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PARABOLIC ELEMENTS FOR COMET 1819 II,

BY HENRY A. PECK.

In his review of the "Definitive Orbit of Comet 1819 II," Professor KREUTZ has expressed a preference for elements based upon the first solution of the differential equations. I have carried this work to completion, and am led to the result that a parabola represents the entire series of observations nearly as well as either one of the ellipses given. Starting from the first solution, as given in Nos. 584-5 of the *Astronomical Journal*, we have

$$\begin{aligned}\partial T &= 0.001351 \\ \partial \Omega &= +35''.26 \\ \partial i &= +12.10 \\ \partial \omega &= -17.17 \\ \partial q &= +0.0001170 \\ \partial e &= -0.000120\end{aligned}$$

Corresponding to which are the elements:

$$\begin{aligned}T &= 1819 \text{ June } 27.71682 \text{ G.M.T.} \\ \Omega &= 273^\circ 42' 7.3'' \\ i &= 80^\circ 44' 50.1'' \\ \omega &= 13^\circ 25' 56.8'' \\ \log q &= 9.533382 \\ \log e &= 0.999880\end{aligned}$$

EQUATORIAL COORDINATES.

$$\begin{aligned}x &= [9.237944] r \sin(35^\circ 21' 8.8'' + v) \\ y &= [9.996718] r \sin(260^\circ 42' 15.6'' + v) \\ z &= [9.996737] r \sin(349^\circ 50' 3.3'' + v)\end{aligned}$$

And computing the position of the comet for the last normal date, the residuals are

$$\Delta \alpha \cos \delta = -15''.5 \quad ; \quad \Delta \delta = +1.1$$

while substituting in the last normal equation they are $-14''.9$, $+1.1$ respectively.

The probable error of the correction to the eccentricity

is larger than the quantity itself. To test this further the equations were again solved, the other unknown quantities being stated in terms of the eccentricity, with the result that

$$\begin{aligned}\partial k &= +14.44'' + 2.0997 \frac{\partial e}{2} \\ k\sqrt{2} \partial T &= +13.39 + 0.5352 \frac{\partial e}{2} \\ \partial q &= +28.63 + 0.3619 \frac{\partial e}{2} \\ \partial \lambda &= -37.65 - 0.5237 \frac{\partial e}{2} \\ \partial v &= +21.36 + 0.1447 \frac{\partial e}{2}\end{aligned}$$

Substituting these values in the observation equations there results

$$\begin{array}{l|l} + 1.26 + 0.034 \partial e & + 1.66 + 0.000 \partial e \\ - 0.90 - 0.000 & - 3.80 - 0.005 \\ - 0.98 - 0.017 & + 0.54 + 0.007 \\ - 2.25 - 0.020 & + 1.86 + 0.015 \\ + 2.58 - 0.016 & + 0.66 + 0.014 \\ + 1.04 - 0.003 & + 0.36 + 0.003 \\ + 5.48 + 0.014 & + 14.55 - 0.012 \\ - 1.02 + 0.051 & - 19.24 - 0.044 \\ + 9.74 + 0.075 & + 1.16 - 0.060 \\ - 11.98 + 0.110 & - 0.70 - 0.074\end{array}$$

If values for ∂e , ranging from 0 to $-50''$, are substituted, the following table may be formed:

∂e	$p\partial v$
$-50''$	14282
40	13980
30	13953
20	13968
10	14153
0	14437

from which may be seen that although there is an incli-

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nation towards an elliptic form, yet a parabola is not out of the range of possibilities.

Assuming $\partial e = 0$, there results the following corrections to the elements:

$$\begin{aligned}\partial T &= +0.00267 \\ \partial \Omega &= +42''.12 \\ \partial i &= +12.04 \\ \partial \omega &= +7.67 \\ \partial q &= +0.0001388\end{aligned}$$

Adding these corrections to the original elements, and computing the probable errors, we have as the final parabolic elements:

$$T = 1819 \text{ June } 27.71814 \pm 0.00100 \text{ Gr. M.T.}$$

$$\left. \begin{aligned}\Omega &= 273^\circ 42' 14.1 \pm 3.0 \\ i &= 80^\circ 44' 50.0 \pm 4.5 \\ \omega &= 13^\circ 26' 21.7 \pm 17.1\end{aligned} \right\} 1819.0$$

$$\log q = 9.533409 \pm 0.000032$$

Syracuse University, 1907 Jan. 29.

EQUATORIAL COORDINATES.

$$\begin{aligned}x &= [9.237973] r \sin (35^\circ 22' 10.4 + v) \\ y &= [9.996716] r \sin (260^\circ 42' 41.2 + v) \\ z &= [9.996737] r \sin (349^\circ 50' 28.5 + v)\end{aligned}$$

As a check on the numerical part of the work the comparison of the residuals obtained by direct computation from the elements, and by substitution in the differential equations, is appended.

