Bulletin

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l'Observatoire astronomique

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I. ASTRONOMIE

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Biuletyn

Obserwatorjum astronomicznego

w Wilnie.

1923

Wydano z zasiłku Ministerstwa W. R. i O. P.

Drukarnia „ZNICZ“ Ś-to Jańska 1.

S. SZELIGOWSKI.

Definitive Orbit of Comet 1904 II.

1. The Discovery and the Visibility of the Comet.

The comet 1904 II. was discovered by *Giacobini* on the 17-th of Decemb. 1904 at *Nice* as a very faint object of 11 magnitude in the neighbourhood of Cor. bor. It described an arc through Herc. took the path between Lira and Draco and disappeared in Draco.

At the beginning the comet possessed a well marked nucleus. Prof. *Wolf* of Heidelberg even noticed, on the plate of the 19-th Dec. a short tail. The nearest approch of the comet to the earth was on Jan. 19. The conditions of visibility of the comet became more difficult with the increase of its distance from the earth, so that the last observations were made on the 1-th and 2-d of May. The 31-st May and 1-th June 1905 the disappearence of the comet was definitly confirmed by prof. *Palissa* of Wien.

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2. The Provisional Elements and Ephemeris.

As provisional elements were used those calculated by *R. S. Aitken* and published in Lick Bull. № 67. They were determined from 3 observations 1904 Dec. 19., Dec. 27., and 1905 Jan. 9.

Provisional Elements

$$\begin{array}{ll} T & 1904 \text{ Nov. } 3.2272 \text{ Greenw. M. T.} \\ \omega & 40^{0}\ 42'\ 34''8 \\ \Omega & 218\ \ 28\ \ \ 4.5 \\ i & 99\ \ 36\ \ 41.2 \\ log\ q & 0\ 274540 \end{array} \left.\begin{array}{l} \\ \\ \\ \end{array}\right\} 1905.0$$

Equations for coordinates 1905.0

$$x = [9.897525]\ r.\ \sin\ (303^{0}\ \ 9'\ 11.''1 + v)$$
$$y = [9.600988]\ r.\ \sin\ (285\ \ 11\ \ 20.0 + v)$$
$$z = [9.994785]\ r.\ \sin\ (\ \ 26\ \ 11\ \ 56.4 + v)$$

Middle place O — C:

$$\Delta\lambda'\ \cos\ \beta' = +\,3.''3 \qquad \Delta\beta' = -\,3.''8$$

As the later observations gave too great deviations from these figures as for example:

1905 March 6.0

$$d\alpha \cos \delta = +\ 6.''0$$
$$d\delta = -\ 30.0$$

they had to be corrected. For this purpose three normal places were determined, using *Aitkens* elements, viz:

1. 1904 XII. 19.0 (Nice, Kopenhagen, Kopenhagen, Nice, Heidelberg, Lick, Wien, Strassburg, Nice, Heidelberg),
2. 1905. I. 28.0 (Nice, Nice, Lick),
3. III. 9.0 (Nice, Denver, Denver, Nice, Nice, Nice),

and from them I obtained the following corrected elements, with the aid of the classical method of *Olbers*.

Elements for comparison

T	1904	Nov.	3.28615	Greenw. M. T.
ω	40^0	$44'$	$36''.76$	
Ω	218	27	15.00	1904.0
i	99	36	30.84	
log q	0.274614			

Equations for coordinates 1904.0

$$x = [9.8976026]\ r.\ \sin\,(303^0\ 11'\ 34.''15 + v)$$
$$y = [9.8008859]\ r.\ \sin\,(285\ \ 12\ \ 52.04 + v)$$
$$z = [9.9947773]\ r.\ \sin\,(\ 26\ \ 14\ \ 12.98 + v)$$

Middle place O — C:

$$\Delta\lambda' \cos\beta' = +\ 1.''4$$
$$\Delta\beta' = +\ 5.2$$

By making use of these elements I calculated the ephemeris for the whole time of the visibility of the comet. This was done by calculation of the coordinates for every second day and interpolating the values for the remaining days.

3. Ephemeris.

(Greenwich M. T.)

1904.0—1905.0	α	δ	log r	log Δ	Aberration	Red. ad. l. app. dα	Red. ad. l. app. dδ
Dec. 15.0	16h 8m 1.s65	26° 14′ 44.″16			0.d013697		
16.0	16 10 26.92	26 41 27.47	0.2914188	0.37398	0.013650	+ 1.s96	+ 0.″55
17.0	16 12 53.74	27 8 29.46			0.013605		
18.0	16 15 22.14	27 35 49.86	0.2929524	0.37110	0.013560	+ 1.95	+ 0.91
19.0	16 17 52.16	28 3 28.48			0.013516		
20.0	16 20 23.83	28 31 25.16	0.2945424	0.36830	0.013473	+ 1.94	+ 1.28
21.0	16 22 57.18	28 59 39.60			0.013431		
22.0	16 25 32.25	29 28 11.67	0.2961878	0.36558	0.013389	+ 1.93	+ 1.67
23.0	16 28 9.07	29 57 0.88			0.013348		
24.0	16 30 47.69	30 26 6.99	0.2978866	0.36296	0.013308	+ 1.92	+ 2.06
25.0	16 33 28.13	30 55 29.58			0.013269		
26.0	16 36 10.44	31 25 8.41	0.2996376	0.36046	0.013232	+ 1.91	+ 2.47
27.0	16 38 54.67	31 55 2.84			0.013195		
28.0	16 41 40.81	32 25 12.58	0.3014386	0.35809	0.013160	+ 1.89	+ 2.89
29.0	16 44 28.95	32 55 37.11			0.013125		
30.0	16 47 19.11	33 26 15.83	0.3032886	0.35586	0.013092	+ 1.88	+ 3.32
31.0	16 50 11.33	33 57 8.20			0.013060		
Jan. 1.0	16 53 7.85	34 28 8.45	0.3051856	0.35376	0.013030	— 0.33	+ 9.54
2.0	16 56 4.27	34 59 26.45			0.013001		
3.0	16 59 2.86	35 30 56.18	0.3071280	0.35185	0.012973	— 0.31	+ 9.50
4.0	17 2 3.65	36 2 36.92			0.012947		
5.0	17 5 6.69	36 34 27.77	0.3091142	0.35013	0.012921	— 0.28	+ 9.46
6.0	17 8 12.00	37 6 27.94			0.012898		
7.0	17 11 19.64	37 38 36.51	0.3111428	0.34860	0.012876	— 0.26	+ 9.42

1905.0		α	δ	log r	log Δ	Aberration	Red. ad. l. app.	
							dα	dδ
Jan.	8 0	17^h 14^m $29^s.63$	38° 10′ 52.″63			$0^d.012856$		
	9.0	17 17 42.02	38 43 15.28	0.3132118	0.34728	0.012837	$-0^s.23$	$+9.''38$
	10.0	17 20 56.84	39 15 43 50			0.012820		
	11 0	17 24 14 14	39 48 16.21	0.3153198	0.34618	0.012804	− 0.20	+ 9 34
	12.0	17 27 33.96	40 20 52.38			0.012791		
	13.0	17 30 56.33	40 53 30.85	0.3174654	0.34530	0 012779	− 0.17	+ 9.29
	14.0	17 34 21.30	41 26 10.50			0.012769		
	15.0	17 37 48 90	41 58 50.21	0.3196466	0.34467	0.012760	− 0.15	+ 9.24
	16.0	17 41 19.17	42 31 28.94			0.012754		
	17.0	17 44 52.14	43 4 5 36	0.3218622	0.34428	0.012749	− 0 12	+ 9.19
	18.0	17 48 27.87	43 36 38.12			0.012747		
	19.0	17 52 6 37	44 9 6.09	0.3241102	0.34415	0.012745	− 0.09	+ 9.13
	20.0	17 55 47.70	44 41 28.06			0.012746		
	21.0	17 59 31.87	45 13 42 78	0.3263896	0.34428	0.012748	− 0.06	+ 9.07
	22.0	18 3 18.93	45 45 48.96			0.012754		
	23.0	18 7 8.89	46 17 45.[illegible]8	0.3286988	0.34467	0.012760	− 0 02	+ 9.01
	24.0	18 11 1.80	46 49 30.77			0.012769		
	25.0	18 14 57 66	47 21 3.90	0.3310360	0.34533	0.012779	+ 0.01	+ 8.94
	26.0	18 18 56.51	47 52 23.53			0.012792		
	27.0	18 22 58 35	48 23 28.44	0.3334002	0.34625	0.012806	+ 0.04	+ 8.87
	28.0	18 27 3.21	48 54 17.36			0.012823		
	29.0	18 31 11.07	49 24 49.13	0.3357894	0.34744	0.012841	+ 0.08	+ 8 79
	30.0	18 35 21.96	49 55 2.56			0.012861		
	31.0	18 39 35.86	50 24 56.43	0.3382030	0.34889	0.012884	+ 0.12	+ 8.71
Feb.	1.0	18 43 52.77	50 54 29.49			0 012909		
	2.0	18 48 12.68	51 23 40.67	0 3406390	0.35059	0.012935	+ 0.15	+ 8.62
	3.0	18 52 35.57	51 52 28.82			0.012964		
	4.0	18 57 1.42	52 20 52.85	0.3430964	0.35255	0.012994	+ 0.19	+ 8.52
	5.0	19 1 30.21	52 48 51 60			0.013027		
	6.0	19 6 1.90	53 16 24.14	0.3455736	0.35476	0.013060	+ 0.24	+ 8.41
	7.0	19 10 36.46	53 43 29.43			0.013097		
	8.0	19 15 13.83	54 10 6.55	0,3480698	0.35720	0 013134	+ 0.28	+ 8.30
	9.0	19 19 53.98	54 36 14.49			0 013174		
	10.0	19 24 36.84	55 1 52.46	0.3505834	0.35988	0.013215	+ 0.32	+ 8.18
	11.0	19 29 22.36	55 26 59.58			0.013259		
	12.0	19 34 10.46	55 51 35.19	0.3531134	0.36277	0.013303	+ 0 37	+ 8.06
	13.0	19 39 1.07	56 15 38.50			0.013350		
	14.0	19 43 54 11	56 39 8.95	0.3556586	0.36587	0.013398	+ 0.41	+ 7.92
	15.0	19 48 49.48	57 2 5.84			0.013448		
	16.0	19 53 47.10	57 24 28.75	0.3582180	0.36917	0.013500	+ 0.46	+ 7.78
	17.0	19 58 46.87	57 46 17.11			0.013554		
	18.0	20 3 48.67	58 7 30 62	0.3607900	0.37265	0.013609	+ 0.51	+ 7.63
	19.0	20 8 52.40	58 28 8.88			0.013666		
	20.0	20 13 57 92	58 48 11.73	0 3633742	0.37630	0.013724	+ 0.56	+ 7.47
	21.0	20 19 5.13	59 7 38.88			0.013784		
	22.0	20 24 13.87	59 26 30.31	0.3659692	0.38011	0 013845	+ 0.61	+ 7.30
	23.0	20 29 24.02	59 44 45.83			0.013908		
	24.0	20 34 35.43	60 2 25.59	0.3685740	0.38407	0.013972	+ 0.66	+ 7.12
	25.0	20 39 47.94	60 19 29.84			0.014037		
	26.0	20 45 1.41	60 35 58.03	0.3711878	0 38816	0.014104	+ 0.72	+ 6.93
	27.0	20 50 15 66	60 51 50.99			0 014172		
	28.0	20 55 30.55	61 7 8.78	0.3738098	0.39237	0.014241	+ 0.78	+ 6.74
March	1.0	21 0 45 88	61 21 51.63			0.014312		
	2 0	21 6 1.50	61 35 59 92	0.3764386	0.39668	0 014383	+ 0.82	+ 6.53
	3.0	21 11 17.26	61 49 33.91			0.014456		
	4.0	21 16 32.98	62 2 34.11	0.3790740	0.40109	0.014530	+ 0.87	+ 6.33
	5.0	21 21 48.46	62 15 0.97			0 014605		
	6.0	21 27 3.54	62 26 55.04	0.3817148	0.40558	0.014681	+ 0.92	+ 6.11
	7.0	21 32 18.07	62 38 16.76			0.014758		
	8.0	21 37 31.88	62 49 6.81	0.3843600	0.41013	0.014836	+ 0.97	+ 5.89
	9.0	21 42 44.79	62 59 25.79			0.014915		
	10.0	21 47 56.67	63 9 14.32	0.3870094	0.41474	0.014994	+ 1.02	+ 5.66

