1895phae.proj..924K

KG
11365
923

ESK

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

KG11365.923

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..9Z4K

12,5

12

15,5

15,1

10,0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

KG11365.923

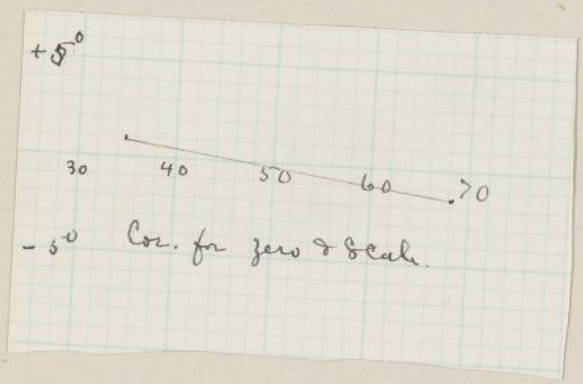
HARVARD
UNIVERSITY
LIBRARY
JUL 17 1956

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phae.proj...924K



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday, Dec 14 1895.

Exposed in Lab. H.C.O.

Readings made of Barometer Green No 3218, which is similar to Nos. 2995 & 3185 used in Peru, to determine accuracy of results if we apply a correction to Dunckers Observations made previous to some date in the first 10 days of July 1891, when readings were made to edge of mercury.

				Error using +.040
9 29 A.M.	Att Therm +65.0			
	Set lower index.	Cor.	Error	
1st	30.120 Tangent	+.034	5	6
	30.086 Edge			
2nd	30.082 Edge	+.038	1	2
	30.120 Tangent.			
9 33.	Att. Therm +65.0			
	Reset.			
	30.119 Tang.	+.041	2	1
	30.078 Edge.			4
9 38	Att Therm +65.0			6
	Reset.			10
	30.120 Tang.	+.044	5	2
	30.076 Edge.	+.157	13	7|31
		+.039	.003	.004

15 7
12 2
7|12 7 9
+.040

4|+.157
+.039

4|13
.003

Result of Observations

Mean Cor. = +.040
Av. Error = .004
Max Error = .010

Above Readings made with some care in general to keep the eye in line with lower edge of Vernier.

Mean +.039 — Av. Error

Readings made without particular regard to this point

30.086 Edge	.034	7
30.070	.050	9
30.082	.038	3
	3|122	3|19
9 46 Att Therm +65.5	+.041	.006

Mean +.041

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

KG 11365.922

Saturday Dec 14 1895

Readings Min Therm. Green No 2618.

A.M.
9.50 — Upper Knob. +8.2 upper edge
+7.8 lower " 0.°4

−5.0 upper
Lower " −5.2 lower. 0.°2

Extreme length 13.°4

Placing of Heliostat

At noon shadow of roof was about 15 inches above pier at ~~Extreme~~ edge in ~~top~~ line of sight.

At 2.30 about, latter extreme height of shadow of roof. The mars. will not exceed 32 inches. at 8 in. from end of pier & 4 in in from E. side. Sun is within 1/4° of southern limit.

1.0964
1.8976
9.1993 Tan. 8.°99

Dec. 16th. At time of Sun's merid. passage found that edge of pier inclined to shadow by 12½ inches in ~~80~~ 79 inches. which would make the angle about 9.°, the line of pier being East of North point.

Reference to map. seems to make this angle greater.

Measures agree from map. 12.°2 12.°5 13.°9

1.0899
1.8899
9.2000 Tan. 9.°0

Dec 17th A careful determination using a cylindrical pier of wood on a plumb line as a style makes edge of pier ~~Made by influence to shadow~~ incline to west by 12.3 inches in 77.6 inches at ~~time of Sun's merid. passage~~ 9.°1

Shadow moved about 3/8 in in 1 minute.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phae.proj..024K

Tuesday Dec 17. 1895.

Readings of Barometer in Laboratory for purpose same as stated p. 1.

P.M.

2 16 Att Therm +71.0 Diff.

K (obs) 30.757 Lang. :38
30.719 Edge.

Reset by Atwill.

30.757 Lang 53

A (obs) 30.704 Edge.

30.755 Lang 55

30.700 Edge.

Reset by Ring.

K (obs) 30.752 Mercury lowered to ivory point

30.750 " raised " "

K	C	A
38	40	53
44	31	55
2|82	2|71	52
41	36	53
		4|213
		54

Therefore if to these readings we had applied .040 as a correction found on p. 1. we should have had as average errors

K, .001 C, .004 A .014

2 28 Att Therm +69.0

Reset by Colson.

30.743 Lang. 40

C (obs) 30.703 Edge.

30.742 Lang. 31

30.711 Edge

Not reset.

K (obs) 30.746 Lang. 44

30.702 Edge

Mean of the 15 readings +.043
(pages 1 & 3)

Average Error ± .007

Max. " .012

2 36 Att Therm +69.0

Not reset.

30.743 Lang 52

A (obs) 30.691 Edge

30.744 Lang. 55

30.684 Edge

Therefore a correction applied to reading made at edge of mercury of +.04 or +.043 will probably not give an error of reading ± .02 inch which does not seem very exact.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Dec. 19. 1895.

Distances from Mollendo to Pimo by using positions as found from Map. ~~Brit~~ Encyc. Brit

120 cos 15°49 Pimo
72'
Mollendo

	Lon.	Lat.
Mollendo	$4^h\ 47^m.7$	−17 1
Pimo	4 39.7	−15 49
Diff	$8^m.0 = 120'$	$1^\circ\ 12 = 72'$

log 120 2.0792
log Co 15°44' 9.9832 (18) 51841
2.0624 (10)
4.1248 (20) 13330. 13240 18424 2/

log 72 1.8573
2
3.7146

$1^\circ = 60/69.12$ miles
$1' = 1.15$ "

log 18514 = 4.2675
2.1338

2) 4.2654
2.1327
0607
2.1934
156.

log 1.15 0.0607
156 = 2.1945

Computed Dist = 156 miles.
Distance as measured by scale = 153 "

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Method of Obtaining Corrected Values
of Hourly Thermograph Readings.

Sheet read from Retard Thermograph
No 3980. Exposed in A. C. O. Outside
Shelter for week Nov 18 – 25. 1895

E. S. R.

Corrections for zero scale & showing influence of sluggishness.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

Hourly Thermograph Readings. H. C.

A.M.

1895	1	Error	2	Error	3		4		5		6		7		8		9		10		11		12		1
Nov 18																							55 / 61		56 / 63
" 19	42 / 43		41 / 42		40 / 41		40 / 41		∨ 40 / 41		40 / 41		41 / 42		44 / 45		46 / 48		50 / 54	/ −1	58 / 66		60 / 68		62 / 71
" 20	51 / 56		52 / 58	/ 0	54 / 60		55 / 61	— +2	55 / 61		54 / 60	— +1	53 / 59		54 / 60	— 0	55 / 61	/ −1	57 / 64	/ −2	58 / 65	/ −1	60 / 68	/ 0	∧ 60 / 68
" 21	32 / 29		30 / 26	\ 0	29 / 25		27 / 22	\ +1	25 / 19		24 / 18	— 0	∨ 24 / 18		25 / 19	/ −1	26 / 21	/ −1	28 / 24	— −2	29 / 25	— −1	∧ 29 / 25	— −1	29 / 25
" 22	20 / 13		20 / 12	\ 0	19 / 11		18 / 10	\ 0	18 / 9		17 / 8	— 0	∨ 17 / 8		18 / 10		22 / 15	/ −2	26 / 20		27 / 22	— −1	27 / 22	— −1	28 / 23
" 23	29 / 25		28 / 23	\ −1	27 / 22		27 / 22	— −2	∨ 27 / 22		27 / 22	— −1	28 / 23		28 / 23		28 / 24	/ −2	31 / 28		31 / 28	/ −1	35 / 33	/ −1	38 / 38
" 24	55 / 61		53 / 59		52 / 57		51 / 56		50 / 55		50 / 54		49 / 53		48 / 52		44 / 45		42 / 43	\ +1	40 / 41		40 / 40	\ +1	38 / 38
" 25	37 / 36		36 / 34	\ +3	34 / 31		33 / 30	\ +3	31 / 28		∨ 31 / 28	— −1	31 / 28		32 / 29		38 / 38		40 / 41	/ −2	42 / 43	/ 0			
Means.				5) +2 / +0.4				5) +4 / +0.8				5) −1 / −0.2				2) −1 / −0.5		4) −6 / −1.5		5) −6 / −1.2		5) −4 / −0.8		5) −2 / −0.4	

∧ = Max point

∨ = Min "

/ = ascending curve

\ = descending "

— = horizontal

+3.	0	−1:	−30
2.	0	2:	−1.
1.	0	1:	1.
3.	0.	1.	1.
1.	0.	1.	2
1.	0.	1	2
1.	0.	1.	37
2.	0.	2	34
1.	0.	2.	
1	0.	1	
1.	0.	2.	
2.	0.	2.	
2.	0.	2	
1.	0.	1	
1.	0.	1	
1.	0.	1	
1.	0.	1.	
1.	0.	1	
1	0.	1	
1.	0	1.	
1.	0.	1	
1		2.	
1.		1	
34		30	

75) 71.0 (0°.9
675
35

75) −0.300 (−0°.04
300

Nov 1895	Error of Uncor. Mean	
18	— +4°.3	
19	— +4.5	Mean for week.
20	— +5°.3	Uncor. 40°.3
21	— −5°.2	Cor. 40.0
22	— −5°.8	
23	— +0.2	
24	— +1.3	
25	— −1.7	

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

H. E. O Outside Shelter Nov 18–25 1895.

	P. M.												Max.	Min.
1	2	3	4	5	6	7	8	9	10	11	12			
56	58	57	54	51	50	50	49	48	45	44	44		58	
63	65	64	60 0	56	55	54	53	51	47	46	45		65 +1	—
62	64	63	60	57	55	53	52	52	50	49	48		64	40
71	73	72 +1	69 +1	64 +2	61 +2	59	58	57	55	53	52	+1	74 0	41 +1
60	59	58	55	54	52	51	50	47	42	38	34		60	48
68	67 +2	66	62 +1	60	58 0	56	54 +1	50	43 +1	37	32	+1	68 0	52 +2
29	29 —	28	28	26	26	24	23	22	22	21	20		29	24
25	25 0	24	23 0	21	20 +1	18	17	16 −1	15 0	14	13	−1	25 −2	18 0
28	28	28	28	28	29	29	30	30	30	30	30	—	30	17
23	24 −1	24	24 −1	24	25 −1	25	26	26	26	26	26	0	26 −2	08 +1
38	40	41	54	55	55	54	54	56 —	56	56	56		56 68	27
38	41 −2	42	60 0	61 0	61 +1	60	60	62 +1	62	62	62		62 0	22 +3
38	38	38	38	38	37	36	36	36	36	36	37	—		
38	38	38	38	37	36	35	34	34	34	35	36	0	—	—
													—	31
														28 +1

4/ −1 1/ +1 6/ +1 2/ +2 5/ +3 1/ +1 2/ 0 2/ +1 5/ +1 6/ −3 5/ +5

−0.2 +1.0 +0.2 +1.0 +0.6 +1.0 a0 +0.5 +0.2 −0.5 +1.0

Richard Thermograph No 3980

The readings in black are those read directly from the sheet. Those in red are the corrected readings. The corrections are obtained from accompanying chart. See Sheet "a"

The figures in pencil give errors as found by actual thermometer readings.

+2	−1
+4	−1
+1	−6
+1	−6
+2	−4
+3	−2
+1	−1
0	−3
+1	−24
+1	+21
+5	−3
+21	

Register 75 | −3.00 | 0°.04
900

Mean diff = −0°.04

Average ~~Mean of the~~ Errors 0°.9

Reading of Min. on Nov 23rd rejected as incorrect.

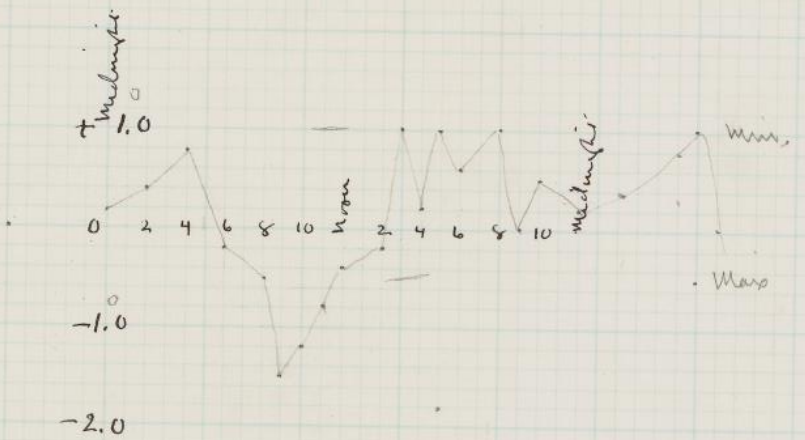
John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

OBS

Curve showing average error of thermometers as derived from record of Nov 18-25-1895 at Cambridge.

Minimum & Maximum occur at about 9 AM & 5 P.M. Minimum occurs the first when the Thermometer is above the Thermograph, i.e. during increasing temperature. Maximum occurs when temperature is decreasing.

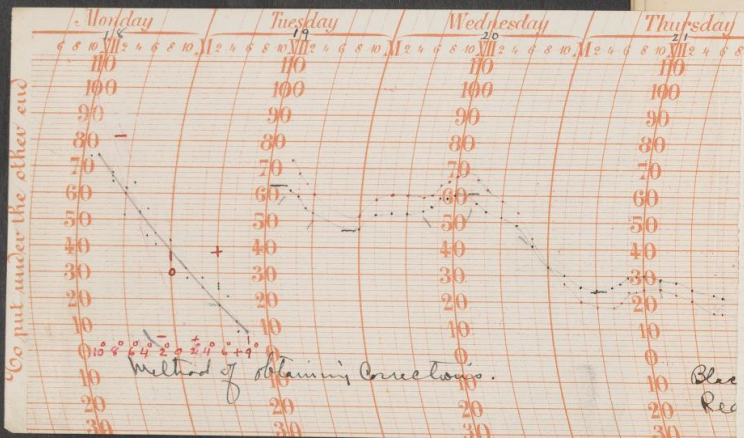


-10^0 $+5^0$ 0 $+5^0$ $+10^0$
Correction to give thermometer true temperature.

This white part must be put under the cross bar

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

This white card must be put under the brass bar

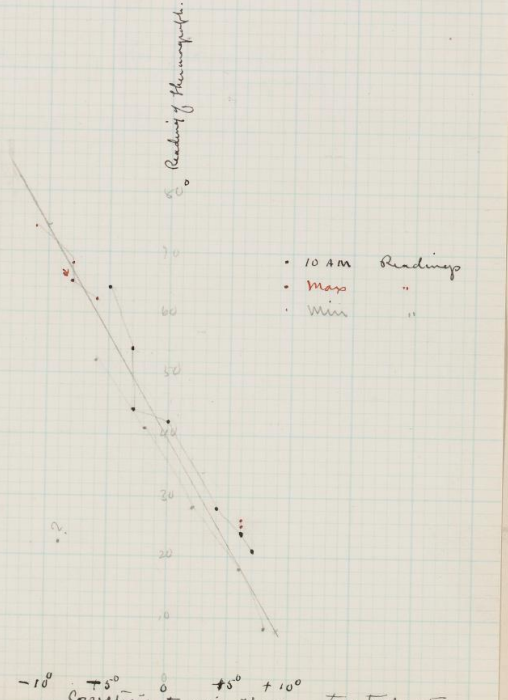


Do not write under the other end

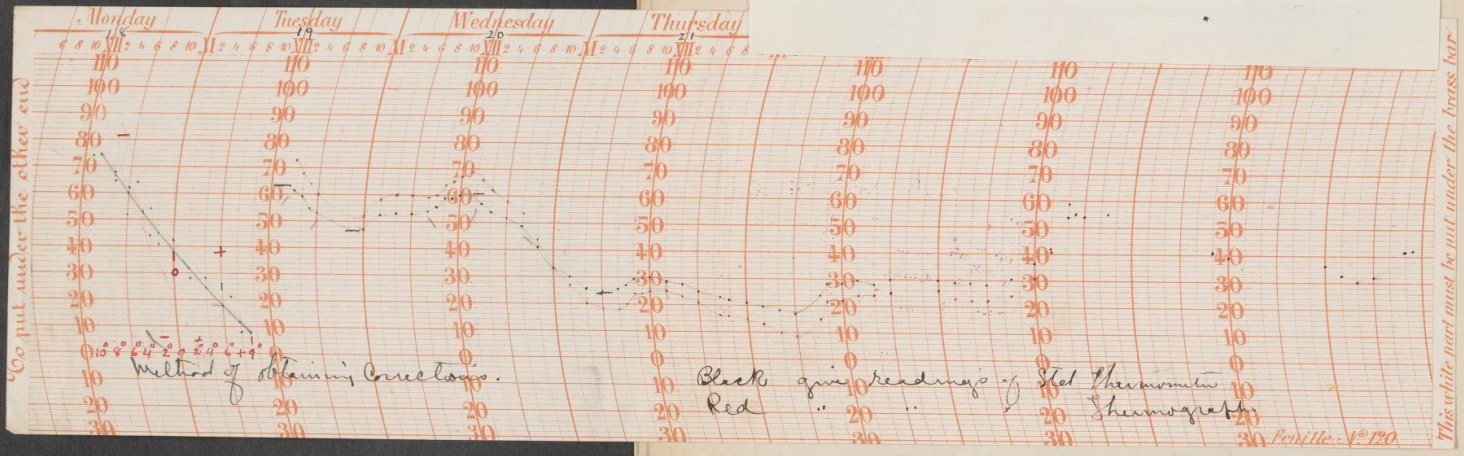
(b-1)

A

Curve for Cor. of Thermg Readings from data given page "a".



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

a

Reading of Thermograph Sheet A.C.O Nov 18-25 1895

	10. A.M. Therm.	Therm.	Cor & Therm.	Noon Therm	Therm.	Cor.	Min Therm.	Therm.	Cor
18	—	—		65	57	-8	—	—	
19	54	51	-3	74	63	-11	41	39	-2
20	64	59	-5	68	60	-8	52	46	-6
21	24	30	+6	25	31	+6	18	24	+6
22	20	28	+7	26	32	+6	08	16	+8
23	28	32	+4	62	56	-6	(22	14?)	(-8?)
24	44	41	-3	—	—	—	—	—	—
25	41	41	0	—	—	—	28	80	+2

The thermograph readings above are made directly from the sheet without reference to those entered in regular Met. records.

From chart ~~(A)~~ A we have following corrections.

Thermog. Reading.	Cr.	Sly R.	Cr.	Sly R.	Cr.
+8°	+9°	31	+2°	53	-5
10°	8	34	+1	58	6
13	7	38	0	62	7
16	6	41	-1	65	8
20	5	45	2	69	9
23	4	48	3	73	10
27	3	51	4	76	
31		55			

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Comparison Readings of Thermograph No 3980 and Std Thermometer Cuba No. 4408

1895 Nov		Thermometer	Thermograph.	1895 Nov		Thermometer	Thermograph.
18	3.50 P	+53.9	+62	21	1.55 A	+30.0	+27
		50.9	56				
19	10. A	~~+61.6~~	~~73~~	"	4.04 A	25.8	20
"	2.54 P	61.6	73	"	6.00 A	24.4	18
"	3.57 P	58.5	68	"	8.04 A	25.5	18
"	5.06 P	54.8	64	"	9.04 A	27.0	20
"	6.05 P	53.0	60	"	10. A	29.7	24
"	11.58 P	47.2	52	"	11.02 A	30.0	24
20	2.06 A	52.4	58	"	11.51 A	29.9	25
"	4.00 A	52.9	60	"	2.13 P	29.0	25
"	6.05 A	53.0	60	"	4.00 P	27.6	23
"	8.00 A	54.0	59	"	6.00 P	25.0 ?	21 ?
"	9.01 A	55.7	60	"	8.40 P	23.2	16
"	10.06 A	59.0	64	"	9.56 P	22.2	16
"	11.03 A	58.7	65	"	12. Midn.	21.2	15
"	11.58 A	60.0	67	22	2.00 A	19.5	13
"	2.47 P	57.2	66	"	4.10 A	18.3	10
"	4.01 P	54.0	62	"	5.55 A	17.2	8
"	6.02 P	52.0	58	"	9.15 A	24.0	15
"	8.02 P	49.0	54	"	10. A	28.4	22
"	9.57 P	41.1	44	"	11.46 A	28.5	22
"	11.50 P	33.3	33	"	1.50 P	29.4	24

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

C

Comparison Readings of Thermograph & Std. Thermometer.

	Thermometer	Thermograph.
403 P	+29.0	+24
6.05 P	30.1	25
12. midn	30.3	26
2.05 A	29.2	23
4.00 A	28.6	23
6.10 A	28.4	22
9.14 A	30.5	24
10. A	32.0	28
11.58 A	36.5	31
2.00 P	42.3	41
4.02 P	54.0	59
5.08 P	55.1	61
6.00 P	54.2	60
8.40 P	55.0	61
10. A	41.0	43
12 Noon	39.0	40
12 midn.	37.2	36
2.10 A	33.3	32
4.10 A	30.5	29
6.00 A	31.8	28
10. A	42.0	43
11.00 A	41.6	42

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

d

Readings of Thermograph Curve Nov 4 – 18, 1895. (Sheets)
Max, Min, & 10 AM readings made. Min Correction
assumed zero. Corrected values in red. Cor. same as for Nov 18-25/95.

1895 Nov.	Max Thermg.	Max Thermometer.		Min. Thermometer		10 A.M. I	10 A.M. Thermometer		10 AM II
	~~60~~ 54	~~53~~							
4	60	53	+1	—		—			
	64			31		53			53
5	73	63	+1	28	30 +1	59	53 0	0	59
	70			47		57			59
6	82	70	0	50	46 +1	64	60 -3	-1	67
	74			49		61			63
7	89	74	0	53	48 +1	70	62 -1	+1	72
	73			57		70			71
8	86	73	0	64	55 +2	82	69 +1	+2	83
	66	66	0	64		65			65
9	76	(43)	*	74	62 +2	75	64 +1	+1	75
	48			44	43	47			47
10	51	47	+1	45	(66) +1	50	46 +1	+1	50
	39			32		36			38
11	39	40	-1	29	31 +1	34	38 -2	0	38
	38			22		32			31
12	38	39	-1	16	22 0	29	33 -1	-2	28
	46			29		38			38
13	49	45	+1	25	24 +5	38	39 -1	-1	38
	48			38		46			45
14	52	49	-1	38	29 +9	49	46 0	-1	47
	48			38		48			48
15	52	50	-2	38	37 +1	52	49 -1	-1	51
	50			38		46			46
16	54	50	0	38	38 0	48	46 0.	0	48
	48			33		40			40
17	52	49	-1	30	33 0	41	41 -1	-1	40
				40		48			49
18				40	40 0	52	50 -2	-1	53

* Shd be transposed.

Correction Curve for Nov 18-25 Used.

Corrections range from −15° to +6°

Some were extrapolated.

I Read from Sheets

II Taken " record.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Jan 2. 1896

At 8 40 P.M. Compared Thermometer Green No 4819 with Standard in Shelter.

Green 4819 +37.°2 Std Therm. +37.2

Comparisons of Thermograph Richard 4071 with Mercurial Green No 4819.

The two instruments were placed on the table in the Laboratory side by side, the thermometer resting horizontally on two parts of its cast board box. Heat turned off. Doors & windows thrown open till instruments became stationary.

	Therm 4071	Green 4819.	
15⁻	+42.0	+ 54.4	All doors & windows closed
20	+42.0	+ 59.6	Immediately after 9 15⁻
25⁻	+43.0	+ 62.2	
30	+44.0	+ 63.5	
35⁻	+44.5⁻	+64.0	
40	+46.0	+64.7	
45⁻	+46.5⁻	+65.0	Opened Registers.
50	+47.0	+66.0	
55⁻	+48.0	+67.0	
0 00	+48.5⁻	+67.6	
0 05⁻	+50.0	+68.0	
0 10	+50.0	+68.4	Rapped Thermgo. Rose 0.5
0 ~~15~~ 11⁻	+51.0	+68.8	
0 15⁻	+51.0	+69.0	

Adjusted instrument for zero orange. Left it in dark room with thermometer, in order to compare occasionally for further adjustment.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924k

1896 Thermograph Experiments.

		R. 4071	S 4819
Jan 3	9.9 A.	56.5	56.5
"	noon	56.0	55.5
"	1.5	40.0	43.6
"	4.3	32.0	37.6

Monday Jan 6th Instruments have been exposed to extremes of temperature for purpose of regulating thermograph.

— AM	−11.	+6.	11 inch down
AM Set	−8	+9	" "

Found pen loose. Tightened it & again exposed in 11 inch down

5.30 P.M.	−7	+6.3

Brought instruments inside with temperature about 70°. Lifted cover of thermograph. Pen rose rapidly almost catching up with thermometer.

5 40 "	53	58.7
5 50 "	62	64.5

Tuesday Jan 7th Thermograph has been regulated to-day

# 3.50 P.M.	15	16.8	11 inch down.

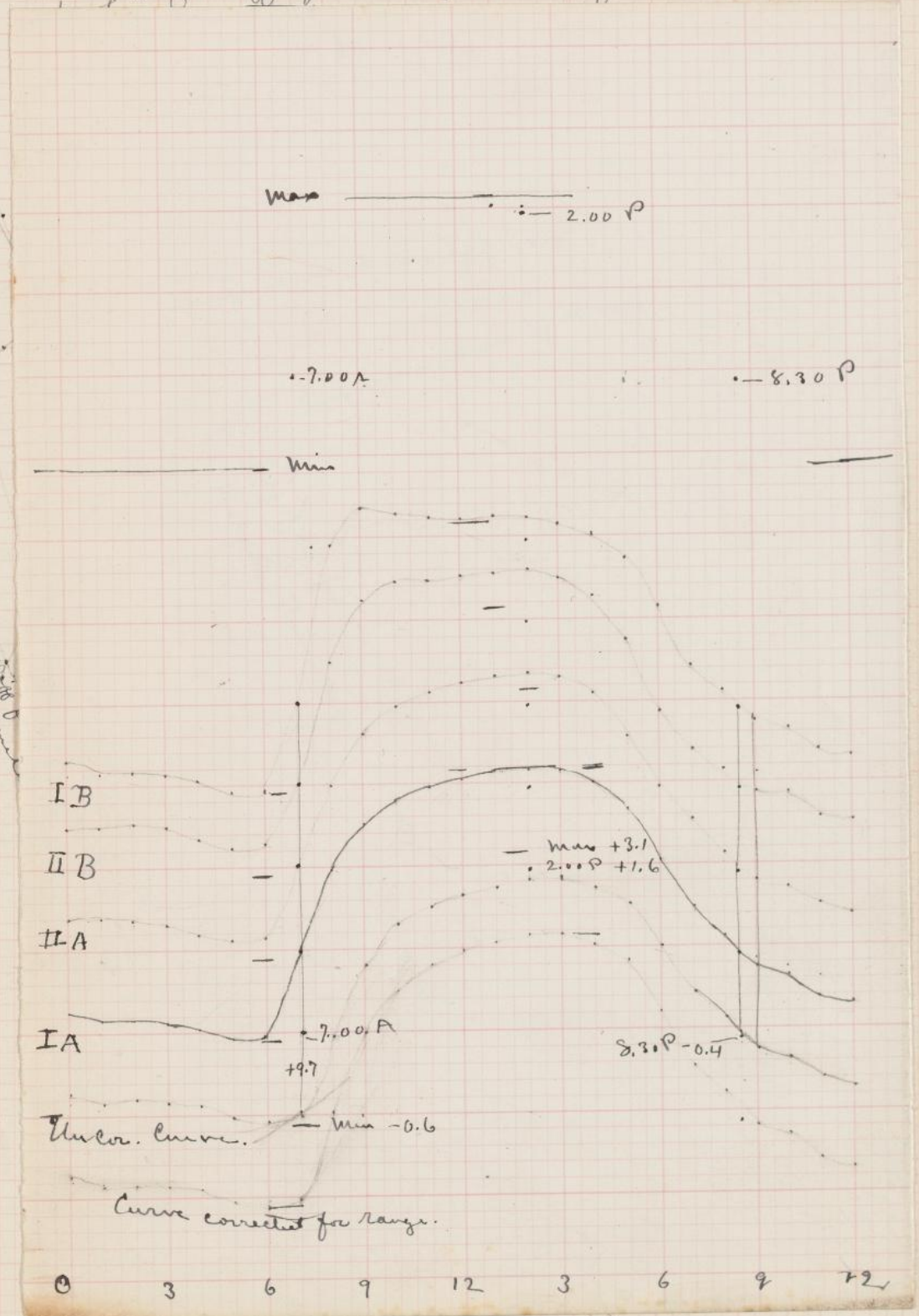
Brought inside. Cover left down. Clock stopped soon after.

3.52	16.	22.
3.55	21.	37.2
4.01	30.0	58.0 ? (53 prob.)
4.05	35.0	58.0
4.11	41.0	61.0
4.15	45.0	62.4
4 20	47.0	63.5
4.25	50.0	64.2 Raised Thermograph.
4.33	54.0	64.9

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj: .924K

Sluggishness of Thermograph. shown by curves of readings & Log of Diff. from Temperature of room which is assumed

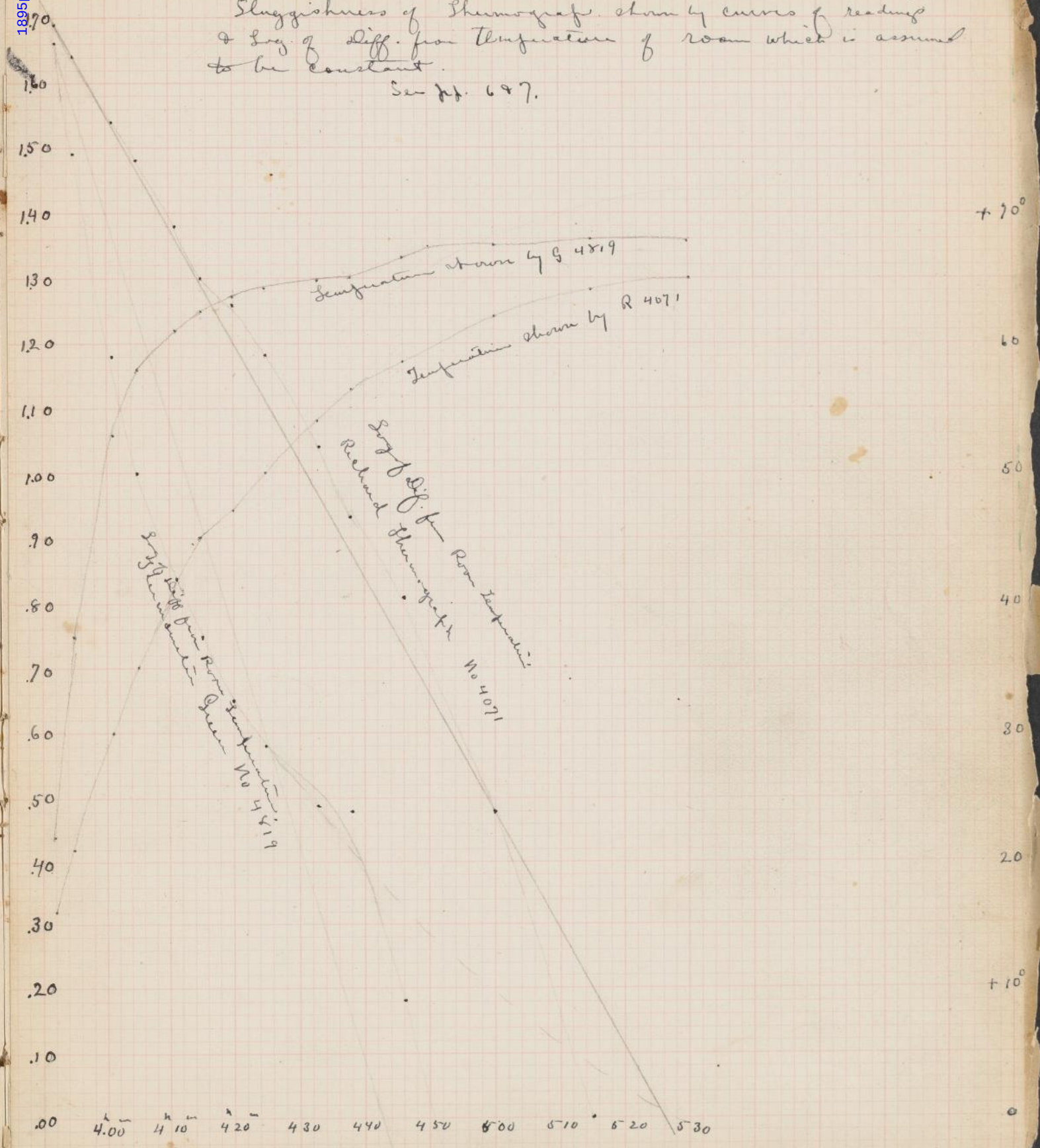


John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj: .924K

Sluggishness of Thermograf. shown by curves of readings & Log. of diff. from temperature of room which is assumed to be constant.

See pp. 687.



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

1896

Jan 4th 4.36. Thermograph Experiments (Continued)
Lifted Cover. Raised pen from paper. Took off cylinder & started clock.

	R 4071	S. 4819	
4 36	56.5	65.0	
4 46	56.5	66.5	
5 00	62.0	67.5	(Pen rose about 1°)
5 15	64.0	68.0	Raffel thermograph after reading
5 30	65.0	67.8	
5 45	66.5	69.0	Raffel Therm. after reading:
6 00	67.5	69.0	

Assume that at 5.30 instruments attained temperature of room. Assume ~~that~~ thermograph needs no corr.s for range. ~~an average correction.~~

~~Temp from 3.50 P.M.~~ ~~R~~ T = Temperature of Room.

t = 65°. t' = 68°

Temp from 3.50 P.M. Diff from final temperature

P.M.	min.	~~t~~ t-y R. 4071	~~t~~ t-y S. 4819	log (t-y)/t	log (t-y)/t'
3.52	2	49.	46.	1.69	1.66
55	5	44.	30.8	1.64	1.49
4.01	11	35	15.0	1.54	1.18
05	15	30.0	10.0	1.48	1.00
11	21	24.0	7.0	1.38	.84
15	25	20.0	5.6	1.30	.75
20	30	18.0	4.5	1.26	.65
25	35	15.0	3.8	1.18	.58
33	43	11.0	3.1	1.04	.49
38	48	8.5	3.0	.93	.48
46	56	6.5	1.5	.81	.18
5 00	70	3.0	0.5	.48	.70 - 1.
15	85	1.0	0.0	.00	
30	100	0	0		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Jan. 9. 1896

~~1 40 P.M~~ Thermograph R. No 4071 has received some repairs. The clamp screw of adjustment for range has been renewed, the old one had its thread so worn as to allow the adjustment to slip. A new pen has also been added.

1 35 P.M Placed R. No 4071 & S 4619 in N with dome

		R 4071	S 4619	
2	35 P.M	24.0	27.0	Brought both instruments in again.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Jan 10 1896.

Richard 4071 has been adjusted approximately for focus point and range.

8h 0m P.M. Set R 4071 & G 4819 on Table in room over library. Placed S. 9784 in 11 inch dome.

8	26	S 9784	24.6		
~~8~~	~~30~~	G 4819	R 4067		
8	30	65.0	65.0	— Taken to 11 inch dome. Cover of Thermograph	
8	33	52.0	62.0	was kept closed.	
	34	43,6	60.5		
	35	38.0	60.0		
	36	34,7	~~58~~.0		
	37	31.8	57.0		
	38	30.0	55.0	S. 9784	27.0
	39	29.0	54.0	G 9784	
	40	28.5	52.5	27.3	
	41	28.0	51.5		
	42	27.4	50.0		
	44	26.7	48.0	26.7	
	46	26.5	46.0	26.5	
	48	26.1	44.0	26.5	
	50	21.0	42.5	26.3	
	55	25.0	39.0	25,2	
9	00	24.8	36.5	25.0	
	10	24.5	33.0	24.8	
	20	24.4	30.5	24.7	
	30	24.4	28.5	24.6	
	40	24.2	27.5	24.4	
	50	24.0	26.0	24.3	
10		23.9	25.5	24.2	

Time for reading.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Jan 10 1896

h	m	G 4819	R 4071	G 9789
10	10	24.0	25.0	24.0
10	20	24.2	24.5	24.0
11	20	22.9	22.5	22.9

We assume that 24.0 is the Temperature to which instrument were exposed.

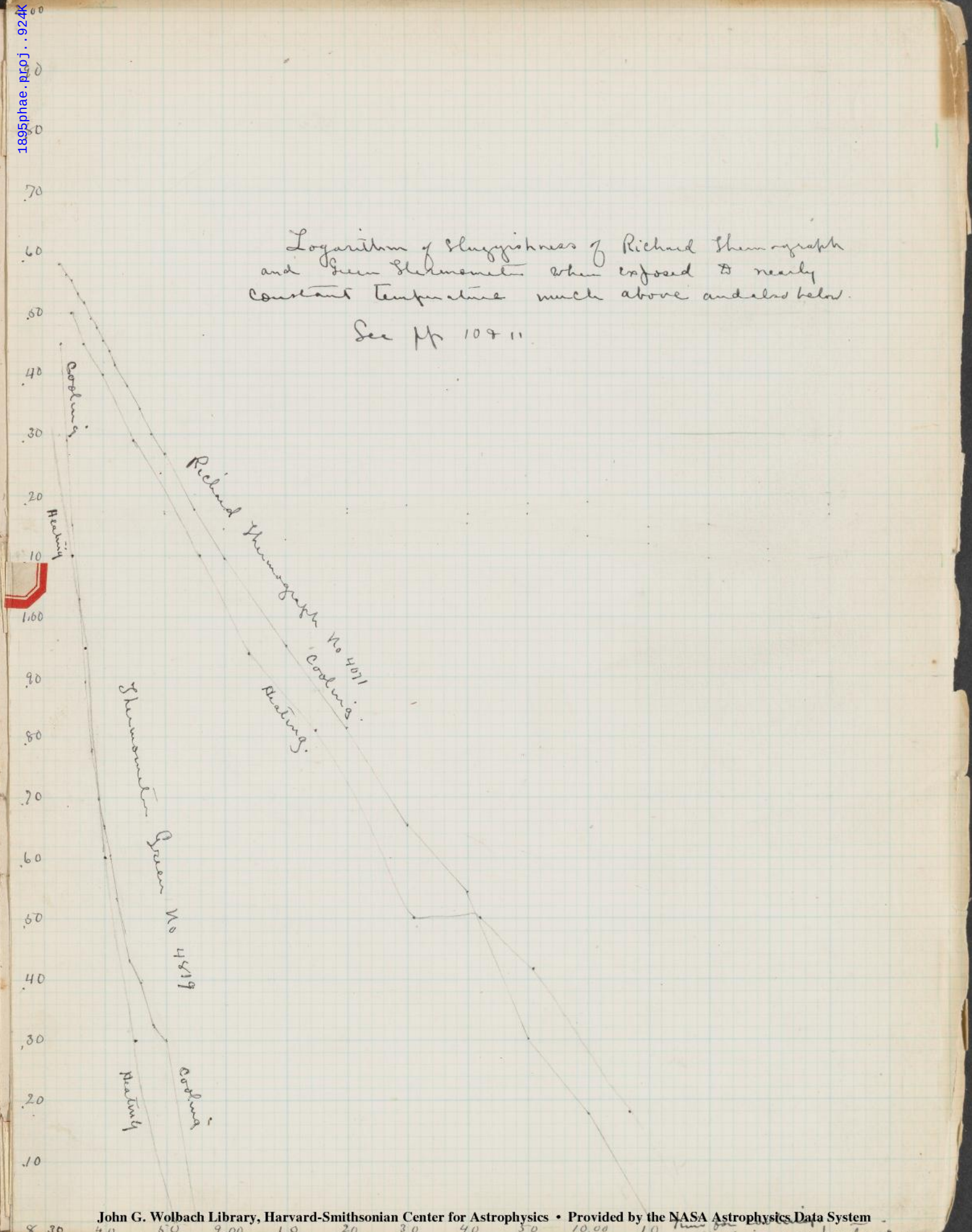
		(t − g) G 4819	(t − g) R 4071	log (t − g) G 4819	log (t − g) R 4071	
8	33	28.0	38.0	1.45	1.58	0
	34	19.6	36.5	1.29	1.56	562
	35	14.0	36.0	1.15	1.56	556
	36	10.7	34.0	1.03	1.53	532
	37	7.8	33.0	.89 (892)	1.52	518
	38	6.0	31.0	.78 (778)	1.49	491
	39	5.0	30.0	.70 (699)	1.48	477
	40	4.5	28.5	.65 (653)	1.46	455
	41	4.0	27.5	.60 (602)	1.44	439
	42	3.4	26.0	.53 (532)	1.42	415
	44	2.7	24.0	.43 (431)	1.38	380
	46	2.5	22.0	.40 (398)	1.34	342
	48	2.1	20.0	32 (322)	1.30	301
	50	2.0	18.5	.30 (301)	1.27	267
	55	1.0	15.0	.00 (001)	1.18	176
9	00		12.5		1.10	097
	10		9.0		.95	954
	20		6.5		.81	813
	30		4.5		.65	653
	40		3.5		.54	544
	50		2.0		.30	301
10	00		1.5		.18	176
	10		1.0		.00	000

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Logarithm of sluggishness of Richard Thermograph and Green Thermometer when exposed to nearly constant temperature much above and also below.

See pp 10 & 11



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

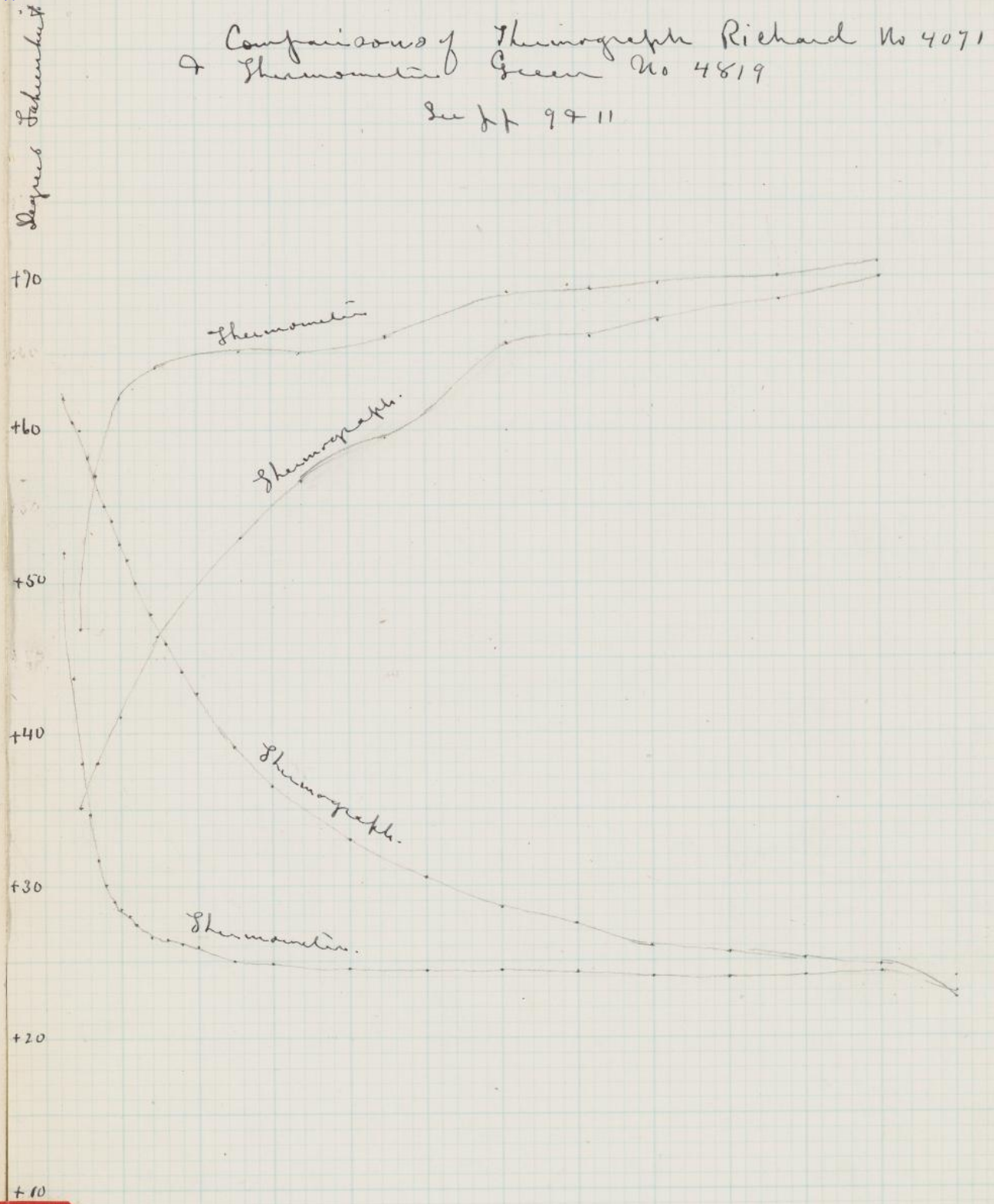
1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Comparisons of Thermograph Richard No 4071
& Thermometer Green No 4819

Sept 9 & 11



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Saturday Jan. 11 1896

		S 4819	R 4071 Cover off for one reading	S. 9789	S 9789 has been in 11 in. down for about six hours.	
11h	+	66.5	68.0	66.5 7 28 (a) above		
		Carried to 11 in down			Cover of thermog. raised. Thermometer resting in bosses	
11	17	53.0	54.0	53.5		
	21	41.0	40.5	41.0 / 32.5		
	28	34.8	34.5	35.5 / 32.2	Assume 32.5 as final Temperature	
11	48	32.6	31.5	32.5 / 32.4		
12	00	32.1	31.5	32.5 / 32.8		
1	10	35.0	34.0	35.0 / 35.4		
1	40	36.0	35.0	36.0		

Instruments brought inside. S 9789 in advance. (7, 10 about)
Cover of thermograph raised often bringing in.

1	42	45.0	39.5	40.	68.0	
	43	53.0	44.0	44.	68.0	
	46	63.0	52.0	51.5	68.0	Assume 68° as final Temp.
	49	66.0	56.0	55.5	68.1	
	55	67.8	60.0	59.0	68.6	
3	00	68.8	70.0	68.5	68.8	

Instruments (4819 & 4071) placed in 11 inch down

4	02	32.8	33.0	34		Brought in side (Cover down)			
4	05	47.0	35.0		66.5	t − y / 4819	t − y / 4071	log (t − y)	
	07	57.0	38.0			12.5	31.5	1.10	1.50
	10	62.0	41.0		66.0	9.0	28.	0.95	1.45
	15	64.0	46.5		65.9	4.0	25.	0.60	1.40
	26	65.0	53.0		65.5	2.0	18.5	0.30	1.29
	34	65.0	56.5		65.3	0.5	12.5	—	1.10
	45	66.0	59.5		66.0		8.8		.94
5	01	69.0	65.5		68.7		6.5		.81
	12	69.2	66.0		69.2		3.2		.50
	21	69.6	67.0		69.6		3.2		50
	37	70.0	68.5		70.0		2.6		.42
5	50	71.0	70.0		71.0		1.5		.18

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Jan. 11 1896

Carried from preceding page.

Cooling of R 4071 & ~~R~~. G. 4819

Cover off from Thermograph.

		G. 4819		R 4071	
		$(t-y)$	$\log(t-y)$	$(t-y)$	$\log(t-y)$
11	17	21.5	1.33	21.0	1.32
	21	8.5	.93	8.5	.93
	28	2.3	.86	3.0	48
	48	0.1	—	.0	—

Warming of

Cover raised.

		G 4819		R 4071	
~~1~~	~~42~~	$(t-y)$	$\log(t-y)$	$(t-y)$	$\log(t-y)$
1	42	23	1.36	28	1.45
	43	15	1.18	24	1.33
	46	5	.70	16.5	1.22
	49	2	30	12.5	1.10
	55	0.2	—	9.0	.95

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Wednesday ... Jan. 13 1896

Sheet (new) placed on Thermograph R. 4071
10 15 (afternoon). Set Thermograph in Shelter on the floor under regular instrument & placed G 4819 beside it.

Date	8 7 min	Thermometers & Thermograph Readings at 8h intervals. Green 4408	Green 4819	Richard 3980	Richard 4071	Remarks.
~~Jan 13~~	~~1.00 P~~					
13	1.00 P	+ 31.5		—	—	7 min check.
"	4.00 P	28.0	28.0	31.5	28.5	
"	7.00 P	23.5	23.8	—	24.0?	
"	10.02 P	21.0	21.0	23.	22.	
14	1.00 A	17.8	—	18.	—	
	4.00 A	16.0	—	16	—	
	6.58 A	12.2	—	10	—	
	10.00 A	22.9	23.0	~~22~~ 24?	20.	
	10.59 A	26.0	26.1	27	24.5	
	12.00 Noon.	27.8	27.8	29	27.	7 min check.
	1.00 P	28.8	—	—	—	
	2.00 P	29.9	29.5	32.5	28.5	
	3.00 P	28.6	28.5	32.0	28.5	
	3.58 P	27.0	27.0	30.	27.5	
	4.55 P	26.7	26.7	29	26.5	
	7.09 P	21.3	—	—	20.8	
	9.55 P	19.8	—	—	20.	
15	12.59 A	16.5	—	16	—	
	4.00 A	14.1	—	13,	—	
	6.58 A	12.2	—	12	—	
	9.56 A	21.6	~~24.6~~	20.5	20	
	10.56 A	23.3	23.2	22.5	22	
	11.58 A	24.6	24.8	24.5	—	7 min Check.
	1.02 P	25.0	25.0	25.5	24	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

1896 Thermometer Thermographs Readings (Continued)

		S 4408	S 4819	R 3980	R. 4071	
~~Jan 15 3.58 P~~						
Jan 15	3.58 P	24.2	24.0	25.5	24.5	
	6.57 P	18.0	18.1	18.5	18.0	
	10.16 P ✓	13.5	—	—	13.	
Jan 16	1.00 A	10.6	—	9.	—	
	4.00 A	8.1	—	5	—	
	7.00 A	4.3	—	0	~~4.0~~ 3.5	
	10.03 A	15.1	15.5	12.	12.5	
	11.04 A	20.3	20.8	19.	18.	
	12.00 Noon	23.0	23.0	22.5	21.5	Time Check
	1.00 P	26.2	24.2 6.6	27.0	24.2	
	3.58 P	28.0	27.9	30.0	28.0	
	7.12 P ✓	21.2	—	—	—	
	10.00 P	22.3	22.5	24? ~~22.0~~	22.0	
Jan 17	1.00 A ~~12.02 P~~	22.7	—	—	22.	
	4.00 A	23.2	—	—	22	
	6.58 A	22.3			21	R4071 at 7.30
	10.12 A ✓	29.8	—	31	—	S4408 shaded.
	12.02 P	36.4	36.5	39.5	35.5	Time check.
	1.05 P	36.4	36.3	40.5	36.5	
	4.00 P	34.6	34.5	39.0	37.0 ?	
	7.16 P ✓	34.0	—	—	34.0	
	11.20 P ✓	34.0	—	—	34.0	R4071 at 12.00
Jan 18	1.00 A	33.5	—	—	33.	
	4.00 A	33.1	—	—	33.	
	6.58 A	28.5	—	—	28	R4071 at 7.30
	10.15 A ✓	27.0	27.4	30	27	R4071 at 11.55 — S4408 shaded
	12.00 Noon	29.0	29.2	30.	28	R4071 at 12 50
	1.08 P ✓	31.9	—	—	30.5	" " 2.00
	4.02 P	30.2	30.1	33.5	30.5	" " 4.55

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Thermometer } Readings (Continued)
Thermograph }

1896		G. 4408	G 4819	R 3980	R 4071	
Jan 18	7.09 P	24.0	—	—	24.0	
	10.00 P	18.8	—	—	18.5	
" 19	1.00 A	16.3	—	—	16.	
	4.00 A	19.1	—	—	18.	
	7.00 A	25.1	—	—	24	R 4071 at 7:45
	10.00 A	30.0	—	32	—	
	1.00 P	—	—	—	—	
	4.01 P	—	—	—	—	
	7.00 P	—	—	—	—	
	10.00 P	—	—	—	—	
" 20	1.00 A	23.2	—	—	23.	
	4.02 A	23.8	—	—	23.5	
	6.58 A	20.4	—	—	20.	R 4071 at 7.45
	9.59 A	20.0	19.9	19.	19.	" " 10.50

20 { Sheets taken from with instruments at 10 30 AM
{ New sheets started. Sun check put on both at 1.10 P.M

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Jan. 23 1896.

