.64	+ 0.41	+12.5	1.0	34
27.65	+ 0.19	+ 6.9	1.0	34
27.89	- 0.01	---	0.5	62
27.89	----	+10.8	0.5	62
28.63	+ 0.28	+ 3.1	1.0	74
28.64	+ 0.65	+11.0	1.0	74
28.65	+ 0.69	+ 6.2	1.0	74
28.90	- 0.50	+ 7.6	0.5	39
29.88	+ 0.04	+ 7.0	1.0	56
30.64	- 0.37	+12.5	1.0	74
30.64	+ 0.82	+14.9	1.0	74

TABLE 1 (Continued)

Dates	O - C α	O - C δ	Weights	Obs.
1909				
Jan. 30.65	+ 0.88	+14.1	1.0	74
30.88	- 0.19	+12.9	1.0	56
31.62	+ 0.28	+17.9	0.4	34
31.63	+ 0.01	+12.3	1.0	34
31.63	- 0.09	+ 4.8	1.0	34
31.87	- 0.04	+11.1	1.0	56
Feb. 1.88	- 0.31	+21.8	0.5	39
1.91	- 0.63	----	0.6	48
2.88	+ 0.18	+11.8	1.0	56
3.64	+ 0.93	+ 7.7	1.0	74
3.65	+ 0.13	+ 6.0	1.0	74
3.65	+ 0.76	+ 9.8	1.0	74
3.88	+ 0.73	+ 5.0	1.0	56
4.86	+ 0.13	----	1.0	56
4.87	----	+ 4.3	1.0	56
5.88	- 0.25	+10.6	0.5	39
5.91	- 1.46	+ 4.5	0.6	48
Feb. 8.86	+ 0.60	----	1.0	56
8.87	----	+ 4.4	1.0	56
9.90	- 1.41	+ 0.3	0.5	62
10.82	+ 0.46	----	1.0	56
10.83	----	+ 6.2	1.0	56
12.84	+ 0.67	+10.4	1.0	56
12.86	- 1.31	+ 7.2	0.6	48
13.82	+ 0.63	+ 6.4	1.0	56
15.59	+ 1.14	+16.4	1.0	74
15.60	+ 1.25	+ 8.2	1.0	74
15.61	+ 0.90	+ 4.8	1.0	74
15.82	- 0.44	+ 8.3	0.5	39
16.64	+ 0.47	+12.1	1.0	74
16.85	- 0.39	----	0.6	48
16.85	----	- 0.2	0.6	48
17.83	- 0.43	+10.0	0.5	39
19.80	- 0.77	----	0.6	48
19.81	----	+ 4.4	0.6	48
20.76	+ 1.52	+ 5.6	1.0	56
21.78	+ 1.47	+12.3	1.0	56
22.84	+ 1.08	- 7.0	1.0	56
Feb. 25.77	+ 0.80	+ 7.4	0.5	39
26.71	+ 3.90	+14.5	0.0-0.4	74
26.78	- 0.17	+ 9.0	0.6	48
27.75	- 0.11	+ 1.8	0.5	39
27.78	- 1.09	+ 8.6	0.5	60
28.76	+ 0.36	+ 6.6	1.0	56
28.78	- 1.14	+ 8.9	0.5	60
Mar. 1.74	+ 2.09	+ 3.8	0.5	39
2.62	+ 2.80	+11.1	0.8	74
2.63	+ 2.32	+12.9	0.8	74
3.72	+ 2.12	- 4.8	0.6	56