1905.0		α			δ			log r	log Δ	Aberration	Red. ad. l. app.	
											dα	dδ
March	11.0	21h	53m	7.s33	63°	18′	33.″02			0.d015075		
	12.0	21	58	16.65	63	27	22.64	0.3896616	0.41940	0.015156	+ 1.s07	+5.″43
April	4.0	23	46	26.47	65	6	33.75			0.017151		
	5.0	23	50	34.72	65	7	40.51	0.4215002	0.47536	0.017240	+ 1.50	+ 2.62
	6.0	23	54	39.90	65	8	37.34			0.017329		
	7.0	23	58	42.00	65	9	24.64	0.4241378	0.47981	0.017418	+ 1.52	+ 2.41
	8.0	0	2	41.04	65	10	3.04			0.017506		
	9.0	0	6	37.00	65	10	33.19	0.4267710	0.48420	0.017594	+ 1.56	+ 2.21
	28.0	1	12	13.00	65	3	57.59			0.019205		
	29.0	1	15	13.35	65	3	12.50	0.4527782	0.52402	0.019284	+ 1.64	+ 0.36
	30.0	1	18	11.23	65	2	26.44			0.019363		
May	1.0	1	21	7.04	65	1	40.33	0.4553402	0.52756	0.019442	+ 1.67	+ 0.20
	2.0	1	24	0.48	65	0	54.49			0.019519		
	3.0	1	25	51.45	65	0	8.98	0.4578940	0.53099	0.019596	+ 1.82	+ 0.05

4. Observations.

The following tables contain observations made by other observatories, ordered in an alphabetic way. The column O — C gives residuals between the observations and the ephemeris.

Notations: A. N. — Astronomische Nachrichten, B. A. — Bulletin astronomique. L. B. — Lick Bulletin.

ARCETRI.

A. Abetti. Equatoriale di Amici. Obiettivo 284 mm. Micrometro a lamine 19.″45. Ingr. 124.

A. N. 167.55,359. 168.138.

1904–05	T. m. Arcetri	Δα	Δδ	Cfr.	α app.	log p. Δ	δ app.	log p. Δ	Red. ad l. app.		O — C dα cos δ	O — C dδ	*
Dic. 20	$17^h 58^m 50^s$	$+0^m 17.^s15$	$-7' 59.''1$	24.12	$16^h 22^m 14.^s09$	9.650_n	$+28° 51' 20.''2$	0.613	$+0.^s49$	$-2.''3$	$+0.^s24$	$+3.''6$	6
20	17 58 50	−0 40.44	−11 17.6	24.12	16 22 13.89	9.650_n	+28 51 19.3	0.613	+0.49	−2.3	+0.07	+2.7	7
21	18 9 7	+0 6.26	+2 47.7	16.8	16 24 49.52	9.641_n	+29 19 58.9	0.592	+0.50	−2.4	+0.03	+2.7	8
28	17 51 57	+0 17.07	−4 20.5	8.8	16 43 40.81	9.665_n	+32 46 35.4	0.569	+0.42	−2.5	+0.35	+5.7	15
28	17 51 57	−0 54.56	+11 22.7	8.4	16 43 40.37	9.665_n	+32 46 31.5	0.569	+0.42	−2.5	−0.02	+1.8	16
31	18 1 21	+0 44.36	+4 9.9	20.8	16 52 16.56	9.661_n	+34 19 21.0	0.527	+0.39	−2.6	+0.17	+13.7	19
Gen. 1	17 55 24	+0 25.12	−1 26.2	8.4	16 55 11.65	9.668_n	+34 50 24.7	0.528	−1.81	+3.1	+0.16	+10.1	20
1	17 55 24	−0 38.55	−10 4.1	8.4	16 55 11.56	9.668_n	+34 50 24.5	0.528	−1.81	+3.1	+0.09	+9.9	21
7	18 0 31	−0 49.98	+0 30.2	16.12	17 13 33.90	9.676_n	+38 1 39.6	0.463	−1.78	+1.8	+0.29	+8.3	29
8	17 55 20	−0 18.93	+9 42.6	20.12	17 16 44.74	9.683_n	+38 33 51.1	0.463	−1.77	+1.5	+0.02	+4.4	30
10	17 45 11	−0 46.19	−1 54.4	24.8	17 23 14.37	9.698_n	+39 38 40.8	0.467	−1.76	+1.2	+0.42	+11.3	35
11	18 0 44	−0 45.62	−0 46.9	16.8	17 26 35.25	9.687_n	+40 11 33.6	0.420	−1.76	+1.0	+0.18	+7.6	38
11	18 0 44	−2 2.69	+8 56.1	16.8	17 26 35.40	9.687_n	+40 11 31.0	0.420	−1.76	+1.0	+0.29	+5.0	40
12	18 15 15	+0 21.29	+0 57.3	16.8	17 29 59.49	9.672_n	+40 44 31.9	0.366	−1.75	+0.8	+0.57	+8.0	42
13	17 48 35	+0 11.34	−3 58.2	12.8	17 33 19.90	9.705_n	+41 16 33.4	0.428	−1.75	+0.6	+0.52	+6.6	45
13	17 48 35	−1 18.08	−10 21.6	12.8	17 33 19.74	9.705_n	+41 16 31.2	0.428	−1.75	+0.6	+0.40	+4.4	46
14	18 6 7	+1 50.28	+3 48.7	12.8	17 36 48.66	9.690_n	+41 49 40.2	0.367	−1.75	+0.4	+0.10	+9.6	47
14	18 6 7	−1 23.74	+7 29.7	12.8	17 36 49.13	9.690_n	+41 49 35.1	0.367	−1.75	+0.4	+0.45	+4.5	48
15	18 1 43	+1 6.51	−4 21.6	12.8	17 40 18.02	9.699_n	+42 22 11.0	0.366	−1.74	+0.2	+0.45	+7.4	50
31	17 26 56	−0 6.56	−9 3.1	32.16	18 42 32.30	9.796_n	+50 15 25.2	0.305	−1.71	−2.0	+0.58	+7.9	57
Febb. 1	17 45 22	−1 10.89	+1 28.2	20.8	18 46 54.29	9.785_n	+51 15 3.9	0.205	−1.70	−2.1	+0.39	+5.8	58
3	17 35 19	−0 36.79	+9 30.9	16.8	18 55 39.95	9.805_n	+52 12 23.1	0.236	−1.70	−2.2	+0.72	+10.2	59
6	17 29 42	+0 34.86	−1 28.2	16.12	19 9 11.14	9.825_n	+53 35 15.4	0.231	−1.69	−2.5	+0.61	+8.0	64

1905	l. m. Arcetri	$\Delta\alpha$	$\Delta\delta$	Cfr.	α app.	log p. Δ	δ app.	log p. Δ	Red. ad l. app.		O—C		*
											$d\alpha \cos\delta$	$d\delta$	
Febb. 6	$17^h 29^m 42^s$	$+0^m 17.^s42$	$+6' 30.''0$	16.12	$19^h 9^m 10.^s90$	9.825_n	$+53^{\circ} 35' 16.''4$	0.231	$-1.^s69$	$-2.''5$	$+0.^s47$	$+9.''0$	65
7	17 37 21	−1 21.35	−5 1.5	20.8	19 13 49.40	9.823_n	+54 2 5.0	0.178	−1.69	−2.6	+0.78	+4.0	68
7	17 37 21	−1 39.22	+3 36.0	20.8	19 13 49.26	9.823_n	+54 2 7.0	0.178	−1.69	−2.6	+0.70	+6.0	69
8	17 48 36	−2 52.65	−4 3.2	8.8	19 18 30.96	9.819_n	+54 28 37.5	0.093	−1.69	−2.7	+0.81	+6.3	71
9	17 39 49	−0 46.80	+12 38.3	24.8	19 23 10.70	9.839_n	+54 54 12.7	0.204	−1.69	−2.7	+0.46	+3.9	72
10	17 28 6	−0 14.80	+6 16.9	20.8	19 27 53.31	9.845_n	+55 19 19.5	0.205	−1.69	−2.7	+0.59	+6.3	73
10	17 28 6	−0 53.83	−3 48.5	20.8	19 27 53.38	9.845_n	+55 19 18.6	0.205	−1.69	−2.7	+0.63	+5.4	74
12	17 36 33	−1 25.41	+2 38.0	20.8	19 37 31.86	9.850_n	+56 8 23.7	0.141	−1.69	−2.8	+0.41	+3.0	76
12	17 36 33	−1 43.88	−12 1.1	20.8	19 37 31.93	9.850_n	+56 8 24.1	0.141	−1.69	−2.8	+0.44	+3.4	77
13	17 22 12	−0 7.17	+1 49.2	16.8	19 42 21.82	9.865_n	+56 31 52.6	0.220	−1.68	−2.9	+0.71	+5.4	78
13	17 22 12	−0 29.36	−0 54.1	16.8	19 42 21.61	9.865_n	+56 31 52.7	0.220	−1.68	−2.9	+0.54	+5.5	79
14	17 38 17	+1 27.13	−4 16.9	8.12	19 47 19.23	9.860_n	+56 55 7.3	0.112	−1.68	−3.0	+0.41	−2.9	80
14	17 38 17	+0 36.95	+6 38.8	8.12	19 47 18.94	9.860_n	+56 55 8.4	0.112	−1.68	−3.0	+0.25	−1.8	81
16	17 24 16	+0 13.06	−2 2.3	16.8	19 57 12.98	9.880_n	+57 39 36.0	0.194	−1.68	−3.1	+0.72	+6.3	82
16	17 24 16	+0 10.17	+6 44.3	16.8	19 57 12.71	9.880_n	+57 39 36.7	0.194	−1.68	−3.1	+0.58	+7.0	83

