

KG
11365
304

V 21

*Asteroids from
July 13 1870 to
Dec. 21, 1870*

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KG11365.304



KG 11365.304



Asteroid Observations.

July 13. 1870 Marsalia.

Place for Aug 13. 10^h C. M. T. = 13^d 15^m B. M. 71

α	δ	S	$\frac{d\alpha}{dt}$	$\frac{d\delta}{dt}$
19 17 31	-21° 10'		-2.55	-4.75"

Comp. H's Approp. position for date

Qeltren	19444	mag. 7	$\alpha = 19 14 57$	$\delta = 21^{\circ} 52'$
x	19454	9	15 15	21 2
	19505	9	17 11	20 57

Sh. 39^s semi gcl.
Cl 27^s fast.

16 Minute break, in rattle, 20^h 0.

P = 74.25

Star precedes.
3 comp. for d.

Interval bet. star no. 2 + planet 2^m 13 ³/₄
2^m 13 ¹/₄

Circuit broken after first obs. for a.

Euryhomer 2

July 13 1870

Place for July 13 10^h C.M.T. = 16.6^h B.M.T.

α	δ	$\frac{d\alpha}{dt}$	$\frac{d\delta}{dt}$
18 ^h 19 ^m 18	-16° 16'	-2.31	-2.04

Approx. place of comp. #1's for date

Ortzen 18182	(9)	$\alpha = 18 17 23$	-16 21	
18199	(89)	17 52	35	
18245	(89)	20 18	30	
18288	(9)	22 7	10	Dulander
18304	(8)	22 38	17	

Failed to find the planet

18 Euterpe

Aug 13 1871

Hour for Aug 13 10^h C.M.T. = 15.6^h B.M.T.

α	δ	$\frac{d\alpha}{dt}$	$\frac{d\delta}{dt}$
18 41 48	-23 33	-255	-4.45

Comp. #s

18 39 49	23 24
18 40 41	23 21

Failed behind the planet.

Nebe

July 13 1870

Flow for 10^h C.M.T. = 15.6^h B.M.T. α
20 48 21 δ
-9° 56' $\frac{d\alpha}{dt}$
-163
 $\frac{d\delta}{dt}$
-23.4"

Comp. #

L (9)

(11 59)

 $\alpha = 20 46 21$ $\delta = -9 58$

20 49 52

10 10

7
9

1258

20 53 03

10 10

Failed to find the planet.

July 124 Marsala (98)

10^h C.M.T. = 15^h 6^m B.M.T.
 a fu plant = 19^h 16^m 30^s
 " " = 21^h 12^m

Comp. 1820

Alt. 1937 19^h 10^m 32^s (89) = a
 21^h 8^m = s

19454 19^h 15^m 15^s (9)
 21^h 2^m

July 14

Antarpi

ap planet 18 40 47 at 10^h C.M.T.
 R... .. 23 34

Herbe (7.7)

 $\alpha = 20\ 47\ 42$ $\delta = -10\ 58$

Comp #s

	α	δ
20 50 01	-	10 10
20 52 23	-	10 00 (89)
(1) W(159) 19 20 46 18	-	9 58
(2) W(1249) 21 3 49 50	-	10 12
(3) W(1268) 20 50 01	-	10 11

Stop watch interval bet. planet + star No. 2.

Stop watch

2.09 3/4

2.09 3/4

2.11

2.10 3/4

Planet precedes - 1st 4 wires.

Star No. 2 - 2nd do do.

 $P = 74.15'$ for δ $= 73.15'$ for δ .

(Screwhead reads backwards for motion in order of diurnal rotation.)

Declination. planet + star no. 2.

Thy on	reading of microns
18. 3. 0	56.50
18. 6. 45	56.74
18. 10. 25	56.80
18. 14. 0	57.48
18. 17. 20	57.23.8

Stop watch interval -
 Reading of # wire 74.70 mag

R 2.11 3/4
 2.11 3/4

Chronograph read

1st set for a by R

R's signal

42 12.1

13.1

2nd set for a by R

and

13.1

3rd set for a by R

L's signal

end

Declination -

T by Ch	Reading -
19. 4. 00	59 32.2
19. 8. 40	59 43.2
19. 12. 0	59 73.2

Plant on lower wire -
 Reading of middle wire in order of diurnal motion
 50. R - P = 73.15

Ch - 19, 21. 40 - 45. 50 55 60 - on chronograph -
 last minute break, 19. 25. -

Reducing to H20

Val - 3 44 - 0 15

Comp. 16 1249
 Val. 40458
 Arrang. 415-16

July 17 Ketch. (77)

10^h C.M.T.

α_{hms} 20 45 36 — δ 10 38

$\frac{d\alpha}{dt}$ 1.83

$\frac{d\delta}{dt}$ 25.7

Micrometer reading
of wires

Comp. #1's 1170 W. 1111 (9.10) α_{hms} 20 44 15 δ - 10 48
W 1121 (8) 20 44 40 - 10 48

for Circle W

a = most remote wire in
or order of apparent
diurnal motion

b = middle wire

c = wire nearest mirror

Chronograph 16^h 5^m.

$P = H \text{ at } 1924 = 51.3$

2nd sheet started 19^h 27^m

1st 3 sets by Austin stops water (not on the sheet) 50.8 50.4 50.1
2nd " " " Royer 50.3 51.0 51.0
3rd " " " Austin 50.0 49.6 49.8

planet or of *

$P = 73.0$

1st sig. of α 1st late
2nd sig. of α 30

Comp. #1 W 1121

α 80.425

.150

000

100

-80

b = 49.968

95.0

95.5

96.8

97.0

97.5

98.0

98.5

99.0

99.5

100.0

100.5

101.0

101.5

102.0

102.5

103.0

103.5

104.0

104.5

105.0

105.5

1470

July 17

Marralia (P.P.)

10^h C.M.T

Lol - 351. - 0° 6'

$$\begin{array}{r} a \\ 1913 \text{ } 28 \end{array} \quad \begin{array}{r} S \\ -21 \text{ } 17 \end{array}$$

$$\begin{array}{r} da \\ d\tau \\ -250 \end{array} \quad \begin{array}{r} d\beta \\ d\tau \\ -45 \end{array}$$

Comp^{ts} altⁿ 19334 $a = 19 \text{ } 937$ $P = -21 \text{ } 18$ $\text{mag} = 7 + \frac{8}{9}$

19344	19 10 4	21 24
19377	19 11 32	21 8
19385	19 11 47	- 21 25

diff between 2 x 15.6

Oct 19334 - (99)

by stop watch
4 m 35.2

Diff declin

 $P = 73^{\circ} 15'$ No 1 on middle wire planet from the middle
wire to the 1st
planet or of xat 17^h 26^m

$$\begin{array}{r} 48 \text{ } 40.5 \\ 28.8 \\ 21.0 \end{array}$$

at 17 30

$$\begin{array}{r} 48.120 \\ -45 \\ -12 \end{array}$$
Comp^{ts} altⁿ 19334stop watch 4.4
4 3.2

July 17 1870

Concordia (11.8)

10^h C.M.T.
$$a \quad 20^h 37^m 48^s - 13^h 30^m$$

$$\frac{da}{dt} \quad \frac{dS}{dt} \\ -2.02 \quad -1.94''$$

Comp #5 W 879 (8) 20 35 22 - 13 33

W 39 00 - 13 17

(9) W 39 14 13 17

W 41 05 13 35 (20 41 19 - 13 31) July 17 1870 (9)

879 on @

P

55 29.02

55 20.6

55 44.0

Chronometer work

19^h 1^m 20^s - 25^s 30^s

Stopped chronometer 21 11

127
889
10
315
2151
339
3340
4119

(9)

Aug 18 1870
Mr C. M. T.

Concordia

$$a = 20^{\text{h}} 37^{\text{m}} 5^{\text{s}}$$

$$\alpha = -13^{\circ} 30' \quad \frac{da}{dt} = -2.02^{\circ} \quad \frac{d\delta}{dt} = -10.4''$$

Comp #

(8) W 8791 20 35 22

$\delta = -13^{\circ} 33'$

1 20 39 00

$-13^{\circ} 19'$

Schij 8290 20 41 5-

$-13^{\circ} 35'$

July 1870 Marsalia
10th E. M. T.

$a = 19^{\circ} 12' 28''$ $\delta = 21^{\circ} 19'$

Camp 4's
No. 1. Alt. 19384 $a = 19^{\circ} 9' 31''$ $\delta = 21^{\circ} 18'$
19341 $a = 19^{\circ} 10' 4''$ $\delta = 21^{\circ} 24'$

ht Minute break 17.21-
Star No. 1. + planet - stop watch. 3, 3.1
3 obs - on Chro. 3, 3.3
 $P = 73$ 3, 3.2
Star precedes -

~~A~~ ~~B~~ ~~C~~ Declination taken at - 17, 45.05 - on Chro.

42, 20.8
42, 8.5

19.0
13.1

41, 89.5

75.4

72.6

δ again - stop watch 2.58 $\frac{3}{4}$
2.59 $\frac{1}{2}$

δ at 19.