Dates	O - C α	O - C δ	Weights	Obs.
1909				
Mar. 3.72	+ 0.10	+ 5.1	0.5	39
3.74	+ 1.88	+ 0.6	0.5	60
3.75	- 5.80	+ 4.5	0.0-0.5	73
4.68	+ 2.14	+ 2.3	0.8	74
4.68	+ 1.57	+ 3.7	0.8	74
Mar. 9.59	+ 2.32	+ 5.1	0.6	56
11.62	- 2.32	+27.7	0.6-0.0	48
12.64	+ 0.25	+ 2.5	0.6	56
12.65	- 3.70	+11.8	0.0-0.6	73
14.41	+ 2.74	+ 2.6	0.8	74
14.42	+ 2.10	+21.0	0.6	74
14.69	+ 1.63	+ 4.7	0.6	56
15.70	- 0.28	+14.4	0.6	48
16.32	+ 1.32	+15.8	0.8	74
16.33	+ 2.42	+16.5	0.8	74
18.81	+ 3.01	0.0	0.6	56
19.40	+ 1.26	- 2.6	0.8	74
19.42	+ 4.99	+ 3.5	0.6-0.8	74
21.40	+ 4.34	+ 7.4	0.6-0.8	74
21.41	+ 2.16	- 2.2	0.8	74
22.65	- 8.00	+ 9.8	0.0-0.6	73
23.73	+ 0.49	- 5.1	0.6	73
24.72	- 5.72	+ 6.9	0.0-0.6	73
29.59	+ 8.08	-11.8	0.0-0.6	73
30.80	+ 4.09	+ 1.1	0.6	56
30.80	+ 1.61	- 5.3	0.6	56
Apr. 6.52	- 1.59	-11.1	0.6	56
6.52	- 0.88	-10.7	0.6	56
7.57	+ 1.82	- 1.2	0.5	39
13.61	+ 0.34	- 7.0	0.6	56
13.62	+ 2.71	- 5.3	0.5	39
14.67	+ 1.47	+ 2.9	0.5	39
15.67	+ 2.14	+ 6.1	0.6	56
16.59	- 1.71	- 4.8	0.6	56
17.68	+ 1.75	- 4.0	0.5	39
18.57	- 0.43	- 7.2	0.6	56
18.57	- 0.26	-10.1	0.6	56
19.70	- 1.23	-27.2	0.6	48
20.71	+ 2.41	- 3.8	0.5	39
22.64	+ 2.97	- 5.1	0.5	39
22.64	+ 2.99	- 3.9	0.5	39
25.66	+ 0.33	- 6.9	0.6	56
25.66	+ 0.56	- 0.3	0.6	56
26.70	+ 2.35	- 1.1	0.5	39
27.75	+ 1.17	- 1.6	0.6	56
May 10.63	+ 1.52	+ 7.6	0.6	56
10.63	+ 0.03	+ 2.2	0.5	39