Dic. 20. Sereno splendido. La cometa si lasciò osservare soltanto quando per l'avviarsi della Luna al tramonto venne a scemare la illuminazione del cielo ed a farsi scuro il campo del cannocchiale, ma ciò fu di breve durata a motivo dell'aurora nascente. La cometa apparve e disparve insieme alle stelle di 11^a in 12^a grandezza e si mostrò come una di esse supposta nebulosa. Nella mattina prossima seguente tramontando la Luna dopo l'alba la cometa non potrà quì essere osservata. — Dic. 21. La circostanza di aver ben precisata la posizione della cometa e la sua immediata vicinanza alla bella stella di confronto ($6.^m8$) hanno permesso di riosservarla contro l'aspettativa. La piccolissima macchia nebulare, simile ad una stellina nebulosa che appena si sospettasse nel campo dell'Amici fortemente rischiarato dal chiaro di luna piena e dall'alba incipiente, fu osservata con estrema difficoltà — Dic. 28. Sereno splendido. Fu vista debolissima nel campo dell'Amici rischiarato dalla Luna in U. Q., e fu osservata con difficoltà. Rassomigliava ad una stella di 12^m velata da leggerissima nebbia; scomparve nella prima mezz'ora dell'alba. — Dic. 31. Osservazioni contrastate da formazioni subitanee di nubi; puntate difficili. — Genn. 1. Vento freddo (—7°) fortissimo che alterna il sereno ed il nuvolo così che le osservazioni sono osteggiate, ed a mezzo vengono interrotte. La cometa fu vista debolissima e si puntò penosamente. — Genn. 7, 8. Bello. Sfocando una stella di $11.^m5$ si ottenne un'immagine molto somigliante alla cometa. — Genn 11 al 15. Cielo sereno con magnifiche aurore. Prima di queste fu sempre osservata la cometa e giudicala equivalente ad una stellina nebulosa di 11^a in 12^a grandezza. — Genn. 31. Sereno splendido. Cometa debolissima, ma è ancora osservabile coll'Amici alla mattina

ad oriente. Somiglia alle stelle più piccole di 12.^{m}5 in 13^{m}, insieme alle quali sparisce nella prima mezz'ora del crepuscolo mattutino, che quì dura 1.^{h}5. — Febb 1. Bello. Debolissima tanto che a semplice vista non si riconoscerebbe se la sua posizione non fosse ben precisata rispetto alle stelle note. Essendo essa circumpolare si provò a puntarla anche di sera ad occidente, ma invano, che allora essendo vicina all' orizzonte e digradando verso la culminazione inferiore rimane estinta nell' atmosfera bassa, la quale è, come del resto deve essere, molto meno transparente di quella, al contrario, altissima relativa alla posizione mattutina. — Febb. 3, 6, 7, 8. Cielo sempre splendido. Sfocando una stella di 12.^{m}5 le si fa assumere un' apparenza somigliante a quella della cometa, laonde si può dire che questa ha tale grandezza, che poi si sa essere di difficile osservazione toccando quasi il limite della forza dell'Amici — Febb. 12, 13, 14. Splendidissimo. Appena percettibile in cielo perfettamente scuro. Si riconosce e si distingue a fatica dalle stelline ultime visibili nel campo e ciò solo in grazia del suo leggerissimo velo di nebulosità che però splende con intermittenza e con un' oscillazione ritmica. — Febb. 16. Splendido. Osservazioni penose tanto che si risolve di chiudere con questa la serie di tutte, anche perchè da oggi in poi il tenue ed intermittente splendore nebuloso che rivela la cometa, in cielo perfettamente scuro, sarà soverchiato dal chiarore lunare che s'avvicina per durare tutta la notte

BESANÇON.

L'équatorial coudé, par M Chofardet.

A. N. 167 205.

1904	T. m. Besançon	$\Delta\alpha$	Δ D P	Cp.	α app.	log p.Δ	D P app.	log p. Δ	Red. ad l. app.	O − C: $d\alpha \cos\delta$	O − C: $d\delta$	*
Déc. 21	$18^{h}\ 16^{m}\ 15^{s}$	$-1^{m}\ 7.^{s}89$	$-4'\ 33.''$[illegible]	9.6	$16^{h}\ 24^{m}\ 52.^{s}33$	9.609_{n}	$60^{0}\ 39'\ 32.''4$	$[illegible].627_{n}$	$+0.^{s}50\ \ +2.''3$	-0.16	$-$[illegible]$.''0$	9
22	18 8 27	−0 25.4	−0 25.4	16.12	16 27 27.58	9.616_{n}	60 10 59.8	0.630_{n}	$+0.49\ \ +2.4$	$+0.25$	-5.0	10

Les 21 et 22 Décembre, vu la présence de la pleine lune, la comète est à peine visible. On n'aperçoit qu'un vague noyau, pénible à observer.

CHAMBERLIN OBSERVATORY, DENVER.
20 inch refractor. Herbert A. Howe.
A. N. 171.165.

1905	Denver M. T.	Δα	Δδ	Cp.	α app.	log p. Δ	δ app.	log p. Δ	Red. ad l. app.		O — C dα cos δ	O — C dδ	*
Febr. 24	$7^h\ 12^m\ 47^s$	$-0^m\ 38.^s55$	$+2'\ 54.''2$	20.8	$20^h\ 37^m\ 36.^s50$	9.823	$+60^\circ\ 12'\ 26.''5$	0.832	$-1.^s65$	$-3.''5$	$+0.^s06$	$+0.''2$	84
24	7 28 33	−2 56.09	−2 47.1	20.6	20 37 40.34	9.793	+60 12 42.9	0.850	−1.66	−3.4	+0.27	+5.5	85
27	7 25 7	−2 9.62	+1 34.2	20.6	20 53 21.17	9.818	+61 1 0.0	0.840	−1.63	−3.4	+0.20	+2.5	88
27	7 39 51	−4 44.05	−6 20.1	20.6	20 53 25.21	9.788	+61 1 8.1	0.856	−1.63	−3.3	+0.59	+1.4	89
Mar. 2	7 28 34	−0 26.93	−5 37.2	16.6	21 9 8.06	9.829	+61 44 14.3	0.837	−1.61	−3.6	+0.06	+7.5	90
2	7 48 5	−1 18.04	−1 3.4	20.8	21 9 12.40	9.789	+61 44 20.0	0.858	−1.61	−3.6	+0.08	+2.3	91
8	7 43 26	+0 45.00	−0 4.2	20.6	21 40 40.03	9.832	+62 55 32.6	0.842	−1.59	−4.1	+0.02	+8.5	92
8	8 2 1	−1 23.05	+6 22.9	20.8	21 40 44.43	9.792	+62 55 34.7	0.862	−1.59	−4.0	+0.18	+2.8	93
April 5	8 3 3	+0 21.60	+4 16.7	14.6	23 53 4.99	9.872	+65 8 16.9	0.832	−1.34	−6.3	−0.35	+0.3	96
5	8 23 15	−2 18.49	−16 32.5	20.6	23 53 8.81	9.828	+65 8 18.0	0.854	−1.36	−6.2	−0.19	+0.7	97
6	8 10 33	−2 7.35	+3 54.9	20.6	23 57 9.89	9.857	+65 9 8.5	0.841	−1.33	−6.4	−0.24	+0.9	98
6	8 32 59	−2 40.09	−9 28.7	20.6	23 57 14.52	9.805	+65 9 10.7	0.864	−1.35	−6.3	−0.11	+2.4	99

Febr. 24. Comet small and faint — Febr. 27. Comet very faint; nucleus seen. — March 2. Very difficult in haze. — March 8. Nucleus of mag. 13. — April 5 Comet very faint.

HEIDELBERG-KÖNIGSTUHL, astronom. Institut.
12.-zölliger Refraktor. M. Knapp.
A. N. 168.155.