Method of Reduction for Thermograph.
(Copied from loose sheets and amended.)

Let

x = Time in hours.
y = Ordinate of curve.
T = Temperature shown by Mercurial Thermometer at x.
$z = T - y$ = Thermograph Correction = Thermometer - Thermograph Reading.
$t = y + a + by$ = Thermograph reading Corrected for zero and scale.
$T - t$ = Sluggishness of Thermograph.

By Newton's law

$$\frac{dt}{dx} = (b+1)\frac{dy}{dx} = m(T-t)$$

If we put $m = \frac{1}{c}$

Then $$T - t = c(b+1)\frac{dy}{dx}.$$

and

$$Z = T - y = a + by + c(b+1)\frac{dy}{dx}.$$

Theoretically c should be the reciprocal of the constant of cooling taken for same unit of time as x. Practically it may include a correction for time and to vary. For example if there was no sluggishness, $c(b+1)$ would show approximately what part of an hour the cylinder was fast or slow. The error would be in the amount of divergence of tangent from curve.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Method of Reduction of Thermograph (Continued)

$\frac{dy}{dx}$ may be determined by differentiating an empirical Equation for the diurnal temperature; by plotting the curve and finding rate of tangent line per hour; or by method of differences. The first difference or the mean of those preceding and following ($\frac{1}{2}$ diff of 2 hours) will be a close approximation.

I At max. and min. $\frac{dy}{dx} = 0$, therefore these points enable us to determine a and b. With ~~these values of~~ thus found a and b, determine values of c for increasing and decreasing temperatures, from morning and evening readings.

or,

II Accept only b from max and min. Then find a and c from morning and evening readings. On account of time correction, and also convenience in application, a uniform value of c appears desirable.

or

III If we wish to exclude max. and min. thermometers, we can solve equations at the three daily readings for a, b and c. This will be simplified by assuming $\frac{dy}{dx} = 0$ for 2.00 P.M. The 2.00 P.M. reading serves to check I and II; max. and min check III.

or

IV We might make a least square solution of 5 eqs for a, b, and c.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Reduction of Thermograph (continued)

The following page gives reductions of Thermograph record at Augusta for week Sept 2 – 8 – 1889. Made according to methods outlined on page 17. Two cases are made under each head. A when 1st differences are used; B when mean differences are used.

Z = 7.00 A 2.00 P
+6.4

I A. $a = -6°.7$ $b = +.135$ $c = +1.00$ & $+.17$

Z(increasing temp.) $= -6°.7 + .135y + 1.14 \frac{dy}{dx}$

Z(decreasing temp.) $= -6°.7 + .135y + .19 \frac{dy}{dx}$

I B. $a = -6°.7$ $b = +.135$ $c = +1.86$ and $+.17$

Z(increasing temp.) $= -6°.7 + .135y + 2.11 \frac{dy}{dx}$

Z(decreasing temp.) $= -6°.7 + .135y + .19 \frac{dy}{dx}$

II A. $a = -4.2$ $b = +.135$ $c = +.77$

$Z = -4°.2 + .135y + .87 \frac{dy}{dx}$

II B. $a = -2°.6$ $b = +.135$ $c = +1.10$

$Z = -2°.6 + .135y + 1.30 \frac{dy}{dx}$

III A. $a = +5°.0$ $b = -.061$ $c = +.79$

$Z = +5°.0 - .061y + .74 \frac{dy}{dx}$.

B. $a = +9.2$ $b = -.123$ $c = +1.18$

$Z = +9°.2 - .123y + 1.04 \frac{dy}{dx}$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Hour.	Maximal Thermometer.	Thermograph Maximal.	1st Diff.	Mean Diff. on ½ Diff. of Prec. & following hour.	Diff. from Tangent Line. (T = .136)	T	y + a + by (a = −6.7)	I A	I B	y + a + by a = −9.2 b = +1.35	II A	y + a + by a = −2.6 b = +1.35	II B	III A	III B
							−1.0	+0.2	−0.1	+1.5	+0.2	+3.1	−0.5		
1 A.M		41.9	+0.2	−0.4	0	5.7	40.9	41.1	40.8	43.4	43.6	45.0	44.5		
							−1.0	−0.1	0	+1.5	−0.3	+3.1	−0.1		
2		42.1	−0.4	−0.1	0	5.7	41.1	41.0	41.1	43.6	43.3	45.2	45.1		
							−1.0	−0.1	−0.1	+1.5	−0.3	+3.1	−0.5		
3		41.7	−0.4	−0.4	−0.4	5.7	40.7	40.6	40.6	43.2	42.9	44.8	44.3		
							−1.1	−0.3	−0.2	+1.4	−1.2	+3.0	−1.2		
4		41.3	−1.4	−0.9	−1.4	5.6	40.2	39.9	40.0	42.7	41.5	44.3	43.1		
							−1.3	−0.1	−0.2	+1.2	+0.3	+2.8	−1.0		
5		39.9	−0.3	−0.8	−0.4	5.4	38.6	38.5	38.4	41.1	40.8	42.7	41.7		
	min.						−1.3	+0.8	+0.4	+1.2	+0.6	+2.8	+0.3		
6	38.3	39.6	+0.7	+0.2	0	5.4	38.3	39.1	38.7	40.8	41.4	42.4	42.7		44.1
							−1.2	+10.6	+10.6	+1.3	+8.1	+2.9	+6.3		
7	49.7	40.3	+9.3	+5.0	+3.0	5.5	39.1	49.7	49.7	41.6	49.7	43.2	49.7		49.7
							0	+9.7	+16.8	+2.5	+7.4	+4.1	+11.6		
8		49.6	+8.5	+8.9	+9.0	6.7	49.6	59.3	68.4	52.1	59.5	53.7	65.3		
							+1.2	+5.2	+13.9	+3.7	+4.0	+5.3	+6.6		
9		58.1	+4.6	+6.6	+6.0	7.9	59.3	64.5	73.2	61.8	65.8	63.4	72.0		
							+1.8	+3.0	+7.6	+4.3	+2.3	+5.9	+4.7		
10		62.7	+2.6	+3.6	+3.3	8.5	64.5	67.5	72.3	67.0	69.3	68.6	73.3		
							+2.2	+1.6	+4.2	+4.7	+1.2	+4.3	+2.6		
11		65.3	+1.4	+2.0	+2.0	8.9	67.5	69.1	71.7	70.6	71.2	71.6	74.2		
							+2.4	+1.0	+2.5	+4.9	+0.8	+0.5	+1.6		
12		66.7	+0.9	+1.2	+1.3	9.1	69.1	70.1	71.6	71.3	72.1	73.2	74.8		
							+2.5	+0.5	+1.7	+5.0	+0.6	+1.6	+1.3		
1 P.M		67.6	+0.7	+0.8	+0.8	9.2	70.1	70.9	71.8	72.6	73.2	74.2	75.2		
							+2.6	+0.1	+0.8	+5.1	+0.1	+1.7	+0.5		
2	69.1	68.3	+0.1	+0.4	+0.3	9.3	70.9	71.0	71.7	73.4	73.5	75.0	75.5		69.5
	max.						+2.6	−0.2	−0.1	+5.1	−0.7	+1.7	−0.5		
3	71.0	68.4	−0.8	−0.4	−0.3	9.3	71.0	70.8	70.9	73.5	72.8	75.1	74.6		68.8
							+2.5	−0.4	−0.3	+5.0	−1.7	+1.6	−1.8		
4		67.6	−2.0	−1.4	−1.6	9.2	70.1	69.7	69.8	72.6	70.9	74.2	72.4		
							+2.2	−1.1	−0.7	+4.7	−4.9	+1.3	−4.9		
5		65.6	−5.6	−3.8	−3.3	8.9	67.8	66.7	67.1	70.3	65.4	71.9	67.0		
							+1.5	−1.1	−1.7	+4.0	−5.0	+5.6	−7.3		
6		60.0	−5.7	−5.6	−5.4	8.2	61.5	60.4	60.4	64.0	59.0	65.6	58.3		
							+0.7	−0.6	−0.4	+3.2	−2.6	+4.8	−5.7		
7		54.3	−3.0	−4.4	−4.0	7.4	55.0	54.4	54.2	57.5	54.9	59.1	53.4		
							+0.3	−0.7	−0.6	+2.8	−3.2	+4.4	−4.4		
8		51.3	−3.7	−3.4	−3.3	7.0	51.6	50.9	51.0	54.1	50.9	55.7	51.3		
							0	−0.7	−0.7	+2.5	−3.1	+4.1	−4.8		
8.30	48.7	49.4	−3.6	−3.7	−2.6	6.7	49.4	48.7	48.7	51.9	48.8	53.5	48.7		48.7
							−0.2	−0.2	−0.4	+2.3	−0.8	+3.9	−3.0		
9		47.6	−0.9	−2.3	−2.0	6.5	47.4	47.2	47.0	49.9	49.1	51.5	48.5		
							−0.3	−0.5	−0.3	+2.2	−2.3	+3.8	−2.3		
10		46.7	−2.6	−1.8	−1.3	6.4	46.4	45.9	46.1	48.9	46.6	50.5	48.2		
							−0.7	−0.2	−0.3	+1.8	−1.0	+3.4	−2.3		
11		44.1	−1.1	−1.8	−0.5	6.0	43.4	43.2	43.1	45.9	44.9	47.5	45.2		
							−0.9	−0.2	−0.2	+1.6	−1.0	+3.2	−1.4		
12		43.0	−1.1	−1.1	−1.7	5.8	42.1	41.9	41.9	44.6	43.6	46.2	448		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Reduction of Thermographs (continued)

From page 16 we have

$$T = y + a + by + c(b+1)\frac{dy}{dx}$$

More convenient for use when a b & c are known is

$$T = a + (b+1)\left(y + c\frac{dy}{dx}\right)$$

When corrections are made 1st for sluggishness; 2nd for scale, 3rd for zero.

Mean Temperature for diurnal period may be expressed

$$\text{Mean Temp.} = \frac{\int_{x=\text{midnight}}^{12.\text{midnight}} T\,dx}{x}$$

$$\int T\,dx = \int (a\,dx + (b+1)y\,dx + c\,dy = ax + (b+1)\int y\,dx + cy + C.$$

Whence it is seen that with a constant value for c, sluggishness does not introduce error into daily mean. Since y has same value for both limits.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

22

1896

Hourly Readings, Richard Thermograph 3980.

Jan.	13	Diff.	14		15		16		17		18		19		20	
1 AM			18	-0.5	16	-1.5	9	-2.0	24	0	37	0	17	-1.0	25	-0.5
2			17.5	-0.5	14.5	-0.5	7	-0.5	24	0	37	0	16	+1.0	24.5	0
3			17.	-1.0	14	-1.0	6.5	-1.0	24	0	37	0	17	+1.0	24.5	0
4			16	-2.0	13	-0.5	5.5	-1.0	24	-1.5	37	-3.0	18	+2.0	24.5	0
5			14	-2.0	12.5	-0.5	4.5	-1.5	22.5	0	34	-2.0	20	+2.0	24.5	-1.0
6			12	-1.0	12	0	3.	-2.0	22.5	0	32	-1.0	22	+4.0	23.5	-2.5
7			11	+2.0	12	+1.0	1.	0.	22.5	-0.5	31	-0.5	26	+1.0	21	-1.0
8			13	+6.0	13	+3.0	1.	+6.0	22	+4.0	30.5	-0.5	27	+2.0	20	-0.5
9			19	+5.0	16	+4.5	7	+5.0	26	+4.0	30	-1.0	29	+2.0	19.5	0
10			24	+6.0	20.5	+2.5	12	+7.0	30	+6.0	29	+0.5	31	+2.0	19.5	
11			28	+2.0	23	+1.5	19	+8.5	36	+3.5	29.5	+1.0	33	0		
12			30	+1.0	24.5	+1.5	22.5	+4.5	39.5	+1.0	30.5	+3.5	33	-1.0		
1 P.M			31	+1.0	26	0	27	+5.0	40.5	0	34	+2.0	32	0		
2			32	-0.5	26	0	32	+1.0	40.5	-0.5	36	-1.0	32	0		
3	34	-2.5	31.5	-1.5	26	0	33	-2.0	40	-1.0	35	-2.0	32	-1		
4	31.5	-2.5	30	-1.0	26	-2.0	31	-2.0	39	-1.0	33	-3.0	31	-1.5		
5	29.	-2.5	29	-2.0	24	-3.0	29	-3.0	38	-2.0	30	-2.0	29.5	-0.5		
6	26.5	-0.5	27	-3.0	21	-3.0	26	-1.0	36	+1.5	28	-2.0	29	-1.0		
7	26	-0.5	24	-3.0	18	-0.5	25	-2.0	37.5	+0.5	26	-2.0	28	-0.5		
8	25.5	-0.5	21	0	17.5	-1.5	23	+1.0	38	0	24	-2.0	27.5	-0.5		
9	25	-2.0	21	-0.5	16	-2.5	24	0	38	0	22	-3.0	27	0		
10	23	-2.0	20.5	-0.5	13.5	-1.5	24	-0.5	38	0	19	-0.5	27	-0.5		
11	21	-1.0	19	-1.5	12	-1.5	23.5	0	38	0	18.5	-0.5	26.5	-0.5		
12	20	-2.0	17.5	-1.5	10.5	-1.5	23.5	+0.5	38	-1.0	18	-1.0	26	-1.0		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Hourly Readings, Richard Thermograph 4071

1896

Jan	13	Diff	14		15		16		17		18		19		20	20
1 AM			18	-0.5	16	-1.0	11	-2.0	22.5	0	33.5	0	16.5	-0.5	23	0
2			17.5	-1.0	15	-1.0	9	-1.0	22.5	0	33.5	0	16	+1.0	23	0
3			16.5	0	14	-0.5	8	-0.5	22.5	0	33.5	0	17	+1.0	23	+0.5
4			16.5	-1.5	13.5	-0.5	7.5	-1.0	22.5	-0.5	33.5	-2.5	18	+1.5	23.5	-1.0
5			15	-2.0	13	-0.5	6.5	-1.5	21	+0.5	31	-2.0	19.5	+2.5	22.5	-0.5
6			13	-1.0	12.5	-0.5	5	-1.5	21.5	0	29	-0.5	22	+2.0	22	-2.0
7			12	+0.5	12	+0.5	3.5	+0.5	21.5	-0.5	28.5	-0.5	24	+2.0	20	-1.0
8			12.5	+3.5	12.5	+4.5	4	+4.0	21	+3.0	28	-0.5	26	+1.5	19	0
9			16	+4.0	17	+3.0	8	+4.5	24	+3.5	27.5	-0.5	27.5	+2.0	19	0
10			20	+5.0	20	+2.0	12.5	+5.5	27.5	+4.5	27	0	29.5	+0.5	19	—
11			25	+2.0	22	+2.0	18	+3.5	32	+3.5	27	+1.0	30	0		
12	31	+0.5	27	+1.5	24	+0.5	21.5	+3.5	35.5	+1.0	28	+2.0	30	0		
1 PM	31.5	+0.5	28.5	+0.5	24.5	0	25	+4.0	36.5	0	30	+2.0	30	-0.5		
2	32	-1.5	29	-0.5	24.5	0	29	-0	36.5	0	32	-0.5	29.5	-0.5		
3	30.5	-1.5	28.5	-1.0	24.5	-0.5	29	-1.0	36.5	-1.0	31.5	-1.0	29	-1.0		
4	29	-2.0	27.5	-1.0	24	-2.5	28	-1.5	35.5	-1.5	30.5	-2.0	28	-1.0		
5	27	-2.0	26.5	-2.0	21.5	-2.5	26.5	-2.5	34	-1.0	28.5	-2.0	27	-1.0		
6	25	-1.0	24.5	-2.5	19	-1.0	24	-2.0	33	+0.5	26.5	-1.5	26	-0.5		
7	24	0	22	-1.5	18	-1.0	22	+0.5	33.5	+0.5	25	-2.0	25.5	-0.5		
8	24	-1.0	20.5	0	17	-2.0	22.5	+0.5	34	0	23	-2.0	25	0		
9	23	-1.0	20.5	-0.5	15	-1.0	23	-0.5	34	0	21	-2.0	25	0		
10	22	-2.5	20	-2.0	14	-2.0	22.5	-0.5	34	0	19	-1.5	23	-2.0		
11	19.5	-0.5	18	-0.5	12	-0.5	22	+0.5	34	0	18.5	-1.0	23	-1.0		
12	19	-1.0	17.5	-1.5	11.5	-0.5	22.5	0	34	-0.5	17.5	-1.0	22	+1.0		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Thermograph Readings & Reductions (p 13 - 15) (p 22, 23)

Date & Time 1896	G. 4408	G. 4819	Eye Obs. R 3980	Eye Obs. R 4071	R 2980 (Accepted values from this sheet)	d/dt	Z	R 4071 (Accepted values from this sheet)	d/dt	Z
Jan 13. 1.00 P	+31.5	—	—	—	—	—	—	31.5	+0.5	0
4.00 P	28.0	28.0	31.5	28.5	31.5	-2.5	-3.5	29	-2.0	-1.0
7.00 P	23.5	23.8	—	24.0?	26	-0.5	-2.5	24	0	-0.5
10.02 P	21.0	21.0	23	22	23	-2.0	-2.0	22	-2.5	-1.0
Jan 14 1.00 A	17.8	—	18	—	18	-0.5	-0.2	18	-0.5	-0.2
4.00 A	16.0	—	16	—	16	-2.0	0	16.5	-1.5	-0.8
6.58 A	12.2	—	10	—	11	+2.0	+1.2	12	+0.5	+0.2
10.00 A	22.9	23.0	24?	20	24	+6.0	-1.1	20	+5.0	+2.9
10.59 A	26.0	26.1	27	24.5	28	+2.0	-2.0	25	+2.0	+1.0
12.00 M	27.8	27.8	29	27	30	+1.0	-2.2	27	+1.5	+0.8
1.00 P	28.8	—	—	—	31	+1.0	-2.2	28.5	+0.5	+0.3
2.00 P	29.9	29.5	32.5	28.5	32	-0.5	-2.1	29	-0.5	+0.9
3.00 P	28.6	28.5	32.0	28.5	31.5	-1.5	-2.9	28.5	-1.0	+0.1
3.58 P	27.0	27.0	30	27.5	30	-1.0	-3.0	27.5	-1.0	-0.5
4.57 P	26.7	26.7	29	26.5	29	-2.0	-2.3	26.5	-2.0	+0.2
7.09 P	21.3	—	—	20.8	23	-3.0	-1.7	21.5	-1.5	-0.2
9.55 P	19.8	—	—	20	20.5	-1.5	0 -1.7	20	-2.0	-0.2
Jan 15 12.59 A	16.5	—	16	—	16	-1.5	+0.5	16	-1.0	+0.5
4.00 A	14.1	—	13	—	13	-0.5	+1.1	13.5	-0.5	+0.6
6.58 A	12.2	~~12.~~	12	—	12	+1.0	+0.2	12	+0.5	+0.2
9.56 A	21.6	21.6	20.5	20	20.5	+2.5	+1.1	20	+2.0	+1.6
10.56 A	23.3	23.2	22.5	22	23	+1.5	+0.3	22	+2.0	+1.3
11.58 A	24.6	24.8	24.5	—	~~25~~ 24.5	+1.5	+0.1	24	+0.5	+0.6
1.02 P	25.0	25.0	25.5	24	26	0	-1.0	24.5	0	+0.5
3.58 P	24.2	24.0	25.5	24.5	26	-2.0	-1.8	24	-2.5	+0.2
6.57 P	18.0	18.1	18.5	18	18	-0.5	0	18	-1.0	0
10.46 P	13.5	—	—	13	13	-1.5	+0.5	13	-2.0	+0.5
Jan 16 1.00 A	10.6	—	9	—	9	-2.0	+1.6	11	-2.0	-0.4
4.00 A	8.1	—	5	—	5.5	-1.0	+2.6	7.5	-1.0	+0.6
7.00 A	4.3	—	0	—	1	0	+3.3	3.5	+0.5	+0.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thermograph Comparisons & Reductions (N. 13-15, 22, 23) 25

		G 4408	G 4819	R 3980 (by Obs.)	R 4071 (by Obs.)	R 3980 (deep-well thermograph)	Δ/Δ	ν	R 4071 (deep-well thermograph)	Δ/Δ	ν
1896											
Jan 16	10.03 A	15.1	15.5	12	12.5	12	+1.0	+3.5	12.5	+5.5	+2.6
	11.04 A	20.3	20.8	19	18	19	+3.5	+1.3	18	+3.5	+2.3
	12.00 M	23.0	23.0	22.5	21.5	22.5	+4.5	+0.5	21.5	+3.5	+1.5
	1.00 P	26.2	26.6	27.0	24.2	27	+5.0	-0.8	25	+4.0	+1.2
	3.58 P	28.0	27.9	30.0	28.0	31	-2.0	-3.0	28	-1.5	0
	7.12 P	21.2	—	—	—	23	-2.0	-1.8	22	+0.5	-0.8
	10.00 P	22.3	22.5	24?	22.0	24	-0.5	-1.7	22.5	-0.5	-0.2
Jan 17	1.00 A	22.7	—	—	22	24	0	-1.3	22.5	0	+0.2
	4.00 A	23.2	—	—	22	24	-1.5	-0.8	22.5	-0.5	+0.7
	6.58 A	22.3	—	—	21	22.5	-0.5	-0.2	21.5	-0.5	+0.8
	10.12 A	29.8	—	31	—	31	+6.0	-1.2	29	+4.5	+0.8
	12.02 P	36.4	36.5	39.5	35.5	39.5	+1.0	-3.1	35.5	+1.0	+0.9
	1.05 P	36.4	36.3	40.5	36.5	40.5	0	-4.1	36.5	0	-0.1
	4.00 P	34.6	34.5	39.0	37.2	39	-1.0	-4.4	35.5	-1.5	-0.9
	7.16 P	34.0	—	—	34.0	38	+0.5	-4.0	34	+0.5	0
	11.20 P	34.0	—	—	34.0	38	0	-4.0	34	0	0
Jan 18	1.00 A	33.5	—	—	33	37	0	-3.5	33.5	0	+0.5
	4.00 A	33.1	—	—	33	37	-3.0	-5.6	33.5	-2.5	-0.4
	6.58 A	28.5	—	—	28	31	-0.5	-2.5	28.5	-0.5	+0.5
	10.15 A	27.0	27.4	30	27	29	+0.5	-2.0	27	0	0
	12.00 M	29.0	29.2	30	28	30.5	+3.5	-1.5	28	+3.0	+1.0
	1.08 P	31.9	—	30.5	35	30.5	+2.0	-3.1	30.5	+2.0	+1.4
	4.02 P	30.2	30.1	33	30.5	33	-3.0	-2.8	30.5	-2.0	-0.3
	7.09 P	24.0	—	—	24.0	26	-2.0	-2.0	24.5	-2.0	-0.5
	10.00 P	18.8	—	—	18.5	19	-0.5	-0.2	19	-1.5	+0.3
Jan 19	1.00 A	16.3	—	—	16	17	-1.0	-0.7	16.5	-0.5	-0.2
	4.00 A	19.1	—	—	18	18	+2.0	+1.1	18	+1.5	+0.3
	7.00 A	25.1	—	—	24	26	+1.0	-0.9	24	+2.0	+1.1
	10.20 A	30.0	—	32	—	32	+2.0	-2.0	30	+0.5	0
Jan 20	1.00 A	23.2	—	—	23	25	-0.5	-1.8	23	0	+0.2
	4.02 A	23.8	—	—	23.5	24.5	0	-0.7	23.5	-1.0	+0.3
	6.58 A	20.4	—	—	20	21	-1.0	-0.6	20	-1.0	+0.4
	9.58 A	20.0	19.9	19	19	19.5	—	+0.5	19	—	+1.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

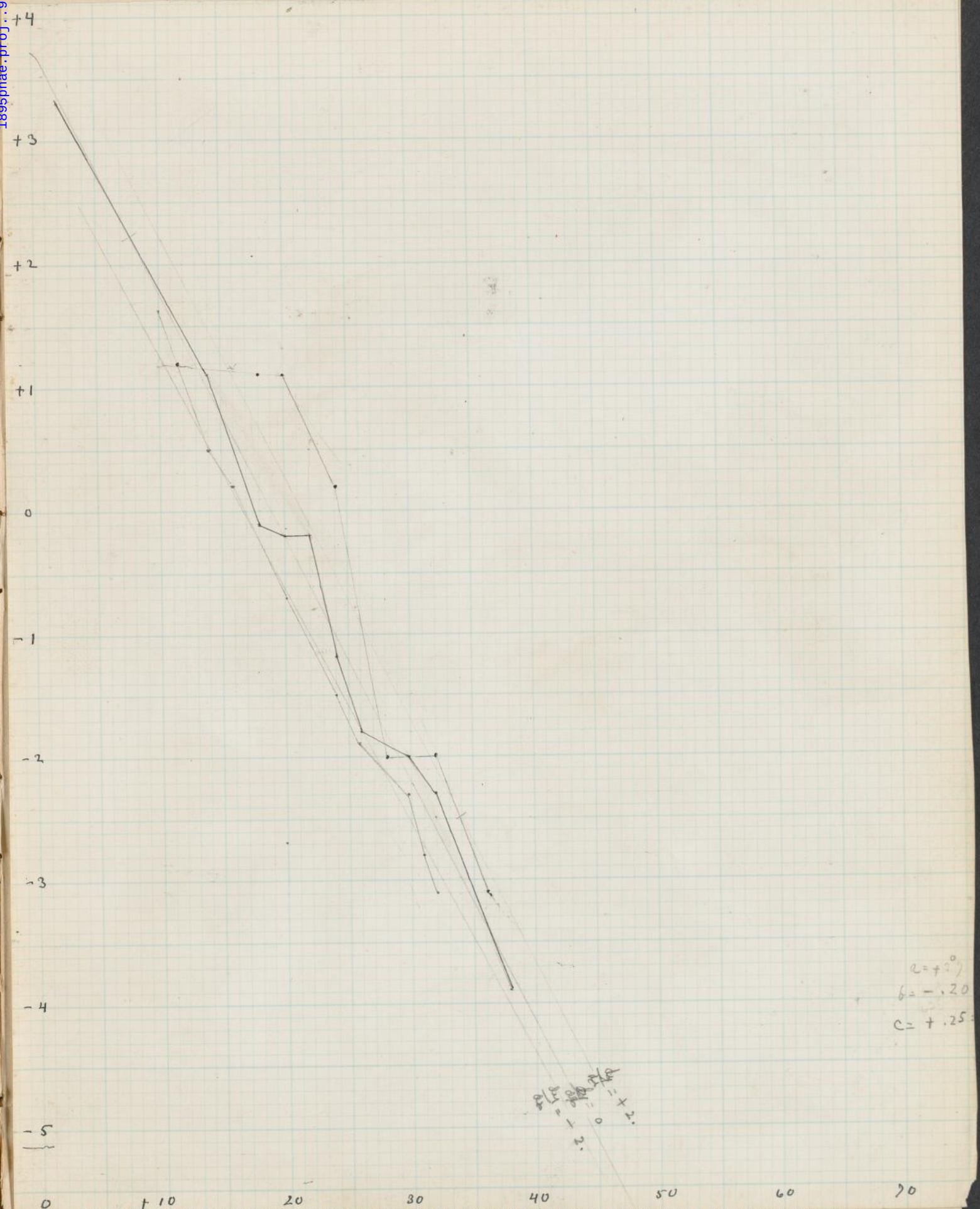
Thermograph Corrections for Richard 3980,
arranged according to Reading & 1st Diff. (for time)

y =	2°	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
−4															−1.5					
−3												−1.7					−2.8		−5.6	
−2					+1.6		+0.5	0 +0.5 3|+0.5 +0.2		−0.7		−2.0 −1.8 −0.8 3|−4.6 −1.5	−1.8 −2.0 3|−3.8 −1.9		−2.3	−3.5 −2.9 −3.0 3|−9.4 −3.1				
−1			+2.6						−0.7		−0.6				−3.0					−4.4
0	+3.3						+1.1		−0.2 0 2|−0.2 −0.1	−0.2	−0.2	−1.7 −1.3 −0.7 3|−3.7 −1.2	−2.5 −1.0 −1.8 3|−5.3 −1.8	−	−2.0	−2.5 −2.1 2|4.6 −2.3			−4.0 −4.0 −3.5 3|11.8 −3.9	
+1						+0.2							−0.9		−2.2	−2.2 −2.1 3|−4.3 −2.2				−3.1
+2						+1.2			+1.1	+1.1		+0.3 +0.1 3|+0.4 +0.2		−2.0		−2.0		−2.1		
+3																				
+4										+1.3	+0.5									
+5													+0.8	−0.8						
+6												−1.1				−1.2				
+7						+3.5														

$\frac{dy}{d\lambda}$ = 1st Diff.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

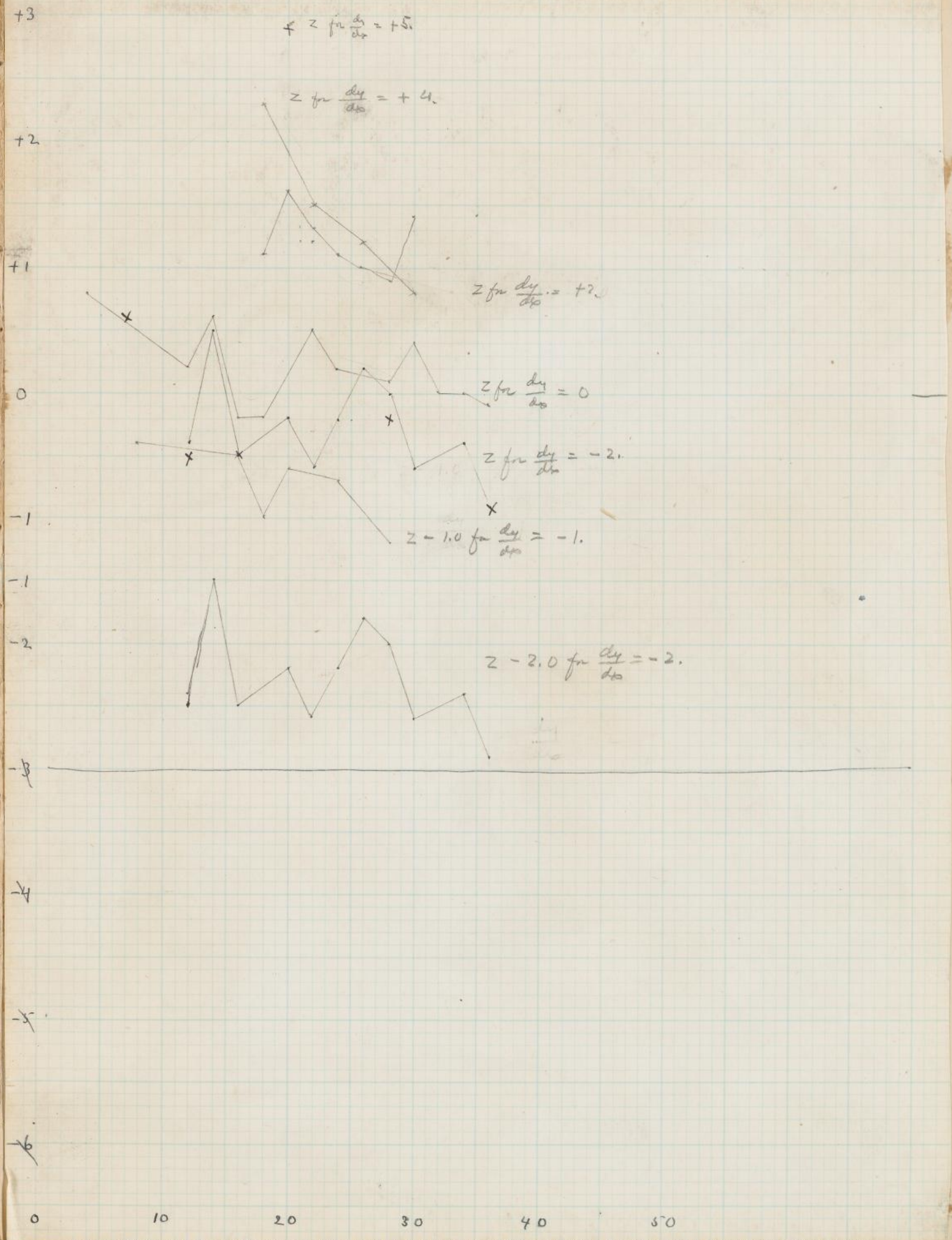
28

Thermograph Correction for Richard 4071
arranged according to Reading & 1st diff.

$\frac{dy}{dx}$ = 1st diff.	y = 2°	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
−2						−0.6	+0.5	−0.5		−0.2 −0.2 Σ −0.4 −0.2	−1.0 −0.2 Σ 1.2 −0.6	+0.2 −0.5 Σ +0.3 −0.2	+0.2	0	−1.0 −0.3 Σ 1.3 −0.6		−0.4	−0.9		
−1				+0.6				+0.5	0	+0.4		+0.3		+0.1 −0.5 Σ 0.4 −0.2						
0		+0.8				+0.2 +0.2 Σ 1.4 +0.2	+0.6	−0.2	−0.2	+0.8 −0.2 +0.2 +0.7 +0.8	+0.8 −0.2 +0.2 +0.7 +0.8 Σ 2.5 +0.5	−0.5 −0.6 +0.5 +0.2 Σ 1.8 +0.2		+0.3 0 0 Σ .3 +0.1	+0.9 0	0	0 0 0 0	−0.1		
+1																		+0.9		
+2									+1.1	+1.6	+1.3	+1.1	+1.0	+0.8 +1.0 Σ 1.8 +0.9	+1.4					
+3																				
+4									+2.3		+1.5		+1.2		+0.8					
+5										+2.9										
+6						+2.6														

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1005phac.proj .924K



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Feb. 1 1896

Thermograph Comparisons made in room with varying Temperatures: Both thermometers, in their boxes with bulbs projecting. S 4819, was placed on top of Thermograph which with S 9789 rested on same surface.

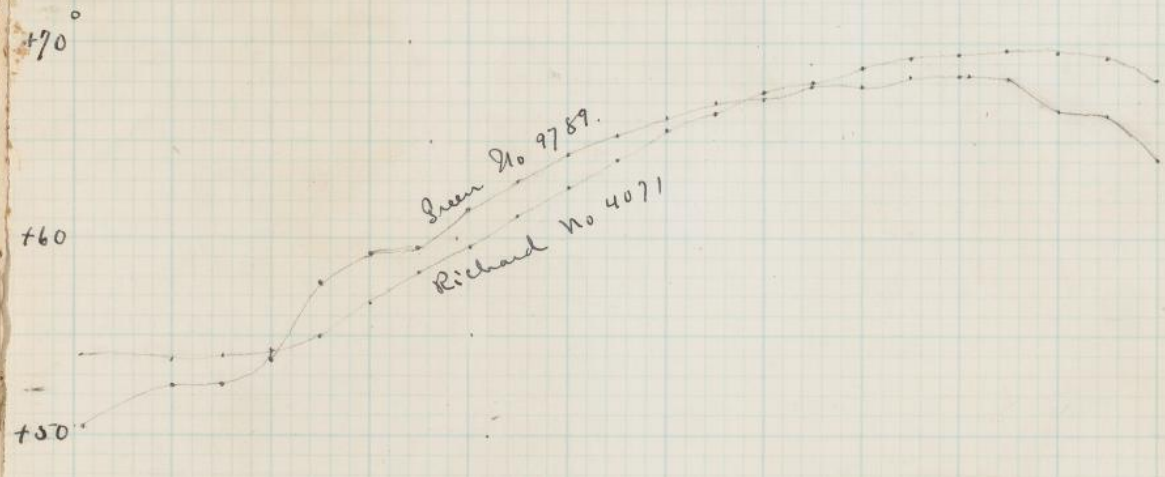
Time	S 4819	S 9789	R 4071	
7 42 P.M	49.0	50.3	54.0	
8 00	52.0	52.5	53.8	Thermograph & S 9789 were placed side by side on same surface. Windows open at first.
10	52.0	52.6	54.0	Windows closed.
20	53.0	53.9	54.2	Oil Stove lighted.
30	60.7	57.7	55.0	
40	62.2	59.2	56.8	Flame turned lower.
50	62.0	59.5	58.2	" higher.
9 00	65.0	61.5	59.6	
10	67.0	63.0	61.2	
20	68.1	64.2	62.8	
30	69.5	65.2	64.0	
40	70.1	66.1	65.6	
50	71.0	67.0	66.6	Opened window
10 00	70.8	67.2	67.4	
10	71.4	67.9	68.0	Opened another window.
20	71.3	67.9	68.8	
30	72.0	68.3	69.2	Windows closed. Flame turned down.
40	70.1	68.3	69.4	
50	70.0	68.2	69.6	Flame turned out.
11 00	66.3	66.6	69.6	
10	65.4	66.3	69.2	
30	63.0	64.0	68.0	

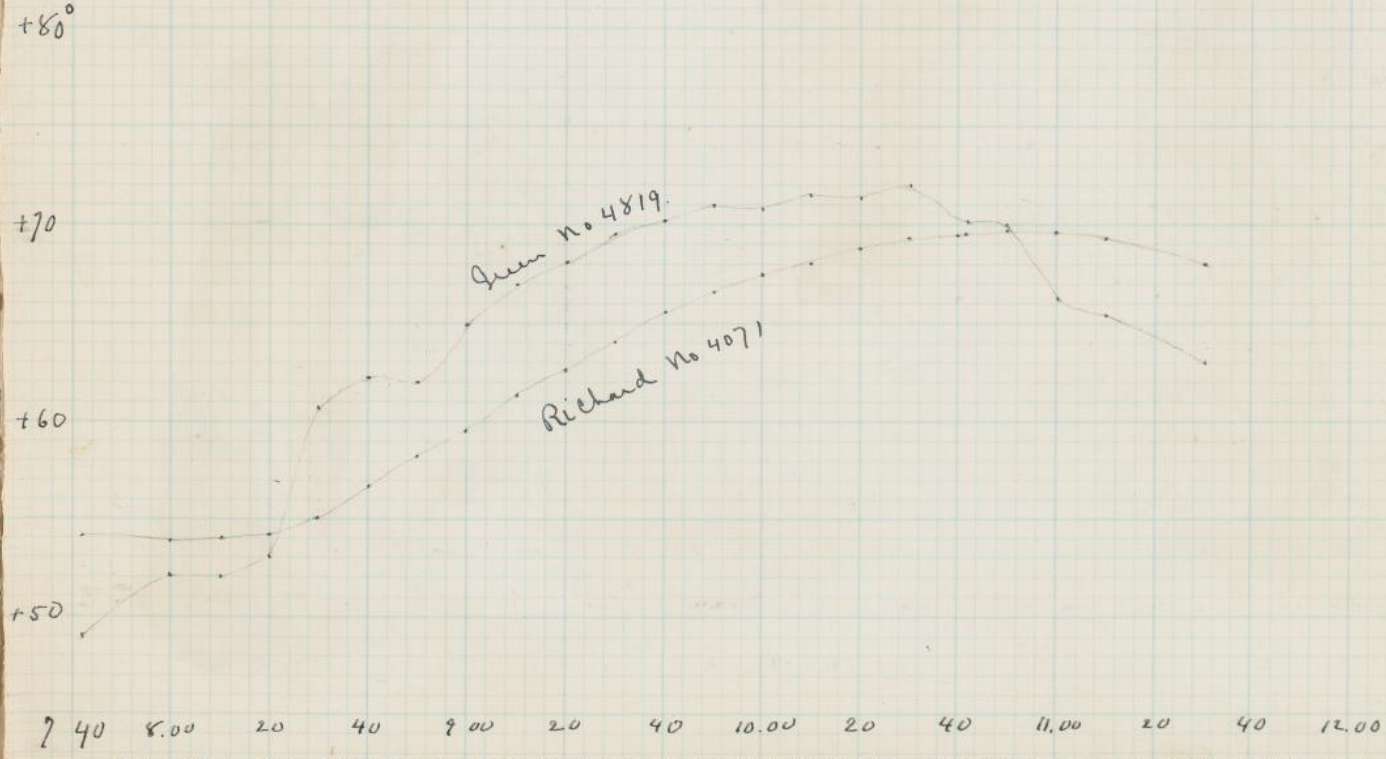
The reading of the thermograph was made with a magnifier. The results as plotted do not seem satisfactory. S No 9789 ~~received greater radiation from the~~ was affected by radiation to the surface on which it rested. This probably also affected thermograph.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

. Thermograph Comparisons with varying Temperature.





John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Feb. 7 1896

Thermograph Comparisons made in Room cooled to ordinary temperature and then suddenly heated by Coal stove. Instruments suspended side by side by means of cords.

Hour.	G 4819	G 9769	R 4071	Mean Thermometer	Thermograph Correction	
10.20	59.5 3.0	59.2 3.4	59.7 0.9	59.4		
10.30	62.5 4.0	62.6 4.0	60.7 3.2	62.6		
10.40	65.5 5.4	65.6 5.3	63.9 3.7	65.6		
10.50	73.9 3.1	73.9 3.6	67.6 5.2	73.9		
11.00	77.0	77.4	71.8	77.2		
11.10	75.4	76.1	74.6	75.8		
11.20	74.0	74.9	75.6	74.4		
11.31	74.0	74.7	76.0	74.4		
11 40	73.8	74.6	76.2	74.2		
12 00	74.5	75.0	76.8	74.8		
	Began again. Fire cooled & windows opened for long time & unable Thermograph to fully take air temperature					
2 20	53.8	54.0	59.2	53.9	-5.3	+0.2 +0.4
2 30	55.2	56.0	59.4	55.6	-3.8	+0.6 +0.7
2 40 #	57.3	56.7	60.0	57.0	-3.0	+0.8 +2.0
2 50 †	56.7	56.0	60.8	56.4	+4.4	+3.2 +5.0
3.00	69.0	68.5	64.0	66.8	+4.8	+6.8 +8.2
3 10	80.4	79.4	70.8	79.9	+9.1	+9.4 +8.6
3 20	88.3	88.8	80.4	88.6	+8.2	+7.9 +5.6
3 31	90.1	89.3	88.3	89.7	+1.4	+3.7 +3.2
3 40	90.0	90.6	92.0	90.3	-1.7	+2.8 +2.0
3.50	90.0	90.0	97.8	90.0	-4.8	+1.2 +1.0
4.00	91.0	90.1	96.0	90.6	-5.4	+0.8

May lay about 10 seconds 310–320

230–240 Usual position of instruments. † Windows closed & Thermometers.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Friday Feb 7, 1896

Thermograph Comparisons (Continued)

Hour	G 4819	99789	R 4071	mean Thermometer		
4 10	90.0	90.4	96.8	90.2	-6.6	+1.0 +1.2
4 20	90.9	91.4	95.0	91.2	-6.8	+0.6 0
4 30	90.0	90.4	95.0	90.2	-7.8	+0.1 +0.2
4 41	90.3	90.3	95.2	90.3	-7.9	+0.3 +0.4
4 50	90.0	90.1	95.6	90.0	-8.6	+0.2 0
5 01	89.0	89.3	88.6	89.2	-9.4	-0.2
5 10	88.4	88.6	98.4	88.6	-9.8	-2.0
5 31	83.1	84.2	96.4	84.0	-12.4	-1.4
5 40	83.4	84.0	95.0	83.7	-12.7	-1.4
5 50	82.7	82.9	93.6	82.8	-10.8	-1.6
6 01	81.3	82.1	92.0	81.7	-10.3	

59.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

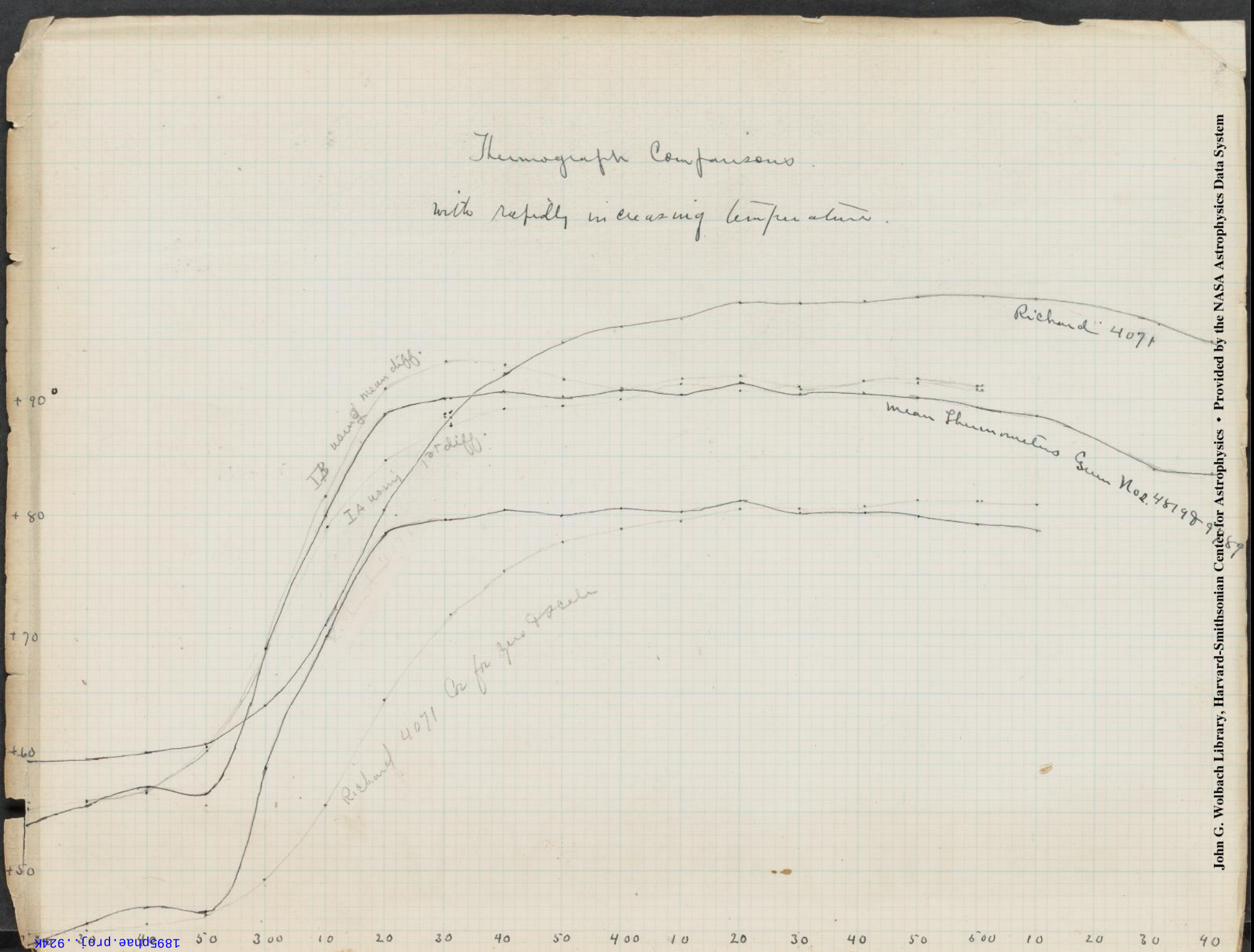
Reduction of Thermograph Readings on Pages 32, 33.

Time	Thermgph. Reading	Corrected for grav. scale	1st Diff	Means Diff.	Cr. I A	Cr I B	IA.	IB.	Mean Thermgph.
2 20	59.2	54.7	+.03	~~+0.4~~ +0.4	+0.4	~~+0.~~	55.1	—	53.9
30	59.4	55.0	+0.5	+0.6	+0.8	+0.8	55.8	55.8	55.6
40	60.0	55.5	+0.7	~~+1.8~~ 0.6	+1.1	+1.3	56.6	56.8	57.0
50	60.8	56.2	+3.0	~~+4.6~~ 1.8	+4.5	+3.8	60.7	60.0	56.4
3 00	64.0	59.2	+6.3	~~+7.6~~ 4.6	+9.6	+9.6	68.8	68.8	68.8
10	70.8	65.5	+8.9	~~+7.8~~ 6	+13.5	+16.0	79.0	81.5	79.9
20	80.4	74.4	+6.8	~~+8.8~~ 1.8	+10.3	+16.4	84.7	90.8	88.6
30 (Interpolated)	87.8	81.2		5.84		11.3		93.0	
36	88.3	81.7	+3.9	~~+3.2~~ 3.2	+5.9	~~+12.2~~	87.6	~~93.9~~	89.7
40	92.0	85.1	+2.6	~~+1.8~~ 1.8	+3.9	+6.7	89.0	92.8	90.3
50	94.8	87.7	+1.1	~~+0.9~~	+1.6	+3.8	89.3	91.5	90.0
4 00	96.0	88.8	+0.7	+0.9	+1.1	+1.9	89.9	90.7	90.6
10	96.8	89.5	+1.1	+0.9	+1.6	+1.9	91.1	91.4	90.2
20	98.0	90.6	0	+0.6	0	+1.3	90.6	91.9	91.2
30	98.0	90.6	+0.2	+0.1	+0.3	+0.2	90.9	90.8	90.2
41	98.2	90.8	+0.4	+0.3	+0.6	+0.6	91.4	91.4	90.3
50	98.6	91.2	0	+0.2	0	+0.4	91.2	91.6	90.0
5 01	98.6	91.2	-0.2	-0.1	-0.3	-0.2	90.9	91.0	89.2
10	98.4	91.0	—	—	—	—	—	—	—

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

Thermograph Comparisons

with rapidly increasing temperature.



1895phae.pro1 .92ak

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Tuesday Feb. 11 1896.

A.M.