TABLE 2

Reference for Observers

No.	Observers	Location	Wt.	Nights Used α	Nights Used δ	Nights Omits α	Nights Omits δ	Reference
1	A. Abetti	Arcetri	0.6	119	118	2	3	A.N., 179, 13, 29; 180, 313, 315, 317: Publ. Arcetri, 26, 38-43.
2	A. Antoniazzi	Padua	0.5	14	14	1	1	A.N., 179, 13, 177; 188, 381.
3	W. Baranow	Kasan	0.8	20	19	1	1	A.N., 181, 51.
4	E.E. Barnard	Williams Bay	0.8	4	4	-	-	A.N., 181, 401: A.J., 41, 148.
5	E. Bianchi	Rome	0.8	21	21	-	-	A.N., 179, 331, 333; 181, 197: Rom. Linc. Rend., 17, II.
6	H.W. Bigelow	Northampton	0.8	19	19	2	2	A.N., 182, 75, 77.
7	A. Borrelly	Marseilles	0.5	8	10	4	2	C.R., 147, 492,730; B.A., 25, 465.
8	V. Cerulli	Teramo	1.0	3	3	-	-	A.N., 179, 271.
9	J. Chatelu	Paris	0.8	20	21	1	-	B.A., 27, 165, 166.
10	P. Chofardet	Besancon	0.8	43	43	-	-	A.N., 179, 29; 181, 73-75: C.R. 147, 492: B.A., 26, 234.
11	J. Coggia	Marseilles	0.6	31	31	-	-	B.A., 26, 286.
12	J. Dreyer	Armagh	0.6	2	2	1	1	M.N., 70, 540.
13	D. Eginitis	Athens	0.8	3	3	1	1	C.R., 148, 397: Athens Ann., 5, 63.
14	E. Esclangon	Bordeaux	0.8	19	19	-	-	A.N., 179, 31; 180, 13: B.A., 26, 315: Bord. Ann., 15, 301.
15	G.A. Favaro	Padua	0.6	40	44	6	1	A.N., 179, 13, 177, 286; 180, 207.
16	V. Fontana	Turin	0.6	9	9	-	-	A.N., 180, 327.
17	P. Fox	Williams Bay	0.5	5	5	-	-	A.N., 179, 31: A.J., 26, 38.
18	J. Franz	Breslau	0.6	9	10	2	1	A.N., 182, 407.
19	M. Frederickson	Washington	1.0	7	7	2	2	A.J., 26, 51: Publ. U.S. Naval Obs., 12, 184.
20	C.E. Furness	Poughkeepsie	0.8	12	12	1	1	A.N., 181, 191.
21	L. Gabba	Milan	1.0	8	7	-	1	A.N., 180, 165: Lomb. Inst. Rend., 42, 137.
22	M. Giacobini	Nice	0.6	29	30	1	-	B.A., 26, 177: C.R., 147, 474.
23	A.E. Glancy	Mt. Hamilton	0.8	7	7	1	1	Lick Obs. Bull., 168, 147.
24	H. Godard	Bordeaux	1.0	1	1	-	-	Bord. Ann., 15, 301.
25	F. Gonnessiat	Algiers	0.8	10	10	-	-	A.N., 179, 177, 179.
26	M.A. Gratschew	Kasan	0.6	2	2	-	-	A.N., 181, 51.
27	Observer	Greenwich	1.0	31	32	1	-	M.N., 69, 116: Grw. Obs., 1908, 136.
28	E. Guerrieri	Naples	0.6	70	64	-	2	A.N., 188, 195, 197: Rivista Di Fisica Mathematica E Scienze Naturali, 23, 230-233.
29	A. Hall	Washington	1.0	7	7	-	-	A.J., 26, 51: Publ. U.S. Naval Obs., 12, 184.
30	J.C. Hammond	Washington	1.0	2	2	-	-	A.J., 26, 51: Publ. U.S. Naval Obs., 12, 184.
31	E. Hartwig	Bamberg	0.6	2	2	-	-	A.N., 179, 211.
32	W. Hassenstein	Königsberg	0.8	27	27	1	1	A.N., 180, 163.
33	J. Holetschek	Vienna	0.8	3	3	-	-	A.N., 180, 353.
34	S.S. Hough	Cape of Good Hope	1.0	10	10	-	-	A.N., 183, 11.
35	H.A. Howe	Denver	1.0	36	36	-	-	A.J., 26, 92.
36	W.J. Hussey	Ann Arbor	1.0	2	1	-	1	Publ. Obs. Mich., 1, 184.
37	S. Javelle	Nice	0.8	5	5	-	-	B.A., 26, 173.
38	E. Jost	Strassburg	0.8	3	3	2	2	A.N., 179, 45, 367.
39	Jungk	Santiago	0.5	18	18	-	-	A.N., 184, 77, 79.
40	O. Knopff	Jena	0.6	6	8	1	-	A.N., 180, 333.
41	S. Kostinsky	Pulkovo	1.0	17	17	-	-	Pulkovo Mitt., 3, 47.
42	A. Kühl	Munich	0.6	8	9	4	3	A.N., 181, 231.
43	A. Mikhailowsky	Kasan	0.6	2	2	-	-	A.N., 181, 59.
44	E. Millosevich	Rome	1.0	16	16	-	-	A.N., 179, 13, 45, 331, 333; 181, 197: Rom. Linc. Rend., 17, II.
45	A.A. Nijland	Utrecht	1.0	3	3	-	-	A.N., 180, 105.
46	S. Ogura	Tokyo	0.4	41	36	1	5	A.N., 181, 291, 293.
47	L. Okoulitch	Pulkovo	1.0	11	11	-	-	Pulkovo Mitt., 3, 27.
48	Oportot	Santiago	0.6	9	7	-	1	A.N., 184, 77, 79.
49	J. Palisa	Vienna	1.0	5	5	-	-	A.N., 179, 13, 45; 180, 231.
50	C.F. Pechüle	Copenhagen	0.8	4	4	-	-	A.N., 179, 13, 15, 45; 181, 217.

