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Begun Sept. 2. 1881.

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log. $\frac{u}{15}$
" sin. t
" tan. δ
Sum logs.
Cor. Zy.
$\frac{u}{15}$
Alg. Sum.
log. sum.
" ½ interval.
Sum log.
Cor. Zy.
Orig. α. R.
A.
log. $\frac{u}{15}$
" sin. A.
" tan. D.
Sum logs.
Cor. Zy.
$\frac{u}{15}$
Alg. sum.
log. do.
log. total int.
Sum logs.
Cor. Zy.
Orig. R. A.
Final R. A.

log. u
" cos. t
" ½ interval.
Sum logs.
Cor. Zy.
Orig. Dec.
D
log. u
" cos. A.
" total interval.
Cor. Zy.
Orig. Dec.
Final Dec.

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log. $\frac{n}{15}$

1 sin. r

" tan. δ

Sum logs.

Cor. Ly.

$\frac{m}{15}$

Alg. Sum

log. "

" $\frac{1}{2}$ interval

Sum logs.

Cor. Ly.

Orig. A. R.

δ

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26 yrs. Aug. 10. 1881.
Comet b 1881.

Assu. +78° 46. 13 42 6 +78 47.4 (5.8)

B.Z. 13 42 5.51 +78 47 26.9 (6.0)
205° 31' 22".65

log. $\frac{m}{n}$	0.126131	log. n	1.302206
" sin t	9.634348 n	" cos t	9.955405 n
" tan. δ	0.702957	" ½ interval	1.113943
Sum logs.	0.463436 n	Sum logs.	2.371554 n
Cor. 2y.	-2.9069	Cor. 2y.	-235.26 = -3 55.26
$\frac{m'}{n}$	+3.0707	Aug. Dec.	78 47 26.9
Alg. Sum	+0.1638	II	78° 43' 31".6
log. sum	9.214314	log. n	1.302179
" ½ interval	1.113943	" cos. A.	9.955378 n
Sum logs.	+0.328257	" total interval	1.414973
Cor. 2y.	+2.13	Sum logs.	2.672525 n
Orig. R.A.	13 42 5.51	Cor. 2y.	-470.46 -7 50.46
A.	13h 42m 7.64	Aug. Dec.	+78 47 26.9
log. $\frac{n}{n}$	0.126087	Final Dec.	+78° 39' 36".4
" sin A.	9.634490 n		
" tan. D.	0.700367		
Sum logs	0.460944 n		
Cor. 2y.	-2.8903		
$\frac{m'}{n}$	+3.0710		
Alg. sum	+0.1807		
log. dt	9.256958		
" total int.	1.414973		
Sum logs	+0.671931		
Cor. 2y.	+4.70		
Orig. R.A.	13 42 5.51		
Final R.A.	13h 42m 10.21		

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39 yrs. Aug. 10. 1881.
Comet C 1881.

W. M. +51° 1372 7 h 44 m 29.7 s +51 ° 53' 9" (8.8)

Oe. A. 8386-9 7 h 43 m 31.36 s +51 ° 55' 0".1 (9)

115° 52' 50".4

log. $\frac{m}{15}$	0.126131	log m	1.302223
" sin t	9.954101	" cos t	9.639983 n
" tan. d	0.105889	" ½ interval	1.290035
Sum logs	0.186121	Sum logs.	2.232241
Cor. 2y.	+1.5351	Cor. 2y.	-170.70 - 2 50.70
$\frac{m}{15}$	+3.0704	Orig. Dec.	+51° 55' 0".1
Alg. Sum	+4.6055	D.	+51° 52' 9".4
log. sum	0.663277	log. n.	1.302193
" ½ interval	1.290035	" cos d.	9.645781 n
Sum logs.	1.953312	" total inter.	1.591065
Cor. 2y	+89.81	+1 29.81	Sum logs. 2.539039 n
Orig A. R.	7 h	43 m 31.36 s	Cor. 2y. -345.97 - 5 46.0
A.	7 h	45 m 1.17 s	Orig. Dec. +51° 55' 0.1
log $\frac{m}{15}$	0.126101		Finab Dec. +51° 49' 14".1
" sin A.	9.952712		
" tan D	0.105149		
Sum logs	0.183962		
Cor. 2y.	+1.5274		
$\frac{m}{15}$	+3.0708		
Alg. sum	+4.5982		
log do	0.662588		
" total int.	1.591065		
Sum logs	2.253653		
Cor. 2y	+179.33 + 2	59.33	
Orig R. A.	7	43 31.36	
Finab R. A.	7 h	46 m 30.69 s	

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3 yrs. Aug. 11. 1881.
Comet b 1881.

Obs. M. +78° 476	14	4	47	+78	46.8	(9.1)
Obs. A. 143 √	14	4	52.53	+78	50	22.8 (9)

211° 13′ 7″.9 √

log $\frac{n}{\Delta}$	0.126131
" sin +	9.714589 n
" tan d	0.704904
Sum logs	0.545624 n
Cor. 2y.	− 3.√126
$\frac{nn}{\Delta}$	+ 3.0704
Alg. Sum	− 0.4422
log sum	9.645619 n
" ½ interval	1.290033 √
Sum logs.	−0.935654
Cor. 2y.	− 8.62
Orig. A. R.	14 4 √2.√3
A.	14h 4m 43s.91
log $\frac{n}{\Delta}$	0.126101
" sin d	9.714139 n
" tan D	0.701210
Sum logs	0.541450 n
Cor. 2y.	− 3.4790.
$\frac{nn}{\Delta}$	+ 3.0708
Alg. sum	− 0.4082
log	9.610873 n
" Côtab int.	1.59106 √
Sum logs.	1.201938 n
Cor. 2y.	− 15.920
Orig. R.A.	14 4 52.√3
Final R.A.	14h 4m 36s.61

log n	1.302223
" cos +	9.932065 n
" ½ interval	1.290033 √
Sum logs	2.√24323 n
Cor. 2y.	-334.44 − 5′ 34.″44
Orig. Dec.	+78 50 22.8
D	+78° 44′ 48.″4
log n	1.302193
" cos A.	9.932230 n
" Côtab interval	1.59106 √
Sum logs.	2.825488 n
Cor. 2y.	-669.09 − 11 9.09
Orig. Dec.	+78 50 22.8
Final Dec.	+78° 39′ 13.″7

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31 yrs. Aug. 6. 1881.
Comet b 1881.

Oltm. +79°422. 13 25 50 +79 23.2 (6.0)

B.A.C. 4527. 13 25 44.07 +79 25 8.4 (6)

Log Δ_0 +	9.693750n
Cor.	-36
log. law. δ	0.728619
Sum logs.	0.422333 n
number cor.	-2.644444
$\frac{1}{15}$ m.	+3.07061
Result	+0.42617
log "	9.629583
" 31	1.491362
Sum logs.	1.120945
Cor. Pne	13.^{s}21
" "	0 13.^{s}21
Orig A.R.	13 25 44.07
1881 1st ap.	13^h 25^m 57.^{s}28

Tab 2y. -18.6693
Cor. -15
Log -18.6678 = 1.271093
" 31 = 1.491362
-578.70 = 2.762455
-9' 38.70
+79 25 8.4
+79° 15' 29.7

Log Δ_0 +	9.690020 n
Cor.	-101
log. law. δ	0.721918
Sum logs.	0.411837 n
Cor. 2y.	-2.58129
$\frac{1}{15}$ m.	+3.07124
Result	+0.48995
1st "	+0.42617
Mean	0.45806
Log "	9.660922
" 31	1.491362
Sum logs.	1.152284

Tab 2y. -18.6623
Cor. -45
Result -18.6578
1st " -18.6678
Log Mean -18.6628 = 1.270976
" 31 = 1.491362
-578.55 = 2.762338
-9' 38.55
+79 25 8.4
79° 15' 29.8

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Cor. Pre. $14^s.20$

" " $+ 0^m\ 14^s.20$

Orig. A.R. $13\ 2^m\ 44.07$

1881 2nd Eq. $13^h\ 2^m\ 58^s.27$

Log Δ_0 + 9.690100n

Corr -101

log. Law. δ 0.721919

Sum logs 0.411918 n

Cor. $2y$ -2.58177

$\frac{1}{15}$ m +3.07124

Result +0.48947

$1\frac{1}{2}$ " +0.42617

Mean 0.45782

Log " 9.660695

" 31 1.491362

Sum logs 1.152057

Cor. Pre. $14^s.19$ 14.19

Orig. RA. $13\ 2^m\ 44.07$

(1881 3rd Eq. Appt.) $13^h\ 2^m\ 58^s.26$

Red. to Appt. -2.77

Ap. pos * $13\ 25\ 55.49^v$

Tab. $2y$. -18.6617

Corr -4

Result -18.6572

$1\frac{1}{2}$ " -18.6678

Log Mean $-18.6625 - 1.270970$

" 31 $= 1.491362$

$-578.''54 = 2.762332$

$-9'\ 38.''54$

$+79°\ 25'\ 8.''4$

$+79°\ 15'\ 29.''9$ Finals

finals. $+79°\ 15'\ 29.9^v$

$+2.1^v$

$+79\ 15\ 32.0^v$

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56 yrs. Aug. 22. 1881.
Comet C. 1881.

D M. +42° 2225.	11	29	13.3	+42	51.2 (8.3)
W. B. 11^h 544-5	11	27	35.26	+43°	0′ 26.″8 (A.9)
	171° 53′ 48.9				

log $\frac{n}{15}$	0.126177	log n	1.302270
" sin +	9.149079	" cos +	9.995643 n
" tan d	9.969769	" ½ interval	1.447158
Sum logs.	9.245025	Sum logs.	2.745071 n
Cor. 2y	+0.1758	Cor. 2y	-555.99 -9 16.0
$\frac{m}{15}$	+3.0701	Orig. Dec	+43° 0′ 26.″8
Alg. sum	+3.2459	II	+42° 51′ 10.8
log sum	0.511335	log n	1.302211
" ½ interval	1.447158	" cos A.	9.996041 n
Sum logs	1.958493	" total int.	1.748188
Cor. 2y	90.88 = + 1 30.88	Sum logs.	3.046440 n
Orig. a. R.	11 27 35.26	Cor. 2y	-1112.″86 -18′ 32.″86
A.	11^h 29^m 6^s.14	Orig Dec.	+43° 0′ 26.″8
log $\frac{n}{15}$	0.126119	Final Dec.	+42° 41′ 53.″9
" sin A.	9.128427		
" tan D	9.967421		
Sum logs.	9.221967		
Cor. 2y	+0.1667		
$\frac{m}{15}$	+3.0707		
Alg. sum	+3.2374		
log "	0.510196		
" total int.	1.748188		
Sum logs.	+2.258384		
Cor. 2y	+181.29 + 3 1.29		
Orig. R. A.	11 27 35.26		
Final R.A.	11^h 30^m 36^s.55		

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56 yrs. July 24. 1881.
Comet C. 1881.

M. +42° 1509. 6 4 3.9 +42 50.3 (E.A.)

W.B. 6h 6s. 6 1 53.17 +42 50 12.7 (9)

90° 28' 17."5

log $\frac{m}{n}$	0.126177	log n	1.302270
" sin t	9.999985	" cos t	7.915404 n
" tan d	9.967176	" ½ interval	1.447158
Sum logs	0.093338	Sum logs.	0.664832 n
Cor. 2y.	+1.2398	Cor. 2y.	-4.62 - 0 24.6
$\frac{m}{n}$	+3.0701	Orig. Dec.	+42 50 12.7
Alg sum	+4.3099	D	+42° 50' 8."1
Log sum	0.634467	log. n	1.302211
" ½ interval	1.447158	" cos. A.	8.230588 n
Sum logs.	2.081625	" total int.	1.748188
Cor. 2y	+120.68 + 2m 0.s68	Sum logs.	1.280987 n
Orig A.R.	6 1 53.17	Cor. 2y.	-19.10 - 0 19.1
A.	6h 3m 53.s85	Orig. Decl.	+42 50 12.7
log $\frac{m}{n}$	0.126119	Final Dec.	+42° 49' 53."6
" sin A.	9.999937		
" tan D	9.967157		
Sum logs	0.093213		
Cor. 2y	+1.2394		
$\frac{m}{n}$	+3.0707		
Alg sum	+4.3101		
Log "	0.634487		
" total int.	1.748188		
Sum logs	2.382675		
Cor. 2y.	+241.37 + 4 1.s37		
Orig R.A.	6 1 53.17		
Final R.A.	6h 5m 54.s54		

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July 13. 1881.
Comet (b)
Red. to apparent place.
δ (1881.0) = +81° 51' 1.7"

f	= +2.7721		
log. q	1.2733+	log. q.	1.2733+
" sin. (G+f)	9.7239+	" cos. (G+f)	9.9248
" tan. δ	0.8440+	Sum logs. =	1.1981
" sum logs.	1.8212+	z_y =	−15.20
log. 15	1.1761+	log. h	1.3078+
" diff log.	0.6451+	" cos. (H+f)	9.6970+
z_y.	= +4.417	" sin. δ =	9.9956+
log. h	1.3078+	Sum logs. =	0.9984+
" sin. (H+f)	9.9382 n	z_y. =	+9.96
" sec. δ	0.8481+	log. i	0.4798+
sum logs.	2.0925 n	" cos. δ =	9.1511
log. 15	1.1761+	Sum logs. =	9.6313+
" diff log.	0.9164 n	z_y. =	+0.43
z_y.	= −8.249	$\delta' - \delta$ =	−4.81
$f' - f$	−1.111		

G = 0h 32.1m H = 10h 39.4
f = 9h 20.0 f = 9 20.0
(G+f) = 9 52.1 (H+f) = 19 59.4

−.07 day.

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Aug. 26. 1881.
Comet (b.)
Red. to apparent place.
δ 1881.0 = 76° 32' 5."5

f =	+ 3.045		
log. g	1.3060+	log. g,	1.3060+
" sin.(G+H)	9.8721 n	" cos.(G+H)	9.8242 n
" tan. δ	0.6208+	Sum logs. =	1.1302 n
Sum logs.	1.7989 n	Zy =	−13.50
log. 15	1.1761+	log. h	1.2809+
diff. logs =	0.6228 n	" cos.(H+h)	9.9735+
Zy =	−4.196	" sin. δ	9.9879+
log. h	1.2809+	Sum logs. =	1.2423+
" sin.(H+h)	9.5304 n	Zy =	+17.47
" sec. δ	0.6329+	log. $\dot{c}$	0.8640+
Sum logs.	1.4442 n	" cos. δ =	9.3671+
log. 15 =	1.1761+	Sum logs. =	0.2311+
diff. logs =	0.2681 n	Zy =	+1.70
Zy =	−1.854	$\delta' - \delta$ =	+5.67
$t' - t$ =	−2.965		

$G = 0^h\ 24.^m2$ $H = 7^h\ 52.3$
$t = 14\ 48.4$ $t = 14\ 48.4$
$G+H = 15^h\ 12.^m6$ $(H+h = 22\ 40.7$

−.09 day.

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Aug: 26, 1881.
Comet b 1881.

G.m.t. 7h 6m.-36

Same as on August 27.

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Aug. 30 1881

Comet (c.)

δ (1881.0) = + 16° 42′ 24″.0

f	+ 3.110		
log. g	1.3095+	log. g.	1.3095+
" sin (G+t)	9.6247 n	" cos (G+t)	9.9576 n
" tan. δ	9.4773 +	Sum logs.	1.2671 n
Sum logs.	0.4115 n	2y.	−18.50
log. 15	1.1761 +	log. h	1.2789 +
Diff. logs.	9.2354 n	" cos (H+t)	9.8336 +
2y.	−0.172	" sin δ	9.4586 +
log. h.	1.2789 +	Sum logs.	0.5711 +
" sin (H+t)	9.8643 n	2y.	+ 3.72
" sec. δ	0.0187 +	log i	0.8770+
sum logs	1.1619 n	" cos. δ	9.9813+
log. 15	1.1761+	Sum logs.	0.8583+
diff logs.	9.9858 n	2y.	+ 7.228
2y.	−0.964	$\delta' - \delta$	−7.56
$t' - t$	+1.970		

G = 0 23.8 H = 7 36.0

t = 13 15.9 t = 13 15.9

(G+t) = 13h 39m.7 (H+t) = 20h 51.9

−.15 day.

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Aug. 22. 1881
Comet (c)

$\delta\ (1881.0) = +42^\circ\ 41'\ 53.''9$

f	$+3.058$
Log. g	$1.30222+$
" $\sin(G+\delta)$	$8.30000+$
" $\tan\delta$	$9.96511+$
" sum	$9.56733+$
" $\log 15$	$1.17611+$
" result	$8.39122+$
$2y$	$+0.025$
" h	$1.28311+$
" $\sin(H+\delta)$	$9.95799n$
" $\sec\delta$	$0.13388+$
" sum	$1.37748n$
" $\log 15$	$1.17611+$
" result	$0.19757n$
$2y$	-1.580
$f'-f$	$+1.503$

Log. g	$1.30222+$
" $\cos(G+\delta)$	$9.99999n$
" sum	$1.30221n$
$2y$	-20.05
" h	$1.28311+$
" $\cos(H+\delta)$	$9.62311+$
" $\sin\delta$	$9.83103+$
" sum	$0.73725+$
$2y$	$+5.46$
" i	$0.84811+$
" $\cos\delta$	$9.86622+$
" sum	$0.71433+$
$2y$	$+5.18$
$\delta'-\delta$	-9.41

$G = 0\ \ 24.8$ $\quad h = 8\ \ 8.7$
$f = 11\ \ 30.6$ $\quad f = 11\ \ 30.6$
$(G+f) = 11^h\ 55^m.4$ $\quad (H+f) = 19^h\ 39.3$

-18 day.

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Aug. 10. 1881

Comet (C.)

$\delta(1881.0) = +51^\circ\ 49'\ 14.''1$

f	$+2.973$		
log. g.	$1.2904+$	log. g	$1.2904+$
" $\sin(G+f)$	$9.9220+$	" $\cos(G+f)$	$9.7399n$
" tan. d	$0.1044+$	" sum	$1.0303n$
" sum	$1.3168+$	$2y$	-10.72
" 15	$1.1761+$	" h	$1.2903+$
" Result	$0.1407+$	" $\cos(H+f)$	$9.5267n$
$2y$	$+1.383$	" $\sin\delta$	$9.8955+$
log. h.	$1.2903+$	" sum	$0.7125n$
" $\sin(H+f)$	$9.9739n$	$2y$	-5.16
" sec. δ	$0.2089+$	" i	$0.7864+$
" sum	$1.4731n$	" cos. δ	$9.7911+$
" 15	$1.1761+$	" sum	$0.5775+$
" result	$0.2970n$	$2y$	$+3.78$
$2y$	-1.982	$\delta' - \delta$	-12.10
$f' - f$	$+2.374$		

$G = 0^h\ 26.^m8$ $\quad$ $\log = 8\quad 54.9$

$f = 7\quad 46.5$ $\quad$ $f = 7\quad 46.5$

$(G+f) = 8^h\ 13.^m3$ $\quad$ $(H+f) = 16\quad 41.4$

$+.09$ day

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1881phae.proj..491T

July 24 1881
Comet (c)

δ (1881.0) = +42° 49' 53".6 v

f	+2.829 v	log. g	1.26995+ v
Log. g	1.26995+ v	" cos (G++)	9.19463 n v
" sin (G++)	9.99946+ v	Sum Logs	0.46638 n v
" tan. δ	9.96711+ v	2y	−2.91 v
" sum	1.23112+ v	log. h	1.30055+ v
" 15	1.17611+ v	" cos (H++)	9.68244 n v
" result	0.05501+ v	" sin δ	9.83244+ v
2y	+1.135 v	" sum	0.81543 n v
log. h	1.30055+ v	2y	−6.54 v
" sin (H++)	9.94288 n v	" i	0.64033+ v
" sec. δ	0.13477+ v	" cos. δ	9.86533+ v
" sum	1.37800 n v	" sum	0.50566+ v
" 15	1.17611+ v	2y	+3.20 v
" result	0.20199 n v	$\delta' - \delta$	−6.25 v
2y	−1.592 v		
f − f	+2.372 v		

G = 0 30.1 v H = 9 59.0 v
t = 6 5.9 v t = 6 5.9 v
(G++) = 6h 36.0m v (H++) = 16h 4.9m v

+.12 day

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1881phae.proj..491T

July 23. 1881

Comet (C)

$\delta(1881.0) = +42^\circ\ 10'\ 23''.1$

f	+2.819		
log. g.	1.26822	log. g	1.26822
" sin(G+δ)	9.99954+	" cos(G+ℓ)	9.16202
" tan. δ	9.95971+	" sum	0.43024
" sum	1.22207+	2y	-2.69
" 15	1.17611+	" h	1.30104
" result	0.04466+	" cos(H+δ)	9.67977
2y	+1.108	" sin δ	9.82704
" h	1.30104	" sum	0.80777
" sin(H+δ)	9.94366	2y	-6.42
" sec. δ	0.11301+	" i	0.62899
" sum	1.37477	" cos. δ	9.86999
" 15	1.17611+	" sum	0.49898
" result	0.19886	2y	+3.15
2y	-1.5800	δ'' - δ	-5.96
f'' - f	+2.3477		

G = 0 30.3 H = 10 2.6

ℓ = 6 3.1 ℓ = 6 3.1

(G+ℓ) = 6h 33m.4 (H+δ) = 16h 5m.7

+.14 day

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1881phae.proj..491T

July 21. 1881
Comet (c)

δ (1881.0) = +41° 22′ 22.″4

f	+2.800		
log. g	1.26544	log. g	1.26544
" sin(G+f)	9.99588	" cos(G+f)	9.14499
" tan. δ	9.94488	" sum	0.41093 n
" sum	1.20600	Σy	−2.57
" 15	1.17611	" h	1.30211
" result	0.02999	" cos(H+f)	9.65966
Σy	+1.071	" sin δ	9.82011
" h	1.30211	" sum	0.78188
" sin(H+f)	9.94922	Σy	−6.05
" sec. δ	0.12477	" r	0.60399
" sum	1.37600 n	" cos. δ	9.87553
" 15	1.17611	" sum	0.47952
" result	0.19999 n	Σy	+3.01
Σy	−1.584	$\delta' - \delta$	−5.61
$f' - f$	+2.287		

$G = 0^h\ 30.^m7$ $H = 10^h\ 9.^m9$
$f = 6\ \ 1.4$ $f = 6\ \ 1.4$
$(G+f) = 6^h\ 32.^m1$ $(H+f) = 16^h\ 11.^m3$

+11 day

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1881phae.proj..491T

July 19, 1881

Comet (c)

$\delta(1881.0) = +40^\circ\ 40'\ 1.''1$

f	$+2.782$		
log g.	$1.26255+$	Log g.	$1.26255+$
" sin$(G+f)$	$9.99976+$	" cos.$(G+f)$	$9.01923n$
" tang d	$9.93411+$	" sum	$0.28179n$
" sum	$1.19426+$	$2y$	-1.91
" 15	$1.17611+$	" h	$1.30311+$
" result	$0.01811+$	" cos$(H+f)$	$9.66400n$
$2y$	$+1.043$	" sin δ	$9.81400+$
" h	$1.30311+$	" sum	$0.78111n$
" sin$(H+f)$	$9.94800n$	$2y$	-6.04
" sec. d	$0.12001+$	" x	$0.57771+$
" sum	$1.37111n$	" cos. δ	$9.88001+$
" 15	$1.17611+$	" sum	$0.45771+$
" result	$0.19501n$	$2y$	$+2.87$
$2y$	-1.567	$\delta' - \delta$	-5.08
$f' - f$	$+2.258$		

$G = 0\ \ 31.0$ $\quad H = 10\ \ 17.1$

$f = 5\ \ 53.0$ $\quad f = 5\ \ 53.0$

$(G+f) = 6^h\ 24^m.0$ $\quad (H+f) = 16^h\ 10^m.1$

+.13 day.

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1881phae.proj..491T

Aug. 30 1881
Comet (b) 1881

δ (1881.0) = +75° 54' 38."3

f	+ 3.111		
log. g.	1.3096+	Log. g.	1.3096+
" sin (G++)	9.9111 n	" cos. (G++)	9.7632 n
" tan. δ	0.6004+	" sum	1.0728 n
" sum	1.8211 n	$2y$	− 11.82
" 15	1.1761+	" h	1.2788+
" result	0.6450 n	" cos (H++)	9.9995+
$2y$	− 4.416	" sin δ	9.9867+
" h	1.2788+	" sum	1.2450+
" sin (H++)	9.4775 n	$2y$	+ 17.58
" sec. δ	0.6136+	" x'	0.8773+
" sum	1.3699 n	" cos. δ	9.3864+
" 15	1.1761+	" sum	0.2637+
" result	0.1938 n	$2y$	+ 1.84
$2y$	− 1.562	$\delta' - \delta$	+ 7.60
$t' - t$	− 2.867		

G = 0 23.8 H = 7 25.6
t = 15 14.5 t = 15 14.5
(G++) = 15 38.3 (H++) = 22 50.1

−.05 day

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1881phae.proj..491T

Aug 29 1881

Comet (b.) 1881

δ (1881.0) = + 75° 54′ 38.″3

f	+ 3.105
log g.	1.3087+
" sin (G+f)	9.9112n
" tan. δ	0.6004+
" sum	1.8203n
" 15	1.1761+
" result	0.6442n
$2y$	- 4.408
" h	1.2793+
" sin (H+f)	9.4533n
" sec. δ	0.6136+
" sum	1.3462n
" 15	1.1761+
" result	0.1701n
$2x$	- 1.479
$f' - f$	- 2.782

Log g	1.3087+
" cos (G+f)	9.7629n
" sum	1.0716n
$2y$	- 11.79
" h	1.2793+
" cos (H+f)	9.9817+
" sin δ	9.9867+
" sum	1.2477+
$2y$	+ 17.69
" x	0.8744+
" cos. δ	9.3864+
" sum	0.2608+
$2y$	+ 1.82
$\delta' - \delta$	+ 7.72

g = 0 23.9 16 = 7 39.5

f = 15 14.5 f = 15 14.5

(G+f) = 15h 38m 8.4 (G+f) = 22h 54m 0

.00 day

1881phae.proj..491T

Aug. 27 1881
Comet (b.) 1881

$\delta\ (1881.0) = +76^\circ\ 32'\ 5''.5$

f	+ 3.091
log g	1.3069+
" sin(G+t)	9.8719 n
" tan d	0.6208+
" sum	1.7996 n
" 15	1.1761+
" result	0.6235 n
Σy	− 4.202
" h	1.2804
" sin(H+t)	9.5514 n
" sec. d	0.6329+
" sum	1.4647 n
" 15	1.1761+
" result	0.2886 n
Σy	− 1.944
f' − f	− 3.055

Log g	1.3069+
" cos(G+t)	9.8245 n
" sum	1.1314 n
Σy	− 13.53
" h	1.2804+
" cos(H+t)	9.9706+
" sin d	9.9879+
" sum	1.2389+
Σy	+ 17.33
" i	0.8674+
" cos. d	9.3671+
" sum	0.2345−
Σy	+ 1.72
δ' − δ	+ 5".52

G = 0 24. 1 H = 7 48. 2
t = 14 48. 4 t = 14 48. 4
(G+t) = 15h 12m (H+t) = 22h 36m. 6

−.11 day.

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1881phae.proj..491T

Aug 15, 1881

Comet (b) 1881

δ (1881.0) = +78° 6' 21".1 v

f	+3.009 v		
Log g	1.2955+ v	Log g	1.2955+ v
" sin(G+f)	9.7970n v	" cos(G+f)	9.8917n v
" tan. d	0.6765+ v	" sin	1.1872n v
" sin	1.7690n v	2y	−15.39 v
" 15	1.1761+ v	" h	1.2873+ v
" result	0.5929n v	" cos(H+f)	9.9767+ v
2y	−3.916 v	" sin d	9.9906+ v
" h	1.2873+ v	" sin	1.2546+ v
" sin(H+f)	9.5037n v	2y	+17.97 v
" cos d	0.6859+ v	" i	0.8146+ v
" sin	1.4769n v	" cos d	9.3141+ v
" 15	1.1761+ v	" sin	0.1287+ v
" result	0.3008n v	2y	+1.34 v
2y	−1.999 v	$\delta' - \delta$	+3.92 v
$f' - f$	−2.906 v		

G = 0 25.9 v 16 = 8 36.3 v

f = 14 9.3 v f = 14 9.3 v

(G+f) = 14h 35m.3 v (16+f) = 22h 45m.6 v

−.13 day.

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1881phae.proj..491T

Aug. 11 1881

Comet (b) 1881

$\delta(1881.0) = +78^\circ\ 39'\ 13.''7$ v

f	+ 2.980 v		
Log g	1.29714+ v	Log g	1.29714+ v
" sin(G+H)	9.78774 n v	" cos(G+H)	9.89977 n v
" tan d	0.6975+ v	" sin	1.18911 n v
" sin	1.7763 n v	Dy	−15.46 v
" √	1.1761+ v	" h	1.28977+ v
" result	0.60062 n v	" cos(H+H)	9.98279+ v
Dy	− 3.983 v	" sin d	9.99914+ v
" h	1.28977+ v	" sin	1.26388+ v
" sin(H+H)	9.44108 n v	Dy	+ 18.36 v
" sec d	0.7061+ v	" i	0.79222+ v
" sin	1.43688 n v	" cos d	9.29399+ v
" √	1.1761+ v	" sin	0.08617+ v
" result	0.26079 n v	Dy	+ 1.22 v
Dy	− 1.823 v	δ' − δ	+ 4.12 v
f' − f	− 2.826 v		

G = 0 26.6 v K = 8 51.3 v

t = 14 4.6 v t = 14 4.6 v

(G+H) = 14h 31.2m v (H+H) = 22h 55.9m v

+ .02 day. v

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1881phae.proj..491T

Aug. 10. 1881

Comet (b) 1881

δ (1881.0) = +78° 39' 36.4"

f.	+2.971		
Log q	1.2901+	Log q	1.2901+
" sin(G+t)	9.7272 n	" cos(G+t)	9.9272 n
" tan. δ	0.6978+	" sum	1.2173 n
" sum	1.7151 n	2y	−16.49
" 15	1.1761+	" h	1.2904+
" result	0.5390 n	" cos(H+t)	9.9716+
2x	−3.459	" sin δ	9.9914+
" h	1.2904+	" sum	1.2534+
" sin(H+t)	9.5443 n	2y	+17.92
" sec. δ	0.7064+	" i	0.7849+
" sum	1.5411 n	" cos. δ	9.2936+
" 15	1.1761+	" sum	0.0785+
" result	0.3650 n	2y	+1.20
2x	−2.317	$\delta' - \delta$	+2.63
$t' - t$	−2.805		

G = 0 26.8 16 = 8 55.8

t = 13 42.2 t = 13 42.2

(G+t) = 14h 9.m0 (H+t) = 22h 38.m0

−.14 day.

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1001phae.proj..4917

Aug. 6 1881.

Comet (b) 1881

$\delta(1881.0) = 79^\circ\ 15'\ 29.9''$

f	$+2.939$		
Log g	1.2857+	Log g	1.2857+
" sin(G+t)	9.6770 n	" cos(G+t)	9.9444 n
" tan. δ	0.7219+	" sum	1.2301 n
" sum	1.6846 n	Σy	-16.99
" $\sqrt{}$	1.1761+	" h	1.2929+
" result	0.5085 n	" cos(H+t)	9.9710+
Σy	-3.225	" sin δ	9.9923+
" h	1.2929+	" sum	1.2562+
" sin(H+t)	9.5489 n	Σy	$+18.04$
" sec. δ	0.7296+	" x	0.7577+
" sum	1.5714 n	" cos. δ	9.2704+
" $\sqrt{}$	1.1761+	" sum	0.0281+
" result	0.3953 n	Σy	$+1.07$
Σy	-2.48	$\delta' - \delta$	$+2.12$
$t' - t$	-2.771		

$G = 0\ \ 27.5''$ $H = 9\ \ 11.1''$

$t = 13\ \ 26.0''$ $t = 13\ \ 26.0''$

$(G+t) = 13^h\ 53^m\ 37.5''$ $(H+t) = 22^h\ 37^m\ 37.1''$

$-.10$ day

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1881phae.proj..491T

July 26 1881.

Comet (b) 1881.

$\delta\,(1881.0) = +81^\circ\ 29'\ 10.2''$

f	$+2.844$		
Log q	$1.2719+$	Log q	$1.2719+$
" $\sin(G+\tau)$	$9.3214n$	" $\cos(G+\tau)$	$9.9902n$
" tan. δ	$0.8248+$	" sum	$1.2621n$
" sum	$1.4181n$	$2y$	-18.28
" 15	$1.1761+$	" h	$1.2995+$
" result	$0.2420n$	" $\cos(H+t)$	$9.9491+$
$2y$	-1.746	" $\sin\delta$	$9.9952+$
" h	$1.2995+$	" sum	$1.2438+$
" $\sin(H+t)$	$9.6600n$	$2y$	$+17.53$
" sec. δ	$0.8296+$	" i	$0.6596+$
" sum	$1.7891n$	" $\cos\delta$	$9.1704+$
" 15	$1.1761+$	" sum	$9.8300+$
" result	$0.6130n$	$2y$	$+0.68$
$2y$	-4.102	$\delta - \delta$	-0.07
$f' - f$	-3.004		

$G = 0\ \ 29.7'\quad H = 9\ \ 52.5'$

$\tau = 12\ \ 18.7'\quad t = 12\ \ 18.7'$

$(G+\tau) = 12^h\ 48^m.4\quad (H+t) = 22^h\ 11^m.2$

$-.13$ day.