$\Delta \alpha \cos \delta$		$\Delta \delta$	
Elements	Equations	Elements	Equations
+ 1.3	+ 1.3	+ 1.6	+ 1.7
- 0.9	- 0.9	- 3.2	- 3.8
- 1.0	- 1.0	+ 1.0	+ 0.5
- 2.1	- 2.2	+ 2.0	+ 1.9
+ 2.7	+ 2.6	+ 0.2	+ 0.7
+ 1.0	+ 1.0	+ 0.5	+ 0.4
+ 5.8	+ 5.5	+14.2	+14.5
- 1.1	- 1.0	-18.7	-19.2
+ 9.7	+ 9.7	+ 1.3	+ 1.2
-12.3	-12.0	- 0.9	- 0.7

MAXIMA OF LONG-PERIOD VARIABLES,

By IDA WHITESIDE.

The maxima of the following long-period variables were determined by the single-light curves, deduced from observations made with a four-inch Dolland telescope. The predicted times of maximum are those given in CHANDLER'S

"Ephemerides of Long-Period Variables." The last column gives the authority for the magnitudes of the comparison stars used.

Star	Date of Maximum	Predicted Date	Magn.	No. of Obsns.	Time covered by Observations	Comparison Stars
7468 <i>T Aquarii</i>	Nov. 17, 1906	Dec. 23, 1906	7.60	8	Oct. 12, '06-Dec. 18, '06	Harvard
5194 <i>V Bootis</i>	Near Aug. 9, "	May 24, "	7.80	25	Mar. 12, " -Oct. 1, "	Harvard
5190 <i>R Camelopardalis</i>	Oct. 20, "	Nov. 2, "	8.10	10	Sept. 15, " -Dec. 4, "	Harvard
432 <i>S Cassiopeiae</i>	Sept. 21, "	Oct. 31, "	7.40	18	Aug. 13, " -Jan. 26, '07	Harvard
243 <i>U Cassiopeiae</i>	Sept. 15, "	Aug. 6, "	8.60	14	Aug. 9, " -Nov. 14, '06	Harvard
294 <i>W Cassiopeiae</i>	July 19, "	Aug. 4, "	8.90	16	June 29, " -Oct. 23, '06	B.D.
845 <i>R Ceti</i>	Nov. 18, "	Dec. 12, "	9.00	7	Oct. 12, " -Jan. 11, '07	Harvard
2942 <i>RT Cygni</i>	Nov. 30, "	Dec. 17, "	7.30	8	Oct. 12, " -Dec. 18, '06	B.D.
7299 <i>U Cygni</i>	Dec. 21, "	Oct. 28, "	6.40	17	Aug. 13, " -Jan. 10, '07	Harvard
7192 <i>Z Cygni</i>	Sept. 22, "	Oct. 13, "	9.25	11	Aug. 13, " -Nov. 1, '06	Harvard
7261 <i>R Delphini</i>	Nov. 7, "	Dec. 1, "	8.35	9	Oct. 12, " -Jan. 11, '07	Harvard
5955 <i>R Draconis</i>	After Nov. 24, "	Nov. 7, "	7.30or+	10	Sept. 15, " -Nov. 24, '06	Harvard
5768 <i>RR Herculis</i>	Sept. 24, "	Nov. 18, "	8.40	8	Sept. 14, " -Nov. 14, "	B.D.
6512 <i>T Herculis</i>	Aug. 9, "	Aug. 1, "	7.80	13	June 29, " -Sept. 28, "	Harvard
5887 <i>V Ophiuchi</i>	On or bef. July 13 "	Sept. 3, "	7.90or+	10	July 13, " -Oct. 13, "	B.D.
6682 <i>X Ophiuchi</i>	Aug. 8, "	Aug. 8, "	6.15	22	June 29, " -Dec. 18, "	Harvard
6207 <i>Z Ophiuchi</i>	On or aft. Sept. 8 "	Sept. 8, "	8.05	15	July 13, " -Nov. 24, "	B.D.
8290 <i>R Pegasi</i>	Sept. 15, "	Sept. 29, "	7.65	19	July 18, " -Dec. 18, "	Harvard
8373 <i>S Pegasi</i>	Sept. 14, "	Aug. 27, "	8.50	19	July 11, " -Dec. 11, "	Harvard
5677 <i>R Serpentis</i>	Near July 8, "	July 8, "	Abt. 7.65	16	June 29, " -Oct. 23, "	Hagen
5501 <i>S Serpentis</i>	Aug. 29, "	Oct. 11, "	9.15	6	Aug. 13, " -Oct. 12, "	Harvard
906 <i>R Trianguli</i>	Oct. 8, "	Nov. 12, "	6.00	12	Sept. 15, " -Jan. 11, '07	Harvard
5601 <i>S Ursae minoris</i>	Sept. 10, "	Sept. 19, "	8.00	19	July 13, " -Dec. 4, '06	B.D.

South Cambridge, N. Y.