TABLE 2 (Continued)

No.	Observers	Location	Wt.	Nights Used α	Nights Used δ	Nights Omits α	Nights Omits δ	Reference
51	L. Picart	Bordeaux	1.0	6	6	-	-	C.R., 147, 729: Bord. Ann., 15, 301.
52	K. Popoff	Paris	0.8	22	24	3	1	B.A., 27, 162, 163.
53	J.G. Porter	Cincinnati	1.0	7	6	-	1	A.J., 26, 83.
54	C. Rambaud	Algiers	1.0	12	11	-	1	A.N., 179, 177, 179; 180, 179, 181.
55	F. Renz	Pulkovo	1.0	8	7	-	1	Pulkovo Mitt., 3, 25.
56	F.W. Ristenpart	Santiago	0.6*	59	61	-	-	A.N., 180, 359; 184, 75, 77, 79.
57	F. Rossard	Toulouse	0.8	27	27	-	-	A.N., 182, 191, 193: C.R., 147 1266.
58	D. Saint-Blancat	Toulouse	0.6	18	21	4	1	A.N., 182, 193: C.R., 147, 1265, 1266.
59	K. Schiller	Bothkamp	0.6	9	10	1	1	A.N., 181, 201.
60	Sebek	Santiago	0.5	3	3	-	-	A.N., 184, 77, 79.
61	E. Silbernagel	Munich	0.6	42	41	1	2	A.N., 181, 231, 233.
62	Soza	Santiago	0.5	18	13	-	-	A.N., 184, 75, 77.
63	P. Sternberg	Moscow	0.8	-	1	1	-	A.N., 179, 45.
64	F. Sy	Algiers	0.8	18	19	-	-	A.N., 179, 177, 179; 180, 181.
65	H. Thiele	Copenhagen	0.8	3	3	1	1	A.N., 179, 45, 273.
66	P.Tsutsihashi, S.J.	Zô-Sè	0.8	11	11	-	-	A.N., 185, 67.
67	G. Van Biesbroeck	Uccle	1.0	45	44	-	1	Ann. Belg., 13, 534, 535: A.N. 179, 13.
68	J. v.d. Bilt	Utrecht	0.6	47	47	1	1	A.N., 180, 105, 107.
69	B. Viaro	Arcetri	0.8	7	8	1	-	A.N., 180, 313, 315, 317.
70	R. Vogel	Kiev	0.6	1	1	-	-	A.N., 180, 391.
71	M. Völkel	Heidelberg	0.6	11	12	1	-	A.N., 179, 287.
72	J. Vôute	Leiden	0.5	17	9	1	8	A.N., 180, 261, 263.
73	A. Weber	Santiago	0.6	1	6	7	2	A.N., 184, 79.
74	W. Whittingdale	Cape of Good Hope	0.8	31	32	3	2	A.N., 183, 11, 13.
75	W. Winkler	Jena	0.4	6	5	14	15	A.N., 179, 239; 180, 15.
76	C.W. Wirtz	Strassburg	0.8	27	27	-	-	A.N., 179, 15, 273; 180, 195.
77	G. Zappa	Rome	1.0	43	43	1	1	A.N., 179, 13, 45, 331, 333; 181, 197: Rom. Linc. Rend., 17, II.

* 0.6 before Jan. -- 1.0 up to Mar. 1 (Micr.) -- Then 0.6 (Squ. bar)

TABLE 3

Planetary Perturbations (1950)

Date	x	y	z	Date	x	y	z
1908				1909			
Aug. 30	+189	-113	-110	Jan. 17	+ 5	+ 2	+ 2
Sept. 19	145	72	69	Feb. 6	18	11	14
Oct. 9	101	40	39	Feb. 26	42	29	41
Oct. 29	60	16	18	Mar. 18	72	57	88
Nov. 18	26	- 4	6	Apr. 7	102	95	158
Dec. 8	+ 6	0	- 1	Apr. 27	127	139	253
Dec. 28	0	0	0	May 17	+143	+185	+377

Table 3 gives the sum of the perturbations expressed in units of the seventh decimal and referred to the equator of 1950. The date of osculation is December 28.0, 1908. These values interpolated for the dates of the normal places and transformed in α and δ are incorporated in Table 4, which lists the fourteen normal places. These were formed by grouping the data of Table 1, as indicated by the lines across the table.