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1881phae.proj.491T

July 24 1881.
Comet (b) 1881.

δ (1881.0) = +81° 24' 15".9

f	+2.828
Log f	1.2693+
" sin(G+t)	9.1436n
" tan. δ	0.8206+
" sum	1.2335n
" l5	1.1761+
" result	0.0574n
2y	−1.141
" h	1.3006+
" sin(H+t)	9.6943n
" sec. δ	0.8255+
" sum	1.8204n
" l5	1.1761+
" result	0.6443n
2y	−4.409
t'' − t	−2.722

Log q	1.2693+
" cos(G+t)	9.9958n
" sum	1.2651n
2y	−18.41
" h	1.3006+
" cos(H+t)	9.9390+
" sin δ	9.9951+
" sum	1.2347+
2y	+17.17
" i	0.6386+
" cos δ	9.1745+
" sum	9.8131+
2y	+0.65
$\delta'' - \delta$	−0.59

G = 0 30.1 H = 9 59.5
t = 12 1.9 t = 12 1.9
(G+t) = 12h 32.0 (H+t) = 22h 1m.4

−.03 day.

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1881phae.proj..491T

July 21 1881.

Comet (b) 1881.

$\delta\,(1881.0) = +82^\circ\ 9'\ 45.''3$

f	$+2.^s798$		
Log. g	1.2650+	Log g	1.2650+
" $\sin(G++)$	8.4313 n	" $\cos(G++)$	9.9999 n
" $\tan\delta$	0.8612+	" sum	1.2649 n
" sum	0.5575 n	$2y$	-18.40
" 1^s	1.1761+	" h	1.3023+
" result	9.3714 n	" $\cos(H++)$	9.9214+
$2y$	-0.241	" $\sin\delta$	9.9959+
" h	1.3023+	" sum	1.2196+
" $\sin(H++)$	9.7413 n	$2y$	$+16.^s8$
" sec. δ	0.8653+	" i	0.6009+
" sum	1.9089 n	" cos. δ	9.1347+
" 1^s	1.1761+	" sum	9.7356+
" result	0.7328 n	$2y$	$+0.^s54$
$2y$	$-5.^s405$	$\delta' - \delta$	$-1.''28$
$f' - f$	$-2.^s848$		

$G = 0\ 30.'7$ $H = 10\ 10.'7$

$+ = 11\ 35.'5$ $+ = 11\ 3\,5.'5$

$(G++)\ 12^h\ 6.^m2$ $(H++) = 21^h\ 46.^m2$

-12 day.

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1881phae.proj..491T

July 18. 1881.
Comet (c) 1881.

δ (1881.0) = +82° 19' 2."9 ✓

f.	+ 2.770 ✓		
Log g	1.2607+ ✓	Log g	1.2607+ ✓
" sin(G+f)	9.2164+ ✓	" cos(G+f)	9.9940n ✓
" tan. d	0.8700+ ✓	" sum	1.2547n ✓
" sum	1.3471+ ✓	Zy	−17.98 ✓
" lr	1.1761+ ✓	" h	1.3037+ ✓
" result	0.1710+ ✓	" cos(H+t)	9.8719+ ✓
Zy	+1.483 ✓	" sin d	9.9961+ ✓
" h	1.3037+ ✓	" sum	1.1717+ ✓
" sin(H+t)	9.8244n ✓	Zy	+14.85 ✓
" sec. d	0.8739+ ✓	" i	0.5600+ ✓
" sum	2.0020n ✓	" cos. d	9.1261+ ✓
" lr	1.1761+ ✓	" sum	9.6861+ ✓
" result	0.8259n ✓	Zy	+0.49 ✓
Zy	−6.697 ✓	d'−d	−2.64 ✓
t'−t	−2.444 ✓		

G = 0 31.2 ✓ H = 10 21.6 ✓
t = 10 50.9 ✓ t = 10 50.9 ✓
G+H = 11h 22.1m ✓ (H+t) = 21h 12.5m ✓

−.12 day ✓

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1881phae.proj..491T

July 17 1881

Comet (b) 1881

δ (1881.0) = +82° 11′ 17.2″

f.	+2.760″
Log. g	1.2592″+
" sin(G+t)	9.3927″+
" Law. d	0.8627″+
" sum	1.5146″+
" 15″	1.1761″+
" result	0.3385″+
2y	+2.180″
" h	1.3041″+
" sin(H+t)	9.8555″n
" sec. d	0.8667″+
" sum	2.0263″n
" 15″	1.1761″+
" result	0.8502″n
2y	−7.082″
t′ − t	−2.142″

G = 0 31.4″ H = 10 25.4″

t = 10 31.4″ t = 10 31.4″

(G+t) = 11h 2.8m (H+t) = 20h 56.8m

−.13 day″.

Log g	1.2592″+
" cos(G+t)	9.9863″n
" sum	1.2455″n
2y	−17.60″
" h	1.3041″+
" cos(H+t)	9.8433″+
" sin d	9.9960″+
" sum	1.1434″+
2y	+13.91″
" i′	0.5450″+
" cos. d	9.1333″+
" sum	9.6783″+
2y	+0.48″
δ′ − δ	−3.21″

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1881phae.proj..491T

July 16. 1881
" Comet (a)

$\delta(1881.0) = +82^\circ\ 16'\ 38.''4$

f.	+ 2.753		
Log g	1.25581+	Log g	1.25581+
" sin(G++)	9.48665+	" cos(G++)	9.97864
" tan. δ	0.86777+	" sum	1.23367 n
" sum	1.61123+	2y	−17.25
" 1√	1.17611+	" h	1.30455+
" result	0.43622+	" cos(H++)	9.81933+
2y	+ 2.730	" sin δ	9.99600+
" h	1.30455+	" sum	1.11988+
" sin(H++)	9.87599 n	2y	+13.18
" sec. δ	0.87177+	" i'	0.53344+
" sum	2.05721 n	" cos. δ	9.12833+
" 1√	1.17611+	" sum	9.66177+
" result	0.87609 n	2y	+0.46
2y	−7.516	δ' − δ	−3.61
t' − t	−2.033		

G = 0 31.6 H = 10 28.1
t = 10 17.0 t = 10 17.0
(G++) = 10h 48m.6 (H++) = 20h 45m.1

+.12 day

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1881phae.proj..491T

July 15 1881.
Comet (b.)

$\delta(1881.0) = +82^\circ\ 3'\ 32''.4$

f	$+2.7411$		
Log. q	$1.2562+$	Log q	$1.2562+$
" $\sin(G+t)$	$9.5722+$	" $\cos(G+t)$	$9.9674n$
" $\tan\delta$	$0.8554+$	" sum	$1.2236n$
" sum	$1.6838+$	$2y$	-16.73
" $\sqrt{}$	$1.1761+$	" h	$1.3050+$
" result	$0.5077+$	" $\cos(H+t)$	$9.7918+$
$2y$	$+3.219$	" $\sin\delta$	$9.9958+$
" h	$1.3050+$	" sum	$1.0926+$
" $\sin(H+t)$	$9.8950n$	$2y$	$+12.38$
" $\sec\delta$	$0.8596+$	" r	$0.5137+$
" sum	$2.0596n$	" $\cos\delta$	$9.1404+$
" $\sqrt{}$	$1.1761+$	" sum	$9.6541+$
" result	$0.8835n$	$2y$	$+0.45$
$2y$	-7.647	$\delta' - \delta$	-8.90
$t' - t$	-1.687		

$G = 0\ 31.7$ $H = 10\ 32.4$
$t = 10\ 0.6$ $t = 10\ 0.6$
$(G+t)\ 10^h\ 32.3$ $(H+t) = 20^h\ 33.0$

$-.11$ day.

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1881phae.proj..491T

July 2. 1881

Comet b.

$\delta = +72^\circ\ 27'\ 24''.6$

f.	+ 2.608		
Log. g.	1.2352 +	Log. g.	1.2352 +
" sin (G++)	9.9836 +	" cos. (G++)	9.4310 n
" tan. δ	0.5001 +	" sum	0.6662 n
" sum	1.7189 +	Zy	− 4.64
" l5	1.1761 +	" h	1.3093 +
" result	0.5428 +	" cos. (H++)	8.7327 n
Zy	+ 3.490	" sin δ	9.9793 +
" h	1.3093 +	" sum	0.0213 n
" sin (H++)	9.9994 n	Zy	− 1.05
" sin δ	0.5208 +	" i	0.2000 +
" sum	1.8295 n	" cos δ	9.4792 +
" l5	1.1761 +	" sum	9.6792 +
" result	0.6534 n	Zy	+ 0.48
Zy	− 4.502	δ' − δ	− 5.21
t' − t	+ 1.596		

y = 0 33.6 H = 11 18.6

t = 6 29.0 t = 6 29.0

(G++) 7 2.6 (H++) = 17 47.6

−.12 day

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1881phae.proj..491T

July 3. 1881

Comet (b.)

$\delta = +74^\circ\ 6'\ 40.''8$

f.	+ 2.619		
Log. g.	1.2370 +	Log. g.	1.2370 +
" sin (G++)	9.9938 +	" cos. (G++)	9.5283 n
" tang. d	0.5457 +	" sum	0.7653 n
" sum	1.7565 +	Σy	− 5.82
" r	1.1761 +	" h	1.3090 +
" result	0.5804 +	" cos (H++)	7.2419 +
Σy	+ 3.805	" sin d	9.9831 +
" h	1.3090 +	" sum	8.5340 +
" sin (H++)	0.0000 n	Σy	+ 0.03
" sec. d	0.5626 +	" i	0.2364 +
" sum	1.8716 n	" cos. d	9.4374 +
" r	1.1761 +	" sum	9.6738 +
" result	0.6955 n	Σy	+ 0.47
Σy	− 4.960	d' − d	− 5.32
t' − t	+ 1.464		

G = 0 33.5 H = 11 15.0

t = 6 45.4 t − 6 45.4

(G++) 7 18.9 (H++) = 18 0.4

−.08 day.

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1881phae.proj..491T

July 6. 1881.

Comet (c.)

$\delta = +77^\circ\ 52^m\ 0.^s6$ v

ff.	+2.650 v		
Lvg. g.	1.24204 v	Lvg. g.	1.24204 v
" sin (G++)	9.94974 v	" cos. (G++)	9.65774 n v
" tan. δ	0.66764 v	" sum	0.89997 n v
" sum	1.85933 v	Zy	−7.94 v
" 15	1.17611 v	" h	1.30833 v
" result	0.68322 v	" cos (H++)	8.93364 v
Zy	+4.822 v	" sin δ	9.99024 v
" h	1.30833 v	" sum	0.23221 v
" sin (H++)	9.99844 n v	Zy	+1.71 v
" sec. δ	0.67744 v	" i	0.32444 v
" sum	1.98411 n v	" cos. δ	9.32266 v
" 15	1.17611 v	" sum	9.64700 v
" result	0.80800 n v	Zy	+0.44 v
Zy	−6.427 v	δ' − δ	−5.79 v
f' − f	+1.0455 v		

G = 0h 33.m1 v H = 11h 4.m6 v

f = 7 15.1 v f = 7 15.1 v

(G++) = 7 48.2 v (H++) 18 19.7 v

−14 days.

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1881phae.proj..491T

July 8. 1881
Comet (b)

$\delta = +79^\circ\ 33'\ 43''.3$

f.	+2.670		
Log. f	1.24527	Log. g	1.24527
" sin (G++)	9.9034+	" cos (G++)	9.7777n
" tan. δ	0.7347+	" sum	1.0229n
" sum	1.8833+	Zy	−10.54
" 15	1.1761+	" h	1.3076+
" result	0.7072+	" cos (H++)	9.3521+
Zy	+5.096	" sin δ	9.9928+
" h	1.3076+	" sum	0.6525+
" sin (H++)	9.9887n	Zy	+4.49
" sec. δ	0.7419+	" i'	0.3748+
" sum	2.0382n	" cos. δ	9.2581+
" 15	1.1761+	" sum	9.6329+
" result	0.8621n	Zy	+0.43
Zy	−7.280	δ' − δ	−5.62
f' − f	+0.486		

G = 0h 32m.8 H = 10h 57m.5
f = 7 54.5 f = 7 54.5
(G++) 8 27.3 (H++) 18 52.0

= .14 day

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1881phae.proj..491T

July. 9. 1881.

Comet (b.)

$\delta = +79^\circ\ 57'\ 19.''1$ v

f.	+2.681 v		
Log. g.	1.2469+ v	Log. g.	1.2469+ v
" sin (G++)	9.8961+ v	" cos. (G++)	9.7901 n v
" tan. δ	0.7517+ v	" sum	1.0370 n v
" sum	1.8947+ v	Zy.	−10.89 v
" 15	1.1761+ v	" h	1.3073+ v
" result	0.7186+ v	" cos. (H++)	9.3642+ v
Zy	+5.231 v	" sin δ	9.9933+ v
" h	1.3073+ v	" sum	0.6648+ v
" sin (H++)	9.9881 n v	Zy	+4.62 v
" sec. δ	0.7584+ v	" i	0.3981+ v
" sum	2.0538 n v	" cos. δ	9.2416+ v
" 15	1.1761+ v	" sum	9.6397+ v
" result	0.8777 n v	Zy	+0.44 v
Zy	−7.546 v	δ' − δ	−5.83 v
t' − t	+0.366 v		

G = 0^h 32.7 v H = 10^h 53^m.9 v

t = 7 59.6 v t = 7 59.6 v

(G++) = 8 32.3 v (H++) 18 53.5 v

−13. day.

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Sept 13. 1881

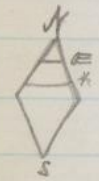
	Fav. 1 Stars	Fav. 2 Stars	Diff.	Diff./2
20h	5m 39.s7	7 28.0		
	6 38.5	8 31.2		
	12 18.2	15 59.2	3m 41.s0	1m 50.s50
20	5 39.7	11 13.2		
	6 38.5	14 15.3		
	12 18.2	25 28.5	13m 10.3	6m 35.s15

Log 122.s0 = 2.0864
" 15 = 1.1761
" cos. dec = 9.4733
2.7358
" 2 = 0.3010
2.4348 = 272.15

889.8
272.15
2 | 617.65
308.88

72° 42 = Dec. Fav *
- 5
72° 37'

	Comet	Star	Diff.	Diff/2
20	55 26.2	58 15.0		
	58 15.0	59 22.1		
	113 41.2	117 37.1	- 3m 55.9	1m 57.s9



21	0 21.8	1 29.4		
	0 46.9	3 33.0		
	1m 8.7	5m 2.s4	- 3m 53.7	1m 56.8



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1901phae.proj.:4917

Continued on Page 50.

Diff Tau. 1 Diff Tau. 2 (Col. 5 + Col. 6)

58.^{s}8 1^m 3.^{s}2 2^m 2.^{s}0

58.^{s}8 3^m 2.^{s}1 4^m 0.^{s}9

Log. 240.^{s}9 = 2.3818 889.8 72° 42′ Dec. Tau
" 15 = 1.1761 − 3
" cos. dec = 9.4733 537.28 72° 39′
3.0312 2 ⌊3 52.60
176.30
" 2 = 0.3010
2.7302 = 537.28

5 6 7

Diff = Diff * (Col 5 - Col. 6)

2^m 48.^{s}8 1^m 7.^{s}1 1^m 41.^{s}7

Log. 101.^{s}7 = 2.0073 72° 42′ = Dec. *
" 15 = 1.1761 + 4
" cos. dec. = 9.4733 72 43
2.6567
" 2 = 0.3010
2.3557 = 226.83 = 3′ 46″.83

0^m 2 5.^{s}1 2^m 3.^{s}6 1^m 38.^{s}5

Log 98.^{s}5 = 1.9934 72° 42′ - Dec. *
" 15 = 1.1761 − 4
" cos. dec = 9.4733 72° 38′
2.6428
" 2 = 0.3010
2.3418 = 219.68 = 3′ 39.68

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1881phae.proj.491T

Log 122.0 = 2.0864
" 1″ = 1.1761
" cos cor. Dec = 9.4753
2.7378
" 2 = 0.3010
273.40 = 2.4368
889.8
616.40 = 10′ 16.″4

Log 240.9 = 2.3818
" 1″ = 1.1761
" cos cor. Dec = 9.4745
3.0324
" 2 = 0.3010
538.77 = 2.7314
889.8
351.03 = 5′ 51.″03

Log 101.7 = 2.0073
" 1″ = 1.1761
" cos cor. Dec = 9.4729
2.6563
" 2 = 0.3010
3′ 46.″62 = 226.62 = 2.3553

Log 96.5 = 1.9834
" 1″ = 1.1761
" cos cor Dec = 9.4749
2.6444
" 2 = 0.3010
3′ 40.″5 = 220.50 = 2.3434

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1881phae.proj...4917

July 14. 1881
Leonet (b)

$\delta = +82^\circ\ 3'\ 12''.4$

f.	+ 2.731
Log. g.	1.25488
" sin (G++)	9.66733
" tan. δ	0.85551
" sum	1.77772
" 15	1.1761
" result	0.6011
η	+ 3.991
" h	1.30544
" sin (H++)	9.92233
" sec. δ	0.85593
" sum	2.08770
" 15	1.1761
" result	0.9109
ξ	− 8.145
f' − f	− 1.423

Log. g.	1.25488
" cos (G++)	9.94719
" sum	1.20199
η	− 15.92
" h	1.30544
" cos (H++)	9.73933
" sin δ	9.99588
" sum	1.04065
ξ	+ 10.98
" i'	0.4975
" cos. δ	9.1407
" sum	9.6382
η	+ 0.43
δ' − δ	− 4.51

G = $0^h\ 31^m.9$ H = $10^h\ 3^m.8$
+ = 9 37.3 + = 9 37.3
(G++) = 10 9.2 (H++) = 20 1.1

−.07 day

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1881phae.proj.5491T

52

July 19. 1881

Comet (b.)

δ =

f.

Log. g.
" sin (G+t)
" tan. δ
" sum
" 15
" result
Σy
" h
" sin (H+t)
" sec. δ
" sum
" 15
" result
Σy
t' - t

Log. g.
" cos. (G+t)
" sum
Σy
" h
" cos (H+t)
" sin δ
" sum
Σy
" r'
" cos. δ
" sum
Σy
δ' = δ

G =
t =
(G+t) =

H =
t =
(H+t) =

- .09 day.

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1881phae.proj..491T

July 27. 1881
comet (+)

δ =

ft.	
Lrg. q.	Lrg. q.
" sin (G++)	" cos (G++)
" tan. δ	" sum
" sum	Zy
" 15"	" h
" result	" cos (H++)
Zy	" sin δ
" h	" sum
" sin (H++)	Zy
" sec. δ	" α'
" sum	" cos. δ
" 15"	" sin α
" result	Zy
Zy	$\delta' - \delta$
$t' - t$	

G =
+ =
(G++)

H =
+ =
(H++) =

-.17" day.

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1881phae.proj..491T

July 12. 1881

Comet (b)

δ = Vic Book 79.

f.

Log. g.
" sin. (G++)
" tan. δ
" sum
" 15
" result
2y
" h
" sin (H++)
" sec. δ
" sum
" 15
" result
2y
t' − t

Log. g.
" cos. (G++)
" sum
2y
" h
" cos. (H++)
" sin δ
" sum
2y
" r'
" cos. δ
" sum
2y
δ' − δ

G =
t =
(G++) =

H =
t =
(H++) =

−.04 day.

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1881phae.proj..491T

Aug. 21. 1881.
Comet (c)

$\delta = +45^\circ\ 8'\ 38''.4$

f.	+ 3.051
Log. g.	1.3013+
" sin (G++)	9.1449+
" tan. δ	0.0022+
" sum	0.4484+
" r	1.1761+
" result	9.2723+
Σy	+ 0.187
" h	1.2837+
" sin (H++)	9.9759n
" sec. δ	0.1516+
" sum	1.4112n
" r	1.1761+
" result	0.2351n
Σy	− 1.718
t' − t	+ 1.520

Log. g.	1.3013+
" cos. (G++)	9.9958n
" sum	1.2971n
Σy	− 19.82
" h	1.2837+
" cos. (H++)	9.5109+
" sin δ	9.8506+
" sum	0.6452+
Σy	+ 4.42
" i'	0.8438+
" cos. δ	9.8484+
" sum	0.6922+
Σy	+ 4.92
δ' − δ	− 10.48

G = 0h 24m 9s H = 8h 12m 7s
t = 11 3.0 t = 11 3.0
(G++) = 11 27.9 (H++) = 19 15.7

= .17 day.

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1881phae.proj..491T

$\delta =$

f.	
Log. g.	Log. g.
" sin (G++)	" cos (G++)
" tan. δ	" sum
" sum	Zy
" 15	" h
" result	" cos (H++)
Zy	" sin δ
" h	" sum
" sin (H++)	Zy
" sec. δ	" i
" sum	" cos. δ
" 15	" sum
" result	Zy
Zy	$\Delta' - \delta$
$t' - t$	

$g =$ $H =$

$t =$ $t =$

$(G++) =$ $(H++)$

day.

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1881phae.proj..491T

δ =

f.	
Log. g.	
" sin (G+t)	
" cos. δ	
" sum	
" 15	
" result	
Δy	
" h	
" sin (H+t)	
" sec. δ	
" sum	
" 15	
" result	
Δy	
$t' - t$	

Log. g.	
" cos (G+t)	
" sum	
Δy	
" h	
" cos (H+t)	
" sin δ	
" sum	
Δy	
" i	
" cos. δ	
" sum	
Δy	
$\delta' \angle \delta$	

G =
t =
(G+t) =

H =
t =
(H+t) =

day.

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1881phae.proj..491T

Dennings. Comet (f.)
Oct. 10, 1881.



1 Comet	2 Star	3 Diff.	4 Diff 2
~~10 0.7~~			
9 36.0	9 ~~46.3~~ 45.7		
9 44.4	10 0.7		
19 20.4	19 46.4	0m 26.0s	0m 13.00s
10 29.7	10 40.74		
10 39.9	10 54.9		
21 9.6	21 35.3	0m 25.7s	0m 12.85s
11 58.9	12 8.3		
12 6.8	12 21.9		
24 5.7	24 30.2	0m 24.5s	0m 12.25s
13 15.8	13 25.0		
13 23.4	13 38.9		
26 39.2	27 3.9	0m 24.7s	0m 12.35s
14 9.8	14 18.7		
14 16.8	14 32.7		
28 26.6	28 51.4	0m 24.8s	0m 12.40s
			- 0m 12.54

1st cap for time 0h 2m 6.8s
2nd " " " 0h 44 6.5

Mean of times 0h 11m 58.s15
2 6.8 5h 16.m30s
0h 9m 51s35 9. 51.3
26 21.35

C. Me. T. 16h 5m 30s.6

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1881phae.proj.:491T

5 Diff. =	6 Diff. *	7 (Col. 5 − Col. 6)
$0^m 8^s.4^v$	$0^m 15^s.0^v$	$0^m 6^s.6^v$
$0^m 10^s.2^v$	$0^m 14^s.5^v$	$0^m 4^s.3^v$
$0^m 7^s.9^v$	$0^m 13^s.6^v$	$0^m 5^s.7^v$
$0^m 7^s.6^v$	$0^m 13^s.9^v$	$0^m 6^s.3^v$
$0^m 7^s.0^v$	$0^m 14^s.0^v$	$0^m 7^s.0^v$
$0\ 8.2^v$	$0^v\ 14.20^v$	$0^m 5.98^v$

Log. 8.2ᵛ = 0.914872ᵛ
" 15ᵛ/2 = 0.875061ᵛ
" 15ᵛ cos. dec.* = 9.985822ᵛ
59.6ᵛ = 1.775775ᵛ

Log 8.2ᵛ = 0.914872ᵛ
" 15ᵛ/2 = 0.875061ᵛ
" cos. dec. = 9.98556ᵛ
59.63ᵛ = 1.775498

Log 14.20 = 1.152288ᵛ
" 15ᵛ/2 = 0.875061ᵛ
" cos. δ cc = 9.98556ᵛ
103.02ᵛ = 2.012914*

889.8ᵛ
992.8
59.6
933.2 = +15ᵛ 33.2

+14° 33 40.3ᵛ
14° 49 13.5ᵛ

Log. 14.20 = 1.152288ᵛ
Log. cos. dec. * = 9.985822ᵛ
" 15ᵛ/2 = 0.875061ᵛ
103.08ᵛ = 2.013171

889.8ᵛ
992.9
59.7
2)933.2
466.6

+14° 33′ 40.3″
+ 7 46.6
14° 41 26.9

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1881phae.proj..491T

Dennings Comet (f)

Oct. 10. 1881.

	1 Comet	2 Star.	3 Diff.	4 Diff/12
0^h	$21^m\ 12^s.8^v$	$21^m\ 24^s.6^v$		
	$21\ 19.9^v$	$21\ 36.9^v$		
	$42\ 32.7^v$	$43\ 1.5^v$	$0^m\ 28^s.8^v$	$0^m\ 14^s.40^v$
	$21\ 59.6^v$	$22\ 11.6^v$		
	$22\ 6.8^v$	$22\ 23.5^v$		
	$44\ 6.4^v$	$44\ 35.3^v$	$0^m\ 28^s.9^v$	$0^m\ 14^s.45^v$
	$23\ 16.0^v$	$23\ 28.6^v$		
	$23\ 23.9^v$	$23\ 40.6^v$		
	$46\ 39.9^v$	$47\ 9.2^v$	$0^m\ 29^s.3^v$	$0^m\ 14.65^v$
	$25\ 5.2^v$	$25\ 16.9^v$		
	$25\ 12.4^v$	$25\ 28.7^v$		
	$50\ 17.6^v$	$50\ 45.6^v$	$0^m\ 28.0^v$	$0^m\ 14.00^v$
	$25\ 57.8^v$	$26\ 9.5^v$		
	$26\ 5.3^v$	$26\ 21.6^v$		
	$52\ 3.1^v$	$52\ 31.1^v$	$0^m\ 28.0^v$	$0^m\ 14.00^v$
				$-0^m\ 14^s.30^v$



Mean ☌ time = $0^h\ 23^m\ 33^s.97^v$

Tap fortune = $\underline{2\quad 6.8^v}$

$0\quad 21\quad 27.17$

$5^h\ 16^m\ 30^s$

$21\ 27.17$

$5\ 37\ 57.17$

L. M. T. $16^h\ 17^m\ 4^s.7$

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1881phae.proj..4917

Diff ≈ Diff * (Col 5 − Col 6)

$0^m\ 7^s.1$	$0^m\ 12^s.3$	$0^m\ 5^s.2$
$0^m\ 7^s.2$	$0^m\ 12^s.1$	$0^m\ 4^s.9$
$0^m\ 7^s.9$	$0^m\ 12^s.0$	$0^m\ 4^s.1$
$0^m\ 7^s.2$	$0^m\ 11^s.8$	$0^m\ 4^s.6$
$0^m\ 7^s.5$	$0^m\ 12^s.1$	$0^m\ 4^s.6$
$0^m\ 7^s.38$	$0\ 12.06$	$0^m\ 4^s.68$

Log. 12.06 = 1.081347
" 15/2 = 0.875061
" cos. dec. * = 9.984792
87.34 = 1.941200 *

Log. 7.38 = 0.868056
" 15/2 = 0.875061
" coe (cos.) dec * 9.985053
53.48 = 1.728170 ≈

Log 12.06 = 1.081347
" 15/2 = 0.875061
" cos dec * = 9.985053
87.39 = 1.941461 *

Log 7.38 = 0.868056
" 15/2 = 0.875061
" cos. dec. * = 9.984792
53.44 = 1.727909 ≈

889.8
836.36
87.34
2923.70
461.85

53.48
889.8
836.32
87.39
923.71
60
323
300
23.7

15° 4' 28".6
−7 41.8
14° 56' 46".8

15° 4' 28".6
−15 23.7
14° 49' 4".9 ≈

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1881phae.proj.491T

Barnards ∝ Oct. 7 (1881.)

	1 Comet	2 Star	3 Diff.	4 Diff. / 12
Reject first set.	16 59.0	17 3.0		
Last tap on comet cannot be identified certainly.	17 46.0	17 22.4		
	34 45.0	34 25.4	$0^m\ 19^s.6$	$0^m\ 9^s.80$
	21 3.0	21 12.6		
	21 42.0	21 35.7		
	42 45.0	42 48.3	$0^m\ 3^s.3$	$0^m\ 1^s.65$
	22 30.0	22 40.5		
	23 9.0	23 2.0		
	45 39.0	45 42.5	$0^m\ 3.5$	$0^m\ 1^s.75$
				$-0^m\ 1^s.70$



Mean α = $0^h\ 22^m\ 6^s.0$

Last tap = $0\ 34\ 33.0$ = $20^h\ 20^m\ 0^s$

-34.5

$20\ 19\ 25.5$

$-12\ 27.0$

$20\ 6\ 58.5$

$13\ 5\ 51.4$

$7\ 1\ 7.1$

$-1\ 9.0$

$6^h\ 59^m\ 58^s.1$ = G. Me. T. obs.

1	8.971
	.019
	18.990

1st tap for time $0^h\ 1^m\ 33^s.0$

last " " " $0^h\ 34^m\ 33^s.0$

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Diff.	Diff. *	(Col + Col. 6)
$0^m\ 47^s.0$	$0^m\ 19^s.4$	$1^m\ 6^s.4$
$0^m\ 39.0$	$0^m\ 23^s.1$	$1^m\ 2^s.1$
$0^m\ 39.0$	$0^m\ 21^s.5$	$1^m\ 0.5$

$$\begin{array}{r} 18^\circ\ 23'\ 26.0'' \\ -\ 3\ \ 46.8 \\ \hline 18\ \ 19\ \ 39.2 \end{array}$$

Log. 61.3 = 1.787460
" $\frac{15}{2}$ = 0.875061
" cor. dec. = 9.977233
$436.27 = 2.639754$
889.8
$2)453.3$
226.76

Log 61.3 = 1.787460
" $\frac{15}{2}$ = 0.875061
" cordec = 9.977392
$436.43 = 2.639913$
889.8
$4)53.37$

$$\begin{array}{r} 18^\circ\ \ 23\ \ 26.0 \\ -\ \ 7\ \ 33.4 \\ \hline 18^\circ\ \ 15'\ \ 52.6 \end{array}$$

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1881phae.proj.0491T

56 yrs.

Oct. 7. 1881.

Barnard's Comet.

Ph. M. -18° 27 88	13^h 43^m $26.^s2$	$+18°$	$32.'5$
Yr. XIII 923	13^h 42^m $0.^s94$	$+18°$	$40'$ $27.''0$

Log Δ_0 +	9.760208 n	Tab. Δ_y -18.1020
Corr.	+16	Corr. +7
Log. tan. δ	9.528889	Log -18.1027 = 1.257734
Sum Logs.	9.289113 n	" 56 = 1.748188
Cor. Δ_y	-0.19459	-1013.''73 = 3.005922
$\frac{1}{15}$ mk	+3.07009	-16' 53.''7
Result	+2.875550	+18° 40' 27.0
Log "	0.458713	+18° 23' 33.''3 = (1881 1st approx)
" 56	1.748188	
Sum Logs.	2.206901	
Cor. Phe	161.03 = 2^m $41.^s03$	
Orig. a.R.	13^h 42^m $0.^s94$	
1881 (1st approx)	13^h 44^m $41.^s97$	

Log Δ_0 +	9.770711 n	Tab. Δ_y -17.9996
Corr.	-101	Corr -43
Log. tan. δ.	9.521807	Result -17.9953
Sum Logs.	9.292417 n	1st " -18.1027
Cor. Δ_y.	-0.1960 7	Log. mean -18.0490 = 1.256453
$\frac{1}{15}$ m	+3.07124	" 56 = 1.748188
Result	+2.875117	-1010.''74 = 3.004641
1st "	+2.875550	-16' 50.''7
Mean	+2.875334	+18° 40' 27.0
Log "	0.458689	+18° 23' 36.''3 = 1881 2nd Aff.
" 56	1.748188	
Sum Logs.	2.206877	

Checked.

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1881phae.proj..491T

Cor. Pos.	$161^s.02 = 2^m\ 41^s.02$	
Orig. A.R.	13 42 0.94	
1881 2nd m app.	$13^h\ 44^m\ 41^s.96$	Finish.
	+1.77	

Pos. 1881.0	13^h	44^m	41.96^s	$+18°$ 23′	36.3″
Red. to app.			+1.77		−10.3
App. pl.	13	44	43.73	+18	23 26.0
α − ∗		− 0	1.70		− 7 33.4
Pos. α	13^h	44^m	$42^s.03$	$+18°$	15′ 52.6

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1881phae.proj.4911T

Denning's Comet,
Oct. 18. 1881.

