

EPHEMERIS OF ENCKE'S COMET FOR BERLIN MEAN MIDNIGHT.

1858					1858				
	α	δ	$\log \Delta$	$\log r$		α	δ	$\log \Delta$	$\log r$
	^h _m ^s	^o / _' ^{''}				^h _m ^s	^o / _' ^{''}		
Aug. 7	4 12 26.92	+31 24 21.6	0.165443	0.159333	Sept. 9	7 36 40.17	+33 57 21.2	9.977917	9.973974
8	16 25.86	31 39 23.8	159557	155183	10	45 22.88	33 35 1.9	974222	966091
9	20 30.75	31 54 19.3	153632	150968	11	7 54 10.52	33 9 55.9	970816	958011
10	24 41.84	32 9 6.5	147669	146686	12	8 3 2.15	32 41 59.7	967715	949723
11	28 59.35	32 23 44.0	141671	142336	13	11 56.84	32 11 10.5	964941	941219
12	33 23.54	32 38 9.9	135641	137915	14	20 53.64	31 37 26.5	962515	932490
13	37 54.65	32 52 22.3	129582	133422	15	29 51.56	31 0 47.6	960451	923527
14	42 32.96	33 6 19.0	123498	128854	16	38 49.61	30 21 14.9	958767	914319
15	47 18.76	33 19 57.8	117390	124209	17	47 46.83	29 38 50.2	957476	904857
16	52 12.33	33 33 16.2	111263	119484	18	8 56 42.28	28 53 36.3	956593	895129
17	4 57 13.94	33 46 11.4	105122	114677	19	9 5 35.10	28 5 36.7	956128	885124
18	5 2 23.87	33 58 40.2	098972	109787	20	14 24.51	27 14 58.5	956092	874830
19	7 42.39	34 10 39.4	092816	104809	21	23 9.75	26 21 47.4	956492	864236
20	13 9.76	34 22 5.3	086662	099742	22	31 50.11	25 26 10.8	957335	853328
21	18 46.23	34 32 54.1	080515	094583	23	40 25.09	24 28 16.7	958625	842098
22	24 32.06	34 43 1.5	074382	089328	24	48 54.22	23 28 13.8	960361	830534
23	30 27.51	34 52 23.0	068270	083975	25	9 57 17.12	22 26 11.2	962544	818625
24	36 32.79	35 0 53.8	062187	078520	26	10 5 33.49	21 22 18.0	965170	806358
25	42 48.09	35 8 28.8	056141	072960	27	13 43.20	20 16 43.5	968232	793726
26	49 13.53	35 15 2.3	050141	067290	28	21 46.22	19 9 37.1	971723	780722
27	5 55 49.42	35 20 28.4	044197	061508	29	29 42.59	18 1 7.7	975632	767342
28	6 2 35.70	35 24 41.1	038321	055609	30	37 32.45	16 51 24.2	979946	753587
29	9 32.45	35 27 34.0	032522	049589	Oct. 1	45 16.08	15 40 34.0	984650	739462
30	16 39.68	35 29 0.1	026813	043445	2	10 52 53.84	14 28 44.4	989729	724983
31	23 57.32	35 28 52.3	021207	037170	3	11 0 26.14	13 16 2.4	9.995163	710163
Sept. 1	31 25.23	35 27 3.4	015718	030761	4	7 53.49	12 2 34.7	0.000929	695035
2	39 3.26	35 23 26.7	010360	024212	5	15 16.55	10 48 26.1	007005	679660
3	46 51.13	35 17 54.0	005149	017518	6	22 36.06	9 33 40.5	013364	664122
4	6 54 48.47	35 10 18.0	0.000102	010673	7	29 52.78	8 18 22.8	019977	648511
5	7 2 54.89	35 0 31.3	9.995236	0.003672	8	37 7.53	7 2 36.5	026814	632906
6	11 9.93	34 48 27.0	990565	9.996508	9	44 21.14	5 46 25.1	033838	617522
7	19 32.95	34 33 58.1	986109	989175	10	51 34.47	4 29 52.0	041008	602605
8	7 28 3.27	+34 16 58.2	9.981886	9.981666	11	11 58 48.36	+ 3 12 59.8	0.048278	9.588242

ELEMENTS AND EPHEMERIS OF THE FIFTH COMET OF 1858.

BY JAMES C. WATSON.

THE great dissimilarity of the elements of the orbit of this interesting comet, computed from observations at different intervals, has induced me to undertake, at this time, to determine from a greater number of observations, and including a much greater interval of time, a new system of parabolic elements, and also to determine whether there is any probability of an eccentricity less than that of the parabola. I have, therefore, by means of approximate elements, constructed normal places for June 11, July 13, and August 14 : the first from observations at Florence, Padua, and Berlin ; the second from observations at Washington and Cambridge (Mass.); and the third from the following observations :

1858	Ann-Arbor M.T.	α	δ
Aug. 12	8 ^h 25 ^m 30 ^s .8	151° 42' 31.3	+31° 8' 7.7
13	8 19 7.1	152 1 27.9	31 16 9.1
14	7 59 28.4	152 20 55.2	31 24 29.7
15	8 8 41.6	152 41 13.7	+31 33 18.0