TABLE 4

Residuals to be Corrected

No.	Date	Normal Place cosδ dα	dδ	Perturbation cosδ dα	dδ	Residual cosδ dα	dδ	Weight in α	in δ
	1908								
1	Sept. 6	-1".39	+1".82	-2".49	-1".00	+ 1".10	+2".82	43.2	42.8
2	Sept.19	-1.19	+0.98	-1.68	-1.95	+ 0.49	+2.93	99.2	107.0
3	Oct. 3	-2.50	+0.91	+0.82	-2.26	- 3.32	+3.17	134.6	135.5
4	Oct. 18	-4.37	+1.18	+1.38	-1.14	- 5.75	+2.32	163.1	158.6
5	Oct. 31	-6.27	+0.71	-0.69	-0.51	- 5.58	+1.22	154.7	151.1
6	Nov. 14	-5.26	+1.81	-0.45	-0.12	- 4.81	+1.93	129.7	125.9
7	Nov. 26	-3.30	+1.49	-0.21	0.00	- 3.09	+1.49	97.0	91.9
8	Dec. 6	-3.21	+3.48	-0.04	-0.01	- 3.17	+3.49	45.5	44.7
	1909								
9	Jan. 29	+2.06	+8.50	+0.15	+0.06	+ 1.91	+8.44	34.7	34.1
10	Feb. 17	+5.24	+6.71	+0.45	+0.11	+ 4.79	+6.60	14.3	14.3
11	Mar. 3	+8.23	+6.05	+0.75	+0.01	+ 7.48	+6.04	8.9	9.8
12	Mar. 21	+6.61	+4.47	+0.62	-0.99	+ 5.99	+5.46	11.0	14.0
13	Apr. 18	+6.36	-5.59	-2.31	+1.08	+ 8.67	-6.67	10.6	10.6
14	May 10.6	+9.92	+5.15	-2.99	+2.72	+12.91	+2.43	1.1	1.1

TABLE 5

Differential Correction

dΩ'	di'	dω'	de	dq	dT	Residual	Weight	O - C
+0.635	-0.184	-1.055	-0.3654	-1.063	+0.00286	+ 1".10	43.2	- 1".91
+0.931	+0.294	-1.291	-0.2173	-1.382	+0.00713	+ 0.49	99.2	- 0.82
+0.841	+0.990	-0.644	+0.2415	-0.663	+0.01088	- 3.32	134.6	+ 0.76
+0.650	+0.843	-0.244	+0.2970	-0.115	+0.01022	- 5.75	163.1	- 0.41
+0.614	+0.583	-0.231	+0.2188	-0.027	+0.00977	- 5.58	154.7	- 0.70
+0.580	+0.329	-0.273	+0.1344	-0.025	+0.00932	- 4.81	129.7	- 0.77
+0.550	+0.161	-0.305	+0.0823	-0.022	+0.00915	- 3.09	97.0	+ 0.30
+0.524	+0.048	-0.323	+0.0499	-0.004	+0.00913	- 3.17	45.5	- 0.29
+0.352	-0.400	-0.357	-0.0788	+0.212	+0.00878	+ 1.91	34.7	+ 2.03
+0.269	-0.567	-0.369	-0.1406	+0.274	+0.00897	+ 4.79	14.3	+ 3.79
+0.226	-0.690	-0.431	-0.2039	+0.379	+0.00984	+ 7.48	8.9	+ 5.02
+0.591	-0.428	-1.054	-0.2024	+1.125	+0.01366	+ 5.99	11.0	- 3.04
+0.831	+0.934	-0.737	+0.3708	+0.725	+0.00038	+ 8.67	10.6	+ 4.89
+0.788	+0.762	-0.637	+0.3734	+0.560	+0.00012	+12.91	1.1	+10.74
-0.491	-1.053	+0.343	-0.0706	+0.360	-0.00371	+ 2.82	42.8	+ 1.35
-0.252	-1.073	-0.154	-0.2768	-0.172	-0.00346	+ 2.93	107.0	- 0.81
+0.697	-0.416	-1.353	-0.2068	-1.543	+0.00807	+ 3.17	135.5	+ 0.39
+0.676	-0.354	-1.365	+0.0761	-1.551	+0.01563	+ 2.32	158.6	+ 1.10
+0.326	-0.392	-0.986	+0.1503	-1.050	+0.01563	+ 1.22	151.1	- 0.43
+0.071	-0.282	-0.644	+0.1229	-0.575	+0.01312	+ 1.93	125.9	- 0.40
-0.021	+0.144	-0.480	+0.0820	-0.320	+0.01129	+ 1.49	91.9	- 1.61
-0.045	-0.047	-0.405	+0.0510	-0.175	+0.01028	+ 3.49	44.7	+ 0.54
+0.150	+0.396	-0.418	-0.0699	+0.346	+0.00901	+ 8.44	34.1	+ 4.30
+0.343	+0.540	-0.576	-0.0965	+0.597	+0.00969	+ 6.60	14.3	+ 1.37
+0.551	+0.655	-0.774	-0.0804	+0.860	+0.00997	+ 6.04	9.8	- 0.61
+0.668	+1.035	-0.694	+0.1628	+0.796	+0.00297	+ 5.46	14.0	+ 0.13
-0.522	+0.665	+1.198	-0.0979	-1.222	-0.00782	- 6.67	10.6	+ 5.22
-0.312	+0.623	+0.958	-0.2651	-0.892	-0.00353	+ 2.43	1.1	+12.60