	1 Comet.	2 Star.	3 Diff.	4 Diff. 2
0	3 8.8	5 18.0		
	3 45.7	5 57.0		
	6 54.6	11 15.0	4m 21.0s	2m 10.50s
	7 0.7	9 10.3		
	7 38.2	9 49.6		
	14 38.9	18 59.9	4 21.0	2 10.50
	10 54.2	13 3.4		
	11 31.0	13 42.1		
	22 25.2	26 45.5	4 20.3	2 10.15
	14 43.4	16 52.5		
	15 20.3	17 30.9		
	30 3.7	34 23.4	4 19.7	2 9.85
	18 41.6	20 50.0		
	19 17.9	21 28.3		
	37 59.5	42 18.3	4 18.8	2 9.40
				-2m 10.08s



Mean of ⊂ transit = 0h 11m 12s.13

Tap = 0 22 9.8 − 10 57.67 = 7h 1m 35.s by Bond 236

− 31.9

7 0 63.1

− 10 57.7

6 50 5.4 2 47.102

13 49 13.5 2 47.244

17 0 51.9

− 2 47.2

16h 58m 4s.7 = G.M.T.

Checked by O.C.W.

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1881phae.proj..491T

5 Diff. =	6 Diff. *	7 (Col. 5 + Col. 6)
$0^m\ 37.4^s$	$0^m\ 39.^s0$	$1^m\ 16.^s4$
0 37.5	0 39.3	1 16.8
0 36.8	0 38.7	1 15.5
0 36.9	0 38.4	1 15.3
0 36.3	0 38.3	1 14.6
$0^m\ 36.^s98$	$0^m\ 38.^s74$	$1^m\ 15.^s72$

14 54 28.7
−2 50.5
+14 51 38.2

Log. 75.72 = 1.879211
" $\frac{15}{2}$ = 0.875061
" cos. dec = 9.94 5 190
548.72 = 2.739402

Log. 75.72 = 1.879211
" $\frac{15}{2}$ = 0.875061
" cos. dec = 9.94 5 225
548.9 = 2.739497

449.8
548.8
341.0
170.5

449.8
340.9

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1881phae.proj - 491T

56 yrs. (1825)

Oct. 18. 1881.

Dreaming's Comet.

0 m. + 15° 21' 7	9	54	44.7	+ 15° 1.7 (8.2)
K. 9h 11 72.	9	53	7.27	+ 15 10 44.7

log. 1.337 = 0.126131c
" sin t = 9.720791c
" tan δ = 9.433457c
0.191c = 9.280375
3.0707c
log. 3.2617 = 0.513444c
" 28. = 1.447156c
+91.33c = 1.960602c

9 53 7.27c
1 31.33c
mid. place. 9 54 38.60c

log. cos. t = 9.929761u
" 20.05 = 1.302223c
1.231984u
" 2r. = 1.447158c
-477.66c = 2.679122u

15 10 44.7c
-7 57.7c
15 2 47.0

log. r/15 0.126119c
" sin A. 9.716049c
" tan D. 9.429457c
+0.18692c = 9.271665
+3.0707c
log. 3.25762c = 0.512901c
" 56. = 1.744188c
182.43c = 2.261089

log. u = 1.302211c
" cos. A = 9.931511c
" 56 = 1.744188c
-9559.20c = 2.981910c

9 53 7.27c
+3 2.43c
1881.0 place. 9 56 9.70

+15° 10' 44".7
-15 59.2c
+14 54 45.5c

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1881phae.proj..491T

Oct. 14. 1881.
Deming's Comet.

$\delta = +14^\circ\ 54'\ 47''.6$

f.	+ 3.395
Log. g.	1.3482+
" sin(G+t)	9.6148+
" tan. δ	9.4253+
" sum	0.3883+
" 15	1.1761+
" result	9.2122+
2y	+0.163
" h	1.2809+
" sin(H+t)	9.7102n
" sec. δ	0.0149+
" sum.	1.0060n
" 15.	1.1761+
" result	9.8799n
2y	− 0.676
t' − t	+2.682

Log. g.	1.3482+
" cos.(G+t)	9.9596n
" sum	1.3078n
2y	− 20.31
" h	1.2809+
" cos(H+t)	9.9337n
" sin δ.	9.4104+
" sum	0.6250n
2y	− 4.22
" i	0.8636+
" cos. δ	9.9851+
" sum	0.8487+
2y	+ 7.06
δ' − δ	− 17.47

(G+t) = 10h 22.7m
(H+t) 14h 3.5m

+.19 day

9	56	9.70
9	56	9.32
		1.02
9	56	9.51 Mean.
		+2.86
9	56	12.39
	−2	10.08
9	54	2.31 Pos. ∝

+14	54	47.0
+14	54	46.9
		12.4
+14	54	46.2 Mean.
		−17.5
+14	54	28.7
	−5	40.9
+14	48	47.8

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1881phae.proj..491T

Denning's Comet
Oct. 20. 1881.

1 Comet	2 Star	3 Diff.	4 Diff/2
2 55.3	1 10.8		
3 26.0	1 44.0		
6 21.3	2 54.8	3m 26.5s	1m 43.25s
17 59.2	16 13.9		
18 31.0	16 47.0		
36 30.2	33 0.9	3m 29.3s	1 44.65
24 16.7	22 30.3		
24 47.8	23 3.7		
49 4.5	45 34.0	3m 30.5s	1 45.25
27 40.8	25 54.3		
28 12.2	26 27.8		
55 53.0	52 22.1	3m 30.9s	1 45.45
36 59.3	35 12.4		
37 32.8	35 45.7		
74 30.1	70 58.1	3m 32.0s	1 46.00
			+1 44.92



Mean of times = 0h 22m 13.s91

1st Cap = 0h 5m 53.s0

Last " = 0h 44m 18.s0 = 6 59 45.s by Bond 236.

Mean of times on ∈ = 0 22 13.9 +28.1

0 22 4.1

7 0 13.1

22 4.1

6 38 9.0

13 57 6.6

16 41 2.4

-2 44.0

16h 38m 18.s4 = ∈ Mc N.

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1001phec.proj.4017

Oct. 20. 1881.
Denning's Comet.

5 Diff. =	6 Diff. ∗	7. (Col. 5 + Col. 6)
$0^m\ 30^s.7^v$	$0\ \ 33.2^v$	$1^m\ 3^s.9^v$
$0\ \ 31.8^v$	$0\ \ 33.1^v$	$1\ \ 4.9^v$
$0\ \ 31.1^v$	$0\ \ 33.4^v$	$1\ \ 4.5^v$
$0\ \ 31.4^v$	$0\ \ 33.5^v$	$1\ \ 4.9^v$
$0\ \ 31.5^v$	$0\ \ 33.3^v$	$1\ \ 4.8^v$
$0^m\ 31^s.30^v$	$0^m\ 33^s.3^v$	$1^m\ 4^s.6^v$

$+14°\ 54'\ 24''.4^v$
$-\ 3\ \ 30.8^v$
$+14\ \ 50\ \ 57.6^v$

Log. 64.6 = 1.810233^v
" $\frac{15}{2}$ = 0.875061^v
" cos. dec = 9.985130^v
468.29 = 2.670424^v
889.8
2|421.61
210.80

Log. 64.6 = 1.810233^v
" $\frac{15}{2}$ = 0.875061^v
" cos. dec = 9.985248^v
468.32^v = 2.670542^v
889.8
421.48^v = 7' 1.''5^v

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1881phae.proj..491T

72

16 yrs.

Oct. 20. 1881.

Denning's Comet.

Schj. 9 ν ν 17.2ν +14 ν 9 21.7

log. 1.337 = 0.126131ν
" sin. t = 9.714079ν
" (cos. δ = 9.427729ν
.18ν33ν = 9.267939ν
3.0707ν
log. 3.2ν60ν = 0.ν12644ν
" t. = 0.903090ν
26.048ν = 1.41ν774

log. 20.0ν ν = 1.302222ν
" cos. t = 9.932ν11ν
−17.1ν ν = 1.234474ν
log. δ. = 0.903090ν
−137.27ν = 2.137ν64ν

9 ν ν 17.2ν
26.0ν
9 ν ν 43.29ν

+14 ν 9 21.7ν
−2 17.3ν
+14 ν7 4.4ν

log. u/15 = 0.126077ν
" sin t = 9.712716ν
" (cos. δ = 9.426ν71ν
0.18423ν = 9.26ν364ν
3.0707ν
log. 3.2ν493ν = 0.51254ν2ν
" 16. = 1.204120ν
ν2.079ν = 1.716662

log. u = 1.302169ν
" cos. A = 9.932748ν
" 16. = 1.204120ν
−274.1ν = 2.439037ν

14 ν 9 21.7
−4 34.4ν
14 ν4 46.9

9 ν ν 17.2ν
ν2.0ν
Pos. 1881.0 9 ν6 9.32ν

14 ν4 46.9ν

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Oct. 20. 1881.
Denning's Comet.

$\delta = +14^\circ\ 54'\ 46''.9$

f.	+3.408 v		
Log. q.	1.3499+ v	Log. q.	1.3499+ v
" sin(G++)	9.6135+ v	" cos.(G++)	9.9599m v
" tan. δ	9.4254+ v	" sum	1.3098 v w
" sum	0.3888+	Σy	−20.41 v
" l5	1.1761+ v	" h	1.2820+ v
" result	9.2117+	" cos(H++)	9.9427m v
Σy	+0.163 v	" sin δ	9.4105+ v
" h	1.2820+ v	" sum	0.6352 v w
" sin(H++)	9.6828m v	Σy	−4.32 v
" sec. δ	0.0149+ v	" ν	0.8559+ v
" sum	0.9797 v w	" cos. δ	9.9851+ v
" l5	1.1761 v +	" sum	0.8410+ v
" result	9.8036 w	Σy	+6.93 v
Σy	−0.636 v	δ′ − δ	−17.80 v
δ′ − δ	+2.935 v		

9 56 9.51 v (mean, p. 69.) +14 54 46.2 v
+2.94 v −17.8 v
9 56 12.45 v +14 54 28.4 v
+1 44.92 v −7 1.5 v
9 57 57.37 v Pos. ⊙ +14 47 26.9 v

(G) = 0^h 26.8 v H = 3 57 9.0 v
(H) = 9 56.2 v H = 9 56.2 v
(G++) = 10 23.0 v (H++) = 13 55.2 v
+.18 day v.

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Denning's Comet.

Oct. 21. 1881.

	1 Comet	2 Star	3 Diff.	4 Diff/2
0^h	$5^m\ 56.^s4^v$	$2^m\ 18.^s1^v$		
	$6\ \ 23.9^v$	$2\ \ 49.1^v$		
	$12\ \ 20.3^v$	$5\ \ 7.2^v$	$7^-\ 13.^s1^v$	$3^-\ 36.5^v$
	$11\ \ 5.4^v$	$7\ \ 27.3^v$		
	$11\ \ 33.3^v$	$7\ \ 58.3^v$		
	$22\ \ 38.7^v$	$15\ \ 25.6^v$	$7\ \ 13.1^v$	$3\ \ 36.5^v$
	$18\ \ 49.7^v$	$15\ \ 10.0^v$		
	$19\ \ 16.9^v$	$15\ \ 41.3^v$		
	$38\ \ 6.6^v$	$30\ \ 51.3^v$	$7\ \ 15.3^v$	$3\ \ 37.6^v$
	$24\ \ 12.1^v$	$20\ \ 31.8^v$		
	$24\ \ 38.0^v$	$21\ \ 3.0^v$		
	$48\ \ 50.1^v$	$41\ \ 34.8^v$	$7\ \ 15.3^v$	$3\ \ 37.6^v$
	$29\ \ 33.7^v$	$25\ \ 52.2^v$		
	$30\ \ 0.1^v$	$26\ \ 23.8^v$		
	$59\ \ 33.8^v$	$52\ \ 16.0^v$	$7\ \ 17.8^v$	$3\ \ 38.9^v$
				$+3^-\ 37.^s46^v$

Mean of 4 times = $0^h\ 18^m\ 8.^s95^v$

First tap = $-2.^s5^v$

Last tap of all $0^h\ 31^-\ 10.^s5^v = 6\ 13\ 3.^s5^v$

$\frac{0\ \ 18\ \ 9.0^v}{0^h\ 13^m\ 1.^s0^v}$ $\qquad$ $\frac{+28.4^v}{6\ \ 14\ \ 3.4^v}$

$\frac{-13\ \ 1.0^v}{6\ \ 1\ \ 2.4^v}$

$\frac{14\ \ 1\ \ 3.1^v}{15\ \ 59\ \ 5.5^v}$

$\frac{-2\ \ 37.3^v}{15^h\ 57^m\ 22.^s0 = 6.3m.7\ obs.}$

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1881phae.proj.4917

5 Diff =	6 Diff *	7 (Cols 5 + Col. 6)
$0^m\ 27^s.5^v$	$0^m\ 31^s.0^v$	$0^m\ 58^s.5^v$
0 27.9	0 31.0	0 58.9
0 27.2	0 31.3	0 58.5
0 25.9	0 31.2	0 57.1
0 26.4	0 31.6	0 58.0
0 26.9	0 31.2	$0^m\ 58^s.20^v$

Log. 26.9 = 1.430402
" $\frac{L^v}{2}$ = 0.897061
" cos. dec. = 9.9 cv 261
195.79 = 2.291364

Log. 31.2 = 1.494433
" $\frac{L^v}{2}$ = 0.897061
" cos. dec. = 9.9 cv 261
226.34 = 2.354775

+14 54 28.2
−3 54.0
+14 50 34.2

Log. 58.20 = 1.764923
" $\frac{L^v}{2}$ = 0.897061
" cos. dec = 9.985130
421.81 = 2.625114
889.8
2 | 467.99
234.0

Log. 58.20 = 1.764923
" $\frac{L^v}{2}$ = 0.897061
" cos (var) dec = 9.985261
421.93 = 2.625245
889.8
−467.87 = −7′ 47.″87

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Barnard's Comet.
Oct. 21. 1881.

1	2	3	4
Comet.	Star.	Diff.	Diff. / 2
$20^h\ 48^m\ 41.7^s$	$20^h\ 41^m\ 2.0^s$		
$44\ \ 26.9$	$41\ \ 21.0$		
$4\ \ 4.8$	$2\ \ 23.0$	$2^m\ 41.8^s$	$+2^m\ 2.60^s$



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1881phae.proj..491T

5 6 (Col. 5 − Col. 6)

Diff. ∝ Diff. ∗

0ˢ 45ˢ.2 0ˢ 19ˢ.0 26.2

log. 26.2 = 1.418301
" 45/2 = 0.857061
" cos. δ = 9.995057
177.1 = 2.248419
δ δ.5 9 =

+2 37 7.8
+1 26.6
+2 38 34.4

log. 26.2 = 1.418301
" 45/2 = 0.857061
" cos. δ = 9.994961
177.1 = 2.248330

+2 37 7.8
+2 57.2
+2 40 5.0

log. 45.2 = 1.655114
" 7.5 = 0.857506
" cos. dec. = 9.994497
30 6.1 = 2.487117
444.9
−139.3 = d′ ∝
177.2
−316.5 = d ∗

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1881phae.proj.491T

56 yrs. Barnard's Comet.
Oct. 21, 1881.

Obs. +25°2692. 13 45 13.3 +25° 45'.6

K. 13h 971. 13 43 48.37 +25 54 7.8
20 56° 57' 57.5

log .1337 = 0.126131
" sin t = 9.641088
" tan δ = 9.686297
−0.2841 = 9.457516
3.07
+2.7857 = 0.444961

" Δ. = 1.447158
78.004 = 1.892119

log. 20.055 = 1.302223
" cos. t = 9.953859
−18.037 = 1.256062
log. Δ. = 1.447158
−5049.2 42.703220

13 43 48.37
+1 18.00
13 45 6.37
206° 16' 35."5

log. $\frac{u}{15}$ = 0.126119
" sin A. = 9.646114
" Cos D. = 9.685357
−0.2846 4 9.457820
3.0707
+2.7857 06 = 0.444825
log. 56. = 1.748188
155.96 = 2.193013

+25 54 7.8
−8 24.9
+25 45 42.9

log. u = 1.302211
" cos. A = 9.952631
1.254842
" 56. = 1.748188
−1007.0 = 3.003030

13 43 48.37
+2 35.96
Pos. 1881.0 13 46 24.33
Red. to app. +1.60
13 46 25.93
app. pl. ☉ − ☆ +2 52.40
Pos. ☉ 13 49 18.73

+25 54 7.8
−16 47.0
+25 37 20.8
−12.9
+25 37 7.9
+2 57.2
+25 40 5.1

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1881phae.proj..4917

Oct. 21. 1881.
Barnard's Comet.

f =	+ 3.412		
Log. g	1.3504+	Log. g	1.3504+
" sin (G+f)	9.7402 w	" cos. (G+f)	9.9220 w
" Cor. δ =	9.6809 +	Log. sinn =	1.2724 w
" sinn	0.7715 w	2y =	−18.72
" r	1.1761 +	Log. h	1.2424+
" result =	w 9.9954	" cos. (H+f)	8.4699 w
2y =	−0.994	" sin. δ	9.6059+
Log. h	1.2424+	" sinn	9.7842
" sin (H+f)	9.9944 w	2y =	−0.614
" cos. δ	0.0450+	Log. i	0.4535+
" sinn	1.3262 w	" cos. δ	9.9950+
" r	1.1761	" sinn	0.4585+
" result	0.1501 w	2y =	+6.43
2y. =	−1.413	δ'−δ =	−12.90
f'−f =	+1.605		

−0".08 } Cor. for
+2".1 } Reg.

−.24 day.

g = 0h 27.0 H = 3h 6.6
f = 17 46.4 17 46.4
(G+f) 14 13.4 (H+f) 17 43.0

1881phae.proj.491T

Oct. 21. 1881.

Barnard's Comet.

Time on ☉ by Bond 20ʰ 44ᵐ 4.5ˢ ✓

		+22.2	✓
20	44	32.5	✓
14	1	3.1	✓
6	43	29.4	
	−1	6.1	✓
6	42	23.3	✓ C. M. T. obs.

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1881phae.proj..4911

Denning's Comet.
Oct. 21. 1881.

$\delta = 14^\circ\ 54'\ 46''.2$

f.	+ 3.415		
Log. q.	1.35073	Log. q.	1.35073
" sin(G++)	9.61273	" cos.(G++)	9.96011 n
" tan. δ	9.42544	" sum	1.31084 n
" sum	0.38888	2y	− 20.46
" 15	1.17611	" h	1.28266
" result	9.21273	" cos(H++)	9.94673 n
2y	+ 0.163	" sin δ	9.41055
" h	1.28266	" sum	0.63984 n
" sin(H++)	9.66873 n	2y	− 4.36
" sec. δ	0.01499	" r	0.85191
" sum	0.96622 n	" cos. δ	9.98511
" 15	1.17611	" sum	0.83702
" result	9.79011 n	2y	+ 6.87
2y	+ 0.617	δ' − δ	− 17.95
f' − f	+ 2.961		

Pos. 1881.0	9h 56m 9.51	Pos. 1881.0	+ 14° 54' 46".2
Red. to ap. pl.	+ 2.96	Red. to ap. pl.	− 18.0
ap. pos. *	9 56 12.47	ap. pos. *	+ 14 54 28.2
∈ − *	+ 3 37.46	∈ − *	− 7 47.9
Pos. ∈	9 59 49.93	Pos. ∈	+ 14 46 40.3

G = 0h 27m.0 H = 3h 55m.0
t = 9 56.2 t = 9 56.2
(G++) = 10h 23m.2 (H++) = 13h 51m.2

+ 15. day.

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1881phae.proj.1491T

Barnard's Comet.

Oct. 25. 1881.

(See page 91).

f.	
Log. g.	Log. g.
" sin (G++)	" cos. G++
" tan. δ	" sum
" sum	Σy
" 15	" h
" result	" cos. (H++)
Σy	" sin δ
" h	" sum
" sin (H++)	Σy
" sec. δ	" i
" sum	" cos. δ
" 15	" sum
" result	Σy
Σy	δ' − δ
t' − t	

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1881phae.proj..491T

Barnard's Comet.
Oct. 25. 1881.

(See page 90)

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1881phae.proj.491T

Oct. 25. 1881.

Barnard's Comet.

	1 Comet	2 Star.	3 Diff.	4 Diff/12
0^h	$0^m\ 59^s.4^v$	$1^m\ 21^s.0^v$		
	$1\ 25.1^v$	$1\ 46.0^v$		
	$2\ 24.5^v$	$3\ 7.0^v$	$0^-\ 42^s.5^v$	$0^-\ 21.25^v$
	$3\ 36.8^v$	$3\ 56.6^v$		
	$4\ 15.0^v$	$4\ 37.8^v$		
	$7\ 51.8^v$	$8\ 34.4^v$	$0\ 42.6^v$	$0\ 21.30^v$
	$5\ 20.0^v$	$5\ 40.5^v$		
	$5\ 54.0^v$	$6\ 16.5^v$		
	$11\ 14.0^v$	$11\ 57.0^v$	$0\ 43.0^v$	$0\ 21.50^v$
	$6\ 53.5^v$	$7\ 14.2^v$		
	$7\ 26.3^v$	$7\ 49.6^v$		
	$14\ 19.8^v$	$15^-\ 3.8$	$0\ 44.0^v$	$0\ 22.00^v$
	$8\ 35.3^v$	$8\ 57.2^v$		
	$9\ 8.7^v$	$9\ 32.0^v$		
	$17\ 44.0^v$	$18\ 29.2^v$	$0\ 45.2^v$	$0\ 22.60^v$
				$-0\ 21.73^v$



Last tap.: $0^h\ 10^m\ 53^s.3^v$ = $7^h\ 31^m\ 25^s$ by Bond 236.

Mean ∈ times = $5\ 21.4^v$ -38.1^v

$0^h\ 5^m\ 31^s.9^v$ $7\ 30\ 46.9^v$

$-5\ 31.9^v$ $2\ 48.413^v$

$7\ 25\ 15.0^v$ $.070^v$

$14\ 16\ 49.3^v$ $2\ 48.483^v$

$17\ 8\ 25.7^v$

$-2\ 48.5^v$

$17\ 5\ 37.2^v$ = G. M. T. ds.

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1881phae.proj..491T

5 Diff =	6. Diff. *	7 Col. 5 − Col. 6.
$0^m\ 25^s.7$	$0^m\ 25^s.0$	$-0^m\ 0^s.7$
38.2	41.2	+0 3.0
34.0	36.0	+0 2.0
32.8	35.4	+0 2.6
33.4	34.8	+0 1.4
$0^m\ 32^s.82$	$0^m\ 34^s.48$	$+0^m\ 1^s.66$

Log. 32.82 = 1.516 1K
" 7.5 = 0.875 06
" cos. dec. = 9.94693
217.8 = 2.33813
444.9
−227.1 = d' =
11.0
−216.1 = d *

+27° 45′ 12.9″
− 5.5
+27 45 7.4

Log. 1.66 = 0.220108
" $\frac{15}{2}$ = 0.875061
" cos. dec = 9.946923
11.0″ = 1.042092
5.51

Log. 1.66 = 0.220108
" $\frac{15}{2}$ = 0.875061
" cos. mid. dec. = 9.946929
11.0″ = 1.042098

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1881phae.proj 3491T

Oct. 25. 1881.

Denning's Comet.

1 Comet.	2 Star.	3 Diff.	4 ½ Diff.
3 44.5	2 29.1		
3 53.3	2 46.6		
7 37.8	5 15.7	2m 22.1s	1m 11.0s
5 47.0	4 32.8		
5 57.2	4 50.0		
11 44.2	9 22.8	2 21.4	1 10.70
7 47.8	6 32.4		
7 57.2	6 50.0		
15 45.0	13 22.4	2 22.6	1 11.30
10 14.3	8 59.4		
10 24.4	9 16.5		
20 38.7	18 15.9	2 22.8	1 11.40
12 12.8	10 58.1		
12 22.6	11 15.1		
24 35.4	22 13.2	2 22.2	1 11.10
14 22.4	13 7.5		
14 32.3	13 24.6		
28 54.7	26 32.1	2 22.6	1 11.30
			+1m 11.16s

Last tap = 0h 15m 48.3s = 6 35 20s by Bond 236.

mean of 6 lines = 10 9.8s − 38.1s

5 38.5s 6 34 41.9s

−5 38.5s

6 29 3.4s

14 16 49.3s

16 12 14.1s

−2 39.3 = 16h 9m 34.8s = C. M. T. obs.

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1881phae.proj..491T

Diff. = Diff. * (Col. 5 + Col. 6)

log. cos. dec. * 9.9[illegible]
" 45 = 0.8750 61
" 9.88 = 0.9947 57
= 71.58 = 1.8547 99

0 10.2 0 17.2

9.9[illegible]
0.8750 61
17.20 = 1.2357 24
* 12.62 = 2.0907 70

9.4 17.6

10.1 17.1

889.8
71.6
818.2
124.6
942.8
log. 47.14 =

14 58 53.2
-7 51.4
14 51 1.8

9.8 17.0

log. cos. mid. 9.9852 46
0.8750 61
9.9947 57
= 71.62 = 1.8552 64

9.9 17.1
9.88 17.20

889.8
71.6
818.2
124.7
942.9
* 12.69 =

9.9852 46
0.8750 61
1.2357 24
2.0959 31

14 58. 53.2
-15. 42.9
14 43 10.3 Dec.

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1881phae.proj.0491T

Denning's Comet.

Oct. 21. 1881.

$\delta = +14^\circ\ 59'\ 12.''1$

f	$+3.4422$		
Log. g.	$1.35444+$	Log. g.	$1.35444+$
" $\sin(G+t)$	$9.56551+$	" $\cos(G+t)$	$9.96855n$
" tang. d	9.42766	" sum	$1.32299n$
" sum	$0.34711+$	Σy	-21.03
" 15	$1.17610+$	" h	$1.28500+$
" result	$9.17100+$	" $\cos.(H+t)$	$9.95333n$
Σy	$+0.148$	" $\sin d$	$9.41266+$
" h	$1.28500+$	" sum	$0.65099n$
" $\sin(H+t)$	$9.64344n$	Σy	-4.48
" sec. d	$0.01500+$	" ν'	$0.83366+$
" sum	$0.94344n$	" $\cos. d$	$9.98500+$
" 15	1.17611	" sum	0.81866
" result	$9.76733n$	Σy	$+6.59$
Σy	-0.585	$d'-d$	-18.92
$t'-t$	$+3.005$		

$G = 0\ 27.8$ $H = 3\ 38.4$

$t = 10\ 6.0$ $t = 10\ 6.0$

$(G+t) = 10\ 33.8$ $(H+t) = 13\ 44.4$

$+.16$ day

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1881phae.proj..491T

26 yrs. Oct. 25. 1881.
Deconing's Comet.

Dec. +15°21′ 10 4 35.1 +15° 6′9

B.Z. +15.21′ 10 4 35.09 +15′ 6 49.″

151° 8 46.35″

log. 1.337 = 0.126131″
" sin t = 9.683566″
" tan. d = 9.431490″
+0.1743″ = 9.241187″
+3.07″
+3,24″ = 0.510545″
log. 13 = 1.113943″
42.12″ = 1,624488″

10ʰ 4ᵐ 35.09″
+42.12″
10ʰ 5ᵐ 17ˢ.21″
151° 19′ 18.15″

log. $\frac{n}{15}$ = 0.126087″
" sin A = 9.681143″
" tan d = 9.429576″
+0.1725″ = 9.236806″
+3.0710″
+3 24 35″ = 0.511014″
log. 26 = 1.414973″
84.33″ = 1.925987″

10ʰ 4ᵐ 35.09″
10ʰ +1 24 33″
Pos. 1881.0 10ʰ 5ᵐ 59.42″
Red to app. +3.00″
App. pl. 10 6 2.42″
α = − * +1 11.16″
Pos α= 10ʰ 7ᵐ 13ˢ,58″

log. 20.054 = 1.302206″
" cos t = 9.942432″n
" 13 = 1.113943″
−228.34″ = 2.358581″n

+15° 6′ 49.5″
−3 48.3″
15° 3′ 1.″2″

log n = 1.302179″
" cos A = 9.943162″n
" 26 = 1.414973″
−459.42″ 2.660314″n

+15° 6′ 49.5″
−7 37.4″
+14° 59 12.1″
−15.9″
+14 58 56.2″
−15 42.9″
+14° 43′ 10.″3″

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1881phae.proj.491T

90

56 yrs. Oct. 25. 1881.

Barnard's Comet.

Obs. +27° 23′. 13 49 53.0 +27 52.9

N.B. 15h 1096. 13 48 30.06 +28 2 3.3 (9)

207° 7′ 30.″90

log. 1.337 = 0.126131 log. 20.0 = 1.3022229

" sin. + = 9.625905 " cos. + = 9.949959

" tan. d = 9.726300 − 17.249 = 1.251614

−0.32459 9.511336 log. 2Δ = 1.447150

3.07 −499.7 = 2.698776

log. 2.74541 = 0.439607

" 2Δ = 1.447150

+76.471 = 1.886757

13 48 30.06

+1 16.87

13 49 46.93

mid. pl. 207° 26′ 43.′95

2Δ 2 3.3

−8 19.8

+27 53 43.5

log. $\frac{w}{R}$ = 0.126119 log. w = 1.302211

" sin A. = 9.663612 log. cos. + = 9.994144

" tan. D = 9.723760 −17.797 = 1.250355

−0.32621 9.513491 log. 56. = 1.744188

+3.070 −996.6 = 2.998543

+2.7443 = 0.439432

log. 56. = 1.744188

+153.64 = 2.186620

13 48 30.06

+2 33.64

Pos. 1881.0 13 51 3.74 +28° 2′ 3.″3

Red. to ap. pl. +1.55 −16 36.6

ap. pos. * 13 51 5.29 +27 45 26.7

∈ − * −0 21.73 −13.8

∈'s place 13 50 43.56 +27 45 12.9

− 11.0

+27 45 1.9

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1881phae.proj..491T

Oct. 25. 1881.

Barnard's Comet.

$\delta = +27^\circ\ 45'\ 26.''7$

f	$+3.442$	Log. g.	1.3545_n
Log. g.	1.3545_n	Log. cos. $(G+\delta)$	9.9148_n
" sin $(G+\delta)$	9.7556_n	" sin	1.2693_n
" tan. δ	9.7212_+	Σy	-18.59
" sin	0.8313_n	Log. h	1.2850_+
" r	1.1761_+	" cos. $(H+L)$	9.1256_n
" result.	9.6552_n	" sin. δ	9.6681_+
Σy.	-0.452	" sin	0.0787_n
" h	1.2850_+	Σy	-1.20
" sin $(H+L)$	9.9961_n	Log. i	0.4334_+
" sec. δ	0.0531_+	" cos. δ	9.9469_+
" sin	1.3342_n	" sin	0.7803_+
" r	1.1761_+	Σy	$+6.03$
" result	0.1581_n	$\delta' - \delta$	-13.76
Σy	-1.439		
$L' - L$	$+1.551'$		

$G = 0^h\ 2y.\bar{4}$

$+ = 13.51.1$

$(G+L) = 14\ 18.9$

$H = 3^h\ 3\bar{4}.2$

$+ = 13\ \ 51.1$

$(H+L) = 17\ \ 29.3$

$+.20$ day.

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1881phae.proj.491T

Barnard's Comet
Oct. 26. 1881.

	1 Comet	2 Star	3 Diff.	4 Diff/2
0^h	0 30 1	0 37 8		
	0 39.9	0 54.1		
	1 57.5	2 4.7		
	2 10.2	2 18.7		
	3 38.5	3 44.5		
	3 46.9	4 1.8		
	7 25.4	7 46.3	$0^m\ 20.^s9$	$0^m\ 10.^s45$
	4 42.7	4 50.2		
	4 54.1	5 6.3		
	9 36.8	9 56.5	0 19.7	0 9.85
	6 2.3	6 10.2		
	6 13.0	6 26.7		
	12 15.3	12 36.9	0 21.6	0 10.80
	7 54.2	7 59.8		
	8 3.2	8 14.2		
	15 57.4	16 14.0	0 16.6	0 8.30
	9 43.8	9 51.9		
	9 54.4	10 6.3		
	19 38.2	19 58.2	0 20.0	0 10.0
				$-0^m\ 9.^s88$

Last Tap = $0^h\ 16^m\ 53.^s8$ (See page 94 for Le. No. 5.)

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1881phae.proj..491T

5	6	7
Diff =	Diff. +	(col 5 + col. 6)

Log. 10.02 = 1.000868
" $\frac{15}{2}$ = 0.875061
" cos. dδ = 9.946923
= 66.″505 = 1.822852

Log. 15.74 = 1.197005
" $\frac{15}{2}$ = 0.875061
" cos. dδ = 9.946923
* 104.47 = 2.018989

(d' = + 378.″4) : (d* = −549.4)

$0^m\ 8.^s4$ $0^m\ 17.^s3$

889.8
104.5
994.3
66.5
927.8
463.9

$+27^\circ\ 45'\ 12.8$
$+\ 7\ \ 43.9$
$+27\ \ 52\ \ 56.7$

0 11.4 0 16.1

Log 10.02 = 1.000868
" $\frac{15}{2}$ = 0.875061
" cos. dδ = 9.946408
= 66.43 = 1.822337

0 10.7 0 16.5

Log 15.74 = 1.197005
" $\frac{15}{2}$ = 0.875061
" cos. dδ = 9.946408
* 104.35 = 2.018474

889.8
104.4
994.2
66.4
927.8

$+27^\circ\ 45'\ 12.8$
$+15\ \ 27.8$
$+28\ \ 0\ \ 40.6$

0 9.0 0 14.4

0 10.6 0 14.4

$0^m\ 10.^s02$ $0^m\ 15.^s74$

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1881phae.proj.491T

Barnard's ☌ Oct. 26. (1881)

Last Cap = $0^h\ 16^m\ 53^s.8^v$ = $21^h\ 17^m\ 23.4^v$

mean ☌ Times = $0\ \ 6^m\ 29.3^v$ $\qquad -36.4^v$

$0^h\ 10^m\ 24^s.5^v$ $\qquad 21\ \ 16\ \ 47.0^v$

$-10\ \ 24.5^v$

$21\ \ 6\ \ 22.5^v$

$14\ \ 20\ \ 45.9^v$

$6\ \ 45\ \ 36.6^v$

$-1\ \ 6.4^v$

$6^h\ 44^m\ 30^s.2^v$ = 6 Me. T. obs.