1904—05	M. Z. Königst.	Δα	Δδ	Vgl.	α app.	log p. Δ	δ app.	log p. Δ	Red ad l app.		O — C dα cos δ	O — C dδ	*
Dez. 19	$17^h\ 46^m\ 1.^s7$	$-0^m\ 19.^s08$	$-4'\ 14.''7$	36.8	$16^h\ 19^m\ 40.^s71$	9.612_n	$+28^\circ\ 23'\ 2.''2$	0.693	$+0.^s82$	$-2.''2$	$+0.^s01$	$+1.''7$	3
20	18 20 11.2	−0 37.75	−10 43.0	40.4	16 22 16.55	9.584_n	+28 51 54.0	0.650	+0.48	−2.2	−0.52	+0.2	7
22	18 20 50.7	−0 25.42	+0 35.5	6.6	16 27 27.59	9.584_n	+29 49 10.3	0.640	+0.48	−2.2	−0.50	+3.4	10
27	17 55 10.4	+0 6.85	−2 54.1	30.6	16 40 53.56	9.613_n	+32 16 40.7	0.636	+0.37	−2.6	−0.69	+14.8	13
Jan. 8	17 27 39.6	−0 21.80	+9 23.3	24.6	17 16 41.90	9.653_n	+38 33 31.9	0.608	−1.73	+1.6	−0.34	+9.3	30
14	18 12 35.9	−1 22.21	+7 55.0	20.6	17 36 54.15	9.635_n	+41 50 0.4	0.464	−1.74	+0.4	+2.41	+7.3	48
Febr. 9	17 11 54.7	+2 12.76	+0 58.1	20.6	19 23 6.50	9.802_n	+54 53 54.5	0.387	−1.69	−3.0	+0.06	+5.0	70

Dez. 19. Komet hat gut pointirbaren Kern. — Dez. 20. Beobachtung unsymmetrisch, wegen Tageslicht. — Dez. 22. Dunstig, Vollmond. Komet nur geahnt. Auge und Ohr beobachtet. — 1905. Jan. 8. Bilder schlecht. Komet schwach. — Jan. 14. Bilder schlecht. — Febr. 9. Komet sehr schwach. Sterne ruhig und klar.

HEIDELBERG - KÖNIGSTUHL. Astrophysik Institut.

16.-zöll. Refraktor. Prof. M. Wolf. A. N. 167.55.

1904	M. Z. Kgst.	α app.	log p. Δ	δ app.	log p. Δ	Red. ad l. app.	O — C $d\alpha \cos \delta$	O — C $d\delta$
Dez. 19	$17^h\ 37^m\ 18^s$	$16^h\ 19^m\ 39.^s37$	9.619_n	+ 28° 23′ 6.″8	0.703	+ 0.ˢ52 — 2.″3	— 0.ˢ34	+ 13 2
21	17 57 20	16 24 48.01	9.539_n	+ 29 20 8.1	0.610	+ 0.50 — 2.4	— 1.11	+ 13.9
21	18 27 19	16 24 52.04	9.578_n	+ 29 20 47.8	0.641	+ 0.50 — 2.4	— 0.43	+ 18.0

Die Positionen beruhen auf Ausmessungen von photographischen Aufnahmen mit dem 16-Zöller; Dez. 21 ist die erste Aufnahme mit Objectiv a, die zweite mit Objectiv b gemacht. Vergleichsterne: Dez. 19. AG. Cambr. 7615, 7637, Dez 21. AG Cambr. 7669, 7682.

KOPENHAGEN.

360 mm Refraktor. C. F. Pechüle. A. N. 167.55,207, 170 379.

1904—05	M. Z. Kop.	$\Delta\alpha$	$\Delta\delta$	Vgl	α app	log p. Δ	δ app.	log p. Δ	Red. ad l. app.	O—C $d\alpha \cos \delta$	O—C $d\delta$	*
Dez 18	$17^h\ 39^m\ 17^s$	+ 3ᵐ 40.ˢ89	+ 2′ 1.″6	13 5	$16^h\ 17^m\ 6.^s32$	9.553_n	+ 27° 54′ 47.″6	0.754	+ 0.ˢ53 — 2.″7	— 0.ˢ75	+ 0.″4	1
19	17 30 18	— 0 22.58	— 4 49.1	6.6	16 19 36.92	9.559_n	+ 28 22 27.7	0.757	+ 0.51 — 2.3	+ 0.39	+ 3.0	3
25	18 21 12	+ 1 16.92	+ 0 13.7	4.*6	16 35 25.66	9.523_n	+ 31 16 46 6	0.687	+ 0.46 — 2.7	— 0.55	+ 3.7	11
26	17 57 15	+ 0 26 10	— 0 26.0	6 *6	16 38 6.62	9.548_n	+ 31 46 7.0	0 703	+ 0.44 — 2.5	— 0 53	+ 3.8	12
Jan. 3	16 41 44	— 0 8.82	+ 0 26.2	6.*6	17 0 58.92	9.607_n	+ 35 51 36 4	0.736	— 1 80 + 2.7	— 0.54	+ 3.1	25
9	18 42 22	— 1 7.58	+ 3 48.3	3.*4	17 20 3.68	9.517_n	+ 39 7 14.5	0.558	— 1.77 + 1.4	— 0.44	+ 6.5	32
13	16 8 14	— 0 4.79	— 6 24.2	6.*6	17 33 3.77	9.644_n	+ 41 14 7.4	0.728	— 1.75 + 0.6	— 0.25	+ 5.6	45
14	16 24 20	— 2 13 32	— 2 32.1	6.6	17 36 32.79	9.645_n	+ 41 47 8.8	0.704	— 1.75 + 0.5	— 0.19	+ 5.1	49
Febr. 7	8 31 43	+ 0 42.54	— 0 28.6	4.2	19 12 1.74	9.338_n	+ 53 51 50.8	0.901	— 1.68 — 2.7	+ 0.10	+ 2.6	66
12	16 20 19	+ 1 20.63	+ 1 35.6	6.*5	19 37 14.56	9.773_n	+ 56 7 5.5	0.580	— 1 68 — 3.0	— 0 03	+ 7.2	75
März 2	15 33 8	— 1 19.39	—	4 —	21 9 11.03	9.832_n	—	—	— 1.63 —	— 0.29	—	91
2	15 51 20	—	— 1 27.7	—.3	—	—	+ 61 44 25.7	0.616	— — 3.6	—	— 0.6	91
2	16 16 13	— 1 9.79	—	6.*—	21 9 20.63	9.845_n	—	—	— 1.63 —	— 0 22	—	91

Dez. 18. Die Beobachtung wurde erschwert durch Dünste, in denen der Komet schwach erschien als eine kleine Nebelmasse. — Dez 20 $\Delta\alpha$ mikrometrisch gemessen.

Der Komet war klein und lichtschwach, bis Jan. 14 etwa 11. Gr., mit kernähnlicher Verdichtung. * bei der Anzahl der Vergl. bedeutet. mikrometrisch gemessen. Als mittlerer Fehler für die Einheit der Rubrik „Vergl" ergab sich für die Deklinations- und mikrometrischen Rektaszensions-bestimmungen bis Jan. 14 im grössten Kreise nahezu $\pm 1.''5$, für die Rektaszensions, bestimmung durch Passagen ungefähr das dreifache. Nur für die Deklination des 3. Januar ergab sich $\pm 5''$, in dem der Komet bei den ersten Einstellungen dem Stern zu nahe in Dekl. stand. — Febr. 7. Bei nebliger Luft und tiefem Stande war der Komet sehr schwach und die Bestimmung daher etwas unsicher. Die Hoffnung später in der Nacht eine gute Beobachtung zu erhalten, wurde durch vollständigen Nebel vereitelt.

Febr. 12. Schwach 12. Gr., klein mit Konzentration, recht gut zu pointieren. — März 2. Durch Wolken gehindert. — Mittlerer Fehler für die Einheit der Rubrik „Vgl.": für $\Delta\delta$ und $\Delta\alpha$ mikrometrisch im grössten Kreise $\pm 2''$, für $\Delta\alpha$ durch Passagen im grössten Kreise $\pm 6''$. Mikr. — Pass. im grössten Kreise: Febr. 12 $+2.''1$, März 2 $+3.''5$.

LICK OBSERVATORY, Mount Hamilton. *)

36-inch Refractor. R. G. Aitken. Lick Bull 67.89

1904—05	Mt. Hamilton M. T.	$\Delta\alpha$	$\Delta\delta$	№ of. Comp	α app.	log p.Δ	δ app.	log p. Δ	Red. ad l. app.		O—C $d\alpha \cos\delta$	O—C $d\delta$	*
Dec. 19	$17^h 11^m 57^s$	$-0^m 6.^s13$	$+2' 0.''9$	10.10	$16^h 20^m 31.^s92$	9.717_n	$+28^\circ 32' 38.''0$	0.601_n	$+0.^s51$	$-2.''3$	$-0.^s30$	$+4.''0$	5
27	16 40 30	+0 23.14	−1 24.8	10.8	16 41 46.01	9.740_n	+32 25 49.5	0.610_n	+0.44	2 7	−0.16	+0.3	14
Jan. 9	17 15 28	−0 22.39	−0 14.2	15.10	17 21 5 22	9.759_n	+39 17 25.0	0.437_n	−1.76	+1.2	−0.25	+7.2	53
28	15 21 51	+0 3.61	−0 35 6	10.6	18 31 2.91	9.850_n	+49 23 57 4	$0.6[illegible]4_n$	−1.71	−1.7	+0.08	+4.7	54
Febr. 26	16 24 49	+0 8 41	+0 1.0	10.6	20 50 36.97	9.982_n	+60 52 5 3	0.408_n	−1.71	−1.7	—	+1.4	87

MILANO.

Osservazioni fatti col micrometro circolare al rifrattore equatoriale di 8 pollici del R. Osserv. di Brera in Milano fatte dal L. Gabba. A. N. 168.155.

1905	T. m. Milano	$\Delta\alpha$	$\Delta\delta$	Cf.	α app.	log p. Δ	δ app.	log p Δ	Red. ad l app.		O—C $d\alpha \cos\delta$	O—C $d\delta$	*
Gen. 10	$17^h 14^m 39^s$	$-0^m 9.^s25$	$-2' 33''0$	10	$17^h 23^m 11.^s26$	9.707_n	$+39^\circ 38' 2.''2$	0 556	$-1.^s81$	$+1''2$	$+0.^s36$	$+3.''2$	35

*) In this place I want to express my sincere thanks to Messrs. *C. Luplau-Janssen and G. E H. Haarh*, Kopenhagen for supplying me with these data.

NICE.

Équat coudé par M. Giacobini et équat. 0.m76 par M. Javelle (M. Giacobini=G, M. Javelle=J).