The coefficients of the equation of condition for the differential correction of the equatorial elements were computed by machine in the form given by G. Stracke - "Bahnbestimmung" (1929) p. 330. For that purpose the geometric elements II were referred to the equator of 1908.0:

$$\omega' = 202°11009$$

$$\Omega' = 125.17500$$

$$i' = 130.28365$$

Table 5 lists the equations of condition and their weights. The normal equations of solution are:

$$+6.4676x +2.4723y -4.0892z +1.9543u -3.0325v +4.8487w = -1.6566$$
$$+4.8219 +0.1818 +3.0809 +0.5717 +1.0539 = -3.2003$$
$$+3.9076 -0.2294 +3.1917 -3.8948 = -0.9756$$
$$+4.7421 +0.1437 +2.4959 = -2.9299$$
$$+3.4006 -2.8644 = -0.5280$$
$$+5.5048 = -0.5332$$

In these the following normalizing factors have been introduced:

$d\Omega' = 7.526\ x$ $\quad$ $de = 19.36\ u$

$di' = 6.392\ y$ $\quad$ $dq = 3.759\ v$

$d\omega' = 4.270\ z$ $\quad$ $dT = 373.04\ w$

The solution with the probable errors came out as follows:

$d\Omega' = -0^{\circ}.00281 \pm 0^{\circ}.00211$

$di' = +0.00035 \pm .00217$

$d\omega' = -0.00349 \pm .00443$

$de = -0.0000115 \pm .0000506$

$dq = +0.0000180 \pm .0000716$

$dT = -0.0008330 \pm 0.0000875$

The sum of the weighted squares of the residuals was thereby reduced from 27702 to 3334. The probable error of a measure of weight one was as large as 12".31 which is mainly due to the great scatter of the measures in the second half of the period of observation. The solution indicates probable errors larger than the corrections for four of the elements. Only in the time of perihelion is there a material correction, about ten times its probable error. The final representation is given in the last columns of Table 5 under the heading O - C. Evidently the last normal place is considerably in error. However, when a solution was made omitting this place there was practically no change in the value of the unknowns nor in the representation O - C which therefore must be considered as final.

The definitive elements referred to the equator as well as to the ecliptic are thus:

T = 1908 Dec. 25.75609 G.M.T.	$\omega' = 202^{\circ}.10660$	$\omega = 171^{\circ}.57696$
q = 0.9452995	$\Omega' = 127.17219$	$\Omega = 103.16136$
e = 1.0006923	$i' = 130.28400$	$i = 140.17889$

Equinox 1908.0 - Osculation date 1908 Dec. 28.0

The orbit comes out slightly hyperbolic. The deviation from the parabola is established beyond doubt since the hyperbolic excess is about fourteen times its probable

error. Again it is of interest to investigate what was the character of the original orbit of this object when it was still far removed from the perturbing planets.

For that purpose, starting from the above definitive orbit, the perturbations due to all the planets were established first by Encke's method. The perturbations in the equatorial coordinates in Table 3 were extended backward from Aug. 30, 1908, to Feb. 22, 1908, in 10-day intervals as shown in Table 6, giving the quantities in units of the seventh decimal.