(Ch.) Star on middle wire - planet on movable bit. B7C
at 19. ~~30~~ 29. 30. 58 } 75.0
58 } 83.5
at 19. 35. 30. 58 } 82.0
58 } 74.5

July 21

Reading of wires

a	b	c
24924	50 93	75,190
825	87	185
960	70	186
927	64	192
965	99	182
<hr/> 4661	<hr/> 413	<hr/> 435

24932	50,826	75,187
56083	25,884	
75,187	24,861	

25/51

25/04

04.7

Concordia - July 21-

P.L. - L 20, 34, 31-
 # W844 20, 33, 56

J - -13, 47
 -13, 57 - 7, 8-

Star precedes -

Star twins - pl. twins -

(P = 73)

Obs. for J.

Star on R. (farthest from ^{heat} star)

R

at 18, 15 - 86, 24, 5

at 18, 16 86, 15, 1

18, 17, 30 86, 7, 7, 5(?)

18, 19 - 86, 13, 5

18, 20, 30 86, 18, 4

G

18 39 w 85 350

42 30 85 401

84 942

Order of obs.

R

R

G

R

~~R~~

w

S

S

a

~~W~~

Massalia. July 21.

19324
19344

PZ 19. 9 32 J. - 21. 24
 1st # 19 9 26 - 21. 18 (7)
 2nd # 19. 10 00 - 21. 24

c.l. star stay - planet - planet.
 1st 2 wires, star - 2nd 2 wires, planet.

1st Obs for 1st #

2nd " 2nd #

2nd set with 3 wires - R

S - 1st star -

Star on C -

19. 26. 34. 14. 4

19. 26. 40 34. 33. 0

19. 27. 15 34. 29. 4

S 2nd star -

Star on middle wire (III)

19. 28. 50 54. 9. 31 mean of 3.

19. 31. 54. 26. 8 " " "

19. 32. 30 54. 29. 0 " " "

Using 2nd # P - P -

2nd Obs. for S with 2nd star -

19. 58 54. 50

19. 59. 54. 38

Observed Observed.

R. not 1st star

R " 2nd star

R S.

R 1. 1st star

R 2 2nd star

Reversed

R ut star

R 2nd star

Q P P P P P P P

Q P P P P P P P

Q P P P P P P P

Q P P P P P P P

In 2nd # 1st Obs 2 wires

Massalia - July 23 -

17

Prant L	19	7.36	-	21.28
19(1) # 19280	19	6.49	.	- 21.28
2) # 19264(1)	19	7.2	-	21.27

A short rattle hit. 2 stars + pl. after ht. Obs. -
 out. 3' out for L by R - P no go good - this set is 7 slides

P = 91 - # No 1 on middle wire -

17.30	{ 53.37.2	17.34	{ 53.16.0	} Star No. 1.
	36.5		29.0	
	31.7		27.	

Star on middle wire - No. 2 -

17.35.30	{ 59.55.5	17.36.30	{ 59.43.	} Star No. 2 -
	67.3		52.5	

Again - by L.
 3 obs.
 Star no. 1

Kobe: July 23.

P.	2	20	40	56	-	J	-11.42	-
(951 m)		20	38	6	-		-11.36	(9)
(971 m)		20	38	59	-		-11.30	(8.9)

~~for~~ for a

15 obs only 3 lines

2 " " "

R.3

Obs for J. P = 91.15 -
 Star on C - 19.3 - 23.28.5
 19.6.30, 22.9.5 -
 19.15.30, 22.6.7 -

last minute break - 19.13
 pt do do 19.17 -
 19.16 12.5

Concordia. July 23-

19

P2- α 20. 32.50 δ -13.56
 8494-(7.8) 20 34.00 -13.58

R obs for α . lost 1st wire of # in 1st set obs
 Interval by stop watch 1. 16.0
 planet on middle wire -

obs for δ -
 19.16 26. 12.5
 -11.5
 26. | 32.5
 29.2
 27.6

Interval by stop-watch. 1. 17 $\frac{3}{4}$

Order of obs.

$a_1 R$

$\beta_1 R$

$a_2 R$

$a_1 G$

July 24
Reading of wires

a
24816
836
826
823
860

24832

b
50026
.012
030
050
.030

50.029

ⓐ Q
76.160
180
170
158
180

75.169

17.9 Massalia - July 24-

PL, L	19. 6.41	J-21.29
#	19 6 49	-21.28
#	19 7 2	-21.27

R. Obs for L. - PL precedes - 1st star -

(1) 2 wires observed -

(2) Obs for L with 2nd star - 1st minute break. 17.09

a signal bet. obs - (1) 2 for L -

P = 72.15-

δ 1st #
 Plon middle wire (b)
 27.07.7
 -03.5
 06.0
 14.5

Bar 2995-
 F 84
 F1 81

δ 2nd #
 34.00.0
 6.0
 9.0

Eclipse - July 24 -

Pl. L	18 31 23	δ - 23.47
H	18 30 34	23.37
H	18 33 39	23.57

L. 1st star.

Interval by stop-watch - $47\frac{1}{4}$ sec.

δ
Star on C.

11.58.8

31.0

62.0

for 2
1st Obs. after δ incomplete

July 25

Quilpe 2 18. 30. 31

5 - 23.48

of
Times

Remarks

Comp. # 5 2

2

18. 30. 34

-23.37

2 18. 33 39

-23.5-6

1750 1st Obs. for λ with second λ commenced at 17.50 \pm
Interval by stop-watch 3.22 $\frac{3}{4}$

17,54,30 2nd obs. at 17,54,30 ±

Interval by stop-watch 3.23 3/4

758 2nd Obs for L 17.58, $45^\circ \pm$ lost at view of star in this obs.

all 4 wires taken in each of these sets -

8 10 on 15th Dec 1880 20 73.0
88.5

Planet on C.

~~18, 14, 15~~ } 96:8

~~P-163~~

18, 14, 15 | 2nd sbs for C. 20, 40, 5

$P = 343.15 -$
~~three~~
~~two~~
~~two~~

577

1690

18, 21, 0 - St Dis for 2-Commence.

Luke played out -

$P = 162.15$

time not taken. 2nd Obs for L. Lark plumped out.

18138, 0 ± 3rd obs for L

18, 43	4 thobs for 2 -
--------	-----------------

Arduſſe P P P P ~~X~~ ~~X~~ ~~X~~ ~~X~~ =_p

Ch (A) 80 slow of cl.

July 25 (repeated)

Europe Comp. # 3239
- 23'57

Times

1st 50

Obs. for a 1st by observation 3 22 34. PPPP ***

17 54 30

2nd Obs. for a

3 22 34

17 58 00

3rd " " 1st. 1st. 1st. 1st.

Ren game out.

18 10 00

20 730 845 - 968 Planet on C.

18 14 15

20 405 - 577 690

Ren game out.

18 21 00

Obs. for a P 162 15

Ink faded

18 34 00

Obs. a

18 43

" "

Determination of 1 division of Meridian Circle level.

Radius of arm = 20.4 in

No. threads to the inch of screw = 66

1 Rev. of screw = .0152 in

Base of triangle = $4 \frac{1}{2} \times \frac{1}{2} = 5 \frac{1}{2}$ in

Aug 28

Rev. \Rightarrow change of back

4 = 1.2 div.

4 = 8.5

W
{34.5
{33.2
{32.3

E
{37.7
{38.8
{39.8
{39.6

Wiring

$$\tan x = \frac{0.152 \times 4}{5.2} = \frac{.0608}{5.2}$$

$$\log .0608 = 8.78380$$

$$\log 5.2 = 1.71600$$

$$\log \tan x = 7.06780$$

$$\frac{1}{\tan x} = 10 \text{ div}$$

$$\frac{1}{\tan x} = \frac{0.152}{5.2} = \frac{.0018}{5.2}$$

$$\log .0018 = 7.25527$$

$$\log 5.2 = 1.71600$$

$$\log \frac{1}{\tan x} = 5.53927$$

$$\times 7.08''$$

$$10 \text{ div} = 708''$$

$$1 \text{ div} = 71''$$

over.

26 Aug 28

Nebe

a
20 3642

-12 42

da
215
-2 18ds
250
-306

Comp # 20 3345 -12 40

N 838

18 12 31 3 Obs for a P 7 3 wires
 18 12 31 3 Obs for a 3 wires

The Pas. done wrong owing to a wrong value of P

18 40 25 1 Obs for 67.667 ~~#~~ on a P 7 2 15
 619

18 47 45 2 Obs for 67.890

18 53 12 Obs for a P 342 15 4 wires

18 57 9

" "

19 1 30 3

" "

July 28 Concordia

α δ $\frac{d\alpha}{dt}$ $\frac{d\delta}{dt}$
 20 28 47 -14 17 -2.15 -1.6

Comp 20 26 56 - 14 10

19.18.57.1 Obs for α - R. obs - 4 wires.
 a break after obs. of star. (by mistake)

$P = 342.15$

19.21.30.2nd obs. for α - R. obs - 4 wires

Interval by stopwatch - 1.43.34

Obs. for δ

$P = 72.15$

Star on C-

19 31 40 No. 1 - 23 { 84

98

99

Obs. R.

19-34.20 No. 2-

23 { 98

86

Obs for α obs. R.