7 40 office. Suspended R 4071 G 4819 S 9789 in line by means of cords. Windows thrown wide open at about 7 54

		G 4819	S 9789	R 4071	Inean Thermometer	dy dp	Thermograph Cor.
7	50	64.5	64.7	70.0	64.6	—	-5.4
7	53	64.2	64.0	69.9	64.1	-1.3	-5.8
7	56	61.2	62.0	69.2	61.6	-1.5	-7.6
7	59	57.2	58.7	68.4	58.0	-4.3	-10.4
8	02	56.6	56.0	66.6	56.8	-4.8	-10.8
8	04	54.6	55.4	66.0	56.0	-3.0	-11.0
8	06	53.7	54.8	65.4	54.3	-3.5	-11.1
8	08	53.4	54.5	64.6	54.0	-3.5	-10.6
8	10	52.9	53.8	64.0	53.4	-2.5	-10.6
8	12	53.0	53.8	63.6	53.4	-2.0	-10.2
8	14	52.5	53.6	63.2	53.1	-2.0	-10.1
8	16	52.5	53.3	62.8	52.9	-2.2	-9.9
8	18	52.6	53.2	62.3	52.9	-2.0	-9.4
8	20	52.6	53.2	62.0	52.9	-2.8	-9.1
8	22	52.2	53.2	61.2	52.7	-2.5	-8.5
8	24	52.0	52.8	61.0	52.4	-1.5	-8.6
8	26	51.8	52.3	60.6	52.1	-1.5	-8.5
8	28	52.2	52.9	60.4	52.6	-1.0	-7.8
8	30	51.8	52.2	60.2	52.0	-1.0	-8.2
8	32	51.2	52.0	60.0	51.6	-1.0	-8.4
8	34	51.2	51.9	59.8	51.6	-2.0	-8.2
8	36	50.8	51.1	59.2	51.0	-2.5	-8.2
8	38	50.5	50.8	58.8	50.7	-2.0	-8.1
8	40	50.2	50.7	58.4	50.5	-1.2	-8.1
8	42	50.6	50.9	58.3	50.8	-0.5	-7.5
8	44	50.4	50.8	58.2	50.6	-0.8	-7.6
8	46	50.0	50.6	58.0	50.3	-1.0	-7.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Time	S4819	S9789	R4071	Mean S4819 + S9789	$\frac{dy}{dx}$	Slant Corr.
8 48	50.2	50.8	57.8	50.5	-1.5	-7.3
8 50	50.0	50.5	57.4	50.3	-1.5	-7.1
8 52	49.8	50.0	57.2	49.9	-1.0	-7.4
8 54	49.6	49.8	57.0	49.7	-1.0	-7.3
8 56	49.0	49.6	56.8	49.3	-1.0	-7.5
9 00	50.0	50.3	56.4	50.2	-1.0	-6.2
9 02	49.9	50.3	56.2	50.1	-0.5	-6.1
9 04	49.7	50.1	56.2	49.9	-0.2	-6.3
9 06	49.7	50.0	56.1	49.8	-0.3	-6.3
9 10	48.9	49.2	56.0	49.0	-0.3	-7.0
9 12	49.6	49.8	55.9	49.7	-0.3	-6.2
9 16	50.2	50.2	55.8	50.2	-0.5	-5.6
9 21	47.0	47.8	55.4	47.4	-1.0	-8.0
9 24	47.1	47.8	55.0	47.4	-1.1	-7.6
9 26	47.8	48.0	54.6	47.9	-1.7	-6.7
9 28	46.6	47.2	54.3	46.9	-1.2	-7.4
9 30	46.2	46.9	54.1	46.6	-0.5	-7.5
9 34	47.0	47.6	54.0	47.3	-0.5	-6.7
9 36	47.2	48.0	53.8	47.6	-1.5	-6.2
9 38	47.4	48.9	53.4	48.4	-1.0	-5.0
9 40	48.8	49.8	53.4	49.3	0	-4.1
9 42	49.8	50.9	53.4	50.4	0	-3.0
9 44	50.1	51.1	53.4	50.6	0	-2.8
9 46	52.3	52.5	53.4	52.4	+1.5	-1.0
9 48	54.0	53.6	54.0	53.8	+2.8	-0.2
9 50	56.0	55.2	54.5	55.6	+3.5	+1.1
9 52	58.2	57.6	55.4	57.8	+5.0	+2.4
9 53	59.1	58.1	56.0	58.6	+4.0	+2.6
9 54	60.2	60.0	56.2	60.1	+4.5	+3.9

Ruffled R4071

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

	G 4679	G 4789	R 4071	Mean G 4679 4789	dy dx	Skewlight Cor
9 5-6	62.6	62.6	57.41	62.6	+5.8	+5.2
9 5-8	64.6	64.8	58.5	64.7	+6.3	+6.3
9 5-9	65.9	66.0	59.3	66.0	+7.5	+6.7
10.00	66.8	67.0	60.0	66.9	+5.5	+6.9
10.01	67.6	67.9	60.4	67.8	+7.0	+7.4
10.02	68.4	68.6	61.4	68.5	+8.0	+7.1
10.03	69.1	69.1	62.0	69.1	+7.5	+7.1
10.04	70.0	70.0	62.8	70.0	+7.5	+7.2
10 05	70.5	70.8	63.6	70.6	+7.0	+7.0
10 06	71.0	71.4	64.1	71.4	+6.0	+7.3
10 07	71.7	72.0	64.8	71.8	+5.5	+7.0
10 08	72.5	72.5	65.9	72.5	+8.0	+6.6
10 10	74.0	73.5	67.2	73.8	+7.0	+6.6
10 11	74.5	74.5	68.0	74.5	+6.5	+6.5
10 12	74.9	75.0	68.5	75.0	+7.0	+6.5
10 13	75.2	75.5	69.4	75.3	+7.5	+6.1
10 14	75.8	76.3	70.0	76.0	+7.0	+6.0
10 15	76.0	76.5	70.8	76.2	+8.0	+5.8
10 16	76.5	76.8	71.6	76.6	+6.0	+5.0
10 17	77.0	77.1	72.0	77.0	+4.5	+5.0
10 18	77.1	77.4	72.5	77.2	+6.0	+4.7
10 19	77.8	77.8	73.2	77.8	+7.5	+4.6
10 20	78.0	77.9	74.0	78.0	+5.0	+4.0
10 21	78.6	78.0	74.2	78.3	+5.0	+4.1
10 22	78.6	78.4	75.0	78.5	+6.0	+3.5
10 23	78.9	78.8	75.2	78.8	+4.0	+3.4
10 24	79.0	78.9	75.8	79.0	+4.0	+3.2
10 25	79.0	79.1	76.2	79.0	+5.0	+2.8
10 26	79.1	79.1	76.8	79.1	+7.0	+2.3

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

	S4819	S9789	R4071	Mean S4819 9789	dy/dt	Planig/ch Cor.
10 27	79.8	79.3	77.6	79.6	+6.0	+2.0
10 28	79.8	79.3	78.0	79.6	+4.0	+1.6
10 30	80.1	80.0	78.4	80.0	+4.5	+1.2
10 32	80.3	80.1	79.8	80.2	+3.5	+0.4
10 34	80.7	81.0	80.2	80.8	+3.5	+0.6
10 36	80.9	81.3	81.2	81.1	+4.5	-0.1
10 38	81.0	81.4	82.0	81.2	+3.0	-0.8
10 40	81.3	81.1	82.4	81.2	+3.0	-1.2
10 42	82.0	81.5	83.2	81.8	+3.5	-1.4
10 44	82.2	82.0	83.5	82.1	+2.2	-1.7
10 46	82.4	82.7	84.1	82.6	+3.0	-1.5
10 48	81.6	82.6	85.0	82.1	+2.8	-2.9
10 50	82.0	82.3	86.2	82.2	+2.6 1.7	-3.0
10 54	82.0	82.7	86.0	82.4	+2.0	-3.6
10 56	82.6	82.6	86.4	82.6	+2.0	-3.8
10 58	82.8	82.9	86.8	82.8	+2.0	-4.0
11 00	83.0	83.7	87.2	83.4	+1.8	-3.8
11 02	83.0	83.5	87.5	83.2	+1.5	-4.3
11 04	83.5	84.0	87.8	83.8	+1.2	-4.0
11 06	83.6	84.1	88.10	83.8	+0.8	-4.2
10 09	83.0	83.8	88.2	83.4	+0.5	-4.8
10 10	83.0	83.8	88.2	83.4	+1.0	-4.8
10 12	83.0	83.0	88.5	83.0	+0.7	-5.5
10 16	82.6	82.7	88.6	82.6	+0.1	-6.0
10 20	82.5	82.5	88.6	82.5	0	-6.1
10 24	82.4	82.5	88.6	82.4	0	-6.2
10 26	82.2	82.0	88.6	82.1	0	-6.5
10 30	81.0	81.1	88.6	81.0	-0.1	-7.6
10 34	80.0	80.0	88.5	80.0	-0.8	-8.5
10 38	78.5	78.7	88.0	78.6	-0.8	-9.4
10 40	78.0	78.2	87.9	78.1		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

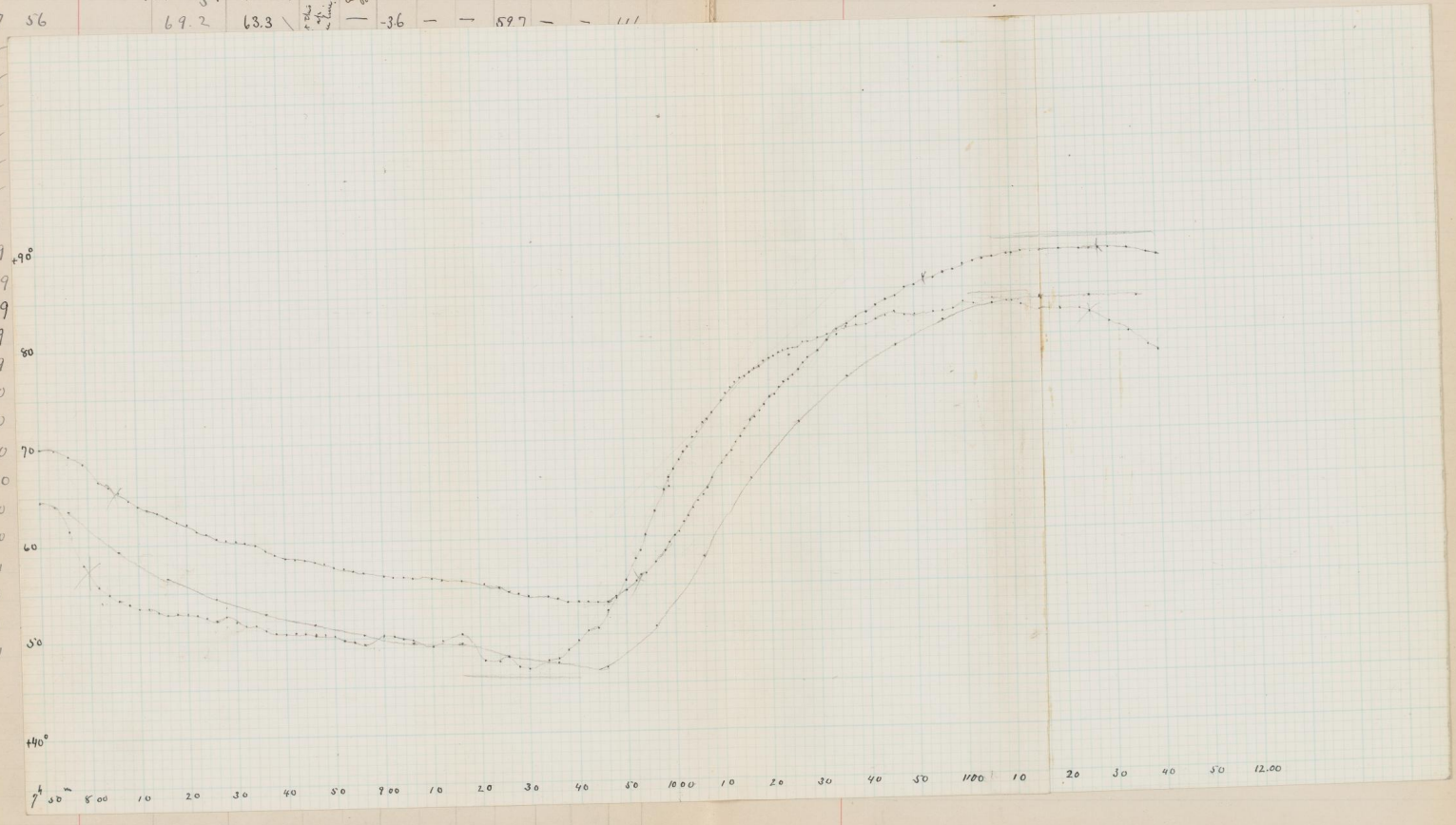
1895phae.proj. .924K

June	Mean Therm.	Thermograph	Corr. for zero of scale.	Diff. Set this by the line.	Mean Diff.							
7 56		69.2	63.3	—	-3.6	—	—	59.7	—	—	61.6	
8 06		65.4	59.3	-4.0	-3.4	~~-3.6~~ -2.4	-3.6	~~-0.3~~ 3.1	56.9	55.7	56.2	54.3
8 16		62.8	56.6	-2.7	-2.6	-2.3	-2.4	~~-0.2~~ 2.3	54.4	54.2	54.3	52.9
8 26		60.6	54.3	-2.4	-2.0	-1.4	-2.2	-1.8	52.9	52.1	52.5	52.1
8 36		59.2	52.8	-1.5	-1.4	-1.2	-1.4	-1.3	51.6	51.4	51.5	51.0
8 46	50.3	58.0	51.5	-1.3	-1.3	-1.2	-1.2	-1.2	50.3	50.3	50.3	50.3
8 56		56.8	50.2	-1.3	-1.0	-0.6	-1.2	-0.9	49.6	49.0	49.3	49.3
9 06		56.1	49.5	-0.7	-0.5	-0.3	-0.6	-0.4	49.2	48.9	49.1	49.8
9 16		55.8	49.2	-0.3	-0.8	-1.2	-0.3	-0.7	48.0	48.9	48.5	50.2
9 26		54.6	47.9	-1.3	-1.0	-0.6	-1.2	-0.9	47.3	46.7	47.0	47.9
9 36	min	53.8	47.1	-0.8	-0.6	-0.4	-0.6	-0.5	46.7	46.5	46.6	47.6
9 46	46.6	53.4	46.7	-0.4	+1.9	+7.0	-0.4	+4.0	53.7	46.3	50.7	52.4
9 56	62.6	57.4	50.9	+4.2	+5.6	+11.7	+11.7	+11.7	62.6	62.6	62.6	62.6
10 06		64.1	57.9	+7.0	+7.5	+13.4	+19.5	+15.7	71.3	77.4	73.6	71.4
10 16		71.6	65.9	+8.0	+6.8	+9.2	+22.2	+14.2	75.1	88.1	80.1	76.6
10 26		~~57.8~~ 26.8	71.4	+5.5	+5.0	+7.7	+16.3	+10.4	79.1	86.8	81.8	79.1
10 36		81.2	76.0	+4.6	+3.8	+5.2	+12.8	+7.9	81.2	88.8	83.9	81.1
10 46		84.1	79.1	+3.1	+2.8	+4.0	+8.6	+5.8	83.0	87.7	84.9	82.6
10 56		86.4	81.5	+2.4	+2.0	+2.8	+6.7	+4.2	84.3	88.2	85.7	82.6
11 06		88.0	83.2	+1.7	+1.2	+1.0	+4.7	+2.6	84.2	87.9	85.7	83.8
11 16	max 83.8	88.6	83.8	+0.6	+0.3	0	+1.7	+0.6	83.8	85.5	84.4	82.6
11 26		88.6	83.8	0	-0.2	-0.4	0	-0.2	83.4	83.8	83.6	82.1
11 36		*88.2 (from Curve)	83.4	-0.4	—		-0.4	—	—	—		

*Interpolated from curve.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

Time	Mean Therm.	Thermograph	Cor. for zero	Diff.	Mean Diff.							
7 56		69.2	63.3	—	-3.6	—	—	59.7	—	—	111	
8												
8												
8												
8												
8												
8												
9												
9												
9												
9												
9												
9												
10												
10												
10												
10												
10												
11												
11												
11												
11												



*Interpolated from curve.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 17 1896

Measures made on apparatus for reading plates to determine rel motion in line of sight

C4843 & C5929 ∠ Cygni taken with 11 inch Draper & B-C prism used to det. accuracy of readings. K. lines matched.

1st Set		2nd Set		3rd Set		4th Set		5th Set	
56.8	13.4	45.6	2.5	47.1	0.6	45.6	2.7	48.6	3.5
40.8	2.6	44.8	1.3	45.6	0.9	50.6	2.3	43.9	3.2
37.0	6.4	45.1	1.0	45.1	1.4	50.4	2.1	47.6	0.5
41.2	2.2	46.0	0.1	46.6	0.1	50.4	2.1	49.9	2.8
41.3	2.1	45.8	0.3	47.9	1.4	44.3	4.0	50.4	3.3
5 | 17.1	5 | 26.7	5 | 30.3	5 | 6.2	5 | 32.3	5 | 14.4	5 | 41.3	5 | 13.2	5 | 35.4	5 | 13.3
43.4	5.3	46.1	1.0	46.5	0.9	48.3	2.6	47.1	2.7

Spring tightened & readjusted.

6th Set		7th Set		8th Set		9th Set		10th Set	
42.1	2.7	37.8	1.3	39.8	0.4	41.3	0.2	39.6	0.1
41.2	1.8	40.1	1.0	40.8	1.4	40.8	0.7	37.8	1.9
38.8	0.6	41.4	3.3	37.8	1.6	42.7	1.2	43.1	3.4
36.0	3.4	38.6	0.5	37.7	1.7	42.5	1.0	40.1	0.4
38.7	0.7	37.5	1.6	40.7	1.3	40.1	1.4	37.8	1.9
5 | 46.8	5 | 9.2	5 | 45.4	5 | 6.7	5 | 46.8	5 | 6.4	5 | 7.4	5 | 4.8	5 | 48.4	5 | 7.7
39.4	1.8	39.1	1.3	39.4	1.3	41.5	0.9	39.7	1.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae_proj..924K

Saturday Oct 17 1896

Measures on C 9544 & 9545 Comparison
of HP 3051 & 3053
Lines H_2

3053			3051		
4	13.2	1.7	3	50.8	2.1
4	22.0	7.1		56.4	3.5
	10.1	4.8		48.9	4.0
	15.6	0.7		56.4	3.5
	13.6	1.3		52.0	0.9
5	74.5	5 15.8		264.5	5 16.0
		3.2			3.2
4	14.9		3	52.9	
3	52.9				
	22.0				

Lines H_2 & K in HP 3053

	H_2		K	
4	23.5	8.3	10 8	46.6	6.5
	11.6	3.6	11	01.4	6.3
	17.9	2.7	10	55.6	0.5
	8.0	7.2	10	59.0	3.9
	15.2	0.0		50.7	4.4
5	76.2	5 21.6	5	275.3	5 21.6
		4.4			4.3
4	15.2		10	55.1	
			4	15.2	
			6	39.9	
			60		
			360		
				39.9	
			2	399.9	
				200.0	Dist. between H_2 & K

$$\Delta\lambda = \frac{36 \times 22}{400.} = 1.98$$

$$c = \frac{\Delta\lambda \cdot v}{\lambda} = \frac{1.98 \times 300000}{3970} = 149.6$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 17 1896

Measures on Pleiades C 95297+95310.

	$\Delta\gamma$	$\Delta\delta$	$\Delta 8$		$\Delta\gamma$	$\Delta 8$
Alcyone	0 01.2	34 24.5		Electra	0 50.2	34 30.7
		~~35 27.4~~	35 31.4			35 22.2
			29.1			27.2
			33.2			
Atlas	0 38.6	34 21.1		Maia	0 50.3	34 24.1
		3	35 22.1			35 20.6
			17.3			27.7
Merope	0 59.5	34 33.4		Taygeta	0 48.7	34 30.6
			35 29.8			35 18.8
			29.7			20.6

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 17 1896

Measures of plates C 9529 & 9530

Alcyone

H_γ		H_8	
23.6	3.2	50.0	3.1
26.2	0.6	42.7	4.2
27.8	1.0	48.2	1.3
26.9	0.1	45.8	1.1
27.6	0.8 / 15.7	48.0	1.1 / 10.8
134.1	(20.8)	234.7	(46.9)
	(1.1)		2.2

$2(H_\gamma - H_8)$ 2019.9

Atlas

H_γ		H_8	
20.1	1.4	37.1	0.1
19.2	0.5	33.1	3.9
20.8	2.1	36.9	0.1
19.5	0.8	38.0	1.0
14.0	4.7 / 9.5	40.0	3.0 / 8.1
93.6	(18.7)	185.1	(37.0)
139.1	1.9	234.7	1.6
− 40.5		− 49.6	
− 8.1		− 9.9	

2021.7

Merope

H_γ		H_8	
24.9	2.0	55.6	0.7
30.0	3.1	49.8	6.5
28.0	1.2	01.0	4.7
27.9	4.0	58.8	2.5
23.7	3.2 / 10.4	56.3	0 / 14.7
134.5	(26.9)	281.5	(56.3)
134.1	2.1	234.7	2.9
+ 0.4		+ 46.8	
+ 0.1		+ 09.4	

2010.6

Electra

H_γ		H_8	
19.1	2.4	47.4	1.1
30.0	3.5	45.4	3.1
26.1 / 28.0	0.4	52.0	3.5
28.6	2.1	48.9	0.4
28.7	2.2 / 15.6	48.9	0.4 / 8.5
132.5	(26.5)	242.6	(48.5)
134.1	3.1	234.7	1.7
− 1.6		+ 07.9	
− 0.3		+ 1.6	

$H_\gamma - H_8$ 2018.0

Maia

H_γ		H_8	
29.7	5.0	46.1	1.7
28.8	4.1	39.5	8.3
30.6	5.9	50.5	2.7
13.8	10.9	51.7	3.9
20.6	4.1 / 21.0	51.1	3.3 / 19.9
123.5	(24.7)	238.9	(47.8)
134.1	4.2	234.9	4.0
− 10.6		+ 4.2	
− 2.1		+ 0.8	

2016.9

Saygeta

H_γ		H_8	
24.7	1.4	37.5	6.6
28.3	2.2	33.0	11.6
23.8	2.3	50.6	6.5
27.0	0.9	46.4	2.3
26.6	0.5 / 7.3	53.2	9.1 / 25.6
130.4	(26.2)	220.7	(44.1)
134.1	1.5	234.7	5.1
− 3.7		− 14.0	
− 0.7		− 2.8	

2022.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Oct 19 1896

Measures on C 9544 9545 57 + 9552

1st

# P 3053			K.		# P 3051		K.
	H_2				H_2		
9	13.0	0.4	44.7	3.9	44.1	0.1	—
	9.6	3.8	37.9	2.9	40.8	3.2	—
	11.7	1.7	37.9	2.9	46.2	2.2	—
	14.4	1.0	38.2	2.6	44.4	0.4	—
	18.4	5.0	45.3	5.5	44.6	0.6	—
5	67.1	11.9 / 2.4	204.0	19.8 / 3.6	220.1	5.6 / 1.3	
	9 13.4		2 40.8		9 44.0		
	2 40.8				9 13.4		
	6 32.6				30.6		
	360						
	392.6						

$$C = \frac{36. \times 30.6}{392.6} \times \frac{300000}{3970} = 212.$$

2nd

	H_2		K		H_2		K
9	13.1	6.4	43.1	2.5	45.2	0.1	—
	18.6	0.9	38.7	1.9	43.1	2.0	—
	21.4	1.9	41.6	1.0	43.2	1.9	—
	20.3	0.8	39.4	0.8	49.8	4.7	—
	24.0	4.5	40.0	0.6	44.3	0.8	—
5	97.4	14.5 / 2.9	202.8	6.8 / 1.4	225.6	9.6 / 1.9	
	9 19.5		2 40.6		9 45.1		
	2 40.6				9 19.5		
	6 38.9				0 25.6		
	360						
	398.9						

$$C = \frac{36. \times 25.6}{398.9} \times \frac{300,000}{3970} = 175.$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Oct 20 1896

Measures on plates C 95-44 & C 95-45

H.P. 3053				H.P. 3053			
H_γ	K	H_2	H_δ	H_γ	K	H_2	H_δ
00.2	25.2	04.0	16.6	13.5	–	16.3	29.6
04.0	28.7	04.3	15.3	15.2	–	12.7	20.0
00.1	26.3	02.3	14.4	12.0	–	15.4	21.2
07.2	26.1	03.0	13.4	17.0	–	18.3	23.7
08.2	28.0	10.0	06.0	17.7	–	18.5	24.0
5/19.7	5/34.3	5/23.6	5/68.7	5/25.4		5/31.2	5/118.5
5 03.9	13 26.9	20 04.7	42 13.1	5 15.1		20 16.2	42 23.7
				5 03.9		20 04.7	42 13.1
				11.2		11.5	10.6
57.7	29.5	08.2	20.9	17.1	–	17.8	29.1
57.3	24.5	06.9	13.9	20.5	–	20.8	32.3
55.9	22.2	08.6	21.0	20.0	–	17.8	26.7
56.4	29.1	02.4	19.5	21.0	–	18.7	29.8
00.4	27.9	05.8	13.2	18.3	–	18.6	26.1
5/37.7	5/33.2	5/31.9	5/88.5	96.9		93.7	5/144.0
57.5	13 26.6	20 06.4	42 17.7	5 19.4		20 18.7	42 28.8
				4 57.5		20 06.4	42 17.7
				21.9		12.3	11.1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Oct. 21. 1896.

Measures on plates C 9544 & C 9545.

H.P. 3053

H_α	K	H_2	H_3
~~06.4~~			
~~06.6~~			
17.0	25.6	17.4	16.3
13.8	32.7 31.5	10.8	14.2
14.7	~~23.3~~	12.6	18.8
12.6	34.8	15.5	16.5
15.8	36.0	07.7	13.9
23.9	5/160.6	64.0	29.7
5 14.8	13 32.1	20 12.8	42 15.9

H.P. 3051

H_α	K	H_2	H_3
~~31.2~~			
~~23.3~~			
22.3		26.4	26.8
21.2		21.9	29.5
22.2		25.1	29.4
21.0		25.6	30.2
20.7		17.4	26.9
7 14		5/116.4	42.8
5 21.5		20 23.3	42 28.6
5 14.8		20 12.8	42 15.9
06.7		10.5	12.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Oct 22 1896

Measures on C4843 & 5929

~~H~~ α Cygni To ~~test~~ apparatus for motion in line of sight.

	K		H_ε	
9	55.9	1.9	24 06.0	2.3
	55.2	2.6	03.4	0.3
	02.4	4.6	04.6	0.9
	00.2	2.4	04.2	0.5
	55.4	2.4	00.4	3.3
5	39.1	9 13.9 / 2.8	5 18.6	5 7.3 / 1.5

9 57.8

24 03.7
9 57.8
14 05.9
60
840 5.9
2 8445.9
423.0 Dist H_ε to K

Call average div of wide setting 2.0 div.
Average div on pages 438 46 call 2.5 div. & the dist from H_2 to K = 200. div (affirm)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Oct 23. 1896.

Apparatus for measuring motion in line of sight has been made & work more easily.

Measures made of dist. between lines ruled with diamond on plain glass.

Stationary plate ruled thus ≡

Moveable " " " X

1st line		2nd line		3rd line	
9 46.1	+0.9	26 50.8	+0.5	38 45.6	+0.5
9 45.0	−0.2	50.4	+0.1	44.8	−0.3
44.1	−1.1	51.3	+1.0	45.0	−0.1
46.0	+0.8	51.1	+0.8	44.9	−0.2
43.9	−1.3	50.0	−0.3	45.9	+0.8
45.8	+0.6	50.7	+0.4	45.0	−0.1
44.7	−0.5	49.1	−1.2	45.4	+0.3
44.9	−0.3	51.4	+1.1	44.0	−1.1
46.2	+1.0	48.9	−1.4	45.2	+0.1
45.5	+0.3	49.7	−0.6	45.2	+0.1
52.2	10) 7.0	3.4	10) 7.4	51.0	10) 3.5
	0.7		0.7		0.4
9 45.2		26 50.3		38 45.1	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phee.proj...924K

Friday Oct. 23 1896

Measures made on C 9551 & 9552.

HP 305-3

Set I

	H_G	K	H_2
14	58.5 −6.4	28.2 −3.7	13.2 +5.4
	02.1 +2.2	31.0 −0.9	05.4 −2.4
	10.9 +6.0	33.7 +1.8	08.8 +1.0
	57.0 −7.9	36.3 +4.4	02.1 −5.7
	04.5 −0.4	25.8 −6.1	09.8 +2.0
	04.9 0.0	31.9 0.0	08.2 +0.4
	05.4 +0.5	28.8 −3.1	02.9 −4.9
	59.1 −5.8	35.8 +3.9	06.8 −1.0
	13.3 +8.4	33.9 +2.0	08.2 +0.4
	06.2 +3.3	33.3 +1.4	13.0 +5.2
	148.9	19 40.9 / 11 8.7	19 27.3 / 78.4	15 28.4
		4.1	2.7	2.8
Means	15 04.9	23 31.9	30 07.8
		15 04.9	15
		8 27.0	

30 07.8 / 23 31.9 / 6 / 60 / 360 / 35.9 / 395.9 = 2(H₂ − K)

HP 305-1

	H_G	K	H_2
15	29.8 −3.0	—	33.3 −3.5
	31.0 −1.8	—	38.6 +1.8
	33.0 +0.2	—	42.5 +5.7
	35.0 +2.2	—	40.6 +3.8
	37.2 +4.4	—	40.6 +3.8
	31.6 −1.2	—	35.8 −1.0
	29.4 −3.4	—	29.3 −7.5
	29.0 −3.8	—	32.3 −4.5
	36.2 +3.4	—	38.3 +1.5
	35.7 +2.9	—	36.9 +0.1
	127.9	19 26.3	68.2	19 33.2
		2.6	3.3
	15 32.8	30 36.8
	15 04.9	30 07.8
	27.9	29.0

4.1 / 2.8 / 2.6 / 3.3 / 12.8 / ±3.2

Set II

	H_G	K	H_2
17	53.5 −7.7	28.1 −0.6	05.5 +0.2
	56.6 −3.6	21.8 −6.9	03.7 −1.6
	57.9 −2.3	30.7 +2.0	06.1 +0.8
	54.4 −5.8	25.3 −3.4	02.7 −2.6
	03.7 +2.5	29.9 +1.2	02.8 −2.5
	58.3	26.0	06.1
	01.7 +1.5	27.3 −1.4	01.4 −3.9
	01.1 +0.9	27.0 −1.7	03.4 −1.9
	00.5 +0.3	30.4 +1.7	09.6 +4.3
	01.6 +1.4	35.7 +7.0	08.0 +2.7
	00.2 +0.0	30.7 +2.0	09.5 +4.2
	92.2	19 28.0	86.9	19 27.9	52.7	19 24.7
		2.5	2.8	2.5
18	00.7	26 28.7	33 05.3

18	29.9 −0.9	—	32.0 +2.1
	23.1 −7.7	—	28.3 −5.8
	29.4 −1.4	—	33.3 −0.8
	33.5 +2.7	—	35.8 +1.7
	29.1 −1.7	—	29.0 −5.1
	—		34.0
	34.5 +3.7	—	34.3 +0.2
	33.7 +2.9	—	34.8 +0.7
	32.5 +1.7	—	38.7 +4.6
	31.8 +1.0	—	40.4 +6.3
	30.5 −0.3	—	34.3 +0.2
	108.0	19 24.0	140.9	19 22.5
		2.4	2.8
17	30.8	33 34.1

2.5 / 2.5 / 2.4 / 2.8 / ±2.6

33 05.3 / 26 28.7 / 6 / 60 / 360 / 36.6 / 396.6 = 2(H_G − K)

Over.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Oct 23 1896

Set I ~~Oct~~ 2(Displacement H_2) = 29.0

2(Dist. H_2 to K) = 395.9

λ = 3970

$$c = \frac{\Delta\lambda \cdot v}{\lambda} = \frac{36 \times 29.0}{395.9} \times \frac{300\,000}{3970} = \frac{199.}{\cancel{299.}}$$ Kilo's per sec

Set II 2(Displacement H_2) = 28.8

2(Dist. H_2 to K) = 396.6

$$c = \frac{36 \times 28.8}{396.6} \times \frac{300\,000}{3970} = \frac{198}{\cancel{298.}}$$ Kilo's per sec.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj - 924K

Saturday Oct 24 1896

Measures on C 95-44 + C 95-45 Set I

HP 305-3

H_δ		K		H_2	
14 59.3		23		30	
~~58.6~~	-0.9	20.0	-1.6	02.8	+2.9
55.4	-5.0	21.9	+0.3	59.5	-0.4
05.5	+5.1 ~~-4.9~~	22.1	+0.5	54.6	-5.3
01.0	+0.6	20.5	+1.1	01.7	+1.8
50.3	-10.1	20.2	-1.4	58.5	-1.4
02.7	+2.3	22.0	+0.4	01.0	+1.1
53.1	-7.3	22.5	+0.9	58.9	-1.0
~~04.2~~ 00.6	+3.8	23.0	+1.4	03.1	+3.2
06.8	+6.4	18.5	-3.1	03.5	+3.6
05.1	+4.7	25.1	+3.5	55.4	-4.5
103.6	19 41.2	15.8	19 14.2	99.0	11 25.3
	4.6		1.4		2.5

HP 305-1

H_ε		K		H_ε	
15				30	
12.6	+0.5	—		14.0	+2.6
07.0	-5.1	—		13.1	+1.7
14.2	+2.1	—		09.3	-2.1
13.7	+1.6	—		13.3	+1.9
11.7	-0.4	—		14.0	+2.6
11.5	-0.6	—		11.5	+0.1
11.2	-0.9	—		08.5	-2.9
12.6	+0.5	—		08.1	-3.3
12.1	0.0	—		10.5	-0.9
14.6	+2.5	—		12.2	+0.8
21.2	19 14.2			114.5	19 18.9
	1.4				1.9

		±1.3			±0.7	±0.4	±0.5
15	00.4	23	21.6	~~29~~ 30	59.9	15 12.1	30 11.4
				23	21.6	15 00.4	29 59.9
					6 38.3	11.7 ±1.4	11.5 ±0.8
					60		
					360		
					38.3		
					398.3		

$$C = \frac{36 \times 11.5}{398.3} \times \frac{300000}{3970} = 78.6$$

Log $\frac{36 \times 300000}{3970}$ =

1.5563
5.4771
7.0334
3.5988
3.4346
1.0607
4.4953
2.6002
1.8951

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 24. 1896

Measures in C 9544+9125 Set II

HP 3053

	H_G		K		H_2	
14			23		29	
	53.3	−2.6	20.8	−1.1	56.7	−2.1
	49.5	−6.4	26.1	+4.2	03.4	+4.6
	59.5	+3.6	20.3	−1.6	57.5	−0.7
	58.0	+2.1	25.0	+3.1	00.7	+1.9
	56.8	+0.9	22.3	+0.4	56.1	−2.7
	52.8	−3.1	20.5	−1.4	01.1	+2.3
	58.6	+2.7	20.1	−1.8	01.4	+2.6
	56.8	+0.9	21.2	−0.7	57.2	−1.6
	57.1	+1.2	21.7	−0.2	53.3	−5.5
	56.7	+0.8	20.6	−1.3	00.1	+1.3
	59.0	19 / 24.3 / 2.4	18.6	19 / 15.8 / 1.6	87.5	19 / 26.3 / 2.5

± 0.7 ± 0.7

14 55.9 23 21.9 29 58.8

23 21.9

6 36.9

60

360

36.9

396.9

HP 3051

	H_G		K		H_2	
15					30	
	12.3	+0.9	—		13.4	+1.1
	11.4	0.0	—		14.1	+1.8
	14.1	+2.7	—		10.8	−1.5
	09.5	−1.9	—		11.1	−1.2
	11.9	+0.5	—		09.8	−2.5
	13.0	+1.6	—		18.8	+6.5
	10.4	−1.0	—		12.0	−0.3
	09.3	−2.1	—		08.0	−4.3
	12.1	+0.7	—		09.5	−2.8
	10.1	−1.3	—		15.4	+3.1
	114.1	10 / 112.7 / 1.3			122.9	10 / 25.1 / 2.5

± 0.4 ± 0.7

15 11.4 30 12.3

14 55.9 29 58.8

15.5 ± 0.4 13.5 ± 1.0

$$c = \frac{36 \times 13.5}{396.9} \times \frac{300000}{3970} = 92.5$$

3.4346
1.1303
4.5649
2.5987
1.9662

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 24 1896

Measures on C4643 + C5424. To ~~test~~ diffraction as it now stands upon basis of good definition

	K		H_2		
15	27.5	χ^2 9	28.6		Plates are slightly uneven in film side. therefore two pairs of stops were ground to eyepiece to bring eye centrally to it.
	34.8		25.8		
	24.5		29.2		
	25.8		25.0		
Eyestop used.	32.1	−0.9	35.7	−2.0	
	27.9	−5.1	36.0	−1.7	
	35.5	+2.5	34.7	−3.0	
	33.2	+0.2	38.4	+0.7	
	31.6	−1.4	34.8	−2.9	
	32.3	−0.7	38.8	+1.1	
	34.1	+1.1	37.6	−0.1	
	34.5	+1.5	39.1	+1.4	
	34.5	+1.5	36.6	−1.1	
	34.0	+1.0	45.2	+7.5	
	29.7	10 | 15.9	76.9	10 | 21.5	
		1.6		2.2	

15 33.0 χ^2 9 37.7
15 33.0
χ' 4 04.7
60
440
4.7
1449.7

14 04.7
60
840
4.7
844.7 = 2(H₂ − K)

1.9

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Oct 27 1896

Measures on Plate C 9597 + 9598

Alcyone

44	21	6
04.1	57.3	53.2
55.4	06.0	57.6
04.8	05.1	50.9
12.0	03.9	57.4

Atlas

43	21	7
50.0	42.0	43.8
46.0	41.9	42.9
49.8	35.8	38.0
47.3	36.8	45.0

Merope

44	26	6
04.6	58.0	52.8
01.4	57.0	53.0
03.7	54.0	53.6
06.4	57.8	49.8

Electra

43	26	6
12.8	57.4	49.1
56.8	02.1	49.9
06.2	56.5	54.9
09.2	01.8	50.2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Tuesday Oct 27 1896

	Mercii			Sagittæ	
H X 8	H x 2	H Z 7	H X 8	H x 2	H Z 6
12,1	05,1	01,4	07,0	01,0	56,5
09,4	04,6	57,1	01,8	59,3	52,0
07,0	03,0	54,8	59,0	04,9	52,7
06,4	04,6	58,2	01,6	02,8	49,1

	Columbæ	
H X 8	H x 2	H Z 6
05,6	13,0	55,2
58,0	58,1	55,5
52,9	59,0	58,1
02,3	02,3	54,5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Oct 2 & 1895

measures on C 9601 & 9602

HP 3053

Hε	K	Hε	Hδ
10	18	25	47
01.4 -5.2 (4.8)	36.8 -1.8 (6)	17.0 +3.5	19.4 +2.1
05.7 -0.9 (5)	35.8 -2.8 (6)	10.0 -3.5	17.6 +0.3
06.7 +0.1 (5)	35.8 -2.8 (6)	16.5 +3.0	15.1 -2.2
08.1 +1.3 (9)	39.4 +0.8 (1.0)	13.8 +0.3	14.3 -3.0
58.3 -12.3 (7.9)	38.9 +0.3 (5)	12.4 -1.1	15.2 -2.1
05.5 -1.1 (0.7)	37.9 -0.7 (5)	09.3 -4.2	15.4 -1.9
05.4 -1.2 (0.8)	36.0 -2.6 (4)	12.0 -1.5	15.3 -2.0
10.8 +4.2 (6)	41.5 +2.9 (3.1)	15.3 +1.8	23.5 +6.2
08.9 +2.3 (7)	43.0 +4.4 (6)	15.3 +1.8	21.2 +3.9
10.7 +4.1 (5)	39.4 +0.8 (1.0)	13.6 +0.1	16.2 -1.1
65.5 / 28.9 ±2.9	84.5 / 19.9 ±2.0	35.2 / 20.8 ±2.1	73.2 / 25.0 ±2.5
10 06.6 ±0.8	18 38.4	25 13.5 ±0.6	47 17.3 ±0.7

HP 3051

Hε	K	Hε	Hδ
10	25	47	
08.3 0.0	—	15.5 -2.4	26.3 +2.6
07.8 -0.5	—	16.4 -1.5	21.1 -2.6
06.0 -2.3	—	22.6 +4.7	25.0 +1.3
06.0 -2.3	—	11.6 -6.3	26.5 +2.8
04.3 -4.0	—	16.4 -1.5	21.0 -2.7
10.2 +1.9	—	17.4 +0.5	23.8 +0.1
03.4 -4.9	—	19.0 +1.1	21.2 -2.5
14.1 +5.8	—	20.3 +2.4	23.3 -0.4
11.8 +3.5	—	22.1 +4.2	23.6 +1.9
11.1 +2.8	—	18.0 +0.1	23.4 -0.3
83.0 / 28.0 ±2.8		79.3 / 24.7 ±2.5	37.2 / 17.2 ±1.7
10 08.3 ±0.8		25 17.9 ±0.7	47 23.7 ±0.5
10 06.2		25 13.5	47 17.3
02.1 ±0.1		04.4 ±0.9	06.4 ±0.9

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Wednesday Oct 28 1896.

Measures made on C 4601 & C 4603

~~H P~~ 3052

H_β		H_γ	
13 18.7	-1.1	46 58.2	-3.9
21.4	+1.6	47 12.5	+10.4
22.5	+2.7	58.5	-3.6
21.7	+1.9	06.0	+3.9
17.4	-2.4	57.2	-4.9
20.1	+0.3	58.6	-3.5
19.5	+0.8	02.6	+0.5
16.1	-3.7	04.1	+2.0
17.8	-2.0	02.1	0.0
22.3	+2.5	01.4	-0.7
97.5	10 18.5	21.2	10 33.4
	±1.8		±3.3
13 19.8	±0.5	47 02.1	±0.9

~~H P~~ 3051

H_β		H_γ	
32.8	+2.4	47 02.5	-6.9
21.8	-8.6	05.0	-4.4
24.8	-5.6	12.0	+2.6
30.3	-0.1	02.2	-7.2
29.0	-1.4	11.0	+1.6
30.2	-0.2	07.1	+2.3
33.6	+3.2	11.6	+2.2
38.1	+7.7	14.1	+4.7
29.0	-1.4	13.7	+4.4
34.7	+4.3	14.5	+5.1
104.3	10 34.9	93.7	10 21.4
	±3.5		±2.1
13 30.4	±1.0	47 09.4	±0.6
13 19.8		47 02.1	
	10.6±1.1		07.3 ±1.1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Oct 29 1896

Measures on C 9601 + C 9603

	#P 3053			#P 3051			
	$\#_\delta$		$\#_\nu$	$\#_\delta$		$\#_\nu$	
	13		47	14			
	54.6	− 0.7	40.0	+ 2.2	01.7	0.0	33.3	− 4.9
	54.3	− 1.0	32.4	− 5.4	52.5	− 9.2	37.4	− 0.8
	51.6	− 3.7	37.9	+ 0.1	03.1	+ 1.4	41.8	+ 3.6
	56.5	+ 1.2	34.4	− 3.4	04.9	+ 3.2	41.3	+ 3.1
	53.9	− 1.4	36.8	− 1.0	57.0	+ 4.7	41.9	+ 3.7
	56.3	+ 1.0	38.0	+ 0.2	09.2	+ 7.5	33.6	− 4.6
	59.5	+ 4.2	41.3	+ 3.5	04.4	+ 2.7	36.0	− 2.2
	53.3	− 2.0	34.7	− 3.1	01.3	− 0.4	36.8	− 1.4
	56.6	+ 1.3	41.3	+ 3.5	05.2	+ 3.5	38.8	+ 0.6
	56.1	+ 0.8	40.8	+ 3.0	57.5	− 4.2	46.7	+ 2.5
	52.7	10 | 17.3	77.6	10 | 25.4	116.8	10 | 36.8	81.6	10 | 27.4
		± 1.7		± 2.5		± 3.7		± 2.7

Apparatus works much more smoothly. It is better than it has been at any time.

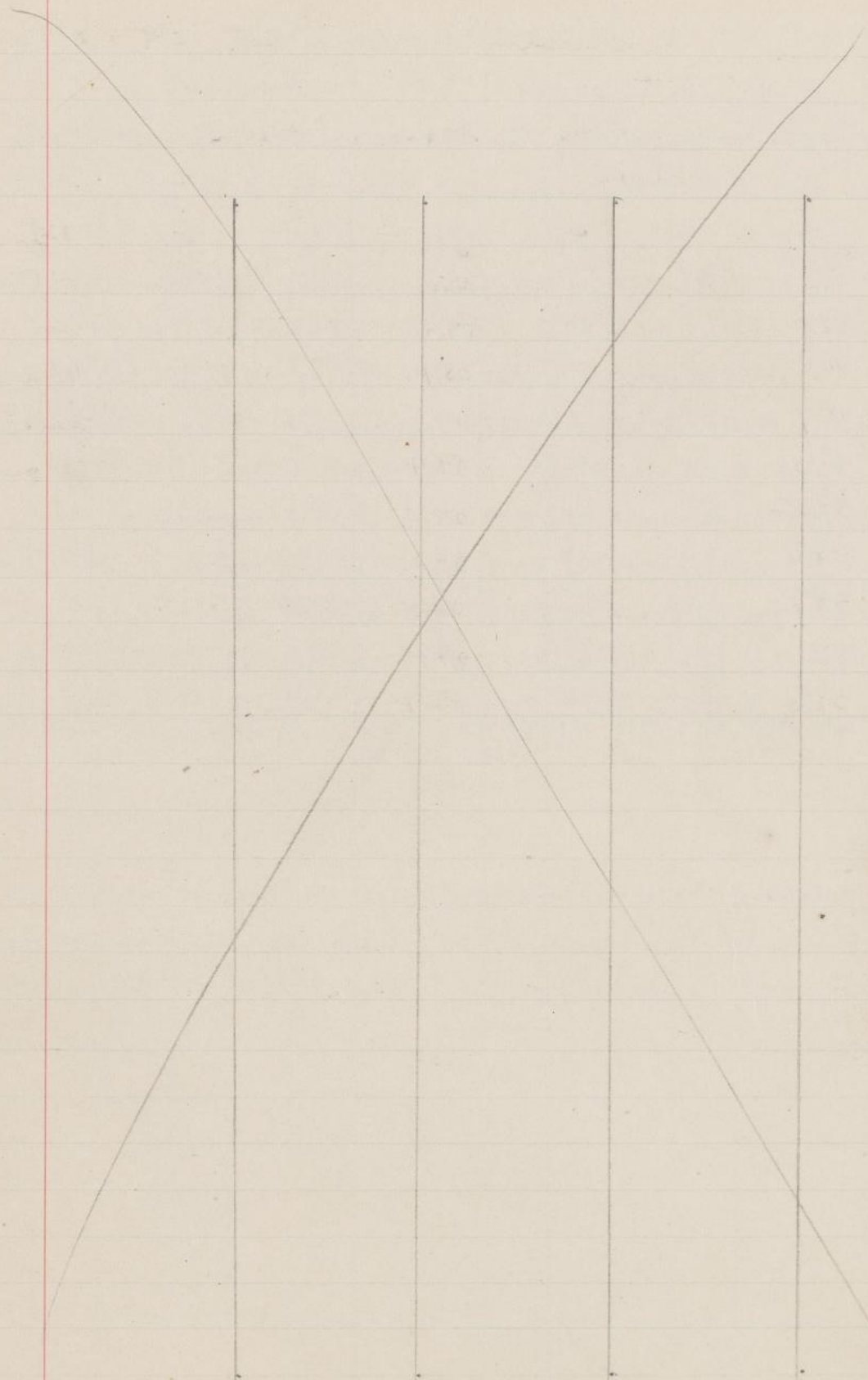
13 55.3 ± 0.5 47 37.8 ± 0.7 14 01.7 ± 1.0 47 38.2 ± 0.8

13 55.3 47 37.8

06.4 ± 1.1 0.4 ± 1.1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Oct. 29 1896

Measures on C 9601 & C 9602.

Edges compared off. to those used on pages 5-8

HP 3053								HP 3051					
Hγ (10)		K (19)		Hζ (25)		Hε (48)		Hγ		Hζ		Hε	
~~49.0~~ 46.4	-2.4	18.7	-0.5	50.8	+2.2	00.9	-2.0	56.0	+1.9	55.2	-2.9	04.5	+0.6
52.5	+3.7	17.9	-1.3	49.2	+0.6	04.4	+1.5	53.2	-0.9	57.7	-0.4	04.8	+0.9
44.4	-4.4	19.3	+0.1	50.8	+2.2	05.1	+2.2	52.7	-1.4	59.0	+0.9	07.0	+3.1
45.7	-3.1	18.2	-1.0	51.3	+2.7	03.3	+0.4	57.0	+2.9	03.1	+5.0	02.5	-1.4
49.0	+0.2	19.8	+0.6	50.5	+1.9	03.4	+0.5	55.0	+0.9	53.8	-2.3	01.0	-2.9
47.5	+1.3	20.3	+1.1	44.9	-3.7	01.1	-1.8	54.6	+0.5	03.0	+4.9	05.0	+1.1
49.0	+0.2	19.0	-0.2	47.2	-1.4	04.2	+1.3	54.9	+0.8	56.3	-1.8	06.3	+2.4
48.7	-0.1	19.4	+0.2	46.7	-1.9	02.1	-0.8	54.8	+0.7	56.8	-1.3	02.3	-1.6
52.7	+3.9	17.6	-1.6	45.9	-2.7	~~59.8~~ 01.6	-1.3	51.4	-2.7	59.8	+1.7	02.0	-1.9
57.6	+2.8	21.5	+2.3	48.3	-0.3	02.7	-0.2	51.2	-2.9	53.9	-4.2	04.0	+0.1
87.5	10/22.1 ±2.2	91.7	10/18.7 ±0.9	85.6	10/19.6 ±2.0	28.8	10/11.20 ±1.2	40.8	9/15.6 ±1.6	80.6	10/24.4 ±2.4	89.4	10/15.0 ±1.5

10 48.8±0.6 19 19.2± 25 48.6±0.6 48 02.9±0.3 10 54.1±0.4 25 58.1±0.7 48 03.9±0.4

10 48.8	25 48.6	48 02.9
05.3±0.7	09.5±0.9	01.0±0.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Oct 30 1896

Measures in C 9601 & C 9602

Same comparison as on preceding page.

HP 3053

	H_ζ		K		H_ε		H_8	
10	32.4	+1.9	04.5	+1.0	35.0	+2.1	47.3	+0.3
	33.3	+2.8	06.7	+3.2	33.6	+0.7	45.8	-1.8
	28.8	-1.7	04.8	+1.3	35.3	+2.4	50.7	+3.1
	29.4	-1.1	03.7	+0.2	32.0	-0.9	45.8	-1.8
	27.3	-3.2	03.6	+0.1	28.8	-4.1	48.3	+0.7
	27.2	-3.3	02.3	-1.2	32.3	-0.6	50.0	+2.4
	28.1	-2.4	04.3	+0.8	34.1	+1.2	49.7	+2.1
	40.9	+10.4	03.0	-0.5	33.3	+0.4	~~45.4~~ 48.0	+0.4
	28.4	-2.1	01.8	-1.7	31.2	-1.7	46.6	-1.0
	28.8	-1.7	00.6	-2.9	33.5	+0.6	44.3	-3.3
	104.6	30.6	35.3	12.9	29.1	14.7	76.6	16.9
		±3.1		±1.3		±1.5		±1.7

HP 3051

	H_ζ		H_ε		H_8	
	44.1	+2.7	48.2	+2.7	46.5	-4.2
	40.5	-0.9	49.0	+3.5	50.2	-0.5
	40.4	-1.0	44.8	-0.7	50.3	-0.4
	42.5	+1.1	46.6	+1.1	51.4	+0.7
	40.6	-0.8	43.2	-2.3	50.7	0.0
	42.3	+0.9	42.1	-3.4	53.6	+2.9
	41.9	+0.5	47.4	+1.9	54.6	+3.9
	39.6	-1.8	46.1	+0.6	~~51.2~~ 47.0	+0.5
	40.8	-0.6	45.1	-0.4	51.3	+0.6
	40.8	-0.6	42.7	-2.8	47.5	-3.2
	13.5	10.8	55.2	11.4	107.3	16.9
		±1.1		±1.9		±1.7

10 30.5±0.9 19 03.5± 25 32.9±0.4 47 47.6±0.5

10 41.4±0.3 25 46.5±0.5 47 50.7±0.5

10 30.5 25 32.9 47 47.6

10.9±1.0 12.6±0.6 3.1±0.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Oct 30 1896.