TABLE 6

Perturbations by Encke's Method

Date	x	y	z	Date	x	y	z
1908 Aug. 30	+189	-113	-110	1908 May 22	+381	-386	- 458
20	211	134	131	12	403	422	512
10	232	157	156	2	425	462	571
July 31	252	182	183	Apr.22	448	505	635
21	272	208	214	12	471	552	704
11	290	235	247	2	495	604	779
1	308	263	282	Mar.23	518	661	860
June 21	325	292	321	13	541	724	948
11	343	322	363	3	564	793	1042
1	+362	-354	-409	Feb.22	+584	-869	-1144

Next the mass of the four inner planets was added to that of the sun; and by Cowell's method the rectangular equatorial coordinates were computed in 20-day intervals, taking into account the four outer major planets. For the two initial dates the values were interpolated from Table 6. The result of the backward computation is given in Table 7. Seven decimal places were used throughout but the results have been rounded off to six places in the table. It will be seen that the interval has gradually been increased to 100 days and that the computation has been carried back to twenty years before the comet's apparition. The date June 11, 1888, was chosen for investigating the character of theorbit. At that time the heliocentric distance had risen to 41 astronomical units. We now have:

Coordinates (1950)

Referred to the sun	-4.8897525	+35.7130211	+19.9946161
Reduction	+39004	+13667	+5239
Referred to center of gravity	-4.8858521	+35.7143878	+19.9951400

10-Day Velocities (1950)

Referred to the sun	+0.0893434	-0.3374972	-0.1476109
Reduction	-5107	+3563	+1612
Referred to center of gravity	+0.0888327	-0.3371409	-0.1474497

from which we find r = 41.22129, 1/a = +0.0001581 and e = 0.999850. Since the eccentricity resulting from the discussion of all the observational material had a probable error of only 0.000050 there is here once more evidence that the original orbit of this comet is clearly elliptical, even though the period would be of the order of half a million years.

The numerical work reported here has been done in duplicate with Mrs. T. Belland, whose assistance is herewith gratefully acknowledged.