Aug 28
Level line description

Degree of Revolution	Dir of Motion of screen				Reverse motion of screen			
	W		E		W		E	
108	445		30		340		440	
120	393	52	400	49	310	80	420	30
	393		400					
120	383		404		316		470	
	351	42	441	37	280	30	502	32
140	351		441		280		502	
	317	34	475	34	244	36	540	38
160	317		445		244		540	
	270	47	520	45	199	45	580	40
180	270		520	520	199		580	
	235	30	552	552	170	29	614	34
200	235		532		170		614	
	180	45	600	48	130	40	657	43
220	180		600		130		657	
	146	34	641	41	95	35	695	38
240	146		641		213		540	
	95	51	695	54	253	40	520	40
80	460		292		253		500	
	505	54	238	55	298	45	456	44
60	396		286		288		456	
	460	64	292	64	343	45	412	44
40	345		307		343		412	
	396	51	356	51	387	44	371	41
20	311		440		387		371	
	345	33	407	34	429	42	329	42
		542		544		461		466

	Direct			
0	291	542	440	544
	311	20	440	20
340	258		482	3.3
	291	3.2	460	3.3
320	227		524	3.2
	258	3.1	492	3.2
300	289		566	4.2
	227	3.8	524	
280	146		605	3.9
	189	4.3	566	
260	100		640	3.5
	146	3.6	605	
	100	—	35	—

18/74.2

4.122

18/74.5

4.139

	Reverse			
	429	461	329	46.6
	484	55	274	45
	484		289	
	538	74	203	71
	558		203	
	629	71	182	71
	629		182	71
	670	41	132	39
			132	39

16/10.2

4.388

16/69.2

4.325

4.122

4.139

4.388

4.325

974

$$4.243 \text{ Dir} = 20'' = 3.1 \times 10^{-2}$$

$$20'' = \frac{20}{360} = \frac{1}{18} \times 0.152'' = 0.00844''$$

$$b = +48.6$$

$$\log x = \frac{0.00844}{57.5} =$$

$$\log 0.00844 = 6.92684$$

$$'' 57.5 = 1.71181$$

$$'' \tan x = 5.21453$$

$$'' 2.1'' = 4.68557$$

$$'' + = 5.2896$$

$$x = 3.380''$$

$$8x = 5.2896$$

$$\log 4.213 = 0.62767$$

$$\log 10 \text{ Dir} = .90129$$

$$\text{Dir} = .797''$$

Meridian Inst. Level Aug 29

	E		W	
Screw E	291		450	
	295		450	
	294		450	
	288		457	
	284	29.04	460	45.44
Screw W.	321		407	
	344		415	
	329		412	
	336		406	
	325	33.00	412	41.04

Herb. Concordia July 29 -

1st minute.

Aug 8 - Hebe -

P_2 2 20.27 3-
 W. 664. X 20.27 26

δ 15.1
 14.54

Obs for δ $P = 73.15$ ~~14.11.25~~ let obs -Obs for δ - time not taken -

3 obs in this set -

Obs for δ -P. on a_+ $P = 73.15$

19.15.30

78.39.5-

19.16.30

78.40.0

19.17.10

78.59.8

 δ again

19.18.55±

4 obs in this set -

Aug. 9 -

Hebe -

 $\delta - 15.14$
 15.24 $P - 220.26.13$
 $a.c. 7127H$
 $20.32.9$ $18.08.00$ - 1st Obs for δ -
(nearly) $P = 162.15$

Interval by stop watch 5.45.5

Obs. unknown star, a little above the middle
of field, about 8 mag - interval by stop watch 5.5 sec.
(Doubtful on acct of change in δ) after supposed planet2nd Obs for δ - Time not taken -

18.14 - 3rd " " "

Obs for δ with unknown star, as above -
~~Star on P on C~~, (C being nearest to micrometer head)

18.24.53 -

44.43.0
26.0
19.5
24.0~~18.26.42~~~~44~~

18.27.10

44.33.0
36.1
41.1
30.8 δ , compared with B.A.C. 7127 -

18.30.30 -

12.45.0

18.31.10

12.35.0

18.31.35

12.45.0

Obs for δ - $P = 162.15 + 180^\circ$

18.32.31

1st Obs for δ -
lost last ^{wire} of H

Interval by stop watch 5.45.5

18.40.30

2nd obs for δ -

Interval by stop watch 5.46.25

Aug. 11 Nobe

Comp # 20 26 03 (1870) - 15⁰ 39 altty.

Mrs. Bannett

1852 10 Obs. a P # = order Stop water P# - 1^m 30^s
54 45 P = 710

Boutique

Trouble with chronograph.

191038 Obs. J. ~~44~~ 697 685 - 686
1238 44 334 338 195

Pon middle wire -

18, 15

44.35 -

Rogers, obs

1920.5 Obs. a Stop water 1^m 31^s1922 33
24 55 " "

Rogers, Obs.

Niobe -

P	L	21	32	30	δ	-11.26
89	X	21	33	11		-11.25

Obs for L. 4 ult. $P = \frac{161.0}{71.0}$ Int. by stop w. 46 $\frac{1}{4}$
 19.48.20 End of obs for L. last rattle -

Obs for δ $P = 71.0$

P on middle wire -

19.57.21	34.85	95
	.93	
54.0	35.02	
	34.91	
55.30	34.77	
	.80	
	92	

Obs for δ $P = 180 +$

58.20	1st Obs.	mind 3rd wire of P	Not planet.
59.20	1st Obs.	Int. by stop watch	47 $\frac{3}{4}$
40.1 10	2nd do	" " " "	47 $\frac{1}{4}$

Aug 17/1870
Planet 111 $a = 21^{\text{h}} 22^{\text{m}} 41^{\text{s}}$ $\Delta 13^{\circ} 18'$

Comp # 10475.

Ch.

21 12 56 Obs a stops watch 57.0

21 15 2 "

21 17 5 "