B. A. XXIII. 27.. XXIV. 156.

1904–05	T. m. de Nice	Δα	Δ DP	N d c	O.	α app.	log f. p.	D P app.	log f. p.	Red. a. j.	O – C dα cos δ	O – C dδ	*
Déc. 17	17h 41m 16s	−1m 35.s42	+ 6′ 0.″8	10.5	G	16h 14m 39.s62	9.664$_n$	62° 32′ 17.″9	0.655$_n$	+0.s52 +2.″0	−0.s40	+ 2.″3	2
18	16 44 1	+3 37.96	− 1 21.8	15 10	"	16 17 3.38	9.683$_n$	62 5 52.1	0.711$_n$	+0.53 +2.7	−0.26	+ 0.8	1
19	17 35 7	−0 58.31	+ 7 40.7	15.10	"	16 19 39.74	9.666$_n$	61 37 3 8	0.647$_n$	+0 52 +2.3	−0.34	− 1.6	5
20	18 5 43	+0 19.18	+ 7 35.0	16.10	"	16 22 16.14	9.648$_n$	61 8 16.0	0.600$_n$	+0 51 +2.3	−0.18	− 0.7	6
21	17 30 28	+0 3 51	− 2 22.3	24.10	J	16 24 46.76	9.669$_n$	60 40 26.6	0.641$_n$	+0.50 +2.4	−0 24	+ 4.6	8
29	16 58 38	−1 7.87	− 5 26.1	18.10	"	16 46 24.84	9.697$_n$	56 43 40.7	0.641$_n$	+0.42 +2.6	−0.56	+ 3.0	17
Janv. 3	17 44 42	−3 28.23	+10 2.9	15 10	G	17 1 9 97	9.683$_n$	54 6 30.6	0 531$_n$	−1 81 −2.8	−0.19	+ 4 1	26
6	18 18 39	−3 53.14	− 6 43.1	12.8	"	17 10 28.77	9.654$_n$	52 29 49.7	0.438$_n$	−1.79 −2.0	+0.10	+ 7.4	28
7	17 27 5	−0 52.64	− 0 4 5	16.10	"	17 13 31 23	9.705$_n$	51 58 46.1	0.530$_n$	−1.78 −1 8	+0.01	+ 6 5	29
13	17 37 21	+3 15.10	+ 1 58 3	12.8	"	17 33 19.88	9.708$_n$	48 43 18.8	0.460$_n$	−1.74 −0.4	+0.02	+ 8.2	43
27	17 1 41	+2 55.82	− 2 15.2	15.10	"	18 25 43 94	9.794$_n$	41 15 25.5	0.415$_n$	−1.71 +1.7	−0.02	+ 5.9	53
28	17 10 1	−2 33.81	+ 4 49 8	15.10	"	18 29 52.46	9.7?4$_n$	40 14 37.9	0.400$_n$	−1.71 +1.8	+0.10	+ 5 5	56
Févr. 1	18 6 7	−1 5 03	− 2 13.3	10.10	"	18 47 0.25	9.775$_n$	38 44 11.0	0.080$_n$	−1.70 +2 0	−0.03	+ 6.4	58
3	17 2 38	−4 15 38	− 4 40.2	12.8	"	18 55 35.95	9 835$_n$	37 47 57.8	0.360$_n$	−1.70 +2.1	+0.16	+ 9.6	59
6	17 6 43	+2 55.89	− 6 42.4	15. 0	"	19 9 9.02	9.837$_n$	36 24 52.5	0.342$_n$	−1.69 +2.6	+0 15	+ 8.3	63
8	17 18 13	+5 6.07	− 3 29 1	12.8	"	19 18 27.29	9.841$_n$	35 31 41.8	0.277$_n$	−1.68 +2.9	+0.31	+ 3.0	67
Mars 8	8 39 1	−0 41.32	+ 2 59.9	6.6	J	21 39 13.73	9.657$_n$	27 7 23.0	0.887$_n$	−1.68 −2.3	−0.39	+ 2.6	92
10	8 42 17	−1 34.89	+ 4 47.5	14.15	"	21 49 39.62	9 660$_n$	26 47 44 8	0.886$_n$	−1.68 −2.3	+0 11	− 7.9	94
11	9 11 6	+3 41.65	− 4 31.3	12.12	"	21 54 56.17	9.549$_n$	26 38 26.1	0.903$_n$	−1.68 −2.3	+0.15	− 8.7	94
Avril 4	9 24 28	+0 14.86	+ 7 37.7	18.10	"	23 47 55.49	9.602$_n$	24 53 5 0	0.882$_n$	−1.35 +6.1	−0.29	− 3.7	95
5	8 25 32	−0 50.81	− 3 59.8	17.16	"	23 51 52.61	9.795$_n$	24 52 0.2	0.851$_n$	−1 31 +6 5	−0.25	+ 0.3	96
6	8 31 2	+3 14.16	− 4 55.7	12.10	"	23 55 57.58	9.782$_n$	24 51 4.3	0.856$_n$	−1.31 +6.5	−0.36	+ 2.3	96
7	9 13 34	+0 48.31	− 4 24.2	16.16	"	0 0 5.57	9.649$_n$	24 50 22.3	0.888$_n$	−1.31 +6.5	−0.43	− 0.9	98
8	9 52 50	−0 46.94	+ 2 53.2	12.12	"	0 4 9.93	9.455$_n$	24 49 45.4	0.908$_n$	−1.31 +6.5	−0.48	− 0.2	100
28	11 27 55	+1 8.78	+ 2 33.6	5.5	"	1 13 31.22	9.495$_n$	24 56 21.5	0.498$_n$	−1.07 +8.9	−0.64	− 1.2	101
Mai 2	9 28 20	−1 5.18	+ 3 58 6	18.10	"	1 24 59 59	9.519$_n$	24 59 26.2	0.907$_n$	−1.03 +9.4	−0.87	+ 2 0	102

PADOVA.

A. Antoniazzi. A. N. 168.335.

1904 - 05	T. m. Padova	Δα	Δδ	Cf.	α app.	log p. Δ	δ app.	log p. Δ	Red. ad l. app.		O — C		*
											dα cos δ	dδ	
Dic 31	$17^h 11^m 59^s$	$+0^m 37.^s 85$	+2′ 56″5	10.10	$16^h 52^m 10.^s 04$	9.683_n	+34° 18′ 7.″6	0.625	$+1.^s 52$	+3.″3	$-0.^s 04$	+ 7.″9	19
31	18 4 15	+ 2 21.09	+ 3 7 3	9.9	16 52 15.95	9.643_n	+ 34 19 16.3	0.543	+ 1.81	+ 3.2	— 0.38	+ 8.5	18
Gen. 7	17 25 55	— 0 55.45	— 0 19 8	10 10	17 13 28.43	9.692_n	+ 38 0 49.7	0.555	— 1.78	+ 1.8	— 0.16	+ 8.6	29
7	18 12 54	+ 3 55 25	— 5 33.5	5.5	17 13 35.06	9.647_n	+ 38 1 51.4	0.460	— 1.78	+ 1.6	+ 0.18	+ 6.8	27
8	17 17 0	— 0 24.79	+ 8 48.5	12.10	17 16 28.87	9.700_n	+ 38 32 57.1	0.563	— 1.77	+ 1 6	— 0.29	+ 5.8	30
10	17 10 44	— 0 51.66	— 2 47.0	10 10	17 23 8.90	9.708_n	+ 39 37 48.2	0.563	— 1 76	+ 1.2	+ 0.10	+ 9.0	35
10	18 5 5	+ 2 8.92	— 3 16.3	10.10	17 23 16.47	9.664_n	+ 39 38 59.6	0.445	— 1 76	+ 1.1	+ 0.19	+ 6.4	31
11	17 3 44	— 2 52.05	+ 4 14.9	10.10	17 26 26.71	9.716_n	+ 40 10 11.1	0.569	— 1.76	+ 1.1	— 0.04	+ 6.4	41
11	17 56 18	— 0 46.79	— 0 55.0	10.10	17 26 34.08	9.676_n	+ 40 11 25.0	0.455	— 1.76	+ 1.0	+ 0.02	+ 8 5	38
12	17 6 54	+ 0 10.30	— 0 37.5	10.10	17 29 48.50	9.717_n	+ 40 42 57.1	0.555	— 1.75	+ 0.8	— 0.21	+ 10 1	42
12	17 58 35	— 2 0.77	— 1 17.9	10.10	17 29 56.14	9.676_n	+ 40 44 5.3	0.440	— 1.76	+ 0 9	+ 0 08	+ 7.7	44
13	17 13 39	+ 3 8.98	— 2 52.7	10.10	17 33 13.75	9.717_n	+ 41 15 46.8	0.533	— 1.75	+ 0.4	— 0.09	+ 11.2	43
13	18 6 10	+ 0 12.60	— 3 34.3	10.10	17 33 21.16	9.671_n	+ 41 16 57.3	0.409	— 1.75	+ 0.6	— 0.14	+ 9.9	45
14	16 55 22	+ 1 39 55	+ 2 8 4	10.10	17 36 37.94	9.731_n	+ 41 47 59.8	0 565	— 1.74	+ 0.3	— 0.03	+ 9.5	47
14	17 45 2	— 0 0.99	— 0 32 5	10.10	17 36 45.12	9.696_n	+ 41 49 8 4	0.452	— 1.75	+ 0.5	— 0 02	+ 10 1	49
15	17 13 18	— 2 47.52	— 7 22.0	10.10	17 40 9.78	9.723_n	+ 42 21 4.9	0.519	1.75	+ 0.4	— 0.14	+ 10.9	51

STRASSBURG.

18-zöll. Refraktor. E. Becker. A. N. 167.221.

1904—05	M. Z. Str.	Δα	Δδ	Vgl.	α app.	log p. Δ	δ app.	log p. Δ	Red. ad l app.		O — C		*
											dα cos δ	dδ	
Dez. 20	$17^h 15^m 44^s$	$+ 2^m 9^s 79$	+5′ 20.″1	12.4	$16^h 22^m 10.^s 54$	9.637_n	+28° 50′ 43.″8	0.709	$+0.^s 52$	—2.″7	$-0.^s 15$	+ 1.″9	4
31	16 56 19	+ 0 37.85	+ 2 55.6	27.8	16 52 9.55	9.665_n	+ 34 18 4.3	0.681	+ 0.39	— 2.6	— 0.50	+ 3.9	19
Jan. 2	16 53 50	+ 0 50.95	+ 2 54 7	21.6	16 58 3.18	9.670_n	+ 35 20 41.0	0.673	— 1.80	+ 2.8	— 0.24	+ 3.2	22
10	17 45 13	+ 1 46.57	+ 2 56.3	30.9	17 23 16 03	9.659_n	+ 39 38 53.4	0.538	— 1.75	+ 1.0	+ 0.26	+ 5.2	34
14	16 23 25	+ 1 37.37	+ 1 44.2	24 8	17 36 35.68	9.715_n	+ 41 47 35.6	0.654	— 1.74	+ 0.2	+ 0.11	+ 6.7	47

Dez. 31. Starke Windstösse erschüttern das Rohr. Im Gegensatz zu Dez. 20 ist nur eine kernartige Verdichtung (schwach 1^{1m}) erkennbar. — Jan. 2. Verdichtung nicht ausgesprochen wie an den vorhergehenden Tagen, mehr verwaschenes Aussehen. — Jan. 10. Komet ist erheblich schwächer als bei der letzten Beobachtung, zuweilen leuchtet ein scharfer fixsternartiger Kern $11^{1}/_{2}-12^{m}$ auf. — Jan. 14. Bilder ganz verwaschen, Durchmesser $30'' \pm$.