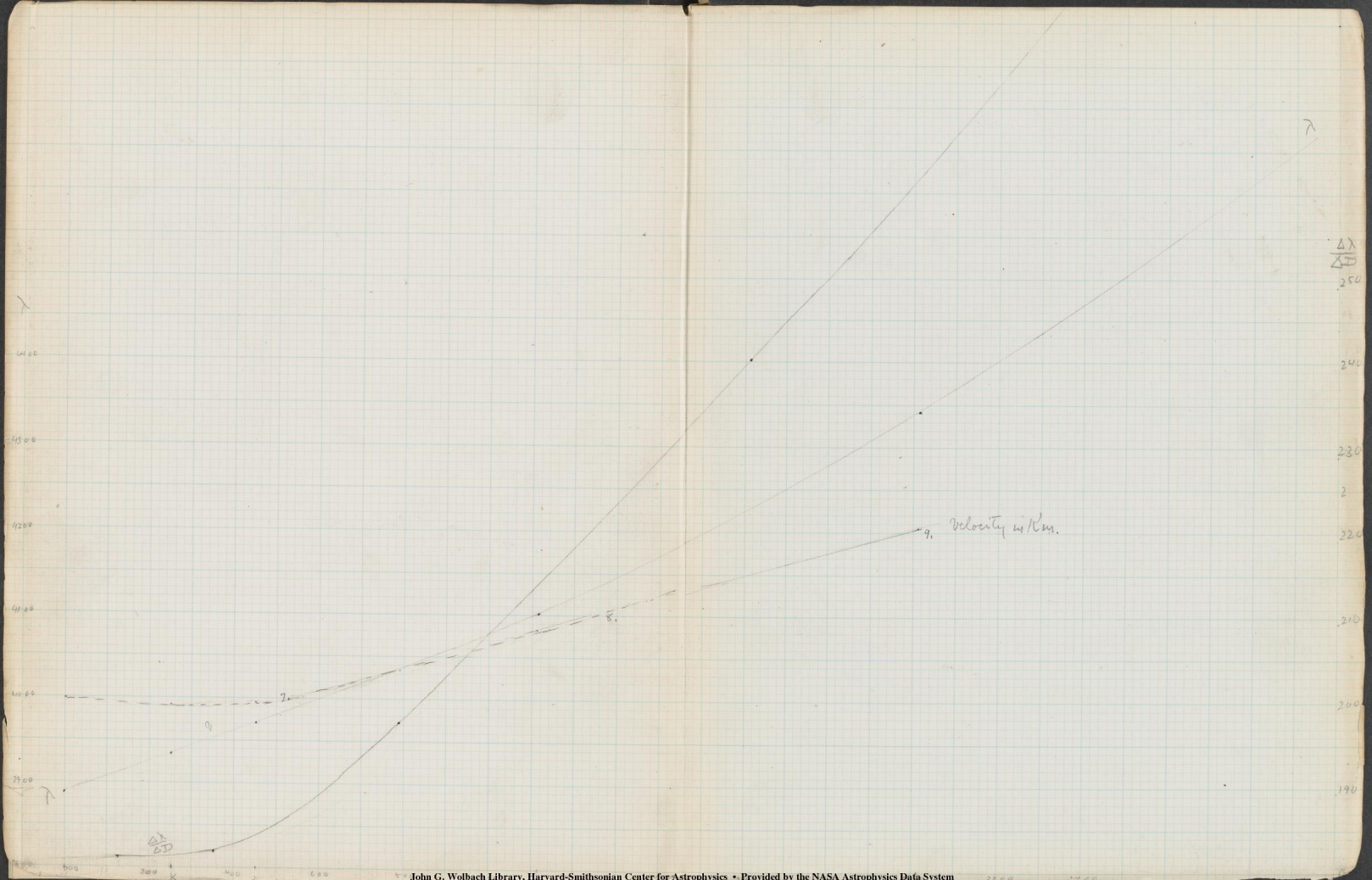
Distances between lines in spectra of ~~H Pegasi~~ 3051 from preceding pages.

	2(Ag K)	2Ag Ad	2Ag As	~~2Ag Ag~~	2K Ae	2 A2 A8	2 A8 Ar
	~~8 24.2 14 55.5~~						
C	~~8 26.0 15~~						
95448 9545	—	14 59.3			—		
	8 21.2	14 59.5			6 38.3		
95448 9545	—	15 00.9			—		
	8 26.0	15 02.9			6 36.9		
95518 9552	—	15 04.0			—		
	8 27.0	15 02.9			6 35.9		
95518 9552	—	15 03.3			—		
	8 29.5	15 06.1			6 36.6		
96018 9602	—	15 09.6	37 15.4		—	22 05.8	
	8 32.2	15 07.3	37 11.1		6 35.1	22 04.8	
96018 9602 Off edges	—	15 04.0	37 09.8		—	22 05.8	
	8 29.4	14 59.8	37 14.1		6 30.4	22 14.3	
96018 9602 Off. edges.	—	15 04.1	37 09.3		—	22 05.2	
	8 33.0	15 02.4	37 17.1		6 29.4	22 14.7	
96018 9603							33 39.0 ~~34 21.0~~
							33 42.3
96018 9603							33 36.5
							33 42.5
	7 | 58.3				7 | 32.6	6 | 49.6	4 | 40.3
	8.3				4.7	8.2	10.1
	8 28.3				6 34.7	22 08.2	33 10.1
	60				60	60	60
	480				360	1320	1980
	28.3				34.7	8.2	10.1
	2 | 508.3				2 | 394.7	2 | 1328.2	2 | 1990.1
½ Means.	254.2				197.4	664.1	995.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj... 924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 31 1896

	Dist from H_ζ D	λ
H_ζ	—	3888.
K	254.1 div.	3934.
H_ε	457.6	3970.
H_δ	1115.7	4101.
H_γ	2110.7	4340.

Dist.	ΔD div	Dist. from middle of	Δλ		Δλ/ΔD
H_ζ - K	254.	127.	46.	1.6927/2.0315/9.1316	0.1811
K - H_ε	198.	353.	36.		0.1818
H_ε - H_δ	664	784	131.		0.1973
H_δ - H_γ	995	1614	239.		0.2402

The above plotted curve gives following values.

	Δλ/ΔD	$\frac{1}{2}\cdot\frac{\Delta\lambda}{\Delta D}\cdot\frac{300000}{\lambda}=M$	log. M.
H_ζ	0.1808 (extrapolated)	0.6975 (?)	0.843 56 ?
K	0.1813	0.6913	0.839 66
H_ε	0.1899	0.6948	0.841 88
H_δ	0.2138	0.7820	0.893 21
H_γ	0.2688 (extrapolated)	0.9048	0.956 57

$C = D \times M.$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Saturday Oct 31 1896.

Reduction of Result from preceding pages.
Motion of AP 3051 with ref. to AP 3053
Values enclosed thus (81.6) are Km per sec.

Plates	H_1 dis.	K	H_2	H_3	H_γ	
95448 95445 P. 53	11.7		11.5			Oct 9
	(81.6) Km		(79.9)			
95448 95445 P 54	13.5		13.5			" "
	(108.1)		(93.8)			
95519 95552 Ph 51952	27.9		29.0			" 10
	(194.6)		(201.5)			
95519 95552 Ph 51952	31.6		28.8			" "
	(220.4)		(201.1)			
96019 96028 R58	02.1		04.4	06.4		" 29
	(14.6)		(30.6)	(50.0)		
96019 96028 Off Ridges P62	05.3		09.5	01.0		" "
	(37.0)		(66.0)	(7.8)		
96019 96028 Off Ridges P63	10.9		12.6	03.1		" "
	(76.0)		(87.5)	(24.2)		
96019 96033 P59				10.6	07.3	
				(82.9)	(31.0)	
96019 96033 P60				06.4	00.4	
				(50.0)	(3.0)	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 31 1896.

Plate	Coordinates of Center from circles R.A.	Dec	Dev. not allowed for.	Side of Pier	Distance of Hz from 2nd off. Plate No HP 3051	HP 3053	Dist. from Center of Plate (Center is 101 from edge) HP 3051	HP 3053
9544	18 04	+12.5		W	110. m.m	56.5 m.m	9.	44.5
9545	18 03	+28.5		E	83.	136.	18.	25.
9551	18 04	+12.3		W	103	49.5	02.	51.5 60.5
9552	18 04	+28.5		E	83.5	137.	16.5	36.
9601	18 04	+12.5		W	Very much inclined to edge.		10.	44.5
9602	18 04	+28.2		E	60.5	114.	40.5	13
9603	18 03	+28.2		E	81.5	135	19.5	34

9603 Probably did not have the plate holder shoved in to the stop.

9551 / 9552 Spectrum is more inclined to edge of plate than 9544 & 9545

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Nov 2 1896

Measures on C 96 1496 15

AP 3053

	$\Delta\zeta$	K	Δ_2	Δ_8
10	03.1 +5.3	18 38.7 +10.3	25 08.2 +6.8	47 19.0 +8.2
	54.0 -3.8	28.7 +0.3	01.5 +0.1	12.2 +1.4
	06.0 +8.2	30.0 +1.6	00.5 +0.1 -0.9	12.7 +1.9
	58.0 +0.2	26.4 -2.0	58.9 -1.5	08.4 -2.4
	59.3 +1.5	26.7 -1.7	00.0 -1.4	10.3 -0.5
	02.0 +4.2	27.4 -1.0	02.3 +0.9	12.3 +1.5
	53.5 -4.3	26.3 -2.1	57.8 -2.6	12.0 +1.2
	55.9 -1.9	24.8 -3.6	58.7 -1.7	08.8 -2.0
	53.0 -4.8	29.8 +1.4	56.6 -4.8	08.9 -1.9
	~~55.0~~ 53.3 -4.5	~~23.9~~ 25.0 -3.4	~~56.3~~ 59.4 -2.0	03.3 -7.5
	78.1 10 / 26.7 ±3.8	83.8 10 / 27.4 ±2.7	103.9 10 / 21.8 ±2.2	107.9 10 / 28.5 ±2.8

AP 3051

	$\Delta\zeta$	K	Δ_2	Δ_8
	04.5 +9.2	—	08.0 +5.6	13.4 +5.6
	54.7 -0.6	—	01.0 -1.4	08.0 +0.2
	00.9 +5.6	—	59.6 -2.8	07.8 0.0
	48.1 -7.2	—	03.6 +1.2	07.0 -0.8
	55.5 +0.2	—	00.5 +1.9	09.1 +1.3
	57.4 +2.1	—	04.6 +2.2	06.2 -1.6
	53.8 -1.5	—	01.3 -1.1	07.2 -0.6
	52.3 -3.0	—	00.2 -2.2	04.4 -3.4
	53.0 -2.3	—	03.9 +1.5	07.2 -0.6
	52.8 -2.5	—	01.6 -0.8	07.2 -0.6
	53.0 10 / 24.2 ±3.4		24.3 9 / 20.7 ±2.1	77.5 14 / 14.7 ±1.5

9 57.8 | 18 28.4 | 25 00.4 | 47 10.8

9 55.3
9 57.8
− 2.5

25 02.4
4
25 00.8
+ 2.0

47 07.8
47 10.8
− 3.0

− 17.4 Km | +13.9 | −23.5 Km

2 Ac Ac

22 10.4

22 05.5 4

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. . 924K

Monday Nov 2 1896

Measures C 9614 & 9615.

HP 3053				HP 3051				
H_ε	$H_2 + H_8$	$H_2 + H_8$ (Return)	H_8	H_2	$H_2 + H_8$	$H_2 + H_8$ Return	H_8
24 45.9 +1.2	35 52.5 +0.2	51.9 -0.2	46 58.4 +2.7	44.7 -2.1	52.3 +0.6	53.8 +1.0	00.8 +6.6
44.9 +0.2	49.5 -2.8	54.0 +1.9 +1.9	57.1 +1.4	46.8 0.0	52.5 -0.4	55.7 +2.9	53.4 -0.8
47.3 +2.6	52.1 -0.2	54.6 +2.5	52.0 -3.7	49.7 +2.9	50.2 -2.7	56.9 +4.1	56.0 +1.8
47.1 +2.4	55.2 +2.9	53.9 +1.8	57.5 +1.8	50.2 +3.4	58.8 +5.9	51.8 -1.0	50.8 -3.4
44.8 +0.1	51.2 -1.1	52.1 0.0	54.4 -1.3	46.7 -0.1	54.0 +1.1	54.6 +1.8	50.2 -4.0
45.0 +0.3	52.9 +0.6	48.2 -3.9	56.3 +0.6	45.6 -1.2	55.0 +2.1	53.8 +1.0	55.3 +1.1
44.4 -0.3	52.9 +0.6	53.0 +0.9	52.3 -3.4	43.5 -3.3	53.2 +0.3	48.5 -4.3	50.2 -4.0
44.4 -0.3	51.0 -1.3	54.0 +1.9	53.5 -2.2	42.4 -4.4	51.3 -1.6	52.1 -0.7	53.6 +1.4
40.8 -3.9	53.4 +1.1	49.1 -3.0	56.3 +0.6	48.8 +2.0	49.6 -3.3	50.2 -2.6	51.8 -2.4
42.4 -2.3	52.3 0.0	49.8 -2.3	59.2 +3.5	49.1 +2.3	52.0 -0.9	51.0 -1.8	58.1 +3.9
47.0 $\frac{10}{18.6}$ ±1.4	23.0 $\frac{10}{10.8}$ ±1.1	20.6 $\frac{14}{18.4}$ ±1.8	57.0 $\frac{6}{21.2}$ ±2.1	67.5 $\frac{14}{21.7}$ ±2.2	28.9 $\frac{10}{18.9}$ ±1.9	28.4 $\frac{14}{20.2}$ ±2.1	42.2 $\frac{10}{23.4}$ ±2.9
24 44.7	35 52.3	35 52.1	46 58.7	24 46.8	35 52.9	35 52.8	46 54.2
				24 44.7	35 52.3	35 52.1	46 53.7
				+2.1	+0.6	+0.7	−1.8
				+14.7	+4.4	+5.1	−11.7 Km

$2\ H_2\ H_8$ 22 11.0 22 07.4

22 11.0

Mean 22 9.2

60

1320

9.2 Div.

2 | 1329.2

664.6

ΔD

$\Delta \lambda$ = 131.

$\lambda(H_8\ H_5/2)$ from curve = 4037

$M_{(H_5 - H_2)} = \frac{\frac{1}{2}}{664.6} = \frac{131}{1329.2} \cdot \frac{300000}{4037} = 7.33$

This agrees with value already plotted.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Nov 3 1896

Measures on C 95-98 & 96 18

Alcyone

	H6	H2	H8
10	21.0 −1.9 −2.0	25 32.8 −1.8	47 33.0 −5.9
	23.4 +0.4 (3)	30.4 −4.2	34.6 −4.3
	22,0 −0.9 −1.0	33.3 −1.3	37,0 −1.9
	24.2 +1.2 (3)	36.4 +1.8	39.8 +0.9
	22.7 −0.8 (2)	37,0 +2.4	41.3 +2.4
	23.4 +0.4 (5)	33.6 −1.0	38,5 −0.4
	19,5 −3.5 (46)	35.2 +0.6	42.0 +3.1
	24,2 +1,2 (3)	33.8 −0.8	44,8 +5.9
	23,3 +0.8 (4)	38.4 +3.8	37,1 −1.8
	25.7 +2.7 (8)	35,5 +0.9	40,5 +2.4 (1.6)
	29.8 10/12.2 ±1.3	46.4 10/13.4 ±1.9	88.6 10/29.0 ±2.9 25.2 ±2.8
10	22.9 23.0	25 34.6	47 38.9

Merope

	22, 1 −1.0	26.2 −3.5	36,2
	18,5 −4.6	26.3 −3.4	38,0
	23.1 0.0	30,0 +0.3	41,5
	22.9 −0.2	28.4 −1.3	38.0
	26.0 +2.9	30,1 +0.4	41,0
	21,5 −1.6	29.2 −0.5	41.4
	28.0 +4.9	34,0 +4.3	36.6
	24.1 +1.0	27.0 −2.7	38,4
	22,1 −1.0	32,1 +2.4	37.7
	22.8 −0.3	33.8 +1.1	44,7
	31.1 10/12.3 ±1.8	97.1 10/22.9 ±2.3	93.6
10	23.1	25 29.7	47 39.4
10	22,9 +0,2	25 34.6 − 4.9	47 38.9 + 0.5

Atlas

	H6	H2	H8
	18,0 +0.1	27.4 +1.5	31.2 −1.2
	17,7 −0.2	23.5 −2.4	37,0 +4.6
	18,0 +0.1	25.7 −0.2	34.8 +2.4
	16,1 −1.8	30,9 +5.0	34,2 +1,8
	18,0 +0.1	21,8 −4.1	33,0 +0.6
	13,6 −4.3	28,1 +2.2	26.9 −5.5
	18,0 +0.1	27,8 +1.9	27,4 −6.0
	18,1 +0.2	24,8 −1.1	29.3 −3.1
	20,6 +2.7	21,6 −4.3	33.4 +1.0
	20.5 +2.6	27,0 +1.1	36.3 +3.9
	78 6 10/12.2 ±1.4	58.6 10/23.8 ±2.4	23.6 10/29.1 ±2.9
10	17.9 10 2[1]2.9 − 05.0	25 25.9 25 34.6 − 8.7	47 32.4 47 38.9 − 06.5

Electra

	05.8 −4.6	20,2 −1.0	25,5 −4.0
	09.6 −0.8	16.3 −4.9	28,2 −1.3
	13.0 +2.6	18,2 −3.0	34,0 +4.5
	13,5 +3.1	22,3 +1,1	27,7 −1.8
	12,3 +1,2	19,4 −1.8	27.8 −1.7
	11,1 +0.7	24,5 +3.3	25,5 −4.0
	07,5 −1.9	17,1 −4.1	36.0 +6.5
	12,0 +1.6	29,3 +8.1	30,8 +1,3
	9,8 −0.6	18,0 −3.2	28,5 −1.0
	8,3 −2.1	27,0 +6.8	30.9 +1.4
	103.9 10/19.9 ±2.0	112.3 10/26.3 ±3.6	94.9 9/27.5 ±2.8
10	10.4	25 21.2	47 29.5
10	22.9 − 12.5	25 34.6 − 13.4	47 38.9 − 18.4

* Read differences

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae..proj...924K

Tuesday Nov 3 1896

Measures on C 95-98 & 96 18 Continued.

Maria

Hζ	Hε	Hδ
08.8 -4.2	16.7 ∓5.6	23.0 ∓4.2
14.0 +1.0	22.3 0.0	30.4 +3.2
11.8 -1.2	19.7 -2.6	27.2 0.0
17.0 +4.0	21.8 -0.5	31.8 +4.6
11.9 -1.1	21.7 -0.6	22.7 -4.5
14.4 +1.4	23.2 +0.9	26.9 -0.3
12.7 -0.3	26.0 +3.7	31.2 +4.0
14.6 +1.6	23.6 +1.3	28.0 +0.8
11.5 -1.5	23.3 +1.0	26.3 -0.9
13.3 ∓0.3	24.5 ∓2.2	25.0 -2.2
30.0 / 12.4 ±1.7	228 / 18.4 ±1.8	72.5 / 24.2 ±2.5
10 13.0	25 22.3	47 27.2
10 22.9	25 34.6	47 38.4
− 09.9	− 12.3	− 11.7
	Star	a
—	10.6 ∓2 −0.8 / 0.8	17.2 +0.1
—	08.4 -3.0	14.7 -2.4
—	12.4 +1.0	17.1 0.0
—	05.6 -6.8	16.8 -0.3
—	10.7 -0.7	11.2 -5.9
—	12.6 +1.2	18.2 +1.1
—	09.5 -1.9	21.6 +4.5
—	12.5 ∓1.1	19.0 +1.9
—	16.0 +4.6	16.3 -0.8
—	15.5 ∓4.1	18.8 ∓1.7
	138 / 24.2 ±2.4	70.9 / 18.5 ±1.8
	25 11.4	47 17.1
	25 34.6	47 38.9
	− 23.2	− 21.8

Saggela

Hζ	Hε	Hδ
00.3 -6.4	08.3 -5.4	21.8 -0.3
08.0 +1.3	11.2 -2.5	22.1 0.0
05.0 +1.3	16.9 +3.2	22.5 ∓0.4
11.3 +4.6	11.5 -2.2	23.8 +1.7
08.2 +1.5	16.3 +2.6	18.2 -3.9
01.6 -5.1	14.4 +0.7	20.4 -1.7
07.4 +0.7	12.9 -0.8	21.9 -0.2
05.5 -1.2	11.6 -2.1	23.4 +1.3
07.6 +0.9	18.9 +5.2	22.6 +0.5
08.8 +2.1	15.3 +1.6	24.5 ∓2.4
66.7 / 25.1 ±2.5	37.3 / 24.3 ±2.6	21.2 / 12.4 ±1.2
10 06.7	25 13.7	47 22.1
10 22.9	25 34.6	47 38.9
− 16.2	− 20.9	− 16.8
	Star	6

* Reading following Set.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Nov 4 1896

Measures made on C 96 22 & 96 23

HP 3053

Hζ	K	Hε	Hδ
10 32.9	19	25	47
~~35.0~~ +0.4	09.4 +0.1	42.0 −0.4	57.0 −1.3
39.9 +2.4	09.6 +0.3	42.4 −0.4	50.7 −1.6
35.5 −2.0	09.9 +0.6	43.6 +0.8	52.7 +0.4
36.1 −1.4	05.5 −3.8	42.5 −0.3	47.1 −5.2
38.10 +0.5	10.2 +0.9	41.5 −1.3	52.3 0.0
39.0 +1.5	09.7 +0.4	41.5 −1.3	52.6 +0.3
35.0 −2.5	10.4 +1.1	44.0 +1.2	56.0 +3.7
35.5 −2.0	08.8 −0.5	44.1 +1.3	52.2 −0.1
40.3 +2.8	09.3 0.0	44.5 +1.7	57.0 −1.3
37.5 0.0	09.8 +0.5	42.1 −0.7	57.1 +4.8
74.7 / 15.5 ±1.6	92.6 / 15.2 ±0.8	28.2 / 19.8 ±1.0	22.7 / 18.7 ±1.9

HP 3051

Hζ	K	Hε	Hδ
39.3 −2.7	—	42.2 +0.5	53.2 +2.4
43.4 +1.4	—	39.6 −3.1	51.1 +0.3
40.8 −1.2	—	42.2 −0.5	51.0 +0.2
43.5 +1.5	—	40.6 −2.1	50.7 −0.1
40.9 −1.1	—	41.1 −1.6	52.2 +1.4
44.0 +2.0	—	43.9 +1.2	50.7 −0.1
40.8 −1.2	—	44.2 +1.5	51.1 +0.3
43.6 +1.6	—	42.6 −0.1	51.2 +0.4
42.8 +0.8	—	45.2 +2.5	47.5 −3.3
40.5 −1.5	—	45.0 +2.3	49.2 −1.6
19.6 / 15.0 ±1.5		26.6 / 16.4 ±1.6	07.9 / 10.1 ±1.0

10 37.5±0.4 19 09.3±0.2 25 42.8±0.3 47 52.3±0.5 10 42.0±0.4 25 42.7±0.4 47 50.8±0.3

10 37.5
+ 04.5

25 42.8
− 0.1

47 52.3
− 1.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Thursday Nov 5 1896

An inspection with pocket magnifier shows ~~that~~ distances between corresponding lines of spectra of AP 30519 30533 is greater on C 9545 than C 9544. This is as it should be since C 9551 was the reversed plate.

C 9545 Rev shows slightly greater distances than C 9552 dir

C 9544 (dir) & C 9601 (Rev) Compared shows greatest dist on C 9544. Focus of C 9601 is 10 m.m shorter than C 9544 which accounts for it. Change of focus due to regrinding of prism.

The focus of the 11 inch Draper is about 389 C.M
Calling change of focus due to reversal = 2 m.m
" dist between corresponding lines = 54 m.m

3890 m.m : 2 m.m :: 54 m.m : .0277 m.m

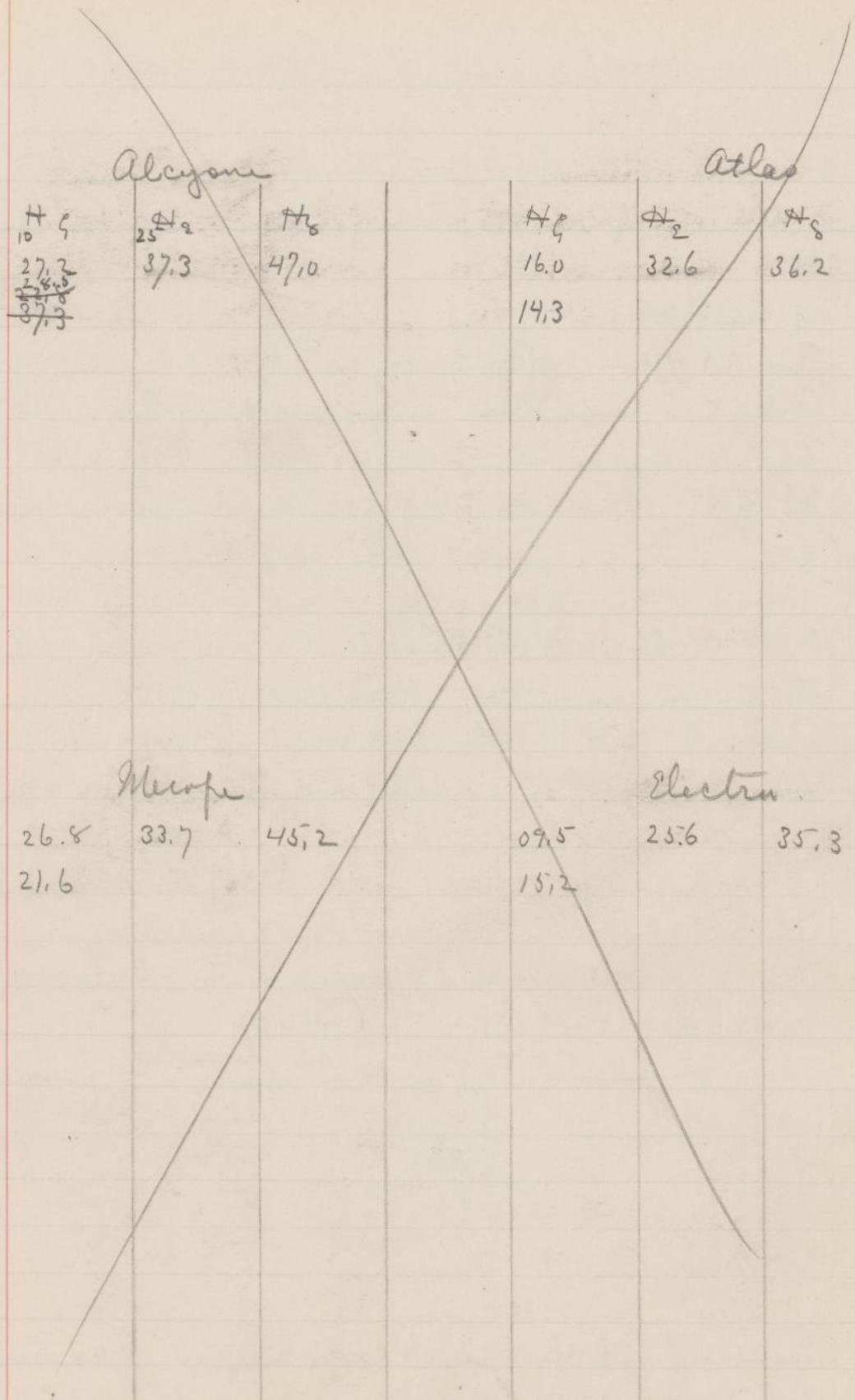
3890 | 108.000 | 273 | 273
27800 | 108000
30200 | 27300
28533 | 302000
28883 | 285300
12700 | 137000
11670 | 116700
1030 | 20300

3890 | 108,000 | .0277
7780
30200
27230
29700
27230
2470

Measured with steel rule & pocket magnifier 40 rev of micrometer screw = 12 m.m 7 which gives 1 div = .0053 m.m
This will make .0277 m.m = 5 div. 2 of screw.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K



Alcyone			Atlas		
H_ζ	H_ε	H_δ	H_ζ	H_ε	H_δ
27.2	37.3	47.0	16.0	32.6	36.2
~~27.3~~			14.3		

Merope			Electra		
26.8	33.7	45.2	09.5	25.6	35.3
21.6			15.2		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phae.proj. .924K

Maia

H_ζ	H_2	H_8
18.0	26.9	33.1

Saygeta

H_ζ	H_2	H_8
07.3	15.4	23.3

Star a

—	10.4	17.1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Nov 6 1896

Measures of Plates & determine thickness of brass & be prepared & holders of 11 inch & 9 inch for reversal of plates in Webb.

.048	.058
.052	.062
.069	.084
.055	.065
.052	.062
.060	.070
.066	.076
.057	.067
.049	.059
.072	.087
6 / .580	10 / .690
3 / .058	3 / .069
.019	.027
	.046

.039 in. thickness of brass to be used.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phae.proj..024K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Nov 6 1896

Measures on C 9598 & C 9618

Alcyone

10		25		47	
27.9	+2.8 (4)	36.5	-0.9	50.3	+3.0
26.0	+0.4 (5)	39.0	+1.6	47.3	0.0
22.7	-2.9 (8)	39.5	+2.1	49.1	+1.8
23.6	-2.0 (1.9)	35.0	-2.4	48.8	+1.5
26.9	+1.3 (4)	36.3	-1.1	48.0	+0.7
20.9	-4.7 (6)	34.5	-2.9	44.2	-3.1
28.2	+2.6 (7)	39.6	+2.2	41.9	-5.4
26.5	+0.9 (1.0)	38.8	+1.4	49.1	+1.8
24.5	-1.8 (0)	38.6	+1.2	48.6	+1.3
27.5	+1.9 (2.0)	36.6	-0.8	45.8	-1.5
54.7	(9) 20.3 ±2.0	74.4	(10) 16.6 ±1.7	73.1	(9) 20.1 ±2.0

Comparisons made with Alcyone:

10	25	47
25.8	37.4	47.3

Merope

17.4	-3.2	32.1	-1.2	47.0	+2.3
22.6	+2.0	36.3	+3.0	43.1	-1.6
20.3	-0.3	33.7	+0.4	50.0	+5.3
20.8	+0.2	37.2	+3.9	45.8	+1.1
21.7	+1.1	34.0	+0.7	43.7	-1.0
22.6	+2.0	30.7	-2.6	45.6	+0.9
				44.2	
18.0	-2.6	34.2	+0.9	~~39.3~~	-0.5
20.0	-0.6	34.3	+1.0	44.5	+0.2
20.8	+0.2	29.7	-3.6	43.4	-1.3
21.3	+0.7 (10)	30.4	-2.9 (10)	39.7	-5.0 (9)
105.5	12.7 ±1.3	32.6	20.2 ±2.0	47.0	19.2 ±1.9

10	25	47
20.6	33.3	44.7

10	25	47
25.5	37.4	47.3
− 4.9	− 4.1	− 2.6

Atlas

13.7	+3.3	29.6	-1.9	37.7	+2.4
18.8	+1.8	33.0	+1.5	36.4	+1.1
16.2	-0.8	30.3	-1.2	37.0	+1.7
17.2	+0.2	32.8	+1.3	32.6	-2.7
17.2	+0.2	33.6	+2.1	34.4	-0.9
14.7	-2.3	29.6	-1.9	35.9	+0.6
17.9	+0.9	36.0	+4.5	33.0	-2.3
18.9	+1.9	31.6	+0.1	32.4	-2.9
16.1	-0.9	31.1	-0.4	33.5	-1.8
19.0	+2.0	27.4	-4.1	40.2	+4.9
69.7	(10) 14.3 ±1.4	150	(10) 19.0 ±1.9	83.1	(9) 21.2 ±2.1

10	25	47
17.0	31.5	38.3
25.5	37.4	47.3
− 8.5	− 5.9	− 12.0

Electra

14.4	+3.0	22.7	-0.5	29.9	+0.7
13.7	+2.3	28.0	+4.8	30.7	+1.5
13.7	+2.3	20.7	-2.5	32.1	+2.9
05.0	-6.4	22.1	-1.1	29.1	-0.1
				29.5	+0.3
08.3	-3.1	24.4	+1.2	~~34.0~~	
09.3	-2.1	27.0	+3.8	28.0	-1.2
14.8	+3.4	22.2	-1.0	23.9	-5.3
06.7	-4.7	22.2	-1.0	30.4	+1.2
11.1	+0.3	21.3	-1.9	29.8	+0.6
16.5	+5.1 (10)	21.4	-1.8 (10)	28.3	-0.9 (9)
13.5	32.6 ±3.3	32.0	14.6 ±2.0	91.7	14.7 ±1.5

10	25	47
11.4	23.2	29.2

10	25	47
25.5	37.4	47.3
− 14.1	− 14.2	− 18.1

* Rudimentary ET

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Nov 6 1896

Measures on ⊙ 45-98 ⊙ 6184.

Maia

H_9	H_{12}	H_8
21.0 +1.3	26.6 -0.5	33.0 +0.7
20.6 +0.9	24.8 -2.3	29.7 -2.6
19.0 -0.7	27.0 -0.1	29.8 -2.5
18.0 -1.7	26.4 -0.7	32.7 +0.4
22.0 +2.3	26.6 -0.5	32.5 +0.2
20.6 +0.9	31.0 +3.9	35.0 +2.7
18.4 -1.3	25.8 -1.3	31.5 -0.8
17.3 -2.4	26.8 -0.3	32.3 0.0
20.4 +0.7	27.6 +0.5	33.8 +1.5
19.9 +0.2	28.2 +1.1	32.6 +0.3
97.2 (10) 12.4 ±1.2	70.8 (4) 11.2 ±1.1	22.9 (7) 11.7 ±1.2
10 19.7	25 27.1	47 32.3
10 25.5	25 37.4	47 47.3
− 5.8	− 10.3	− 15.0

Sun a

—	13.3 -1.8	21.0 +2.4
—	13.0 -2.1	21.6 +3.0
—	15.5 +0.4	23.3 +4.7
—	15.0 -0.1	24.7 +6.1
—	16.7 +1.6	08.0 -10.6
—	20.0 +4.9	17.3 -1.3
—	14.8 -0.3	13.8 -4.8
—	14.0 -1.1	16.9 -1.7
—	12.4 -2.7	19.4 +0.8
—	16.3 +1.2	19.9 +1.3
	51.0 (10) 16.2 ±1.6	85.9 (16) 36.7 ±3.7
	25 15.1	47 18.6
	25 37.4	47 47.3
	− 12.3	− 28.7

Sagzeta

H_9	H_{12}	H_8
10.6 +0.5	20.2 +2.3	24.3 +1.6
11.0 +0.9	16.6 -1.3	22.4 -0.3
11.0 +0.9	20.0 +2.1	23.8 +1.1
09.3 -0.8	20.2 +2.3	23.3 +0.6
07.6 -2.5	17.0 -0.9	20.0 -2.7
07.0 -3.1	17.7 -0.2	22.5 -0.2
12.5 +2.4	16.5 -1.4	19.3 -3.4
14.3 +4.2	16.6 -1.3	21.4 -1.3
05.5 -4.6	16.5 -1.4	23.7 +1.0
11.9 +1.8	17.9 0.0	26.2 +3.5
100.7 (10) 22.1 ±2.2	79.2 (10) 13.2 ±1.3	26.9 (14) 15.7 ±1.6
10 10.1	25 17.9	47 22.7
10 25.5	25 37.4	47 47.3
− 15.4	− 19.5	− 24.6

Obliquity of lines with + difference, scale data reversed edge of spectra, largely accountable for the deviation shown. ~~This~~

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Nov 7 1896

Measures on ℓ 95-49 & 95-50

Alcyone

13 H_2	$-H_8$	35 H_8	
41.0	+2.3	48.6	−4.9
~~57.2~~ 40.6	−2.7	55.2	+1.7
45.4	+2.1	50.3	−3.2
44.0	+0.7	55.7	+2.2
42.0	−1.3	53.2	−0.3
46.0	+2.7	57.8	+4.3
42.9	−0.4	48.9	−4.6
46.0	+2.7	56.4	+2.9
40.8	−2.5	53.9	+0.4
44.4	+1.1	54.6	+1.1
33.1	10 | 18.5 ±1.8	34.6	10 | 25.6 ±2.6

13 43.3 — 35 53.5

Atlas

H_2		H_8	
24.5	−0.6	29.0	−6.6
~~38.5~~ 23.4	−1.7	42.6	+7.0
29.4	+4.3	34.4	−1.2
25.0	−0.1	36.5	+0.9
24.3	−0.8	30.9	−4.8
27.2	+2.1	34.0	−1.6
24.0	−1.1	44.8	+9.2
23.5	−1.6	34.5	−0.1
25.4	+0.3	30.0	−5.6
24.3	−0.8	39.3	+3.7
51.0	10 | 13.4 ±1.3	56.0	10 | 41.6 ±4.2

13 25.1 — 13 43.3 — 18.2

35 35.6 — 35 53.5 — 17.9

Menope

H_2		H_8	
28.0	−3.2	37.9	−5.2
25.2	−6.0	53.4	+2.3
26.1	−5.1	55.0	+1.9
40.6	+9.4	45.6	−7.5
28.2	−3.0	52.0	−1.1
30.3	−0.9	50.7	−2.4
33.0	+1.8	57.0	+3.9
33.2	+2.0	02.2	+9.1
36.2	+5.0	57.5	+4.4
30.8	−0.4	57.8	+4.7
11.6	10 | 36.8 ±3.7	138.1	10 | 52.5 ±5.2

13 81.2 — 13 43.3 — 12.1

35 53.1 — 35 53.5 — 0.4

Electra

H_2		H_8	
33.5	−6.0	41.1	−8.4
36.5	−2.0	46.8	−2.7
38.2	−0.3	51.1	+1.6
44.4	+5.9	49.6	+0.1
38.2	−0.3	52.6	+3.1
36.4	−1.7	48.0	−1.5
39.5	+1.0	50.5	+1.0
37.0	+0.5	50.7	+1.2
41.7	+3.2	46.3	−3.2
37.6	−0.9	58.0	+8.5
85.4	10 | 20.8 ±2.1	94.7	10 | 31.3 ±3.1

13 38.5 — 13 43.3 — 4.8

35 49.5 — 35 53.5 — 04.0

Maia

H_2		H_8	
32.6	−4.1	54.5	−1.3
39.8	+3.1	57.7	+1.9
38.8	+2.1	53.2	−2.6
38.2	+1.5	54.1	−1.7
33.6	−3.1	58.8	+3.0
32.6	−4.1	51.1	−4.7
44.2	+7.5	56.0	+0.2
45.1	+8.4	54.5	−1.3
31.7	−5.0	57.7	+1.9
30.6	−6.1	58.6	+5.0
67.2	10 | 45.0 ±4.5	58.4	10 | 23.6 ±2.4

13 36.7 — 13 43.3 — 06.6

35 55.8 — 35 53.5 — 02.3

Sagyela

H_2		H_8	
28.3	−6.5	47.2	−2.5
39.5	+5.7	46.4	−4.3
32.0	−1.8	46.9	−3.8
35.8	+2.0	50.9	+0.2
35.0	+1.2	50.9	+0.2
28.1	−5.7	53.7	+3.0
36.3	+2.5	52.3	+1.6
38.0	+4.2	45.8	−4.9
28.5	−5.3	51.2	+0.5
36.1	+2.3	01.4	+10.7
37.6	10 | 36.2 ±3.6	106.7	10 | 32.7 ±3.3

13 33.8 — 13 43.3 — 09.5

35 50.7 — 35 53.5 — 02.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Monday Nov 9 1896

Measures on C 9641 + 9642.

HP 3053				HP 3051			
H5	K	H2	H8	H5	K	H2	H8
10 35.6	19	25	47				
~~29.9~~	11.0	43.2	57.9	43.3	—	51.0	57.1
34.7	18.7	47.9	53.8	38.8	—	48.8	54.5
36.7	16.0	48.5	62.0	43.9	—	52.8	59.8
Readjusted							
10	18			9			
02.9	30.3	04.4		55.6			
Readjusted							
10	18	25	47				
23.6 -10.7	59.6 -2.3	38.9 +4.2	46.5 +4.5	29.6 +1.2	—	36.5 +1.4	37.0 -2.5
24.7 +0.4	58.8 -3.1	30.6 -4.1	44.0 +2.0	25.8 -2.6	—	34.4 -0.7	39.2 -0.3
16.9 -7.4	04.7	32.3 -2.4	35.6 -6.4	33.4 +5.0	—	31.3 -3.8	36.0 -3.5
20.6 -3.7	00.0	35.7 +1.0	41.6 -0.4	28.2 -0.2	—	39.5 +4.4	40.7 +1.2
20.5 -3.8	59.0	37.6 +2.9	44.1 +2.1	29.6 +1.2	—	35.1 0.0	42.2 +2.7
24.6 +0.3	02.0	33.3 -1.4	42.9 +0.9	24.4 -4.0	—	35.0 -0.1	40.0 +0.5
31.6 +7.3	01.4	33.9 -0.8	44.0 +2.0	30.8 +2.4	—	35.5 +0.4	37.1 -2.4
29.0 +4.7	04.3	32.6 -2.1	46.2 +4.2	31.4 +3.0	—	32.7 -2.4	40.3 +0.8
21.2 -3.1	06.7	33.6 -1.1	40.2 -1.8	32.1 +3.7	—	34.6 -0.5	41.6 +2.1
30.5 +6.2	02.3	38.2 +3.5	34.7 -7.3	28.3 -0.1	—	36.0 +0.9	40.5 +1.0
43.2 /4 37.6 ±3.8	118.8	46.7 /10 23.5 ±2.4	198 /6 31.6 ±3.2	93.6 /9 21.4 ±2.1		50.6 /10 14.6 ±1.5	94.6 /4 17.0 ±1.7
10 24.3	19 01.9	25 34.7	47 42.0	9 10 28.4		25 35.1	47 39.5
				10 24.3		25 34.7	47 42.0
				+ 03.1		+ 0.4	- 2.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Nov 11 1896

Reductions of Measures on Page 80

Assume deviation = $d = a + bx + cy$ in which x & y are coordinates of star with reference to Alcyone. Expressed in m.m.

Equations of Condition for Unit π_2

	a	b	c		+n	−s	s
Atlas	a	+26.6 x	+3.3 y	=	−18.2	+18.3	+ 49.1
Merope	a	−18.0 x	+11.0 y	=	−17.9	+12.1	+ 06.1
Electra	a	−41.0 x	− 0.5 y	=	−04.8	+04.8	− 35.7
Maia	a	−26.0 x	− 18.0 y	=	−06.6	+06.6	− 36.4
Lagzetar.	a	−35.5 x	− 25.0 y	=	−09.5	+09.5	− 50.0
	5.0	− 93.9	− 29.2			+51.2	− 66.9

04

a	+26. x	+3. y	+18.2	= 0
a	− 18. x	+11. y	+12.1	= 0
a	−41. x	− 0.		

	[aa]	[ab]	[ac]	−[an]	[as]	[bb]	[bc]	−[bs]
Alcyone	1.00	0.	0.	0.	+ 1.0			
	1.00	+26.60	+3.30	+18.20	+49.1	+707.56	+87.78	+484.12
	1.00	−18.00	+11.00	+12.10	+06.1	+324.00	−198.00	+217.80
	1.00	−41.0	− 0.50	+04.80	− 35.7	+1681.00	+ 20.50	−196.80
	1.00	−26.0	−18.00	+06.60	−36.4	+676.00	+468.00	−171.60
	1.00	−35.5	−25.00	+09.50	−50.0	+1260.25	+875.00 (87.50)	−332.50 (37.25)
	+5.00	−93.9	−29.2	+51.2	−66.9	+4648.81	+1265.78	−439.33
Including Alcyone	+6.00				−65.9			

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Wednesday Nov 18 1896

[bs]	[cc]	[cn]	[cs]	[nn]	[ns]	v*	[vv]*
						+10.16*	
+1306.06	+ 10.89	+ 60.06	+ 162.03	+331.24	+ 893.62	− 4.97	103.23
~~+109.80~~	+ 121.00	+ 133.10	+ 67.10	+146.41	+ 73.81	− 4.17	24.70
+1463.70	+ 0.25	− 2.40	+ 17.85	+ 23.04	− 171.36	+ 0.58	17.39
+ 946.40	+ 324.00	− 118.80	+ 655.20	+43.56	− 240.24	+ 0.73	.34
1775.60							
+ ~~+77.50~~	+ 625.00	− 237.50	+1250.00	+90.25	− 475.00	− 3.20	10.24
			2.1		8		
+ ~~3783.86~~	+1081.14	− 165.54	+1052.18	+634.50	+ 80.93		156.43
+5381.36							

*For alegone. Computation on p 85

+5.00 a + 93.90 b − 29.20 c = − 51.20

− 93.90 a + 4648.81 b + 1265.78 c = + 439.33

− 29.20 a + 1081.14 b

Normal Equations.

+	5.00 a	−	93.90 b	−	29.20 c	= −	51.20
−	93.90 a	+	4648.81 b	+	1265.78 c	= +	439.33
−	29.20 a	+	1265.78 b	+	1081.14 c	= +	165.54

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Nov 21 1896

Solution of Normal Equations.

a	b	c	n	s	Prof.
+ 5.00	− 93.90	− 29.20	− 57.20	− 66.90	
log. 0.69897	1.97267n	1.46538n	1.70927n	1.82543n	
−57.20	+ 4648.81	+ 1265.78	+ 439.33	+ 5381.36	
− 0.14	1.27370n + 1763.48 ~~176.35~~	+ 548.38	+ 961.55	+ 1257.40	
−16.88			− 522.22 ~~77.78~~		
	+ 2885.33	+ 717.40		+ 4128.96	+ 4124.95
− 68.22	3.46020	2.85576	2.71786n	3.61542	
1.83391n	− 522.22	+ 1081.14	+ 165.54	+ 2152.18	
log a = 1.13494n	0.76641n + 3.56	+ 170.53	+ 299.01	+ 390.70	
a = −13.644	− 518.66	+ 910.61	− 133.47	+ 1761.48	+ 1761.46
	9.39556 2.71488n	+ 178.37	− 129.84	+ 1025.60	
	log b = 9.~~68~~25468n	+ 732.24	− 3.63	+ 735.88	+ 735.87
	b = − 0.~~18~~1798	2.86465	0.55991n	2.86681	
		log c =	7.69526n		
		c =	− ~~0.005~~ 0.00496		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Monday Nov 23 1896

If we use also an equation of condition for Aleyone $0 = a + \alpha x + \alpha y$ we shall have normal equations

$$6.00\,a - 93.90\,b - 29.20\,c = -51.20$$
$$-93.90\,a + 4648.81\,b + 1265.78\,c = +439.33$$
$$-29.20\,a + 1265.78\,b + 1081.14\,c = +165.54$$

Solution of Normal Equations.

	a	b	c	n	s	Proof
	+ 6.00	− 93.90	− 29.20	− 51.20	− 65.90	
	0.77815	1.97267n	1.46538n	1.70927n	1.81954n (889)	
	− 51.20	+ 4648.81	+ 1265.78	+ 439.33	+ 5381.36	
1.19452n	+ 0.34	+ 1469.57 +46.96	+ 456.98	+ 801.28	+ 1038.40 (21.36)	
	− 10.10	+ 3179.24	+ 808.80	− 361.95	+ 4348.46 (50.00)	+ 4349.99
	− 60.96	3.50232	2.90784	2.55865n	3.63849	
	1.78504n	− 361.95	+ 1081.14	+ 165.54	+ 2152.18	
0.68723n	1.00689n	− 9.33	+ 142.11	+ 249.16	+ 320.72	
	a = − 10.16	− 371.28	+ 938.17 (9.03)	− 84.07 (3.62)	+ 1832.03 (1.46)	+ 1831.45
9.40552		2.56970n	+ 205.76	− 92.08	+ 1106.64	
		9.06738n	+ 733.27	+ 8.46	+ 724.82	+ 724.81
	b =	− 0.11678	2.86526	0.92737	2.86023	
		log c	8.06211			
		c =	+ 0.01154			
				+ 634.50	− 80.83	
0.93112n				+ 436.89	+ 562.35	
					− 643.18	
				+ 197.61	+ 481.52	− 643.18
9.05633n				+ 41.21	− 495.24	
				+ 156.40	− 147.94	− 147.94
8.06211				+ .10	+ 8.36	
				+ 156.30	− 156.30	[vv] = 156.43 Sum. 83

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Nov 25 1896

Reduction of Measures on pages 78 & 79 using 6 stars.

Equations of condition for line H_2.

					S
Alcyone	a	+ 0 b	+ 0 c	+ 0 = 0	+ 1.0
Atlas	a	+ 26.3 b	+ 3.5 c	+ 5.9 = 0	+ 35.7
Merope	a	− 18.2 b	+ 10.9 c	+ 4.1 = 0	− 8.2
Electra	a	− 40.8 b	− 0.6 c	+ 14.2 = 0	− 28.2
Maia	a	− 25.8 b	− 18.2 c	+ 10.3 = 0	− 38.7
Taygeta	a	− 35.5 b	− 25.2 c	+ 19.5 = 0	− 48.2

aa	ab	ac	− an	as	bb	bc	− bn
1.00	0.00	0.00	0.00	+ 1.00	~~+691.69~~ 0.00	0.00	0.00
1.00	+ 26.30	+ 3.50	+ 5.90	+ 36.70	+ 691.69	+ 92.05	+ 155.17
1.00	− 18.20	+ 10.90	+ 4.10	− 2.20	+ 331.24	− 198.38	− 74.62
1.00	− 40.80	− 0.60	+ 14.20	− 26.20	+ 1664.64	+ 24.48	− 579.36
1.00	− 25.80	− 18.20	+ 10.30	− 32.70	+ 665.64	+ 469.56	− 265.74
1.00	− 35.50	− 25.20	+ 19.50	− 40.20	+ 1260.25	+ ~~589.60~~ 894	− 692.25
6.00	− 94.00	− 29.60	+ 54.00	− 63.60 ✓	+ 4613.46	+ 1282.31	− 1456.80

bs	cc	− cn	+ cs	nn	− ns	v	vv
~~+965.21~~ 0.00	0.00	0.00	0.00	0.00	0.00	+ 5.73	32.83
+ 965.21	+ 12.25	+ 20.65	+ 128.45	+ 34.81	+ 216.53	− 4.39	19.27
+ 40.04	+ 118.81	+ 44.69	− 23.98	+ 16.81	− 9.02	+ 1.01	1.02
+ 1068.96	+ .36	− 8.52	+ 15.72	+ 201.64	− 372.04	− 3.21	10.30
+ 840.39 3.66	+ 331.24	− 187.46	+ 595.14	+ 106.09	− 336.81	+ 3.50	12.25
+ 1427.10	+ 635.04	− 491.40	+ 1013.04 ✓	+ 380.25	− 783.90 ✓	− 2.63	6.92
+ 4344.97 ✓	+ 1097.70	− 622.04	+ 1728.37	+ 739.60	− 1285.24		82.59

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Wednesday Nov. 25. 1896

Normal Equations.

$+6.00\,a - 94.00\,b - 29.60\,c = -54.00$

$-94.00\,a + 4613.46\,b + 1282.31\,c = +1456.80$

$-29.60\,a + 1282.31\,b + 1097.70\,c = +622.04$

	a	b	c	n	s	Proof.
	+ 6.00	− 94.00	− 29.60	− 54.00	− 63.60	
	0.77815	1.97313n	1.47129n	1.73239n	1.80346n	
	−54.00	+ 4613.46	+ 1282.31	+ 1456.80	+ 4344.97	
1.19498n	+ 7.88	+ 1472.69	+ 463.73	+ 846.00	+ 996.42	
	+ 11.76	+ 3140.77	+ 818.58	+ 610.80	+ 3348.55	+ 3348.55
	− 34.36	3.49704	2.91306	2.78590	3.52486	
	1.53605n	+ 610.80	+ 1097.70	+ 622.04	+ 1728.37	
0.69314n	log q = 0.75790n	− 217.80	+ 146.03	+ 266.40	+ 315.94	
	a = −5.73	+ 393.00	+ 951.67	+ 355.64	+ 1412.43	+ 14 14.61
9.41602		2.59439	+ 213.34	+ 159.19	+ 872.74	
		log b = 9.09735	+ 738.33	+ 196.45	+ 541.87	+ 541.88
		b = + 0.125	2.86825	2.29325	2.73390	
			log c 9.42500			
			c = + 0.266			
				+ 739.60	+ 1285.24	
0.95424n				+ 487.11	+ 572.40	
				+ 252.49	+ 712.84	+ 712.83
9.28886				+ 118.78	+ 651.22	
				+ 133.71	+ 61.32	+ 61.62
9.42500				+ 52.27	+ 44.19	
				+ 82.56	− 82.57	[vv] = 82.59

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Nov 27 1896

Results from preceding Computations

Name	Results for C95499550	Results for C95987618	Motion rel to Alcyone C95499550	Motion rel to Alcyone C95987618
Alcyone	+10.16	+5.73	0.00	0.00
Atlas	−4.97	−4.39	−15.13	−10.12
Merope	−4.17	+1.01	−14.33	−4.72
Electra	+0.58	−3.21	−9.58	−8.94
Maia	+0.73	+3.50	−9.43	−2.23
Taygeta	−3.20	−2.63	−13.46	−8.36

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Nov 30 1896

Using the formulae $\sin\phi = \mu \sin\phi'$ $\sin\psi = \mu \sin\psi'$ and $i = \phi' + \psi'$. and assuming $i = 15^\circ$ & $\mu = 1.5$, values of ψ' were computed in lower limits for various ~~angles~~ values of ϕ. These values were taken on either side of angle of Min. Dev. which is equal to $11^\circ\ 17'\ 27''$.

Table. computed with 6 place log.