21 24 5 "

~~~~~ "

21 24 00 "

For S  $P = 161.1$  Star on C

Test taken 17.475 Perhaps double signal.

" " .630

.650 Rattle 30° late

.670

21 40 00 89

70

.695

$P = 160^{\text{h}} +$

21 45 7 Obs a First wire of Planet wrong.

473 " " } Last wire of Planet - doubtful illumination bad.

49 15 " " }

3.6

Aug 18 (111)

Apparent place 21 21 45<sup>3</sup> -13<sup>0</sup> 21<sup>0</sup>Comparison star previous 18471. Right 235 and is apparently  
distant 15'

Ch. 21 19 20 Obs. J P first Pm @ 68.92 Jcs G-

21 21 53 68.52 G

21 23 30 68.40 R

21 33 50 Obs. a G Stop water 454

21 36 00 " G 460

21 38 07 " R last 1st time of rain

21 39 32 " R " " Planet



Aug 21 (W)

Obs Comp = W 860 21 17 04 -13° 27'

No. a

In S Pon b

73 95  
8072 92.0  
960

45.02

73 90

72.83  
80.5

Aug 27.

P-269.50

Asteroids 111 —

|       |           |          |          |
|-------|-----------|----------|----------|
| P-2   | 21. 13.27 | $\delta$ | -13. 48- |
| X (8) | 21. 11.14 |          | 13. 53   |
| X (9) | 21. 11.28 |          | 14. 01   |

Failed to find it after a thorough search

Observed a zone  $1^m 12^s$  in R. and 1P in S for new asteroids, about 60 stars.

Aug 28. Observed zone for asteroids, fine a little over 2 h.  
Saw 5 meteors.

Aug 29 Observed zone for asteroids. Came to grief on 3 supposed new ones.

Saw 5 meteors in about 1 h.



Aug 30

P = 70-

R. obs - 39

Niobe-

P  
#2  
#1

L 21, 12, 12

21 9 59

21 9 46

 $\delta$  - 10, 36

- 10, 41 (7)

10, 42

Obs for  $\delta$  - H on F.

22, 17, 0

76, 47, 5

55, 1

49, 1

44, 0

76.489

19, 50

76, 95, 0

95, 0

95, 0

95, 0

76.938

23, 25

96, 0

86, 0

80, 0

87, 0

76.872

Obs for L - both stars. 3 wires - 1" 2" 1" 2" 1" 2"  
P" P" P"22, 29, 0  $\pm$  1st obs.

22, 32 2nd obs. accidental break after stars -

Saw 7 meteor, one a very bright flash, also one tolerable bright. Time about 2h.

Aug 31

Looked In 96. Cloudy.

One meteor. time 8-11



Sept 1st -

Rogers - observer

Obs. of Niobe -

1st Minute break - 20.25. Obs - 3451 -

P 2 21.10.26 -

S-10.31

X 21 9 59

10 41 -

Obs. for S+

Star on a -

P = 65.45 -  
155.45

20.32.40

81.36.0

22.0

40.0

98  
33

20.33.40

60.0

47.0

34.30

64.5

67.0

53.0

Obs for L -

P = 155.45 -  
1.50

20.37.36

3 wires of each -

39.15

41.5

which is the planet -

~~the top set~~ are

42.45

Lost 1st wire of star -

43.20

Obs. but 2 wires of each

} different star, (supposed  
planet) from above -45.5 = time of last set. several intervene between this  
& those previously recorded -

Reversed Micrometer - P = 335.45 -

Obs for L -

46.55

3 wires of each

47.50

48.45

} 1st supposed planet

49.35

2 wires of each

50.05

50.35

} 2nd supposed planet

{ 3 meters, 1st. one like this m., about 5' in length)  
Dist. Dour 30m.

Sept. 1. Pomona -

X L 22 21 40  $-1^{\circ} 57'$   
 L 22 20 28 157 (7.8) { Mag. 10.5 -  
 instead of 11.3 - }

2/ 11.38 Obs for L. P = ~~55.45~~ 335, 45  
 15.50 4 wires - Stop watch 1.15.2  
 2/ 19.20 went up / point 1.14  
 40.30 50 50 50 Stop watch - 1.14  
 42.36 " " 1.73  
 45.35-  
 2/ 52.45- ~~2 obs. for L - time not taken -~~ Stop watch - 13.8

Obs for  $\sigma_+$  65.45 = P.  
 Time taken with Chio. A. 424 -  
 Star on B.

22. 0.20 { 28.0  
 0.40 { 51.97.0  
 0.15 { 65.0  
 2.52 { 61.0  
 51.62.0  
 39.0  
 101.505

X + planet <sup>each both</sup> on movable wire -  
 X Reading -  
 22. 0.5.55 48.72.0 48.21.5  
 58.5 14.0  
 52.0 02.0  
 1825 375  
 608 125

9.15 48.27.0 48.29.5  
 17.0 57.0  
 -8.0 47.0  
 1335  
 445

22. 12.0 48.46.5 48.95.0  
 41.0 75.0  
 34.0 58.0  
 15.0  
 1365 2200  
 341 767



1st minute, 21.12 Sept 5- (111) Peter's-

Planet L 21 6 54  $\delta$  - 14.04  
 Star. 21 6 6 14.14

Obs for L.  $P = 166.50$

21.28.42 1st obs - stop watch  $\delta$  L -  $58^{\text{sec}} \pm$   
 30.32 2nd - " " "  $58. \pm$   
 32.26 3rd - " " "  $58.1$

Obs. for  $\delta$ -

$P = 66.50$

Star on C.-

21 40.10 26. { 35.4  
13.4

26.244

(above.)  
(below.)

41.40 26 { 17.0  
24.0  
19.5

.203

43.30 26 { 27.0  
28.5  
32.0

.292

Reversed. Obs for L  $P = 336.50$

45.20 1st obs -

47.05 2nd - wrong signal just before planet -  
 54.57 3rd - perhaps completely lost

Sept. 5 (96) Repl -

 $P - L \quad 21.26.00$   
 $21.28.30$ 
 $\delta - 13.41$   
 $13.34 -$ 

W 650

Obs for L -

 $P = 336.50$ 22.15.0  $\pm$  1st obs -18.20  $\pm$  2nd obs -22.0  $\pm$  3rd -

Stop watch 2.28.5

} Probably lost -

Obs for  $\delta$  - $P = 66.50$ ~~33.45~~ $P$  on a -

22. 33.10

 $69. \begin{cases} 79.5 \\ 59.5 \\ 63.5 \end{cases}$ 

69.675

37.0

 $69. \begin{cases} 27.4 \\ 26.2 \\ 27.4 \end{cases}$ 

69.270

42.32

 $69. \begin{cases} 4.0 \\ 17.5 \end{cases}$ 

69.107

Obs for L -

336.50 -

2. 51.37

Reading of wires Sept. 5 -

a

24.935

950

967

950

955

970

970

970

970

970

973

---

630

24.9630

50.1216 25.1586

75.2227 25.1011

a

50.120

126

135

121

11.6

100

130

129

110

124

50.1216

c

75.230

210

226

221

229

223

217

221

231

219

75.2227



$$-34^s = da$$

$$-5^s = d$$

415

Ephemis (approx.) of 90

Aug 22 21 37 52.0

24 36 10.3 1 41.7

26 34 30.1 1 40.2

28 32 51.7 1 38.4

30 31 15.5 1 36.2

31 15.5 1 33.6

Sept. 1 29 41.9 1 30.5

3 28 11.4 1 26.8

5 26 44.6 1 22.5

7 25 22.1 1 18.5

9 21 24 04.6 1 15.5

11

13 25 20.0

28 24 25.1 1 25

30 30 44 1 19

31 55 1 11

32 58 1 3

33 52 54

34 37 45

35 18 36

35 40 27

18 5

16  
 1st minute,  
 20.6

Expt 6 - (111)

Planet - L 21. 6. 21. 5 - 14. 6  
 21. 6. 6 14. 14

Obs for L -

20. 5. 0 ± 1st obs. - wire of each -  
 6. 0 2nd - 3 wires of each -  
 7. 30 3rd - "  
 8. 30 4th - lost 1st wire of planet -  
 9. 30 5th - lost last " " "  
 10. 30 6th - "  
 11. 0 7th - "  
 14. 35 last obs - lost 2nd of pl + 3rd was bad - T, stop watch 21. 7  
 15. 52, Very latest edition, last wire bad -

~~Reversed magnetic~~

7

54. 50 Still later - lost  
 Again so, lost 1st wire of Planet -  
 56. 15 Still more so - lost 1st wire of Planet -  
 57. 0 Once more again -  
 57. 45 - Very latest, last & final -  
 Last fine -

Last words, "Shut up & go home",  
last minute break - 21. 1



Sept. 7+ (111)

Planet - L 21.5.50.  $\delta$  - 14.8  
 X 21.6.6.  $\delta$  14.14

Obs for L

 $P = 66.50$ 19.3.  $\pm$  1st obs. 2 wires of each observed -

Planet comes first &amp; appears below -

19.7.  $\pm$  last obs for L - Interval (stopwatch) 15.2<sup>sec</sup>Obs for  $\delta$ 

Planet on A

19.11.52

52.54.2

68

52.584

13.35

52.58.2

52.557

15.0

52.53.3

85

52.492

19.45.40

52.53.5

988

52.492

4570

Obs for L

 $P = 336.50$ 19.11.8  $\pm$  1st obs - 2 wires of each19.22.  $\pm$  last obs

48

Sept 7 Remains a

Comp. # 24 44 32 - 7 48 ~~Land~~42.4  
20 18<sup>m</sup> Obs. a (L) Stop watch 1 24.920 21 " " 1<sup>st</sup> min Plate Order P # (P above)20 23 " " 3<sup>rd</sup> min of P two sun. Stop watch 1.24.0  