TOULOUSE.

Équat. de $0.^{m}38$. M. F. Rossavel. B. A. XXIII.60

1905	T. m. Toulouse	Δα	Δδ	N. d. c.	α app.	log f p.	δ app.	log f. p.	Red. a. j.	O—C dα cos δ	O—C dδ	*
Jan. 2	$13^{h}\ 22^{m}\ 4^{s}$	$-1^{m}20.^{s}16$	+0′ 8.″9	18.20	$16^{h}\ 58^{m}\ 10.^{s}18$	9.698_n	+35° 21′ 51.″6	0.579	$-1.^{s}81$ +2″9	$+0.^{s}18$	+ 7.″5	24
11	17 19 0	+1 59.69	−0 24.4	15.20	17 26 34.73	9.723_n	+40 11 27.3	0.516	−1.76 +0.9	+0.03	+ 5.1	36
11	17 19 0	+1 51.37	−9 8.9	15.20	17 26 34.56	9.723_n	+40 11 25.6	0.516	−1.76 +0.9	−0.10	+ 3.3	37
12	17 14 40	+0 17.41	+0 29.3	18.20	17 29 55.61	9.730_n	+40 44 3.9	0.520	−1.76 +0.9	−0.11	+ 9.6	39
12	17 14 40	+1 47.17	+9 42.9	18.20	17 29 55.37	9.730_n	+40 44 4.6	0.520	−1.75 +0.7	−0.29	+10.3	42
14	17 14 19	−1 25.89	+7 19.8	18.20	17 36 46.97	9.738_n	+41 49 25.3	0.505	−1.76 +0.5	+0.17	+12.2	48
14	17 14 19	−1 59.31	−0 17.8	18.20	17 36 46.79	9.738_n	+41 49 23.1	0.505	−1.76 +0.5	+0.04	+10.0	49
Févr. 3	17 30 20	−0 31.12	+10 15.1	18.20	18 55 45.51	9.810_n	+52 13 3.8	0.249	−1.68 −2.3	+0.24	+10.8	59
3	17 30 20	−2 34.45	+4 57.1	18.20	18 55 45.32	9.810_n	+52 13 1.9	0.249	−1.68 −2.2	+0.12	+ 8.9	60
4	17 15 2	−2 21.96	+3 54.5	18.20	19 0 11.17	9.824_n	+52 40 47.9	0.304	−1.68 −2.3	+0.57	+ 6.8	62

WIEN.

Am Fadenmikrometer des 27.-zöll. Refraktors. J. Palissa. A. N. 168.95, 171.305.

1904—05	M. Z. Wien.	Δα	Δδ	Vgl.	α app.	log p. Δ	δ app.	log p. Δ	Red. ad l. app	O—C dα cos δ	O—C dδ	*
Dez. 20	$17^{h}\ 26^{m}\ 5^{s}$	$+2^{m}\ 7.^{s}19$	+4′ 52.″2	4	$16^{h}\ 22^{m}\ 7.^{s}93$	9.635_n	+28° 50′ 16.″0	0.697	$+0.^{s}51$ −2″6	$-0.^{s}18$	+ 2.″3	4
Jan. 16	17 51 43	−5 27.84	+1 21.4	5	17 43 45.45	9.674_n	+42 54 6.6	0.464	−1.75 +0.3	+0.27	+ 7.1	52
April 8	8 26 21	−1 6.81	−2 36.8	4	0 3 50.06	9.759_n	+65 10 11.0	0.841	−1.31 −6.5	−0.33	− 1.5	100
Mai 1	14 24 8	−3 25.12	−3 19.9	4	1 22 39.61	9.878_n	+65 1 12.8	0.766	−1.06 −9.1	−0.46	− 1.2	102

Comparison Stars.

*	α 1904,05			δ 1904,05			Authority	
1	16^h	13^m	$24.^s89$	$+27^0$	52′	48.″7	A. G. Cambr.	7573
2	16	16	14 52	27	33	45.1	A. G. Cambr.	7594
3	16	19	58.99	28	27	19.1	A. G. Cambr.	7625
4	16	20	0.23	28	45	26.4	A, G. Cambr.	7626
5	16	20	37.53	28	30	39.4	A. G. Cambr.	7635
6	16	21	56.45	28	59	21.6	A. G. Cambr.	7647
7	16	22	53.84	29	2	39.2	A. G. Cambr.	7654
8	16	24	42.76	29	17	13.6	A. G. Cambr.	7669
9	16	25	59.72	29	15	56.8	A G. Cambr.	7675
10	16	27	52.54	29	48	37.1	A. G. Cambr.	7690
11	16	34	8.28	31	16	35.6	A. G. Leiden	5869
12	16	37	40.08	31	46	35.5	Berl. Jahrb. 1904 ζ Herc.	
13	16	40	46 34	32	19	37.4	A. G. Leiden	5907
14	16	41	22.43	32	27	17.0	A. G. Leiden	5910
15	16	43	23.32	32	50	58.4	A. G Leiden	5924
16	16	44	34.51	32	35	11.3	A. G. Leiden	5930
17	16	47	32.29	33	10	55.8	Connected micrometric. with Leiden 5937	
18	16	49	56.67	34	16	5.8	A. G. Leiden	5966
19	16	51	31.81	34	15	13.7	A. G. Leiden	5977
20	16	54	48.34	34	51	47.8	½ [Leid. 5998+Lund]	
21	16	55	51.92	35	0	25.5	½ [Leid. 6001+Lund]	
22	16	57	14.03	35	17	43.5	A. G. Lund	6975
23	16	59	8.83	35	55	1.7	A. G. Lund	6993
24	16	59	32.15	35	21	44 8	A. G. Lund	6996
25	17	1	9.54	35	51	7.5	Connected micrometric. with 23	
26	17	4	40.01	36	3	29.7	A. G. Lund	7025
27	17	9	41.59	38	7	23.3	A. G. Lund	7051
28	17	14	23.70	37	23	25.1	A. G. Lund	7076
29	17	14	25.66	38	1	7.6	A. G. Lund	7077
30	17	17	5.43	38	24	7.0	A. G. Lund	7093
31	17	21	9.31	39	42	14.8	A. G. Lund	7121
32	17	21	13.03	39	3	24.8	A. G. Lund	7122
33	17	21	29.37	39	17	38.0	A. G. Lund	7127
34	17	21	31.26	39	35	56.1	A. G. Lund	7128
35	17	24	2.32	39	40	34.0	A. G. Lund	7144
36	17	24	36.80	40	11	50.8	A. G. Bonn	11197
37	17	24	44.95	40	20	33.6	A. G. Bonn	11198
38	17	27	22.63	40	12	19.5	A G. Bonn	11222
39	17	28	9.95	40	34	21.0	A. G. Bonn	11234
40	17	28	39.85	40	2	33.9	½ [Bonn 11241 + Lund]	
41	17	29	20.52	40	5	55.1	A. G. Bonn	11247

*	α 1905			δ 1905			Authority	
42	17ʰ	29ᵐ	39.ˢ95	+ 40°	43′	38.″8	A. G. Bonn	11252
43	17	30	6.52	41	18	39.1	A. G. Bonn	11256
44	17	31	58.67	40	45	22.3	A. G. Bonn	11279
45	17	33	10 31	41	20	31.0	A. G. Bonn	11294
46	17	34	40.17	41	26	52.2	A. G. Bonn	11317
47	17	35	0.13	41	45	51.1	A. G. Bonn	11323
48	17	38	14.62	41	42	5.0	A. G. Bonn	11356
49	17	38	47 86	41	49	40.4	A. G. Bonn	11361
50	17	39	13.25	42	26	32.4	+42.°2900, Bonn V f. 6	
51	17	42	59.05	42	28	26.5	A. G. Bonn	11414
52	17	49	15.04	42	52	44.9	A. G. Bonn	11498
53	18	22	49 83	48	42	21.0	A. G. Bonn	11977
54	18	31	1.01	49	24	34.7	Connected micrometric. with 55	
55	18	31	42.04	49	27	43.2	A. G. Bonn	12119
56	18	32	27.98	49	20	13.8	A. G. Bonn	12127
57	18	42	40.57	50	54	30.3	A. G. Harv.	5716
58	18	48	6.98	51	13	37.7	A. G Harv.	5743
59	18	56	18.44	52	2	54.4	A. G. Harv.	5807
60	18	58	21.45	52	8	7.0	A. G. Harv.	5819
61	18	59	53.03	52	7	24.0	A. G Harv.	5830
62	19	2	34.81	52	36	55.7	A. G. Harv.	5849
63	19	6	14.81	53	28	27.6	A. G. Harv.	5881
64	19	8	37.97	53	36	46.1	A. G. Harv.	5905
65	19	8	55.17	53	28	48 9	A. G. Harv.	5909
66	19	11	20.88	53	52	22.1	A. G. Harv.	5924
67	19	13	22.90	54	24	51.9	A. G. Harv.	5938
68	19	15	12.44	54	7	20.1	A. G. Harv.	5953
69	19	15	30.17	53	58	33.6	A. G. Harv.	5955
70	19	20	55.43	54	52	59.4	A. G. Harv.	5994
71	19	21	25.30	54	32	43.4	A. G. Harv.	5998
72	19	23	59.19	54	41	37.1	A. G. Harv.	6018
73	19	28	9 80	55	13	5.3	A. G. Harv.	6048
74	19	28	48 90	55	23	9.8	A. G. Hels.	10546
75	19	35	55.61	56	5	32.9	A. G Hels.	10658
76	19	38	58.96	56	5	48.5	A. G. Hels.	10701
77	19	39	17 50	56	20	28.0	A. G. Hels.	10705
78	19	42	30.67	56	30	6.3	A. G. Hels.	10762
79	19	42	52.65	56	32	49.7	A. G. Hels.	10768
80	19	45	53.78	56	59	27.2	A. G. Hels.	10812
81	19	46	43.67	56	48	32.6	A. G. Hels.	10826
82	19	57	1.60	57	41	41.4	A. G. Hels.	10978
83	19	57	4.22	57	32	55.5	A. G. Hels.	10979
84	20	38	16.70	60	9	35.8	A. G. Hels.	11574
85	20	40	38 09	60	15	33.4	A. G. Hels.	11596