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1881phae.proj..4911

Oct. 26. 1881.

Barnard's Comet.

$\delta = +27^\circ\ 45'\ 26''.7$

f.	+ 3.446		
Log. g.	1.35550+	Log. g.	1.35550+
" sin(G++)	9.75622	Log. cos.(G++)	9.91466
" tan. δ	9.72122+	" sum	1.26962
" sum	0.83244	Ly	− 18.60
" 15	1.17611+	log h	1.28554+
" result	9.65633	" cos(H++)	9.15688
Ly	− 0.453	" sin δ	9.66811+
" h	1.28554+	" sum	0.11013
" sin(H++)	9.99555	Ly	− 1.29
" sec. δ	0.05311+	log. x'	0.83061+
" sum	1.33405	" cos. δ	9.94699+
" 15	1.17611+	" sum	0.77735+
" result	0.15795	Ly	+ 5.99
Ly	− 1.438	δ' − δ	− 13.90
f' − f	+ 1.555		
Pos. 1881.0	13h 51m 3.74	Pos. 1881.0	+27° 45' 26".7
Red. to app. pl.	+ 1.56	Red. to app. pl.	−13.9
Ap. pos. *	13 51 5.30	Ap. pos. *	+27 45 12.8
⊏ − *	− 0 9.88	⊏ − *	+ 15 27.8
Pos ⊏	13h 50m 55s.42	Pos ⊏	+28 0 40.6

G = 0h 28m.0 H = 3 35.9

* = 13 51.1 * = 13 51.1

(G++) = 14h 19m.1 (H++) = 17 27.0

−.24 day.

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1881phae.proj..491T

Oct. 26. 1881.

Denning's Comet.

	1 Comet	2 Star	6 Diff.	4 Diff
0^h	$1^m\ 9^s.9^v$	$4\ 16.9^v$		
	$1\ 31.6^v$	$4\ 26.4^v$		
	$2\ 41.5^v$	$8\ 43.3^v$	$6^m\ 1^s.8^v$	$3^m\ 0^s.90^v$
	$7\ 37.4^v$	$10\ 45.0^v$		
	$7\ 59.7^v$	$10\ 54.5^v$		
	$15\ 37.1^v$	$21\ 39.5^v$	$6\ 2.4^v$	$3\ 1.20^v$
	$11\ 57.3^v$	$15\ 3.8^v$		
	$12\ 18.9^v$	$15\ 13.3^v$		
	$24\ 16.2^v$	$30\ 17.1^v$	$6\ 0.9^v$	$3\ 0.45^v$
	$16\ 27.1^v$	$19\ 33.8^v$		
	$16\ 49.4^v$	$19\ 43.4^v$		
	$33\ 16.5^v$	$39\ 17.2^v$	$6\ 0.7^v$	$3\ 0.35^v$
	$20\ 27.7^v$	$23\ 33.5^v$		
	$20\ 49.9^v$	$23\ 43.3^v$		
	$41\ 17.6^v$	$47\ 16.8^v$	$5\ 59.2^v$	$2\ 59.60^v$
				$-3^m\ 0^s.50^v$

last taja = $0^h\ 24^m\ 30^s.9^v = 7\ 53\ 0.0^v$

mean of times = $0\ 11^m\ 42.9^v$ $\quad -35.8^v$

$-12\ 48.0^v$ $\quad 7\ 52\ 24.2^v$

$-12\ 48.0^v$

$7\ 39\ 36.2^v$

$14\ 20\ 45.9^v$

$17\ 18\ 50.3^v$

$-2\ 50.2^v$

$17^h\ 16^m\ 0^s.1^v$ = G. Me. T. obs.

2	50.051
	.138
2	50.189

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1881phae.proj..491T

5	6	7
Diff =	Diff +	(col 5 + col 6)
$0^m\ 21.^s7$	$0^m\ 9.^s5$	$0^m\ 31.^s2$
0 22.3	0 9.5	0 31.8
0 21.6	0 9.5	0 31.1
		14 31 22.2
		+5 30.2
		14 36 52.4
0 22.3	0 9.6	0 31.9
0 22.2	0 9.8	0 32.0
0 22.02	0 9.84	$0^m\ 31.^s60$

Log. 31.6 = 1.499647
" 7.5 = 0.847561
" cos. dec. = 9.994897
229.43 2.360644
889.8
660.4
330.2

1.499647
0.847561
9.994716
229.3 = 2.360464
889.8
660.5 = +11′ 0.5

1881phae.proj.491T

√6 yrs.

Oct. 26. 1881

Denning's Comet.

Wash. M.T.	10	10	39.2	+14	39.8	(8.3)
Wash. I. 10^h 17m	10^h	9m	2.s00	+14	48	18.7	(9)
	152°	15′	30.″0 ✓			

log. 1.337 = 0.126131 ✓
" sin t = 9.667906 ✓
" tan δ = 9.422111 ✓
+ 0.1645 ✓ = 9.216148 ✓
+ 3.07 ✓
+3.234 ✓ = 0.509740 ✓
log. 28 = 1.447158 ✓
+90.s55 ✓ = 1.956898 ✓

10^h 9^m 2.s00 ✓
+ 1 30.√√ ✓
Mid pl. 10^h 10^m 32.s55 ✓

152° 38′ 8.″25 ✓

log. m/15 = 0.126119 ✓
" sin A. = 9.662425 ✓
" tan D = 9.417857 ✓
+0.1608 ✓ = 9.206401 ✓
+3.0709 ✓
+3.2315 ✓ = 0.509404 ✓
log. √6 ✓ = 1.748188 ✓
180.s96 ✓ = 2.257592 ✓

10^h 9^m 2.00 ✓
+ 3 0.96 ✓
Pos. 1881.0 10^h 12^m 2.s96 ✓
Red. to app. pl. +2.99 ✓
app. pl. ☆ 10 12 √.9√ ✓
⊜ − ☆ − 3 0.√0 ✓
Pos. ⊜ 10 9 √.4√ ✓

log. 20.055 = 1.302223 ✓
" cos t = 9.946970 ✓
" 28 = 1.447158 ✓
−496.″99 ✓ = 2.696351 ✓

+14° 48′ 18.7 ✓
− 8 17.0 ✓
+14° 40′ 1.″7 ✓

log. m = 1.302211 ✓
" cos A = 9.948462 ✓
" √6 = 1.748188 ✓
−997.″38 ✓ = 2.998861 ✓

+14° 48′ 18.″7 ✓
− 16 37.4 ✓
+14° 31′ 41.″3 ✓
− 19.1 ✓
⊜ − ☆ +14 31 22.2 ✓
+11 0.√ ✓
+14 42 22.7 ✓

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1881phae.proj..491T

Oct. 26. 1881

Denning's Comet.

$\delta =$

f.	+ 3. 4 5 0 ᵛ		
Log. g.	1. 3 5 5 4 +	Log. g.	1. 3 5 5 4 +
" sin (G++)	9. 5 3 4 1 +	" cos (G++)	9. 9 7 3 0 n
" tang δ	9. 4 1 3 5 +	" sum	1. 3 2 8 4 n
" sum	0. 3 0 3 0 +	Zy	− 21. 3 0
" 15	1. 1 7 6 1 +	" h	1. 2 8 5 6 +
" result	9. 1 2 6 9 +	" cos. (H++)	9. 9 5 1 7 n
Zy	+ 0. 1 3 4	" sin δ	9. 3 9 9 4 +
" h	1. 2 8 5 6 +	" sum	0. 6 3 6 7 n
" sin (H++)	9. 6 4 9 9 n	Zy	− 4. 3 3
" cos. δ	0. 0 1 4 1 +	" i	0. 8 2 8 4 +
" sum	0. 9 4 9 6 n	" cos. δ	9. 9 8 5 9 +
" 15	1. 1 7 6 1 +	" sum	0. 8 1 4 3 +
" result	9. 7 7 3 5 n	Zy	+ 6. 5 2
Zy	− 0. 5 9 4	δ' − δ	−19. 11
t' − t	+ 2. 9 9 0		

b = 0 28. 0 H = 3 34. 1

t = 10 12. 0 t = 10 12. 0

G++ = 10 40. 0 H++ = 13 46. 1

+. 20 day

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1881phae.proj.401T

Oct. 27. 1881.
Denning's Comet.

	1 Comet	2 Star	3 Diff.	4 Diff/2
	0 11.2	1 31.3		
	0 30.0	1 51.5		
	0 41.2	3 22.8	2m 41.6s	1m 20.80s
	2 42.5	4 0.4		
	3 0.0	4 20.8		
	5 42.5	8 21.2	2 38.7	1 19.35
	5 11.9	6 30.4		
	5 28.8	6 50.7		
	10 40.7	13 21.1	2 40.4	1 20.20
	8 16.9	9 32.7		
	8 32.4	9 52.9		
	16 49.3	19 25.6	2 36.3	1 18.15
	10 39.0	11 56.3		
	10 55.9	12 16.9		
	21 34.9	24 13.2	2 38.3	1 19.15
				-1 19.53



Last Obs. = 0h 16m 24s.2 = 7 15 25.
mean of times 5 32.9 -6.2
-10 51.3 7 15 18.8
-10 51.3
7 4 27.5
14 24 42.4
16 39 45.1
-2 43.8
16h 37m 1s.3 = G.M.T. obs.

2 43.662
.123
2 43.785

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1881phae.proj..491T

5	6	7
Diff. =	Diff. +	(Col. 5 + Col. 6)
$0^m\ 18^s.8^v$	$0^m\ 20^s.2^v$	$0^m\ 39^s.0^v$
$0^m\ 17^s.5^v$	$0^m\ 20^s.4^v$	$0^m\ 37^s.9^v$
$0\ 16.9^v$	$0\ 20.3^v$	$0\ 37.2^v$
$0\ 15.5^v$	$0\ 20.2^v$	$0\ 35.7^v$
$0\ 16.9^v$	$0\ 20.6^v$	$0\ 37.5^v$
$0\ 17.12^v$	$0\ 20.34^v$	$0\ 37.46^v$

$+14^\circ\ 31'\ 22.0^v$
$+5\ \ 8.9^v$
$+14\ 36\ 30.9^v$

Log. 37.46 = 1.573568^v
" $\frac{15}{2}$ = 0.875061^v
" cos. dec. 9.9+5+97^v
271.97^v 2.434526^v
889.8^v
761.8^v
308.9^v

Log 37.46 = 1.573568^v
" $\frac{15}{2}$ = 0.875061^v
" cos. dec. = 9.9+5+72^v
271.87^v = 2.434357^v
889.8^v
617.9^v = $+10'\ 17''.9^v$

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1881phae.proj.491T

Oct. 27. 1881

Denning's Comet.

$\delta = +14^\circ\ 31'\ 41.''3$

f.	+3.457 v		
log. g.	1.3564+ v	Log. g.	1.3564+ v
" sin (G+t)	9.5330+ v	" cos. (G+t)	9.9731 n v
" tan. δ	9.4185+ v	" sum	1.3295 n v
" sum	0.3029 v +	Σy	−21.36 v
" 15	1.1761+ v	" h	1.2862+ v
" result	9.1268 v +	" cos (H++)	9.9555 n v
Σy	+0.134 v	" sin δ	9.3994+ v
" h	1.2862+ v	" sum	0.6411 v n
" sin (H++)	9.6340 n v	Σy	−4.38 v
" cos. δ	0.0141+ v	" i	0.8232+ v
" sum	0.9343 v n	" cos. δ	9.9859+ v
" 15	1.1761+ v	" sum	0.8091 v +
" result	9.7582 v n	Σy	+6.44 v
Σy	−0.573 v	δ′ − δ	−19.30 v
t′ − t	+3.018 v		

Pos. 1881.0	$10^h\ 12^m\ 2^s.96$ v	Pos. 1881.0	$+14^\circ\ 31'\ 41.''3$ v
Red. to App. pl	+3.02 v	Red. to App. pl	−19.3 v
Ap. pos +	10 12 5.98 v	Ap. pos +	+14 31′ 22.″0 v
∈ − +	−1 19.53 v	∈ − +	+10 17.9 v
Pos ∈	$10^h\ 10^m\ 46^s.45$ v	Pos ∈	+14 41 39.9

G = $0^h\ 28^m.2$ v H = $3^h\ 30^m.0$ v

t = 10 12.0 v t = 10 12.0 v

(G+t) = $10^h\ 40^m.2$ (H++) = $13^h\ 42^m.0$

+.18 v day.

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1881phae.proj..491T

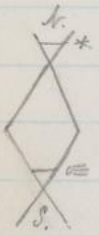
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1881phae.proj..491T

Oct. 27. 1881.

Barnard's Comet.

	1 Comet	2 Star	3 Diff	4 Diff/2
0h	3m 6.8s ✓	0m 34.3s ✓		
	3 27.0 ✓	0 43.9 ✓		
	6 33.8 ✓	1 18.2 ✓	5m 15.6s ✓	2m 37.8s ✓
	6 48.6 ✓	4 17.9 ✓		
	7 21.2 ✓	4 26.8 ✓		
	13 49.8 ✓	8 44.7 ✓	5 5.1 ✓	2 32.5 ✓✓
	10 14.8 ✓	7 44.2 ✓		
	10 28.8 ✓	7 52.7 ✓		
	20 43.6 ✓	15 36.9 ✓	6.7 ✓	2 33.3 ✓
				+ 2m 34.5s ✓



tap = 22m 55.3 ✓

last " = 23 15.8 ✓

mean of times = 0h 6m 51.2s ✓

last tap = 0h 23 15.8 ✓ = 7h 53m 15 ✓

mean of times 0 6m 51.2 ✓ − 6.2 ✓

0h 16m 24.6s 7 53 8.8 ✓

− 16 24.6 ✓

7 36 44.2 ✓

14 24 42.4 ✓

17 1 2 1.8 ✓

− 2. 49.1 ✓

17h 9m 12.7s = C. Me T. obs.

2 49.068 ✓

.00 ✓

2 49.073 ✓

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1881phae.proj..491r

5 6 7

Diff = Diff.* (Col.5+Col.6)

24° 54' 40.3"

0m 20.2 0m 9.6 0m 29.8 Log. 15.6 = 1.193122

" $\frac{15}{2}$ = 0.875061

" cos.dec = 9.942192

= 102.42 = 2.010378

0 12.6 0 8.9 0 21.5

Log 9.0 = 0.954243

" $\frac{15}{2}$ = 0.875061

0 14.0 0 8.5 0 22.5 " cos.dec = 9.942192

0m 15.60 0m 9.00 0m 24.6 * = 59.09 = 1.771496

889.8

948.89

102.42

2)846.47

423.24 = 7' 3.2

24° 54' 40.3

−7 3.2

+24 47 37.1

1.193122

0.875061

9.942682

= 102.53 = 2.010268

889.8

102.5

787.3

159.2

846.5 = −14' 6.5

0.954243

0.875061

9.942682

* 59.15 = 1.771986

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1881phae.proj..491T

56 yrs. Oct. 27. 1881.
Barnard's Comet.

Prel. +29°.2471. 13 47 33.5 +29° 2.8 (7.8)

M. 13h 1036. 13 46 11.43 +29° 11' 36."7 (7.8)
206° 32' 51."4

log. 1.337 = 0.126131
" sin. + = 9.6 0251
" tan. δ = 9.744720
−0.33848 = 9.923847

3.07
+2.7361 0.437135
log. zΔ = 1.447185
+76.61 = 1.884293

13 46 11.43
+1 16.61
13 47 24.04
206° 2' 0."60

log. u/15 0.126119
" sin. A 9.6 0060
" tan. D 9.744717
−0.33766 = 9.923896

3.0707
+2.7350 = 0.436963
log. 6. = 1.748188
+13.16 = 2.184181

13 46 11.43
+2 33.16
18810 13 48 44.59
Red. to ap. pl. +1.54
ap. pl. 13 48 46.13
− * +2 34.57
Pos. ☌ = 13 51 20.70

log. 20.0 = 1.302223
" cos. + = 9.916113
= 1.253834
log. zΔ = 1.447185
−102.33 = −2.700992

+29° 11' 36."7
−8 22.3
+29 3 14.4

log. u = 1.302211
" cos. A = 9.903933
= 1.260404
" 6. = 1.748188
−1001.8 = 3.000792

+29° 11' 36."7
−16 41.8
+28 54 54.9
−14.6
+28 54 40.3
−14 6.5
+28 40 33.8

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1881phae.proj..4911

Oct. 27. 1881

Barnard's Comet.

$\delta = +28^\circ\ 54'\ 54''.9$

f.	+ 3.457		
Log. g.	1.3564+	Log. g.	1.3564+
" sin (G+t)	9.7501 n	" cos. (G+t)	9.9174 n
" tan. δ	9.7422+	" sum	1.2738 n
" sum	0.8487 n	Zy	− 18.78
" 15	1.1761+	" h	1.2862+
" result	9.6726 n	" cos. (H++)	9.2554 n
Zy	− 0.470	" sin. δ	9.6844+
" h	1.2862+	" sum	0.2260 n
" sin (H++)	9.9929 n	Zo	− 1.68
" sec. δ	0.0578+	" i	0.8231+
" sum	1.3369 n	" cos. δ	9.9422+
" 15	1.1761+	" sum	0.7653+
" result	0.1608 n	Zy	+ 5.83
Zy	− 1.448	δ' − δ	−14.63
f' − f	+1.539		

G = 0 25.2 H = 3 29.8

t = 13 48.7 t = 13 48.7

(G++) = 14 16.9 (H++) = 17 18

+.21 day.

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1881phae.proj..491T

July 19., 1881.
Comet (b)

See Page 106. Book 79.

1

Comet.

17^h	26^m	$56.^s4$
	30	21.7^v
	57	18.1

17	55	12.1^v
	58	23.1^v
	113	35.2

18	4	13.9^v
	7	33.6^v
	131	47.5

18	15	43.8^v
	18	34.3^v
	154	18.1

18	25	56.7^v
	29	21.1^v
	175	17.8

mean of ~~=~~ times = 18^h 3^m $13.^s67^v$

			-13.6^v
18	3	0.07	^{v}
7	50	27.08	^{v}
10	12	32.99	^{v}
	-1	40.35	^{v}
10^h	10^m	$52.^s64$	^{v} = t. Me. S. obs.

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1881phae.proj..491T

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1881phae.proj..491T

√ Aug. 4. 1881

Comet (b)

See Page 162 Book 79.

Comet

17	52	17.4	v
	55	5.5	v
	107	22.9	

18	2	16.0	v
	5	24.9	v
	127	40.9	

18	20	53.2	v
	23	56.0	v
	164	49.2	

18	27	30.5	v
	30	33.7	v
	178	4.2	

18	33	51.7	v
	36	52.7	v
	190	44.4	

mean of times = $18^h\ 16^m\ 52^s.16$ v

$-4^s.0$ v

18	16	48.16	v
8	53	31.97	v
9	23	16.19	v
	1	32.28	v
9^h	21^m	$43^s.91$	v

= 6 Me. S. Ber

1881phae.proj..491T

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1881phae.proj..491T

Nov. 17.

1 Comet.	2 1st " star	3 2d " star.	(Col. 1 − Col. 2)	$\left(\frac{\text{Col. 1} - \text{Col. 2}}{2}\right)^2$
0h 4m 10.4	0h 1m 18.3	4m 25.0		
6 4.2	4 10.0	7 25.0		
10 14.6	5 28.3	11 50.0	4m 46.3	2m 23.1s
11 36.1	8 33.2	13 19.0		
14 39.8	11 15.0	14 41.1		
26 15.9	19 48.2	28 0.1	6 27.7	
18 27.5	14m 59.4	19 3.8		
20 40.4	18 40.0	22 6.0		
39 7.9s	34 39.4s	41 9.3s	4 28.5s	2 14.2s
32 1.7	29 51.0	32 57.2		
34 35.4	32 33.2	35 59.0		
66 37.1s	62 24.2s	68 56.2s	4 12.9s	2 6.4s
38 52.3	36 50.0	39 56.0		
41 33.2	39 32.5	42 57.7		
80 25.5s	76 23.5s	82 53.7s	4 2.0s	2 1.0s
45 38.9	43 45.8	46 52.9		
48 30.3	46 30.3	49 52.2		
94 9.2s	90 16.1s	96 45.1s	3 53.1s	1 56.5s

35m 2.46s = mean of lines on ⊕

52 0.0s in assumed zero = 13h 21m 17.2s M.S. (Corrected)

16 57.54s − 16 54.8s

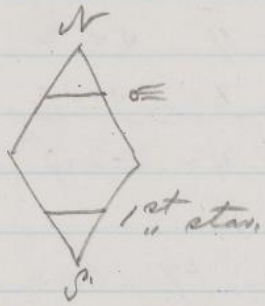
2.74s

16m 54.76s 13 4 22.5s C. M. S. obs.

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1881phae.proj..491T

(Col. 1. − Col. 2.) | (Col. 1. + Col. 3.)/2 | Diff. ∈ | Diff. 1st star. | (Col. 4 + Col. 9)



+74° 1′ 9.″2
+1 7.2
+74 3 6.4

+74° 1′ 9.″2
+3 5.7
+74 5 4.9 = Pos. ∈

2 1.4 | 1 0.70 | 2 12.9 | 2 40.6 | 4 53.5

2 19.1 | 1 9.55 | 2 33.7 | 2 42.2 | 5 15.9

2 28.2 | 1 14.10 | 2 40.9 | 2 43.5 | 5 24.4

2 35.9 | 1 17.95 | 2 51.4 | 2 44.5 | 5 35.9
1m 10.54 | 2m 34.72 | 5m 17.42

log. 317.42″ = 2.501634 3
" 7.5 = 0.875061 3
" cos. dec. = 9.439830
6 55.43 = 2.816525
+9.8
2/234.4
117.2

2/317.42
158.71 = 2m 38.71
log. sin. 39′ 40.″6 = 8.062252
" cos. mid. dec. = 9.439867
10′ 54.1 = 654.″1 = 7.501219
+9.8
23 5.7 = 3′ 55.″7
74 1 9.2
74 5 4.9 Pos. ∈

1h 55 24.68
+2 4.56
1 57 29.24 Pos. ∈

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1881phae.proj..491T

1 Comet.	2 1st " star	3 2d " star.	4. (Col. 1 − Col. 2)	5 (Col. 1 − Col. 2)/2
0h 8m 26s.4	7m 23s.9	9m 55s.2		
10 21.3	8 36.8	12 34.7		
18 47.7 v	16 0.7 v	22 29.9 v	2 47.0 v	1m 23.5 v
0 15 45.3	14 42.3	17 14.2		
17 30.8	15 57.9	19 54.7		
33 16.1 v	30 40.2 v	37 8.9 v	2 35.9 v	1 17.9 v
0 21 40.0	20 38.5	23 10.0		
23 14.7	21 53.2	25 49.8		
44 54.7 v	42 31.7 v	48 59.8 v	2 23.0 v	1 11.5 v
				+ 1 17.6 v

0h 26m 20s.0 = 14 13 v m. v.

0 27 20.2 = 14 14 v

Mean of times on ≡ = 0h 16m 9.7s v

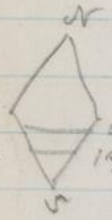
0 26 20.0 v = 14 13 27.3 v Cor. m. v.

10 10.2 v − 10 8.6 v

−1.67 v

14 3 18.7 v C. m. v. obs.

10m 8.58 v



(Chr. B + C. 22s.3 v slow)

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1881phae.proj..491T

6 (Col. 1 − Col. 3)	7 $\left(\frac{\text{Col. 1} - \text{Col. 3}}{2}\right)$	8 (Diff. =)	9 (Diff. 1st diff.)	(Col. 8 − Col. 9)
3 42.2	1m 51.10	1m 54.9	1m 12.9	0m 42.0
3 52.8	1 56.40	1 45.5	1 1.6	0 29.9
4 1.1	2 2.55 / 1 56.64	1 34.7 / 1m 45.03	1 14.7	0 20.0 / 0 30.63

log. 30.63 = 1.486147
" 7.5 = 0.875061
" cos. dec. = 9.439430
2/63.25 = 1.801038
31.62

+74° 1' 9.2
+ 31.6
+74° 1' 40.8

2/30.63
15.315 = 3' 49.8

+74° 1' 9.2
+1 3.2
+74 2 12.4 Proof

log. sin. 3' 49.8 = 7.046924
" cos. mid. dec. = 9.439597
1' 3.2 = 6.486521

1 55 24.68
+1 17.65
1 56 42.33 Proof

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1881phae.proj..491T

39 yrs. Nov. 17. 1881.

~~Comet~~ Comet g 1881.

Obs. +73°112	1	52	56	+73 52.0 (7.5)
Oe. A. 2256-7	1	51	47.42	+73° 49′ 11.3
	t = 27° 56′ 57.″3			
log. 1.337	0.126131		log. 20.052 = 1.302223	
" sin. t	9.670445		" cos. t = 9.946138	
" tan. δ	0.537374		17.72 1.248361	
2.1597	0.334390		19.5 = 1.290035	
3.0704			+ 345.46 = 2.538396	
5.2301	0.718510			
19.5	1.290035		+73 49 11.3	
101.99	2.008545		+ 5 45.5	
	1 51 47.42		+73 54 56.8	
	+ 1 41.99			
	1 53 29.41			
	28° 22′ 27.″15			
log. $\frac{u}{r}$	0.126101		log. u = 1.302193	
" sin. A.	9.676902		" cos. A. = 9.944415	
" tan. D.	0.540100		" 39 = 1.591065	
2.203435 =	0.343103		688.13 = 2.837673	
3.0708				
5.27425 =	0.722161			
39.	= 1.591065			
205.70	2.313226			
	1 51 47.42		+73 49′ 11.″3	
	+ 3 25.70		+ 11 28.1	
1881.0	1 55 13.52		+74 0 39.4	
Red. to ap. pl.	+ 11.16		+ 29.8	
ap. pos. star.	1 55 24.68		+74 1 9.2	

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1881phae.proj.491T

Aug. 17. 1881

Comet g. 1881.

$\delta = +74^\circ\ 0'\ 39.''4$

f.	+ 3.628		
Log. g.	1.37844	Log. g.	1.37844
" sin (G++)	9.7785	" cos (G++)	9.9029
" tan. δ	0.54288	" sum	1.28173
" sum	1.69977	2y	+ 19.11
" r	1.17611	" h	1.29966
" result	0.52366	" cos (H++)	9.69306
2y	+ 3.339	" sin δ	9.98299
" h	1.29966	" sum	0.97755
" sin (H++)	9.9395	2y	+ 9.45
" sec. δ	0.56000	" i	0.65699
" sum	1.79911	" cos. δ	9.44000
" r	1.17611	" sum	0.09699
" result	0.62300	2y	+ 1.25
2y.	+ 4.198	$\delta' - \delta$	+ 29.81
t' - t.	+ 11.165		

G = 0h 32m.4 H = 2h 6m.6

t = 1 55.2 t = 1 55.2

(G++) = 2 27.6 (H++) = 4 1.8

+.06 day

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1881phae.proj..491T

Nov. 19. 1881.
Comet g 1881.

1 Comet	2 Star	3 Diff.	4 Diff. / 2	5 Diff. ∈
0h 2m 15s.3	0h 4m 46s.2			
3 15.7	5 13.8			
5 31.0	10 0.0	4m 29s.0	2 14.50	1m 0s.4
0 12 40.2	15 10.2			
13 24.8	15 40.8			
26 9.0	30 50.5	4 41.5	2 20.75	0 48.6
0 16 34.3	19 4.5			
17 17.4	19 34.2			
33 51.7	38 39.3	4 47.6	2 23.80	0 43.1
20 29.2	22 54.4			
21 17.4	23 38.6			
41 47.0	46 37.0	4 50.0	2 25.00	0 48.6
25 34.0	28 3.7			
26 15.2	28 42.7			
51 49.2	56 46.4	4 57.2	2 28.60	0 41.2
Excess of ∈ times 0h	15m 54s.8		− 2m 34s.53	0 48.36
0	33 35.2	= 16 1 5 by N+C.		
	34 40.8	= 16 2 10 " "		
	1 46.0	+ 27.3 Chr. cor.		
	− 3.1	16 2 37.3		
	1 42.9	− 1 42.9		
		15 43 54.4 C. M. T. obs.		

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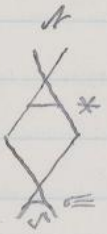
1881phae.proj.:491T



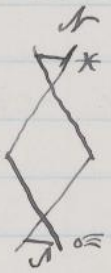
6 7
Diff. * (Col. 6 − Col. 5)

71 0 26.1
−7 7.4
71 43 18.7

0 27.6 −0 32.8



0 30.1 −0 18.5



0 30.3 −0 12.8

2/14.94
7.47 = 1′ 52.″0

0 40.2 −0 8.4

log. sin. da = 6.73471
9.49618
6.23113

0 39.0 −0 2.2
−0 14.94

6.73459
9.49641
0′ 35.″1 = 6.23140

log. 14.94 = 1.17453
" 7.5 = 0.87561
" cos. dec. = 9.49364
34.″2 = 1.54309

89.8
2/8549
4274

1.17453
0.87561
9.49641
35.1 = 1.54630

89.8
4549
4274
−14′ 14.″7

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1881phae.proj..491T

39 yrs.

Nov. 19. 1841.
Comet g 1841.

Oc. m. +71° 1 24 22 +71° K0.K (7.8)

Oc. A. 1645-6 1 23 20.98 +71 37 K2.8
20° V0! 14."7 V

log. 1.337 = 0.126131 V
" sin. + = 9.VV1105 V
" Cos. δ = 0.478728 V
+1.4321 V = 0.1VV964 V
+3.07 V
4.V021 V = 0.6V3415 V
19.V = 1.290035 V
+87.79 V = 1.943450 V

log. 20.0VV = 1.302223 V
" cos. + = 9.997623 V
" 19.V = 1.290035 V
36V.49 V = 2.V628871 V

1 23 20.98 V
+1 27.79 V
1 2K 48.77 V
21° 12' 11."VV V

+71 37 42.8 V
6 5.5 V
+71 43 48.3 V

log. m/r = 0.126101 V
" sin. A. = 9.VV8320 V
" Cos. D = 0.481307 V
1.46463 V 0.16V728 V
3.070K V
4.V3V43 V = 0.6V6619 V
39. = 1.V91065 V
+176.88 V = 2.247684

log. m = 1.302193 V
" cos. A. = 9.9699VV8 V
" 39. = 1.V91065 V
729.1V V = 2.863816 V

1 23 20.98 V
2 V6.88 V
Pos. 1841.0 1 26 17.86 V
+9.40 V
Pos. * 1 26 27.26 V
-2 34.V3 V
Pos. E 1 23 V2.73 V

+71 37 42.8 V
+12 9.1V V
+71 49 V2.0 V
+34.1 V
+71 V0 26.1 V
-14 14.7 V
+71 36 11.4 V

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1881phae.proj..491T

Nov. 19. 1881.
Comet 2. 1881.

$+71^\circ\ 49'\ 52''.0$

f	$+3.648$		
Log. g	1.3408	Log. g	1.3408
" sin. $(G+H)$	9.6957	" cos. $(G+\delta)$	9.9346
" tan δ	0.4439	" sum	1.3194
" sum	1.5604	$2y$	$+20.86$
" r	1.1761	" L	1.3008
" result	0.3843	" cos. $(H+\delta)$	9.7972
$2y$	$+2.423$	" sin. δ	9.9776
Log. L	1.3008	" sum	1.0756
" sin. $(H+\delta)$	9.8915	$2y$	$+11.91$
" sec. δ	0.1061	" i	0.6320
" sum	1.6984	" cos. δ	9.4939
" r	1.1761	" sum	0.1259
" result	0.5223	$2y$	$+1.34$
$2y$	$+3.329$	$\delta' - \delta$	$+34.11$
$f' - f$	$+9.400$		

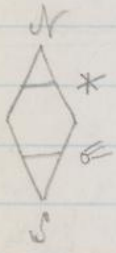
$+.1^r$ day.

G	$0^h\ 32.7$	$H = 1^h\ 5.4$
$+$	$1\ \ 26.3$	$+ = 1\ \ 26.3$
$(G+\delta)$	$1\ \ 59.0$	$(H+\delta) = 3\ \ 24.7$

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1881phae.proj.491T

Nov. 20. 1881.
Comet g 1881.