Stop watch 1 24.0

L obs. of above.

20 30 30 Sun (L) obs.  
Pos b. 62, 631 1003120 33 62, 631 10031  
566 108 307  
62, 6450 168 102  
x.661 505

20 37, 20 obs for L - Rogers obs -

62, 28.7

050

093

430

39.45

62, 070

177

025

+ 070

255

+ 090

064

20 43 - Obs for L - P = 156.50

Obs for L -

Rogers, obs -



Pomona - Sept 7 -

49

Planet L 22, 16, 50  
22, 16, 9

S - 2, 35

2, 39

~~not from star in cut~~  
Lain 8804

obs for L  
120.55 ± 1st obs - 4 wires of each -

Stop watch 4, 4 -

21, 00 last obs +

Obs for S -  
Star on A

21, 8, 50

52, 59, 5

60, 0

4, 50

68.8

69.1

58.1

55.0

} Probably did not rattle -

5, 55

620

660

56.5

Lost minute break of sheet - 21 10

Obs. for S

21 15 10

52, 41, 0

21 16 35

33.9

11 52

60.4

} Chw - Arnold, 424

Panopaea, Sept 7-

Planet - L 22, 4, 18 - 5 - 34.57  
 " 22, 4, 5 - 35.06

Obs. for L -

Rogers, obs -

Commenced 2nd sheet - 1st minute 21, 47.

21, 45 - Commenced obs for L -

Twins of each -

46.30 Ended obs. for L -

Obs for 5 - Star on A

21, 48.10

66, 16.4

Only one reading each

15.5

Time -

11.0

Obs for L -

 $\rho =$ 

21, 50.30

Commenced.

52.0

Ended.



Equia. Sept 7-

58

Planet. L 22.26.10

F-37.4-

Mag-

Observed with a star

Stopwatch 1.478

about  $4\frac{1}{2}$  above + precedes 1 in  $47.8^{\text{eye}}$  —

Am 11th mag Precedes comparison star about 10 sec —

Obs for L —

22.31.1 Commenced - 4 wires of each —

Stopwatch 1.46.6

1.46.4

1.46.2

22.30. last obs. ended —

1.46.2

Obs. for F-

Star supposed to be on a-

22.35

60. 40.2

37.0

37.5

45.0

59.4

46.2

45.4

62.0

Obs for L —

22.42

Stopwatch 1.46.2

1.46.6

52

Sept 8 (111)

wt minute 19.4

Planet L 21.5.13

S - 14.10

Star L 21.6.6

S 14.14

Stop watch interval 52.4 at 1850

Obs. for L -

19.6

Commence - 4 coins of each -

break in wt just before star -

Stop watch 52.5 -

19.12 ended Planet apparently below star.

Obs. for S -  
Planet on C

19.16

58.38.0

32.7

24.5

24.3

1195

58.299

19.17.30

58.31.0

26.9

32.2

23.0

27.6

1407

58.281

19.20.0

58.55.5

53.2

54.2

52.5

154

58.539

Obs for L -

336.50 = P.

23.45

Commenced -

break in wt before star - Stop watch - 52.5 -

29.0

Ended -



## Sept 8 - Pomona.

Planet. L 22.16.6       $\delta$  - 2.41  
 (#1) Star      22.16.9      - 2.39 -  
 (#2) "      22.17.28      - 2.43

Obs for L - with 1st star

19.33.0 commenced - 2 wires of each  
~~2 (X1) P P (X1) Stop watch 2.8 at 19.32 -~~  
 35.30 Ended -

19.38.40 ~~36.0~~ Obs - for L - with both stars.

P (X1) P (X1) P (X1) P (X1) (X2) (X2) (X2) (X2)

19.44 Ended Obs. for  $\delta$  -

Planet on  $\delta$  -

45.75      58.31.5 } 1st star -  
 45.40      31.8  
             39.3

Planet on  $\delta$  -

47.0      35.75.3 } 2nd star -  
             68.0  
             65.3  
             67.2  
 49.10      35.99.0  
             87.0  
             94.0  
             90.5

Sept 8. Kimausa -

Planet - L 21.39.25 J - 7.25 10975 (9)  
21.41.32 7.18

20.0.0 Obs for L - Stopwatch 2, 3, 5  
Commenced - 4 wins of each.

Obs for D -  
Planet on a

20.10.

64.94.0

Planet apparently  
above -

91.0

92.9

12.30

65.23.5

18.4

12.2

12.0

Obs. for L -  
16.45 Commenced - 3<sup>rd</sup> win of P lost;  
~~16.45~~



Sept. 8 1870 Panopaea

Lacaille 8873 Planet  $\alpha$  21 35 50  $\delta$   $-35^{\circ} 06'$   
 Comp. star  $\alpha$  21 32 41  $\delta$   $-35^{\circ} 07'$

Obs. for  $\alpha$  Stop watch 3<sup>m</sup> 14.3  
 21<sup>h</sup> 41<sup>m</sup> Comm.

21<sup>h</sup> 44<sup>m</sup> 30<sup>s</sup> " 3 13.7

Obs. for  $\delta$  Star on middle wire.  
 21.54.53<sup>s</sup> 51.90.0 } doubtful Planet apparently below  
 52.0 }  
~~59 30~~ 95.0 } 270  
 59 30 52.99.1 } 890  
 53.25.0 }  
 16.5 } 406  
 53.10.5 } 135

22<sup>h</sup> 4<sup>m</sup> 30<sup>s</sup> 53.10.5 }  
 33.3 }  
 46.0 } 1368  
 47.0 } 53.342

At 22<sup>h</sup> 9<sup>m</sup> Obs. for  $\alpha$   
 Planet passed wire { 3<sup>m</sup> 12.8 } Start wire planet  
 after star } little too early  
 22 14 stop watch 3<sup>m</sup> 13.8

56

Sept 10

Error of chro. &amp; instrument, 21 sec. slow, at -13.26

Declination -

2.

(111)

At minute break - 21.34 L 21.4.0 S-1414

Obs for 2.

R obs -

19.34.45, 4 wires of each.

P. #1.

#2.

#3.

Stop watch

2.3

2.50

3rd set, 1st wire of 3rd

1.07

2.3.4

2.50.5

star wrong -

57.7

2.3.2

1948.38

G. obs. for a

1949.50

G. obs. for a stop w. Pto 1 = Pto 2 = Pto 3 =

1952.10

G. obs. for a stop w. Pto 1 = 42.6 Pto 2 = Pto 3 =

1954.48

G. obs. for a stop w. Pto 1 (42.5) Pto 2 3.0 Pto 3 32.50.

1959.630

G. obs. for J Pm h

52.46

95.7

47.013

#3

net-

20 11 55

542

golden

20 11 55

52.46

95.4

46.860

#3

47.046

696

47.046

#3

49.140

599

46.847

#3

Obs. for 5 -

Rogus, obs -

20.17.0.

52.50.5

46.891

49.020

55.6

715

48.915

56.2

670

800

22.30

53.00.5 (#1)

46.81.5 (#2)

49.275 (#3)

52.84.0

81.0

015

8.2.0

78.7

000

80.0

Obs. for 2

Observe as above -

20.28.30

111

a = 21 24 00 - 14 14

#1 = 1<sup>m</sup> 21<sup>s</sup> before #2, same

#2 = 21 06 00 - 14 14

#3 follows #2 47<sup>s</sup>

#1 = 21 4 45

#2 = 21 6 06

#3 = 21 6 54



Break, 21.29 - Pomona - Sept 10 - not found star in Cat - 57

P2 - 2 22.14.35  $\delta$  - 25'3  
 (X2) 22.16.53 - 25'6  
 W.320 22.16.53 257

(X1) (X2) (X3) -

21.18.30 Commencing stop watch. 46.5 2.18.5  
 22.0 2nd obs - (X1) is about halfway between Pt (X2) in  $\delta$  -

27.30 Obs for  $\delta$ . P (X1) (X2)  
 46.5 2.18.5

(X1) is halfway between P & X2 in  $\delta$  -  
 about 2" below (X2) in  $\delta$ , apparently -

37.0 Ended.

Obs for  $\delta$  - P. on 7 -

38.50 35.84.0 } 26.800 }  
 860 } (X1) 874 } (X2)  
 80.5 } 990 }

42.20 36.18.0 } 27.300 }  
 374 } 344 }  
 350 } 345 }

45.45 36.67.0 } 27.574 }  
 36 sec - 71.5 } 605 }  
 704 } 624 }

50.0 36.52.4 } 27.586 }  
 sec 603 } 540 }  
 598 } 480 }  
 554 }

Obs for  $\delta$  -

52.50

538 New sheet. 1st minute, 22, 26 <sup>after breakdown</sup> ~~inverted back~~

~~22, 21~~ Panopaea  
22, 20.30 Obs for L commence

P. L - 21.34.40 - 34.56  
(#1) 21.32.41 35.07

~~Obs for L~~  
~~22, 25.30 Commence. #1 on 3 wires~~  
~~(#1) (#1) (#1) (#2) (#2) (#1) (#2) (#2) P.P.P.P.~~  
~~lost 1st 2 wires of P in 1st obs -~~  
~~#2 about 8th mag.~~  
~~Stop watch 2.4.0~~  
~~lost 1st 2 wires of 2nd star in 3rd obs~~  
34.30 Ended

Obs for 5 -  
39.0 10.10.0 }  
19.4 } #1  
00.0 }  
9.50.0 }  
Star on C.  
9.4  
10.024  
record on Chronograph 1 minute later.

41.30 9.57.5 }  
48.8 } #1  
74.8 }  
19.4 }  
9.58.2 }  
49.4 } #1  
55.5 }  
49.30 original lat. 9.52.3

47.0 signal lat. 13.28.8 }  
20.5 } #2  
35.5 }

50.0 13.03.6 }  
35.5 } #2

28.5 Obs for L -  
54.30 Commence. #1 #1 #1 #1 #2 #2 #2 PP  
for 1st obs lost #2 on 1st wire



2nd obs. order #1 #1 #2 #1 #1 #2 #2 #2 P P P P