*	α 1905,0			δ 1905,0			Authority	
86	20^h	46^m	$54.^s86$	$+60^0$	45′	58.″2	A. G. Hels.	11670
87	20	50	30.14	60	52	8.3	Connected with 86	micrometric.
88	20	55	32.42	60	59	29.2	A. G. Hels.	11793
89	20	58	10.89	61	7	31.5	A. G. Hels.	11834
90	21	9	36.60	61	49	55.1	A. G. Hels.	11992
91	21	10	32.05	61	45	57.0	A. G. Hels.	12007
92	21	39	56 64	62	55	40.9	A. G. Hels.	12454
93	21	42	9.07	62	49	15.8	A. G. Hels.	12503
94	21	51	16.08	63	17	6.8	A. G. Hels.—Gotha	12631
95	23	47	41.98	65	14	38 8	A. G. Hels.—Gotha	14460
96	23	52	44.73	65	4	6.5	A G. Hels.—Gotha	14536
97	23	55	28 66	65	24	56.7	A. G. Hels.	14589
98	23	59	18.57	65	5	20.0	A. G. Hels.	14640
99	23	59	55.96	65	18	45.7	A. G. Hels.	14649
100	0	4	58.18	65	12	54.3	A. G. Hels.	51
101	1	12	23.51	65	6	21.0	A. G. Hels.	1099
102	1	26	5 80	65	4	41.8	A. G. Hels.	1296

5. Comparison with Ephemeris.

With the calculated ephemeris the comparison was made of all the observations accessible. The time of observations was corrected for aberration. The figures in brackets denote the observations, which were not taken into account as they differed too much from the average values. Moreover I omitted all the observations in α made by *M. Abetti* at Arcetri. Since their value proved to be regularly too high in comparison with the normal figures and consequently needed a correction, I considered it wise to omit them, because this deviation was apt to vitiate the definitive elements.

The figures between the horizontal bars belong to one normal place; there are 7 such places. I excluded however the last three observations, as their number was too small to warrant the formation of a normal place.

O — C

Greenwich M. T.			Observatory	$d\alpha \cos \delta$	$d\delta$
1904	Dec.	17.703139	Nice	$-0.^s40$	$+2.''3$
		18.663513	„	-0.26	$+0.8$
		.687234	Kopenhagen	-0.75	$+0.4$
		19.679832	Alger	-0.36	$+3.9$
		.680951	Kopenhagen	$+0.39$	$+3.0$
		.696578	Heidelberg	-0.34	$[+13.2]$
		.698955	Nice	-0.34	-1.6
		.702643	Heidelberg	$+0.01$	$+1.7$
		20.041062	Lick	-0.30	$+4.0$
		.667616	Wien	-0.18	$+2.3$
		.684235	Strassburg	-0.15	$+1.9$
		.704480	Arcetri	$[+0.07]$	$+2.7$
		.704480	„	$[+0.24]$	$+3.6$
		.720942	Nice	-0.18	-0.7
		.726400	Heidelberg	-0.52	$+0.2$
		21.695811	Nice	-0.24	$+4.6$
		.710575	Heidelberg	$[-1.11]$	$[+13.9]$
		.711664	Arcetri	$[+0.03]$	$+2.7$
		.731252	Besançon	-0.16	-2.0
		.731398	Heidelberg	-0.43	$[+18.0]$
		22.725877	Besançon	$+0.25$	-5.0
		.726948	Heidelberg	-0.50	$+3.4$
		25.716542	Kopenhagen	-0.55	$+3.7$
		26.699947	„	-0.53	$+3.8$
		27.709302	Heidelberg	-0.69	$[+14.8]$
		28.019534	Lick	-0.16	$+0.3$
		.700009	Arcetri	$[-0.02]$	$+1.8$
		.700009	„	$[+0.35]$	$+5.7$
		29.674003	Nice	-0.56	$+3.0$
		31.670639	Padova	-0.04	$+7.9$
		.671157	Strassburg	-0.50	$+3.9$
		.706633	Arcetri	$[+0.17]$	$[+13.7]$
		.706937	Padova	-0.38	$+8.5$
1905	Jan.	1.702531	Arcetri	$[+0.09]$	$+9.9$
		.702531	„	$[+0.19]$	$+10.1$
		2.669489	Strassburg	-0.24	$+3.2$
		.705614	Toulouse	$+0.18$	$+7.5$
		3.647749	Kopenhagen	-0.54	$+3.1$
		.706142	Nice	-0.19	$+4.1$
		6.729779	„	$+0.10$	$+7.4$
		7.680492	Padova	-0.16	$+8.6$
		.694000	Nice	$+0.01$	$+6.5$

Greenwich M. T.	Observatory	dα cos δ	dδ
1905 Jan. 7.706239	Arcetri	[+0.^{s}29]	+ 8.″3
.713119	Padova	+0.18	+ 6.8
8.675119	„	—0.29	+ 5.8
.691331	Heidelberg	—0.34	+ 9.3
.703450	Arcetri	[+0.02]	+ 4 4
9.731660	Kopenhagen	—0.44	+ 6.5
10.044158	Lick	—0.25	+ 7.2
.670001	Padova	+0.10	+ 9.0
.680166	Milano	+0.36	+ 3.2
.695635	Arcetri	[+0.42]	+11.3
.705344	Strassburg	+0.26	+ 5.2
.707744	Padova	+0.19	+ 6.4
11.665155	„	—0.04	+ 6.4
.701659	„	+0 02	+ 8.5
.704672	Toulouse	+0.03	+ 5.1
.704672	„	—0.10	+ 3.3
.706449	Arcetri	[+0.18]	+ 7.6
.706449	„	[+0.29]	+ 5.0
12.667365	Padova	—0.21	+10.1
.701675	Toulouse	—0.11	+ 9.6
.701675	„	—0.29	+10.3
.703257	Padova	+0.08	+ 7.7
.716543	Arcetri	[+0.57]	+ 8.0
13.637446	Kopenhagen	— 0.25	+ 5.6
.684835	Padova	—0 09	+11.2
.710806	Arcetri	[+0.40]	+ 4.4
.710806	„	[+0.52]	+ 6.6
.714027	Nice	+0 02	+ 8.2
.721306	Padova	—0.14	+ 9.9
14.648626	Kopenhagen	—0.19	+ 5.1
.661360	Strassburg	+0.11	+ 6.7
.672139	Padova	—0.03	+ 9.5
.706629	„	—0.02	+10.1
.714214	Toulouse	+0.04	+10 0
.714214	„	+0.17	+12.2
.722982	Arcetri	[+0.10]	+ 9.6
.722982	„	[+0.45]	+ 4.5
15.684592	Padova	—0.14	+10.9
.719926	Arcetri	[+0.45]	+ 7.4
16.698861	Wien	+0.27	+ 7.1
27.689224	Nice	—0.02	+ 5.9
28.695011	„	+0.10	+ 5.5
.978076	Lick	+0.08	+ 4.7
31.695771	Arcetri	[+0.58]	+ 7.9
Febr. 1.708572	„	[+0 39]	+ 5.8

Greenwich M. T.	Observatory	$d\alpha \cos \delta$	$d\delta$
1905 Febr. 1.733969	Nice	$-0.^s03$	$+6.''4$
3.689883	„	+0.16	+ 9.6
.701593	Arcetri	[+0.72]	+10.2
.725336	Toulouse	+0.12	+ 8.9
.725336	„	+0.24	+10.8
4.714711	„	+0.57	+ 6.8
6.692719	Nice	+0.15	+ 8.3
.697692	Arcetri	[+0.47]	+ 9.0
.697692	„	[+0.61]	+ 8.0
7.320421	Kopenhagen	+0.10	+ 2.6
.703005	Arcetri	[+0.78]	+ 4.0
.703005	„	[+0.70]	+ 6.0
8.700704	Nice	+0.31	+ 3.0
.710818	Arcetri	[+0.81]	+ 6.3
9.692379	Heidelberg	+0.06	+ 5.0
.704718	Arcetri	[+0.46]	+ 3.9
10.696581	„	[+0.59]	+ 6.3
.696581	„	[+0.63]	+ 5.4
12.645838	Kopenhagen	−0.03	+ 7.2
.702449	Arcetri	[+0.41]	+ 3.0
.702449	„	[+0.44]	+ 3.4
13.692484	„	[+0.71]	+ 5.4
.692484	„	[+0.54]	+ 5.5
14.703653	„	[+0.41]	− 2.9
.703653	„	[+0.25]	− 1.8
16.693919	„	[+0.72]	+ 6.3
.693919	„	[+0.58]	+ 7.0
24.592068	Denver	+0.06	+ 0.2
.603017	„	+0.27	+ 5.5
27.021803	Lick	—	+ 1.4
.600633	Denver	+0.20	+ 2.5
.610864	„	[+0.59]	+ 1.4
March 2.603029	„	+0.06	+ 7.5
.613072	Kopenhagen	[−0.29]	—
.616582	Denver	+0.08	+ 2.3
.625710	Kopenhagen	—	− 0.6
.642990	„	[−0.22]	—
8.340150	Nice	[−0.39]	+ 2.6
.613353	Denver	+0.02	+ 8.5
.626258	„	+0.18	+ 2.8
10.342418	Nice	+0.11	− 7.9
11.362429	„	+0.15	− 8.7
April 4.371713	„	−0.29	− 3.7
5.330787	„	−0.25	+ 0.3
.626979	Denver	−0.35	+ 0.3

Greenwich M. T.	Observatory	$d\alpha \cos \delta$	$d\delta$
1905. April 5.641007	Denver	$-0.^s19$	$+ 0.''7$
6.334607	Nice	-0.36	$+ 2.3$
.632187	Denver	-0.24	$+ 0.9$
647766	„	-0.11	$+ 2.4$
7.364144	Nice	-0.43	$- 0.9$
8.306250	Wien	-0.33	$- 1.5$
391412	Nice	-0.48	$- 0.2$
28.438200	„	-0.64	$- 1.2$
May 1.535222	Wien	-0.46	$- 1.2$
2.354849	Nice	-0.87	$+ 2.0$

The same weight = 0.1, was attributed to all the observations. The following table gives the normal deviations and their weights.