1 Comet.		2 Mer		3 Diff.		4 Diff. / 2
22	47 f.3		46m 56.8			
	47 49.9		48 25.0			
	94 57.2		95 21.8	0m	23.6	11.80
	49 8.4		48 57.2			
	49 47.2		50 25.0			
	98 55.6		99 22.2	0	26.6	13.30
	51 15.4		51 4.1			
	51 52.4		52 30.1			
	103 7.8		103 34.2	0	26.4	13.20
	53 23.3		53 10.3			
	53 53.8		54 37.6			
	107 17.1		107 47.9	0	30.8	15.40
	56 33.0		56 22.2			
	57 4.1		57 47.2			
	113 37.1		114 9.4	0	32.3	16.15
						−13.97

22 51 47.56 = mean of ⊙ times.
−1.8 Chr. Cor.
22 51 45.8
15 59 19.8
6 52 26.0
1 7.6
6 51 18.4 G.M.T. obs.

1h 16m 5.28
−13.97
1h 15m 51.26 = Pos. ⊙

1881phae.proj..4911

5 6 7
Diff. = Diff. Mer. (Col. 5 + Col. 6)

0 41.6 1 22.2 2 9.4

0 34.4 1 27.4 2 6.6

0 37.0 1 26.0 2 3.0

0 30.5 1 27.3 1 57.4

0 31.1 1 25.0 1 56.1
0 35.80 2 2.66

Log 122.66 = 2.0447038
" 7.5 = 0.8750611
" cos. dec. = 9.5139524
300.1 = 2.4776288
449.6
749.7
294.8

Pos. * = 70° 57' 35.5"
−4 54.6
70 52 40.9

1m 1.33 = 15' 19.95"
log. sin do = 7.6493377
" cos. mid. dec. = 9.9151849
5' 1.4 = 7.1646566
301.4
449.4
88.4 = 9' 44.4"

70 57 35.5
Pos. ∈ = 70 47 47.1

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26 yrs. Nov. 22. 1881.
Comet g. 1881.

Obs. +67° 8' 0 47 33 +67° 41.1' 9.3

B. L. +67° 8' 0 47 32.57 +67 41 6.0 (9.2)

11° 53' 8."55

Log. $\frac{m}{r}$ 0.126115
" sin + 9.313784
" tan. d 0.386755
0.6709
3.0707
+3.7416
log 13. 1.113943
+48.64 1.687000

Log. m = 1.302207
" cos + = 9.990588
" 13 = 1.113943
+ 255."12 = 2.406738

0 47 32.57
+48.64
mid pos. 0 48 21.21
12° 5' 18."15

+67 41 6.0
+4 15.1
+67 45 21.1

Log. $\frac{m}{r}$ 0.126087
" sin A 9.321019
" tan D 0.388286
0.6845
3.0710
+3.7555
log 26 1.414973
+97.64 1.989641

Log. m = 1.302179
" cos A = 9.990262
" 26 = 1.414973
+509.82 = 2.707414

0 47 32.57
+1 37.64
Pos. 1881.0 0 49 10.21
Red. to ap. pl. +7.30
ap. pos. star = 0 49 17.51

+67 41 6.0
+8 29.8
+67 49 35.8
+34.6
+67 50 14.4

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1881phae.proj..491T

Nov. 22. 1881.
Comet g 1881.

$\delta = +67^\circ\ 49'\ 35.8''$

f =	$+3.675$		
Log. g	1.38422+	Log. g.	1.38422+
" sin(G+f)	9.54633+	" cos.(G+f)	9.97113+
" tan δ	0.38988+	" sum	1.35555+
" sum	1.32203+	z_y =	+22.67
" r	1.17611+	" h	1.30244+
" result	0.14422+	" cos.(H+f)	9.88999+
z_y =	+1.394	" sin δ	9.99666+
Log. h	1.30244+	" sum	1.15889+
" sin(H+f)	9.79988+	z_y =	+14.42
" sec. δ	0.42332+	" i	0.59444+
" sum	1.52554+	" cos. δ	9.95768+
" r	1.17611+	" sum	0.17112+
" result	0.34993+	z_y =	+1.48
z_y =	+2.235	$\delta' - \delta$ =	+38.57
$f' - f$ =	+7.304		

Pos. 1881.0	$0^h\ 49^m\ 10.21^s$	$+67^\circ\ 49'\ 35.8''$
Red. to App. pl	+7.30	+38.6
Ap. pos ☉	0 49 17.51	+67 50 14.4
☉ − ☉	+2 9.40	−7 37.3
Pos ☉	$0^h\ 51^m\ 26.91^s$	$+67^\circ\ 42'\ 37''.1$

$G = 0^h\ 33^m.2$ $H = 1^h\ 47^m.2$
$f = 0\ 49.2$ $f = 0\ 49.2$
$(G+f) = 1\ 22.4$ $(H+f) = 2\ 36.4$

$\therefore +.04$ day.

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1881phae.proj..491T

Nov. 22. 1881.
Comet g. 1881.

	1 Comet.		2 Star.		3 Diff.		4 Diff./2	
0	14	24.9	12	14.1				
	16	6.7	13	40.4				
	30	35.6	25	54.5	4	41.1	2	20.5
	35	25.5	33	9.2				
	36	41.2	34	34.5				
	72	6.7	67	43.7	4	23.0	2	11.50
	39	36.3	37	19.3				
	40	46.6	38	43.7				
	80	22.9	76	3.0	4	19.9	2	9.95
New zero.	4	27.7	2	7.3				
	5	17.7	3	32.1				
	9	45.4	5	39.4	4	6.0	2	3.00
	9	20.5	6	59.0				
	10	4.8	8	22.3				
	19	25.3	15	21.3	4	4.0	2	2.00
							+ 2	9.40



$12^h\ 30^m\ 14.5^s$ (by B+6) = $0^h\ 18^m\ 9.5^s$ (initial assumed zero)
13 9 40.0 (by B+6) = 0 5 41.5 (" second = 4)

$12^h\ 54^m\ 41.8^s$ G.M.S. obs.

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1881phae.proj..4917

5 6 7
Diff. = Diff. * Col. 5 + Col. 6.

1 37.8 1 26.3 3 4.1

1 15.7 1 25.3 2 41.0

1 10.3 1 24.4 2 34.7

0 50.0 1 24.8 2 14.8

0 44.3 1 27.3 2 7.6
1 7.62 2 32.44

67° 50' 14".4
−3 49.2
67 46 25.2

152.44 = 2.183099
7.5 = 0.875061
log. cos. du = 9.577797
431.30 = 2.634775

2.183099
0.875061
9.577797
432".47 = 2.635957

889.8
2|455.50
229.25

889.8
457.33 = −7' 37".3

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1881phae.proj..491T

June 24. 1881
Comet (b)

H. a	+9h 18m 52.7s
θ	14 57 52.0
t'	5 38 59.3
t' = (θ − t')	9 18 52.7
log. sin t'	9.8105 +
Co. log. cos δ'	0.1896 +
Log. t − t'	0.8022 +
(t − t')	6.342 in Arc.
Co. log. cos t'	0.1175 n
Log. tan y	0.0748 n
y	+130.1°
(y − δ')	+80.4
log. sin (y − δ')	9.9939 +
Co. log. sin y	0.1164 +
log. (δ − δ'')	0.8697 +
(δ − δ'')	+ 7."41
= δ =	+49° 44' 41."7
Par. in A.R.	0.s423
" " Dec.	7."41
Orig. log = 0.423	9.6261
	9.6400 +
Orig log = 7.41	0.8697
	0.8836 +

June 26. 1881
Comet (b)

H. a	+9h 37m 37.0s
θ	15 25 37.0
t'	5 48 2.0
t' = (θ − t')	9 37 37.0
log. sin t'	9.7670 +
Co. log. cos δ'	0.2673 +
Log. t − t'	0.8344 +
(t − t')	6.830 in Arc.
Co. log. cos t'	0.0899 n
Log. tan y	0.0472 n
y	+131.9°
(y − δ')	+74.6
log. sin (y − δ')	9.9841 +
Co. log. sin y	0.1282 +
log. (δ − δ'')	0.8717 +
(δ − δ'')	+7."44
= δ =	+57° 17' 23.3
Par. in A.R.	0.s456
" " Dec.	7."44
Orig. log. 0.456	9.6583
	9.6722 +
Orig log = 7.44	0.8717
	0.8856 +

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1881phae.proj..491T

June 28. 1881
Comet (b)

H. a	+12h	55m	47.5s
θ	18	55	59.9
t'	6	0	12.4
t' = (θ − t')	12	55	47.5
log. sin t'	9.	3822	m
Co. log. cos. δ'	0.	3553	+
Log. (t − t')	0.	5396	m
(t − t')	3.	464	in Arc.
Co. log. cos. b'	0.	0130	m
Log. tan γ	9.	9703	m
γ	+137.	0	
(γ − δ')	+73.	2	
log sin (γ − δ')	9.	9811	+
Co. log. sin γ.	0.	1662	+
log. (δ − δ')	0.	9067	+
(δ − δ')	+8.″	07	
⊂ δ =	+63°	48′	46.″4
Par. in A. R.	0.″	231	
" " Dec.	8.″	07	
Orig. log. 0.231	9.	3635	
	9.	3774	m
Orig log. 8.07	0.	9067	
	0.	9206	+

See Book 8r Page 15.

June 30 1881
Comet (b)

H. a.	11h	7m	4.s2
θ	17	20	59.0
t'	6	13	54.8
t' = (θ − t')	11	7	4.2
log. sin t'	9.	3594	+
Co. log. cos. δ'	0.	4361	+
Log. (t − t')	0.	5976	+
(t − t')	3.	959	in Arc.
Co. log. cos b'	0.	0117	m
Log. tan γ	9.	9690	m
γ	+137.	0	
(γ − δ')	+68.	5	
log. sin (γ − δ')	9.	9687	+
Co. log. sin γ	0.	1662	+
log. (δ − δ')	0.	8943	+
(δ − δ')	+7.″	84	
⊂ δ =	+68°	30′	28.″1
Par. in A. R.	0.″	264	
" " Dec.	7.″	84	
Orig. log. 0.264	9.	4215	
	9.	4354	+
Orig. log. 7.84	0.	8943	
	0.	9082	+

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1881phae.proj..491T

July 1. 1881 Comet (b)		July 2. 1881 Comet (b)	
H. a.	$+10^h\ 47^m\ 32^s.9$	H. a.	$+9^h\ 45^m\ 27^s.2$
θ	$17\ 9\ 42.3$	θ	$16\ 16\ 29.8$
t'	$6\ 22\ 9.4$	t'	$6\ 31\ 2.6$
$t' = (\theta - t')$	$10\ 47\ 32.9$	$t' = (\theta - t')$	$9\ 45\ 27.2$
log. sin t'	9. 4923 +	log. sin t'	9. 7433 +
Co. log. cos δ'	0. 4773 +	Co. log. cos δ'	0. 5169 +
Log. $(t - t')$	0. 7717 +	Log. $(t - t')$	1. 0623 +
$(t - t')$	5. 912 in Arc.	$(t - t')$	11. 542 in Arc.
Co. log. cos. t'	0. 0220 n	Co. log. cos. t'	0. 0796 n
Log. tan. γ /	9. 9793 n	Log. tan. γ /	0. 0369 n
γ /	$+136.^\circ 4$	γ /	$+132.^\circ 6$
$(\gamma - \delta')$	$+65.^\circ 9$	$(\gamma - \delta')$	$+60.^\circ 3$
log. sin $(\gamma - \delta')$	9. 9604 +	log. sin $(\gamma - \delta')$	9. 9388 +
Co. log. sin γ	0. 1614 +	Co. log. sin γ	0. 1331 +
Log. $(\delta - \delta')$	0. 8812 +	log $(\delta - \delta')$	0. 8313 +
$(\delta - \delta')$	$+7.''61$	$(\delta - \delta')$	$+6.''78$
$= \delta =$	$+70^\circ\ 32'\ 15''.4$	$= \delta =$	$+72^\circ\ 17'\ 30''.2$
Par. in a. R.	$0.^s394$	Par. in a. R.	$0.^s769$
" " Dec.	$7.''61$	" " Dec.	$6.''78$
Orig. log. 0.394	9. 5956	Orig. log. 0.770	9. 8862
	9. 6095 +		9. 9001 +
Orig log. 7.61	0. 8812	Orig. log. 6.78	0. 8313
	0. 8951 +		0. 8452 +

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1881phae.proj..491T

July 3. 1881 Comet (b)		July 4. 1881 Comet (b)	
H. a.	$10^h\ 34^m\ 48.^s2$	H. a.	$+12^h\ 4^m\ 45.^s2$
θ	$17\ 16\ 9.0$	θ	$18\ 58\ 40.3$
t'	$6\ 41\ 20.8$	t'	$6\ 53\ 55.1$
$t' = (\theta - t')$	$10\ 34\ 48.2$	$t' = (\theta - t')$	$12\ 4\ 45.2$
log. sin t'	9. 5602 +	log. sin t'	8. 3194 n
Co. log. cos. δ'	0. 5576 +	Co. log. cos. δ'	0. 6011 +
Log $(t - t')$	0. 9199 +	Log $(t - t')$	9. 7226 n
$(t - t')$	8.316 in Arc.	$(t - t')$	0.528 in Arc.
Co. log. cos. t'	0. 0307 n	Co. log. cos t'	0. 0001 n
Log. tan γ	9. 9880 n	Log. tan γ	9. 9574 n
$-\gamma$	$+135.^\circ8$	γ	$+137.^\circ8$
$(\gamma - \delta')$	$+61.^\circ9$	$(\gamma - \delta')$	$+62.^\circ3$
log sin $(\gamma - \delta')$	9. 9455 +	Log. sin $(\gamma - \delta')$	9. 9471 +
Co log. sin γ	0. 1567 +	Co. log. sin γ	0. 1728 +
Log. $(\delta - \delta')$	0. 8616 +	log. $(\delta - \delta')$	0. 8793 +
$(\delta - \delta')$	$+7.''27^s$	$(\delta - \delta')$	$+7.''57$
$\leqq \delta =$	$+73^\circ\ 45'\ 15.''0$	$\leqq \delta =$	$+7^\circ\ 29'\ 18.''2$
Par. in A. R.	$0.^s554$	Par. in A. R.	$0.^s035$
" " Dec.	$7.''27$	" " Dec.	$7.''57$
Orig. log. 0.554	9. 7438	Orig. log. 0.035	8. 5465
	9. 7577 +		8. 5604 n
Orig log. 7.27	0. 8616	Orig. log. 7.57	0. 8793
	0. 8755 +		0. 8932 +

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July 5. 1881 Comet (b)

H. a.	$+9^h\ 10^m\ 41.^s4$
θ	$16\ \ 15\ \ 37.5$
t'	$7\ \ 4\ \ 56.1$
$t' = (\theta - t')$	$9\ \ 10\ \ 41.4$
log. sin t'	$9.8282+$
Co. log. cos. δ'	$0.6347+$
Log. $(t - t')$	$1.2650+$
$(t - t')$	18.408 in Arc.
Co. log. cos. t'	$0.1311\ n$
Log. tan γ	$0.0884\ n$
γ	$+129.^\circ2$
$(\gamma - \delta')$	$+52.^\circ6$
log. sin $(\gamma - \delta')$	$9.9000+$
Co. log. sin γ	$0.1107+$
log. $(\delta - \delta')$	$0.7701+$
$(\delta - \delta')$	$+5.''89$
$= \delta =$	$+76^\circ\ 3'\ 28.''9$
Par. in A. R.	$1.^s227$
" " Dec.	$5.''89$
Orig log 1.227	0.0889
	$0.1028+$
Orig log. 5.89	0.7701
	$0.7840+$

July 6. 1881 Comet (b)

H. a.	$+8^h\ 37^m\ 37.^s1$
θ	$15\ \ 55\ \ 57.4$
t'	$7\ \ 18\ \ 20.3$
$t' = (\theta - t')$	$8\ \ 37\ \ 37.1$
log. sin t'	$9.8880+$
Co. log. cos. δ'	$0.6706+$
Log. $(t - t')$	$1.3607+$
$(t - t')$	22.946 in Arc.
Co. log. cos. t'	$0.1974\ n$
Log. tan γ	$0.1547\ n$
γ	$+125.^\circ0$
$(\gamma - \delta')$	$+47.^\circ3$
log. sin $(\gamma - \delta')$	$9.8662+$
Co. log. sin γ	$0.0866+$
log. $(\delta - \delta')$	$0.7122+$
$(\delta - \delta')$	$+5.''16$
$= \delta =$	$+77^\circ\ 40'\ 23.''8$
Par. in A. R.	$1.^s529$
" " Dec.	$5.''16$
Orig. log. 1.529	0.1846
	$0.1985+$
Orig. log. 5.16	0.7122
	$0.7261+$

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July 8. 1881 Comet (b)		July 9. 1881 Comet (b)	
H. a.	+8h 26m 32.3s	H. a.	+8h 16m 4.s2
θ	16 15 44.5	θ	16 22 16.4
t'	7 49 12.2	t'	8 6 12.2
t'=(θ-t')	8 26 32.3	t'=(θ-t')	8 16 4.2
log sin t'	9.9045+	log sin t'	9.9185+
Co. log cos δ'	0.7374+	Co. log cos δ'	0.7666+
Log (t-t')	1.4440+	Log (t-t')	1.4872+
(t-t')	27.797 in Arc.	(t-t')	30.704 in Arc.
Co. log cos t'	0.2244 n	Co. log cos t'	0.2521 n
Log tan γ	0.1817 n	Log tan γ	0.2094 n
1-γ	+123.4	γ 1	+121.°7
(γ-δ')	+44.°0	(γ-δ')	+41.6
log sin(γ-δ')	9.8418+	log sin(γ-δ')	9.8221+
Co. log sin γ	0.0784+	Co. log sin γ	0.0702+
log (δ-δ')	0.6796	log (δ-δ')	0.6517+
(δ-δ')	+4".78	(δ-δ')	+4".48
⊂δ =	+79° 27' 8.2"	⊂δ =	+80° 8' 42.6"
Par. in A. R.	1.s853	Par. in A. R.	2.s047
" " Dec.	4."78	" " Dec	4."48
Orig. log. 1.853	0.2679	Orig. log. 2.047	0.3111
	0.2818+		0.3250+
Orig. log 4.78	= 0.6796	Orig. log. 4.48	0.6517
	0.6936+		0.6656+

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July 12. 1881 Comet (b)		July 13. 1881 Comet (b)	
H. a	$+9^h\ 44^m\ 35^s.8$	H. a.	$+8^h\ 51^m\ 48^s.8$
θ	18 48 6.7	θ	18 14 0.0
t'	9 3 30.9	t'	9 22 11.2
$t' = (\theta - t')$	9 44 35.8	$t' = (\theta - t')$	8 51 48.8
Log. sin t'	9.7459 +	Log. sin t'	9.8645 +
Co. log. cos. δ'	0.8352 +	Co. Log. cos. δ'	0.8493 +
Log. $(t - t')$	1.3832 +	Log. $(t - t')$	1.5159 +
$(t - t')$	24.166 in Arc.	$(t - t')$	32.802 in Arc.
Co. log. cos. t'	0.0807 n	Co. Log. cos. t'	0.1666 n
Log. tan ν	0.0380 n	Log. tan ν	0.1239 n.
ν	$+132.^\circ5$	ν	$+126.^\circ9$
$(\nu - \delta')$	$+50.^\circ9$	$(\nu - \delta')$	$+45.^\circ0$
log. sin $(\nu - \delta')$	9.8899 +	log. sin $(\nu - \delta')$	9.8495 +
Co. log. sin ν	0.1324 +	Co. log. sin ν	0.0971 +
log $(\delta - \delta')$	0.7817 +	log. $(\delta - \delta')$	0.7060 +
$(\delta - \delta')$	$+6.''05$	$(\delta - \delta')$	$+5.''08$
δ =	$+81^\circ\ 3'\ 42.''9$	δ =	$+81^\circ\ 51'\ 58.''1$
Par. in A. R.	$1.^s611$	Par. in A. R.	$2.^s187$
" " Dec.	$6.''05$	" " Dec.	$5.''08$
Orig. log 1.611	0.2071	Orig. log. 2.187	0.3398
	0.2210 +		0.3737 +
Orig. log. 6.05	0.7817	Orig log. 5.08	0.7060
	0.7956 +		0.7199 +

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July 14. 1881 Comet (H)		July 15. 1881 Comet (H)	
H. a.	+8h 30m 39.s2	H. a.	+7h 20m 6.s6
θ	18 11 47.1	θ	17 19 10.3
t'	9 41 7.9	t'	9 59 3.7
t' = θ − t'	8 30 39.2	t' = (θ − t')	7 20 6.6
log. sin t'	9. 8985 +	log. sin t'	9. 9729 +
Co. log. cos. δ'	0. 8601 +	Co. log. cos. δ'	0. 8672 +
Log. (t − t')	1. 5607 +	Log. (t − t')	1. 6422 +
(t − t')	36. 366 in Arc.	(t − t')	43. 873 in Arc.
Co. log. cos. t'	0. 2138 n	Co. log. cos. t'	0. 4654 n
Log. tan γ	0. 1711 n	Log. tan γ	0. 4227 n
γ	+124.° 0	γ	+110.° 7
(ν − δ')	+41.° 9	(ν − δ')	+28.° 5
log. sin (ν − δ')	9. 8247 +	log. sin (ν − δ')	9. 6787 +
Co. log. sin γ	0. 0814 +	Co. log. sin γ	0. 0290 +
log. (δ − δ')	0. 6655 +	log. (δ − δ'')	0. 4671 +
(δ − δ')	+4.″ 63	(δ − δ'')	+2.″ 93
δ =	+82° 4′ 5.″2	δ =	+82° 11′ 4.″3
Par. in A. R.	2.s 42	Par. in A. R.	2.s 92
" " Dec.	4.″ 63	" " Dec.	2.″ 93
Orig. log. 2.42	0. 3846	Orig. log. 2.92	0. 4661
	0. 3984 +		0. 4800 +
Orig. log. 4.63	0. 6655	Orig. log. 2.93	0. 4671
	0. 6794 +		0. 4810 +

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July 16. 1881 Comet (b)		July 17. 1881 Comet (b)	
H. A.	+12h 29m 10.1s	H. A.	+6h 20m 50.1s
θ	22 50 7.8	θ	16 54 27.9
t'	10 20 57.7	t'	10 33 37.8
t' = (θ − t')	+12 29 10.1	t' = (θ − t')	6 20 50.1
log. sin t'	9.1040 n	log. sin t'	9.9982 +
Co. log. cos δ'	0.8718 +	Co. log. cos δ'	0.8727 +
Log (t − t')	0.7779 n	Log (t − t')	1.6730 +
(t − t')	5.996 in Arc.	(t − t')	47.098 in Arc.
Co. log. cos t'	0.0035 n	Co log. cos t'	1.0428 n
Log. tan ν	9.9608 n	Log. tan ν	1.0001 n
ν'	+137.°6	ν'	+95.°7
(ν − δ')	+55.°3	(ν − δ')	+13.°4
Log. sin (ν − δ')	9.9149 +	Log. sin (ν − δ')	9.3650 +
Co. log. sin ν	0.1711 +	Co. log. sin ν	0.0022 +
Log (δ − δ')	0.8454 +	Log (δ − δ')	0.1266 +
(δ − δ')	+7."00	(δ − δ')	+1."34
δ =	+82° 16' 46.2"	δ =	+82° 17' 43.6"
Par. in A. R.	0.s400	Par. in A. R.	3.s140
" " Dec.	7."00	" " Dec.	1."34
Orig. log. 0.400	9.6018	Orig. log. 3.140	0.4969
	9.6157 n		0.5108 +
Orig log. 7.00	0.8454	Orig. log. 1.34	0.1266
	0.8593 +		0.1405 +

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	July. 16. 1881 Comet (b)		July 21. 1881 Comet (b)
H. a	+6h 25m 26.1s	H. a.	+5h 56m 27.4s
θ	17 15 22.3	θ	17 28 46.3
t'	10 49 56.2	t'	11 32 18.9
t'=(θ-t')	6 25 26.1	t'=(θ-t')	5 56 27.4
log. sin t'	9.9973+	log. sin t'	9.9999+
Co. log. cos. δ'	0.8717+	Co. log. cos. δ'	0.8580+
Log (t-t')	1.6711+	Log (t-t')	1.6600+
(t-t')	46.892 in Arc.	(t-t')	45.709 in Arc.
Co. log. cos. t'	0.9563 n	Co. log. cos. t'	1.8206+
Log. tan γ	0.9136 n	Log. tan γ	1.7779+
γ	+97.°0	γ	+89.°0
(γ-δ')	+14.°7	(γ-δ')	+7.°0
log. sin (γ-δ')	9.4044+	log. sin (γ-δ')	9.0859+
Co. log. sin γ	0.0032+	Co. log. sin γ	0.0001+
log. (δ-δ')	0.1670+	log. (δ-δ")	9.8454+
(δ-δ')	+1.'47	(δ-δ")	+0."70
= δ =	+82° 16' 39."0	= δ =	+82° 1' 44."1
Par. in A. R.	3.s126	Par. in A. R.	3.s048
" " Dec.	1."47	" " Dec.	0."70
Orig log. 3.126	0.4950	Orig log. 3.048	0.4839
	0.5089+		0.4978+
Orig. log 1.47	0.1670	Orig log 0.70	9.8454
	0.1809+		9.8593+

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July 24. 1881 Comet (b)		July 26. 1881. Comet (b)	
H. A.	+7h 39m 0.9s	H. A.	+5h 15m 22.9s
θ	19 45 53.1	θ	17 38 50.5
t'	12 6 52.2	t'	12 23 27.6
t=(θ-t')	7 39 0.9	t'=(θ-t')	5 15 22.9
log. sin t'	9. 9582 +	log. sin t'	9. 9917 +
Co. log. cos. δ'	0. 8350 +	Co. log cos. δ'	0. 8192 +
Log (t-t')	1. 5932 +	Log (t-t')	1. 6130 +
(t-t')	39. 382 in Arc.	(t-t')	41. 020 in Arc.
Co. log. cos. t'	0. 3781 n	Co. log. cos t'	0. 7136 +
Log. tan γ	0. 3354 n	Log. tan γ	0. 6709 +
γ	+114°. 8	γ	+78. 0
(γ-δ')	+33°. 2	(γ-δ')	-3°. 3
log. sin (γ-δ')	9. 7384 +	log. sin (γ-δ')	8. 7602 n
Co. log. sin γ	0. 0420 +	Co. log. sin γ	0. 0096 +
Log (δ-δ')	0. 5398 +	Log (δ-δ')	9. 5292 n
(δ-δ')	+3."47	(δ-δ')	-0."34
= δ =	+81° 35' 34."8	= δ =	+81° 16' 45."1
Par. in A. R.	2.s626	Par. in A. R.	2.s734
" " Dec.	3."47	" " Dec.	0."34
Orig log. 2.626	0. 4192	Orig log. 2.734	0. 4369
	0. 4331 +		0. 4508 +
Orig log. 3.47	0. 5398	Orig. log. 0.34	9. 5292
	0. 5537 +		9. 5431 n

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	Aug. 2. 1881 Comet (b)		Aug. 6. 1881 Comet (b)
H. a.	$+4^h\ 14^m\ 44.6^s$	H. a.	$+5^h\ 3^m\ 45.7^s$
θ	17 27 34.3	θ	19 7 28.7
t'	13 12 49.7	t'	13 3 43.0
$t = (\theta - t')$	+4 1 44.6	$t = (\theta - t')$	+5 3 45.7
log. sin t	9.9525+	log. sin t	9.9972+
Co. log. cos. δ'	0.7627+	Co. log. cos. δ'	0.7340+
Log. $(t - t')$	1.5173+	Log. $(t - t')$	1.5333+
$(t - t')$	32.908 in Arc.	$(t - t')$	34.143 in Arc.
Co. log. cos. t	0.3533+	Co. log. cos. t	0.9428+
Log. tan γ	0.3108+	Log. tan γ	0.9001+
γ	+63.°9	γ	+82.°8
$(\gamma - \delta')$	−16.°2	$(\gamma - \delta')$	+3.°4
log. sin $(\gamma - \delta')$	9.4456n	log. sin $(\gamma - \delta')$	8.7731+
Co. log. sin γ	0.0467+	Co. log. sin γ	0.0034+
log. $(\delta - \delta')$	0.2517n	log. $(\delta - \delta')$	9.5379+
$(\delta - \delta')$	−1.″79	$(\delta - \delta')$	+0.″34
$= \delta =$	$+80^\circ\ 3'\ 19.^s$	$= \delta =$	$+79^\circ\ 22'\ 4.''0$
Par. in A. R.	2.°194	Par. in A. R.	2.276
" " Dec.	1.″79	" " Dec.	0.″34
Orig log. 2.194	0.3412	Orig log. 2.276	0.3572
	0.3551+		0.3711+
Orig log. 1.79	0.2517	Orig log. 0.34	9.5359
	0.2656n		9.5498+

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Aug. 10. 1881 Comet (b)		Aug. 11. 1881 Comet (b)	
H. a.	+4h 32m 14.8s	H. a.	+8h 29m 8.3s
θ	18 23 39.6	θ	22 25 25.6
t'	13 51 24.8	t'	13 56 17.3
t' = (θ - t')	4 32 14,8	t' = (θ - t')	8 29 8.3
log. sin t'	9.9673 +	log. sin t'	9.9008 +
Co. log. cos δ'	0.7091 +	Co. log. cos δ'	0.7021 +
Log. (t - t')	1.4785 +	Log (t - t')	1.4050 +
(t - t')	30.09 m in Arc.	(t - t')	25.410 in Arc.
Co. log. cos t'	0.4273 +	Co. log. cos t'	0.2178 m
Log. tan γ	0.3846 +	Log. tan γ	0.1751 m
γ	+67.°6	γ	+123.°8
(γ - δ')	-11.°1	(γ - δ')	+43.°3
Log. sin (γ - δ')	9.2845 m.	Log sin (γ - δ')	9.8517 +
Co log. sin γ	0.0341 +	Co. log. sin γ	0.0804 +
log (δ - δ')	0.0780 m	log. (δ - δ')	0.6915 +
(δ - δ')	-1.'20	(δ - δ')	+4'.91
= δ =	+78° 43' 55".5	= δ =	+78° 32' 52".2
Par. in A. R.	2.s006	Par. in A. R.	1.s694
" " Dec.	1."20	" " Dec.	4".91
Cuj log. 2.006	0.3024	Cuj log. 1.694	0.2289
	0,3163 +		0,2428 +
Cuj log. 1.20	0.0780	Cuj log. 4.91	0.6915
	0,0919 m		0,7054 +

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Aug. 15. 1881. Comet (b)		Aug. 26. 1881 Comet (b)	
H. a.	$+4^h\ 39^m\ 52.4^s$	H. a.	$+5^h\ 3^m\ 17.7^s$
θ	$18\ 51\ 28.6$	θ	$20\ 27\ 54.8$
t'	$14\ 11\ 36.2$	t'	$14\ 52\ 37.1$
$t' = (\theta - t')$	$4\ 39\ 52.4$	$t' = (\theta - t')$	$5\ 35\ 17.7$
log. sin t'	9. 99729 +	log. sin t'	9. 9997 +
Co. log cos. δ'	0. 6813 +	Co. log. cos. δ'	0. 6324 +
Log. $(t - t')$	1. 4563 +	Log. $(t - t')$	1. 4320 +
$(t - t')$	28.96 in arc.	$(t - t')$	27.040 in arc.
Co. log. cos. t'	0. 4654 +	Co. log. cos. t'	0. 9684 +
Log. tan γ	0. 4227 +	Log. tan γ	0. 9257 +
γ	$+69.^\circ 3$	γ	$+83.^\circ 2$
$(\gamma - \delta')$	$-8.^\circ 7$	$(\gamma - \delta')$	$+6.^\circ 7$
Log. sin $(\gamma - \delta')$	9. 1797 m	Log. sin $(\gamma - \delta')$	9. 0670 +
Co. log. sin γ	0. 0290 +	Co. log. sin γ	0. 0031 +
log $(\delta - \delta')$	9. 9681 m	log. $(\delta - \delta')$	9. 8295 +
$(\delta - \delta')$	$-0.''93$	$(\delta - \delta')$	$+0.''68$
$\delta =$	$+77^\circ\ 8'\ 40.''0$	$\delta =$	$+76^\circ\ 31'\ 9.''$
Par. in A. R.	$1.^s906$	Par. in A. R.	$1.^s803$
" " Dec.	$0.''93$	" " Dec.	$0.''68$
Orig log. 1.906	0. 2802	Orig log. 1.803	0. 2559
	0. 2941 +		0. 2698 +
Orig log 0.93	9. 9681	Orig log. 0.68	9. 8329
	9. 9820 m		9. 8434 +

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Aug. 27. 1881 Comet (b)		Aug. 29. 1881 Comet (b)	
H. a.	+6h 1m 3.6s	H. a.	+7h 57m 43.2s
θ	20 57 21.8	θ	23 1 43.1
t′	14 56 18.2	t′	15 3 59.9
t′ = (θ − t′)	6 1 3.6	t′ = (θ − t′)	7 57 43.2
log. sin t′	0. 0000 +	log. sin t′	9. 9400 +
Co. log. cos δ′	0. 6285 +	Co. log. cos δ′	0. 6209 +
Log. (t − t′)	1. 4306 +	Log. (t − t′)	1. 3630 +
(t − t′)	26. 93 in Arc.	(t − t′)	23. 067 in Arc.
Co. log. cos t′	2. 3301 n	Co. log. cos t′	0. 3087 n
Log. tan γ	2. 2874 n	Log. tan γ	0. 2660 n
γ	+90.°3	γ	+118.°5
(γ − δ′)	+13.°9	(γ − δ′)	+42.°4
log. sin (γ − δ′)	9. 3806 +	log. sin (γ − δ′)	9. 8289 +
Co. log. sin γ	0. 0000 +	Co. log. sin γ	0. 0561 +
Log. (δ − δ′)	0. 1400 +	Log. (δ − δ′)	0. 6444 +
(δ − δ′)	+13.″80	(δ − δ′)	+4.″41
α = δ =	+76° 23′ 42.″1	α = δ =	+76° 8′ 56.″1
Par. in A. R.	1.″797	Par. in A. R.	1.″537
" " Dec.	13.″80	" " Dec.	4.″41
Orig. log. 1.797	0. 2545	Orig. log. 1.537	0. 1869
	0. 2684 +		0. 2008 +
Orig. log. 13.80	0. 1400	Orig. log. 4.41	0. 6444
	0. 1539 +		0. 6583 +

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	Aug. 30. 1881 Comet (b)		July 27. 1881 Comet b.
H. a.	$+6^h\ 11^m\ 49^s.2$	H. a.	$+4\ \ 10\ \ 37.7$
θ	$21\ \ 19\ \ 7.6$	θ	$16\ \ 46\ \ 4.1$
t'	$15\ \ 7\ \ 18.4$	t'	$12\ \ 35\ \ 26.4$
$t' = (\theta - t')$	$6\ \ 11\ \ 49.2$	$t' = (\theta - t')$	$+4\ \ 10\ \ 37.7$
log. sin t'	9. 9994 +	log. sin t'	9. 9486 +
Ct. log cos. δ'	0. 6176 +	Co. log. cos. δ'	0. 8170 +
Log $(t - t')$	1. 4191 +	Log $(t - t')$	1. 5676 +
$(t - t')$	26. 248 in Arc.		36. 949 + in Arc.
Co. log. cos. t'	1. 2888 n	Co. log. cos t'	0. 3378 +
Log. tan γ	1. 2461 n	Log. tan γ	0. 2951 +
γ	+ 93. 2	γ	+ 63. 1
$(\gamma - \delta')$	+ 17. 2	$(\gamma - \delta')$	− 18. 1
log. sin $(\gamma - \delta')$	9. 4709 +	log. sin $(\gamma - \delta')$	9. 4923 n
Co log. sin γ	0. 0007 +	Co. log. sin γ	0. 0497 +
log. $(\delta - \delta')$	0. 2310 +	log. $(\delta - \delta')$	0. 3014 n
$(\delta - \delta')$	+ 1.″70	$(\delta - \delta')$	− 2. 00
$\alpha = \delta$	$= +76^\circ\ 2'\ 27.''9$	$\alpha = \delta$	$= +81^\circ\ 14'\ 0.''$
Par in A. R.	$1.^s7$	Par. in A R.	$2.^s464$
" " Dec.	1.″70	" " Dec	2.″00
Orig log 1.7	0. 2430	Orig log. 2.464	0. 3915
	0. 2569 +		0. 4054 +
Orig log 1.70	0. 2310	Orig log 2.00	0. 3014
	0. 2449 +		0. 3153 n

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1881phae.proj.491T

Dec. 16. 1881.