	ϕ	ψ	1st Diff	2nd Diff	Scale Ratio = m	1st Diff
	$9^\circ\ 17'\ 27''$	$13^\circ\ 17'\ 53.4''$	$-60'\ 21.4''$		1.0079	−.0040
	10 17 27	12 17 34.0	−60 07.0	+ 14.4	1.0039	39
angle of min. deviation.	11 17 27	11 17 27.0	−59 53.0	+ 14.0	1.0000	39
	12 17 27	10 17 34.0	−59 38.7	+ 14.3	0.9961	39
	13 17 27	9 17 55.3	−59 24.7	+ 14.0	0.9922	37
	14 17 27	8 18 30.6	−59 10.7	+ 14.0	0.9885	41
	15 17 27	7 19 19.9	−58 56.7	+ 14.0	0.9844	40
	16 17 27	6 20 23.2	−58 42.5	+ 14.2	0.9804	39
	17 17 27	5 21 40.7	−58 28.2	+ 14.3	0.9765	39
	18 17 27	4 23 12.5	−58 14.2	+ 14.0	0.9726	40
	19 17 27	3 24 58.3	−57 59.7	+ 14.5	0.9686	41
	20 17 27	2 26 58.6	−57 45.1	+ 14.6	0.9645	
	21 17 27	1 29 13.5				

From the above it would appear that within the limits taken the scale ratio can be represented by a straight line

May 12 1897 From above it may be shown that

$$\psi = 11^\circ\ 17'\ 27''.0 - n(59'\ 53''.0) + \frac{n(n-1)}{2}\ 14''.14$$

$n = \phi - 11\ 17\ 27''.0$ (Expressed in degrees)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Nov 30, 1896.

Reduction of Measures on pages 70 & 71 using 6 stars. These are same plates measured on pages 79 & 80 & reduced pages 86 & 87.

Equations of Condition for Unit Δt^2

Aleyone $a + 0b + 0c + 0 = 0$

Atlas. $a + 26.3b + 3.5c + 8.7 = 0$

Merope $a + 18.2b + 10.9c + 4.9 = 0$

Electra $a - 40.8b - 0.6c + 13.4 = 0$

Maia $a - 25.8b - 18.2c + 12.3 = 0$

Saygeta. $a - 35.5b - 25.2c + 20.9 = 0$

aa	ab	ac	-an	as	bb	bc	-bn
			0.00	+ 0.00			0.00
			+ 8.70	+ 39.50			+228.81
			+ 4.90	- 1.40			- 89.18
			+ 13.40	- 87.00			- 546.72
			+ 12.30	- 30.80			- 317.34
			+ 20.90	- 38.80			- 741.95
+6.00	-94.00	-29.60	+60.20	- 57.40 ✓	+4613.46	+1282.31	-1466.38

bs	cc	-cn	cs	nn	-ns	v	vv
0.00		0.00	0.00	0.00	0.00	+ 7.14	50.98
+1038.85		+ 30.45	+138.25	+ 75.69	+343.65	- 4.84	23.43
+ 25.48		+ 53.41	- 15.26	+ 24.01	- 6.86	+ 0.16	.26
+1101.60		- 8.04	+ 16.20	+179.56	- 361.80	- 2.74	7.51
+ 792.06		- 223.86	+ 558.74	+151.29	- 377.61	+ 2.89	8.35
+1377.40		- 526.68	+ 977.76	+436.81	- 810.92	- 2.63	6.97
+4335.39 ✓	+1097.70	- 674.82	+1675.69 ✓	+867.36	-1213.54		97.50

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Nov 30 1896

Normal equations

$+ 6.00a - 94.00b - 29.60c = -60.20$

$- 94.00a + 4613.46b + 1282.31c = +1466.38$

$- 29.60a + 1282.31b + 1097.70c = +674.72$

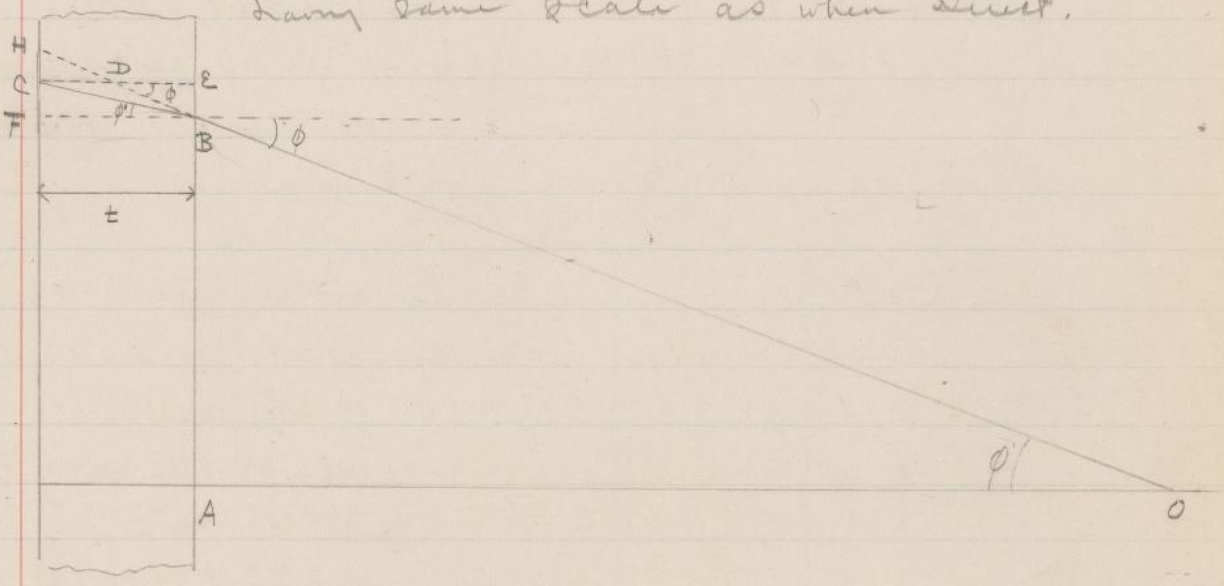
	a	b	c	n	s	Proof
	+ 6.00	− 94.00	− 29.60	− 60.20	− 57.40	
	0.77885	1.97313n	1.47129n	1.77960n	1.75891n	
	− 60.20	+ 4613.46	+ 1282.31	+ 1466.38	+ 4335.39	
1.19498n	+ 9.68	+ 1472.69	+ 463.73	+ 943.15	+ 899.28	
	+ 2.65	+ 3140.77	+ 818.58	+ 523.23	+ 3436.11	+ 3436.12
	− 42.87	3.49704	2.91306	2.71869	3.53606	
	1.63215n	+ 523.23	+ 1097.70	+ 674.72	+ 1675.69	
0.69314n	log a 0.85400n	− 267.59	146.03	+ 296.99	+ 283.18	
	a = − 7.14	+ 255.64	+ 951.67	+ 377.73	+ 1392.51	+ 1392.52
9.41602		2.40763	+ 213.34	+ 136.37	+ 895.52	
		log b = 8.91059	+ 738.33	+ 241.36	+ 496.99	+ 496.97
		b = + 0.081	2.86825	2.38267	2.69635	
			log c 9.51442			
			c = + 0.327			
				+ 867.36	+ 1213.54	
1.00145n				+ 604.01	+ 575.91	
				+ 263.35	+ 637.63	+ 637.61
9.22165				+ 87.16	+ 572.41	
9.22165				+ 176.19	+ 65.22	+ 65.17
9.51442				+ 78.90	+ 162.47	
				+ 97.29	− 97.25	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Dec 9 1896

To find position of Reversed Plate in Telescope having same scale as when Direct.



OBC represents path of stars rays (at an angle ϕ from Centre of plate), when the plate is reversed.

From the diagram it is evident that to preserve the scale the change from reversed to direct is equal to DE.

$$DE = \frac{BE}{\tan\phi} = \frac{CF}{\tan\phi} = BF\frac{\tan\phi'}{\tan\phi'} = t\frac{\tan\phi'}{\tan\phi}.$$

For the small angle involved in which the ratios of the sines can be taken for that of tangents

$$\therefore DE = t\frac{\sin\phi'}{\sin\phi} = \frac{t}{\mu} = \frac{2}{3}t$$

This result accords with position for best focus.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

Barograph Means for Boyden Station near Chosica.

	days	A.M. 1	2	3	4	5	6	7	8	9	10	11	M. 12	1	2	3	4	5	P.M. 6	7	8	9	10	11	12
May	17	80.6	78.9	77.4	76.8	77.1	78.9	82.1	86.0	89.6	92.1	93.1	91.9	90.2	87.6	85.5	83.9	83.0	83.0	83.5	84.1	84.0	83.8	82.9	81.6
	15	80.2	78.7	77.3	76.9	77.4	79.4	82.7	86.8	90.3	92.6	93.6	92.4	90.6	88.1	85.9	84.4	83.3	83.3	83.8	84.4	84.3	84.0	83.3	82.0
Jun.	30	75.7	74.0	72.1	71.1	70.7	71.5	73.7	76.6	80.4	82.9	84.8	84.6	83.5	81.0	79.2	78.1	77.0	76.6	76.9	77.5	78.0	76.4	76.1	77.6
	26	75.2	73.6	71.8	70.8	70.5	71.5	73.8	77.2	80.9	83.3	84.7	84.5	83.4	81.0	79.2	76.0	76.9	76.4	76.7	77.3	77.9	78.2	76.0	77.7
Jul		67.4	65.3	63.4	62.9	63.1	64.1	66.5	70.6	74.5	76.9	77.4	76.8	75.0	72.5	70.9	70.3	69.7	69.4	69.5	70.2	71.0	70.9	70.3	69.1
		66.3	64.3	62.4	61.9	62.3	63.3	65.9	70.0	74.1	76.7	77.3	76.9	75.3	72.8	71.1	70.4	69.7	69.6	69.8	70.4	71.1	71.0	70.6	69.3
Aug.																									
Sept																									
Oct																									

The lower mean for each month is that excluding Mondays.

Wednesday Dec 23 1896.

for Reducing Barograph Results obtained
Station near Chosica. 1889 1890.
Barometer Comparisons could be had.
ork was done last spring & is now entered
the rough work is on margins of sheets
Means ...adings.
& min for the incomplete days are
ica. ...mean of Tuesday of each sheet
59 ...t of ~~Saturday~~ Sunday, to obtain a
mean. max & min ...to sheet. From these correctio
0.8 −7.2 ...d for the Mean of the Month.
7. ±132 ...n of Tuesday & Sunday was
889 ...mean of 24 readings, (2nd) by
...x. & Min. Readings.
9.2 +144. ...shows accordance of results.
0. ±185 ...2nd method would answer

in Total

...ns it might be better to exclude
1889 ...n sheets were changed.
+53. ...n is slight as is shown for
±82 ...9.

...uld be given in inches as

...ns of 24; by max & min
...s of m.m. ...l range as varying from Mean
+4.3 ...the monthly corrections.
+17.9 ...ave to be increased by
+31.7 (4)

...ether the annual range thus obtained
it is worth trying.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

1895phae.proj...924K

Wednesday Dec 23 1896.

Plan for Reducing Barograph Results Planned at Boyden Station near Chosica. Used 1888 1889 1890. where no Barometer Comparisons could be had.

This work was done last spring & is now ended in form. The rough work is on margins of sheets and notes.

Comparison of Means

Of 24h & means of Max & Min for the 24 complete days are Barographs at Chosica.

May 21 – 26 1889

	in Total 24h means.	Max & Min
Mean Change for day	− 10.8	+ 6.2
Av. Change diff from zero	± 77.	± 132

June 11 – 16 1889

	in Total	
Mean Change for day	+149.2	+144.7
Av. Chang diff from zero	± 150.	± 135

These are changes in Totals for 24h.

For Feb 18 – 23 1889

	in Total	
Mean Change for day	+48.	+53.
Av. Change diff from zero	± 95	± 82

Comparison of means of 24h

	Means of Limits	Max & Min
For May 1889	+3.3	+4.3
June 1889	+15.9	+17.9
July 1889	+31.2	+31.9

Tuesday & Sunday

Saturday

sheet. From these corrects for the Mean of the Month.

Tuesday & Sunday was mean of 24h readings (12th) by Max. & Min. Readings.

shows accordance of results.

2nd method would answer

ns it might be better to exclude sheets were changed.

is slight as is shown for 9.

uld be given in inches as

ranges as varying from Mean the monthly Corrections.

have to be increased by

ether the annual range thus Plan it is worth trying.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1896

(Plots in Telescope
when Direct.

99
87
180

-1
3

Wednesday Dec 23 1896.

Plan for Reducing Barograph Results Adopted at Bogdan Station near Chosica. Visit 1889 90. where no Barometer Comparisons could be had.

This work was done last spring & is now ended in form. The rough work is on margins of sheets giving the hourly readings.

In taking monthly diurnal means the incomplete days are to be omitted. The mean of Tuesday of each sheet is compared with that of ~~Saturday~~ Sunday to obtain a correction from sheet to sheet. From these corrections one can be obtained for the mean of the month.

The mean pressure of Tuesday & Sunday was compared (1st) by taken mean of 24 readings, (2nd) by taking mean of Max. & Min. Readings. The accompanying slips show accordance of results. It would seem as if 2nd method would answer purpose.

In taking monthly diurnal means it might be better to exclude Mondays on which the sheets were changed. However the difference is slight as is shown for May, June, & July 1889.

The diurnal range should be given in inches as varying from Mean.

Finally the Annual range as varying from Mean could be derived from the monthly corrections. This range would have to be increased by 1/6 theoretically.

It may be doubtful whether the annual range thus obtained will show much, but think it is worth trying.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Dec. 24. 1896.

To construct Phot. wedge upon which the graduations for star magnitudes shall be equidistant.

d = density of wedge at given point $x = \int_0^x y\,dx$ of aperture curve, thus if a = initial magnitude. r = magnitude.

$$ar^x = \int y\,dx$$

$$ar^x \log r\,dx = y\,dx$$

$$y = ar^x \log r$$

Working backward

$$\int y\,dx = ar^x + C \qquad \therefore \int_0^x y\,dx = ar^x - a$$

~~If the aperture curve $y = ar^x \log r - a \log r$~~

Hence if we add an aperture that will throw over wedge an amount of light equivalent to "a" we shall have the required conditions.

It remains to plot the curve

$y = ar^x \log r$ in which $\log r$ is Nap. log.

This can be put in form $\log y = \log a + \log 0.7622 + 0.4x$

or further $a = 1$ $\log y = 9.9643 + 0.4x$

x	log y	y	x	log y	y
0	9.9643	.92	2.00	0.7643	5.81
0.25	0.0643	1.16	2.25	0.8643	7.32
0.50	0.1643	1.46	2.50	0.9643	9.21
0.75	0.2643	1.84	2.75	1.0643	11.59
1.00	0.3643	2.31	3.00	1.1643	14.66
1.25	0.4643	2.91	3.25	1.2643	18.38
1.50	0.5643	3.67	3.50	1.3643	23.13
1.75	0.6643	4.62	3.75	1.4643	29.13
			4.00	1.5643	36.81

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Dec. 26, 1896

Continuation of values of y.

x	log y	y	y/2
2.50	0.9643	9.21	4.60
—	0.9843	9.64	4.82
—	1.0043	10.10	5.05
—	1.0243	10.57	5.28
—	1.0443	11.07	5.54
2.75	1.0643	11.59+	5.80
—	1.0843	12.14	6.07
—	1.1043	12.71+	6.36
—	1.1243	13.31+	6.66
—	1.1443	13.94	6.97
3.00	1.1643	14.60	7.30

14.60 | 2.5
11.07
2980
2905
750

921 | 14.60 | 1.6
9.21
5390

The above diagram represents the curve constructed on these principles & serves as the pattern for the aperture in brass for the new wedge Apparatus.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday March 17 1897.

Settings of Lens & Easel of Enlarging Apparatus.

The enl. app. is so arranged at present that, it is hoped possible to adjust it without experiment for scale & focus. The results already obtained are quite satisfactory. The chief difficulty to be apprehended is in the permanence of the relative position of the several parts of the apparatus.

The setting of easel is the distance in inches between plates. The setting of lens is the shorter conjugate focus in inches from plate being enlarged. The lens is considered a simple one & actual trial proves that the assumption is sufficiently accurate for our purpose. By means of a screw 10 threads to the inch we can return the lens to the same position. In case of any displacement of frame carrying plate to be enlarged which may take place as it is fastened to side of house while lens is on plate; — it will be possible to detect it by means of this screw, and make proper correction.

D = Setting of easel. F = Equivalent Focus of lens. = 14.66 in for Ross Lens which is used

f = " " lens.

f' = Conjugate focus (longer).

Σ = Enlargement

Then $D = f + f' = F\frac{(\Sigma+1)}{\Sigma} + F(\Sigma+1) = F\frac{(\Sigma+1)^2}{\Sigma}$

$f = F\frac{(\Sigma+1)}{\Sigma} = F + \frac{F}{\Sigma}$.

$D = (\Sigma+1) f$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Wednesday March 17 1897

Settings of Ross Lens & Easel for enlarging Negatives

Enl.	Easel.	Lens.
2.0	66.0	21.99 69
2.2		21.30 53
2.4		20.77 47
2.6		20.30 40
2.8		19.90 35
3.0		19.55 31
3.2		19.24 27
3.4		18.97 24
3.6		18.73 21
3.8		18.52 20
4.0		18.32 17
4.2		18.15 16
4.4		17.99 14
4.6		17.85 14
4.8		17.71 12
5.0		17.59 27
5.5		17.32 22
6.0		17.10 18
6.5		16.92 17
7.0		16.75 14
7.5		16.61 13
8.0		16.49 11
8.5		16.38 11
9.0		16.29 9
9.5		16.20 7
10.0		16.13

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Sept 17 1897

Improved or rather enlarged apparatus for measuring plates taken to show motions in line of sight. is now complete. at least for trial. It seems to work smoothly.

Test on plates χ Aurigae 1279 + 1585

1) #2 line of Alleyone compared.

		2)		3)		
06.5	+3.1	03.5	+1.3	08.2	+5.9	12.4 +5.4
56.7	-6.7	05.4	+3.4	00.1	-2.2	05.9 -1.1
01.2	-2.2	07.7	+5.7	01.7	-0.5	02.2 -4.6
09.6	+6.2	08.8	+6.8	54.7	-7.6	04.6 -2.4
03.0	-0.4	55.0	-7.0	57.1	-5.2	02.5 -4.5
02.1	-1.3	59.6	-2.4	03.7	+1.4	05.9 -1.1
02.2	-1.2	01.1	-0.9	59.2	-3.1	08.0 +1.0
01.7	-1.7	05.8	+3.8	05.5	+3.2	12.3 +5.3
13.41	+10.0	58.0	-4.0	02.0	-0.3	09.0 +2.0
57.2	-6.2	55.5	-6.5	11.2	+8.9	07.3 +0.3
10 | 33.6	15 | 37.0	10 | 20.4	15 | 43.0	10 | 23.4	15 | 38.3	11 | 70.1 | 27.9
03.4	±3.9	02.0	±4.3	02.3	±3.8	07.0 ±2.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj ..924K

Saturday Sept 18 1897

Measures made with New Apparatus (Motion in line of right) on H_2 Plates X 8 1.27 + X 8 1.58

	Algeiba	Alkaid	Mesarthim	Electra	Maia	Taygeta
1st set	03.7 +3.7	11,2 -20.8	52.5 +1.0	14.7 ± 8.2	02.2 - 7.5	02.9 -13.0
	01.3 +1.3	34.3 +2.3	44.9 -6.6	13.0 ± 9.9	07.7 -12.0	07.5 - 8.4
	06.0 +6.0	18.0 -14.0	39.3 -12.2	20.3 ± 2.6	06.8 -2.9	09.2 -6.7
	01.7 +1.7	26.5 - 5.5	42.8 -9.7	20.6 ± 2.3	09.5 - 0.2	07.1 -8.8
	56.5 - 3.5	35.3 +3.3	57.1 - 0.4	29.9 +7.0	10.0 +0.3	10.5 -5.4
	58.7 -1.3	33.7 +1.7	54.8 +3.3	22.9 0	03.7 -6.0	20.6 +4.7
	53.2 -6.8	36.2 +4.2	49.6 -1.9	29.7 +6.8	20.0 +10.3	18.5 -12.6
	57.2 -2.8	37.5 +5.5	56.9 +5.4	16.8 -6.1	14.1 +4.4	24.8 +8.9
	02.7 +2.7	39.9 +7.9	01.0 +9.5	31.7 +8.8	22.2 +12.5	24.3 +8.4
	59.1 -0.9	47.3 +15.3	01.7 +10.2	29.7 +6.8	10.6 +0.9	33.3 +17.4
	10) 00.1	10) 30.7 ± 3.1	10) 19 31.9	11) 80.2 ± 8.0	10) 51 4.6	10) 60.2 ± 6.0	10) 22 9.3	14) 58.5 ± 6.8	10) 9 6.8	10) 57.0 ± 5.7	10) 15 8.7	10) 84.3 ± 8.4
Av. Dec.												
Means	1 00.0	1 32.0	0 57.5	1 22.9	1 09.7	1 15.9						
Diff from Algeiba.		- 32.0	+ 08.5	- 22.9	- 09.7	- 15.9						
2d Set.	59.8 -0.7	34.9 -11.6	58.3 - 3.8	25.6 - 5.8	06.7 -10.8	05.2 -23.3						
	05.8 +5.3	31.7 -14.8	47.0 -15.1	30.7 - 0.7	10.8 -6.7	22.4 - 6.1						
	59.2 -1.3	48.8 +2.3	13.1 +11.0	24.6 -6.8	29.0 +11.5	38.4 +9.9						
	53.5 -7.0	46.1 -0.4	54.8 -0.73	34.7 +3.3	18.8 +1.3	30.0 +1.5						
	03.9 +3.4	43.3 -3.2	10.7 +08.6	42.0 +10.6	14.3 -3.2	27.5 -1.0						
	58.7 -1.8	39.7 -6.8	09.8 +7.7	23.0 -8.4	20.3 +2.8	28.2 -0.3						
	03.3 +2.8	54.9 +8.4	59.5 -02.6	42.0 +10.6	12.1 -5.4	21.8 -6.7						
	54.3 -6.2	50.2 +3.7	53.0 -07.1	31.9 +0.5	21.1 +3.6	25.4 -3.1						
	06.6 +8.1	56.1 +9.6	01.8 -0.3	39.0 +7.6	17.8 +0.3	44.2 +15.7						
	58.2 +2.3	59.4 +12.9	10.9 +8.8	20.8 -10.6	23.9 +6.4	41.7 +13.2						
	10) 05 3	10) 38.9 ± 3.9	10) 46 5.1 ± 7.4	10) 73.7 ± 7.2	10) 20.9	10) 31 4.3 ± 6.5	10) 6 4.9	11) 52.0 ± 5.2	10) 17 4.8	10) 26 4 8 ± 8.1	10) 80.8	
Av. Dec												
Means	1 00.5	1 46.5	1 02.1	1 31.4	1 17.5	1 28.5						
Diff from Alcyone		- 46.0	- 01.6	- 30.9	- 17.0	- 28.0						

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Sept 16 1897

Work on Hourglass telescope in identifying regions in Galaxy & Star Stars.

Sid. Time			
		Setan α Aquilae.	
19	46	Obs Dec +8° 20'	Obs Alt. + 04.5
		Alm " +8° 36	
		— 16	

Setan θ Aquilae

20	06	Obs Dec — 1° 22'	Obs Col + 04.3
		Alm " — 1 0	
		— 22	

γ Cygni?

20	19	Obs Dec +39° 36	Obs Col ½ min late + 16.1
		Alm " 39 56	
		— 20	

α Cygni.

20	39	Obs Dec +44° 32	Obs Col 1 min late + 26.2
		Alm " +44° 55	
		— 23	

Eveniting Collimation and flips.

ε Cygni

20	42	Obs Dec +33° 12	Obs Col + 25.9
		Alm Dec +33 35	
		23	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj... 924K

Saturday Sept 16 1897

β Cephei ?

6m late

21 33 Obs Dec +69° 40' Obs Col +28.2

Alm Dec +70 6

— 26'

ε Pegasi

21 39 Obs Dec +9 0 Obs Col +26.0

+9 24

— 16'

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Sept 20 1897

Measures made with New Apparatus (Modern in line of sight) on Plates C 5929 & C 4843 Spectra of α Cygni. To test apparatus & compare with measures made on same plate with former apparatus (See p 53)

	H_γ		K		
0	26.4	+3.2	24.1	−5.4	
	22.4	−0.8	32.6	+3.1	Range 6.9 & 8.8
	26.5	+3.3	28.3	−1.2	Compare with 7.6 & 10.5 for
	22.8	−0.4	30.4	+0.9	page 53
	23.9	+0.7	29.6	+0.1	
	21.2	−2.0	28.3	−1.2	
	21.0	−2.2	29.5	0.0	
	19.6	−3.6	29.7	+0.2	
	21.7	−1.5	32.9	+3.4	
	26.4	+3.2	29.5	0.0	
	10) 231.9	20.9	10) 294.9	15.5	av. dev. for pages 53 was ± 2.2 & ± 1.6
av. dev.		± 2.1		± 1.6	
Mean	0 23.2		14 29.5		

0	23.2
14	06.3
14	04.7

Diff for page 53.

The above lines are of excellent definition

The results seem to point out that the large av. deviation of the measures on page ~~101~~ 99 are due to a defect of apparatus but to the lines of the particular plates. Though perhaps one opposing spring should be strengthened.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Monday Sept 20 1897.

Measures of preceding page repeated.
Plates C 5929 & C 4843

	H_2			K	
0	21.9	- 1.3	14	29.3	+ 0.5
	23.8	+ 0.6		26.9	- 1.9
	22.5	- 0.7		28.9	+ 0.1
	21.9	- 1.3		29.6	+ 0.8
	21.5	- 1.7		29.3	+ 0.5
	24.5	+ 1.3		30.6	+ 1.8
	24.8	+ 1.6		31.4	+ 2.6
	23.2	0.0		28.6	- 0.2
	24.0	+ 0.8		27.3	- 1.5
	24.41	+ 1.2		26.5	- 2.3
	325	10.5		884	12.2
Av. Dev.		± 1.0			± 1.2
Mean.	0	23.2	14	28.8	

0 23.2

14 05.6

The repetition of the measures decreases the average deviation.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Sept 20 1897

Improved spring of which mention was made on page 102.

Trial made on H_2 line in Algenib on plates. Measures made by Gaslight.

Plates X 8179 & 8180

~~H.~~

1st Set			2nd Set		
	03.6	−5.4		09.1	−2.3
	06.6	−2.4		17.6	+6.2
	12.6	+3.6		17.0	+5.6
	11.7	+2.7		14.1	+2.7
	09.3	+0.3		09.2	−2.2
	06.8	−2.2		06.0	−5.4
	04.3	−4.7		13.3	+1.9
	11.0	+2.0		15.9	+4.5
	08.0	−1.0		07.0	−4.4
	16.2	+7.2		05.0	−6.4
	901	31.5		1142	41.6
Av. Dev.		±3.2			±4.2
Mean	09.0			11.4	

The measures seem to be slightly better than on the other set of Pleiades plates but it may be due to better definition

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

2

Tuesday Sept 21 1897

Measures made upon λ8179 & 8180 by gaslight. H_2

Alcyone	Atlas	Merope	Electra	Maia	Taygeta
10.2 +2.9	11.0 −0.2	08.0 −0.3	03.0 +20.0 −1.3	11.9 +11.3 +20.3 −11.5	+10.3
02.6 −4.7	06.8 −4.4	10.8 +2.5	58.3 −6.0	49.1 −16.5	−12.5
09.3 +2.0	17.9 +6.7	10.2 +1.9	56.4 −7.9	44.6 −7.0 +3.5	17.0
07.4 +0.1	08.9 −2.3	58.8 −9.5	05.0 +0.7	04.1 −5.3	+2.5
00.2 −7.1	07.0 −4.2	51.1 −17.2	07.9 +3.6	55.3 −1.7	−6.3
06.4 −0.9	08.4 −2.8	11.3 +3.0	09.5 +5.2	58.9 +2.2	−2.7
13.5 +6.2	15.8 +7.6	00.8 −7.5	01.0 −3.3	02.8 +8.2	+1.2
10.4 +3.1	14.8 +3.6	19.4 +11.1	00.1 −4.2	08.8 +14.6	+7.2
04.1 −3.2	08.7 −2.5	07.9 −0.4	09.4 +5.1	12.2	+10.6
09.2 +1.9	09.4 −1.8	24.8 +16.5	12.4 +8.1	08.1 +9.0	+6.5
73.3 32.1 ±3.2	111.7 36.1 ±3.6	83.1 69.9 ±7.0	43.0 45.4 ±4.5	5.8 04.3 01.6	76.8 ±7.7
0 07.3	0 11.2	0 08.3	1 43.0	0 57.6	
	−3.9	−1.0	−570	543	

05.2 −3.6	16.0 −1.2	13.5 0.0	01.8 −11.4	11.9 +5.9 +6.3
13.4 +4.6	24.8 +7.6	03.3 −10.2	07.2 −6.0	06.7 +0.7 +1.1
02.6 −6.2	09.1 −8.1	08.7 −4.8	00.2 −13.0	56.0 −10.0 −9.6
06.1 −2.7	13.3 −3.9	20.9 +7.4	19.3 +6.1	11.2 +5.2 +5.6
04.5 −4.3	07.0 −10.2	14.6 +1.1	00.5 −12.7	09.2 +3.2 +3.6
07.8 −1.0	23.8 +6.6	25.4 +11.9	15.0 +1.8	09.7 +3.7 +4.1
12.9 +4.1	19.6 +2.4	57.8 −15.7	26.4 +13.2	09.0 +3.0 +3.4
10.5 +1.7	27.0 +10.8	21.9 +8.4	17.2 +4.0	04.2 −1.8 −1.4
15.4 +6.6	14.4 −2.8	09.0 −4.5	22.9 +9.7	05.2 −0.8 −0.4
11.0 +2.2	17.5 +0.3	19.8 +6.3	21.9 +8.7	56.5 −9.5 −7.1
89.4 37.0 ±3.7	172.5 52.9 ±5.3	135.9 70.2 ±7.0	132.4 62.6 ±6.3	54.6 43.1 ±4.4
0 08.9	0 17.2	0 13.5	1 13.2	0 06.4 05.6
	−83	−4.6	−623	−571

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Sept 24 1897

Measures made on λ5158 + λ5127 using

line H γ

Aldebaran		Atlas		Merope		Electra		Maia		Taygeta	
45.2	-1.9	60.8	+1.3	69.7	-4.9	99.7	-2.1	76.5	-2.9	102.0	+3.9
47.4	+0.3	60.2	+0.7	75.9	+1.3	98.2	-3.6	78.0	-1.4	101.2	+3.1
42.1	-5.0	55.8	-3.7	70.8	-3.8	98.5	-3.3	79.1	-0.3	94.8	-3.3
43.4	-3.7	59.7	+0.2	77.5	+2.9	103.8	+2.0	77.4	-2.0	98.0	-0.1
49.8	+2.7	56.3	-3.2	78.9	+4.3	99.4	+2.4	80.4	+1.0	99.8	+1.7
43.2	-3.9	63.8	+4.3	77.8	+3.2	103.7	+1.9	76.7	-2.7	97.3	-0.8
52.1	+5.0	63.4	+3.9	74.2	-0.4	100.9	-0.9	84.8	+5.4	100.0	+1.9
49.4	+2.3	57.9	-1.6	70.7	-3.9	100.9	-0.9	84.0	+4.6	96.9	-1.2
45.4	-1.7	61.6	+2.1	79.8	+5.2	105.3	+3.5	80.7	+1.3	96.3	-1.8
53.3	+6.2	55.2	-4.3	70.5	-4.1	107.8	+6.0	76.2	-3.2	95.1	-3.0
471.3	32.9	594.7	26.3	45.8	34.0	118.2	26.6	93.8	24.5	81.4	20.8
	±3.3		±2.5		±3.4		±2.7		±2.5		±2.1
a	47.1	a	59.5	74.6		101.8		79.4		98.1	
			− 12.4	−27.5		− 54.7		−32.3		−51.0	

Set made Sat. P.M Sept 25 1897

19.2	+5.2	44.6	+3.8	39.0	+8.3	42.3	-6.5	31.5	+6.5	45.1	+2.1
16.0	+2.0	40.4	-0.4	30.2	-0.5	44.0	-4.8	28.8	+3.8	44.6	+1.6
14.0	0.0	44.8	+4.0	28.6	-2.1	44.7	-4.1	31.2	+6.2	42.5	-0.5
14.7	+0.7	47.9	+7.1	32.2	+1.5	53.7	+4.9	32.2	+7.2	46.3	+3.3
11.3	-2.7	37.0	-3.8	33.8	+3.1	54.2	+5.4	22.7	-2.3	34.5	-8.5
04.9	-9.1	39.4	-1.4	30.0	-0.7	42.8	-6.0	21.5	-3.5	43.3	+0.3
14.2	+0.2	41.3	+0.5	25.9	-4.8	48.6	-0.2	23.0	-2.0	47.1	+4.1
19.2	+5.2	32.1	-8.7	25.7	-5.0	50.0	+1.2	17.0	-8.0	43.6	+0.6
14.4	+0.4	38.6	-2.2	32.3	+1.6	54.6	+6.0	28.7	+3.7	43.1	+0.1
11.6	-2.4	42.0	+1.2	29.0	-1.7	53.6	+3.8	18.9	-11.1	38.4	-4.6
139.5	27.9	408.1	82.1	106.7	27.3	87.7	42.9	50.5	54.3	29.5	25.7
	±2.8		±3.3		±2.9		±4.3		±5.4		±2.5
o	14.0	o	40.8	30.7		48.8		26.0		43.0	
			− 26.8	− 16.7		−34.8		−11.0		−29.0	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Wednesday Sept 29 1897

Measures on X 8158 + X 8127 comparing opposite edges of the two and previously + y line taken.

Alcyone	Atlas	Merope	Electra	Maia	Taygeta
41.1 +3.8	82.0 +2.2	51.1 +5.4	49.2 -0.5	45.2 +1.8	48.5 -1.4
33.1 -4.2	78.4 -1.4	45.1 -0.6	44.2 -5.5	45.3 +1.9	48.9 -1.0
37.9 +0.6	86.1 +6.3	47.0 +1.3	62.1 +12.4	43.4 0.0	49.4 -0.5
37.2 -0.1	75.7 -4.1	49.8 +4.1	43.5 -6.2	43.4 0.0	55.1 +5.2
40.7 +3.4	75.0 -4.8	45.9 +0.2	47.2 -2.5	44.4 +1.0	49.7 -0.2
37.7 +0.4	79.2 -0.6	44.3 -1.4	42.8 -6.9	39.4 -4.0	49.0 -0.9
39.2 +1.9	79.0 -0.8	45.4 -0.3	49.6 -0.1	48.5 +5.1	48.7 -1.2
33.7 -3.6	80.0 +0.2	48.5 +2.8	50.7 +1.0	36.8 -6.6	45.5 -4.4
34.0 -3.3	84.2 +4.4	29.0 -16.7	55.5 +5.8	44.2 +0.8	48.8 -1.1
38.2 +0.9	78.3 -1.5	51.3 +5.6	52.0 +2.3	43.2 -0.2	55.0 +5.1
72.8 22.2	97.9 26.3	57.4 38.4	96.8 43.2	33.8 21.4	98.6 21.0
±2.2	±2.6	±3.8	±4.3	±2.1	±2.1
37.3	79.8	45.7	49.7	43.4	49.9
	-42.5	-8.4	-12.4	-6.1	-12.6

The readings in arcsecs as the red ends of panels.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

~~Monday~~ ~~Wednesday~~ Oct 18 1897

Measures (Rel. motion in line of sight) using C 9847 + 9850.

Lick N Aldeyan Aldeyan	Lick S Atlas Atlas	Readings in increase as red ends "a" Merope	Merope Electra	Maia Maia	Taygeta Taygeta	Pleione Pleione	Celaeno Celaeno
62.2	91.6	71.3	53.0	65.1	70.2	68.1	77.4
61.3	82.3	82.7	60.2	65.1	66.8	69.8	77.4
61.5	81.1	83.7	67.1	66.3	74.4	66.6	75.0
63.6	78.5	98.0	65.7	62.1	67.9	69.2	79.3
68.1	76.4	79.0	73.4	70.1	75.8	73.1	75.3

Readings made Wed. Oct 20 1897

63.7	−0.9	87.6	+0.1	101.1	+0.1 −3.9 +5.3	62.7	∓1.9	67.6	−0.6	72.8	+3.1	70.4	−1.1	73.0	−9.4
65.1	+0.5	84.1	−3.4	106.3	+1.3 −6.4	65.0	+0.4	67.7	−0.5	71.2	+1.5	70.2	−1.3	80.7	−1.7
64.1	−0.5	86.4	−1.1	94.6	−10.4 −6.0	62.5	−2.1	64.7	−3.5	69.2	−0.5	71.2	−0.3	82.5	+0.1
61.3	−3.3	86.7	−0.8	95.0	−10.0 −2.8	66.1	+1.5	66.6	−1.6	73.2	+3.5	70.7	−0.8	80.2	−2.2
65.3	+0.7	88.1	+0.6	98.2	−6.8 −13.8	59.1	−5.5	68.1	−0.1	65.4	−4.3	78.3	+1.8	86.6	+4.2
62.1	−2.5	88.5	+1.0	87.2	−17.8 −0.1	67.9	+3.3	69.3	+1.1	67.8	−1.9	73.7	+2.2	84.3	+1.9
64.9	+0.3	87.9	+0.4	100.9	−4.1 +16.8	66.0	+1.4	67.7	−0.5	70.1	+0.4	69.1	−2.4	81.6	−0.8
62.7	−1.9	87.8	+0.3	117.8	+12.8 +2.6	65.1	+0.5	70.1	+1.9	68.3	−1.4	71.9	+0.4	86.3	+3.9
70.3	+5.7	89.3	+1.8	103.6	−1.4 +3.9	68.4	+3.8	72.3	+4.1	67.0	−2.7	69.9	−1.6	86.2	+3.8
66.7	+2.1	88.4	+0.9	104.9	−0.1	63.3	−1.3	68.1	−0.1	72.4	+2.7	74.8	+3.3	82.1	−0.3
	14/184		10.4		58		21.7		140		22.0		15.2		26.3
Sums & av. dev.	46.2	±1.8	74.8	±1.0	1009.6	±5.9	461	±2.2	82.2	±1.4	974	±2.2	152	±1.5	23.5	±2.8
Means.	64.6		87.5		105.0 1.0		64.6		68.2		69.7		71.5		82.4	
Diff. fr. Ale.	0.0		−22.9		−36.4		0.0		−3.6		−5.1		−6.9		−7.8	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Monday Oct 25 1897

Measures (Rel. Motion in line of sight) using C9848 + 9849.

Limit 2 Readings increase as red ends approach.

Alcyone	Atlas	"a"	Merope	Maia	Taygeta	Electra	Celaeno
68.5 -2.0	57.5 +1.5	39.1 +4.9	59.2 +2.2	54.9 -1.1	58.2 +1.9	52.8 0.0	50.5 +0.2
71.2 +0.7	53.8 -2.2	31.2 -3.0	59.9 +2.9	58.6 +2.6	51.0 +0.7	51.4 -1.4	50.3 +0.4
70.5 0.0	55.6 -0.4	31.4 -2.8	55.3 -1.7	56.9 +0.9	57.8 +7.5	56.4 +3.6	48.4 -2.3
72.2 +1.7	56.9 +0.9	33.0 -1.2	58.2 +1.2	52.5 -3.5	47.9 -2.4	54.9 +2.1	48.8 -1.9
70.0 -0.5	55.4 -0.6	32.3 -1.9	50.9 -6.1	58.1 +2.1	46.6 -3.7	53.1 +0.3	55.3 +4.6
69.7 -0.8	56.7 +0.7	37.4 +3.2	54.1 -2.9	56.2 +0.2	45.6 -4.7	50.1 -2.7	51.3 +0.6
72.3 +1.8	58.4 +2.4	35.9 +1.7	59.3 +2.3	55.2 -0.8	50.1 +0.2	53.7 +0.9	51.6 +0.9
68.2 -2.3	56.2 +0.2	35.3 +1.1	57.2 +0.2	55.7 -0.3	51.2 +0.9	51.7 -1.1	51.5 +0.8
70.2 -0.3	58.8 +2.8	33.6 -0.6	56.2 -0.8	55.6 -0.4	47.9 -2.4	53.6 +0.8	50.0 -0.7
72.4 +1.9	50.4 -5.6	33.3 -0.9	59.8 +2.8	56.8 +0.8	47.1 -3.2	50.8 -2.0	48.9 -1.8
Sum. 5.2 (10)120	59.7 17.3	42.5 21.3	70.1 23.1	60.6 12.7	03.4 32.6	28.5 14.9	06.6 14.2
Av. Dev. ±1.2	±1.7	±2.1	±2.3	±1.3	±3.4	±1.5	±1.4
Means 70.5	56.0	34.2	57.0	56.0	50.3	52.8	50.7
Diff. ale. 0.0	-14.5	-36.3	-13.5	-14.5	-20.2	-17.7	-19.8
67.4 -1.2	59.1 +1.6	33.5 +0.5	58.4 +1.9	52.3 -0.8	48.5 +1.6	51.2 +3.2	48.3 +3.5
66.8 -1.8	58.3 +0.8	34.8 +1.8	55.4 -1.1	51.9 -1.2	43.2 -3.7	49.6 +1.6	48.2 +3.4
70.2 +1.6	58.3 +0.8	34.2 +1.2	55.4 -1.1	50.4 -2.7	45.0 -1.9	47.2 -0.8	43.9 -0.9
68.8 +0.2	58.8 +1.3	34.6 +1.6	58.3 +1.8	56.9 +3.8	50.2 +3.3	48.2 +0.2	48.1 +3.3
69.4 +0.8	57.2 -0.3	29.2 -3.8	58.3 +1.8	54.9 +1.8	46.1 -0.8	48.3 +0.3	43.2 -1.6
68.3 -0.3	56.0 -1.5	32.6 -0.4	53.0 -3.5	51.9 -1.2	44.4 -2.5	47.4 -0.6	41.9 -2.9
68.9 +0.3	57.1 -0.4	32.5 -0.5	61.6 +5.1	51.1 -2.0	46.8 -0.1	43.0 -5.0	42.8 -2.0
67.8 -0.8	57.7 +0.2	34.7 +1.7	55.5 -1.0	54.8 +1.7	47.2 +0.3	48.8 +0.8	44.3 -0.5
69.8 +1.2	56.1 -1.4	33.2 +0.2	55.9 -0.6	53.3 +0.2	46.2 -0.7	46.5 -1.5	43.9 -0.9
68.4 -0.2	56.2 -1.3	30.2 -2.8	53.2 -3.3	53.3 +0.2	51.7 +4.8	50.3 +2.3	43.0 -1.8
85.8 6.4	74.8 9.6	29.5 14.5	65.0 21.2	30.8 15.6	69.3 1.97	80.5 16.3	47.6 20.8
±0.8	±1.0	±1.4	±2.1	±1.6	±2.0	±1.6	±2.1
68.6	57.5	33.0	56.5	53.1	46.9	48.0	44.8
	-11.1	-35.6	-12.1	-15.5	-21.7	-19.6	-23.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Nov 24 1897

Work preliminary to attempting to transform photographically the prismatic spectrum to the normal.

α Canis Majoris as shown plate X 8094.
taken with 13 inch Boyden telescope.

~~H_β~~ Line		Dist. in m.m from H_β	Re-measured Dist. in m.m		Mean	Diff.	λ	Diff	λ per m.m
~~H_Y~~	H_β	—	71.5	—	—		4862		
~~H_8~~	—	24.1	95.7	24.2	24.2	24.2	4481	381	15.7
~~H~~	H_γ	35.3	106.6	35.1	35.2	11.0	4341	140	12.7
	H_8	57.2	128.7	57.2	57.2	22.0	4102	239	10.9
	H_ζ	71.6	143.2	71.7	71.6	14.4	3970	132	9.2
	K	~~35.9~~	147.5	76.0	76.0	4.4	3934	36	8.2
	H_G	81.4	153.1	81.6	81.5	5.5	3889	45	8.2
	H_η	88.4	160.1	88.6	88.5	7.0	3836	53	7.6
	H_θ	93.5	165.2	93.7	93.6	5.1	3798	38	7.4
	H_L	97.0	169.0	97.5	97.2	3.6	3771	27	7.5

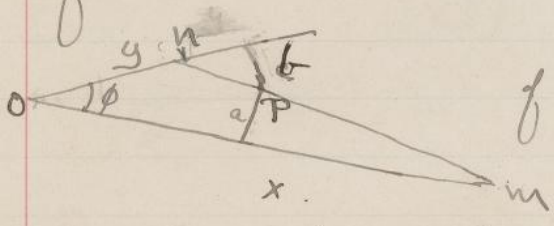
John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Tuesday Nov 30 1897.

If we use a pinhole camera with a vertical slit for the pinhole & incline the two plates at the proper angle with each other, a very close approximation can be obtained in changing the prismatic to the normal spectrum. A careful plotting showed this to be nearly so in reality; the question now is whether a good enough picture can be made & giving sufficient definition.

The form of curve is interesting as it affords the means of interpolation between any set of points where the inclination of the curve is gently changing.

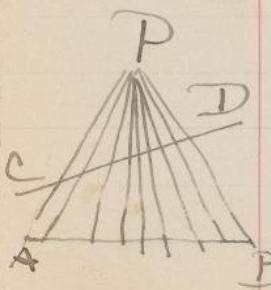


Let P be the pinhole or point of projection. then n is the projection of m. x & y are the respective distances from O. The opening between the lines is ϕ.

Then $xy \sin\phi = 2 \text{ area } O\,m\,n = ax + by$

or $$y = \frac{ax}{x \sin\phi - b}$$

A discussion of the curve shows it to be a hyperbola.



It is to be remarked that a flat fence having the distances on A B equal & crossed by C D gives a hyperbola the scale of which is determined by the distance of C D from P. It can also be used for interpolation as will be shown later.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Dec 9 1897

Measures on D 5200 plate
Eaton with slit camera for transfer prism
normal spectrum

	I/	I	II	III	IV	
H_β	2.3.6	73.7	88.0	35.8		52.9
—						
H_γ	18 / 107.9	118.8	133.0	80.6		97.9
H_ε	151.8	139.9	154.0	101.7		119.0
H_2		151.7	165.8	113.5		130.8
K		154.9	169.1	116.9	[147.7]	134.1
H_G		159.0	173.1	121.0	↑	138.2
H_η		163.8	177.9	125.5		142.7
H_θ		167.3	181.2	129.0	↓	146.2
H_L		169.6	183.5		[162.1]	148.5

	Diff I	Diff I	Diff III	Diff IV	Means III+IV	Mean of all Sept 1896
H_β	0	0	0	0	0	
—	—	—	—	—	—	
H_γ	45.1	45.0	44.8	45.0	44.9	45.0
H_δ	66.2	66.0	65.9	66.1	66.0	66.0
H_2	78.0	77.8	77.7	77.9	77.8	77.8
K	81.2	81.1	81.1	81.2	81.2	81.2
H_G	85.3	85.1	85.2	85.3	85.2	85.2
H_η	90.1	89.9	89.7	89.8	89.8	89.9
H_θ	93.6	93.2	93.2	93.3	93.2	93.4
H_L	95.9	95.5	95.5	95.6	95.6	95.6

* Counted Sept 1896

Measured

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Thursday Dec 9 1897

On the following pages (114 & 115) is given a plot of prismatic spectrum with λ as abscissa. using measures from X 8094 (Spectrum of Sun) recorded on page 110

Also a similar plot is given of measures (Means III & IV page 112) made from D 5200 (a reproduction of X 8094 & made with camera as described on page 111) A line joining the extremities passes very nearly through all the points showing that the condition is approximately fulfilled, that the distances should be proportional to the wave length.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924W

4508 John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

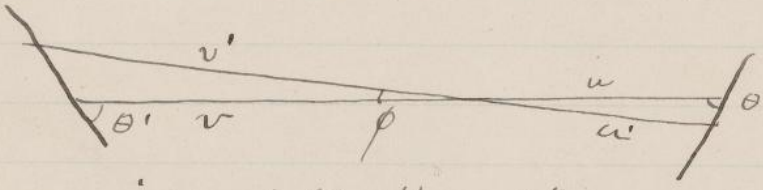
1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Friday Dec 10 1897

Focus between inclined lines.



$u : u' :: \sin(\theta+\phi) : \sin\theta$

$u : u'-u :: \sin(\theta+\phi) : \sin\theta - \sin(\theta+\phi)$

$: -2\cos(\theta+\frac{1}{2}\phi)\sin\frac{1}{2}\phi$

$$\frac{du}{u} = \frac{2\cos(\theta+\frac{1}{2}\phi)\sin\frac{1}{2}\phi}{\sin(\theta+\phi)}$$

$v : v' :: \sin(\theta'-\phi) : \sin\theta'$

$v : v'-v :: \sin(\theta'-\phi) : \sin\theta' - \sin(\theta'-\phi)$

$: 2\cos(\theta'-\frac{1}{2}\phi)\sin\frac{1}{2}\phi$

$$\frac{dv}{v} = \frac{2\cos(\theta'-\frac{1}{2}\phi)\sin\frac{1}{2}\phi}{\sin(\theta'-\phi)}$$

$$\frac{1}{u}+\frac{1}{v} = \frac{1}{f} \qquad -\frac{du}{u^2} - \frac{dv}{v^2} = 0$$

$$u^2 dv = -v^2 du \quad \therefore \quad \frac{\frac{du}{u}}{\frac{dv}{v}} = -\frac{u}{v}$$

$$\therefore \quad \frac{u}{v} = +\frac{\cos(\theta+\frac{1}{2}\phi)\sin(\theta'-\phi)}{\sin(\theta+\phi)\cos(\theta'-\frac{1}{2}\phi)}$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

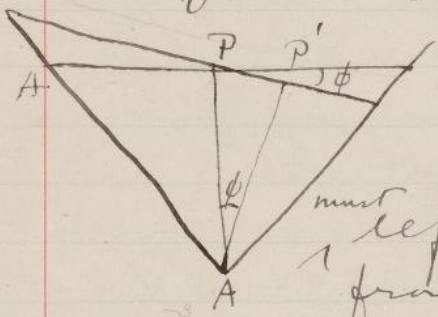
1895phae.proj..924K

Saturday Dec 11 1897.

The relation between u & v given on the preceding page becomes, when ϕ is very small,

$$\frac{u}{v} = + \frac{\cos\theta \sin\theta'}{\sin\theta \cos\theta'} = + \frac{\tan\theta'}{\tan\theta}$$

$$u \tan\theta = + v \tan\theta'$$



To maintain the equality, either member of this equation must represent the perpendicular from A upon the reference line of focus. This being the case the joint P' is moved through an angle $= \phi$ about A. The polar equation to the curve referred to P & the line PB is

$$p = u \tan\theta \sin\phi = v \tan\theta' \sin\phi.$$

We can make five points in the two lines correspond (not regarding the lens but considering a single particle) in the following way.

$$xy \sin\phi - ax - by = 0 \quad \text{(See page (111))}$$

Considering $x'y'$ as the reference point from which our x's & y's are measured, we have five unknown quantities $x', y', \sin\phi$ & a & b.

It is found that the solution of the resulting five equations might involve special difficulties.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj.,924K

Saturday Dec. 11, 1897

Differentiating

$$\frac{dy}{d\phi} = \frac{a - x' \sin\phi}{y' \sin\phi - b} = n$$

From 5 points of the curve a corresponding values of x & y reduced to x' & y' we can find 5 values of n by process given by Encke in Jahrbuch 1830.

$$a - x' \sin\phi - n y' \sin\phi + b n = 0$$

A later examination shows that the equation $x'y' \sin\phi - ax' - cy' = 0$ must be introduced & hence only four points can be used.

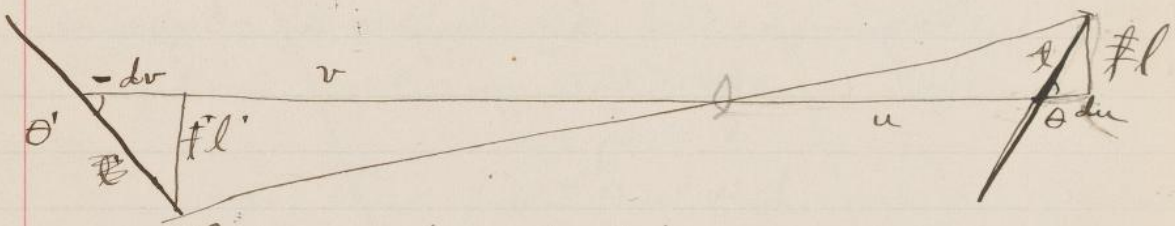
Continued on page 120

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Monday Dec 13, 1897.