Greenw. M. T.	$d\alpha \cos \delta$	Wt.	$d\delta$	Wt.
1904. XII. 20.0	$-0.^s235$	1.9	$+1.''48$	1.9
31.0	-0.350	1.2	$+5.10$	1.5
1905. I. 13.0	-0.035	3.3	$+7.59$	4.4
II. 2.0	$+0.152$	0.8	$+7.50$	1.1
10.0	$+0.118$	0.5	$+4.50$	2.1
III. 4.0	$+0.063$	1.3	$+1.35$	1.3
IV. 6.0	-0.303	1.0	$+0.06$	1.0

6. Perturbations.

I calculated the perturbations by the *Encke* method, in rectangular coordinates, in intervals of 20 days. They are extremely small owing to the large distance of the comet from Jupiter and Saturn. The calculations, only for these two planets, were made with 6 — and 5 — place logarithmic tables. The osculating epoch is 1904 Dec. 19.0.

Denoting the perturbations in rectangular ecliptical coordinates by $d\xi$, $d\eta$, $d\zeta$, we obtain (in units of the seventh decimal place):

Greenw. M. T.	$d\xi$[♃ + ♄]	$d\eta$[♃ + ♄]	$d\zeta$[♃ + ♄]
1904. Nov. 19.0	— 18	— 10	— 9
Dec. 9.0	— 2	— 1	— 1
29.0	— 2	— 1	— 1
1905. Jan. 18.0	— 15	— 10	— 11
Feb. 7.0	— 40	— 29	— 33
27.0	— 74	— 56	— 70
March 19.0	—115	— 92	—126
April 8.0	—160	—136	—204
28.0	—207	—187	—309

Adding the above values to normal deviations, we have:

Greenw. M. T.			$d\alpha \cos \delta$	$d\delta$
190'.	Dec.	20 0	—3."52	+1."48
		31.0	—5.27	+5.07
1905.	Jan.	13.0	—0.62	+7.49
	Febr.	2.0	+1 94	+7.27
		10.0	+1 31	+4.26
	March	4.0	+0.23	+1.29
	April	6.0	—4.88	+0.35

and the corresponding normal places:

Greenw. M. T.			α			δ		
1904.	Dec.	20.0	245°	5'	53."47	+28°	31'	26."64
		31.0	252	32	43.57	+33	57	13.27
1905.	Jan.	13.0	262	44	4 12	+40	53	38.34
	Febr.	2 0	282	3	13 31	+51	23	47.94
		10.0	291	9	14.92	+55	1	56.72
	March	4.0	319	8	15.13	+62	2	35.40
	April	6.0	358	39	46.89	+65	8	37.69

7. Least Squares Solution for Definitive Elements.

The differential coefficients of the equations of condition were computed by formulae given in *Bauschinger's* Bahnbestimmung p. 450; the calculation was made by means of logarithms and verified by means of the arithmometer Trinks-Brunsviga. Multiplying the equations of condition by the square root of the weights given on p. 24 I got the following system of equations, whose weights=1 (the coefficients in natural numbers).

— 818.04 dT	— 0.25800 dq	+ 0.50634 ds	— 0 42484 dp	+ 0.93424 dq	= — 4.859
— 796.45	— 0.28568	+ 0.52371	— 0.39550	+ 0.69184	— 5.775
— 1615.36	— 0.65118	+ 1.13954	— 0.70233	+ 0.97740	— 1.126
— 966.49	— 0.44893	+ 0.75794	— 0.26657	+ 0.27491	+ 1.736
— 785.91	— 0.38367	+ 0.64278	— 0.14860	+ 0.13746	+ 0.925
— 1138 67	— 0.63294	+ 1.04775	— 0.16402	— 0.11450	+ 0.258
— 497.83	— 0.34447	+ 0.56540	— 0.60751	— 0.28258	— 4.878
— 1939.44	— 0.11778	+ 0 99904	+ 0.16742	— 0.36817	+ 2.040
— 1692.33	— 0.15680	+ 0.88772	+ 0.23694	— 0.41448	+ 6.209
— 2676.12	— 0.33752	+ 1.43864	+ 0 65294	— 0 90868	+ 15.711
— 946.82	— 0.13453	+ 0.50977	+ 0.56245	— 0.58007	+ 7.625
— 1002.59	— 0.11245	+ 0.50975	+ 0.89728	— 0.82999	+ 6.173
— 90.51	+ 0.15972	— 0.12283	+ 0.82617	— 0.57676	+ 1.471
+ 439.22	+ 0.40620	— 0.62160	+ 0.50959	— 0.23703	+ 0.350

The equations were rendered homogeneous by introducing the following substitutions

$$
\begin{aligned}
x &= 2676.12\ dT \\
y &= 0.65118\ dq\ . \\
z &= 1.43864\ d\mathfrak{s} \\
u &= 0.89728\ d\mathfrak{p} \\
v &= 0.97740\ d\mathfrak{q} \\
\log \text{ unit of error} &= 15.711
\end{aligned}
$$

In this way I obtained the system of homogeneous equations:

$-0.3057\,x$	$-0.3962\,y$	$+0.3520\,z$	$-0.4735\,u$	$+0.9559\,v$	$=-0.3093$
-0.2976	-0.4387	$+0.3641$	-0.4408	$+0.7079$	-0.3676
-0.6036	-1.0000	$+0.7921$	-0.7327	$+1.0000$	-0.0717
-0.3612	-0.6894	$+0.5269$	-0.2971	$+0.2813$	$+0.1105$
-0.2937	-0.5892	$+0.4468$	-0.1656	$+0.1406$	$+0.0589$
-0.4255	-0.9720	$+0.7282$	$+0.1828$	-0.1171	$+0.0164$
-0.1860	-0.5290	$+0.3930$	$+0.6770$	-0.2891	-0.3105
-0.7247	-0.1809	$+0.6945$	$+0.1866$	-0.3767	$+0.1298$
-0.6324	-0.2408	$+0.6171$	$+0.2641$	-0.4241	$+0.3952$
-1.0000	-0.5183	$+1.0000$	$+0.7277$	-0.9297	$+1.0000$
-0.3538	-0.2066	$+0.3544$	$+0.6268$	-0.5935	$+0.4853$
-0.3746	-0.1727	$+0.3543$	$+1.0000$	-0.8492	$+0.3930$
-0.0338	$+0.2453$	-0.0854	$+0.9207$	-0.5901	$+0.0936$
$+0.1611$	$+0.6238$	-0.4321	$+0.5679$	0.2425	$+0.0223$

The sum of the squares of the weighted residuals: 1.92055=474."07.

Normal equations:

$+3.19741\,x$	$+2.82286\,y$	$-3.61825\,z$	$-0.86362\,u$	$+0.83335\,v$	$=-1.42162$
$+2.82286$	$+4.27764$	-3.85093	$+0.73365$	-1.07392	-0.37527
-3.61825	-3.85093	$+4.35415$	$+0.49419$	-0.41059	$+1.30257$
-0.86362	$+0.73365$	$+0.49419$	$+4.83576$	-4.63241	$+1.76714$
$+0.83335$	-1.07392	-0.41059	-4.63241	$+5.27757$	-2.32898

From these, the following values of the unknown quantities were deduced and found to satisfy the normal equations:

$$
\begin{aligned}
x &= -4.43499 \\
y &= -2.03004 \\
z &= -5.21088 \\
u &= -0.76697 \\
v &= -1.23269
\end{aligned}
$$

The substitution of this values gives

$$
\begin{aligned}
dT &= -0.^{4}026038 && \pm\ 0.005444 \\
dq &= -0.0002375 && \pm\ 0.000063 \\
d\mathfrak{s} &= -56.''91 && \pm\ 13.''24 \\
d\mathfrak{p} &= -13.43 && \pm\ 2.76 \\
d\mathfrak{q} &= -19.82 && \pm\ 2.97
\end{aligned}
$$

Calculating from the quantities $d\mathfrak{s}$, $d\mathfrak{p}$, $d\mathfrak{q}$ the corrections of the elements ω, i, Ω, we have:

$$
\begin{aligned}
d\omega &= -60.''94 \\
di &= +2.76 \\
d\Omega &= -24.12
\end{aligned}
$$

The resulting corrections found, being applied to the elements for comparison, give the following system of parabolic elements:

Definitive Elements.

T	1904 Nov. 3.260112 Greenw. M. T.	
ω	40° 43′ 35.″82	1904.0
Ω	218 26 50.88	
i	99 36 33.60	
$\log q$	0.2745593	

In order to verify the reliability of the determined elements I substituted the quantities dT, dq, $d\mathfrak{s}$, $d\mathfrak{p}$, $d\mathfrak{q}$ in the equations of condition and thus the sum of the squares of the weighted residuals equal 30″ was obtained. Therefore this sum has been reduced from 474″ (elements for comparison) to 30″ (definitive elements). I verified this last quantity computing the formula [ll 5]=31″.

For the definitive comparison of the new elements with the provisional ones I calculated the ephemeris for all the normal places in order to obtain the values of O—C which are given in the following table.

Greenw. M. T.	$d\alpha \cos \delta$		$d\delta$	
	Equations	Elements	Equations	Elements
1904. Dec. 24.0	+1.″90	+2.″07	−1.″76	−1.″73
31.0	−2.11	−2.07	−0.04	+0.03
1905. Jan. 13.0	−0.22	−0.14	+1.02	+1.07
Feb. 2.0	−0.47	−0.42	+1.38	+1.39
10.0	−1.44	−1.35	−0.57	−0.53
March 4.0	−0.74	−0.68	−0.35	−0.32
April 6.0	+0.02	+0.05	−1.54	−1.48

The same table gives also the results of the substitution of the obtained solutions in the equations of condition. As can be seen the differences are rather small and the determined parabolic elements are to be considered definitive.

In this place I desire to express my sincerest thanks to Prof. *Wl. Dziewulski*, Director of the Wilno Observatory for his untiring help and valuable advice.

Wilno, 1922 Dec. 16.