Comet b. 1881.

Last tap = $0^h\ 24^m\ 4.^s9^v$ = $9^h\ 0^m\ 54.^s0^v$ (by B+C. 1882.)

mean g ∈ lines = $0\ \ 13\ \ 18.2^v$ $\quad +1\ \ 4.7^v$ = Chr. cor.

$0\ \ 10\ \ 46.7^v$ $\quad 9\ \ 1\ \ 58.7^v$

-1.8 $\quad -10\ \ 44.9^v$

$-0\ \ 10\ \ 44.9^v$ $\quad 8\ \ 51\ \ 13.8^v$ = C. M. T. obs.

Sid time g obs = $2^h\ 34^m\ 31.^s3^v$

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1881phae.proj..491T

Aug. 15. 1881
Comet (c)

H. a.	+9h	12m	1.s3 v
θ	18	12	46.0 v
t'	9	0	44.7 v
t = (θ − t')	+9	12	1.3 v
log. sin t'	9. 8255 + v		
Co. log. sec. δ'	0. 2173 + v		
Log. (H − t')	0. 8449 + v		
(H − t')	6. 997 in arc. v		
Co. log. sec. t'	0. 1289 m v		
Log. tan y	0. 0862 m v		
y	+129.°4 v		
(y − δ')	+76.7 v		
log. sin (y − δ')	9. 9882 + v		
Co. log sin y	0. 1120 + v		
log. (δ − δ')	0. 8796 + v		
(δ − δ')	+7.″24 v		
= δ	+52°	40′	37.″7
Par in A. R.	0.s467 v		
" " Dec.	7.″24 v		
Erg log 0.467 v	9. 6688 v		
	9. 6827 v +		
Erg log 7.24 v	0. 8796 v		
	0. 8732 v +		

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1881phae.proj..491T

Nov. 17. 1881
Comet g.

H. a.	+3	22 12.0
θ	5	19 21.1
t'	1	57 9.1
t' = (θ − t')	+3	22 12.0
log. sin t'	9.	88 77 +
Co. log. cos δ'	0.	56 14 +
Log. (t − t')	1.	25 12 +
t − t'	17.	832 in Arc.
Co. log. cos t'	0.	19 70 +
Log. tan γ	0.	15 43 +
γ	54.	97
(γ − δ')	−19.	09
log. sin (γ − δ')	9.	51 46 n
Co. log. sin γ	0.	08 68 +
log. (δ − δ')	0.	36 08 n
(δ − δ')	− 2.	30
∠ δ =	74°	3' 51.0
Par. in A. R.	1.s	189
" " Dec.	2.	30
Orig. log 1.189	0.	07 51
	0.	08 90 +
Orig. log 2.30	0.	36 08
	0.	37 47 n

Nov. 19. 1881
Comet g.

H. a.	+6	18 00.0
θ	7	41 52.7
t'	1	23 52.7
t' = (θ − t')	+6	18 00.0
log. sin t'	9.	99 87 +
Co. log. cos δ'	0.	50 09 +
Log. t − t'	1.	30 17 +
t − t'	20.	031 in Arc.
Co. log. cos t'	1.	10 54 n
Log. tan γ	1.	06 27 n
γ	+94.	95
(γ − δ')	+23.	35
log. sin (γ − δ')	9.	59 81 +
Co. log. sin γ	0.	00 16 +
log. (δ − δ')	0.	35 91 +
(δ − δ')	+ 2.	29
∠ δ =	71°	36' 11.4
Par. in A. R.	1.s	335
" " Dec.	2.	29
Orig. log. 1.335	0.	12 56
	0.	13 95 +
Orig. log. 2.29	0.	35 91
	0.	37 30 +

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1881phae.proj..491T

Nov. 20. 1881
Comet g.

H. a.	+21	35	54.5
θ	22	51	45.8
t'	1	15	51.3
t = (θ − t')	+21	35	54.5
log. sin t'	9.7695 n		
Co. log. cos. δ'	0.4829 +		
Log. (t − t')	1.0545 n		
(t − t')	11.337 in Arc.		
Co. log. cos. t'	0.0921 +		
Log. tan γ	0.0494 +		
γ	48.°25		
(γ − δ')	− 22.°55		
log. sin (γ − δ')	9.5838 n		
Co. log. sin γ	0.1272 +		
log (δ − δ")	0.4704 n		
(δ − δ')	− 2.″95		
= δ =	70°	47'	47.″1
Par. in A.R.	0.ˢ756		
" " Dec.	2.″95		
Orig log. 0.756	9.8784		
	9.8923 n		
Orig. log. 2.95	0.4704		
	0.4843 n		

Nov. 22. 1881
Comet g.

H. a.	+4	12	35.0
θ	5	4	1.9
t'	0	51	26.9
t = (θ − t')	+4	12	35.0
log. sin t'	9.9504 +		
Co. log. cos. δ'	0.4210 +		
Log. (t − t')	1.1735 +		
(t − t')	14.911 in Arc.		
Co. log. cos. t'	0.3452 +		
Log. tan γ	0.3025 +		
γ	63.°51		
(γ − δ')	− 4.°20		
log. sin (γ − δ')	8.8647 n		
Co. log. sin γ	0.0482 +		
log (δ − δ')	9.6723 n		
(δ − δ')	−0.″47		
= δ =	67°	42'	37.″1
Par. in A.R.	0.ˢ994		
" " Dec.	0.″47		
Orig. log 0.994	9.9974		
	0.0113 +		
Orig. log. 0.47	9.6720		
	9.6862 n		

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1881phae.proj..491T

Oct. 26. 1881.

Comet (b) 1881.

	1 Comet	2 Star	3 Diff.	4. Diff/19
0h	0m 33.8s ✓	5m 1.1s ✓		
	1 31.3 ✓	6 4.4 ✓		
	2 5.1 ✓	11 12.5 ✓	9m 7.4s ✓	4m 33.70s ✓
	6 50.0 ✓	11 24.6 ✓		
	7 48.4 ✓	12 21.0 ✓		
	14 38.4 ✓	23 45.6 ✓	9 7.2 ✓	4 33.60 ✓
	13 12.3 ✓	17 44.0 ✓		
	14 7.3 ✓	18 37.4 ✓		
	27 19.6	36 21.4	9 1.8 ✓	4 30.90 ✓
	20 55.1 ✓	25 15.0 ✓		
	21 41.8 ✓	26 20.1 ✓		
	42 36.9	51 35.1	8 58.2 ✓	4 29.10 ✓
	27 19.0 ✓	31 36.7 ✓		
	28 3.1 ✓	32 42.0 ✓		
	55 22.1	64 18.7	8 ✓6.6 ✓	4 28.30 ✓
1st ☍ Cap. =	8m 30.2s ✓			− 4m 31.12s ✓
2nd ☍ Cap. =	33m 37.3s ✓			
3rd ☍ " =	34m 9.6s ✓			

1st ☍ Cap. = 8m 30.2s ✓ = 22h 20m 0.0s ✓ (by Bond 236)

Mean ☉ time = 14 12.2 ✓

+5 42.0 ✓

−36.7 ✓

22 19 23.3 ✓

+5 42.6 ✓

22 25 5.9 ✓

14 20 45.9 ✓

8 4 19.4 ✓

−1 19.3 ✓

8 3 0 1 ✓ = C. Inv. N. obs.

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1881phae.proj..491T

5 6 7

Diff. = Diff. * (Col 5 + Col. 6)

0 | 0m 7.s5 | 0m 6.s3 | 1m 53.s8

0 | 0 58.4 | 0 56.4 | 1 54.8

0 | 0 55.0 | 0 3.4 | 1 48.4

0 | 0 46.7 | 1 5.1 | 1 51.8 | +69° 2.6′ 11.9″
−4 7.8
+69 21 14.1

0 | 0 44.1 | 1 .3 | 1 49.4
261.7 | 1m 51.s64

0m 2.s34

Log. 111.64 = 2.0477820
" 7.5 = 0.8775061
" Cos Dec = 9.5447275
294.1 = 2.4685838
889.8
979.7
297.8

Log. 111.64 = 2.0477820
" 7.5 = 0.8775061
" Cos. Dec = 9.5447275
29.2 = 2.4701756
889.8
−94.6 = −9′ 4.″6

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1881phae.proj..491T

39 yrs. Oct. 26. 1881.

Comet (L) 1881

Pol. Mo. +69° 10′5 18 58 19 +69 24. 8

Oc. A. 1887.0-00 18h 58m 25s.89 +69° 22′ 27″.6

284° 36′ 28″.3 ν

log. $\frac{m}{r}$ = 0.126131ν log. m = 1.302222ν

" sin ϒ = 9.985729n " cos ϕ = 9.401749ν

" tan δ = 0.424366ν " 19.ν = 1.290035ν

-3.4374ν = 0.536226n 98″.63ν = 1.994007ν

+3.0704ν

-0.3670ν = 9.564666n

19.ν = 1.290035ν

-7.s16ν = 0.854701νn

18h 58m 25s.89ν +69° 22′ 27″.6ν

-7.16ν + 1 38.6ν

18 58 18.73ν +69 24 6.2ν

284° 34′ 40″.9ν

Log. $\frac{m}{r}$ 0.126101ν log. m = 1.302193ν

" sin A 9.998ν7888n " cos ϕ = 9.400881ν

" tan D 0.424996ν " 39 = 1.591065ν

-3.4426ν = 0.536885n 196″.8ν = 2.294139ν

+3.0708ν

-0.3718ν = 9.570309νn

39 = 1.591065ν

-14.s0ν0ν = 1.161374νn

18h 58m 25s.89ν +69° 22′ 27″.6ν

-14.ν0ν + 3 16.8ν

Pos. 1881.0 18 58 11.39ν +69 25 44.4ν

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1881phae.proj..491T

Oct. 26. 1881.

Comet (b) 1881.

$\delta = +69^\circ\ 2\checkmark'\ 44.''4\checkmark$

f.	+ 3.447 ✓		
Log. g.	1.3✓✓0 + ✓	Log. g.	1.3✓✓0 + ✓
" sin (G+t)	9.9685 n ✓	" cos. G+t	9.56✓1 + ✓
" tan. δ	0.42✓6 + ✓	" sum	0.9201 + ✓
" sum	1.7493 n ✓	2y.	+ f.32 ✓
" l✓	1.1761 + ✓	" h	1.2f✓4 + ✓
" result	0.✓7321 n ✓	" cos. (H+t)	9.96f✓ + ✓
2y.	− 3.743 ✓	" sin δ	9.9714 + ✓
" h	1.2f✓4 + ✓	" sum	1.2253 + ✓
" sin (H+t)	9.56✓1 n ✓	2y.	+ 16.f0 ✓
" sec. δ	0.4542 + ✓	" i	0.f303 + ✓
" sum	1.3047 n ✓	" cos. δ	9.5✓45f + ✓
" l✓	1.1761 + ✓	" sum	0.3761 + ✓
" result	0.1286 n ✓	2y.	+ 2.3f
2y	− 1.34✓ ✓	δ − δ	+ 27.✓0 ✓
t' − t.	− 1.641 ✓		

Pos. 1881.0	18h	5f m	11.s39 ✓	Pos. 1881.0	+69°	2✓′	44.″4 ✓
Red. to Appt. pl.			−1.64 ✓	Red. to Appt. pl.			+27.✓ ✓
True pos *	18	✓f	9.7✓ ✓	True pos *	+69	26	11.9 ✓
≡ − *		−4	31.12 ✓	≡ − *		−9	✓4.6 ✓
Pos ≡	18	53	3f.63 ✓	Pos ≡	+69	16	17.3 ✓

G = 0 2f 0 ✓	H = 3 3✓.6 ✓
t = 18 5f.2 ✓	t = 18 5f.2 ✓
G+t = 19 26.2 ✓	H+t = 22 33.f ✓

−18 ✓ day

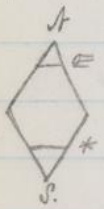
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1881phae.proj..491T

Oct. 28. 1881.

Comet (b) 1881

	1 Comet	2 Star	3 Diff	4 Diff/2
	$0^h\ 3^m\ 6^s.2^v$	$0^h\ 3\ 2^m\ 40^s.8^v$		
	$36\ \ 2.3^v$	$33\ \ 23.4^v$		
	$71\ \ 8.5^v$	$66\ \ 4.2^v$	$5^m\ 4^s.3^v$	$2^m\ 32^s.15^v$
	$39\ \ 33.0^v$	$37\ \ 8.8^v$		
	$40\ \ 25.8^v$	$37\ \ 46.7^v$		
	$79\ \ 58.8^v$	$74\ \ 52.5^v$	$5\ \ 6.3^v$	$2\ \ 33.15^v$
	$43\ \ 39.2^v$	$41\ \ 10.7^v$		
	$44\ \ 33.6^v$	$41\ \ 56.7^v$		
	$88\ \ 12.8^v$	$83\ \ 7.4^v$	$5\ \ 5.4^v$	$2\ \ 32.70^v$
	$47\ \ 59.6^v$	$45\ \ 29.3^v$		
	$48\ \ 53.7^v$	$46\ \ 15.8^v$		
	$96\ \ 53.3^v$	$91\ \ 45.1^v$	$5\ \ 8.2^v$	$2\ \ 34.10^v$
	$52\ \ 11.9^v$	$49\ \ 40.2^v$		
	$53\ \ 6.3^v$	$50\ \ 27.2^v$		
	$105\ \ 18.2^v$	$100\ \ 7.4^v$	$5\ \ 10.8^v$	$2\ \ 34.40^v$
				$+2^m\ 33.50^v$



mean of times = $44^m\ 9^s.16^v$

Last Tap = $53^m\ 26.0^v$ = $23^h\ 48^m\ 27^s.0^v$ (by Sid watch.)

$44\ \ 9.2^v$

$-9\ \ 16.8^v$

-8.0^v

$23\ 48\ \ 19.0^v$

$-9\ \ 16.8^v$

$23\ 39\ \ 2.2^v$

$14\ 28\ \ 39.0^v$

$9\ \ 10\ \ 23.2^v$

$-1\ \ 30.2^v$

$9\ \ 8\ \ 53.0^v$ = G. Me. T. obs.

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1881phae.proj..491T

5	6	7
Diff =	Diff *	(Col 5 + Col 6)
$0^m\ 56^s.1$	$0^m\ 42^s.6$	$1^m\ 38^s.7$
0 52.8	0 44.9	1 37.7
0 54.4	0 46.0	1 40.4
0 54.1	0 46.5	1 40.6
0 54.4	0 47.0	1 41.4
271.8		$1^m\ 39^s.76$
0 54.36		

$+68^\circ\ 47'\ 20''.4$
$+5\quad 9.6$
$+68\quad 52\quad 30.0$

Log. 99.76 = 1.99899
" 7.5 = 0.89061
" cos dec = 9.55844 3
270.7 = 2.432490
889.8
619.1
309.6

Log. 99.76 = 1.99899
" 7.5 = 0.89061
" cos dec = 9.55679 9
269.6 = 2.430806
889.8
620.15 = $+10'\ 20''.2$

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1881phae.proj.491T

39 yrs.

Oct. 28. 1881.

Comet (b.)

M. +68° 10′ 38″. 18h 59m 24 +68° 4′ 5″ (f. 5)

Oz. A. 1849-6 18 59 28.62 +68° 43′ 32″.6 (f)

284° 52′ 9″.30

log. $\frac{n}{15}$ = 0.126131 5

" sin A = 9.985208 n

" tan δ = 0.409641 5

-3.3188 5 0.520980 5 n

+3.0704 5

-0.2484 5 = 9.395152 5 n

19.5 = 1.290035 5

-4.84 5 = 0.685187 5 n

Log. n = 1.302223 5

" cos t = 9.409280 5

" 19.5 = 1.290035 5

100.35 5 = 2.001538 5

18h 59m 28.62 5

-4.84 5

18 59 23.78 5

284° 50′ 56″.70 5

+68° 43′ 32″.6 5

+1 40.4 5

+68 45 13.0 5

log. $\frac{n}{15}$ = 0.126101 5

" sin A. = 9.985249 n

" tan. D = 0.410267 5

-3.3237 5 = 0.521617 5 n

+3.0708 5

-0.2529 5 = 9.402949 n

39 = 1.591065 5

-9.86 5 = 0.994014 5 n

log. n = 1.302193 5

" cos δ = 9.408705 5

" 39 = 1.591065 5

2 cos. 43 5 = 2.301963 5

18h 59m 28.62 5

-9.86 5

Pos 1881.0 = 18 59 18.76 5

+68° 43′ 32″.6 5

+3 20.4 5

+68 46 53.0 5

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1001phae.proj..491T

Oct. 28. 1881.

Comet (b). 1881.

$\delta = 68^\circ\ 46'\ 53''.0$

f	+3.462		
Log. q.	1.3570+	Log. q.	1.3570+
" sin (G++)	9.9674n	" cos (G++)	9.5722+
" tan δ	0.4109+	" sum	0.9292+
" sum	1.7353n	Zy.	+8.50
" r	1.1761+	" h	1.2866+
" result	0.5592n	" cos (H++)	9.9628+
Zy.	−3.624	" sin δ	9.9695+
" h	1.2866+	" sum	1.2189+
" sin (H++)	9.5984n	Zy.	+16.55
" sec. δ	0.4414+	" i	0.8196+
" sum	1.3265n	" cos δ	9.5586+
" r	1.1761+	" sin	0.3782+
" result	0.1504n	Zy.	+2.39
Zy.	−1.414	δ' − δ.	+27.44
t' − t.	−1.576		

Pos. 1881.0	18h 59m 18.s76	Pos. 1881.0	+68° 46′ 53″.0
Red. to app. pl.	−1.58	Red. to app. pl.	+27.4
True pos ✶	18 59 17.18	True pos ✶	+68 47 20.4
= − ✶	+2 33.50	= − ✶	+10 20.2
Pos =	19 1 50.68	Pos =	+68 57 40.6

Q = 0h 26.m4 H = 3h 27.m2

t = 18 59.3 t = 18 59.3

(H++) = 19 27.7 (H++) = 22 26.5

−.14 Day.

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1881phae.proj..491T

81 yrs. Nov. 22. 1881.

Comet b. 1881.

Nov. +64°.14 ν 20ʰ 37ᵐ 1ν.ˢ +64° 38′.2

P. XX. 29ν. 20 36 30.067 + 64 26 6.3

309° 7′ 31″.0 ν ν

Log. m/r = 0.126230 ν Log. m = 1.302322 ν

" sin t = 9.889732 ν m " cos t = 9.800047 ν

" tan d = 0.320239 ν " 40.ν = 1.607455 ν

-2.1687 ν = 0.336201 m ν12.″65′ = 2.709819 ν

+3.0696 ν

+0.9009 ν = 9.954677 ν

40.ν = 1.607455 ν

36.ˢ486 ν = 1.562132 ν

20ʰ 36ᵐ 30.ˢ067 ν +64° 26′ 6.″3 ν

+ 0 36.ˢ486 ν + 8 32.″6 ′

20 37 6.ˢ553 ν +64 34 38.″9 ν

309° 16′ 38.″2 ν ν

Log. m/r = 0.126145 ν ν Log. m = 1.302237 ν

" sin A = 9.888792 ν m " cos A = 9.801454 ν

" tan D = 0.323017 ν " 81 = 1.908481 ν ν

-2.1775 ν ν = 0.337954 ν m 1028.″43 ν = 3.012176 ν

+3.0704 ν

+0.8929 ν = 9.950803 ν

81 = 1.908481 ν ν

72.ˢ32 ν ν = 1.859288 ν

20ʰ 36ᵐ 30.ˢ067 ν +64° 26′ 6.″3 ν

+1 12.ˢ32 ν ν +17 8.′4 ′

Pas. 1881.0 20 37 42.392 ν +64 43 14.″7 ν

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1881phae..proj..491T

Nov. 22. 1881.

Comet b. 1881.

$\delta = +64^\circ\ 43'\ 14''.7$ ✓

f.	+ 3.674 ✓		
Log. q.	1.3840+ ✓	Log. g.	1.3840+ ✓
" sin(G+f)	9.8278m ✓	" cos.(G+f)	9.8692+ ✓
" tan f	0.3258+ ✓	" sum	1.2532+ ✓
" sum	1.5376m ✓	Zy.	+ 17.91 ✓
" r	1.1761+ ✓	" l	1.3023+ ✓
" result	0.3615m ✓	" cos(H+f)	9.9621+ ✓
Zy.	- 2.299 ✓	" sin. δ	9.9563+ ✓
" l	1.3023+ ✓	" sum	1.2207+ ✓
" sin(H+f)	9.6024m ✓	Zy.	+ 16.62 ✓
" sec. δ	0.3695+ ✓	" i	0.5967+ ✓
" sum	1.2742m ✓	" cos. δ	9.6305+ ✓
" r	1.1761+ ✓	" sum	0.2272+ ✓
" result	0.0981m ✓	Zy.	+ 1.69 ✓
Zy.	- 1.2573 ✓	δ' - δ	+ 36.22 ✓
f' - f.	+ 0.122 ✓		

Pos. 1881.0	20h 37m 42s.39 ✓	Pos. 1881.0	+64° 43' 14".7 ✓
Red. to App. pl.	+ 0.12 ✓	Red. to App. pl.	+ 36.2 ✓
True pos *	20 37 42.51 ✓	True pos *	+64 43 50.9 ✓
= - *	- 2 9.69 ✓	= - *	+ 3 2.4 ✓
Pos =	20 35 32.82 ✓	Pos =	+64 46 53.3 ✓

G = 0h 33m.2 ✓ H = 1h 47m.9 ✓

f = 20 37.7 ✓ f = 20 37.7 ✓

(G+f) = 21 10.9 ✓ (H+f) = 22 25.6 ✓

-.13 ✓ day.

✓

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1881phae.proj.491T

39 yrs. Nov. 10. 1881.
Comet b 1881.

Dec. +66° 12′ 54″ 19ʰ 51ᵐ 50ˢ +66° 41′ 2″ (8.4)

Oe. A. 19 81 V. 19ʰ 51ᵐ 46.92ˢ +66° 39′ 20.9″ (9)
297° 56′ 43.″8 V

log. n/r 0.126131 V
" sin t 9.946154 V n
" tan δ 0.364936 V
2.7367 V − = 0.437221 V n
3.0704 V +
+0.3337 V = 9.523356 V
19. V = 1.290033 V
6.″81 V = 0.813391 V

Log. n = 1.302223 V
" cos t = 9.670831 V
" 19.5 = 1.290033 V
183.″27 V = 2.263089 V

19ʰ 51ᵐ 46.ˢ92 V
+ 6.″81 V
19 51 ″53.43 V
297° 58′ 21.″44 V

+66° 39′ 20.″9 V
+3 3.′3 V
+66 42 24.″2 V

Log. n/r 0.126101 V
" sin A. 9.946045 V n
" tan D 0.365997 V
2.7422 V − = 0.438143 V n
3.0706 V +
0.3283 V = 9.516271 V
39 = 1.591065 V −
12.″80 V = 1.107336 V

Log. n = 1.302193 V
" cos A = 9.671219 V
" 39 = 1.591065 V −
366.″84 V = 2.564477 V

19ʰ 51ᵐ 46.ˢ92 V
+12.″80 V
Pos. 1881.0 19 51 ″59.72 V

+66° 39′ 20.″9 V
+6 6.′8 V
+66 45 27.″7 V

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1881phae.proj..491T

Nov. 10. 1881.

Comet b. 1881

$\delta = +66^\circ\ 45'\ 27.7$

f.	+3.564		
Lvg. g.	1.37033+	Lvg. g.	1.37033+
" sin(G++)	9.90922n	" cos(G++)	9.76699+
" tan δ.	0.36711+	" Sum	1.13732+
" Sum	1.64666n	Zy.	+13.72
" 15	1.17611+	" h	1.29511+
" result	0.47077n	" cos(H++)	9.96311+
Zx	−2.955	" Sin δ	9.96322+
" h	1.29511+	" Sum	1.22144+
" sin(H++)	9.59677n	Zy.	+16.65
" sec. δ	0.40388+	" i	0.72889+
" Sum	1.29956n	" cos. δ	9.59622+
" 15	1.17611+	" Sum	0.32511+
" result	0.11967n	Zy.	+2.11
Zy.	−1.317	δ' − δ.	+32.4+
f' − f.	−0.708		

Pos. 1881.0	19	51	59.72	Pos. 1881.0	+66	45	27.7
Red. to App Pl			−0.71	Red. to App. Pl.			+32.5
True Pos +	19	51	59.01	True Pos +	+66	46	0.2
≡ − *	+0	13	13.75	≡ − *		+5	18.6
Pos ≡	19	52	12.76	Pos ≡	+66	51	18.8

g =	0h 31m 1.1	H =	2 34.9
f =	19 52.0	f =	19 52.0
(G++) =	20 23.1	(H++) =	22 26.9

= .16 day

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1881phae.proj..491T

39 yrs. Eur. 11. 1881.
Comet 6. 1881.

Obs. +66° 1254 19^h 51^m $\nu 0^s$ $+66°$ 41′ 2″ (f. 4)

Obs. A. 1881. 19 51 46.92 +66 39 20.9 (9.)
297° 56′ 43.″80

Log. $\frac{m}{\Delta}$ = 0.126131$^\nu$ Log. m = 1.302223$^\nu$
" sin t = 9.946154$^\nu m$ " cos t = 9.670831$^\nu$
" tan δ = 0.364936$^\nu$ " 19.ν = 1.2900 3ν^ν
2.736$7^\nu m$ = 0.437221$^\nu m$ 183.″27$^\nu$ = 2.263049$^\nu$
3.0704$^\nu$+
0.3337$^\nu$+ = 9.523336$^\nu$
19.ν = 1.290003ν^ν
$6^s.\nu 1^\nu$ = 0.813391$^\nu$

19^h $\nu 1^m$ $46^s.92^\nu$ +66 39 20.9$^\nu$
+6.$\nu 1^\nu$ +3 3.3$^\nu$
19 $\nu 1$ $\nu 3.43^\nu$ +66 42 24.2$^\nu$
297° $\nu 8'$ 21.″4ν^ν

Log. $\frac{m}{\Delta}$ = 0.126101$^\nu$ Log m = 1.302193$^\nu$
" sin A = 9.946047$\nu^\nu m$ " cos a = 9.671219$^\nu$
" tan D = 0.36ν997$^\nu$ " 39 = 1.ν9106ν^ν
2.742ν^ν = 0.438143$^\nu m$ 366.″4$^\nu$ = 2.ν64477$^\nu$
3.0708$^\nu$+
0.3283$^\nu$+ = 9.ν16271$^\nu$
39 = 1.ν9106ν^ν
$12^s.80^\nu$ = 1.107336$^\nu$

19^h $\nu 1^m$ $46^s.92^\nu$ $+66°$ 39′ 20.″9$^\nu$
+12.80$^\nu$ +6 6.8$^\nu$
Pas. 1881.0 19 $\nu 1$ $\nu 9.72^\nu$ +66 45 27.7$^\nu$

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1881phae.proj..491T

Nov. 11. 1881.

Comet b. 1881.

$\delta = +66^\circ\ 4'\ 27''.7$

f	+3.573		
Log. g.	1.37114+	Log. g.	1.37114+
" sin (G+f)	9.90899n	" cos (G+f)	9.76774+
" cos. δ	0.36711+	" sum	1.13888+
" sum	1.64744n	2y.	+13.77
" r	1.17611+	" h	1.29588+
" result	0.47133n	" cos (H+f)	9.95994+
2y.	−2.960	" sin. δ	9.96322+
" h	1.29588+	" sum	1.21884+
" sin (H+f)	9.61399n	2y.	+16.55
" sec. δ	0.40388+	" i	0.71988+
" sum	1.31135n	" cos. δ	9.59622+
" r	1.17611+	" sum	0.31610+
" result	0.13746n	2y.	+2.07
2y.	−1.372	δ' − δ.	+32.39
f' − f	−0.799		

Pos. 1881.0	19 51 9.72	Pos. 1881.0	+66 4 27.7
Red. to app. pl.	−0.76	Red. to app. pl.	+32.4
True pos ☉	19 51 8.96	True pos ☉	+66 46 0.1
☉ − ☆	+4 2.36	☉ − ☆	−5 5.2
Pos ☉	19 56 1.32	Pos ☉	+66 40 54.9
H = 0h 31.3m	H = 2h 30.9m		
f = 19 52.0	f = 19 52.0		
(G+f) = 20 23.3	(H+f) = 22 22.9		

= 14 day.

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1881phae.proj..491T

39 yrs. Dec. 10. 1881.
Comet b 1881.

Neu. +61.2166. 21 33 22 +61 39.6 (7.6)

Oe. A. 22610-1 21 32 57.29 +61 37 19.37 (8.9)
323° 14' 34."37

Log. n/r 0.126131
" sin + 9.777099
" tan δ 0.266841
1.4790 = 0.169981 m

3.0704 +
1.7914 + = 0.201779
19.7 = 1.290037
31.503 = 1.491814

Log. n = 1.302226
" cos + = 9.903730
" 19.7 = 1.290037
313.32 = 2.497988

21h 32m 57.29s
+31.03
21 33 29.32
323° 22' 19.80"

+61° 37' 19.4"
+5 13.3
+61 40 32.7

Log. n/r 0.126101
" sin A 9.775694
" tan D 0.268419
1.4798 = 0.170214 m

3.0708 +
1.7910 + = 0.201670
39 = 1.591067
62.07 = 1.792737

Log. n = 1.302199
" cos A = 9.904460
" 39 = 1.591067
627.67 = 2.797718

21h 32m 57.29s
+1 2.07
Pos 1881.0 21 34 0.34

+61° 37' 19.4"
+10 27.6
+61 47 47.0

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1881phae..proj..491T

Dec. 10. 1881.

Comet b. 1881.

