LICK OBSERVATORY BULLETIN

NUMBER 86

ELEMENTS AND EPHEMERIS OF COMET *b* 1905 (SCHAER)

The results given below were obtained from the following observations telegraphed by the Director of the Lick Observatory:

1905 Gr. M.T.	Comet's Apparent.		Observer.
	α	δ	
Nov. 18.6834	0 ^h 33 ^m 54. ^s 4	+77° 17' 26"	Aitken
21.6236	23 45 22.3	+51 36 49	Aitken
25.8176	23 33 48.2	+23 1 47	Smith

Originally the computation was based on the first two of these observations and one taken November 22 by Smith. On account of the rapid motion of the comet, two other observations, one by Hartwig made at Bamberg on the 18th, and the other by Morgan made at Glasgow, Mo., on the 19th, were used in combination with these three for the determination of the velocities and accelerations at the middle date (November 21), thus taking into account the third and fourth derivatives of α and δ with respect to the time. The parabolic residuals for the first and third places, November 18 and November 22, were very unsatisfactory. Instead of removing them by a solution without hypothesis regarding the eccentricity, it was decided to correct the orbit on the basis of the observation of November 25 given above, which in the meantime had become available.

The method used was Leuschner's adaptation of his "Short Method" to the computation of a parabola (cf. Bulletin No. 73). The computation was made so as to satisfy the three right ascensions and the second and third declinations. The result was a residual in the first declination of $-38' 35''$ (o—c). Like the former attempts, this large residual shows that the observations cannot be represented satisfactorily by a parabola. Corrections to the geocentric

distance and the heliocentric velocities were then obtained without assumption regarding the eccentricity by the "Short Method," so as to remove all of the residuals. The resulting elements are as follows:

$$\begin{aligned}
 T &= 1905 \text{ October } 25.02430 \\
 \omega &= 132^\circ 07' 26''.8 \\
 \Omega &= 223 \quad 04 \quad 08.3 \\
 i &= 140 \quad 27 \quad 14.0 \\
 \phi &= 74 \quad 41 \quad 13 \\
 \log a &= 0.020856 \\
 \log e &= 9.984301 \\
 q &= 1.049195 \\
 \log \mu &= 1.344119 \\
 \text{Period} &= 160.6526 \text{ years}
 \end{aligned}
 \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} 1905.0$$

The "Constants for the Equator" were computed from the heliocentric rectangular coördinates and their velocities. The elements were then computed from the "Constants for the Equator."

CONSTANTS FOR THE EQUATOR 1905.0.

$$\begin{aligned}
 x &= r [9.954499] \sin (6^\circ 20' 22''.6 + v) \\
 y &= r [9.832248] \sin (64 \quad 55 \quad 42.3 + v) \\
 z &= r [9.930826] \sin (113 \quad 32 \quad 24.5 + v)
 \end{aligned}$$

The ephemeris was computed by the formulae given in v. Oppolzer, vol. I, p. 73, for nearly parabolic orbits.

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EPHEMERIS FOR GREENWICH MEAN MIDNIGHT.

1905	True α			True δ			$\log r$	$\log \Delta$	Br.
Dec. 3.5	23 ^h	30 ^m	07 ^s .9	+00°	25'	18"		9.7463	
4.5	30	06.2	—01	06	59				
5.5	30	07.6	—02	28	56	0.0957	9.7964	0.13	
6.5	30	11.8	—03	47	01				
7.5	30	18.5	—04	47	31		9.8419		
8.5	30	27.3	—05	46	27				
9.5	30	38.2	—06	39	45	0.1077	9.8835		
10.5	30	50.7	—07	28	04				
11.5	31	04.8	—08	12	06		9.9216		
12.5	31	20.3	—08	52	16				
13.5	31	37.0	—09	29	06	0.1199	9.9566	0.06	
14.5	31	55.0	—10	02	54				
15.5	32	14.1	—10	34	02		9.9890		
16.5	32	34.2	—11	02	46				
17.5	32	55.4	—11	29	20	0.1324	0.0190	0.04	
18.5	33	17.6	—11	54	05				
19.5	33	40.6	—12	16	49		0.0470		
20.5	34	04.5	—12	38	04				
21.5	34	29.2	—12	57	53	0.1449	0.0731		
22.5	34	54.2	—13	16	22				
23.5	35	20.9	—13	33	37		0.0976		
24.5	35	47.9	—13	49	45				
25.5	36	15.6	—14	04	53	0.1574	0.1205	0.02	
26.5	36	43.9	—14	19	03				
27.5	37	12.8	—14	32	22		0.1422		
28.5	37	42.3	—14	44	52				
Dec. 29.5	23	38 12.5	—14	56	37	0.1698	0.1626	0.02	

Brightness November 21, 1905 = 1.00

R. T. CRAWFORD,
A. J. CHAMPREUX.

BERKELEY ASTRONOMICAL DEPARTMENT,
December 1, 1905.