TABLE 7

Equatorial Coordinates (1950.0) Cowell Method

Grw.	M.N.	x	y	z	Grw.	M.N.	x	y	z
1908	Apr. 8	+1.652879	+1.829971	+2.861594	1902	Oct. 17	+0.091998	+14.803312	+10.329436
	Mar. 19	1.664761	2.027406	3.009560		July 29	+0.011372	15.203782	10.529344
	Feb. 28	1.673537	2.221067	3.151916		May 10	-0.069306	15.599746	10.726119
	Feb. 8	1.679639	2.411184	3.289240		Feb. 19	0.150007	15.991409	10.919922
	Jan. 19	1.683418	2.597972	3.422018	1901	Dec. 1	0.230704	16.378958	11.110901
1907	Dec. 30	1.685164	2.781627	3.550665		Sept.12	0.311371	16.762565	11.299191
	Dec. 10	1.685118	2.962329	3.675542		June 24	0.391985	17.142393	11.484917
	Nov. 20	1.683485	3.140243	3.796957		Apr. 5	0.472526	17.518589	11.668194
	Oct. 31	1.680436	3.315521	3.915183		Jan. 15	0.552973	17.891294	11.849129
	Oct. 11	1.676120	3.488301	4.030458	1900	Oct. 27	0.633310	18.260635	12.027821
	Sept.21	1.670662	3.658711	4.142993		Aug. 8	0.713521	18.626733	12.204362
	Sept. 1	1.664174	3.826868	4.252975		May 20	0.793590	18.989701	12.378836
	Aug. 12	1.656751	3.992879	4.360571		Mar. 1	0.873505	19.349644	12.551323
	July 23	1.648477	4.156846	4.465933	1899	Dec. 11	-0.953254	+19.706659	+12.721898
	July 3	1.639427	4.318859	4.569195					
	June 13	1.629665	4.479005	4.670479	1899	Sept. 2	-1.052690	+20.148952	+12.932533
	May 24	1.619251	4.637363	4.769897		May 25	1.151831	20.586983	13.140412
	May 4	1.608235	4.794006	4.867549		Feb. 14	1.250662	21.020906	13.345653
	Apr. 14	1.596665	4.949004	4.963529	1898	Nov. 6	1.349169	21.450865	13.548362
	Mar. 25	1.584582	5.102420	5.057920		July 29	1.447343	21.876994	13.748640
	Mar. 5	1.572024	5.254315	5.150801		Apr. 20	1.545175	22.299417	13.946577
	Feb. 13	1.559026	5.404745	5.242244		Jan. 10	1.642658	22.718250	14.142261
	Jan. 24	1.545618	5.553762	5.332314	1897	Oct. 2	1.739790	23.133600	14.335770
	Jan. 4	1.531828	5.701416	5.421074		June 24	1.836568	23.545569	14.527180
1906	Dec. 15	+1.517683	+5.847754	+5.508580		Mar. 16	1.932993	23.954251	14.716562
					1896	Dec. 6	2.029067	24.359736	14.903980
1906	Nov. 5	+1.488420	+6.136653	+5.680041		Aug. 28	2.124794	24.762108	15.089496
	Sept.26	1.457994	6.420783	5.847079		May 20	2.220181	25.161446	15.273169
	Aug. 17	1.426546	6.700434	6.010033		Feb. 10	2.315236	25.557825	15.455053
	July 8	1.394198	6.975866	6.169199	1895	Nov. 2	2.409969	25.951319	15.635202
	May 29	1.361052	7.247316	6.324841		July 25	2.504391	26.341997	15.813664
	Apr. 19	1.327196	7.514998	6.477193		Apr. 16	2.598518	26.729925	15.990489
	Mar. 10	1.292707	7.779105	6.626466		Jan. 6	2.692362	27.115168	16.165721
	Jan. 29	1.257652	8.039818	6.772850	1894	Sept.28	2.785940	27.497792	16.339406
1905	Dec. 20	1.222088	8.297301	6.916515		June 20	2.879271	27.877858	16.511587
	Nov. 10	1.186065	8.551704	7.057615		Mar. 12	2.972370	28.255429	16.682303
	Oct. 1	1.149629	8.803167	7.196292	1893	Dec. 2	3.065257	28.630568	16.851599
	Aug. 22	1.112818	9.051818	7.332674		Aug. 24	3.157948	29.003336	17.019513
	July 13	1.075668	9.297776	7.466878		May 16	3.250459	29.373796	17.186087
	June 3	1.038211	9.541152	7.599012		Feb. 5	3.342806	29.742011	17.351359
	Apr. 24	1.000473	9.782049	7.729176	1892	Oct. 28	3.435002	30.108043	17.515368
	Mar. 15	0.962479	10.020565	7.857462		July 20	3.527057	30.471954	17.678150
	Feb. 3	0.924253	10.256789	7.983953		Apr. 11	3.618978	30.833807	17.839745
1904	Dec. 25	0.885814	10.490806	8.108730		Jan. 2	3.710770	31.193661	18.000186
	Nov. 15	0.847180	10.722694	8.231864	1891	Sept.24	3.802434	31.551575	18.159509
	Oct. 6	0.808369	10.952529	8.353424		June 16	3.893969	31.907607	18.317748
	Aug. 27	0.769395	11.180381	8.473475		Mar. 8	3.985369	32.261811	18.474934
	July 18	0.730273	11.406317	8.592074	1890	Nov. 28	4.076628	32.614238	18.631096
	June 8	0.691014	11.630398	8.709279		Aug. 20	4.167737	32.964937	18.786264
	Apr. 29	0.651631	11.852686	8.825142		May 2	4.258684	33.313953	18.940464
	Mar. 20	0.612134	12.073235	8.939711		Feb. 1	4.349458	33.661327	19.093721
	Feb. 9	0.572533	12.292099	9.053034	1889	Oct. 24	4.440046	34.007098	19.246057
1903	Dec. 31	0.532837	12.509329	9.165153		July 16	4.530435	34.351301	19.397493
	Nov. 21	0.493054	12.724973	9.276110		Apr. 7	4.620612	34.693967	19.548050
	Oct. 12	0.453193	12.939078	9.385945	1888	Dec. 28	4.710565	35.035126	19.697745
	Sept. 2	0.413262	13.151686	9.494694		Sept.19	4.800282	35.374802	19.846595
	July 24	0.373266	13.362839	9.602392		June 11	4.889752	35.713021	19.994616
	June 14	0.333212	13.572577	9.709072		Mar. 3	-4.978966	+36.049803	+20.141822
	May 5	0.293107	13.780939	9.814765					
	Mar. 26	0.252956	13.987960	9.919502					
	Feb. 14	0.212764	14.193675	10.023311					
	Jan. 5	0.172538	14.398118	10.126220					