$\delta = +61^\circ\ 45'\ 47.''0$

ft.	+ 3. 8		
Lrg. g.	1. 4 0	Lrg. g.	1. 4 0 +
" sin (G+t)	9. 6 6 8 4 n	" cos (G+t)	9. 9 4 6 8 +
" tang. δ	0. 2 7 0 0 +	" Sum	1. 3 2 6 +
" Sum	1. 3 4 4 2 n	2y.	+ 2 2. 5 2
" r	1. 1 7 6 1 +	" h	1. 3 0 9 4 +
" result	0. 1 6 8 1 n	" cos (H+t)	9. 9 1 +
2y.	− 1. 4 7 3	" sin δ	9. 9 4 5 0 +
" h	1. 3 0 9 4 +	" Sum	1. 2 0 5 9 +
" sin (H+t)	9. 6 0 6 n	2y.	+ 16. 0 7
" Sec. δ	0. 3 2 5 0 +	" r	0. 1 8 3 1 +
" Sum	1. 2 8 5 0 n	" cos. δ	9. 6 7 0 +
" r	1. 1 7 6 1 +	" Sum	9. 8 8 1 +
" result	0. 1 0 8 9 n	2y.	+ 0. 7 2
2y.	− 1. 2 8	δ' − δ	+ 39. 31
f' − f	+ 1. 0 9 9		

Pos. 1881.0	21h	34m	0.s34	Pos. 1881.0	+61° 4' 47.''0
Red. to appt.			+ 1. 1 0	Red. to appt.	+ 39. 3
True pos +	21	34	1. 4 4	True pos δ +	+ 61 46 26. 3
≡ − +		− 0	7. 9	≡ − +	− 2 55. 9
Pos ≡	21	33	53. 4 9	Pos ≡	+ 61 43 30. 4

h = 0h 34.m 9 H = 0h 39.m 7

t = 21 34.0 t = 21 34.0

(G+t) = 22 8.9 (H+t) = 22 13.7

− .17 day.

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71 yrs.

No. $21^h\ 49^m\ 57^s.4$ $+60^\circ\ 48'.3$

Gr. 3616. $21\ 48\ 37.83$ $+60\ 35'\ 5.8$

$327^\circ\ 9'\ 27''.4$

log. $\frac{m}{15}$ 0.126209 log. m = 1.302301

" sin δ 9.734263 " cos δ = 9.92436

" tan. δ 0.248861 " 35.5 = 1.550228

-1.2863^v = 0.109333 n $598''.27$ = 2.776894

$+3.0694^v$

$+1.7835$ = 0.251273

35.5 = 1.550228

$63^s.31$ = 1.801501

$21^h\ 48^m\ 37^s.83$ $+60^\circ\ 35'\ 5''.8$

$+1\ 3.31$ $+9\ 58.3$

$21\ 49\ 41.14$ $+60\ 45\ 4.1$

$327^\circ\ 25'\ 17''.10$

log. $\frac{m}{15}$ 0.126134 log. m = 1.302226

" sin A. 9.731150 " cos A = 9.92564

" tan D 0.251811 " 71 = 1.851258

-1.2856 0.109095 n $1199''.9$ = 3.079133

$+3.0702$

$+1.7849$ = 0.251614

71 = 1.851258

$126^s.73$ = 2.102872

$21^h\ 48^m\ 37^s.83$ $60^\circ\ 35'\ 5''.8$

$+2\ 6.73$ $+19\ 59.9$

Pos. 1881.0 $21\ 50\ 44.56$ $60\ 55\ 5.7$

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1881phae.proj..491T

$\delta = +60^\circ\ 55'\ 5''.7$

f.		Log. g.	
Log. g.		" cos.(G+f)	
" Sin(G+f)		" Sum	
" tan δ	0. 2548+ ✓	Zy.	
" Sum		" h	
" r	1. 1761+ ✓	" cos (H+f)	
" result		" Sin δ	9. 9415+ ✓
Zy.		" Sum	
" h		Zy.	
" Sin(H+f)		" i	
" sec. δ	0. 3133+ ✓	" cos. δ	9. 6867+ ✓
" Sum		" Sum	
" r	1. 1761+ ✓	Zy.	
" result.		δ'-δ	
Zy.			
f'-f			

G= H=

f= 21 50.8 f= 21 50.8

(G+f)= (H+f)=

day

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1881phae.proj..491T

45 nus. Dec. 15 1881.

Comet b. 1881.

R. No. +60°.2312	$21^h\ 49^m\ 54^s.9$	$+60°\ 50'.8$
R. 967 v.	21 49 27.344	+60. 46 8.4 v
	327° 21′ 50″.10	
Log. $\frac{m}{1v}$	0.126154 v	Log. m = 1.302446 v
" sin t	9.731832 v n	" cos t = 9.92 v 3707 v
" tan d	0.2 v 2129 v	" 22. v = 1.3 v 2183 v
1.2886 v n	= 0.111011 v n	380″.01 v = 2.579799 v
3.0703 v +		
1.7817 v +	= 0.25083 v v	
22. v	= 1.352183 v	
40.s088 v	= 1.603018 v	
	$21^h\ 49^m.\ 27^s.344$ v	+60° 46 8.4 v v
	+ 40.088 v	+6 20.01 v
	21 50′ 7.432 v	+60 52 28.46 v
	327° 31′ 51.″4 v v	
Log. $\frac{m}{1v}$	= 0.126107 v	Log. m = 1.302199 v
" sin A.	= 9.729847 v n	" cos A = 9.926179 v
" tan D	= 0.2 v 4009 v	" 45 = 1.6 v 3213 v
−1.2881 v	= 0.109964 n	761.36 v = 2.881 v 91 v
+ 3.0708 v		
+1.7827 v	= 0.2 v 10786 v	
4 v	= 1.6 v 3213 v	
80.222 v	= 1.904291 v	
	$21^h\ 49^m\ 27^s.344$ v	+60° 46′ 8.″4 v v
	+1 20.222 v	+12 41.36 v
Pos. 1881.0	21 v0 47.v66 v	+60 v8 49.81 v

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1881phae.proj..491T

Dec. 15. 1881.

Comet b. 1881.

$\delta = +60^\circ\ 58'\ 49.8''$

f		Lrg. g'	
Lrg. g.		" cos (G+f)	
" sin (G+f)		" Sun	
" tan. δ	0. 2 ✓ ✓ 9 + ✓	Σy.	
" Sun		" h	
" r	1. 1761 + ✓	" cos (H+f)	
" result		" Sin δ	9. 9417 + ✓
Σx.		" Sun	
" h		Σy.	
" Sin (H+f)		" ι'	
" Sec. δ	0.3142 + ✓	" cos. δ	9. 6858 + ✓
" Sun		" Sun	
" r	1. 1761 + ✓	Σy.	
" result		δ' − δ.	
Σy.			
f' − f			

Pos. 1881.0 $21^h\ 50^m\ 47^s.57$ Pos. 1881.0 +60 ° 58' 49.8 ✓

Red. to Appt. pl.

True pos *

ε − *

Pos ε

Red. to Appt. pl.

True pos *

ε − *

Pos ε

h = H =

f = 21 50.8 ✓ f = 21 50.8 ✓

(G+f) = (H+f) =

day.

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1881phae.proj..491T

Nov. 26. 1881.

Location of plan. nebulæ discovered by Prof. P.

Nov. 24. 1881.

1	2	3	4 (Col. 1 − Col. 2)	5 (Col. 1 − Col. 3)	4/2	5/2
Neb.	* 3404	* 3405				
h 21	40.7	21 11.2	21 15.7			
22	5.0	22 3.3	22 12.2			
43	45.7	43 14.5	43 27.0	31.2	17.7	15.6	8.85
33	47.5	33 17.3	33 22.9			
34	13.2	34 12.0	34 21.0			
67	0.7	67 30.3	67 43.9	30.4	16.8	15.20	8.40
43	59.2	43 31.3	43 38.1			
44	26.0	44 25.0	44 34.0			
68	25.2	67 56.3	68 9.1	28.9	16.1	14.45	8.05
						15.08	8.43

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1001phae.proj.:4917



all in s. half.

Nov. 26. 1881.

Diff. rect.	Diff. * 3f0f	Diff. * 3f0r
24.3	r2.1	r6.4
2r.7	r3.7	r8.1
26.8	r3.7	r8.9
25.60	53.17	57.20

37	6	12.9
	−1	22.r
37	4	r0.4

37	6	3r.3
	−1	36.3
37	4	r9.0

log. 27.rf = 1.44043f
" 7.r = 0.8fr061
" cos. dec. = 9.9017r6
2/164.91 = 2.217r4
f2.46

log. 32.20 = 1.r07fr6
" 7.r = 0.8fr061
" cos. dec. = 9.901721
2/192.r9 = 2.2f4638
96.30

1.44043f
0.8fr061
9.901fff
164.96 = 2.217 3f r

1.r07fr6
0.8fr061
9.901f74
192.66 = 2.2f4791

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1881phae.proj..491T

Nov. 26. 1881.

5 yrs.

Nov. +37°37'04"	20h	5m	15.5	+ 37°	1'	5
W.B. 20h19m-7)	20	4	9.75	+ 36	56	39.95

301° 2' 26.2"

Log. n/r	0.126178	Log. n = 1.302270
" sin +	9.932881 n	" cos + = 9.712352
" tan. d	9.876238	" 27.5 = 1.439333
-0.8616	9.935297 n	284.42 = 2.453955
+3.0701		
+2.2085	0.344097	
log. 27.5	1.439333	
60.73	1.783430	

	20h 4m 9.75	+ 36° 56' 39.9"
	+1 0.73	+ 4 44.42
mid prov.	20 5 10.48	+ 37 1 24.4

301° 17' 37.2"

log. n/r	0.126120	Log. n = 1.302212
" sin A.	9.931721 n	" cos A = 9.715522
" tan D	9.877484	" 55 = 1.740363
-0.8616	9.935325 n	572.92 = 2.758097
+3.0706		
+2.2090	0.344196	
log. 55	1.740363	
121.50	2.084559	

	20h 4m 9.75	+ 36° 56' 39.95
	+ 2 1.50	+ 9 32.92
Pos. 1880.0	20 6 11.25	+ 37 6 12.9

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Nov. 26. 1881.

W. 20^h 196-7	20	6	11.2	v	+37	6	12.9 v (1 Aff. 0
W. 20^h 200-1	20	6	18.00	v	+37	6	35.3 v ("

# 20^h 196-7	20	6	11.2	v	37	6	12.9 v
			+15.04	v		-2	4.0 v
Pos. neb.	20	6	26.38	v	37	3	27.9 v

# 20^h 200-1	20	6	18.00	v	+37	6	35.3 v
			+ 8.43	v		-3	12.7 v
Pos. neb.	20	6	26.43	v	+37	3	22.6 v
" "	20	6	26.33	v	+37	3	27.9 v
Mean " "	20	6	26.38	v	+37	3	25.2 v (1 Aff. 0)

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1881phae.proj..491T

1	2	3	4	
# 3804	N *	S. *	(Col. 2 - Col. 1)	$\frac{(\text{Col. 2} - \text{Col. 1})}{2}$
43m 31.3s ✓	43m 59.4s ✓	44m 6.9s ✓		
44 25.0 ✓	44 32.0 ✓			
87m 56.3s ✓	88m 31.4s ✓		35.1s ✓	17.55s ✓

# 3805					
43m 35.1s ✓					
44 34.0s ✓					
88 9.1s ✓	88m 31.4		22.3s ✓	11.15s ✓	
Yr. 20^h 196-7	20 6 11.25s ✓		+37 6 12.9 ✓		
	+ 17.55s ✓		−2 6.2 ✓		
Pos. N. *	20 6 28.80 ✓		+37 4 6.7 ✓		(1881.0)
Yr. 20^h 200-1	20 6 18.00 ✓		+37 6 35.3 ✓		
	+ 11.15s ✓		−2 37.4 ✓		
Pos. N. *	20 6 29.15s ✓		+37 3 57.9 ✓		
" N. *	20 6 28.80 ✓		+37 4 6.7 ✓		
Mean pos. N. *	20 6 28.98s ✓		+37 4 2.3 ✓		(1881.0)

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1881phae.proj..4911

Diff. 3 for 1	Diff. for 1 ″	Diff. 3 for 1 ″
53.7″	32.6″	8.9″

log. 21.1″ = 1.324282″
" 7.5″ = 0.875061″
9.901786″
126.21 = 2.101099″
63.10″

37	6	12.9″
	−1	3.1″
37	5	9.8″

1.324282″
0.875061″
9.901786″
126.24 = 2.101199″

37	6	12.9″
	−2	6.2″
37	4	6.7″

log. 26.3″ = 1.419986″
0.875061″
" corr. dec. 3 for 1″) 9.901721″
2157.30″ = 2.196768″
74.6″

37	6	35.3″
	−1	18.6″
37	5	16.7″

1.419986″
0.875061″
log. corr. mid. dec. 9.901844″
157.35″ = 2.196892″

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1881phae.proj..491T

	1	2	(Col. 2 − Col. 1)	$\frac{\text{Col. 2} - \text{Col. 1}}{2}$
#3704	S. *			
	43 31.3	44 3.9		
	44 27.0	44 27.0		
	87 56.3	88 30.9	34.6	17.30

#3704	20	6	11.25	37	6 12.9
			+17.30		−3 3.1
S. *	20	6	28.55	37	3 9.8

	1	2	Col. 2 − Col. 1	$\frac{\text{Col. 2} - \text{Col. 1}}{2}$
#3705	S. *			
	43 35.1	44 3.9		
	44 34.0	44 27.0		
	88 9.1	88 30.9	21.8	10.90

#3704	20	6	11.25	+37	6 12.9
			+17.30		−3 3.1
Pos. * S	20	6	28.55	+37	3 9.8

#3705	20	6	14.00	+37	6 25.7
			10.90		−3 24.2
S. star	20	6	24.90	+37	3 1.1
	20	6	24.55	+37	3 9.8
mean pos. S. *	20	6	24.72	+37	3 5.4

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(Diff. col. 1.) (Diff. col. 2)

37 6 12.9
−1 31.5
37 4 41.4

3.7 23.1

log. 30.6 = 1.486721
" 7. = 0.845061
" cos. dec. = 9.901756
2/18.04 = 2.262538
91.52

1.486721
0.845061
9.901902
2.262684 = 182.10

Diff. col. 1. Diff. col. 2 (S.T.)

37 6 35.3
−1 47.1
37 4 48.2

8.9 23.1

log. 35.8 = 1.553843
" 7. = 0.845061
" cos. dec. = 9.901721
2/214.12 = 2.300626
107.06

37 6 30.0
−3 34.2
37 3 1.1

1.553843
0.845061
9.901891
214.21 = 2.300795

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Date.	S. T. obs.			R. A. =			H. A			Dec. =			Pa
													Com
July 16	22	10	36.2	5	49	34.97	-7	38	54.6	+39	3	10.6	
" 17	23	15	6.3	5	51	22.42	-6	36	16.1	+39	56	43	
" 18	22	13	39.3	5	53	8.69	-7	39	24.6	+40	17	27.0	
" 19	23	26	43.5	5	55	3.23	-6	28	19.7	+40	41	13.4	
" 21	23	6	33.2	5	59	57.47	-6	52	32.7	+41	26	39.8	
" 23	23	49	23.3	6	3	48.82	-6	14	22.5	+42	17	0.7	
" 24	23	30	13.3	6	6	4.60	-6	35	55.3	+42	41	22.3	
" 26	23	41	11.3	6	11	51.69	-6	30	40.6	+43	37	17.6	
Aug. 2	23	25	54.3	6	39	56.66	-7	14	2.4	+47	16	42.1	
" 3	23	11	42.9	6	45	31.37	-7	33	46.5	+47	56	8.5	
" 8	23	43	4.6	7	24	11.04	-7	41	2.4	+50	47	12.0	
" 10	23	47	50.4	7	46	19.36	-7	58	24.6	+51	48	53.8	
" 15	18	12	46.0	9	0	44.67	+9	12	1.3	+52	40	37.7	
" 21	18	21	50.4	11	6	59.87	+7	14	15.5	+44	15	31.8	
" 22	18	9	20.8	11	26	47.00	+6	42	33.8	+42	44	30.6	
" 30	19	25	4.8	13	16	56.49	+6	8	8.3	+16	28	3.4	

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Pav. in R. A.	Pav. in Dec.	L. f. R. A.	L. f. Dec.	L. f. f. R. A.	L. f. f. Dec.
onct (c) 1881.					
0.s499	6.″12	9.6941	0.7466	9.7120 n	0.8007 +
0.5455	5.05	9.7364	0.7033	9.7503 n	0.7172 +
0.5504	6.11	9.7024	0.7460	9.7163 n	0.7999 +
0.5554	4.87	9.7435	0.6875	9.7574 n	0.7014 +
0.5549	5.27	9.7396	0.7218	9.7538 n	0.7357 +
0.5571	4.52	9.7566	0.6551	9.7705 n	0.6690 +
0.5569	4.90	9.7551	0.6902	9.7690 n	0.7041 +
0.5540	4.74	9.7634	0.6758	9.7773 n	0.6897 +
0.5591	5.38	9.7716	0.7306	9.7855 n	0.7447 +
0.5579	5.72	9.7624	0.7554	9.7766 n	0.7713 +
0.6055	5.73	9.7816	0.7552	9.7957 n	0.7721 +
0.5955	6.02	9.7745	0.7796	9.7884 n	0.7935 +
				9.6827 +	0.8735 +
0.5705	5.49	9.7559	0.7396	9.7698 +	0.7535 +
0.5675	5.02	9.7536	0.7007	9.7675 +	0.7146 +
0 4411	5.58	9.6444	0.7466	9.6583 +	0.7605 +

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Date.	S. T. obs.	R. A. =	H. a.	Dec. =	
					Bar
Oct. 21	20h 44m 32.s5	13h 49m 18.s73	+6h 55m 13.s77	+25° 40′ 5.″1	
" 25	7 25 15.0	13 50 43.56	-6 25 28.56	+27 45 1.9	
" 26	21 6 22.5	13 50 55.42	+7 15 27.08	+26 0 40.6	
" 27	7 36 44.2	13 51 20.70	-6 14 36.5	+28 40 33.8	
					Den
Oct. 18	6h 50m 5.s40	9h 54m 2.s31	-3h 3m 56.s91	+14° 48′ 47.″8	
" 20	6 38 9.00	9 57 57.37	-3 19 48.37	+14 47 26.9	
" 21	6 1 2.40	9 59 49.93	-3 58 47.53	+14 46 40.3	
" 25	6 29 3.40	10 7 13.58	-3 38 10.18	+14 43 10.3	
" 26	7 39 36.20	10 9 5.45	-2 29 29.25	+14 42 22.7	
" 27	7 4 27.50	10 10 46.45	-3 6 18.95	+14 41 39.9	

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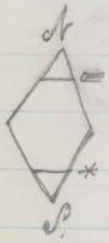
Par. in R.A.	Par. in Dec.	L. f. p. R.A.	L. f. p. Dec.	L. f. p. R.A.	L. f. p. Dec.
rauds = (ε)	1881				
0.s456 v	5.″84 v	9.6790 v	0.7664 v	9.6729 + v	0.7803 + v
0.477 v	5.42 v	9.6767 v	0.7340 v	9.6906 m v	0.7479 + v
0.453 v	6.04 v	9.6761 v	0.7810 v	9.6700 + v	0.7949 + v
0.482 v	5.24 v	9.6836 v	0.7193 v	9.6969 m v	0.7332 + v
rungs = (ζ)	1881.				
0.s315 v	4.″44 v	9.4983 v	0.6474 v	9.5122 v	0.6613 v
0.335 v	4.52 v	9.5250 v	0.6551 v	9.5389 v	0.6690 v
0.378 v	4.75 v	9.5775 v	0.6767 v	9.5914 v	0.6906 v
0.375 v	4.63 v	9.5529 v	0.6656 v	9.5666 v	0.6795 v
0.265 v	4.29 v	9.4232 v	0.6325 v	9.4371 v	0.6464 v
0.318 v	4.46 v	9.5024 v	0.6493 v	9.5163 v	0.6632 v

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Dec. 21. 1881.
Comet g 1881.

1 Comet.	2 Star.	3 Diff.	4 Diff. ÷ 2
$0^h\ 1^m\ 44.7^s$	$4^m\ 48.3^s$		
$2\ \ 5.8^s$	$4\ \ 59.8^s$		
$3\ \ 50.5^s$	$9\ \ 48.1^s$	$5^m\ 57.6^s$	$2^m\ 58.80^s$
$7\ \ 21.4^s$	$10\ \ 26.3^s$		
$7\ \ 44.6^s$	$10\ \ 38.6^s$		
$15\ \ 6.0^s$	$21\ \ 4.9^s$	$5\ \ 58.9^s$	$2\ \ 59.45^s$
$12\ \ 43.3^s$	$15\ \ 47.9^s$		
$13\ \ 6.7^s$	$16\ \ 0.3^s$		
$25\ \ 50.0^s$	$31\ \ 48.2^s$	$5\ \ 58.2^s$	$2\ \ 59.10^s$
$17\ \ 49.2^s$	$20\ \ 55.3^s$		
$18\ \ 14.3^s$	$21\ \ 8.5^s$		
$36\ \ 3.5^s$	$42\ \ 3.8^s$	$6\ \ 0.3^s$	$3\ \ 0.15^s$
			$-2\cdot\ 59.38^s$



$0^h\ 21^m\ 51.7$ $\quad$ $4^h\ 36^m\ 56.9\pm$
$22\ \ 19.8$ $\quad$ $4\ \ 37\ \ 20.3$
$30\ \ 22.4$ $\quad$ $4\ \ 45\ \ 25.7$
} Vapo. by D. & C.

Mean of 8 times $= 0^h\ 10^m\ 6.25^s$
$0\ \ 22\ \ 19.8^s$
$12\ \ 13.55^s$
-2.00^s
$-12^m\ 11.55^s$

$8\ \ 37\ \ 20.3^s$
$+1\ \ \ 12.7^s$
$= 4^h\ 38^m\ 36.0^s$ mean time.
$-12\ \ 11.6^s$
$8\ \ 26\ \ 24.4^s$ = C. M. V. obs.

Sid. time of obs. $= 2^h\ 29^m\ 20.6^s$

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5 Diff =	6 Diff *	7 (Lev r + Col. 6)
0m 21.5	0m 11.5	0m 32.6
0 23.2	0 12.3	0 35.5
0 23.4	0 12.4	0 35.8
0 25.1	0 13.2	0 38.3
0 23.20		0m 35.5

+31° 2′ 20.7″
+ 5 30.7
+31 7 51.4

Log. 35.5 = 1.550844
" 15/2 = 0.875061
" cos. dec = 9.932487
228.4 = 2.358392
849.8
661.35
330.68

Log. 35.5 = 1.550844
" 15/2 = 0.875061
" cos. dec = 9.932467
228.23 = 2.358368
849.8
661.57 = + 11′ 1.57″

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1881phae.proj..491T

56 yrs.

Dec. 21. 1881.
Comet g 1881.

Mn. +30° 50 14 23h 37m 55.2 +30° 53.3 (9.0)

Tr. 23h 8 22. 23h 36m 25.71 +30° 43' 6.3 (9)
354° 6' 25.65

log. 1.337 = 0.126131
" sin. t = 9.011439
" cos. δ = 9.773926
− 0.08154 = 8.911496
+3.07
+2.98444 = 0.475446
log. 2δ. = 1.447158
83.676 = 1.922603

log. 20.0556 = 1.302223
" cos. δ = 9.997699
1.299922
" 2δ. = 1.447158
+5558.57 2.747080

23 36 25.71
+1 23.64
23 37 49.39
354° 27' 20.85

+30 43 6.3
9 18.6
+30 52 24.9

log. u/r 0.-126119
" sin A. 8.985039
" cos D 9.776601
−0.07722 = 8.877959
+3.0707
+2.99357 = 0.476179
log. 56. = 1.748144
+167.64 = 2.224367

log. u = 1.302211
" cos A = 9.999963
" r6. = 1.748144
1117.8 = 3.048362

23 36 25.71
+2 47.64
23 39 13.35
+3.89
23 39 17.24
−2 9.38
23 36 7.86

Pos. 1881.0
Red. to app. pl.
Ap. for *
Pos ≡

+30 43 6.3
+18 37.8
+31 1 44.1
+36.6
+31 2 20.7
+11 1.6
+31 2 13

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1881phae.proj..491T

Dec. 21. 1881.
Comet g. 1881.

$\delta = 31^\circ\ 1'\ 44.1''$

f.	+ 3.978		
Lrg. g.	1.4191 +	Lrg. g.	1.4191 +
" sin (G+A)	8.7918 +	" cos. (G+A)	9.9992 +
" tan. δ	9.7793 +	" sin	1.4183 +
" sin	9.9902 +	Σ.	+ 26.20
" 1/r	1.1761 +	" 1/n	1.3106 +
" result	8.8141 +	" cos (H+A)	9.9979 +
Σ.	+ 0.065	" sin δ	9.7122 +
" 1/n	1.3106 +	" sin	1.0207 +
" sin (H+A)	8.9874 n	Σ.	+ 10.49
" sec. δ	0.0671 +	" r	8.7782 n
" sin	0.3651 n	" cos. δ	9.9329 +
" 1/r	1.1761 +	" sin	8.7111 n
" result	9.1890 n	Σ.	- 0.05
Σ.	- 0.155	δ' - δ	+ 36.64
f' = f.	+ 3.823		

G = 0 35.0 H = 23 54.5
A = 23 39.2 A = 23 39.2
(G+A) = 24 14.2 (H+A) = 47 37.7
" = 0 14.2 " = 23 37.7
$\log = 1.5$ day

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1881phae.proj..491T

Dec. 21. 1881.
Comet g. 1881.

Correction for Parallax.

2	29	21	= sid. time obs.
23	36	18	= R.A.
+2	53	3ˢ	

$2^h\ 53^m.05^s$

Dec. = +31 13 22.3″
" = +31.22″

0.ˢ340 in R.A. } from tables.
2.″52 " Dec. }

Log. 0.340 = 9.5315ˢ
" $\left(\frac{\text{R.A.}}{\text{R.T.}}\right)$ 0.0139ˢ
Final Log. R.A. = 9.5454ˢ+ on basis of 0.″85

Log. 2.52 = 0.4014″
" $\left(\frac{\text{Dec.}}{\text{R.T.}}\right)$ = 0.0139ˢ
Final Log. Dec. = 0.4153″+ on basis of 2.″52

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Dec. 16. 1881.

Comet b. 1881.

$\delta = +60^\circ\ 5'\ 49''.8$

f.	+3.923		
Log. g.	1.4130 +	Log. g.	1.4130 +
" sin (G+f)	9.6016 n	" cos (G+f)	9.9622 +
" tan. δ	0.2557 +	" sum	1.3752 +
" sum	1.2705 n	Dy.	+ 23.72
" r	1.1761 +	" h	1.3103 +
" result	0.0944 n	" cos (H+f)	9.9459 +
Dy.	− 1.243	" sin δ	9.9417 +
" h	1.3103 +	" sum	1.1979 +
" sin (H+f)	9.6716 n	Dy	+ 15.77
" cos δ	0.3142 +	" sin	9.8188 +
" sum	1.2961 n	" cos δ	9.6857 +
" r	1.1761 +	" sum	9.5046 +
" result	0.1200 n	Dy	+ 0.32
Dy	− 1.318	δ' − δ	+ 39.81
f' − f.	+ 1.362		

Pos. 1881.0	21h 50m 47s.5	Pos. 1881.0	+60° 5′ 49″.8
Red. to App. pl.	+ 1.36	Red. to App. pl.	+ 39.8
True pos *	21 50 48.93	True pos *	+60 9 29.6
⊏ − *	+ 0 56.32	⊏ − *	− 13 22.1
Pos ⊏	21 51 45.25	Pos ⊏	+60 46 7.

G 0h 32m.0 H = 0h 17m.2

f = 21 50.8 f = 21 50.8

(G+f) = 22 22.8 (H+f) = 22 8.0

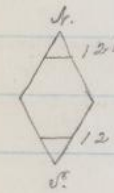
= 1.5 day

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Reduction of stars used with comet on Jan. 20. 1881.

1 D M 6+24 12.00	2 2. D M 6+25 12 1⁵	3 (12 1⁵ - 12.00)	4. $\frac{(12\,1^{5}-12.00)}{2}$
0^{h} 1ᵐ 42.2ˢ	2ᵐ 23.7ˢ		
2 28.7	2 50.8		
4 10.9	5 14.5	1ᵐ 3.6ˢ	0ᵐ 31.8ˢ
3 22.7	4. 3.9		
4 8.5	4 31.6		
7 31.2	8 35.5	1 4.3	0 32.1⁵
4 58.0	5 39 2		
5 43.7	6 6.3		
10 41.7	11 45.5	1 3.8	0 31.9
6 53.3	7 34.4		
7 39.2	8 2.0		
14 32.5	15 36.4	1 3.9	0 31.9⁵
8 39.4	9 20.8		
9 25.5	9 48.5		
18 4.9	19 9.3	1 4.4	0 32.20
10 18.9	11 0.2		
11 -5.0	11 27.8		
21 23.9	22 28.0	1 4.1	0 32.05
11 56.3	12 37.5		
12 41.8	13 4.8		
24 38.1	25 42.3	1 4.2	0 32.10
13 34.9	14 16.5		
14 21.4	14 43.4		
27 56.3	28 59.9	1 3.6	0 31.80
			− 0ᵐ 31.99
15 2.0			
15 49.4		6^{h} 12ᵐ 31.71ˢ	
16 32.9 (1881.0 place)		− 0 31.99	
	6 11 59.72	of nulletter'd star.	



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1881phae.proj..491T

	5		6		7	
	Diff. 1200.		Diff. 121		(Col 5 + Col. 6)	
0	46.5	0	27.1	1	13.6	Log. 73.39 = 1.86 6537
					" 7. = 0.84 5061	
					" cor. dec. = 9.99 7047	
0	45.8	0	27.7	1	13.5	498.60 = 2.697752
					8 8 9.8	
					2) 391.20	
					195.60	
0	45.7	0	27.1	1	12.8	
					Log 73.39 = 1.86 5637	
0	45.9	0	27.6	1	13.5	" 7. = 0.84 5061
					" cor dec = 9.99 7246	
					498.82 = 2.697944	
0	46.1	0	27.7	1	13.8	8 8 9.8
					390.98	
0	46.1	0	27.6	1	13.7	
0	45.5	0	27.3	1	12.8	
0	46.5	0	26.9	1	13.4	
				1m	13.39	

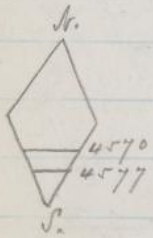
+2	-	3	4	1	+2	3	4	1
		3	1	6		6	31	0
+2	0		29	5	+24	57	14	1 = (1881.0 place of midlatitude star.

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1881phae.proj..491T

Reduction of stars used with comet on Nov. 3. 1888.

	1		2		3		4	
	$\mathfrak{D}$ Mc + 3 Lyr. 4570		4577		(4577 − 4570)		$\frac{4577-4570}{2}$	
0	4	8.5	5	25.8				
	4	54.8	6	0.3				
	9	3.3	11	26.1	2m	22.8	1m	11.40
	6	23.7	7	41.2				
	7	10.0	8	15.8				
	13	33.7	15	57.0	2	23.3	1	11.65
	9	5.2	10	22.4				
	9	51.7	10	57.7				
	18	56.9	21	20.1	2	23.2	1	11.60
	11	23.8	12	41.4				
	12	10.8	13	16.4				
	23	34.6	25	57.8	2	23.2	1	11.60
	13	43.4	15	0.8				
	14	30.4	15	36.2				
	28	13.8	30	37.0	2	23.2	1	11.60
	16	5.3	17	22.9				
	16	52.4	17	58.3				
	32	57.7	35	21.2	2	23.5	1	11.75
	19	23.1	20	40.7				
	20	10.8	21	16.0				
	39	33.4	41	56.7	2	23.3	1	11.65
							+1m	11.571



Copies
8m 37.5
21 36.0

22h 20m 25.84
+1 11.71
22 21 37.55 of unlettered star.

(1880.0 place)

1881phae.proj.491T

	5	6	7
	Diff 4 v 70	Diff 4 v 77	(Col 5 − Col. 6)
40 v	0m 46s.3 v	0m 34s.5 v	0m 11s.8 v
6 v v	0 46.3 v	0 34.6 v	0 11.7 v
60 v	0 46.v v	0 35.3 v	0 11.2 v
60 v	0 47.0 v	0 35.0 v	0 12.0 v
60 v	0 47.0 v	0 3v.4 v	0 11.6 v
7 v v	0 47.1 v	0 3v.4 v	0 11.7 v
6 v v	0 47.2 v	0 3v.3 v	0 11.9 v
71 v			0m 11.7 v

Log. 11.70 = 1.068186 v
" 7.v = 0.8v0661 v
" cos. dec = 9.8974v8 v
69°30 v = 1.840705 v
34.6 v v

Log. 11.70 = 1.068186 v
" 7.v = 0.8v0661 v
" cos. dec - 9.8975v5 v
69°30 v = 1.840762 v

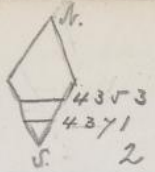
+37° 50′ 35″.4 v
−34.6 v
+37 50 0.8 v

+37° v0′ 3v″.4 v
−1 9.3 v
+37 49 26.1 =

(1880.0 place)
of unlettered star.