23.0. Ended -

Stopwatch 2.35

1st minute Quak 23.6

Obs - for L

23.6. Commence order as at top of page -

2 sets obs -

Reversed -

1st - order reversed from above -

stop watch. 2.2 -

2.2.8

#2 42 sec. ±

23.18.30 Ended

2nd minute 23.24 -

860

Sept. 12. (111)

1st minute - 20.17 -

L 21.02.54 -  $\delta$  - 14.18 -X2 21 6 6  $\delta$  14.14 - $P = 15.5 \pm 15$ 

Obs for L -

In 1st. 3 wires of unknown star after P. (by mis-)

Taken P. 4 wires X1 50 X2 50

In last obs. lost 4th wire of 46 star

Minute break 21.18

Obs for  $\delta$  - $P$  on upper wire -1st { 45.442  
45.4422nd { 45.340  
45.340

46.090

Rattle for 2nd false -

2nd - 45.849

46.279

P. incorrect.

45.066

45.936

O 6.945

6.45

46.044

222

370

45.860

46.070

360

3 sets for L -

Reversed.

860

070

361



28.4  
27.86  
28.0

6.9  
7.4  
7.3

W 1563 W 1541  
Sept. 13

51.4 26.5 14.7 68  
4.5 1.4 3.2 1.9  
4.40

(111) 2<sup>m</sup> 14.5 preceding #, Sept. 10, 4' above (opp.)  
1st minute, 21.9 — (2 or 3 before it that this follows water)  
P = 66.0.

obs. for L

21.12.0 Begin — 3 stars, same as Sept 10 —  
lost 1st wire of 2nd star in 1st obs —  
1st wire of 2nd star wrong in 2nd set —  
Stopwatch #1, 2.19 — #2 3.40 #3 4.26.5 —

21.28.45 L from Weiss 1541 — where L = S =  
2 wires of each — Stopwatch 12 — 12 — 12.1

Obs. for S

with 3 stars, as above — Planet on b.

|          |         |         |         |
|----------|---------|---------|---------|
| 21.35.10 | 57.39.0 | 45.60.5 | 47.68.0 |
|          | 56.0    | 72.0    | 73.4    |
|          | 59.0    | 60.0    | 82.0    |
| 40.30    | 57.35.4 | 45.32.0 | 47.54.2 |
|          | 40.4    | 45.5    | 65.4    |
|          | 50.6    | 56.2    | 70.6    |
|          | 65.0    |         | 68      |

with Weiss, 1541 — Star on b —

|       |         |
|-------|---------|
| 37.45 | 48.60.0 |
| 52.15 | 67.0    |
| 52.45 | 55.7    |
| 53.10 | 76.4    |
| 53.40 | 59.1    |

Reversed, Obs. for L — with 3 stars, as above —  
35.15 Commence  
Stopwatch #1 2.19 #2 3.40 #3 4.27 —

Obs. a W. 1521

62

Sept 14 - (111) —

1st minute, 21.39 —  
observed with Weiser, 15-6B —

21 2 12 14 19

21.39.10 Obs for L —  $\phi = 65.20$ 

Commence —

3 wires of each Stop watch 17.8 — 17.8

In 4th, 1st wire of star wrong — 17.7 17.9

44.0. Ended. 17.9

Obs. for  $\delta$  —  
Planit on 7 —

45.30

56.11.0 } 09.0

23.0 } 37.0

18.7 } 21.3

46.15

56.32.0 } 5.6 subtracted from —

28.4 } 48.0

33.0 } 31.6

46.50

56.42.0 } 47.0

48.10

56.47.5 } 38.0

48

34.8

20.0

22.8

48.55

56.29.5

31.1

35.4

28.6

18.0

49.50

56.49.4

34.0

33.2

28.4

52.30 Obs for L —  
Commence —

58.30 —

17.9

18.0

18.4



Search for (111) Sept. 19

a-b 21.8-    b-c 9.9    c-d 3.6     $\delta'$  precedes  $\delta$  3 sec  
 $\tau$  is 3m above it in  $\delta$

~~Chandra~~  
 d

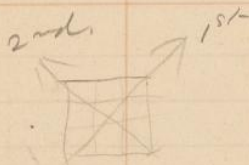
a

b

c

d'

3 meters



b-c  
 9.9

64

Sept. 20 1870

W.A.R. obs.

Obs. of (111) Comp. Star Weiss 20 1499  
Obs. of  $\alpha$  3 wires each planet. prec. star

22 4 34

stopwatch 21.6

22 9 40

last obs. for  $\alpha$  $P = 62^\circ 50'$  for  $\delta$ Obs. for  $\delta$ 

Planet in middle wire

22 13 20

40 9.4 bad; focus wrong

16 18

48.6

16 58

71.0

17 34

41.6

18 3

52.6

18 25

35.5

Obs. for  $\alpha$   $P' = 270^\circ + P = 332^\circ 50'$ 

22 24

22 22

stopwatch 21.0  
21.8

23

24

24 20 last obs. for  $\alpha$  " 21.6 $\alpha$  for Weiss 1499  $\delta$   $20^h 59^m 5.6^s$   
 $- 14^h 27^m$ Obs. for  $\alpha$ 

23 40 50

23.2 stopwatch

22.0

"

23 42 10

22.3

"



Sept 20 1870

Obs. of Bellona

Comp. star Schj. 9726  $\alpha$  23<sup>h</sup> 28<sup>m</sup> 32<sup>s</sup>  $\delta$  -10° 24'

4 wires each star from planet

23 23 stopwatch 1<sup>m</sup> 6.7 ink failed  
 11 58 last observation for  $\alpha$  last wire planet bad  
 11 45

Obs. for  $\delta$  Star on C

23 16 12 41.39.2  
 18 0 46.2  
 19 30 52.7

Charles J. Fox

23 23 10 lost 4<sup>m</sup> wire for stop watch 1 6.2

23 27 05 3<sup>rd</sup> of Planet lost 1 6.0

23 29 55 W.A.R. obs. for  $\alpha$

23 32 40

106  
Sept. 24 1870

$P = 63^{\circ} 3'$   
Obs. Bellona Comp. \* Schj. 9726  
Star on middle wire.

Obs. for  $\delta$

22 23 0

56.476

22 23 50

1730

22 24 30

1740

22 26 40

1762

Obs. for  $\alpha$

$P$

333.3

Star pr. planet.  
3 wires each

22 27 45

22.3

22 28 35

22.7

22 30 9 last found

23.0

3 Meteis

1 meter tube this = length 3'



Sept 21 1870

$P = 63.3$

Obs. (117)

Comp Star

W. 20<sup>h</sup> 1499Obs. for  $\alpha$ 

22 47 30

22 42 15

34.2 wrong wire

39.0

4 wires each Plan. for star

22 43 40

22 44 50

22 46 22

39.2

39.2

39.3

 $P_1 = 63.3$  Obs. for  $\delta$ Star on middle wire  
Planet on middle wire

22 49 50

22 51 45

22 52 40

22 53 55

22 54 35

56

7.0

55

12.6

55

69.0

55

68.0

55

56.0

right

doubtful

both doubtful

Lost min. break 23<sup>h</sup> 17<sup>m</sup>

108

Sept. 22

111  
Comp # 20 1499  
Stop button 53.5

Obs. W

Obs. S

Pm W

\* = 47585  
580  
662

1m  $\searrow$  brighter



Sept. 22

Bellona

P<sup>2</sup> 23 28 14 - 10.32

X 23 28 32 10 24

20<sup>h</sup> 32<sup>m</sup>~~20 32~~

Two stars near place of planet: uncertain which is planet: both observed over two wires: order of observations 1<sup>st</sup> wire P P': 2<sup>nd</sup> wire P P': 1<sup>st</sup> wire, star: 2<sup>nd</sup> wire, star.

20 35 15

20 37 0

20 37 50

38 26

20 40 5

Obs. for d

49.960

880

865

760

49.510

.490

49.400

.312

49.600

P on C should be 30.960

all this read wrong

P' on C

20 41 15

42 5

41.534

41.635

P on C

20 43 0

44 50

45 20

~~48.5~~ 30.480

30.537

} right nr. revolutions  
} sure

Pas. angle 333° 30'

Obs. for d

Same order as before

20 49 0

20 49 30

20 50 5

20 50 40

21.0 stop watch

20.7 "

20.5 "

21.3 "

P. to star

last minute chronograph 20<sup>h</sup> 55<sup>m</sup>

70

Sept. 21

Search for (11)  
Chart

a

b

d

e

|      |     |    |    |
|------|-----|----|----|
| ab   | be  | cd | de |
| 26.1 | 95  | 08 | 77 |
| 26.1 | 99  | 08 | 55 |
|      | 9.5 |    |    |

Sept. 26

|    |    |
|----|----|
| ab | be |
| 17 | 28 |

t = Planet-(111)

Morton  
 Sept. 28

9h 7m sid. time



Sept. 26  
Search for 112

at  
11.0

Chart

Sept. 27 1870 Search for 112  
Comp. stars from Weiss  $\alpha = 0 \ 55 \ 16$   $\delta = + 10^\circ \ 2'$   
 $0 \ 57 \ 20$   $+ 10 \ 20$   
 $0 \ 57 \ 24$   $+ 10 \ 10$

1 1 10  
2 2 13

8 9 14 d

6  $\frac{1}{2}$  13

8  $\frac{1}{2}$  13

2  $1\frac{1}{2}$  10

3 6 14

9  $\frac{1}{2}$  8 12

$\frac{1}{2} \times 7 \ 11$   
Sept 28  
Ad 32, 1, 1/4  
at 22 1/4

8 2 13  
9  $\frac{1}{2}$  3

2 1 12  
2 9 13

7  $1\frac{1}{2}$  16 Sept 28  
9  $1\frac{1}{2}$  16 Sept 28

Chart  
of  
stars

5 7 13

8 1 14  
9 8 13

2  $1\frac{1}{2}$  16  
Sept 28

9 10 10  
1 8 13

8 0 10

5 7 13

5 4 10