Fruther consideration of focus between inclined lines.



Regarding the field of the lens as flat du + dv are accurately represented as drawn.

$$du = l \cot\theta \qquad -dv = -l' \cot\theta'$$

$$l : l' : u : v \quad \therefore \quad dv = -\frac{lv}{u} \cot\theta'$$

$$\frac{dv}{du} = -\frac{\frac{v}{u}\cot\theta'}{\cot\theta} = -\frac{v \tan\theta}{u \tan\theta'} = -\frac{v^2}{u^2}$$

$$\therefore \frac{u}{v} = \frac{\tan\theta'}{\tan\theta}$$

This is same result as was obtained on page 117 when ϕ was considered a small angle.

And the important law that the perpendicular from the intersection of the planes of the plates upon the axis of the lens determines the position of the lens. See page 117.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj.,924K

Monday Dec 13. 1897.

From page 118 (Continued)

Beginning with $xy\sin\phi - ax - by = 0$

Let us substitute for x & y

$$x = \overset{c}{\kappa} + x'$$
$$y = \overset{d}{\kappa} + y'$$

Omit accents in result.

$$\overset{c\,d}{\kappa\kappa}\sin\phi + \overset{a}{\kappa} y\sin\phi + \overset{d}{\kappa} x\sin\phi + xy\sin\phi - a\overset{c}{\kappa} - ax - b\overset{d}{\kappa} - by = 0$$

Diff. $$\overset{c}{\kappa}\sin\phi\,dy + \overset{d}{\kappa}\sin\phi\,dx + x\sin\phi\,dy + y\sin\phi\,dx - a\,dx - b\,dy = 0$$

$$\frac{dy}{dx} = \frac{a - \overset{d}{\kappa}\sin\phi - y\sin\phi}{x\sin\phi + \overset{c}{\kappa}\sin\phi - b} = n$$

$$a - d\sin\phi - y'\sin\phi = n'x'\sin\phi + cn'\sin\phi + bn' \quad \left[\ \phi = 0\right.$$
$$a - d\sin\phi - y''\sin\phi = n''x''\sin\phi + cn''\sin\phi + bn'' \quad \left.\ \phi = 0\right.$$
$$\text{&c} \qquad \text{&c}$$

$a, b, c, d,$ & $\sin\phi$ are the unknown quantities.

If the coordinates of one of the joint chosen are c & d. The five determining equations are as follows.

(1) $cd\sin\phi - ac - bd = 0$

(2) $a - d\sin\phi - cn'\sin\phi + bn' = 0$

(3) $a - d\sin\phi - y''\sin\phi - n''x''\sin\phi - cn''\sin\phi + bn'' = 0$

(4) $a - d\sin\phi - y'''\sin\phi - n'''x'''\sin\phi - cn'''\sin\phi + bn''' = 0$

(5) $a - d\sin\phi - y^{IV}\sin\phi - n^{IV}x^{IV}\sin\phi - cn^{IV}\sin\phi + bn^{IV} = 0$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Dec 13 1897

Substract (2) fr (3), (4) & (5)
The resulting equations will involve
$\sin\phi$, $c\sin\phi + b$. Since we have
c also.

We may then find $a - d\sin\phi$ from (2)
Let us call it $a - d\sin\phi = e$

Then from (1) $bd = -ce$

$$d = -\frac{ce}{b}$$

a may then be found from either (1) or (2)

$$a = -\frac{(c\sin\phi + b)e}{b}$$

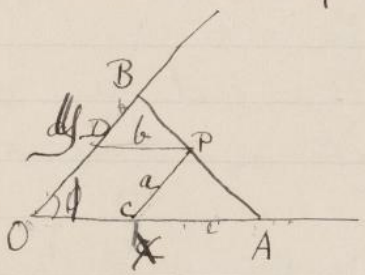
Found to be faulty

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj.1924K

Wednesday Dec 15 1897.

Trouble in eliminating unknown quantities from Eq. page 117. seems to be in an identity. It is also seen that ϕ is not necessarily a determinate quantity.



Let ϕ be any angle, & a & b be parallel to axes of x & y respectively, then from similar triangles we have

$$x : y :: x - b : a$$

~~$xy = ab$~~

$$ax = xy - by \quad \text{or} \quad xy - ax - by = 0$$

It is seen that the figure represents a form of Pantograph, the angle ϕ can be changed at will without affecting the position of A & B, so long as a & b remain constant. This freedom of movement permits us to make the diagonal OP perpendicular to AB, the condition of best focus.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Dec 27 1897

Measures made on D5220 Plate taken with Normal Spectrum Aff. with inclined plates & lens instead of pin hole slit.

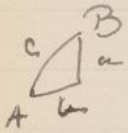
	I		II		III		Means
H_β	39.8	0	32.2		34.2	0	0
—	←	—	64.3	32.1	66.1	31.9	32.0
H_γ	83.9	44.1	76.3	44.1	78.3	44.1	44.1
H_δ	104.5⁻	64.7	97.0	64.8	99.0	64.8	64.8
H_ε	115.9	76.1	108.5⁻	76.3	110.5⁻	76.3	76.2
K	119.1	79.3	111.7	79.5⁻	113.7	79.5⁻	79.4
H_ζ	123.0	83.2	115.7	83.5⁻	117.5⁻	83.3	83.3
H_η	127.6	87.8	120.0	87.8	122.2	88.0	87.9

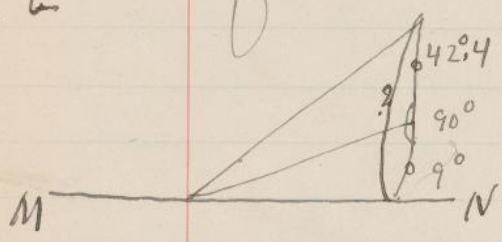
John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

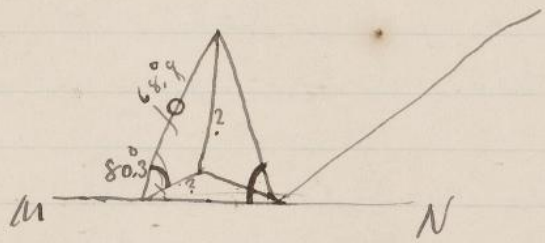
1895phae.proj.1924K

Friday Dec. 30, 1897.

Altitude & Azimuth of Secondary Mirror of Heliostat.







a & b given

$\cos c = \cos 42^\circ.4 \times \cos 9^\circ. = \cos 43^\circ.2$

$\tan A = \frac{\tan 42^\circ.4}{\sin 9^\circ} = \tan 80.3$

180
42.2
313.6.8
68.9

9.8683
9.9946
9.8629 = cos 43°.2

9.9605
9.1943
0.7662 = Tan 80.3 .28

A & C given

$\tan b = \tan c \cos A$

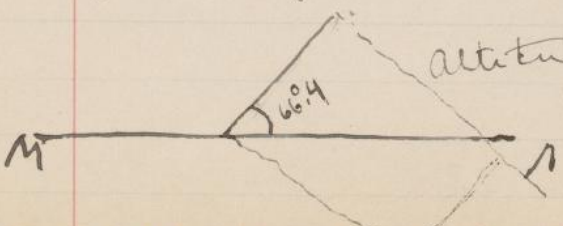
$\sin a = \sin c \sin A$

arc required
68.9
c = ~~43.2~~
A = 80.3

0.4136
~~9.9729~~
9.2286
~~9.2002~~
9.6411 = tan 23.6

9699
~~9.8354~~
9.9937
~~9.8291~~ = ~~sin 42.4~~
9.9636 = sin 66.9

Hence the normal to secondary mirror has azimuth & altitude referred to horizontal plane passing through MN equal to 23°.6 & 66°.9 respectively. The complements of these angles give the same coordinates for surface



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

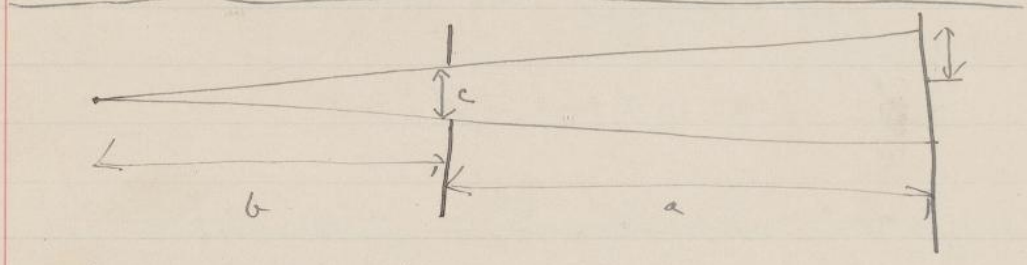
1995phae.proj..924K

Tuesday Jan 11 1895

Prints of pictures of dome & flagstaff examined as to general definition & arranged in order from best to worst
ε 3929, 3938, 3937, 3928, 3932.

Again by me first.
ε 3929, 3937, 3930, 3928, 3932

		aperture (after)	Exposure
4	ε 3928	0.9	2^m
Best 1	ε 3929	0.6	$2^m.6$
2	ε 3930	0.5	3.2
3	ε 3931	0.3	13.
worst	ε 3932.	0.2	20.



2x (geom) : c : b + a : b

$x(\text{geom}) = \frac{(a+b)c}{b}$ (1)

$x(\text{diff}) = \frac{mb}{a}$ (2)

We can find a value for m by taking a plate & measuring outermost fringe.

For minimum value equate (1) & (2)

$$\frac{(a+b)c}{b} = \frac{ma}{c}$$

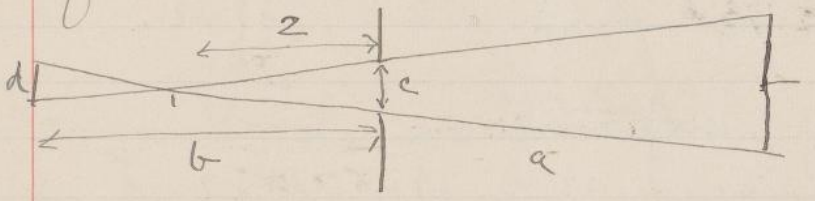
$$c^2 = \frac{mab}{a+b} \quad \text{or} \quad c = \sqrt{\frac{mab}{a+b}}$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday June 11 1895

To determine we must know the distance between the geometrical images of two points.



$b - z : a + z :: d : 2x$

~~$a + b : a + z :: d + 2x : 2x$~~

$z : b - z :: c : d$

$z : b :: c : c + d$

$z = \frac{bc}{c+d}$

$b - \frac{bc}{c+d} : a + \frac{bc}{c+d} :: d : 2x$

$bd : ac + ad + bc :: d : 2x$

$2x = \frac{ac + ad + bc}{b} = \frac{c}{2} + \frac{a(c+d)}{2b}$

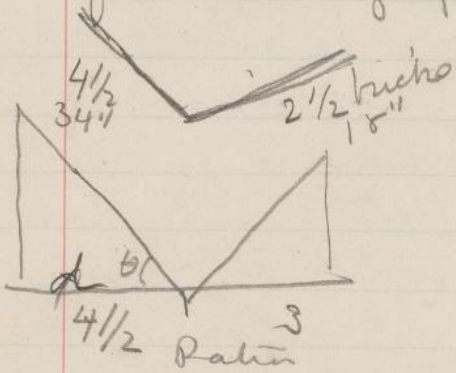
This formula will enable us to make a correction in finding a value of m when the object is not a point but has breadth or subtends an appreciable angle.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Jan 14 1898

Measure of Chimney by county tricks for studying pin hole pictures



$$\tan\theta = \frac{3 \times 4\frac{1}{2}}{2 \times 2\frac{1}{2}} = \frac{27}{16} = 1.6875$$

$\theta = 59.3+$

$d = 34 \times \cos\theta = 17.''3$

34" × .51 = 17.34

25.4 × 692 + 865 + 346 m.m = 439.42

$d = 440^{m.m}$ aprox.

Measurements of Apetures ~~for~~ used in Pin Hole Experiments

Apeture # V	45.308	49.957
	45.537	49.657
	0.229	0.300
Apeture IV	51.624	53.977
	51.224	54.326
	0403	0.349

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Jan. 14, 1895.

Aperture III	50.082	65.579
	49.487	66.087
	0.595	0.506
Aperture II	52.227	75.784
	52.557	76.474
	0.670	0.690
Aperture I	54.536	85.421
	53.608	86.316
	0.928	0.895

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Feb 8 1898

Measures on D 5341
Normal Spectrum of ε Carinae.

	mm
H B.	100.0
H V	143.2
H 8	163.4
H 2	174.7
K	177.8
H G	181.5

See Pages 114 + 115.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Mar. 7 1898

Measures & determins relative
reforms made in 1 sec by Var. Star
Aff when signals come from F1327.
Measures made by Asst. of Surv.

C 11040

Long	Short	
—	0.9	19,6,6 Whole dist
13.2	2.0	8.9,3
17.0	1.2	10.7,3 14/
11.5	1.3	Diff 0.5
14.7	1.8	9.47 11.94.7 0.1
14.4	1.2	11.1
10.6	1.4	105.8
13.3	1.3	
9)94.7	8)11.1	
13.5	1.4	13.5 / 12 6 (9.6
		90 84

C 11041

—	1.0	
12.3	1.3	19.7 Whole dist
13.2	1.5	88.8
13.2	1.0	108.9 15/
9.3	1.0	Diff 1.9
9.5	1.0	96.2 0.1
9.4	1.0	10.8
9.2	0.9	107.0
9.6	1.0	1.1 / 10.7 (9.7
10.5	1.1	99 80
9)96.2	4)4.8	77

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday. ~~Wednesday~~ March 10, 1898

Measures similar to those of Jan. 30

Total Length 110.6

C 11069

Long	Short	
min	2.8	0
12.8 +5	2.7	-1
11.4 -9	2.6	-2
11.0 -13	2.7	-1
12.3 0	2.8	0
11.5 -8	2.8	0
13.3 +10	3.2	+4
13.8 +15	3.1	+3
7 | 86.1 0	8 | 22.7 +3	
12.3	2.78	

86.1 / 22.7 / 108.8

108.8 / 19 | 1.8 / .18 Av. Instr.

Short Scale = 0.18

2.7 | 12.3 / 10.8 / 1.5 / 1.02 | 4.6 = 1.65 mgn

C 11070 -

Total a

10.8	-17	2.1	-4
14.2	+17	2.4	-1
13.3	+8	3.0	+5
11.3	-12	2.4	-1
11.6	-7	2.6	+1
12.5	0		
13.3	+8	2.3	-2
		3.0	+5
		2.5	0
7 | 87.2		8 | 20.3 +3	
12.45		2.54	

74.7 / 12.3 / 92.0

Total Length 109.8 / 87.2 / 20.3 / 107.5

14 | 2.3 / .16

2.5 | 12.45 / 10 / 2.45 | 5.0 / 4.9

2.54 | 12.45 / 12.72 | 5.0 = 1.75 mgn

Short Scale = 0.17

C 11070

~~Double~~ Total

—		2.6	-3
9.5	-2.4	2.7	-2
13.4	+1.5	3.5	+6
13.1	+1.2		
11.9	0	2.9	0
11.5	-4	2.8	-1
10.5	-1.4	2.7	-2
12.4	+5	2.5	-4
13.2	+1.3	3.2	+3
8 | 95.5	+3	8 | 22.9	-3
11.94		2.86	

11.94 | 4.2 = 2.86 / 11.44 / 5.00

Total 120.0 / 118.4 / 15 | 1.6 / 0.1

95.5 / 22.9 / 118.4

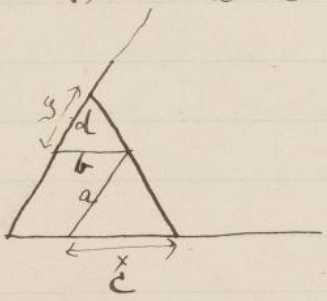
Short Scale = 0.16

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday June 8, 1898

Prismatic & Normal Spectrum.



$a : x :: y : b$

$xy = ab$

$x = x' + c$

$y = y' + d$ } i.e. omitting ' after substitution

We have

$$xy + cy + dx + cd = ab.$$

Since $cd = ab$.

Then $$xy + cy + dx = 0 \qquad (1)$$

Using one set of fonts as fonts of reference determined by c & d when found we find can make the curve pass through two sets of points: Three sets in all.

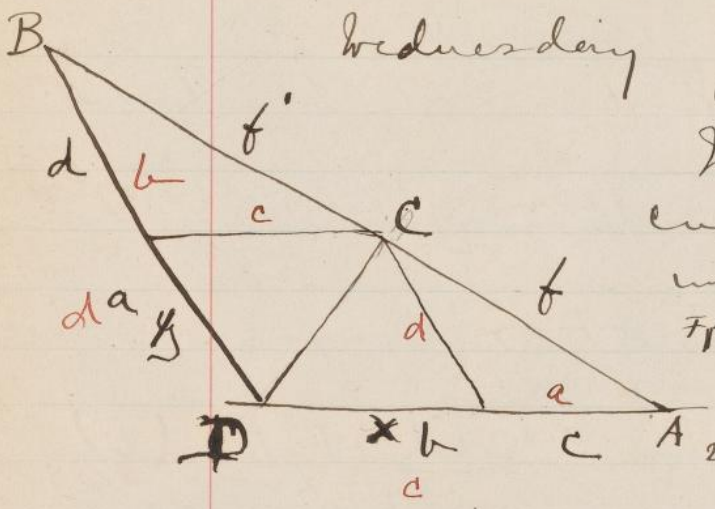
Considering a & b as unknown quantities & designating them by x & y that we see the only condition imposed is that their product = cd

$$xy = cd$$

Continued on next page.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K



Wednesday June 8 1898

In addition to passing the curve through 3 points, we impose the following condition viz that the focus of lens used shall be equal to F and that the intersection at D shall be on a perpendicular erected at P the position of the lens; or rather on a line passing through the lens & at right angles to its axis.

Let $\Sigma = \frac{f'}{f}$

Then $f = F\frac{\Sigma+1}{\Sigma}$ & $f' = F(\Sigma+1)$

By similar triangles

$$c : f :: x : f'$$

$$\text{or } \Sigma = \frac{f'}{f} = \frac{x}{c}$$

$$\therefore f = F\frac{\frac{x}{c}+1}{\frac{x}{c}} = F\frac{x+c}{x}$$

$$f' = F\left(\frac{x}{c}+1\right) = F\frac{x+c}{c}$$

Since CD is at right angles to AB. we have from triangles ACD & BCD

$$(x+c)^2 - F^2\frac{(x+c)^2}{x^2} = (y+d)^2 - F^2\frac{(x+c)^2}{c^2}$$

$$= \left(\frac{cd}{x}+d\right)^2 - F^2\frac{(x+c)^2}{c^2}$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday June 8 1898
Normal Spectra work (Continued

$$(\overset{\smile}{x}+c)^2 - F^2\frac{(\overset{\smile}{x}+c)^2}{\overset{\smile}{x}^2} = d^2\frac{(\overset{\smile}{x}+c)^2}{\overset{\smile}{x}^2} - F^2\frac{(\overset{\smile}{x}+c)^2}{c^2}$$

$$c^2\overset{\smile}{x}^2 - c^2F^2 = c^2d^2 - F^2\overset{\smile}{x}^2$$

$$\overset{\smile}{x}^2 = \frac{c^2d^2+c^2F^2}{c^2+F^2} = \frac{c^2(d^2+F^2)}{c^2+F^2} \quad (2)$$

This determines x.

$$\frac{a}{y} = \frac{cd}{x\smile} \qquad \varepsilon = \frac{f'}{f} = \frac{\overset{\smile}{x}}{c} \quad (3)$$

$$D = f + f' = F\frac{(\Sigma+1)^2}{\Sigma} = F\frac{(\frac{\overset{\smile}{x}}{c}+1)^2}{\frac{x\smile}{c}} = F\frac{(\overset{\smile}{x}+c)^2}{cx\smile} \quad (4)$$

Angles at A & B are determined.

$$\left.\begin{aligned} \cos A &= \frac{f}{\overset{\smile}{x}+c} = \frac{F}{x\smile} \\ \cos B &= \frac{f'}{y+d} = F\frac{x}{cd} = \frac{F}{y\cdot a} \end{aligned}\right\} \quad (5)$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Thursday June 9, 1898.

Test of Principles by applying it to the case where we wish to enlarge from prismatic spectrum. Scale as shown on X 8094 (main measures on page 110) to normal having scale of one wave length for m.m. Points chosen on H_δ H_γ & H_ζ. Take H_γ as fit of reference

	x_{mm}	$y_{m.m}$	x_{in}	y_{in^2}
H_δ	−14.4	+132.	− 0.57	+ 5.20
H_γ	0	0	0.	0
H_ζ	+ 9.9	− 81.	+ 0.39	−3.19

$$-2.96 + 5.20c - 0.57d = 0$$
$$-1.24 - 3.19c + 0.39d = 0$$

$$-1.1544 + 2.0280c + (\quad)d = 0$$
$$+.7068 + 1.8183c + (\quad)d = 0$$
$$-1.8612 + 0.2097c = 0$$
$$0.44760 + 3.8463c = 0$$

3 8463
.06 2970

$c = +0.196$ in. $c = +8.86$ in.

5.2
1774
4435
46.124
− 2.96
+43.16

.196 × 5.2
232
580
+.6032
1.0852

2.96 × 60
.57 | 2.96 | 3.

.57 | 43.16 | 75.72 = d
899
326
285
410
399
110

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday June 9 1898

Continued from preceding page.

$c = +8.87$ Let $F = 14.66$

$d = +75.72$

$c^2 = 78.68$ $F^2 = 214.92$

$d^2 = 5730.49$

$d^2 + F^2 = 5945.41$

$c^2 + F^2 = 293.60$) 5945.41 (2
2

log c^2 1.89586

d^2+F^2 3.77418

5.67004

c^2+F^2 2.46776

b^2 2 | 3.20228

b 1.60114

log F 1.16613

$b+c$ 1.68833

2

$(b+c)^2$ 3.37666

4.54279

2.54906

1.99373

$b = 39.92$ log b 1.60114

$c = 8.87$ " c 0.94792

$b+c = 48.79$ 2.54906

$D = 98.56$ in

Co $A = \frac{14.66}{39.92}$ 1.16613 + 1.60114 = 9.56499 $A = 68°.5$

Co $B = \frac{14.66 \times 39.92}{8.87 \times 75.72}$ 0.94792 + 1.87921 = 2.82713 + 1.16613 = 8.33900

1.16613 + 1.60114 = 2.76727 + 2.82713 = 9.94014

0.94792 + 1.87921 = 2.82713

$B = 29.4$

$B = 88.8$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Saturday June 11 1898

To determine numerical setting & enlarge factor of spectrum from $H_8 - H_4$ of a Canopi (Plate X814) to a normal scale of 1 wavelength per m.m.

Measures copied from C. S. Micrometer Record No 17 pages 20-24

H_8 75313 72367

24 | 13871 | .578
120
187
168
191
192

.579
.608
2 | 1187
.594

24 | 14595 | .608
144
195
192

H_2 89184 86962

24 | 9208 | .384
72
200
192
88
72
16

.384
.376
2 | 1760
.38

24 | 9015 | .376
72
181
168
135

H_4 98392 95977

		Diff in wave length
∴ $H_8 - H_2$ =	0.59 in	131.6
$H_2 - H_4$ =	0.38	81.1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday June 11 1898

Continued from preceding page.

	X in	Y in mm	
#8	− 0.59	+ 131.6	or + 5.18 in
#2	0.	0	
#9	+ 0.38	− 81.1	or − 3.19 in

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday June 15 1898

Repetition of work on page 135 et seq. with scale of 10 λ per m.m.

	x	y
H_δ	−0.57	+0.52
H_ε	0	0
H_ζ	+0.39	−0.32

$$-0.2964 + 0.52c - 0.57d = 0$$
$$-0.1248 - 0.32c + 0.39d = 0$$

$$-.1155\overset{596}{\cancel{713}} + .2028c - (\ )d = 0$$
$$-.07136 - .1824c + (\ )d = 0$$

.0204)
$$-.186849 + .0204c = 0$$
$$c = +^{\circ}$$

Measures made of λ8114 Spectrum of α Canum Cr. S. Micrometer (arrows indicate order of readings)

					Mean
H_δ	67545	67473	67547	67473	
	13836	13763	13831	13824	13.814
H_ε	81381	81236	81378	81297	
K	85341	85239	85337	85246	
	9142	9301 ~~2948~~	9102	9265	9.202
H_ζ	90523	90537	90480	90562	

$\therefore$

$H_\delta - H_\varepsilon = 0^{m}.576$ $\quad H_\varepsilon - H_\zeta = 0^{m}.383$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj - 924K

Wednesday June 15 1895

Normal Spectrum Constants for λ 8114

$H_8 - H_2 - HC_l$. Scale of the $1\lambda = 1^{mm}$

	x	y
H_8	$-0.^{in}576$	$+ 5.^{in}181$
H_2	0	0
HC_l	$+0.383$	$- 3.193$

0.959

$$- 2,984256 + 5,181\,c - 0.576\,d = 0$$
$$- 1.222919 - 3,193\,c + 0.383\,d = 0$$

$$-1,142970 + 1,984323\,c - (\quad)\,d = 0$$
$$-0.704401 - 1.896768\,c - (\quad)\,d = 0$$
$$-1.847371 + 0.087555\,c$$
$$.145155\,c = 0$$

0.26655

$c = 12.^{in}727$

9.16183

1.10462

34 | 23 | 7

I. dt. d.

$- 2.984256$

$+65.938587$

.576 | $+62.954331$ | $109.^{in}295 = d$

576

5354

5184

1703

1152

5513

5184

3291

2880

391

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday June 15 1895

Continued from preceding page.

$c = 12''.727$ Lat. $F = 14''.66$

$d = 109.295$ $F^2 = 214''.916$

$\log c = 1.10472$

$\log c^2 \quad 2.20944$ $c^2 = 161.978$

$\log d = 2.03860$

$\log d^2 \quad 4.07720$ $d^2 = 11945.4$

$d^2 + F^2 = 12160.3$

$c^2 + F^2 = 376.886$

$\log c^2$	2.209441	$b = 72.290$	$\log(b+c) = 1.92951$
$\log(d^2+F^2)$	4.08493	$c = 12.727$	$\log F \quad 1.16613$
	6.29437	$b+c = 85.017$	5.025515
$\log(c^2+F^2)$	2.57621	$\log b = 1.85908$	$\log c \quad 2.96386$
	2)3.71816	$\log c = 1.10472$	2.06135
$\log b^2$	1.85908	2.96380	$D = 115''.17$

$b = 72''.290$

$\cos A = \frac{F}{b}$ 1.16613 / 1.85908 / 9.30705 $A = 78°.3$

11.7

$\cos B = F\frac{b}{cd}$ 1.16613 / 1.85908 / 3.02521 / 3.14332 / 9.88189 — 1.10472 / 2.03860 / 3.14332 $B = 40°.2$

49.8

$\Sigma = \frac{b}{c} =$ $\log b = 1.85908$ / $\log c = 1.10472$ / 0.75436 $\Sigma = 5.68$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj_924K

Wednesday June 15 1894

Continued from preceding page

$f = F\frac{b+c}{b}$ $\quad \log F = 1.16613$

$\log(b+c) = 1.92951$

3.09564

$\log b \quad 1.85908$

$\log f. \quad 1.23656$

$f = 17.^{in}24$

Summary of results.

Distance between plates measured on axis of lens from H_2 of X 8114 is equal to $115.^{in}17$

Lens setting = $17.^{in}24$

Inclination of X 8114 to axis of lens = $78.^{\circ}3$

" " Sensitive plate " " " " = 40.2

Ross lens to be used. Focus $14.^{in}66$

The eq. enlargement at H_2 = 5.68

Red end of spectrum (X 8114) will be inclined toward lens.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Tuesday June 21 1898

Measures of Lines in D 57 55 Enlarged from X 8114 according to dates given on page 142. Scale = 1λ to 1 m.m.

Steel m.m rule used

7	~~44.7~~			
	447.0	4110.6		
	445.9	4109.5		
	443.8	4107.4		
H_8	438.2	4101.8		
	41x4.8	4078.4		
	408.9	4072.5	4072.0	4072
	405.4	4069.0		
	404.3	4067.9		
	400.9	4064.5		
	400.0	4063.6		
	394.8	4058.4		
	394.0	4057.6		
	391.5	4055.1		
	389.7	4053.3		
	386.5	4050.1		
	383.5	4047.1		
	381.8	4045.4		
	379.2	4042.8		
	374.2	4037.8		
	373.5	4037.1		
	372.2	4035.8		
	370.9	4034.5		
	368.5	4032.1		
	367.8	4031.4		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday June 21 1898

366.3	4030.9
363.1	4026.7
362.4	4026.0
361.3	4024.9
359.8	4023.4
356.3	4019.9
354.0	4018.6
353.4	4017.0
352.5	4016.1
350.4	4014.0
347.8	4011.4
343.5	4007.1
341.2	4004.8
340.3	4003.9
338.2	4001.8
337.1	4000.7
336.0	3999.6
334.9	3998.9
334.0	3997.6
329.2	3992.8
328.0	3991.6
325.8	3989.4
324.8	3988.4
322.1	3985.7
320.8	3984.4
319.9	3983.5
317.7	3981.3
315.8	3979.4
314.0	3978.3
312.1	3975.7
311.0	3974.5

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Tuesday June 21 1898

	80 8.1	3971.7
H ε	306.5⁻	3970.1
	302.5⁻	3966.1
	301.0	3964.6
	299.4	3963.0
	296.1	3959.7
	294.5⁻	3958.1
	293.0	3956.6
	291.1	3954.7
	290.5⁻	3954.1
	289.7	3953.3
	288.9	3952.5⁻
	288.0	3951.6
	286.7	3950.3
	285.4	3949.0
	282.8	3946.4
	281.6	3945.2
	280.0	3943.6
	278.8	3942.4
	276.3	3939.9
	275.9	3939.5⁻ 8.4
K	271.3	3934.9
	267.8	3931.4
	265.2	3928.8
	263.8	3927.4
	263.0	3926.6
	260.2	3923.8
	258.0	3921.6
	257.2	3920.8
	255.9	3929.5⁻
	255.4	3929.0

Read lines {414.8 / 383.5⁻} shown with no change

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj - 924K

Tuesday June 21 1898.

25 3.4	3917.0
25 1.2	3914.8
25 0.3	3913.9
248.0	0911.6
246.5	3910.1
243.0	3906.6
242.0	3905.6
240.3	3903.9
239.6	3903.2
237.0	3900.6
236.0	3899.6
235.5	3899.1
234.2	3897.8
232.0	3895.6
230.0	3893.6
225.0	3888.6
218.8	3882.4
217.5	3881.4
214.0	3877.6

Hδ

Red line ~~410.~~ 401.0

" " 380.4 (5)

" " 408.8

" " 445.8

" " 299.4

" " 383.5

Pluto has aff. been stationary during measures

Hγ – Hδ 99 lines.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday June 27 1898.
~~Tuesday June 28 1898~~

Measures from X 7901. (C. S. micrometer)

H_8	(55.771	169.38)	58.719		
H_2	72.709	9.264	72.623	13.904	
H_9	81.973		~~76.609~~	9.253	
			81.876		
				23.157	

again

H_8	61.634	13.877	61.557	13.908		.16
H_2	75.511	9.249	75.465	9.259		.17
H_9	84.760		84.724			.13
		23.126		23.167		1.46
						.15

X 8096

H_8	61.647	13.765	61.591	13.700		.15
H_2	75.412	9.381	75.291	9.434		.13
H_9	84.793		84.725			.10
		23.146		23.134		~~.07~~
						~~.08~~
						.12
						4.45
						.11

again

H_8	61.662	13.696	61.561	13.725	
H_2	75.358	9.372	75.286	9.370	
H_9	84.730		84.656		
		23.068		23.095	

13.765	9.381		13.721
.700	9.434		9.389
.696	.372		23.110
.724	.370		
4|2885	4|1557		
13.721	9.389		
$H_8 - H_2$	$H_2 - H_9$		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday June 28 1898

Measures for enlargement to normal Spectrum: derived from data on preceding pages

From page 147

		dis.	cor.
Plate X 8096	$H_8 - H_\varepsilon$	13.721	+.023
	$H_\varepsilon - H_\zeta$	9.389	+.016
		23.110	

Add Cor. & reduced measure of X 7901

we have $H_8 - H_\varepsilon$ = 13 dis. 744 = 0.573 in.

0.965 $H_\varepsilon - H_\zeta$ = 9.405 = 0.392

Computation following scheme of pages 132 et seq. 140 " "

	x (in.)	y
H_8	− 0.573	+ 5.181
8.274 H_ε	0	0
H_ζ	+ 0.392	− 3.193

$$xy + cy + dx = 0 \qquad (1)$$

$$-2.968713 + 5.181c - 0.573d = 0$$
$$-1.251656 - 3.193c + 0.392d = 0$$

$$-1.163735 + 2.030952c - (1)d = 0$$
$$-0.717199 - 1.829589c + (1)d = 0$$

0.27437
9.30397
0.97040

$$-1.880934 + 0.201363c = 0$$

$$c = +9.341$$

+ 48.3957
− 1.1637
.573) + 47.2320 (82.430
4584
9

d = 82.430

log 2.484481
0.269594
2.618875

log 1.67424
9.75815
1.91609

−29,8258
− 1.2517
.392) − 31.0775 (79.280

d = 79.280

log 1.49245
9.59329
1.89916

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phao.proj...924K

Tuesday June 28 1898.
Computation (continued)

Eq.'s rewritten.

$-2.9687 + 5.151c - 0.573d$
$-1.2517 - 3.198c + 0.392d$

$-9.47906 + (\ )c - 1.82959d = 0$
$-6.48506 - (\ )c + 2.03095d = 0$

$-15.9641 \qquad + 0.20136d = 0$
$1.20314 \qquad d = +79.28$
$9.30397 \qquad c = +9.34$
1.89917

$b^2 = \dfrac{c^2(d^2+F^2)}{(c^2+F^2)}$ (2)

$c = +9.34 \qquad F^2 = 14.66$
$d = +79.28 \qquad F^2 = 161.970$

$c^2 = +87.236 \qquad c^2+F^2 = 249.206$
$d^2 = 6285.318 \qquad d^2+F^2 = 6447.288$

log
c^2 1.94070
d^2 3.80938
c^2+F^2 2.39657
~~4.33727~~
5.75008
c^2+F^2 2.39657
b^2 3.35351
b 1.67676

$b = +47.506$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday June 28 1898

Computation (Continued)

$$D = F\frac{(b+c)^2}{bc} \qquad (4)$$

b =	+47.506	$\log b$ =	1.67676
c =	9.841	$\log c$ =	0.97040
$b+c$ =	56.847	$\log b+c$	2.64716

$\log(b+c)$ 1.75471
2
3.50942
$\log F$ 1.16613
4.67555
2.64716
$\log D$ 2.02839

D = 106.76

$$\text{Co}_0\, A = \frac{F}{b}$$

$$\text{Co}_0\, B = F\frac{b}{cd}$$

(5)

$\log F$ = 1.16613
$\log b$ = 1.67676
$\log \text{Co}_0 A$ = 9.48937
A = +72°0

18°.0

$\log F$ = 1.16613
$\log b$ = 1.67676
2.84289
$\log c$ = 0.97040
$\log d$ = 1.89917
2.86957
$\log \text{Co}_0 B$ 9.97332
B = 19°.9

$$E = \frac{b}{c} \qquad (3)$$

1.67676
0.97040
0.70636

E = 5.09

$$f = F\frac{b+c}{b}$$

1.16613
1.75471
2.92084
1.67676
1.24408

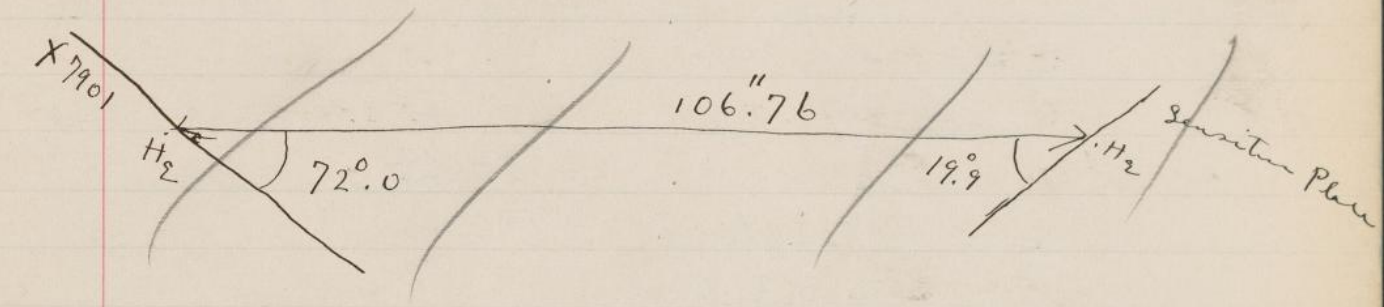
f = 17.54

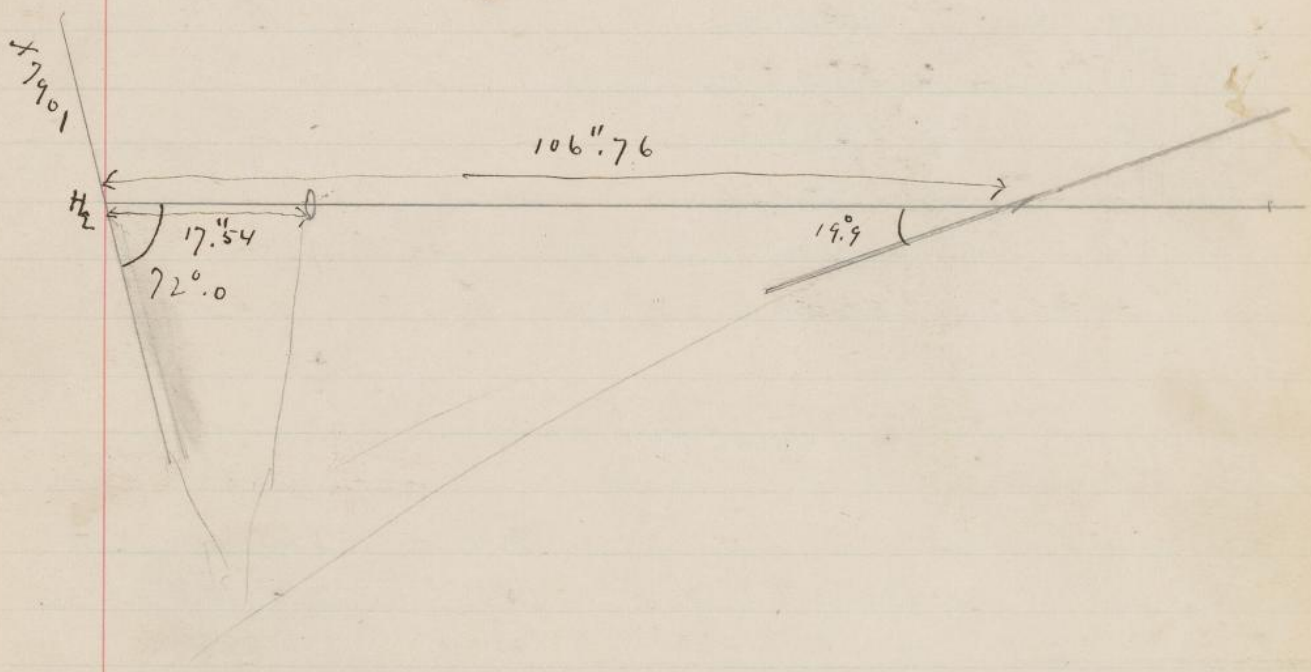
John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday June 28 1892

Summary of result of preceding days





John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Aug. 3 1898

Repetition of work beginning at middle of f 149

$$b^2 = \frac{c^2(d^2+F^2)}{(c^2+F^2)}$$

$F = 14.66$
$F^2 = 214.916$

$c = +9.34$
$d = +79.28$

$c^2+F^2 = 302.152$
$d^2+F^2 = 6500.234$

$c^2 = +87.236$
$d^2 = +6285.3184$

log c^2	1.94070
log d^2+F^2	3.81292
	5.75362
log c^2+F^2	2.48022
	2 | 3.27340
log b	1.63670
b =	+ 43.321

$$D = F\frac{(b+c)^2}{bc}$$

b =	+ 43.321
c =	+ 9.341
$b+c$	52.662
log $b+c$	1.72150
	2
	3.44310
log F	1.16613
	4.60923
log bc	2.60709
log D	2.00214

log b	1.63670
log c	0.97039
log bc	2.60709

$D = + 100.49$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae..proj...924K

Wednesday Aug 3 1898

$\cos A = \frac{F}{b}$

$\log F = 1.16613$
$\log b = 1.63670$
$\log \cos A \quad 9.52943$
$A = 70.22$

$\cos B = \frac{F b}{c d}$

$\log c = 0.97039$
$\log d = 1.89916$
2.86955

$\log F \quad 1.16613$
$\log b \quad 1.63670$
2.80283
$\log cd \quad 2.86955$
$\log \cos B \quad 9.93328$
$B = 31.06$

$\varepsilon = \frac{b}{c}$

$\log b \cdot 1.63670$
$\log c \cdot 0.97039$
$\log \varepsilon \quad 0.66631 \qquad \varepsilon = 4.64$

$f = \overline{F} \frac{(b+c)}{b}$

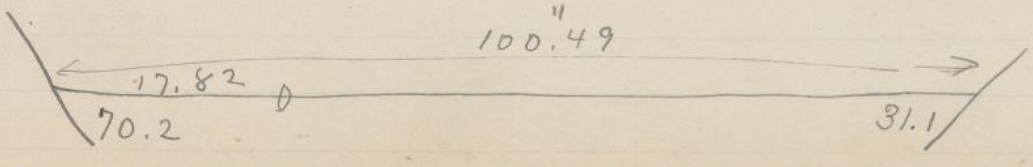
$\log \overline{F} = 1.16613$
$\log (b+c) \quad 1.72150$
2.88763
$\log b \quad 1.63670$
$\log f \quad 1.25093 \qquad f = +17.82$

Prof. $f \tan A = (D - f) \tan B$. $D = 100.49$

$f = 17.82$

$\log f \quad 1.25093$
0.4442
1.6951

$\log 82.67 \quad 1.91735 \quad 82.67$
9.7799
1.6973

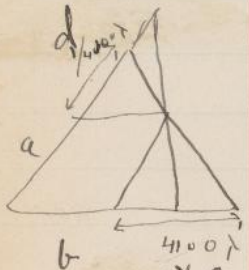


John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Oct 20 1898.

Reduction of Rowland's Map to scale 1/1.



Consider points λ 3900 & 4100

Dist = ~~67.5~~ 2) 676.5

Dist for 100 λ = 338.25

41

33825

135300

Dist of 4100 13868.25

676.5

Dist of 3900 13191.8

Dist of 4000 13868 − 338 = 13530

1,000,000,000 log 13191.8 4.120304

~~Recip. log. x~~ 35.879696 758047

4.

8.000000

log 13191.8 4.120304

4.879696 75804.7

log 13868.2 4.142020

4.857980 72107.5

3697.2

2.301030

3.567873

8.733157

9.000000

7.733157 54,095,000.

Apparently Rowland's map is on a reciprocal scale.

c = 13868.2

d = 3900.6

log c d/a

7.733157

4.120304

3.612853 4100.65

3900.65

7.733157

4.142020

3.591137

7.733157

4.130

3.60186 3998

log 13530

May 31 1901 Apparently the similarity is due to the particular scale

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Friday Oct 21 1898.

Reduction of $H_\delta - H_\zeta$ on ~~X 1096~~ X 7901 D ~~rect~~ reciprocal scale. To be changed to

$H_\delta - H_\varepsilon = -0^m.573 \qquad +5^m.075$

$H_\varepsilon - H_\zeta = +0^m.392 \qquad -3^m.299$

	WL	Log re		
		3.612974		
H_δ	4101.8	3.387026		2437.96
		3.594812		
H_ε	3970.2	3.401188		2518.77
		3.589849		
H_ζ	3889.1	3.410151		2571.29
	212.7	Extremes		133.33
log	2.327767		log	2.124928
	2.124928			
	0.202839	0.202839		0.202839
o	3.387026	3.401188		3.410151
	3.589865	3.604027		3.612990
	3889.25	4018.15		4101.95
Diff		128.9		83.8
		83.5		
		212.7		

$25.4 \overline{)128.9} = 5^m.075$ (1270, 1900, 1778, 1220)

$25.4 \overline{)83.8}$ (262, 760, 508, 2520, 2286, 2340, 2286, 54) $= 3.299$

Eq. $-2.907975 + 5.075c - 0.573d = 0$

$-1.293208 - 3.299c + 0.392d = 0$

$-1.13994 + 1.9894c - (\quad)d = 0$ | 0.27438

$+0.74100 - 1.8903c + (\quad)d = 0$ | 8.99607 | 1.27831

$-1.88094 + 0.0991c = 0$

$c = +18.98$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 22 1898

Computation continued from preceding page.

Eqs. $= 9.5934920 + (\ )c - 1.890327d = 0$

$* 6.5630806 - (\ )c + 1.989400d = 0$

$-16,1565226 \quad + 0.099073d = 0$

1.20836 — 8.99596 — 2,21240

1.208357 — 8.995955 — 2,21240 (corrected)

$d = +163.077$

$+5.073c = +2.907975 + 93.44 = 96.35$

1.983844 — 0.705265 — 1.278599 — 18.946

$+3.299c = +64.827360 - 1.293206 = 63.534154$

$= +63.927360 - 1.293206 = +62.634154$

1.803007 — 0.518382 — 1.284625

1.796811 — 0.518382 — 1.278429 — 18.986

1.983856 — 0.705265 — 1.278591

1.796803 — 0.518382 — 1.278421

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 22 1898

$$+5.075c - 0.573d = 2.907975$$
$$-3.299c + 0.392d = 1.293208$$

$$c = \frac{nb' - n'b}{ab' - a'b} \qquad d = \frac{an' - a'n}{ab' - a'b}$$

$ab' = +1.989400$
$a'b = +1.890327$
Denom $= 0.099073$

$nb' = +1.139926200$
$n'b = +0.741058$
0.398868
1.88098

$8.995955 \rightarrow$
0.604887

0.274384
8.995955
$1.278429 = \log c$

$c = 18.986$

$\log a \quad 0.705436$
$\log n' \quad 0.111666$
0.817102
$+ \quad 6.5630$
$- \quad 9.598338$
16.15638

$\log a' \quad 0.518382$
$\log n \quad 0.463590$
0.981972

1.208345
8.995955
$2.212390 = \log d$

$d = 163.076$

$\log c^2 = 2.557858$ $\qquad c^2 = +360.471$

$\log d^2 = 4.424780$ $\qquad d^2 = +26593.8$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 22/ 1898

Computations continued from Sunday Jan.

$b^2 = \frac{c^2(d^2+F^2)}{c^2+F^2}$

$C = +18.99$ $\quad F = 14.66$

$d = +163.08$ $\quad F^2 = 214.916$

$c^2 = +360.46$ $\quad c^2+F^2 = +575.38$

$d^2 = +26594.6$ $\quad d^2+F^2 = +2874.7$

$\log c^2 = 2.556858$ $\quad \log c^2 = 2.556858$

$\log(d^2+F^2) = 2.759955$ $\quad \log(d^2+F^2) = 3.458593$

5.316813 $\quad 6.015451$

$\log(c^2+F^2)$ $\quad 2.759955$

$2 \mid 3.255496$

$\log b \quad 1.627748$

$b = 42.437$

$c = 18.986$

$b+c = 61.423$

$D = F\frac{(b+c)^2}{bc}$

$\log(b+c) \quad 1.788331$

2

$\log(b+c)^2 \quad 3.576662$

$\log F. \quad 1.166134$

4.742796

$\log bc \quad 2.906177$

$\log D \quad 1.836619$

$\log b \quad 1.627748$

$\log b \quad 1.278429$

$\log bc \quad 2.906177$

$D = 68.65$ in (68.6466

$\text{Cos } A = \frac{F}{b}$

$\log F. \quad 1.166134$

$\log b \quad 1.627748$

9.538386

1.166134

1.627748

2.793882

3.490819

9.303063

1.166134

1.627748

2.793882

3.490819

9.303063

1.278429

2.212390

3.490819

$\text{Cos } B = \frac{Fb}{cd}$

$A = 69.8$

$A = 69^\circ\ 47'\ 27''$

$B = 78.4$

$78^\circ\ 24'\ 35''$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Saturday Oct 22 1898

Computation continued.

$\Sigma = \frac{b}{c}$ $\log \Sigma = 0.3493$

$\Sigma = 2.24$

$f = \mathcal{F} \frac{(b+c)}{b}$

1.166134
1.788331
2.954465
1.627748
$\log f$ 1.326717

$f = 21.22$

$D = 68.6466$
$f = 21.2186$
47.4280

Proj. $f \tan A = (D-f) \tan B$

$\tan A$ 0.434023
1.326717
1.760740

$\tan B$ 0.688048
1.676035
2.364083

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Oct 22 1898
Computations continued from page 156

$b^2 = \frac{c^2(d^2+F^2)}{(c^2+F^2)}$

$c = +18.99$ $\quad$ $F = +14.66$

$d = +163.08$ $\quad$ $F^2 = +214.916$

$c^2 = +360.46$ $\quad$ $c^2+F^2 = 575.38$

$d^2 = +26593.8$ $\quad$ $d^2+F^2 = 26808.7$

$\log c^2$ 2.556858

$\log(d^2+F^2)$ 4.428276

6.985134

$\log(c^2+F^2)$ 2.759955

2) 4.225179

$\log b = 2.112589$ $\quad$ $b = 129.596$

$c = 18.986$

$b+c$ 148.582

$D = F\frac{(b+c)^2}{bc}$

$\log(b+c) = 2.171966$

2

4.343932

$\log F$ 1.166134

5.510066

$\log c$ 3.391019

2.119047

$D = 131.537$

$\log b = 2.112590$

$\log c = 1.278429$

3.391019

$\log \frac{b}{c} = \log \frac{b}{c} = 0.834161$

$2 = 6.826$

$f = F\frac{(b+c)}{b}$

1.166134

2.171966

3.338100

$\log b$ 2.112590

1.225510

$D = 131.537$

$f = 16.808$

114.729

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Saturday Oct. 22, 1898.

$\text{Co } A = \frac{F}{b}$

1.166134
2.112590
9.053544

$A = 83^\circ\ 30'\ 17''$

$\text{Co } B = \frac{76}{cd}$

1.166134
2.112590
3.278724
3.490819
9.787905

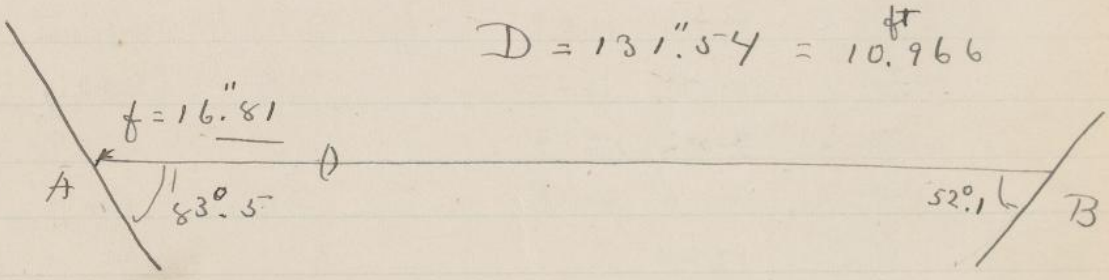
1.278429
2.212390
3.490819

$B = 52^\circ\ 08'$ ~~52~~

tan A 0.943659
log f 1.225510
2.169169

tan B 0.109500
log D-f 2.059673
2.169173

Check.



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Oct 24 1898

Measures made with Steel Millimetre rule (1 metre in length) upon Rowlands map of normal Spectrum.