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1881phae.proj..491T



Reduction of stars used with comet on Nov. 6, 1880.

1	2	3. R.	4	Diff	Diff / 20
16.+43.43√3	43√4	4 43 71			
0 0 41.√	1 32.1				
3 29.9	4 8.8				
4 11.4	√ 40.9				
6 10.3	6 24.0	8 58.6			
7 1.3	6 51.4	9 38.2			
13 11.6	13 1√.4	18 36.8	5m 25s.2	2m 42.60	0
10 44.4	10 57.7	13 32.8			
11 3√.4	11 2√.8	14 12.6			
22 20.1	22 23.√	27 4√.4	5 25.3	2 42.6√	0
14 42.8	14 56.0	17 31.3			
1√ 34.4	15 24.3	18 11.3			
30 17.2	30 20.3	3√ 42.6	5 25.4	2 42.70	0
22 √.7	22 18.8	24 54.0			
22 √8.0	22 48.√	2√ 34.9			
4√ 3.7	4√ 7.3	√0 28.9	5 25.2	2 42.60	0
28 22.7	28 36.2	31 11.3			
29 16.0	29 6.8	31 √3.0			
√7 38.7	√7 43.0	63 4.3	5 25.6	2 42.80	0
32 30.4	32 48.8	3√ 18.8			
33 24.2	33 14.3	36 0.9			
6√ √4.6	6√ √8.1	71 19.7	5 25.1	2 42.55	0
38 2.8	38 16.3	40 √0.9			
38 √7.0	38 47.2	41 33.8			
76 √9.8	77 3.√	82 24.7	5 24.9	2 42.4√	0
				− 2m 42,s62	

Caps = { 26 14.0 ; 46 36.√ }

22h √√m 47.s √4

− 2 42.62

(1880.0 place) = 22 √3 4.9 2 = ν nulletter d stars

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6. Diff 43	7. Diff 43	8. (col. 6 − col. 7)
0m 51.0	0m 39.6	0m 11.4
0 51.3	0 39.8	0 11.5
0 51.6	0 40.0	0 11.6
0 52.3	0 40.9	0 11.4
0 53.3	0 41.7	0 11.6
0 53.8	0 42.1	0 11.7
0 54.2	0 42.9	0 11.3
		0m 11.5

Log. 11.5 = 1.060698
" 7.5 = 0.845061
" corr. dec. = 9.860173
62.51 = 1.791932
31.26

Log. 11.50 = 1.060698
" 7.5 = 0.845061
" corr dec = 9.860111
62.50 = 1.791870

+43° 33′ 14.4″
+ 31.3
+43 33 45.7

+43° 33′ 14.4″
+1 2.5
+43 34 16.9 = (1880.2 place of milletta star.

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Nov. 10. 1881.

Comet (b) 1881.

1	2	3	4
Comet	Star.	Diff	Diff/2
$0^h\ 5^m\ 33^s.1^v$	$0^h\ 4^m\ 25^s.4^v$		
$5\ \ 57.2^v$	$6\ \ 37.4^v$		
$11\ \ 30.3^v$	$11\ \ 2.8^v$	$0^m\ 27^s.5^v$	$+\ 0^m\ 13^s.7\ v^v$



mean of times = $5^m\ 45^s.15^v$

Last tap = $27^m\ 21^s.v^v$ = $9^h\ 0^m\ 0^s.0^v$ by A.N.C.'s mean time watch

$v\ \ 4v.2^v$ $\qquad -6.v^v$ = Chr. cor.

$0^h\ 21^m\ 36^s.3^v$ $\qquad f\ \ v9\ \ v3.5^v$

$-3.v^v$ $\qquad -21\ \ 32.8^v$

$0\ \ 21\ \ 32.8^v$ $\qquad f\ \ 38\ \ 20.7^v$ = C. Inv. S.

Sid time of obs = $23^h\ 59^m\ 40^s.0^v$

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1881phae.proj.:4911

5	6	7.
Diff =	Diff. *	(col 5 - col. 6)
$0^m\ 24^s.1^v$	$2^m\ 12^s.0^v$	$1^m\ 47^s.9^v$

Log. 107.9 = 2.033021^v
" 7.5 = 0.845061^v
" cos dec = 9.596020^v
319.23^v = 2.504102^v
159.62^v

Log. 107.9 = 2.033021^v
" 4.5 = 0.845061^v
" cos. dec = 9.595237^v
318."65^v = 2.503319^v
" = +5$^{'}$ 18."65^v

+66°	46′	0."2^v	
	+ 2	39.6^v	
+66	48	39.8^v	

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1881phae.proj..491T

Denning's Comet.
Oct. 10. 1881.

$\delta = 14^\circ\ 33'\ \overline{\text{V}}\overline{\text{V}}.9$

f	$+3.346$		
Log. f.	1. 3414+	Log. g.	1. 3414+
" $\sin(G+\delta)$	9. 6913+	" $\cos.(G+\delta)$	9 94 00 n
" Cor. δ	9. 4147+	Log. $\sin$	1.2814 n
" $\sin$	0.4474+	$2y$	-19.12
" 1^{st}	1. 1761+	" h	1. 2771+
" result	9.2713+	" $\cos.(H+\delta)$	9. 91 V6 n
$2y$	$+0.187$	" $\sin.\delta$	9. 40 0 V+
		" $\sin$	0 .V932 n
" h	1. 2771+	$2y$	-3.92
" $\sin(H+\delta)$	9. 7V39 n	" i	0. 8883+
" $\sec.\delta$	0. 0142	" $\cos.\delta$	9. 98V8+
" $\sin$	1.04V2 n	" $\sin$	0. 8741+
" 1^{st}	1. 1761+	$2y$	$+7.48$
" result	9.8691 n	$\delta' - \delta$	$-1V.V6$
$2y$	$-0,740$		
$\delta' - \delta$	$+2.793$		

$G = 0^{\text{h}}\ 2\overline{\text{V}}.1$ $H = 4\ \ 41.1$

$\delta = 9\ \ 37.2$ $\delta = 9\ \ 37.2$

$(G+\delta) = 10\ \ 2.3$ $(H+\delta) = 14\ \ 18.3$

$+.15$ day.

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1881phae.proj...4917

Denning's Comet.
Oct. 10. 1881.

δ = 15 4 44.2

f.	+ 3.346		
Log. q	1.34144	Log. q.	1.34144
" sin.(G+t)	9.69104	" cos. (G+t)	9.94000 n
" tan. δ	9.43044	" sum	1.28144 n
" sum	0.46288	Zy.	− 19.12
" r	1.17611	" h	1.27711
" result.	9.28677	" cos (H+t)	9.91575 n
Zy	+ 0.194	" sin δ	9.41572 +
Log. h	1.27711	" sum	0.60708 n
" sin.(H+t)	9.75742 n	Zy.	− 4.05
" sec. δ	0.01572 +	" i	0.88883
" sum	1.04685 n	" cos. δ	9.98488 +
" r	1.17611	" sum	0.87301
" result.	9.87044 n	Zy.	+ 7.47
Zy	− 0.7442	$\delta' - \delta$	− 15.70
(t' − t)	+ 2.798		

G = 0 25.1 H = 4 41.1
t = 9 37.3 t = 9 37.3
(G+t) = 10 2.4 (H+t) = 14 18.4

+.16 day

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1881phae.proj.491T

Denning's Comet.
Oct. 11. 1881.

$\delta = 14 \quad \nu 2 \quad 14.4$

f.	$+3.3\nu 2$		
Log. q.	1. 3422+	Log. q.	1. 3422 +
" sin $(G+t)$	9. 674ν+	" cos $(G+t)$	9. 94ν1 n
" tan. δ	9. 4241+	" sum	1.2873 n
" sum	0.4408+	$\log$.	− 19.38
" $l\nu$	1. 1761+	" h	1. 277ν+
" result	9.2647+	" cos $(H+t)$	9. 9148 n
$\log$.	+ 0. 184	" sin δ	9. 4093+
" h	1. 277ν+	" sum	0.6016 n
" sin $(H+t)$	9. 7ννν6 n	$\log$.	− 4.00
" sec. δ	0. 0148+	" i	0. 88ν8+
" sum	1.0479 n	" cos. δ	9. 98ν2+
" $l\nu$	1. 1761+	" sum	0.8710+
" result	9.8718 n	$\log$.	+ 7.43
$\log$.	− 0. 744	$\delta' - \delta$	−15.9ν
$f' - f$	+ 2.792		

$G = 0 \quad 2\nu.3 \quad H = 4 \quad 37.0$

$t = 9 \quad 41.9 \quad t = 9 \quad 41.9$

$(G+t) = 10 \quad 7.2 \quad (H+t) = 14 \quad 18.9$

+.13 day.

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1881phae.proj..491T

26 yrs Denning's Comet
Oct. 11. 1881.

Dec. +14° 21 44

9 40 28.90 +14 ν-9 23.0
14 ν-° 7′ 13.″ν-0″

Log. 1.337 = 0.126.181ν
" sin t = 9.7ν-728ν-ν
" tan δ = 9.427740ν
+0.20472ν = 9.311 1ν-6ν
+3.07ν
+3.27472ν = 0.51ν-17ν-ν
13 = 1.113 944ν
+42.ˢν7ν = 1.629 118ν

Log. 20.0νν = 1.302223ν
" cos t = 9.914-02ν m
1.216 22ν-m
" 13 = 1.113 946ν
-213.88ν = 2.330 168m

9ʰ 40ᵐ 28.ˢ90ν
+0 42.ν-7ν
9 41 11.47ν

14° ν-9′ 23.″0ν
-3 33.9ν
14 νν 49.1ν

14ν° 17′ 52.″0ν-ν

Log. n/ν = 0.126087ν
" sin A = 9.7νν3ν-0ν
" tan D = 9.42ν-93ν-ν
+0.20294ν = 9.307372ν
+3.0710ν
+3.27394ν = 0.51ν-071ν
= 1.414973ν
+8ν.ˢ12ν = 1.930044ν

Log. m = 1.302179ν
" sin A = 9.914936ν m
" 26 = 1.414973ν
-428.″64ν 2.632058m

9ʰ 40ᵐ 28.ˢ90ν
+1 2ν.12ν
Par. 1881.0 9 41 ν4.02ν

+14° ν-9′ 23.″0ν
-7 8.6ν
+14 ν2 14.4ν

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1881phae.proj.1491T

Deming's Comet.

Oct. 11. 1881.

1 Comet.	2 Star.	3 Diff.	4 Diff/2
4 45 16.5	48 31.0		
46 14.0	49 5.8		
92 10.5	97 36.8	5 26.3	2 43.15
49 33.2	52 7.8		
49 50.3	52 42.2		
99 23.5	104 50.0	5 26.5	2 43.25
53 45.3	56 14.9		
54 2.0	56 32.1		
107 47.3	113 21.1	5 24.8	2 42.40
57 19.2	59 1.5		
57 34.7	0 26.0		
114 53.9	120 17.5	5 23.6	2 41.80
5 1 12.6	3 45.3		
1 41.9	4 31.7		
122 54.5	124 17.0	5 22.5	2 41.25
			-2 42.37

28.1 fast.

mean of times $4^h\ 3^m\ 43.^s0$

$-\ 28.1$

$4\ 3\ 14.9$

$13\ 21\ 37.6$

$15\ 31\ 37.3$

$-\ 2\ 32.6$

$15\ 29\ 4.7$ = C. M. T. obs

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1881phae.proj..4917

5 6 7
Diff. = Diff. *

0 17.5 0 34.8 0 17.3

0 17.1 0 34.4 0 17.3

0 16.7 0 34.3 0 17.6

0 15.5 0 34.5 0 19.0

0 29.3 0 46.4 0 17.1
0 17.66

14° 49′ 50.4″
− 1 4.0″
14 48 46.4″

Log. 17.66 = 1.246991
" 7.5 = 0.875061
" cos. dec = 9.98526
128°04′ = 2.107338
64.02″

1.246991
0.875061
9.98321
128.05″ = 2.107373

− 2′ 8.0″

1881phae.proj..491T

√6 yrs. Denning's Comet

Oct. 10. 1881.

M. 783

$9^h\ 34^m\ 11.^s26$ $+14^\circ\ 49'\ 3.''7$

$143^\circ\ 32'\ 48.''90$

Log. 1.337 = 0.126 1314√
" sin t = 9.90√4417√
" tan δ = 9.422 4943√
+0.28449√ = 9.4√406744√
3.07√
+3.3√4√ = 0.52√563√
28 = 1.4471√8√
+93.91√ = 1.972721√

Log. 20.0√√ = 1.302223√
" cos t = 9.90√4417√n
" 28 = 1.4471√8√
−4√1.67√ = 2.6√4822√n

9 34 11.26√
+1 33.91√
9 3√ 4√.17√

+14 49 3.7√
−7 31.7√
+14 41 32.0√

143° √6' 17.''√√√

Log. m/1√ = 0.126119√
" sin A. = 9.769863√
" tan D = 9.41863 3√
+0.20636√ = 9.31461√√
+3.0707√
3.27706√ = 0.√1√4884√
√6 = 1.7481858√
+183.√2√ 2.263672√

Log. m = 1.302211√
" cos A = 9.907617√n
1.209828√n
" √6 1.7481858√
−907.6√√ = 2.9√8016√n

9 34 11.26√
+3 3.√2√
Pos. 1881.0 9 37 14.78√

+14 49 3.7√
−1√ 7.8√
+14 33 √√.9√

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1881phae.proj..4917

~~6 yrs~~ Denning's Comet
Oct. 10. 1881.

Yr. 2 774

$9^h\ 34^m\ 14^s.02$ $\quad +17^\circ\ 19'\ 52''.1$
$143^\circ\ 33'\ 30''.30$

Log. 1.337 = 0.126181
" sin ϕ = 9.773788
" tan δ = 9.437993
+0.21772 = 9.337912
+3.07
+3.28772 = 0.516897
2δ = 1.447158
$+92^s.06$ 1.964057

Log. 20.077 = 1.302223
" cos ϕ = 9.907706 n
" 2δ = 1.447158
$-471''.74$ = 2.677887 n

9 34 14.02
+1 32.06
9 35 46.08

+17 19 52.1
−7 31.7
17 12 20.4

143° 6′ 31″.20

Log. $\frac{m}{17}$ = 0.126119
" sin A = 9.769827
" tan D = 9.434249
+0.21389 = 9.330197
+3.0707
+3.28459 = 0.516471
6 = 1.778151
+183.94 = 2.264669

Log. m = 1.302211
" cos A = 9.907638 n
" 6 = 1.778151
−907.90 = 2.987937 n

9 34 14.02
+3 3.94
9 37 17.96

+17 19 2.1
−17 7.9
17 4 44.2

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1881phae.proj,491T

Denning's Comet
Oct. 10. 1881.

Correction for Parallax.

5 2 51.v = mid time obs.
9 37 v.v = R. a.
-4 11 14v

Dec = +14° 49′ 13.″v−v
" = +14.° 8 2v

4h 11.m 2v

0.s390v in R. a. } from tables.
4.″8 2v in Dec. }

Log. 0.390 = 9.5911v
" f.f.v / f.v.7 = 0.0139v
Final log. R. a = 9.6050v on basis of f.″f.v−

Log. 4.8 2 = 0.6830v
" f.f.v / f.v.7 = 0.0139v
Final log. Dec. = 0.6969v on basis of f.″f.v

---

v - 37 27.00v = mid time obs.
9 37 6.4v = R. a.
-3 v9 39.4vv
-3h v9.m 6v

Dec = +14° 49′ 4.″9v
" = +14.° 8 2v

0.s379v in R. a }
4.″7v−v " Dec. } from tables. (Denning's Comet Oct. 10. 1881)

Log. 0.379 = 9.5786v
" f.8.v / f.v.7 = 0.0139v
Final log. R. a 9.v92v on basis of f.″f.v

Log 4.7v = 0.6767v
" f.8.v / f.v.7 = 0.0139v
Final log. Dec. 0.6906v on basis of f.″f.v

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1881phae.proj..491T

Denning's Comet
Oct. 11. 1881.

Correction for Parallax.

4 ν3 16,00ν = Sid time obs.
9 39 14.44ν = R.a.
-4 4ν νδ.44ν

Dec = +14° 49' ν0.4νν
" = +14.° F3ν
-4h 46m 0ν

0.s416ν in R.a.
5."0νν " Dec. } from tables

Lrg. 0.416 = 9.6191ν
" F.Fν / F.νν = 0.0139ν
Finial log. R.a = 9.6330ν on Fauis y F."Fν

Lrg. ν.0ν = 0.7033ν
" F.Fν / F.νν = 0.0139ν
Finial log. Dec = 0.7172ν on Fauis y F."Fν

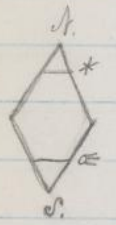
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1881phae.proj..491T

Nov. 11. 1881.

Comet (b.) 1881.

	1	2	3	4
	Comet	Star	Diff.	Diff/2
0^h	$52^m\ 18.^s8^v$	$0^h\ 48^m\ 25.^s3^v$		
	$54\ \ 4.6^v$	$50\ \ 0.2^v$		
	$106\ 23.4^v$	$98\ 25.5^v$	$7^m\ 57.^s9^v$	$3^m\ 58.^s9^v$



1^h	$0\ \ 42.4^v$	$56\ \ 35.2^v$	
	Incomplete Set.	$58\ \ 57.3^v$ ← Reject.	
		$11^v\ 32.5$	

1	$6\ \ 3.8^v$	$2\ \ 10.2^v$				
	$7\ \ v1.4^v$	$3\ \ 40.v^v$				
	$133\ 55.2^v$	$12v\ \ v0.7^v$	$8\ \ 4.v^v$	$4\ \ 2.2v^v$		
	$12\ \ 39.1^v$	$8\ \ 46.0^v$				
	$14\ \ 26.7^v$	$10\ \ 1v.4^v$				
	$147\ \ v.8^v$	$139\ \ 1.4^v$	$8\ \ 4.4^v$	$4\ \ 2.20^v$		
	$19\ \ 19.7^v$	$15\ \ 28.6^v$				
	$21\ \ -9.8^v$	$16\ \ v4.3^v$				
	$160\ 29.5^v$	$152\ 22.9^v$	$8\ \ 6.6^v$	$4\ \ 3.30^v$		
	$2v\ \ 40.7^v$	$21\ \ 56.6^v$				
	$27\ \ 39.1^v$	$23\ \ 13.0^v$				
	$173\ 19.8^v$	$16v\ \ 9.6^v$	$8\ \ 10.2^v$	$4\ \ 5.10^v$		
				$+4^m\ \ 2.^s36^v$		

Sid time of obs $0^h\ 35^m\ 3.^s2^v$

mean of times $= 1^h\ 12^m\ 7.^s37^v$

Corr. $= 1^h\ 1^m\ 4.^s2^v = 8\ \ 58\ \ 53.8^v$ (by B. C. 1182)

" $= 1\ \ 28\ \ 55.8^v = 9\ \ 26\ \ 41.3^v$ (" " " ")

$1\ \ 12\ \ 7.4^v \qquad -13.v^v$ = Chro. Cor.

$16\ \ 48.4^v \qquad 9\ \ 26\ \ 27.8^v$

$-2.8^v \qquad -16\ \ 4v.6^v$

$-16\ \ 45.6^v \qquad 9\ \ 9\ \ 42.2^v$ = G. M. T. obs.

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1881phae.proj..491T

5.	6	7.
Diff. =	Diff +	(Col. 5 + Col. 6)
1m 45.8s	1m 34.9s	3m 20.7s

Lrg 197.24 = 2.29499
" 7. = 0.84506
" cos. dec = 9.596021
58 3.55 = 2.766077
88 9.8
306.25
1 53.12

1	47.6	1 30.3 3 17.9

Lrg. 197.24 = 2.29499
" 7. = 0.84506
" cos. dec = 9.596771
58 4.56 = 2.766827
88 9.8
305.24

1	47.6	1 29.4 3 17.0
1	50.1	1 25.7 3 15.8
1	54.4	1 16.4 3 14.8
	249.5	3m 17.s24

1 49.90 +66° 46' 0.1" + 66° 46' 0.1"
- 2 33.1 - 5 5.2
+66 43 27.0 +66 40 54.9

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1881phae.proj..491T

Nov. 22. 1881.

Comet. (b) 1881.

	1 Comet	2 Star	3 Diff.	4 Diff/2.
0	1 52.5	3 33.0		
	2 14.9	4 56.8		
	4 7.4	8 29.8	4m 22s.4	2m 11s.20
	5 45.4	7 26.5		
	6 17.4	8 55.2		
	12 2.8	16 21.7	4 18.9	2 9.45
	10 37.6	12 19.2		
	11 27.4	14 5.2		
	22 5.0	26 24.4	4 19.4	2 9.70
	14 46.1	16 27.6		
	15 37.0	18 14.0		
	30 23.1	34 41.3	4 18.2	2 9.10
	18 56.5	20 38.0		
	19 46.2	22 22.7		
	38 42.7	43 0.7	4 18.0	2 9.00
				-2m 9s.69



Sid time of obs = 1h 18m 44s.1

mean of times = 0h 10m 44s.1

Cap = 0 22 38.3 = 9 21 15.8 (by B + C. 1882)

" = 0 22 59.8 = 9 21 37.3 (by B + C. 1882)

0 10 44.1

0 12 15.7

-2.0

0 12 13.7

+37.3 = Chr. cor.

9 22 14.6

-12 13.7

9 10 0.9 = C. Ne. Y. obs.

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1881phae.proj..491T

5 6 7
Diff = Diff * (col. 5 - col. 6)

$0^m\ 22.^s4$ $1^m\ 23.^s8$ $1^m\ 1.^s4$

$+64^\circ\ 43'\ 0.''9$
$+1\ 31.3$
$+64\ 44\ 22.2$

$0\ 32.0$ $1\ 28.7$ $0\ 6.7$

$+64\ 43\ 0.''9$
$+3\ 2.4$
$+64\ 46\ 3.3$

$0\ 49.8$ $1\ 46.0$ $0\ 6.2$

$0\ 0.''9$ $1\ 46.7$ $0\ 5.8$

$0\ 49.7$ $1\ 44.7$ $0\ 5.0$
204.8 $0^m\ 57.^s02$
$0\ 40.96$

Log. 7.02 = 1.7 6 0 2 9
" 7. = 0.8 7 0 6 1
" cos dec = 9.630297
$18^h 2.^m 2^s = 2.261385$
91.28

Log. 7.02 = 1.7 6 0 2 9
" 7. = 0.8 7 0 6 1
" cos. dec = 9.629890
$18^h 2.38^s = 2.260978$

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Dec. 10. 1881.

Comet b) 1881.

	1 Comet.	2 Star.	3 Diff.	4 Diff. / 20
0h	9m 26.s2 v	10m 0.s9 v		
	10 35.4 v	10 21.4 v		
	20 1.6 v	20 22.3 v	0m 20.s7 v	0m 10.s3 v
	11 9.9 v	11 43.0 v		
	12 32.9 v	12 18.2 v		
	23 42.8 v	24 1.2 v	0 18.4 v	0 9.20 v
	13 21.7 v	13 53.0 v		
	14 29.2 v	14 13.4 v		
	27 50.9 v	28 6.4 v	0 15.5 v	0 7.7 v
	16 24.2 v	16 56.8 v		
	17 31.9 v	17 16.7 v		
	33 56.1 v	34 13.5 v	0 17.4 v	0 8.70 v
	~~19 40.3 v~~	~~20 12.8 v~~		
	~~20 46.5 v~~	~~20 32.1 v~~		
	21 46.6 v	22 19.9 v		
	22 57.3 v	22 39.3 v		
	44 43.9 v	44 59.2 v	0 15.3 v	0 7.6 v
	~~23 39.3 v~~	~~24 12.3 v~~		
	~~24 46.2 v~~	~~24 31.8 v~~		
	26 31.7 v	27 5.0 v		
	27 42.8 v	27 24.7 v		
	54 14.5 v	54 29.7 v	0 15.2 v	0 7.60 v



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Diff. α ✓	Diff. δ 6	(col. ✓ − col. 6) 7.
1m 9s.2 ✓	0m 20s.5 ✓	0m 48s.7 ✓
1 23.0 ✓	0 35.2 ✓	0 47.8 ✓
1 7.5 ✓	0 20.4 ✓	0 47.1 ✓
1 7.7 ✓	0 19.9 ✓	0 47.8 ✓
1 10.7 ✓	0 19.4 ✓	0 51.3 ✓
1 11.1 ✓	0 19.7 ✓	0 51.4 ✓

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Dec. 10. 1881.

Comet (b) 1881.

1 Comet		2 Star		3 Diff.		4 Diff/2	
29	17.9	29	49.8				
30	28.7	30	9.2				
59	46.6	59	59.0	0m	12.4	0m	6.2
33	11.2	33	42.8				
34	21.3	34	2.0				
67	32.5	67	44.8	0	12.3	0	6.1
						-0m	7.95

mean of times = 0h 20m 44.s3

Cap = 18m 30.s8 = 4 17 53.6 (by B. & G. 1881.2)

Cap = 34. 38.4 = 4 33 58.7 (" " " ")

20 44.3

+13.7 = Chr. cor

-13 54.1

8 34 12.4 = cor. mean time.

-2.3

-13 51.8

13 51.8

8 20 20.6 = G. Mk. T. obs.

Sid time of obs. 1h 39m 53.s70

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Diff = Diff. * (col. 7 - col. 6)

1	10.8	0	19.4	0	1.4
1	10.1	0	19.2	0	50.9
1	11.26	0	49.55		

Lrg. 49.7 = 1.695044
" 7. = 0.845061
" cor. dec = 9.674816
17.76 = 2.244921
87.88

Lrg. 49.55 = 1.695044
" 7. = 0.845061
" cor dec = 9.675161
17.90 = 2.245266

61°	46′	26.3	61°	46′	26.3
	−1	27.9		−2	55.9
61	44	58.4	61	43	30.4

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Dec. 16. 1881.

Comet (b) 1881.

	1 Comet	2 Star.	3 Diff	4 Diff/2.
h	m s	m s		
0	4 21.8 v	3 39.8 v		
	5 14.8 v	4 4.1 v		
	9 36.6 v	7 43.9 v	1 m 52.7 v	0 m 56.3 v
	7 22.5 v	6 39.7 v		
	8 14.8 v	7 4.6 v		
	15 37.3 v	13 44.3 v	1 53.0 v	0 56.50 v
	10 10.8 v	9 25.2 v		
	10 58.7 v	9 51.1 v		
	21 9.5 v	19 16.3 v	1 53.2 v	0 56.60 v
	12 42.6 v	11 58.0 v		
	13 33.2 v	12 24.2 v		
	26 15.8 v	24 22.2 v	1 53.6 v	0 56.80 v
	15 21.9 v	14 36.7 v		
	16 9.4 v	15 3.3 v		
	31 31.3 v	29 40.0 v	1 51.3 v	0 55.6 v
	17 46.0 v	17 0.2 v		
	18 33.9 v	17 27.3 v		
	36 19.9 v	34 27.5 v	1 52.4 v	0 56.20 v
	~~22 26.9 v~~	21 39.6 v		+ 0 m 56.s 3 v
Reject.	23 17.4 v	22 6.4 v		
	~~45 44.3 v~~	~~43 45.7 v~~	~~+ 58.6 v~~	~~0 59.30 v~~
				~~+ 0 m 56.s 9 v~~



mean of times = 0h 13m 18.s 2v

Taps
- 0 1 41.8 v = 8h 38m 34.s 4 v (by B. C. 11 & 2)
- 0 2 1.7 v = 8 38 34.4 v (" " " ")
- 0 23 45.5 v = 9 0 34.3 v (" " " ")
- 0 24 4.9 v = 9 0 54.0 v (" " " ")

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{See page 147 for Apparent Place reduction.
See page 146 " C. Me. T. obs.}

Diff =	Diff *	(Col 6 + Col 7)
$0^m\ 53^s.0$	$0^m\ 24^s.3$	$1^m\ 17^s.3$
0 52.8	0 24.9	1 17.2
0 47.9	0 25.9	1 13.8
0 50.6	0 26.2	1 16.8
0 47.5	0 26.6	1 14.1
0 47.9	0 27.1	1 15.0
0 49.87	0 25.83	1 17.97

Lvg. 49.87 = 1.697839
" 7. = 0.845061
" cos dec = 9.687207
= 2.258707

Lvg. 25.83 = 1.412124
" 7. = 0.845061
" cos dec = 9.687207
= 1.997292

889.8
963.7
181.4
2)2034.9
1017.45 = 6' 57".45

Lvg. 25.83 = 1.412124
" 7. = 0.845061
" cos dec = 9.687207
= 2.260107

889.8
707.8
94.3
802.1

Lvg. 94.3 = 1.974392
" 7. = 0.845061
" cos dec = 9.687207
= 1.974392

-13' 22".1

+60° 9' 29.6
-6 41.2
+60 2 48.4

1881.phae.proj..4911

Reduction of stars used with comet on July 27 1881.
Nov. 28. 1881.

Comet (b) 1881

	1	2	3	4
	D M+81. 400 S.	D M+81. 401 W	Diff.	Diff/2
	0h 0m 53.s4 v	2m 42.s8 v		
	3 7.8 v	7 2.7 v		
	4 1.2 v	9 45.5 v	5m 44.s3 v	2m v2.s1 v
N.	15 0.8 v	16 47.9 v		
401	17 11.2 v	21 9.8 v		
400	32 12.0 v	37 55.7 v	5 43.7 v	2 51.8 v
S.	21 57.4 v	23 40.0 v		
	24 v.2 v	28 6.9 v		
	46 2.6 v	51 46.9 v	5 44.3 v	2 52.1 v
	29 18.1 v	30 57.1 v		
	31 23.1 v	35 28.0 v		
	60 41.2 v	66 25.1 v	5 43.9 v	2 51.9 v
	36 40.7 v	38 17.7 v		
	38 41.8 v	42 v0.v v		
	75 22.5 v	81 8.2 v	5 45.7 v	2 52.8 v
	44 36.2 v	46 11.2 v		
	46 33.8 v	50 47.3 v		
	91 10.0 v	96 v6.5 v	5 46.5 v	2 53.2 v
				+ 2m 52.s37 v
	12h 30m 31.s72 v	+ 60° v4' 24."6 v		
	+ 2 v2.37 v	+ 7 v.6 v		
(41 10 place of un-lettered star)	12 33 24.09 v	+ 81 1 30.2 v		

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5. Diff 400	6 Diff. 401	7. (Col. 5 + Col. 6)
$2^m\ 14.^s4^v$	$4^m\ 19.^s9^v$	$6^m\ 34.^s3^v$
2 10.4	4 23.9	6 34.3
2 7.8	4 26.9	6 34.7
2 5.0	4 30.9	6 35.9
		+40 4 24.6
		+3 31.3
		+40 7 55.9
2 1.1	4 32.8	6 33.9
1 57.6	4 34.1	6 31.7
		$6^{mo}\ 34.^s13^v$

Log. 394.13 = 2.595639
" 7.5 = 0.875061
" cos. dec = 9.198768
46716 = 2.669468
449.6
42264
21132 = 3′ 31.″3

Log. 394.13 = 2.595639
" 7.5 = 0.875061
" cos. dec = 9.198768
46417 = 2.666679
449.6
42563 = 7′ 56.″3

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Dec. 19. 1882.

Reduction of Observ. of Stanley Comet. W. Equat. Ring Micr.

		E	Δ		E
a 1.4	120	4.7	55.3	7 h 0	2.35
a 2 3	120	4.7	29.7	7 0	2.35
b 1 4	1	23.7	50.3	7 0	41.85
b 2 3	1	23.2	21.2	7 0	41.60
E 1 4	12	42.7	9.3	7 6	21.35
E 2 3	12	42.2	45.8	7 6	21.10
C 1 4	21	52.7	63.3	7 10	56.35
				10	56.05
C 2 3		52.1	42.7	11	20.80
b 1 4		41.6	31.2		
E 1 4		57.4	62.6	16	58.70
E 2 3		60.0	39.4	17	0.00
C 1 4	39	0.5	58.5	19	30.25
2 3	38	59.9	35.1	19	29.95
E 1.4	51	5.2	59.2	25	32.60
2 3	51	4.4	33.6	25	32.20
C 1.4	62	57.8 ~~46.0~~	59.2	31	28.90
			35.5	31	28.95
2.3		57.9	60.8	37	30.60
E 1.4		61.2			

Results Diff. R.A.

a – B 236

7	6	21.22	a	7	0	2.35	6m 18.87
"	"	"	b	7	0	41.72	5 39.50
"	16	59.35	b	7	11	20.80	5 38.55
"	"	"	c	7	10	56.20	6 3.15
"	25	32.40	c	7	19	30.10	6 2.30
"	37	30.60	c	7	31	28.92	6 1.68

a – 7h 6m 21.s22 apmn. 6m 18.s87
7h 11m 40.s28 b " 5m 39.s02
7 26 40.s78 c " 6m 2.s38
mnth.

← c
a b
Smith.

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1993phae.proj..491T

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