9 0 13  
4 8 16

5 4 16

2  $\frac{1}{2}$   
9  $\frac{1}{2}$  8 15

5 5 14

8 7 13

1 8 13  
7 2 15

2 1 16  
Sept 28

8  $\frac{1}{2}$  -2 10

6

0 -2 10

3 - $\frac{1}{2}$  13

7 5 13

72

Search for P Sept. 26 1870

Search for Parthenope.

$$a_p = 23\ 54\ 10 - 17\ 51$$

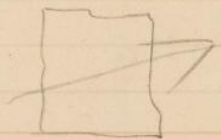
$$\text{comp} \approx 23\ 57\ 52 - 17\ 41 \text{ stop watch } 2\ 57$$

Start-

$$ab = 12.1$$

a. h

meter





Sept. 26 1870

Search for Circe

 $\alpha_c = 0 \ 44 \ 24 \quad \delta + 40 \ 7'$ Comp. star  $0 \ 44 \ 26 \quad \delta + 4 \ 15'$  Planet fr. 1.0 $b = 0 \ 44 \ 26 \ + 4 \ 15'$ 

stop watch

a.

u

b

74

Sept. 27

North Clock -

15<sup>th</sup> minute break by 424 = 20 48 42 double line

20 5-1 or (424) = 20 55-14 (N.C.)

 $P = 244.1$  $P = 63^{\circ} 15'$ 

Planet (III)

Obs. for  $P$ 

Planet on middle wire

Time not taken

1<sup>st</sup> wrong

21 14 0

2<sup>d</sup> wrong

21 15 8

$$\left. \begin{array}{r} 57.69.5 \\ 91.14 \\ 77.0 \end{array} \right\} \text{this set wrong}$$

21 18 45

$$\left. \begin{array}{r} 56.36.5 \\ 350 \\ 554 \\ 604 \end{array} \right\}$$

21 23 30

$$\left. \begin{array}{r} 56.15.5 \\ 400 \end{array} \right\}$$
Obs. for  $\Delta$  $P = 343 15$ 

4 wires each

Planet prec.

A break after 1<sup>st</sup> wire of star, accidental.

21 35 56

Stopwatch 1<sup>m</sup> 56.121<sup>h</sup> 38<sup>m</sup> 44<sup>s</sup> last min. break by A.424



Oct. 8

North Clock -

75

1st Minute work 22 19 50 by 424

$$\begin{cases} 424 = 22\ 21\ 45 \\ Cl. = 22\ 25\ 00 \end{cases}$$

Parthenope -

$$\begin{array}{rcl} P & 23, 45, 40 & - 8, 52 \\ 847\ W. & H & 23, 42, 10 \quad - 8, 52 \end{array}$$

$$P = 62, 45 -$$

Obs. for J -

H on J -

$$\begin{array}{rcl} 22, 35, 30 & 45, 83, 2 & \\ & , 820 & \} 45, 826 - \end{array}$$

$$\begin{array}{rcl} 22, 40, 0 & 45, 1930 & \\ & , 768 & \} 2538 \\ & 800 & \} 45, 853 \end{array}$$

Obs. for L -

42, 45 Commence # -

Stop watch 3, 42, 3 -

Stopped 2, 3, 2 by Clue 424 -

76

Oct-9

P

1<sup>st</sup> minute books <sup>(424)</sup> 21 40 45

Pactenope

424 = 21 43 00  
N.B. =

21 43 Compared with N.C.

Obs. a Stop watch = 3<sup>m</sup> 3<sup>s</sup>

Obs. N P = 62.0

Star on a order # - P

5.2, 5.45  
5.755.2, 6.85  
6.65  
1.735

Obs. a

Last min. books 22 40 45



Oct-9

Penta

~~P-6215-~~

Oct-18

(III)

Chart-

a<sup>b</sup> c

b = supposed (III)

ab = 30<sup>s</sup>  
bc = 32<sup>s</sup>

(II2)

Chart-

ab = 25<sup>s</sup>  
ac = 50<sup>s</sup>

|        |  |        |
|--------|--|--------|
| Meteor |  | bright |
| "      |  | " "    |
| "      |  | " "    |
| "      |  | " "    |
| "      |  | " "    |

78

Oct 10 -

N. le.

1st Minute break, by 424 - 21, 20, 40 -

Parthenope

P. 23 44 —  
W 847. 23, 42, 10

- 8 —

- 8.52

P = 61.45

Rather break at 21.26, by 424 -

21 27 48 obs a G. #, P. stop W Kinsle

21 29 39

" " 2<sup>m</sup> 27.0

21 50 40

74.946  
839

obs P # on a

21 55 30

75.000  
75.055  
74.796  
74.787Rather 2<sup>m</sup> late

21 58 55

obs a

stop water 2 26.0

G observe.

Last minute, 22.13.40



Oct. 12 -

N. C.

79

1st minute break - by 424, 22, 13, 21 -  
Circ

 $P = 60.30 -$ 
 $P - \cancel{22} 0.31.57 + 2.17$ 
 $X1 \quad 0.30.57 \quad 2.25 -$ 
 $X2 \quad 0.32.22 \quad 2.23$ 

Comparison of Chro. with clock -  $22 + 17 + 0 -$

Obs for 2 - both stars -

$X1 - P - X2 -$  In 1st obs - 1st wire of 2nd star.

22.19.15 too soon - stop watch 59.8 - 1.37.3

60.5 - 1.37.8

Obs for 5 -

Star 1 on C -

22.32.0 28.784

22.34.0 28.716

711

35.40 28.667

~~35.40~~ 698

Star 2 - P on A -

37.7 66.361

.284

38.30 66.510

.497

400

Obs for 1

$X1, P, X2 -$

41.30

stop watch

1.0.3 -

1.38.4

In 2nd obs - lost 1st 2 wires of Planet -

1.37.0

59.0

80

#<sub>1</sub> = 989 W#<sub>2</sub> = 15655 + 0.59

Oct. 12

Perigee 15658 + 0.53

230937 Obs from (B.) stop watch 13.0<sup>s</sup> order #, P 2 mins  
 1st min of star late on last set

231122 #<sub>2</sub> order P #<sub>2</sub> stop watch 18.0

Obs.

23 22 30

Obs from

# 74.094

# on a

.180

.191

Obs from #<sub>2</sub>

# on a

Last minute break - 23.32.19 by 424.



Oct-22

112

Comp # W549 (0 33 14 + 7 47)

 $P = 60^{\circ} 45'$ 

last minute reads 23 48 51 (424)

com 424 = 23 48 30

n.c. = 23 48 37.5

 $\Delta a = 26.09$ 

not the planet.

meter  $\Delta$  meter  $\Delta$  meter  $\Delta$  meter  $\Delta$   
 meter  $\Delta$  meter  $\Delta$

82

1870 Oct 29<sup>th</sup>

Mr. A. Rogers, O.L.

(112)

\*K 8.8  $\alpha$  1<sup>h</sup> 28<sup>m</sup> 57.<sup>s</sup>  $\delta$  + 7° 26'\*<sup>2</sup> 0 31 3. + 7° 19'

Obs 424

at 11<sup>m</sup> 38<sup>s</sup> first min breakOrder of Obs P and \*<sup>2</sup>

b 424

1<sup>h</sup> 3<sup>m</sup> 48.<sup>s</sup>

b 424

1<sup>h</sup> 5<sup>m</sup> 46.<sup>s</sup>Stop W 1<sup>h</sup> 21.<sup>s</sup>" " 1 22.5<sup>s</sup>

Position circle 60° 45'

J

P. mid wire 1<sup>h</sup> 18<sup>m</sup> 5<sup>s</sup>

R

66.205

.212

.300

J

1<sup>h</sup> 18<sup>m</sup> 10.<sup>s</sup>

R

67.022

.010

J

1<sup>h</sup> 21<sup>m</sup> 8.<sup>s</sup>

R

67.020

66.960

Dis. of (112) Pelis

|        |    |    |     |     |      |    |    |     |
|--------|----|----|-----|-----|------|----|----|-----|
| 001-18 | 10 | 47 | 57  | 037 | 1049 | +8 | 10 | 164 |
| 21     | 10 | 38 | 20  | 34  | 5131 | 7  | 56 | 116 |
| 22     | 10 | 49 | 57  | 34  | 713  | 7  | 51 | 326 |
| 23     | 8  | 02 | 1   | 33  | 2866 | 7  | 47 | 273 |
| 24     | 7  | 43 | 12  | 415 |      |    |    |     |
| 25     | 7  | 39 | 9   | 403 |      |    |    |     |
| 26     | 7  | 35 | 15  | 350 |      |    |    |     |
| 27     | 31 | 39 | 340 |     |      |    |    |     |
| 28     | 28 | 05 | 330 |     |      |    |    |     |
| 29     | 24 | 49 | 320 |     |      |    |    |     |
| 30     | 24 | 49 |     |     |      |    |    |     |

Rogers 29  
Nov 2Error of Sb. = -1<sup>m</sup> 5.<sup>s</sup>  
" of Pb. = -13<sup>s</sup>(112) = 0<sup>h</sup> 29<sup>m</sup> 42<sup>s</sup> approp. 7<sup>22</sup>



1870 Oct 29 Rogers Obs

(111)

\*a

\*b

\*c

\*d

Stop Watch  
a#b 18.2  
a#c 32.0  
a#d 123.0

14 " 4 42

435 4 39 439

427 4 05 427

415

403

350

340

330

320

Reading of Coincidences.

24.587  
49.757 25.170  
74.815 25.118

Nov. 1 1870

Search for 112

Failed.

Nov. 2 1870

(112)

R.L. =  $20^{\circ}$  fast of 424Error of S.L. =  $-152$  m.s.S.L. =  $1^m 55^s$  fast of 4241st minute work =  $2^h 26^m 37^s$  (424)Comp # 46970 0 28  $277^{\circ} 6' 59''$ 

Obs. for a only (W. &amp; R.)

Order P (4 mins) #

|   |   |    |      |     |    |      |     |    |      |     |    |      |     |
|---|---|----|------|-----|----|------|-----|----|------|-----|----|------|-----|
| P | 1 | 42 | 16.5 |     | 42 | 16.5 |     | 45 | 903  |     | 44 | 31   |     |
| # |   | 43 | 0.6  | 441 |    | 0.6  | 441 |    | 24.6 | 443 |    | 47.2 | 441 |