λ	c.m	Diff.
29.7		
~~30.7~~	94.341	16.69
30.2		
~~31.2~~	77.65	16.68
30.7		
~~31.7~~	60.97	16.67
31.2		
~~32.2~~	44.30	16.65
~~31.7~~		
31.7	27.65	16.64
32.2	11.01	
30.7	96.20	1668
31.2	79.52	16.68
31.7	62.84	1668
32.2	46.16	16.66
32.7	29.50	16.64
33.2	12.86	
32.7	94.55	16.02
33.2	78.53	16.09
33.7	62.44	16.12
34.2	46.32	16.14
34.7	30.18	16.18
35.2	14.00	
34.7	93.09	16.03
35.2	77.06	16.06
35.7	61.00	16.09
36.2	44.91	16.15
36.7	28.76	16.22
37.2	12.54	

λ	c.m	Diff.
36.7	94.10	1701
37.2	77.09	16.97
37.7	60.12	16.91
38.2	43.21	16.87
38.7	26.34	16.84
39.2	09.50	
38.7	95.34	16.95
39.2	78.43	16.95
39.7	61.48	16.91
40.2	44.57	16.88
40.7	27.69	16.87
41.2	10.82	
40.7	89.43	14.85
41.2	74.58	14.86
41.7	59.72	14.86
42.2	44.86	14.86
42.7	30.00	14.88
43.2	15.12	
42.7	89.48	14.81
43.2	74.67	14.83
43.7	59.84	14.86
44.2	44.98	14.86
44.7	30 27.12	14.89
45.2	15.28	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Oct 25 1895.

Measures of Rowlands Map. Continued

	λ	c.m	Diff.
5th Sheet.	44.7	88.42	14.84
	45.2	73.58	14.85
	45.7	58.73	14.84
	46.2	43.89	14.86
	46.7	29.03	14.89
	47.2	14.14	
	46.7	89.46	14.87
	47.2	74.59	14.86
	47.7	59.73	14.87
	48.2	44.86	14.87
	48.7	29.99	14.90
	49.2	15.09	
6th Sheet.	48.7	92.48	14.85
	49.2	77.63	14.89
	49.7	62.74	14.89
	50.2	47.85	14.88
	50.7	32.97	14.91
	51.2	18.06	
	50.7	91.77	14.83
	51.2	76.94	14.87
	51.7	62.07	14.87
	52.2	47.20	14.89
	52.7	32.31	14.90
	53.2	17.41	

	λ	c.m	Diff.
7th	52.7	91.53	14.84
	53.2	76.69	14.86
	53.7	61.83	14.88
	54.2	46.95	14.87
	54.7	32.08	14.86
	55.2	17.22	
	54.7	90.83	14.79
	55.2	76.04	14.85
	55.7	61.19	14.87
	56.2	46.32	14.84
	56.7	31.48	14.85
	57.2	16.63	
8th.	56.7	89.27	15.11
	57.2	74.16	15.15
	57.7	59.01	15.14
	58.2	43.87	15.15
	58.7	28.72	15.14
	59.2	13.58	
	58.7	88.81	14.84
	59.2	73.97	14.85
	59.7	59.12	14.87
	60.2	44.25	14.85
	60.7	29.40	14.87
	61.2	14.53	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Oct 25 1898

Measures of Rowlands Map Continued.

9th Sheet			3rd Sheet Reduced		
60.7	88.28	14.45	36.7	95.14	17.01 / 16.91
61.2	73.83	14.46	37.2	78.13	16.98
61.7	59.37	14.44	37.7	61.15	16.91
62.2	44.93	14.46	38.2	44.34 / 27.43	16.86
62.7	30.47	14.44	38.7	27.38	16.84
63.2	16.03		39.2	10.54	
				84.60	
62.7	89.04	14.45	38.7	95.66	16.97
63.2	74.59	14.46	39.2	78.69	16.96
63.7	60.13	14.45	39.7	61.73	16.90
64.2	45.68	14.47	40.2	44.83	16.91
64.7	31.21	14.47	40.7	27.92	16.87
65.2	16.74		41.2	11.05	
				84.61	
10th Sheet.					
64.7	92.43	14.45			
65.2	77.98	14.45			
65.7	63.53	14.45			
66.2	49.08	14.46			
66.7	34.62	14.46			
67.2	20.16				
66.7	90.53	14.41			
67.2	76.12	14.47			
67.7	61.65	14.45			
68.2	47.20	14.46			
68.7	32.74	14.46			
69.2	18.28				

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Oct. 26, 1898.

To find best approximation to curve giving $1/\lambda^2$. As we can obtain the exact reciprocal of a number, the problem is reduced to finding curve of squares.

Consider values approximating the following.

No.	Sq.	H
1	1	1.0
2	4	5.7
3	9	11.2
4	16	16.7
5	25	25.0
6	36	34.0
7	49	43.9
8	64	58.8
9	81	76.4
10	100	100.0

H Computed from 1 as origin by formula $y = \frac{66x}{x-1.5}$ which satisfies 1. 5 & 10.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

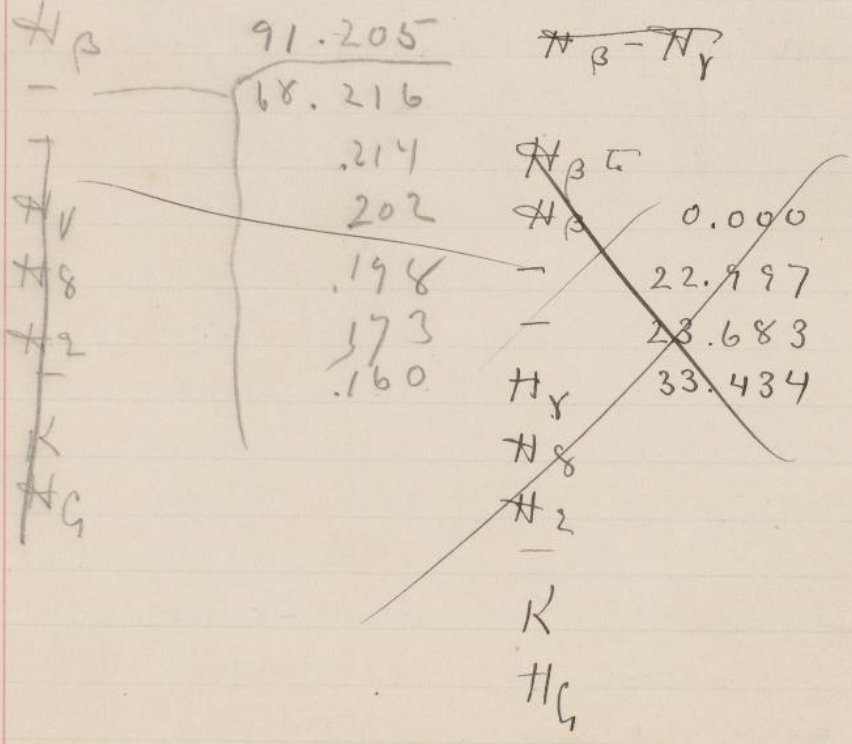
1895phae.proj..924K

Saturday Nov 5 1898

Measures with C.S.M

~~S~~ X7966

H_β	10	91.201	22.997	91.274	22.985
–	4	68.204	0.686	68.289	0.662
–	4	67.518	9.751	67.627	9.795
H_γ	10	57.767	20.884	57.832	20.857
H_δ	10	36.883	13.837	36.975	13.657
H_2	10	23.246	0.204	23.318	0.176
–	8	23.042	3.922	23.142	3.937
K	8	19.120	5.248	19.205	5.263
H_ζ	10	13.872	77.329	13.942	77.332
		77.329		77.332	



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Saturday Nov 5 1898

Measures of x7966 discussed.

	1st	2nd	Mean	λ
	0.000	0.000	0.000	
Hζ	5.248	5.263	5.256	3889.1
K	9.170	9.200	9.185	3933.8
H				3968.6
H_ε	9.374	9.376	9.375	3970.2
H_δ	23.011	23.033	23.022	4101.8
H_γ	43.895	43.890	43.892	4340.7
—	53.646	53.685	53.666	
—	54.332	54.347	54.340	
H_β	77.329	77.332	77.330	4861.5

~~H_β — H_γ~~ Make H_γ the point of reference.

Then

	x		y
Hζ	− 43.892	=	−1.m568
H_γ	0	=	0.
H_β	+ 33.438	=	+ 1.194

Make H_γ the point of reference.
Convert 24ths of inches. Normal scale to be 5λ = 1mm.
which is changed to inches.

Then

	x		y	
Hζ	− 43.892	=	−1.m829	+ 3.in556
H_γ	0			
H_β	+ 33.438	=	+ 1.393	− 4.in101
log y			0.55096	0.61289 n
log x			0.26221 n	0.14895
			0.28875 n	0.46894 n
y		=	−1.9442	−2.9440

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Nov 5 1898.

$xy + cy + dx = 0$

$y = \frac{-dx}{x+c}$

Reduction of $y + \frac{y}{x}c + d = 0$

$+3.556 - 1.944\,c + d = 0$

$-4.101 - 2.944\,c + d = 0$

$+7.657 + c = 0$

$c = -7.657$

$d = -18.438$

-7.657
-1.944
30628
30628
68886
7657
$+14.882508$
$+3.556$
$+18.4385$

$y = \frac{-18.438\,x}{x - 7.657}$

$+14.882$
$+7.657$
22.539
4.101
18.438

Sent for error of 24 Ns.

$x = -20.870 \mid .4696$

192
167
144
230
216
140

$127'' = 1^{m}$

log -0.8696 9.93932n

log d 1.26571n

1.20503

log -8.527 0.93080n

0.27423n

log 127 2.10380

2.37803n

-8.527
-7.657
-870

4340.7
238.8
4101.9

-238.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Saturday Nov 5 1898

Test for λ of line +9.774 for H_γ

$x = 24/+9.774$ (+.4072

96 −7.657

174

168 −7.250

60

48

log .4072 9.60981

log q 1.265714

0.87552 n

log −7.250 0.86034 n

0.01518

log 127 2.10360

2.11898

+131.5

4340.7

4472.2

Test for λ of line +10.448

24/+10.448 + .4353

96 −7.657

84 −7.222

72

128

120

80

72

log +.4353 9.63879

log q 1.265714

0.90450 n

log −7.222 0.85866 n

0.04584 n

log 127 2.10380

2.14964

+141.1

4340.7

4481.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Nov 5 1898

Sun for #2

24) 34.517 ⟨ −1.4382
24.
10.5
96
91
72
197
192
50

−7.657
−9.095

log −1.4382 0.15861 n
log d 1.26571 n
1,42832
log −9.095 0,95880 n
0.46852 n
log 127 2,10380
2,56732 n
−369.2
−370.3

4340.7
−370.3
3970.4

4340.7
369.2
3971.5

Sun for #.

24) 34.707 ⟨ −1.4461
24
107
96
110
96
147
144
30

−7,657
−9.103

log 0.1607 n
log d 1.26571 n
1.42591
log(−9.9) 0,95918 n
0.46673 n
2.60880
2,57053 n
− 372.0

4340.7
372.0
3968.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phae.proj..924K

Saturday Nov 5 1898

Test for K.

24/ x = −38.636 (+1.6098
24 −7.657
146 −9.266
144
236
216
200
172

log 0.20678 n
log d 1.26571 n
1.47249
log (+ 9.96689 n
0.50560 n
log 12.7 2.10380
2.60940 n
= 406.8

4340.7
406.8
3933.9

Table.

Line	λ (Vol XXVIII Pt I)	λ (Beg transverse) 3889.2	Diff.
H_ζ	3889.1		
K	3933.8	3933.9	0.1
H	3968.6	3968.7	0.1
H_2	3970.2	3970.4	0.2
H_δ	4101.8	4101.9	0.1
H_γ	4340.7	—	—
—	4471.8	4472.2	0.4
—	4481.4	4481.8	0.4
H_β	4861.5	4861.5	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Nov 7. 1898.

Determination of Constants for Reproduction on Normal Scale of β Orionis plate X7966

~~b c d~~ ~~f g h~~ determined on page 168 with axis changed

$c = +7.657$ $\quad$ $f = +14.66$

$d = +18.438$ $\quad$ $f^2 = +214.916$

log c 0.884059 n

2

log c^2 1.768118 $\quad$ $c^2 = +58.63$

log (d^2+f^2) 2.744199 $\quad$ log d 1.265714 n

4.512317 $\quad$ 2

log (c^2+f^2) 2.437037 $\quad$ log d^2 2.531428

2 | 2.075280 $\quad$ $d^2 = +339.96$

log b = 1.037640 $\quad$ $d^2+f^2 = 554.88$

b = +10.905 $\quad$ $c^2+f^2 = 273.55$

c = + 7.657 $\quad$ log. b = 1.037640

b+c = 18.562 $\quad$ log c = 0.884059

log(b+c) 1.268625 $\quad$ log b+c = 1.921699

2

log $(b+c)^2$ 2.537250 $\quad$ log $2-\frac{b}{c}$ = 0.153581

log f. 1.166134

3.703384 $\quad$ $\Sigma = +1.42$

log b+c 1.921699

log D 1.781685 $\quad$ D = + 60.491

log (b+c) 1.268625

log f. 1.166134

2.434759

log b 1.037640

log f 1.397119 $\quad$ f = + 24.953

D − f = + 35.538

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1995phaeo.proj : 924K

Monday Nov 7 1898

log f = 1.166134
log b = 1.037640
log Coo A 0.128494 A =

log fb = 2.203774
2.149773
0.154001

log c 0.884059
log d 1.265714
2.149773

These angles are impossible. Hence we must use a shorter focus lens & increase the scale.
A rough calculation for a 6" lens gives
b = 15.3 A = 67° B = 49° & D = 26."5

Rough calculation for scale 2λ = 1 mm.

c = +7.7 f = 14.7
d = +46.1 f² = 215.
c² = 59.3 c²+f² 274
d² = 2125 d²+F 2340

1.7731
3.3692
5.1423
2.4378
2) 2.7045
1.3522
0.8841
2.2363

1.166134
1.3522
9.8139 A = +5°

2.5183
2.2363

0.8841
1.6625
2.5469

2.5183
2.5469
9.9714 B = 20°

Angle impossible.

for 6" lens c = +7.9 d = +46 f = 6 f² = 36

1.7731
3.3345
5.1076
1.9294
3) 3.1782
1.5891

0.7782
1.5891
9.1891
2.3673
2.5469

A = 81°

B = 49°

c²+f² = 85 d²+f² = 2160
b+c = 47

1.5891

0.8841
1.6628
2.5469

D = 59."

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Nov 8 1898

Constants for β Orionis X 1966 for Mw a 6" lens. Frens measured the P.M in enlarging apparatus, gave values from of 7".01 & 7".03. Mean 7".02

$c = +7.657$
$d = +18.438$

$\log c^2$ 1.76812
$\log(d^2+F^2)$ 2.59021
4.35833
$\log(c^2+F^2)$ 2.03306
2 | 2.32527
$\log b$ 1.16264

$b = +14.543$
$c = +7.657$
$b+c = 22.200$
$\log(b+c)$ 1.34635
2
$\log(b+c)^2$ 2.69270
$\log f$. 0.84634
3.53904
2.04670
$\log bc$ 0.27858
$\log D$ 1.49234

$\log(b+c)$ 1.34635
$\log f$. 0.84634
2.19269
$\log b$ 1.16264
$\log b$ 1.03005

$f = 7.02$
$f^2 = 49.28$
$c^2 = 58.63$
$d^2 = 339.96$
$c^2+F^2 = 107.91$
$d^2+F^2 = 389.24$

$\log b = 1.16264$
$\log c$ 0.88406
$\log bc$ 2.04670

$\log \xi = \log \frac{b}{c} = 0.27858$
$\xi = 1.910$

$D = 31.07$

$f = 10.72$
$D-f = 20.35$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

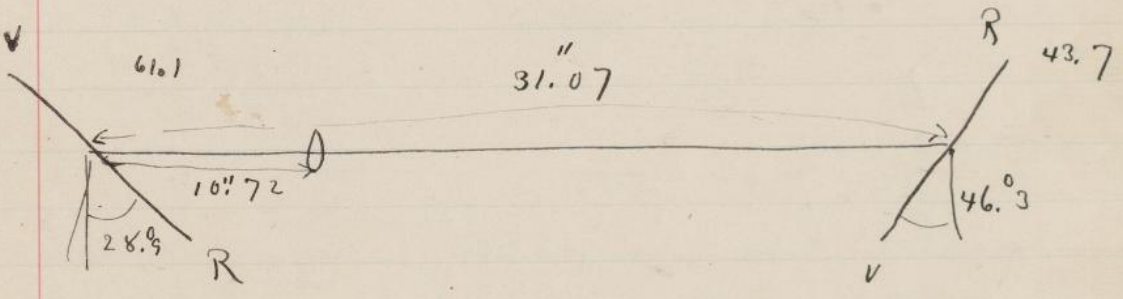
Thursday Nov 8 1898

log f. 0.84634
log b 1.16264
log cos A 9.68370 A = ~~bb~~ 61.1
(28.9)

log fb = 2.00898
log cd 2.14977
log cos B 9.85921 B = 43.7
(46.3)

tan A 0.25867
log f 1.03005
1.28872

tan B 9.98009
log D-f 1.30856
1.28865



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Thursday Nov 10 1898

Reduction for true wave lengths

Measures Copied from C. & M. Book No 17 page 3

Lines	Measures.		Mean	Diff from H_γ	Corr & scale of 166
H_β	8.267	8 266	8 266	+ 38.674	· 33.452
H_γ	41 940	41 940	41 940	00000	
H_δ	86. 026	86 149	86088	−44.148	43.870
H_η	92 688	92 806	92.747		
H_θ	97521	97685	97603		

77.822

77.830

This H_β − H_δ (page 166) 77.8 | .4928 .0063 Cor factor.

4668

2520

.0063

.9937

Wave length H_γ 92.747 / 41.940 / 50.807

log 1.705-92

log .9937. 9.99726

Co-log 24 8.61979

0.32297 n

1.26571 n

1.58868

0.98947 n

0.59921

2.10380

2.70301

$\overline{A}$ 2.1036

− 7.657

− 9.7666

4340.7

504.7

3836.0

504

Wave length H_θ 97.603 / 41940 / 55.663

log 1.74556

8.61705

0.36261 n

1.26571 n

1,62832

0.99834

0.62998

2,10380

2,73378

− 2,3047

− 7.657

− 9.9617

4340.7

+ 541.7

3799.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae..proj...924K

Thursday Nov 10 1898.

Dist H_γ & H_θ 55.581
55.745
2 1 13 2 6
55.663

Comparison for 55.763

	1.74634
	8.61705
	0,36339
− 2.3087	1.26571
− 7.657	0.79851
− 9.9657	0.36488
	1,62910
	0.99851
	0.63059
	2.10380
	2.73439

4340.7
542.5
3798.2

Diff for dis .100 = 0.8 for H_θ

Wave length of H_β. Measure of Image 167 changed by dis .100. +33.538

	log 1.525553
	Colog 8.619799
	0,14532
+ 1.3974	1.26571
− 7.657	1.41103
− 6.260	0.79657
	0.61446
	2.10380
	2.71826

4340.7
522.7
4863.4
4861.5
1.9

Diff for dis .100 = 1.9 for H_β

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Nov. 10 1897 checked

Reduction of measures of ζ Ophiuchi taken with 1 prism. From Book 10 of C. S. Micrometer.

		Measures from C.S.M. Book 10 old p. from H.V. page 12193	Direct ✓ page 13278	x + C	log x	log x d log x+C	log + C			
		1 x								
f.	H_β	+ 9148	+ 9140	3.960 95	3.960 95	7.324 37 n	2.716 684		4861.5	0
				46795	9.307 98	4.026 64 n	3.703 84 n	+ 520.8		
—	~~H.~~	+ 2851	2867	20992	3.457 43	6.820 85 n			4482.2	+.8
				46983		4.670 20 n	2.150 65	+ 141.5		
—	—	+ 2691	2679	22872	3.427 97	6.791 89 n			4472.4	+.6
						4.671 94 n	2.119 45	+ 131.7		
G	H_γ	0	0							0
	~~H_δ~~	~~5734~~	—	—	—					
				55397		7.112 95				
h	H_δ	− 5734	− 5735	10701.2	3.758 53 n	4.743 49 n	2.368 46 n	− 239.0	4101.7	−.1
				59173		7.341 65				
H	H_2	− 9516	9511	14779	3.978 23 n	4.772 12 n	2.569 53 n	371.1	3969.6	
				60301	4.026 90 n	7.390 32				
K	K	10637	10639	4.026 90 n	9.242 03 n	4.780 33 n	2.609 99 n	407.4	3933.3	−.5
				61736		7.445 27				
ε	H_ϵ	12087	12074	17040	4.081 85 n	4.790 54 n	2.654 73 n	457.6	3889.1	0
				63581		7.500 03				
β		13932	13919	18885	4.143 61 n	4.803 33 n	2.703 70 n	506.5	3835.2	−.3
				64924		7.547 03				
γ		15265	15262	20228	4.183 61 n	4.812 41 n	2.734 52 n	542.8	3798.8	−.2
				65933		7.574 84				
δ		16291	16271	21287	4.211 42 n	4.819 10 n	2.755 74 n	569.8	3770.9	−.1
				66729		7.595 58				
ε		16892	17063	22033	4.232 16 n	4.824 81 n	2.771 27 n	590.6	3750.1	−.1
				67325		7.610 49				
ζ		17181	17663	22629	4.247 07 n	4.828 18 n	2.782 31 n	605.8	3734.9	+.7
				67812		7.622 30				
η		17680	18150	23116	4.258 88 n	4.831 30 n	2.791 00 n	618.1	3722.6	+.8
				68195		7.631 48				
θ		18169	18533	23499	4.267 98 n	4.833 75 n	2.797 63 n	627.6	3713.1	+1.4
				68520		7.638 91				
ι		18582	18858	23824	4.275 49 n	4.835 82 n	2.803 09 n	635.5	3705.2	+1.2
				68804		7.645 41				
κ		18893	19142	24108	4.281 99 n	4.837 61 n	2.807 80 n	642.4	3698.3	+.9
				69048		7.650 91				
λ		19166	18386	24352	4.287 49 n	4.839 15 n	2.811 76 n	648.3	3692.4	+.9
				69239		7.655 07				
μ		19374	18577	24543	4.291 64 n	4.840 35 n	2.814 82 n	652.7	3688.0	+1.1

From comparison with measures C.S.M. B 10 p 97 2d column of measures used.

18/95

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

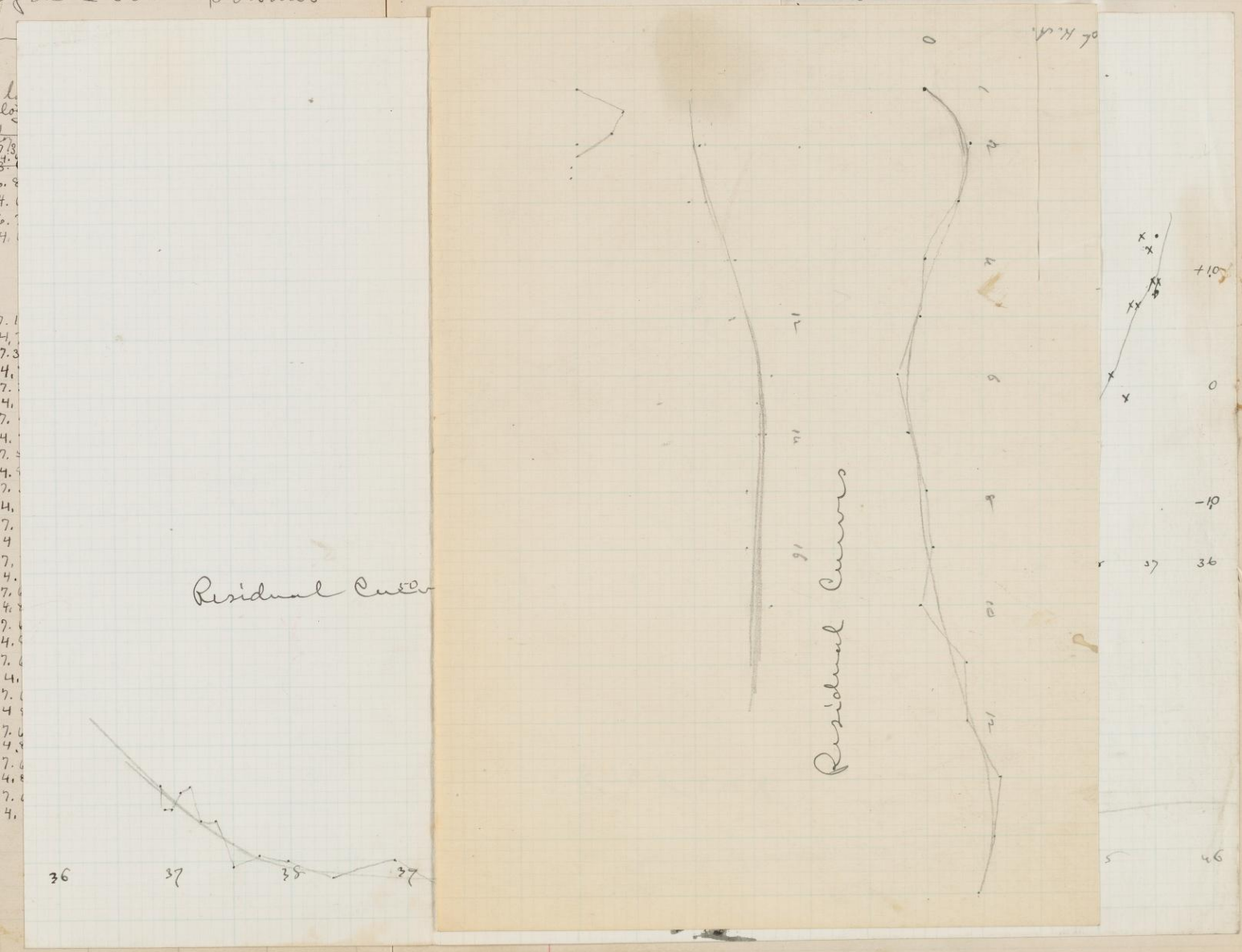
checked

$y = \frac{-dx}{x+c}$

Nov 10, 1898.

y formula

$y \quad c+d=0$



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

8168548 Chem

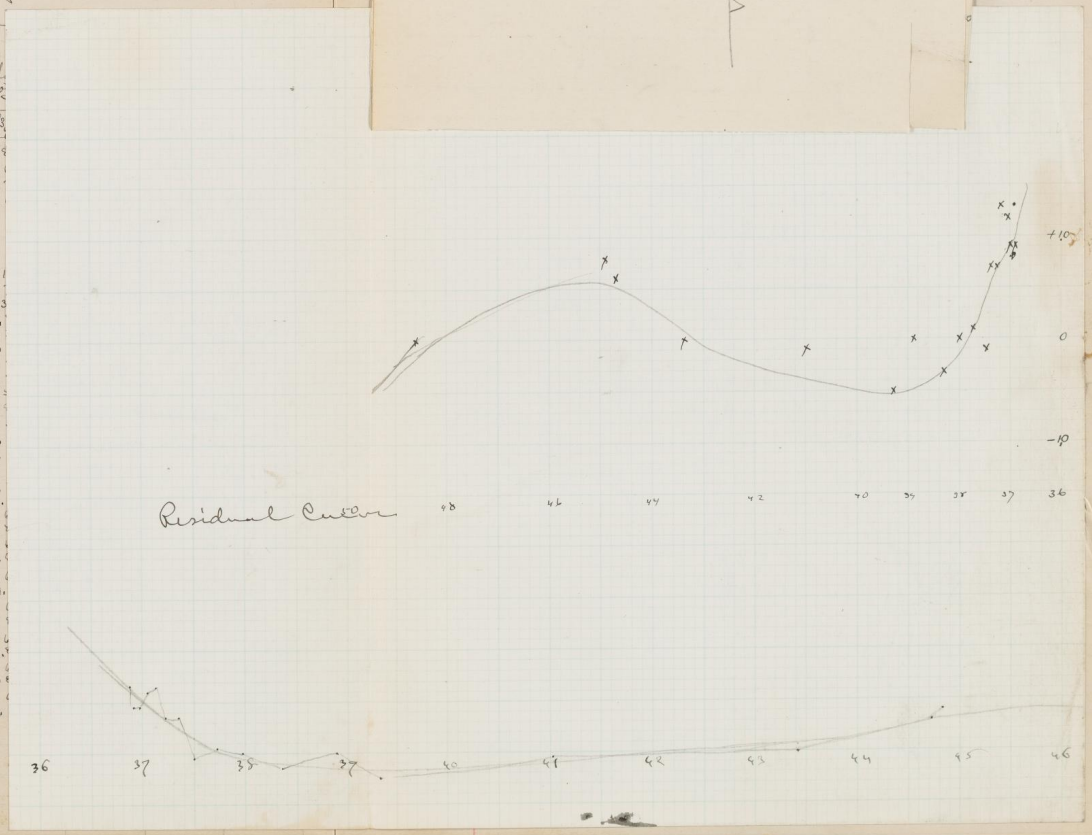
Thursday Nov. 10 1927 checked

Reduction of measures upon C 5016 β Orionis
taken with 1 prism. Dem

		Measures for C 5016 Brok 10 disp. Hγ per 11293	Hδ per 11278	x + C	log x	
		1	x			
f.	H_8	+ 9148	+ 9140	3.960955		
—	—	+ 2851	2867	3.45743		
—	—	+ 2691	2679	3.42797		
G	H_γ	0	0			
		~~5734~~	—	—		
h	H_8	-5734	-5735	3.75853		
H	H_2	- 9516	9511	3.97823		
K	K	10637	10639	4.02690		
—	H_ℓ	12087	12074	4.08185		
β		13932	13919	4.14361		
γ		15265	15262	4.18361		
δ		16291	16271	4.21142		
ε		16892	17065	4.23216		
ζ		17181	17663	4.24707		
η		17680	18150	4.25888		
θ		18169	18533	4.26798		
ι		18582	18858	4.27549		
κ		18893	19142	4.28199		
λ		19166	18386	4.28749		
μ		19374	18577	4.29164		

Sum Comparisons with measures C.S.M. B 10497

2d column of measures work.



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

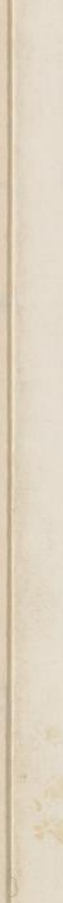
1895phae.proj..924K

$$y = \frac{-2p}{x+c}$$

Nov 10, 1898.

formula

$c + d = 0$





2679446
7
26795 3

~~2671746~~

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$$y = \frac{-2x}{x+c}$$

4861.3
520.8
4340.7

$$y = \frac{-2309\,x}{x - 49\,\text{—}}$$

19577
4966

69237
19577
49662

Residuals for curve

0	0
+1	-2
0	0
-2	-2
0	+1
-2	
0	-1
+1	+3
-1	-1
+3	+1
+2	0
-1	-4
-2	-2 +2
0	-1 0
0	+3 +5
	+2
	-2
	-3
	0

$\frac{29}{15} \pm 0.16$

log c

$\frac{y}{x} =$

$+d = 0$
$+d = 0$
$= 0$

4966.2.

19577
4951
19026.

log d = 3.3

$1 + \frac{c}{x}$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Nov 10. 1898.

Reduction by formula

$$y + \frac{y}{x}c + d = 0$$

Residuals for Curve

		x'	y'
$\#_C$		− 12074	+ 451.6
$\#_B$		+ 9140	− 520.8
		2.65475	2.71667
		8.08185	3.96093
		9.57290	8.75572
	$\frac{y}{x}$ =	− 0.3740	0.5698

Eq. + 451.6 − 0.3740 c + d = 0

− 520.8 − 0.5698 c + d = 0

+ 972.4 + 0.1958 c = 0

c = − 4966.2.

2.98784

9.29181

9.69603n

9.57290n

8.26893

+ 1857.5

+ 451.6

d = − 2309.1

log c

9.69603n

9.75572n

3.45175

+ 2829.8

− 520.8

d = − 2309.0

log d = 3.3

$$y = \frac{-dx}{x+c} = \frac{-d}{1+\frac{c}{x}}$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Nov 10 1898.

Effect of error of Reading.

1st at H_δ

Let $x = +9240$ — 3.96567

-49662 — 3.36342_n

-40422 — 7.32909_n

4.60662_n

2.72247

4340.7

527.8

4868.5⁻

4861.5⁻

7!0 = 100 of reading i.e $\overset{\text{div}}{0}.100$

2nd at H_γ

Let $x = -12174$ — 4.08543_n

-49662 — 3.36342_n

-61836 — 7.44885^-

4.79124

2.65761

4340.7

454.6

3886.1

3889.1

3!0 = 100 of reading i.e $0^{\text{div}}.100$.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Friday Nov. 11, 1898.

Distances of lines from H_γ for ζ Persei.
Measures from C. S. M Book 16 page 182 et seq.

Plate	H_β		F	H_ζ	Sum	Sum of Resid H_β	H_δ	H_ζ
X8228	+ 21319	− 112		− 28198 +4	49517	106	51	91
8230	21486	+ 55	+33	28261 +67	49747	13	13	59
8233	21436	+ 05	−17	28182 −~~8~~ 12	49618	53	37	161
8188	21429	− 02	−24	28149 −48	49575	21	32	57
8234	21509	+ 78	+56	28219 +25	49728	21	33	66
8241	21406	− 25	−47	28155 −~~49~~ 3	49561	16	13	84
	6/2585	6/277 ±46	9/177 ±35	6/1161				
	21431.			28194				
	5/2266			5/963				
	21453			28193				

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday Nov 14 1898.

To find ~~effect of Changes~~ changes in constants for individual plates from those found for mean. Formulae for wave length

$$y' + \frac{y'}{b'} c + d = 0$$
$$y'' + \frac{y''}{b''} c + d = 0$$

$$c = \frac{y'' - y'}{\frac{y'}{x'} - \frac{y''}{b''}} \qquad d = \frac{x'' - x'}{\frac{x'}{y'} - \frac{b''}{y''}}$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Monday Nov. 14 1898

Reduction of Results taken C. S. M. Book 16 pp. 192–204

ζ Puppis.

	X8228	X8230	X8233	X8188	X8235	X8241	Mean
		+43	−178				
	62969	63012	63130	—	—	—	
	—	68237		—	—	—	
	—	68364	68333	—	—	—	
		−169	−56				
Hβ	78681	78514	78564	78571	78491	78594	78569
	0		−30				
	84689	84689	84719	84717	84665	84596	84679
			+9				
	—	84995	84986	85015	84894	84833	
		+110	−126				
	86533	86643	86769	86572	86588	86573	86617
	87933	—	—	—	—	—	
		+16	−21				
	90612	90628	90649	90617	90615	90631	90625
		+114	−100				
	93500	93614	93714	—	93697	93752	
	—	93805	—	93906	—	—	
	0		6				
Hγ	100000	100000	100000	100000	100000	100000	100000
		+28	+21				
	107504	107532	107511	107515	107525	107470	107510
		+5	+65				
Hδ	113441	113446	113381	113402	113445	113414	113422
		+35	+63				
	118316	118351	118288	118326	118372	118351	118334
		+3	+64				
Hε	122232	122235	122151	122153	122235	122170	122196
		+77	+72				
	125567	125644	125572	125529	125483	125545	125558
		+63	+79				
Hζ	128198	128261	128182	128146	128219	128155	128194
		+311	+130				
*	130328	130639	130509	130027	—	130454	
		+52	+5				
Hη	132410	132462	132457	132337	132393	132338	
	—	134147	—	133890	—	—	
		−305					
	—	135449	135754	135427	—	135380	
	—	137556	—	137868	—	138020	

111	55	5
2	78	25
10	10	40
38	14	63
80	0	6
78	32	158
41	5	48
57	28	38
13	3	24
8	10	6
6	22	1
5	15	40
19	24	41
20	23	5
15	17	46
6	16	17
36	39	45
43	39	26
109	42	46
5	54	15
28	75	4 18
4	67	12
48	25	39

* Two, or perhaps three diff. lines seen apparently.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Nov. 18, 1898

Reduction for wave lengths of lines γ & ζ Puppis. as measured on X 8230 (See p 184)

	x'	y'
~~H ζ~~	− 28261	+ 451.6
~~H γ~~		
H β	+ 21486	− 520.8

2.654754 4.451198 = 8.203566 − 0.0159796

2.718667 4.332156 = 8.384515 − 0.0242390

Eq's

+ 457.6 − 0.0159796 c + d = 0

− 520.8 − 0.0242390 c + d = 0

+ 972.4 + 0.0082594 c = 0

2.987844 + 7.916945 = 5.070896 + 8.203566 = 3.274462

2.987845 − 7.916945 = 5.070844 + 8.203566 = 3.274405

c = − 117717 (61)

5.070896 − 8.384515 = 3.455411

2.987844 − 5.070839 − 8.384515 = 3.455354

457.6 + 1881.3 = 2332.9 = d

2653.7 − 520.8 = 2332.9 = d

+ 457.6 + 1881.07 = 2332.7

d = − 2332.6

log d = 3.367884

− 520.8 + 2653.87 = 2332.67

c = − 117732

d = − 2332.9 log d = 3.367896

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Nov 19 1898

Pupin.

y	λ	Resid.
1068.7	5409.4	5409.4
882.0	5282.7	5
857.3	5197.9	
520.8	4861.5	0
348.8	4689.5	
340.8	4681.5	
298.6	4639.3	
201.8	4542.5	
133.8	4474.5	
+129.6	4470.3	
— 0	4340.7	0
−140.3	4200.4	4200.5
239.1	4101.6	−0.2
314.6	4026.1	4226.2
370.6	3970.1	−0.1
417.3	3923.4	3923.5
451.6	3889.1	0
481.7	3859.0	3858.7
504.2	3836.5	+1.0
524.5	3816.2	3814.4
539.9	3800.8	+2.7
564.2	3776.5	+5.7

36988
11732
80744

x+c increasing 15

4.56806
log d 3.36790
7.93596
7.93520

7.93596
4.90711
3,02885

85969

7.86982
4.93434
28.93548

86208

86

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

Friday Nov. 18 1898

Reduc[...]

as measur[...]

	X'
H_ζ	− 28261
H_γ	
H_β	+ 21486

2.654758
4.45118
8.20356
− 0.0159796

Eq's
+ 457.6 +
− 520.8
+ 972.4 +

2.987844
7.916948
5.070896
8.203566
3.274462

2.98784
7.91698
5.07086
5.07084
8.20356
3.27440

5.070896
8.384515
3.455411

2.985
5.070839
8.384515
3.455354

457.6
1881.3
2332.9 = d

2853.7
520.8
2332.9 = a

c = − 117732

2332.8

d = − 2332.9 log d = 3.367896

125264 | 131178 | 136063 | 139967 | 143376 | 145993 | 148371 | 150194 | 151879 | 153181 | 155288

481.8 3858.9

5197.9 4639.2 3858.9

98096 | 96246 | 102421 | 102727 | 104375 | 108360 | 111346 | 111537

Checked.

Saturday Nov 19 1898

ζ Puppis.

y	λ	Resid.	
1068.7	5409.4		~~5409.4~~
882.0	5282.7		
857.3	5198.0		
520.8	4861.5	0	
348.8	4689.5		
340.8	4681.5		
298.6	4639.3		
201.8	4542.5		
133.8	4474.5		
+129.6	4470.3		
0	4340.7	0	
−140.3	4200.4		4200.5
239.1	4101.6	−0.2	
314.6	4026.1		4226.2
370.6	3970.1	−0.1	
417.3	3923.4		3923.5
457.6	3889.1	0	
481.7	3859.0		3858.7
504.2	3836.5	+1.0	
524.5	3816.2		3814.4
539.9	3800.8	+2.7	
564.2	3776.5	+5.7	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Checked

Saturday Nov 19 1898

Reduction of λ 6230 & Preffix.

	Diff from Mean	x+c	log x	log x+c	log x+c	y	λ	Resid.
	+36988			7.93590				
	6304	80729	4.56806	4.90703	3.02887	1068.7	5409.4	5409.4
				7.88976				
	31763	85954	4.50192	4.93427	2.94549	882.0	5282.7	5
				7.86804				
	31636	86081	4.50016	4.93491	2.93309	857.2	5197.9	
				7.69999				
Hβ	21486	86231	4.33215	4.93331	2.71668	520.8	4861.5	0
				7.55285				
	15311	102406	4.18501	5.01033	2.54252	348.8	4689.5	
				7.54408				
	15005	102712	4.17624	5.01162	2.53246	340.8	4681.5	
				7.49355				
	13357	104360	4.12571	5.01853	2.47502	298.6	4639.3	
				7.33967				
	9372	108345	3.97183	5.03480	2.30487	201.8	4542.5	
				7.17307				
	6386	111331	3.80523	5.04661	2.12646	133.8	4474.5	
				7.15988				
	+6195	111522	3.79204	5.04736	2.11252	+129.6	4470.3	
Hγ	0	117717				0	4340.7	0
				7.24475				
	−7532	125249	3.87691	5.09778	2.14697	−140.3	4200.4	4200.5
				7.49643				
Hδ	13446	131163	4.12859	5.11781	2.37862	239.1	4101.6	−0.2
				7.63150				
	18357	136068	4.26366	5.13376	2.49774	314.6	4026.1	4226.2
Hε	22235	139952	4.34704	7.71488	2.56890	370.6	3970.1	−0.1
				5.14598				
	25644	143361	4.40899	7.77683	2.62040	417.3	3923.4	3923.5
				5.15643				
Hζ	28261	145978	4.45119	7.81903	2.65474	451.6	3889.1	0
				5.16429				
	30639	148356	4.48628	7.85412	2.68282	481.7	3859.0	3858.7
				5.17130				
Hη	32462	150179	4.51138	7.87922	2.70261	504.2	3836.5	+1.0
				5.17661				
	34147	151864	4.53335	7.90119	2.71974	524.5	3816.2	3814.4
				5.18145				
Hθ	35449	153166	4.54961	7.91745	2.73229	539.9	3800.8	+2.7
				5.18516				
Hι	−37556	153273	4.57468	7.94252	2.75142	564.2	3776.5	+5.7
				5.19110				

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Saturday Nov. 19, 1898.

Reduction of λ 8230 & Puppis

	x'	y
#6	− 28182 − 21436	+ 451.6
#7	+ 21436 + 28182	− 520.8

2.654754 + 4.331144n = 8.323610n − 0.0210674

2.716671n + 4.449992 = 8.266699n − 0.0184799

+451.6 − 0.0210674 c + d = 0

−520.8 − 0.0184799 c + d = 0

+972.4 + 4125 c = 0

2.654754 + 4.449972n = 8.204782n − 0.0160243

2.716671n + 4.331144 = 8.385527 − 0.0242958

+972.4 + 0.0082718 c = 0

c = − 117567

8272

2.987845
7.917569
5.070276
8.204782
3.275058

5.070276
8.385527
3.455803

2.987845
7.917569
5.070276
8.204782
3.275067

5.070276
8.385527
3.455803

451.6
1883.9
2335.5

2856.4
520.6
2335.8

d = − 2335.6

log d = 3.368398
= 3.368340

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

checked

Saturday Nov. 19. 1898.

Reduction of X8233

	X = Dist. from H_γ	X + C	log X	log x d / log (X+C)	= log x d − log (x+C) / log y	y	λ = 4340.7 + y / λ	
				7.93507				
	+36870	80697	4.56667	4.90686	3.02821	1067.1	5407.8	
	—	—	—					
				7.86901				
	31667	85900	4.50061	4.93399	2.93502	861.0	5201.7	
				7.69954				
H_β	21436	96131	4.33114	4.98286	2.71668	520.8	4861.5	× 0
				7.55255				
	15281	102286	4.18415	5.00982	2.54273	348.9	4689.6	
			7	7.50490	53395			
	15014	102553	4.17650	5.01095	2.49395	311.8	4651.5	
			+17650	7.48999				
	13231	104336	4.+2159	5.01843	2.47156	296.2	4636.9	
	—	—	—					
				7.33926				
	9351	108216	3.97086	5.03429	2.30497	201.8	4542.5	
				7.16677				
	+ 6286	111281	3.79837	5.04642	2.12035	131.9	4472.6	
	—	—	—					
H_γ	0	117567	—				4340.7	× 0
				7.24410			4200.4	
	− 7511	125076	3.87570	5.09718	2.14692	140.3	4480.0	4200.3
				7.49489				
H_δ	13381	130948	4.12649	5.11710	2.37779	238.7	4102.0	+0.2
				7.63056				
	18288	135855	4.26216	5.13308	2.49748	314.4	4026.3	4026.1
				7.71379				
H_ε	22151	139718	4.34539	5.14526	2.56853	370.3	3970.4	+0.2
				7.77617				
	25572	143139	4.40777	5.15576	2.62041	417.3	3923.4	3923.3
				7.81837				
H_ζ	28182	145749	4.44997	5.16361	2.65476	451.6	3889.1	Y 0
				7.85283				
	30509	148076	4.48443	5.17049	2.68234	481.2	3859.5	3859.5
				7.87971				
H_η	32457	150024	4.51131	5.17616	2.70355	505.3	3835.4	−0.1
	—	—	—					
				7.92173				
	35754	153321	4.55333	5.18560	2.73613	544.7	3796.0	−2.1
	—	—	—					

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj.924K

Reduction of x 8228 for wave lengths.
~~Plan~~ page 184

	x' = dist from #1	y'
#6	− 28198	+ 451.6
#β	+ 21319	− 520.8
		972.4
	2.654754	2.716671 n
	4.450218 n	4.328767
	8.204536 n	8.387904 n
	0.0160153	0.0244289
		0.0160153
		0.0084136
	2.987845	
	7.924982	c = − 1155.7
	5.062863	
	845	
	5.062863	451.6
	8.204536	1850.0
	3.267399	2302.6

d = − 2302.6

5.062863		log d = 3.362219
8.387904		= 3.36222
3.450767	2823.4	
	520.8	
	2302.6	

− 28198	4.450228	21349	4.328767
− 1155.75	3.362219	1155.75	3.362219
− 143773	7.812447	94256	7.690986
	5.157677		4.974309
Proof	2.654770		2.716677

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Reduction of λ 8228

checked

	diff fr Hγ	x+c	log x	log x+c	log y	y	λ
				7.93078			
	+37031	78544	4.56856	4.89511	3.03567	1085.6	5426.3
	—	—	—	—	—	—	—
	—	—	—	—	—	—	—
				7.69099	7	520.8	4861.50
Hβ	21319	94256	4.32877	4.97431	2.81668	413.7	4754.4
				7.54723			
	15311	100264	4.18501	5.00115	2.54608	351.6	4692.3
	—	—	—	—	—	—	—
				7.49149			
	13467	102108	4.12927	5.00906	2.48243	303.6	4644.3
				7.44382			
	12067	103508	4.08160	5.01497	2.42885	268.4	4609.1
				7.33479			
	9388	106187	3.97257	5.02607	2.30872	203.5	4544.2
				7.17513			
	6500	109075	3.81291	5.03772	2.13741	+137.2	4477.9
	+ —	—	—	—	—	—	—
Hγ	0	115575	—	—	—	—	—
				7.23751			
	−7504	123079	3.87529	5.09019	2.14732	−140.4	4200.3
				7.49065			
Hδ	13441	129016	4.12843	5.11143	2.37952	239.6	4101.1
				7.62505			
	18316	133891	4.26283	5.12675	2.49830	315.0	4025.7
				7.70920			
Hε	22232	137807	4.34698	5.13927	2.56993	371.5	3969.2
				7.76990			
	25567	141142	4.40768	5.14966	2.62024	417.1	3923.6
				7.81244			
Hζ	28198	143773	4.45022	5.15768	2.65476	451.6	3889.1
				7.84406			
	30328	145903	4.48184	5.16407	2.67999	478.6	3862.1
				7.87290			
Hη	32410	147985	4.51068	5.17022	2.70268	504.3	3836.4
	—	—	—	—	—	—	—
	—	—	—	—	—	—	—
	— —	—	—	—	—	—	—

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Reduction of X 8228

	x Dist fr Hγ	x + c	log x	log d / log (x+c)	log y	y	λ	
+	37031	152606	4.56856	7.90378 / 5.18357	2.72021	525.0	4865.7	
	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	
Hρ	21319	136894	4.32303	7.68525 / 5.13638	2.54887	353.9	4694.6	X
	15311	130886	4.18501	7.54723 / 5.11689	2.43034	269.9	4610.6	
	—	—	—	—	—	—	—	
	13467	129042	4.12933	7.49155 / 5.11973	2.38082	242.0	4582.7	
	12067	127642	4.08160	7.44382 / 5.10599	2.33783	217.6	4558.3	
	9388	124963	3.97257	7.33479 / 5.09678	2.23801	173.0	4513.7	
	6500	122075	3.81291	7.17513 / 5.08663	2.08850	122.6	4463.3	
+	—	—	—	—	—	+ —	—	
Hγ	0	115575	—	—	—	—	4340.7	X
	7504	108071	3.87529	7.23751 / 5.03371	2.20380	159.9	4180.8 / ~~4500.6~~	
Hδ	13441	102134	4.12843	7.49065 / 5.00917	2.48148	303.1	4037.6 / ~~4643.8~~	
	18316	97259	4.26283	7.62505 / 4.98793	2.63712	433.6	3907.1 / ~~4774.3~~	
Hε	22232	93343	4.34698	7.70920 / 4.97001	2.73919	548.5	3792.2 / ~~4889.2~~	
	25567	90008	4.40768	7.76990 / 4.95428	2.81562	654.1	3686.6	
Hζ	28198	87377	4.45022	7.81244 / 4.94140	2.87104	743.1	3587.6	X
	30328	85247	4.48184	7.84406 / 4.93068	2.91338	819.2	3521.5	
Hη	32410	83165	4.51068	7.87290 / 4.91994	2.95296	897.4	3443.3	
	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	
	—	—	—	—	—	—	—	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj.:924K

Reduction of X 8188 for wave lengths
In Jaggs 184

#G	− 28146	+ 451.6
#γ	+ 21429	− 520.8
	2.654754	2.716671 n
	4.449417 n	4.331002
	8.205337 n	8.385669 n
	− 0.0160449	− 0.0243035

Eqs

$$+ 451.6 - 0.0160449\,c + d = 0$$
$$- 520.8 - 0.0243035\,c + d = 0$$
$$+ 972.4 + 0.0082586\,c = 0$$

2.987845 — $c = -117744$
7.916906
5.070939
8.205337
3.276276

451.6
1889.2
2340.8

$d = -2340.8$
$\log d = 3.369364$
$= 3.36936$

5.070939
8.385669
3.456608

2861.6
520.8
2340.8

Prof.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj . 924K

Checked

Reduction of X 8188

Diff. Hr	x	x+C	log x	log x+C	log d	d	λ	
	–							
	–							
	–							
Hβ	21429	96315	4.83100	3.70036 4.98369	2.71667	+520.8	4861.5	0
	15283	102461	4.18421	3.55387 5.01056	2.54301	349.2	4689.9	+.2
	14985	102789	4.17568	3.54505 5.01194	2.53308	341.3	4682.0	+.2
	13428	104316	4.12802	3.49738 5.01835	2.47903	301.3	4642.0	+.2
	–	—	—				—	
	9383	108361	3.97234	3.34170 5.03487	2.30683	202.7	4543.4	+.2
	–		—				—	
	6094	111650	3.78490	3.15426 5.04786	2.10640	127.8	4468.5	+.2
Hγ	0	117744	–	–	–	–	–	0
	7515	125259	3.87593	7.24529 5.09781	2.14748	140.4	4200.3	−.3 −.2 4200.5
Hδ	13402	131146	4.12717	7.49653 5.11775	2.37878	239.2	4101.5	−.3 −0.3
	18326	136070	4.26307	7.63243 5.13376	2.49867	315.2	4025.5	−1 −.2 4025.7
Hε	22153	139897	4.34543	7.71479 5.14581	2.56898	370.6	3970.1	0 −0.1
	25529	143273	4.40703	7.77639 5.15623	2.62016	417.0	3923.7	0 −.1 8928.8
Hζ	28146	145890	4.44942	7.81878 5.16403	2.65475	451.6	3889.1	+.2 0
	30027	147771	4.47751	7.84687 5.16959	2.67728	475.6	3865.1	+.4 3864.7
Hη	32337	150081	4.50970	7.87906 5.17632	2.70274	504.4	3836.3	+.4 +0.8
	33890	151634	4.53007	7.89943 5.18080	2.71863	523.1	3817.6	+.5 +.7 3816.8
Hθ	35427	153171	4.54933	7.91869 5.18518	2.73351	541.4	3799.3	+.6 +.2
Hι	37868	155612	4.57828	7.94764 5.19204	2.75560	569.6	3771.1	+.7 +0.3