The normal places are the following, and are referred to the apparent equinox of the date :

1858	Wash. M.T.	α	δ	No. of Obs.
June 11.0	141° 18' 30.9	+24° 46' 25.4	10	
July 13.0	144 32 49.7	27 48 0.8	9	
Aug. 14.0	152 14 12.0	+31 21 47.9	4	

Assuming an approximate value of $\log \Delta$, and varying it so that the sum of the squares of the residuals in the middle place, or $(\Delta \lambda \cos \beta)^2 + (\Delta \beta)^2$, shall be a minimum, the following corrected elements are obtained from the above normal places:

$$\begin{aligned}
 T &= 1858 \text{ Sept. } 29.794381 \text{ Washington M.T.} \\
 \pi &= 36^\circ 20' 11.5 \\
 \Omega &= 165 \ 15 \ 49.7 \\
 i &= 63 \ 3 \ 6.0 \\
 \log q &= 9.763374
 \end{aligned}
 \left. \vphantom{\begin{aligned} T \\ \pi \\ \Omega \\ i \\ \log q \end{aligned}} \right\} \text{Mean Equinox 1858.0}$$

Motion Retrograde.

The comparison of the middle place with these elements gives the following residual error :

$$\begin{aligned}
 & \text{c.-o.} \\
 \Delta \alpha \cos \delta &= -0''.9 & \Delta \delta &= -7''.4
 \end{aligned}$$

It is evident, therefore, considering the great interval of sixty-four days between the extreme places used in the computation of these elements, and the number of observations employed in the formation of the normals, that the ellipticity of the orbit which has hitherto been suspected, in case it really exists, must be extremely small; and it is unnecessary, for the present at least, to abandon the parabolic hypothesis in the computation of elements.

The above parabolic elements give the following

Ephemeris for Washington Mean Midnight.

1858.	α	δ	$\log \Delta$
Aug. 14	10 ^h 9 ^m 34 ^s	+31° 26'.1	0.30894
18	10 15 7	32 1.2	0.29164
22	10 21 15	+32 38.8	0.27198

1858.	α	δ	$\log \Delta$
Aug. 26	10 ^h 28 ^m 6 ^s	+33° 18'.6	0.24956
30	10 35 53	34 0.4	0.22395
Sept. 3	10 44 52	34 43.2	0.19457
7	10 55 27	35 25.0	0.16072
11	11 8 15	36 1.8	0.12152
15	11 24 7	36 26.3	0.07598
19	11 44 16	36 24.5	0.02309
23	12 10 14	35 31.4	9.96220
27	12 43 40	33 3.2	9.89408
Oct. 1	13 25 16	27 53.0	9.82332
5	14 13 25	18 49.7	9.76231
9	15 3 29	+ 5 59.5	9.73184
13	15 49 57	- 7 56.7	9.74589
17	16 29 28	-19 45.4	9.79476

This ephemeris is referred to the mean equinox of 1858.0

If we suppose the intensity of the light of the comet to vary inversely as the product $r^2 \Delta^2$, the relative brilliancy from August 4 to October 17 will be as follows :

Date.	Brilliancy.	Date.	Brilliancy.
1858 Aug. 14	1.00	1858 Sept. 23	17.57
22	1.90	27	25.27
30	2.45	Oct. 1	35.14
Sept. 7	4.35	5	44.55
15	8.46	9	47.12
19	12.14	17	27.58

On August 14, the comet appeared as bright as a star of the 4.5 magnitude; and we may expect, therefore, that it will present a magnificent appearance, in the west after sunset, about the beginning of October.

Ann-Arbor, 1858 August 25.

ELEMENTS OF VIRGINIA, AND AN EPHEMERIS FOR THE OPPOSITION IN 1859.

BY JOHN N. STOCKWELL.

THE Ephemeris is derived from the following elements, with the addition of the perturbations by *Jupiter* and *Saturn*.

ELEMENTS OF VIRGINIA.

$$\begin{aligned}
 1857 \text{ Oct. } 2.0 \quad M &= 0^\circ 58' 30.7 \text{ Washington M.T.} \\
 \Omega &= 173 \ 29 \ 38.9 \\
 \pi &= 10 \ 20 \ 54.9 \\
 i &= 2 \ 47 \ 44.5 \\
 \varphi &= 16 \ 41 \ 0.0 \\
 \log a &= 0.4232913 \\
 \log \mu &= 2.9150696
 \end{aligned}
 \left. \vphantom{\begin{aligned} M \\ \Omega \\ \pi \\ i \\ \varphi \\ \log a \\ \log \mu \end{aligned}} \right\} \text{Mean Equinox 1857.0}$$

The integrated perturbations by *Jupiter* and *Saturn*, from 1857 Oct. 2, till 1859 March 6, are

$$dM = -291''.44, \quad d\Omega' = +12''.32, \quad d\pi = -597''.59, \quad di' = -0''.082, \quad d\varphi = +24''.01, \quad d\mu = +0''.6350.$$

The perturbations $d\Omega'$ and di' are referred to the equator as the fundamental plane.