|   |   |    | 33.1 |     |    | 33.1 |     |    | 57.3 |     |    | 14.7 |     |
|   |   |    | 17.2 | 441 |    | 17.2 | 441 |    | 41.1 | 438 |    | 3.9  | 442 |
|   |   |    | 40.5 |     |    | 40.4 |     |    | 4.5  | 440 |    | 27.2 |     |
|   |   |    | 24.5 | 440 |    | 24.6 | 442 |    | 48.5 |     |    | 11.2 | 440 |
|   |   |    | 49.7 |     |    | 49.7 |     |    | 13.8 | 441 |    | 36.0 |     |
|   |   |    | 33.7 | 440 |    | 33.6 | 439 |    | 57.9 |     |    | 20.3 | 443 |

approx place of 112  $2^h 37^m 44^s = a$



Scam for 112

change in  $\alpha$  for nov. 2 about  $18''$  per day and in  $\delta$  3'

$$a = 0^{\circ} 25' 0'' \quad \delta = +6^{\circ} 44'$$

I  $0 \times 0h$  27 ~ 07.  $\delta + 6^{\circ} 57'$  May 8.9

II

| A | B                   | b                          |
|---|---------------------|----------------------------|
| 1 | 0 1/2 3             | 1/2 12 - 11.<br>5 - 8 - 13 |
| 2 | 3 7 10<br>1 - 4 - 9 | 0 2 10<br>0 8 14<br>5 8 11 |
| 3 | 0 10 8.0            | 7 2 11. 0                  |

| A | B      | b                                                |
|---|--------|--------------------------------------------------|
| 1 | 0      | 2 8 - 13.                                        |
| 2 | 0 8 11 | 1 5 - 10.<br>2 3 14. <del>3 7 11</del><br>0 7 12 |
| 3 | 0      | <del>2 3 14</del>                                |

| A | B      | b        |
|---|--------|----------|
| 1 | 0      | 6 7 12 0 |
| 2 | 0 7 11 | 0 0      |
| 3 | 0      | 0 0      |

| A | B | b |
|---|---|---|
|   |   |   |
|   |   |   |
|   |   |   |

86

Mother 16 Nov

|   |                              |        |                                                |                          |        |                                   |
|---|------------------------------|--------|------------------------------------------------|--------------------------|--------|-----------------------------------|
| 1 | <del>4</del><br>0            | B<br>0 | 6<br>10 1/2 -                                  | <del>4</del><br>9 1/2 13 | B<br>0 | 6<br>1/2 10 -<br>2 2 10<br>10 2 - |
| 2 | (3 1 1/2 10)                 | 0      | 2 9 14 1/2 9 1/4                               |                          | 0      | 10                                |
| 3 | 0                            | 0 10 9 | (1/2 7 12)                                     | 9 7 12                   | 0      | (10 1 10)                         |
| 1 | 1/2 2 12<br>5 2 12<br>9 3 10 | 7 3 13 | 0                                              |                          |        |                                   |
| 2 | 2 6 10<br>1                  | 2 9 14 | 0                                              |                          |        |                                   |
| 3 | 12 1 10                      | 0      | 10 0 9<br>5 2 13<br>5 3 5<br>5 4 10<br>3 10 13 |                          |        |                                   |



| A |    |   | B  |   |   | C     |     |     | A |   |    | B |   |    | C |    |    |
|---|----|---|----|---|---|-------|-----|-----|---|---|----|---|---|----|---|----|----|
| 1 | 0  | 0 | 0  | 0 | 0 | 5     | 6   | 11  | 0 | 0 | 0  | 1 | 7 | 14 | 2 | 0  | -  |
|   |    |   |    |   |   | 3     | 9   | 10  |   |   |    | 9 | 1 | 11 | 1 | 1  | 9  |
|   |    |   |    |   |   | 8     | 9   | 12  |   |   |    |   |   |    |   |    |    |
| 2 | -2 | 3 | 9  | 0 | 0 | 9     | 1/2 | 1/2 | 7 | 5 | 14 | 0 | 0 | 0  | 5 | 1  | 12 |
|   |    |   |    |   |   |       |     |     | 9 | 9 | 12 |   |   |    |   |    |    |
| 3 | 0  | 0 | 0  | 0 | 0 | 9     | 8   | 13  | 0 | 8 | 13 |   |   |    | 5 | 10 | 10 |
|   |    |   |    |   |   | 9 1/2 | 1   | -   |   |   |    |   |   |    | 1 | 9  | 12 |
| 1 | 0  | 0 | 0  | 0 | 0 | 7     | 1   | 9   |   |   |    |   |   |    |   |    |    |
| 2 | 0  | 1 | 12 | 0 | 0 | 1/2   | 1   | 12  |   |   |    |   |   |    |   |    |    |
| 3 | 0  | 0 | 0  | 0 | 0 |       |     |     |   |   |    |   |   |    |   |    |    |

88

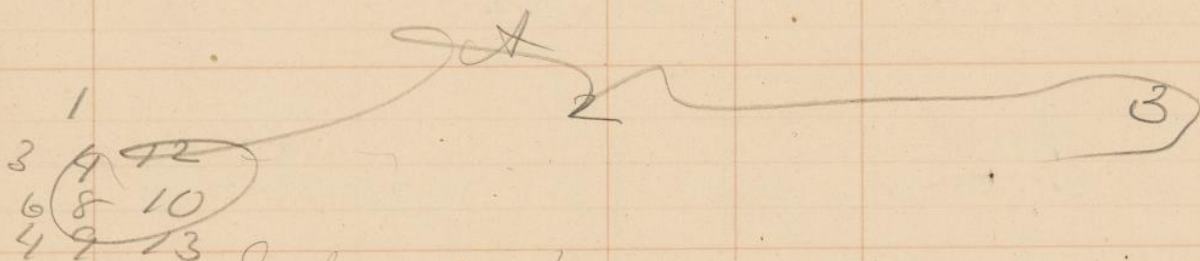
| A |       |  | B       |  |  | C       |       |  | A      |  |  | B      |  |  | C      |  |  |
|---|-------|--|---------|--|--|---------|-------|--|--------|--|--|--------|--|--|--------|--|--|
| 1 | 0     |  | 0       |  |  | 8 8 9   | 0 5 9 |  | 8 1 13 |  |  | 8 1 13 |  |  | 2 5 14 |  |  |
|   |       |  |         |  |  | 8 5 9   |       |  | 9 8 10 |  |  |        |  |  |        |  |  |
| 2 | 6 7 9 |  | 2 12 12 |  |  | 0       | 0     |  | 7 2 11 |  |  |        |  |  | 0      |  |  |
|   |       |  | 6 6 9   |  |  |         |       |  | 8 2 14 |  |  |        |  |  |        |  |  |
| 3 | 0     |  |         |  |  | 3 2 13  |       |  |        |  |  | 8 2 14 |  |  | 2 4 11 |  |  |
|   |       |  |         |  |  | 3 10 10 |       |  |        |  |  |        |  |  | 8 1 9  |  |  |
|   |       |  |         |  |  |         |       |  |        |  |  |        |  |  | 1 5 12 |  |  |
|   |       |  |         |  |  |         |       |  |        |  |  |        |  |  | 2 5 9  |  |  |
| 1 | 0     |  | 4 2 9   |  |  | 0       |       |  |        |  |  |        |  |  |        |  |  |
| 2 | 0     |  | 0       |  |  | 2 7 10  |       |  |        |  |  |        |  |  |        |  |  |
|   |       |  |         |  |  | 7 9 13  |       |  |        |  |  |        |  |  |        |  |  |
| 3 | 0 1 9 |  | 0       |  |  | 5 5 9   |       |  |        |  |  |        |  |  |        |  |  |



(112)

870 Nov 16<sup>th</sup>\*  $\alpha$  26<sup>m</sup> 2<sup>s</sup> 6° 52'1<sup>m</sup> 53.6  
1 53.6

-10.

Two stars near  
XP  $\Delta \alpha$  0.5Position  $\alpha$  b

Supposed piece

 $a = 0^h 24^m 08^s$ 

642

0 26 07

6 50

1st in hole

2<sup>nd</sup>12<sup>m</sup>

424

B

 $R = 60^\circ$ 

2 obs for a

Don't (mean)  $\# = 10 \rightarrow 14.122$ 

93

424 = 3<sup>rd</sup> part of N Co.424 = 1<sup>st</sup> 15<sup>th</sup> part of T.

90  
 Pic 21 1870  
 Supposed description of 111

Assumed place for Ephemeris

(or B.T.)  $a = 21^h 59^m 48^s$   $\delta = -9^\circ 18'$

Comp # 21 57 41  $-9^\circ 20'$  W 1311

2<sup>h</sup> 3<sup>m</sup> 0<sup>s</sup> P-# 15  
 7 0 +1<sup>m</sup> 59.7  
 10 00 59.2  
 59.5

star precedes

For  $\sqrt{\quad}$   
 $\#$  on wire farther for micrometer head

$P = 59.5$

R  
 63.020  
 62.770  
 62.360

T  
 2<sup>h</sup> 17<sup>m</sup> 05<sup>s</sup>  
 21 0  
 09 0

15<sup>th</sup> May.

# 21 57 41  $-9^\circ 20.5'$   
 P-# 2 00 P-# 6.3 24.6  
 P 21 59 41 9 14  $\frac{62.6}{38.0}$

~~Draw Ephemeris for correction~~ ~~Precorrection of Ephemeris~~  
 $4a = +37^s$   $15 = +4'$











94



1870piae.proj.:304k

96





(111)

Aug 17

21 22 37 - 13 15

21 21 18 57 13 30

(21) (21 13 27 13 48) ?

(21 11 37 13 51)

comp 75

No 214

21 10 06 13 50 7

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