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

checked

Reduction of X 8188

Diff. Hγ	x	x+c	log x	log x+c	log y	y	λ
				7.93603			
+	36870	80874	4.56667	4.90781	3.02822	1067.1	5407.8
	−	−	−	−	−	−	−
				7.86997			
	31667	86077	4.50061	4.93489	2.96508	922.7	5263.4
				7.70050			
Hβ	21436	96308	4.33114	4.98366	2.71684	521.0	4861.7
				7.55351			
	15281	102463	4.18415	5.01056	2.54295	349.1	4689.8
				7.54586			
	15014	102730	4.17650	5.01170	2.53416	342.1	4682.8
				7.49029			
	13231	104513	4.12093	5.01917	2.47112	295.9	4636.6
	−	−	−	−	−	−	−
				7.34022			
	9351	108393	3.97086	5.03500	2.30522	201.9	4542.6
				7.16773			
	6286	101458	3.79837	5.00629	2.16144	145.0	4485.7
+	−	−	−	−	− +	−	−
Hγ	0	117744	−	−	−	−	−
				7.24529			
−	7515	125259	3.87593	5.09781	2.14748	140.4	4200.3
				7.49653			
Hδ	13402	131146	4.12717	5.11775	2.37878	239.2	4101.5
				7.63243			
	18326	136070	4.26307	5.13376	2.49867	315.2	4025.5
				7.71479			
Hε	22153	139897	4.34543	5.14581	2.56898	370.6	3970.1
				7.77639			
	25529	143273	4.40703	5.15623	2.62016	417.0	3923.7
				7.81878			
Hζ	28146	145890	4.44942	5.16403	2.65475	451.6	3889.1
				7.84687			
	30027	147771	4.47751	5.16959	2.67728	475.6	3865.1
				7.87906			
Hη	32337	150081	4.50970	5.17632	2.70274	504.4	3836.3
				7.89943			
	33890	151634	4.53007	5.18080	2.71863	523.1	3817.6
				7.91869			
Hθ	35427	153171	4.54933	5.18518	2.73351	541.4	3799.3
				7.94764			
Hι	−37868	155612	4.57828	5.19204	2.75560	569.6	3771.1

4200.5

8928.8

3864.7

3816.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Reduction of D 8234 for wave lengths.
See page 184

	x'	y'
H$_\gamma$	− 28219	+ 451.6
H$_\beta$	+ 21509	− 520.8
	2.654754	2.716671
	4.450542	4.332620
	8.204212 n	8.384051 n
	− 0.0160034	− 0.0242131

Eqs. $+451.6 - 0.0160034\,c + d = 0$
$-520.8 - 0.0242131\,c + d = 0$
$+972.4 + 0.0082097\,c = 0$

2.987845 $\quad c = -118445$
7.914327
5.073518
8.204212
3.277730

451.6
1895.5
2347.1

$d = -2347.1$
$\log d = 3.370532$
$= 3.37053$

5.073518
8.384051
3.457569

2867.9
520.8
2347.1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Reduction of O 8234 for wave lengths.
See page 184

	x'	y'
H$_\gamma$	− 28219	+ 451.6
H$_\beta$	+ 21509	− 520.8
	2.654754	2.716671
	4.450542	4.332620
	8.204212 n	8.384051 n
	− 0.0160034	− 0.0242131

Eqs

$$+451.6 - 0.0160034\,c + d = 0$$
$$-520.8 - 0.0242131\,c + d = 0$$
$$+972.4 + 0.0082097\,c = 0$$

2.987845 $\quad c = -1184.45$
7.914327
5.073518
8.204212
3.277730

451.6
1895.5
2347.1

5.073518
8.384051
3.457569

2867.9
520.8
2347.1

$d = -2347.1$
$\log d = 3.370532$
$= 3.37053$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$ab = cd$

$a : d = c : b$

$d : a+d = c : b+c$

$a+d : a = b+c : b$

$c(a+d) = d(b+c)$

~~$c(a+d) = a(b+c$~~

$b(a+d) = a(b+c)$

~~$y =$~~

$xy - by = ax$

$y = \frac{ax}{x-b}$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$a : d = c : b$

$ad = ab = cd$

$(b+c)(a+d) =$

$ab + bd + ac + cd =$

cd

$x^2 + 15.1x$

$x = 5 + 15.1x$

$x = 5 + 15.1x$

$5 + 9.4y$

$6.4y$

$2.4.9.7$

$1.2.1.7.2$

$44.7.5.4$

$12.5.1.3$

$x^2 + 5x + 9 = 0$

$xy + ay = -4x$

$8.2.2.7.3$

$2.4.9.7$

$1.2.1.7$

$9.4.9.13$

$2.7.2.3$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$$\frac{434.1x + 434.1 \times 154.4 - 210.1x = 434.1 \times 154.4 + 210x}{x + 154.4}$$

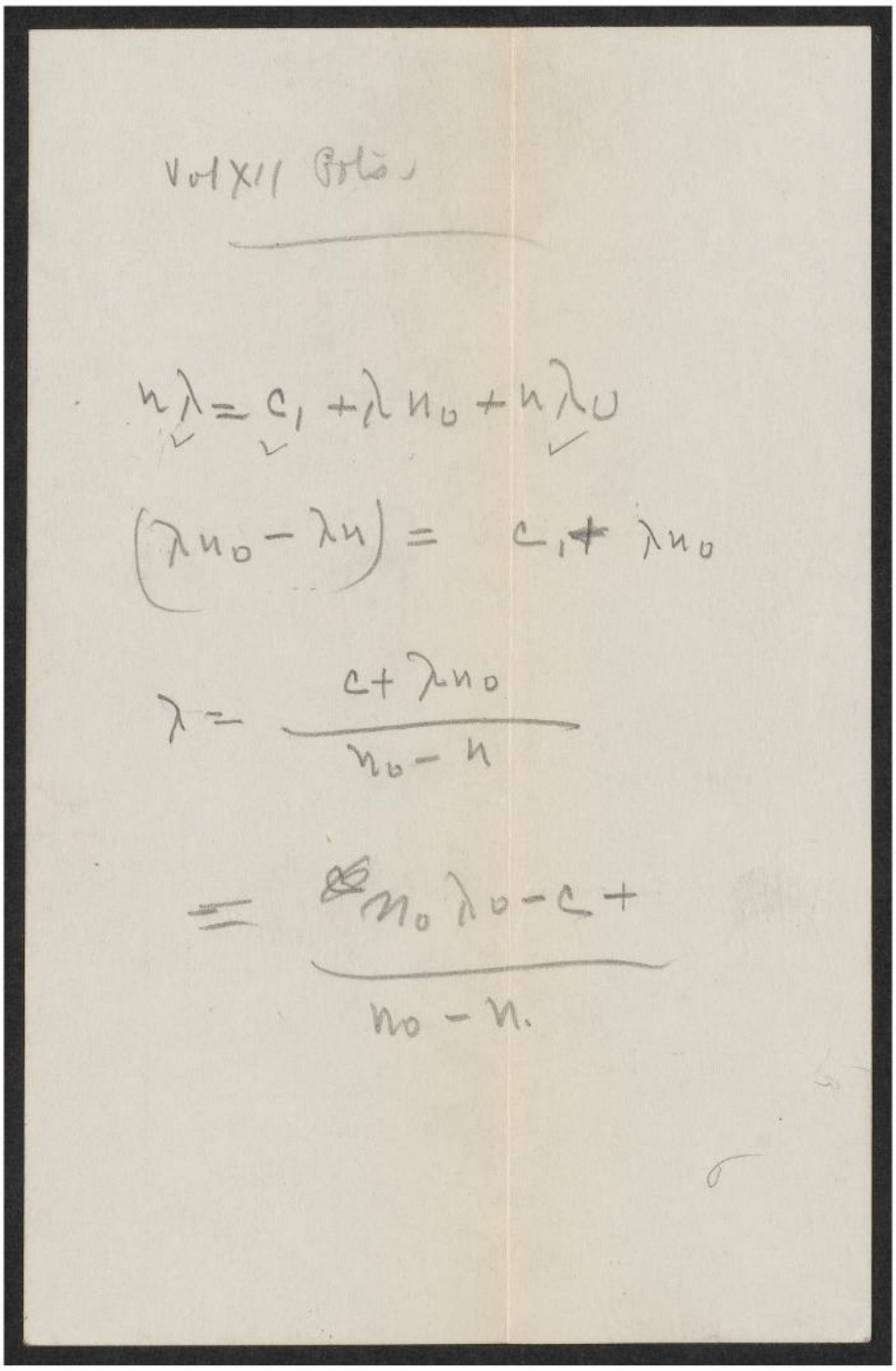
$x = 5 - 61.7$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$xy + ay + bx = 0$

$y(x+a) + bx = 0$

$x + m$

$xy + ay + bx = 0$

Put $x = x' + m$

$yx' + my + ay + bx' + bm = 0$

$m = -a$

$yx' + bx' - ab = 0$

$x' = \frac{ab}{y+b}$

$\frac{11 \times 11\sqrt{2}}{121\sqrt{2}}$

$2\sqrt{2}$

$6 \times 5\sqrt{2}$

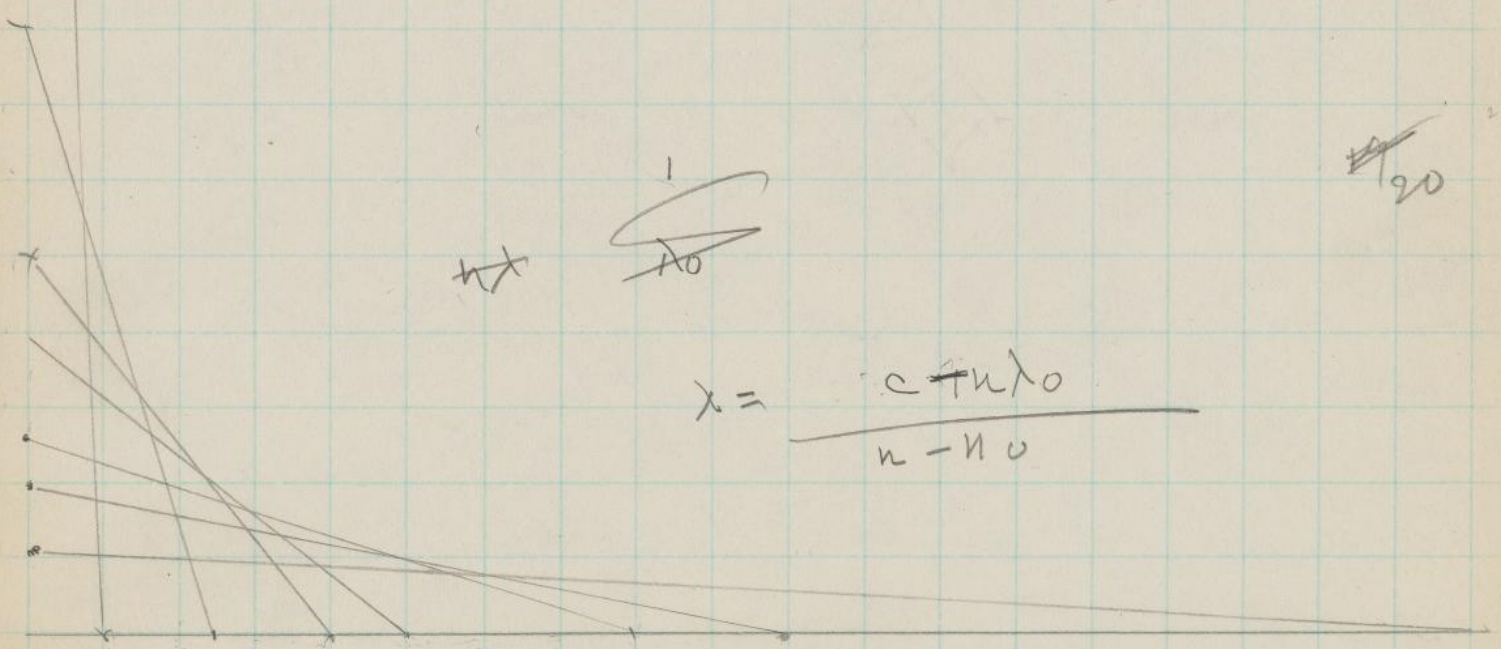
$30\sqrt{2}$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$$\lambda = \lambda_0 + \frac{cd}{x+m}$$

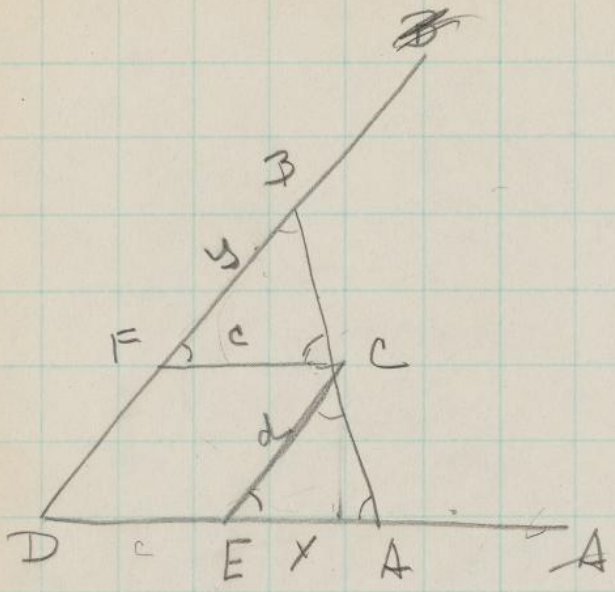
$$n\lambda = c_1 + \lambda n_0 + n\lambda_0$$



$$\lambda = \frac{c + n\lambda_0}{n - n_0}$$

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K



$$y = \frac{cd}{x}$$

$x : d :: c : y$

$xy = cd$

$x = x' - c$

$y = y' - d$

$x'y' - cy' - dx' + cd = cd$

$xy - cy - dx = 0$

x':

$$y = + \frac{dx}{x - c}$$

$\frac{c}{x} = \frac{y}{d}$

$y = \frac{cd}{x}$

$xy = cd$

$x - a$

$x(x-a)$

$xy(x-a) = cd$

$$y = \frac{cd}{x(x-a)}$$

$x - a$

$y - b$

$x^2 - ax - bx + ab = cd$

$xy - ay - bx + ab = M$

$$y = \frac{M - ab + bx}{x - a}$$

$\lambda = \lambda_0 + \frac{cd}{s - s_0}$

$y = \frac{cd}{s - s_0}$

$y^s - y^{s_0} = cd = 0$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Potsdam Vol. XII pto 42 p 22

$$\lambda = 223.5 + \frac{(4.5-1822)}{S+94.913}$$

~~S = 61.692~~

b 1

S = 16.913
94.913
+ 111.826

log = 2.048 54
4.5 1822
2.4696 8

+ 294.9
223.5
518.4

39

$$\lambda - \lambda_0 = -\frac{dx}{x+e}$$

log d = 2,32243

e = +156.4

e = +156.4
x = − 44.8
(x+e) = ~~+121.6~~
111.6

log d = 2,32243
log x = ~~1~~. 6512 n
~~3~~ 9 2 3 7 1 n
~~2.04766~~
log (x+e) ~~2.08493~~
~~2.88878 n~~
2.92605 n

y = ~~7710~~
434.

y = + 84.3
434.4
~~3419.58~~
518.4

b 1

S = 16.913

S_0 = 61.692

$(S - S_0)$ = −44.779 = x

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

			x	y
b_1	16.913	~~5~~18.39	−44.779	+84.32
Δy	61.692	434.07	0	0
H_2	99.186	393.42	+37.494	−40.65

$y = -\frac{dx}{x+c}$ $\quad y + \frac{y}{x}a + b = 0$

$xy + cy = -dx$

$y + \frac{y}{x}c + d = 0$

$-\frac{dx}{x+c}$

$\log y'$	1.92593	1.60906 n
$\log x'$	1.65107 n	1.57396
	0.27486 n	0.03510 n

$+84.33 - 1.883\,c + d = 0$

$-40.65 - 1.084\,c + d = 0$

$+124.97 - 0.799\,c = 0$

2.09680

9.90255

2.19425

~~c = 15.67~~

c = +156.4

$\log c$	2.19425	2.19425
	0.27485 n	0.03503 n
	2.46910 n	2.22928 n
	−294.5	−169.5
	+84.32	−40.65
	−~~54.67~~	57.60
	−294.5	−169.5
	+84.3	−40.6
	−210.2	1:210.1

$\log d =$

$\log 210.1 = 2.32243$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$xy = cd$

$y = \dfrac{cd}{x}$

$y = \lambda' + \dfrac{cd}{x+g}$

$y = \dfrac{cd}{x+a}$

y

$y = \lambda_0 + \dfrac{c}{x+a}$

$y'x' + ay - c = 0$

$y' = \lambda_0 + \dfrac{c}{x'+a}$

$y'' = \lambda_0 + \dfrac{c}{x''+a}$

$y'' - y' = c\left(\dfrac{1}{x''+a} - \dfrac{1}{x'+a}\right) = c\,\dfrac{x'+a-x''-a}{x'x''+a(x'+x'')+a^2}$

$= c\,\dfrac{x'-x''}{x'x''+ax'.}$

$x'x'' + a(x'+x'') + a^2 = c\,\dfrac{x'-x''}{y''-y'}$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$\lambda_o = 4340.7$

~~$c = 111$~~

$c = -117301$

$d = -2333.1$

4340.7
~~20~~
210.

~~43~~
43404 7
− 2332 1
~~6933 6~~
2007.6

4340.7
2333.1
2007.6

log c 5.069130
log d 3.367933
8.437 23

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

$$\lambda_{\pi} = 223.5 + \frac{[4.518\,22]}{s + 94.913} = 223.5 + \frac{32978}{s + 94.913}$$

$$\lambda = 434.1 - \frac{[2.32243]\,x}{x + 156.4} = 434.1 - \frac{210.1\,x}{x + 156.4}$$

434.1 − 223.5 = 210.6 → d

156.4 − 94.9 = 61.5 → s_0

λ_0 d

434.1 − 210.6 = 223.5

c s_0

156.4 − 61.5 = 94.9

210.1 × 156.4 = 32859

d c

$$\lambda_{\pi} = \lambda_0 - d \mp \frac{cd}{s + (c - s_0)}$$

$$= \frac{\lambda_0 s + \lambda_0 c - \lambda_0 s_0 - cd}{s + c - s_0}$$

$s - s_0 + c$

$s + 94.9 =$

s_0 61.5

156.3 + 61.5 =

156.3 − s_0

(c)

λ

94.9 61.7

61.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

checked

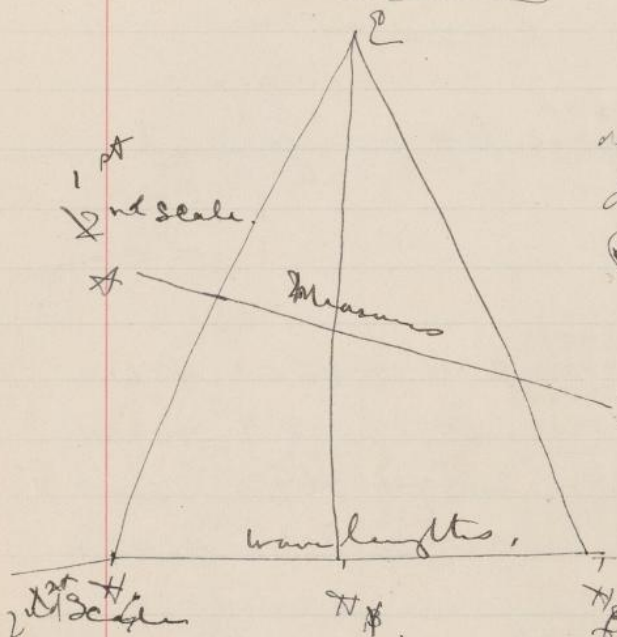
Reduction of X 6241

	dist from Hγ	x+c	log x	log x+c	log y	y	λ		
	+	−	−	−					
	−	−	−	−					
	−	−	−	−					
				7.69847					
Hβ	21406	95895	4.33054	4.98220	2.71627	520.3	4861.0		0
				7.55555					
	15404	101897	4.18762	5.00816	2.54739	352.7	4693.4		
				7.55656					
	15167	102134	4.18090	5.00917	2.56739	369.3	4710.0		
				7.49590					346.5
	13427	103874	4.12797	5.01630	2.47960	301.7	4642.4		
	−	−	−	−					
				7.33962					
	9369	107932	3.97169	5.03315	2.30647	202.6	4543.3		
				7.16367					
	6248	111053	3.79574	5.04552	2.11815	131.2	4471.9		
	+	−	−	−					
Hγ	0	117301	−	−					0
				7.24125					
	7470	124771	3.87332	5.09611	2.14514	139.7	4201.0		4201.2
				7.49549					
Hδ	13414	130715	4.12756	5.11633	2.37916	239.3	4141.5		
				7.63159					
	18351	135652	4.26366	5.13243	2.49916	315.6	4025.1		4025.5
				7.71370					
Hε	22170	139471	4.34577	5.14448	2.56922	370.9	3969.8		
				7.77523					
	25545	142846	4.40730	5.15487	2.62036	417.2	3923.5		3923.6
				7.81749					
Hζ	28155	145456	4.44956	5.16278	2.65476	451.6	3889.1		
				7.85158					
	30454	147755	4.48365	5.16954	2.68204	480.9	3859.8		3859.3
				7.88764					
Hη	32338	149639	4.50971	5.17504	2.71260	514.9	3824.8		+1.0
	−	−	−	−					
				7.91669					
Hθ	35380	152681	4.54876	5.18379	2.73290	540.6	3800.1		+2.0
				7.94794					
Hι	38020	155321	4.58001	5.19123	2.75671	571.1	3769.6		−1.2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Friday Dec 2 1898



An apparatus for reading off wave lengths directly has continued this P.M. It consists of a board on which is fixed rigidly a m.m rule B C. D. This is on metric length. The points ~~of~~ ~~H~~ ~~H~~ ~~H~~ ~~H~~ ~~H~~ ~~H~~ H are graduated so that points H, H H H read 3889.1, 4340.7 & 4861.5 respectively. Threads are stretched from these points to 2, passing over the same edge of a pin to insure their meeting in the same point. The rule A B having had the graduation changed to correspond to the measures on p. 184, & having the measures for H H H H marked on it, is shifted until these points lie under the proper lines. It is then fastened in position. We make the readings by drawing taut a thread from 2 & passing over the two rules. Having brought the thread to the proper reading on A B, the wave length is given directly on C D.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj_924k

Friday Dec 2 1898

Wave lengths of lines in Spectrum of ζ Puppis as read from photographic plate.

X8230	X8230 Repeated	
5410.0		
~~5400~~	5411.5	5407.0
5199.0	5203.5	
5195.0	5196.0	
Hβ		
4689.0	4688.0 9.0	
4681.0	4681.0	
4638.5	4638.0	
4542.0	4541.0	
4474.0	4474.0	
4470.0	4470.0	
Hγ		
4200.5	4200.5	
4101.5	4101.5	
4027.0	4026.5	
3970.5	3970.0	
3923.8	3924.0	
Hδ		
3858.0	3859.5	
3837.0	3836.5	
3816.5	3816.0	
3802.2	3800.5	
3778.5	3777.5	

The readings begun Hβ & Hδ were very difficult to make as another plate had to be used to extend the scale; the range being over 1 metre.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Saturday Dec 3 1898

Constants for Photographing of G Puffin
on normal scale X 6257. Means C.SM B16 p176
1 m.m will be just equal 1 λ.

	X′	G′	127.0
# G	− 13,236 = 0".5575	+ 457,6 ÷ 5	÷ 25.4 = 3".5559
		− 520.8	
# B	+ 10,096 = 0".4207	− 520.8 ÷ 5	÷ 25.4 = 4".1008

2.654754	2.716671 n	2.654754
1,121757 n	1.004149	2,103804
1.532997 n	1.712522 n	0.550950
1.380211	1.380211	3.5559
2.913208 n	3.092733 n	2.716671
2.103804	2.103804	2.103804
~~818,857~~	~~+238,034~~	0.612867
~~5.017012~~		
0.809404 n	0.988929 n	4.1008

Eqs

+ 457.6 − ~~818.857~~ 6,497 c + d = 0 − 6.44769 c + d = 0

− 520.8 − ~~+238.034~~ c + d = 0 − 9.74830 c + d = 0

+ 972.4 + 419,177 c = 0 + 3.300 61 c = 0

2.987845
2.103804
0.884041
0.518594
0.365447 n
0.809404 n
1.174851 #

c = 2".3198

+ 3.5559
+ 14,9572
18.5131

log c

d = − 18".5131

log d = 1.267479

0.865447 n
0.988929 n
1.354376

+ 22.6139
4.1008
18,5131

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae..proj...924K

Monday Dec 5 1898.

$c = 2.3198$

$d = 18.5131$

$\log c \quad 0.365447$

$\log c^2 \quad 0.730894$

$\log (d^2+f^2) \quad 2.746362$

3.477256

$\log (c^2+f^2) \quad 2.343008$

$2 \;|\; 1.134248$

$\log b \quad 0.567124$

$b =$

$f = 14.66$

$f^2 = +214.916$

$c^2 = 5.38139$

$\log d = 1.267479$

2.534958

$d^2 = 342.735$

$d^2+f^2 = 557.651$

$c^2+f^2 = 220.297$

This will give imaginary results.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Tuesday Dec 6 1898.

Re-computation of Constants from page 174 using focus = 6.8

$c = +7.657$ $\quad f = 6.8$

$d = +18.438$ $\quad f^2 = 46.24$

$\log c^2 = 0.884059$ $\quad c^2 = 58.630$

$\log c^2 \quad 1.768118$ $\quad c^2 + F^2 = 104.870$

$\log (d^2+f^2) \; 2.586812$

4.354930

$\log (c^2+F^2) \; 2.020651$

$2 \;|\; 2.334279$

$\log b \quad 1.167140$

$\log d = 1.265714$

$2,531428$

$d^2 = 339.960$

$d^2 + f^2 \; 386.200$

$b = 14.694$

$c = 7.657$

$b+c = 22.351$

$\log (b+c) \quad 1.349297$

2

2.698594

$\log F. \quad 0.832509$

$3,531103$

$\log bc \quad 2.051199$

$\log D \quad 1.479904$

$D = 30.1929$

$\log b \quad 1.167140$

$\log c \quad 0.884059$

$\log bc = 2051199$

$\log (b+c) \quad 1.349297$

$\log f \quad 0.832509$

$2,181806$

$\log b \quad 1.167140$

1.014666

$f = 10.3435$

$D - f = 19.8494$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Dec 6, 1898.

log f. = 0.832509
log b = 1.167140
log Co A 9.665369

A = +62°.4

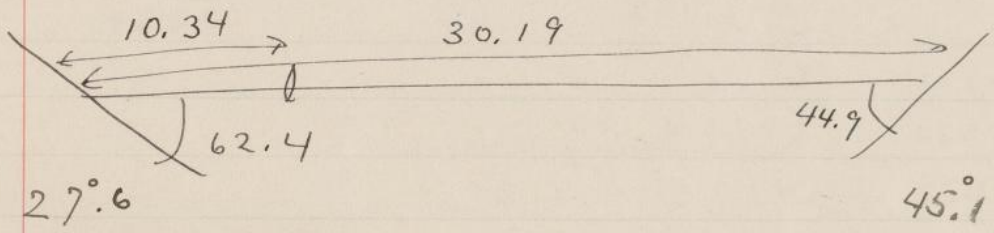
log f b = 1.999649
log cd = 2.149773
log Co B 9.849876

log c = 0.884059
log d = 1.265714
log cd 2.149773

B = + 44.9 ~~45.1~~

tan A 0.282299
1.014666
1.296965

tan B 9.999218
1.297748
1.296966



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Tuesday Dec 6 1898

Rough computation to see if by two inclined enlargements we can ~~transform~~ use Ross Lens in transforming G Puffins & normal scale from Y 6257

	x'	(y')	y'	Enl
H_γ	− 0.″55	+ 1.36	+ 3.56	6.47
H_β	+ 0.42	− 1.36	− 4.10	9.76
Total	0.97		7.66	7.90

1st Enl = $\sqrt{7.90}$ = 2.81 of ~~Dist from H_γ~~ H_β + H_γ equally dist from H_γ

2.81
.97
1967
2529
2.7257
1.36

log 1.36 = 0.1335 log −.136 = 0.1335 n
log −.55 9.7404 n 9.6232
0.3931 0.5103

2.472 3.239

Eqs

+1.36 − 2.472 c + d = 0
−1.36 − 3.239 c + d = 0
+2.72 + 0.767 c = 0

0.4346
9.8848
0.5498
0.3931
0.9429

0.5498
0.5103
1.0611

c = − 3.547

1.36
8.768
10.13

d = −10.14

11.51
1.36
10.15

Constants are too small to give required results

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Dec 6 1894

2nd plane.

1st Ent. = 7.66 = length. Hβ Hγ equally distant

Hγ.	x'	(x'')
Hδ	− 0.55 −	3,83
Hβ	+ 042	3,83

0.5832	0.5832
9.7404	9.6232
0.8428	0.9600
6.963	9.120

$$C = -\frac{7.66}{2.157}$$

0.8842
0.3339
0.5503
0.8428
1,3931

3,83
24.72
28.55

0.5503
0.9600
1,5103

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday Dec 7 1898

On opposite page are compiled results from reading pages 184–197.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Wednesday, Dec 7. 1898.

3741.9

Wavelengths E Puppis Sa Jago 1884-97

X8230	X8233	X8228	X8188	X8234	X8241
5409.4	5407.8	5426.3			
5202.7					
5197.9	5201.7				
4861.5	4861.5	4861.5	4861.5	4861.5	4861.5
4689.5	4689.6	4692.3	4689.9	4689.8	4693.4
4681.5	4682.6		4682.0	4683.8	~~4710.0~~
4639.3	4636.9	4644.2	4642.0	4640.4	4642.4
—	—	4609.1	—		
4542.5	4542.5	4544.2	4543.4	4542.7	4543.3
4474.5	4472.6	4477.9	4468.5	4477.5	4471.9
4470.3	—	—			
4340.7	4340.7	4340.7	4340.7	4340.7	4340.7
4200.4	4200.4	4200.3	4200.3	4200.5	4201.0
4101.6	4102.0	4101.1	4101.5	4101.5	4101.5
4026.1	4026.3	4025.7	4025.5	4024.8	4025.1
3970.1	3970.4	3969.2	3970.1	3969.7	3969.8
3923.4	3923.4	3923.6	3923.7	3925.1	3923.5
3889.1	3889.1	3889.1	3889.1	3889.1	3889.1
3859.0	3859.5	3862.1	3865.1		3859.8
3836.5	3835.4	3836.4	3836.3	3836.7	3824.8
3816.2	—		3817.6		
3800.8	3796.0		3799.3		3800.1
3776.5			3771.1		3769.6

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Friday Dec 9 1898

Reduction of Readings of page 184 by method of page 198

X8230 X8226

Result	1st scale	2nd scale	Result				
	629.8	5411	+1.6		629.5	5428	+0.8
630.1	630.3	5409	5411.0	629.7	629.9	5426	5428.2
	682.3	5202	+1.1				
682.4	682.6	5201	5203.2	—			
	683.1	5199	+1.1				
683.6	683.7	5197	5198.8	—			
	784.9	4861	+0.5		786.5	4861	+0.2
785.1	785.6	4859	4862.0	786.8	787.2	4859	4861.7
	843.8	4692	+0.1		846.3	4692	+0.3
846.9	847.2	4687	4689.4	846.9	847.2	4690	4692.2
	849.6	4681	+0.1				
850.0	850.3	4679	4681.4	—			
	866.3	4638	0		865.2	4643	+0.8
866.4	866.7	4637	4639.3	865.3	865.7	4642	4644.3
					879.2	4608	+0.2
—			—	879.3	879.7	4607	4609.3
	906.1	4541	-0.1		905.7	4544	0
906.3	906.6	4540	4542.2	906.1	906.4	4542	4544.5
	935.7	4476	-0.2		934.8	4479	0
936.1	936.4	4474	4476.5	935.0	935.1	4478	4478.3
	937.8	4471	-0.2				
938.0	938.6	4469	4470.5	—			
	999.4	4342	-0.3		999.3	4342	-0.3
1000.0	1000.3	4340	4340.4	1000.0	1000.4	4340	4340.4
	1074.9	4202	-0.2		1074.9	4201	-0.5
1075.3	1075.4	4201	4200.8	1075.0	1075.4	4200	4200.4
	1134.2	4103	+0.1		1134.1	4102	-0.7
1134.5	1134.7	4102	4101.9	1134.4	1134.9	4101	4101.1
	1182.8	4028	0		1182.9	4027	-0.8
1183.5	1183.9	4026	4026.1	1183.2	1183.6	4026	4026.6
	1222.2	3971	0		1221.8	3971	+0.6
1222.4	1223.0	3970	3970.2	1222.3	1222.4	3970	3969.6
	1256.1	3925	+0.1		1255.5	3925	-0.2
1256.4	1256.8	3924	3923.9	1255.7	1256.1	3924	+0.3
	1281.9	3891	+0.3		1281.4	3891	3924.0
1282.6	1283.6	3889	3889.4	1282.0	1283.0	3889	+0.3
	1305.8	3861	+0.8		1302.7	3864	3889.4
1306.4	1306.6	3860	3859.5	1303.3	1303.4	3863	+0.8
	1324.3	3838	+1.5		1323.9	3838	3862.4
1324.6	1325.2	3837	3837.0	1324.1	1324.2	3837	+1.6
	1341.0	3818	+2.0				3837.1
1341.5	1341.9	3817	3816.7	—			
	1353.8	3803	+3.2				
1354.5	1355.2	3801	3801.3	—			
	1375.4	3778	+5.2				
1375.6	1376.1	3777	3777.0	—			

Qo +0.5
-0.3
+1.3
.0.3
.0.1
0.0
0.3
0.8

Kuj made readings on 2nd grade. Result read 1st scale. Readings were made to nearest tenth. The result is obtained by interpolation. I is corrected for errors of scale. See pages 211 217

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj. .924K

Friday Dec 9 1894

Same as last.

	×8233 1st scale	×8233 2nd scale			×8188		
	630.9	5410	+0.8				
631.3	631.7	5408	5410.2	—			
—				—			
	683.1	5202	+0.6				
683.3	683.4	5201	5202.8	—			
	785.4	4861	+0.4		785.5	4861	+0.5
785.6	786.0	4859	4861.9	785.7	786.2	4859	4862.0
	846.9	4689	+0.3		846.9	4687	+0.4
847.2	847.7	4687	4689.7	847.2	847.3	4688	4690.0
	849.5	4682	+0.3		849.6	4682	+0.4
849.9	850.3	4680	4682.5	850.2	850.4	4680	4682.3
	867.5	4636	+0.2		865.4	4641	+0.3
867.7	867.8	4635	4636.8	865.7	865.9	4640	4642.0
—				—			
	906.84	4541	+0.2		5057	4543	+0.2
906.5	906.9	4540	4542.4	906.2	906.3	4542	4543.8
	936.3	4476	+0.2				
937.1	937.2	4473	4473.2	—			
—					938.6	4470	+0.1
				939.1	939.2	4469	4469.2
	999.6	4342	+0.2		999.5	4342	0
1000.0	1000.6	4340	4340.9	1000.0	1000.5	4340	4340.7
	1075.0	4201	+0.2		1075.0	4201	+0.1
1075.1	1075.7	4200	4200.5	1075.2	1075.6	4200	4200.3
	1133.5	4103	+0.3		1133.7	4103	+0.2
1133.8	1134.2	4102	4102.1	1134.0	1134.9	4101	4102.0
	1182.3	4028	+0.3		1182.0	4027	+0.2
1182.9	1183.7	4026	4026.5	1183.3	1183.6	4026	4026.0
	1221.1	3972	+0.3		1220.8	3972	+0.2
1221.5	1222.0	3970	3970.5	1221.5	1222.2	3970	3970.4
	1255.2	3925	+0.2		1255.1	3925	+0.3
1255.7	1256.0	3924	3923.7	1255.3	1255.8	3924	3924.0
	1281.0	3891	+0.1		1281.0	3891	+0.5
1281.8	1282.6	3889	3889.2	1281.5	1282.6	3889	3889.6
	1304.7	3861	0		1300.0	3867	+1.2
1305.1	1305.9	3860	3859.6	1300.3	1300.6	3866	3865.8
	1323.9	3837	0		1323.3	3838	+1.7
1324.6	1324.8	3836	3835.5	1323.4	1324.0	3837	3837.2
					1336.1	3820	+1.7
				1338.9	1339.0	3819	3818.4
	1357.2	3797	-2.1		1353.9	3801	+1.3
1357.5	1358.1	3796	3796.0	1354.3	1354.7	3800	3799.8
—					1376.3	3773	+0.9
				1378.7	1379.0	3772	3771.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday Dec. 10, 1898.

× 8234 × 8241

—				—			
—				—			
—				—			
	784.7	4861	+0.4		785.7	4861	+0.5
784.9	785.3	4859	4861.9	785.9	786.4	4859	4862.0
	846.4	4689	+0.3		845.7	4693	+0.5
846.6	846.8	4688	4690.0	846.0	846.3	4691	4693.5
	848.7	4683	684.0 +0.3		848.2	4686	+0.5
848.9	849.1	4682	4840.0	848.3	848.7	4685	4687.3
	865.8	4639	+0.3		865.3	4642	+0.5
865.9	866.3	4638	4640.3	865.7	865.8	4641	4642.7
—				—			
	905.9	4542	+0.3		906.0	4543	+0.5
906.2	906.3	4541	4542.8	906.3	906.9	4541	4543.9
	936.8	4474	+0.3		937.1	4474	+0.5
937.0	937.7	4472	4473.6	937.5	938.0	4472	4473.1
—				—			
	999.6	4342	+0.3		999.7	4342	+0.5
1000.0	1000.7	4340	4341.0	1000.0	1000.8	4340	4341.2
	1074.7	4202	+0.3		1074.6	4202	+0.4
1075.2	1075.3	4201	4200.8	1074.7	1075.2	4201	4201.4
	1134.2	4103	+0.3		1133.5	4103	+0.3
1134.4	1134.7	4102	4102.1	1134.1	1134.9	4101	4102.1
	1183.4	4027	−0.1		1183.2	4027	+0.2
1183.7	1184.0	4026	4025.9	1183.5	1184.3	4025	4025.9
	1222.1	3972	−0.2		1221.2	3972	+0.3
1222.4	1222.9	3970	3970.0	1221.7	1222.3	3970	3970.5
	1254.3	3927	+0.2		1255.3	3925	+0.4
1254.8	1255.1	3926	3925.7	1255.4	1256.0	3924	3924.2
	1281.7	3891	+0.5		1281.1	3891	+0.5
1282.2	1283.1	3889	3889.6	1281.6	1282.6	3889	3889.6
—				1304.5	1304.0	3862	+1.0
					1304.7	3861	3860.6
	1323.8	3838	+1.7		1323.2	3838	+1.6
1323.9	1324.7	3837	3837.2	1323.4	1324.0	3837	3837.1
—				—			
					1353.3	3802	+2.6
—				1353.8	1354.2	3801	3800.7
					1380.1	3771	−0.6
—				1380.2	1381.1	3770	3770.2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

This work superseded by later curves with results from Yerkes & Potsdam Refsmus
Apr 21 1899

Monday Dec 12 1898.

Plates 208-10. Corrected by residual

X8230	X8233	X8228	X8188	X8234	X8241
5409.4	5409.4	5427.5			
5202.1	5202.2				
5197.7					
(4861.5	4861.5	4861.5	4861.5	4861.5	4861.5
4689.3	4689.4	4689.9 (92.1²)	4689.6	4689.7	4693.0
4681.3	4682.2	—	4681.9	4683.7	4686.8
4639.3	4636.6	4644.2³	4641.9	4640.0	4642.5
—		4609.5⁶			
4542.3	4542.2	4544.5	4543.6	4542.5	4543.4
4475.1	4473.0⁴	4478.8⁴	4469.1	4473.3	4472.6
4470.7	—	—			
(4340.7	4340.7	4340.7	4340.7	4340.7	4340.7
4201.8⁰	4200.3	4200.9	4200.3²	4200.5	4201.0
(4101.8	4101.8	4101.8	4101.8	4101.8	4101.8
4026.1	4026.2	4026.7	4025.8	4026.0	4025.7
(3970.2	3970.2	3970.2	3970.2	3970.2	3970.2
3923.8	3923.5	3924.2	3923.7	3925.5	3923.8
(3889.1	3889.1	3889.1	3889.1	3889.1	3889.1
3858.7	3859.6	3861.6	3864.6		3859.6
(3836.5	3835.5	3835.5	3835.5	3835.5	3835.5
3814.7	⁰		3816.7		
(3798.1	3798.1		3798.1		3798.1
(3770.8			3770.8		3770.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj .924K

Wednesday Dec 14 1898

For det. Constants for Cuilt's Normal Scale
[illegible] $1^{mm} = 5^{A}$ of prismatic spectrum is enlarged
so that $H_\beta - H_\gamma$ coincides with Corresponding lines in Normal Spectrum.
Computed for β Orionis. See page 167

	x'	y'
H_γ	−1.829	+3.556
H_β	+1.393	−4.101
	3.222	7.657

0.88406
0.50813
0.37593

0.26221
0.37593
9.88628
0.63814
1.26071
1.89885

0.14395
0.37593
9.76802
0.51988
1.26071
1.77059

	x'	y'	
H_γ	−4.3465	+3.556	3.556 / +79.223 / 82.779
H_β	+3.3104	−4.101	

0.55096
0.63814
9.91282
1.26071
1.17353

0.61289
0.51988
0.09301
1.26071
1.35372

60.3[illegible]

3.556 — 3.556
14.912 — 14.890
18.468 — 18.446

Eqs

+3.556 = 0.81812 c + d = 0
−4.101 = 1.23883 c + d = 0
+7.657 = 0.42071 c = 0

0.88406
9.62335
1.26071
1.26008

c = −18.200

22.580 — 22.547
4.101 — 4.109
18.479 — 18.446

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Wednesday Dec 14 1898

Work on Juno's Orbit Continued

c = 18.200
d = 18.446
f = 6.8
f² = 46.24

log c 1.26008
log c² 2.52016
log (d²f²) 2.58713
5.80730
log (c²f²) 2.57691
log b 2.43039
log b 1.21520

c² 331.25
c²+f² 377.49
log d 1.26590
log d² 2.53180
d² 340.25
d²+f² 386.49

b = 16.443 18.416
c = 18.200 18.200
b+c = 34.643 36.616
log b+c 1.53924 1.56367
3.07848
log f 0.83257 0.83251
3.91099
log c 2.52528 2.52528
log D 1.43571 1.43457

log b 1.21520 1.26520
log c 1.26008 1.26008
log c 2.47528 2.52528

D 27.20

log (b+c) 1.53924 1.56367
log f 0.83257 0.83251
2.39618
log b 1.21520 1.26520
1.13098
log d

f = 4.34 13.52
D-f = 2.93 13.68

log f. 0.83251
log b 1.21520
log Cos A 9.67731
log fb 2.04771
log cd 2.52598
log Cos B 9.51173

A = 62° 18.00
65° 31.50
68° 19.88

log c = 1.26008
log d 1.26590
2.52598

B = 68° 5.9
70° 34.94

0.40087
1.13098
1.53185

Tan A 0.34180
log f 0.83251
1.17431

40087
0.27968
0.83251
1.11234

Tan B 0.45284 0.39574
log (D-f) 1.11160 1.13609
1.56444 1.53183

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Thursday Dec 15 1898

Measures for Paper Print of D 6154 ^{2} β Orionis
a normal scale 1mm = 5λ

Dist.	C m			Mean	Diff for 1hr	λ	Print Plate	Final λ	λ
	~~43.38~~ ~~42.17~~	11.63	42.90	11.66	11.645	+582.2	4922.9	+.5	4922.4	4
H3	42.17	10.42	~~41.67~~	10.43	10.425	521.2	4861.9	+.4 +.6 +3.1	4861.3	4
	39.25	7.50	38.75	7.51	7.505	375.2	4715.9	+.6	4715.1	4
	36.65	4.90	36.15	4.91	4.905	245.2	4585.9	+.8	4585.1	2
	34.58	2.83	34.08	2.84	2.835	141.8	4482.5	+1.1 +.8	4481.7	44
	34.38	2.63	33.87	2.63	2.630	131.5	4472.2	+.4 +.2 +.7	4471.5	44
	32.70	0.95	32.20	0.96	0.955	+47.8	4388.5	+.3	4388.2	43
Hγ	31.75	0.00	31.24 (29.78)	0.00	0.000	−00.0	4340.7	+.1 −0.2	4340.6	43
	30.27	1.48	~~29.08~~	1.46	1.470	−73.5	4267.2	−.4	4267.6	42
	27.78	3.97	27.29	2.95	3.960	198.0	4142.7	−1.0	4143.7 ~~4153.7~~	41 ~~41~~
Hδ	26.94	4.81	26.44	4.80	4.805	240.2	4106.8	+1.3 −1.7	4101.8	41
	25.43	6.32	24.92	6.32	6.320	316.0	4024.7	−1.7 −2.3	4026.4	40
	24.29	7.46	23.79	7.45	~~6.45.5~~	372.8 ~~322.8~~	3967.9 4017.9	−2.0	3969.9	39
	24.27	7.48	23.76	7.48	7.480	374.0	3966.7	−1.9 −2.0	3968.7	39
	24.19	7.56	23.68	7.56	7.560	378.0	3962.7	1.9 −2.1	3964.8	39
	23.57	8.18	23.06	8.18	8.180	409.0	3931.7	−2.2	3933.9	39
	22.67	9.08	22.17	9.07	9.075	453.8	3886.9	−2.2 −2.3	3889.2	38
	21.60	10.15	21.09	10.15	10.150	~~507.5~~	3833.2	−2.4	3835.6	38

Av of Dev in Red. = ±1.4

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj...924K

Thursday Dec 15 1898

Residual Curve &c.

	λ for Anvil V (IV)				
22.4	4925.7	-3.3			
61.3	4861.5	-0.2		4860.5	-1.0
15.1	4712.8	+2.3		4714.7	+1.9
85.1	?			4585.1	—
81.7	4481.4	+0.3	4482.3	+0.9	4482.0 +.6
71.5	4471.8	-0.3	4472.0	+0.2	4471.8 0
88.2	4387.8	+0.4			4388.4 +6
40.6	4340.7	-0.1			4340.7 0
67.6	4267.4	+0.2			4267.4 0
43.7	4144.X ?	-0.3			4143.3 -7
53.7	4154.7	+1.0			
01.8	4101.Y	0			4101.3 -.5
26.4	4026.4	0			4025.7 -.8
69.9	3970.2	-0.2			3969.1 -1.1
68.7	3968.6	+0.1			3967.9 -.7
2.48	3964.6	+0.2			3963.9 -.7
33.9	3933.8	+0.1			3933.0 -.8
89.2	3889.1	+0.1			3888.4 -.7
35.6	3835.5	+0.1			

15 | 5.5 | .4

Av. Resid.

When resid is taken from Red curve.

Resid.

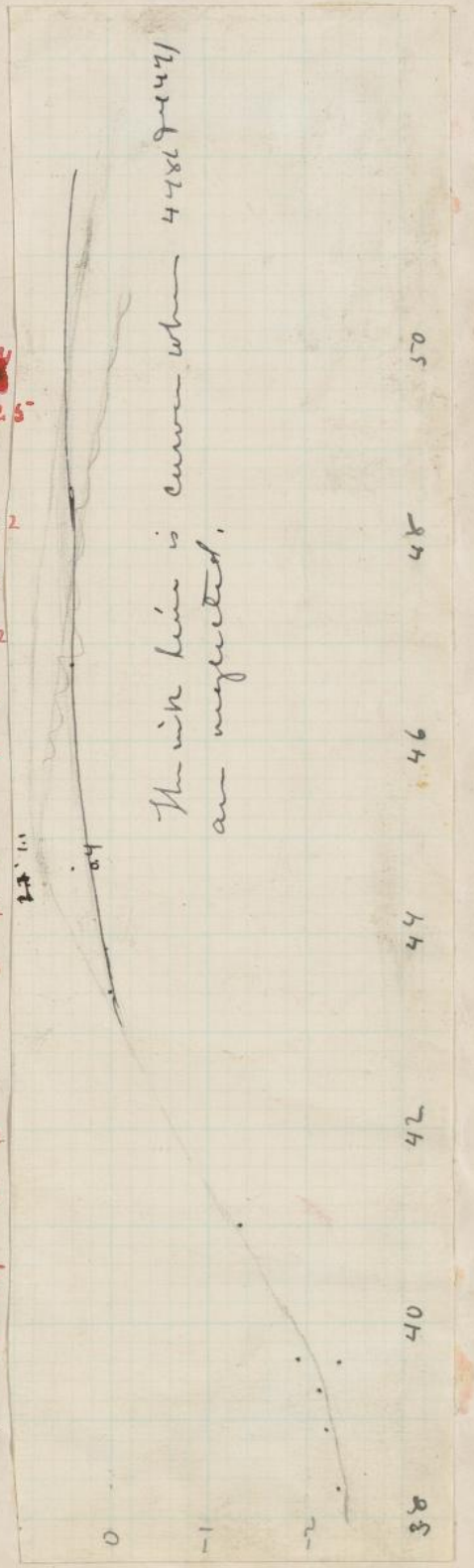
mean + 0.6

These values are obtained by Equality to Red & Green curves.

14 | 8.4 | .6

13 | 9.4 | 0.7

Av. Resid.



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday March 11 1899

Reduction of Plate B 21 258

by Transversal Apparatus

	Measure	C.S.M. 17μ89 (1) ÷ 4					
	98835	2470875	1708.8	709.9 709.6 709.0	5006 5004 5004.2	5004.8
Hβ	99041	2476025	1760.2	759.9 760.9	4860 4858	4861.0
	99268	2481700	1810.0	809.6 810.0	4734 4733.	4734.7
	99408	2485200	1852.0	851.9 852.4	4635 4634	4636.6
	99511	2487775	1877.8	877.3 877.8	4579 4578	4579.8
	99591	2489775	1897.8	897.2 898.1	4537 4535	4537.8
	99671	2491775	1917.8	917.2 917.7 918.6	4498 4497 4496	4496.7
	99740	2493500	1935.0	934.6 935.3	4463 4462	4462.6
Hγ	100000	2500000	1000.0	999.5 1001.0	4343 4340	4341.9
	100153	2503825	1038.2	1037.7 1038.5	4277 4276	4275.8
	100245	2506125	1061.2	1061.0 1061.6	4239 4236	4237.9
	100395	2509875	1098.8	1098.7 1099.3	4180 4179	4176.0
Hδ	100604	2515100	1151.0	1150.5 1152.0	4104 4102	4102.4
	100750	2518750	1187.5	1186.8 1188.4	4054 4052	4052.3
	100892	2522300	1223.0	1222.4 1224.9	4007 4005	4005.0
Hε	100999	2524975	1249.8	1248.8 1250.4	3974 3972	3971.6
H$_4$	101294	2531850	1318.5	1317.8 1319.7	3892 3890	3890.1
Hζ	101472	2536800	1368.0	1366.7 1368.6	3838 3836	3835.5

Error of scale was redetermined as per accompanying slip.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Correctio Readi

Scale	Reading	Reading. o	
0			
10	−0.7	3600	−1.8
20	~~−0.8~~ −0.7	3700	−1.5
30	−0.7	3800	−1.9
40	~~−0.8~~ −0.7	3900	−1.3
50	~~−0.7~~ −0.6	4000	−1.2
60	−0.5	4100	−.9
70	~~−0.5~~ −0.4	4200	−.8
80	−0.3 −.6	4300	−.6
90	−0.2 −.3	4400	−.3
1,00	0 0	4500	0 +1.9 +2.0
100	+1.6 +2.0		
10	+1.5	4600	+1.8
20	+1.5	4700	+1.7
30	+1.5	4800	+1.6
40	+1.6	4900	+1.6
50	+1.6	5000	+1.5
60	+1.5	5100	+1.3
70	+1.5	5200	+1.2
80	+1.3	5300	+1.1
85	+1.2		+0.9
90	+1.2	5400	+0.8
95	+0.9		+0.4
100			

4861.5
1.6
4859.9 Scale Reading

43 40.7
3
43 41.0

4340.7
.5
4341.2

3889.1
0.7
3898

3889.1
1.3
3890.4

Readings in red made March 11 1899

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Saturday March 11 1899

Reduction of Plate B 21251

by Transversal Apparatus.

	Measures C&M 17p89						Measures Rejected.
				764.6	4861		764.7
Hβ	99060	2476500	765.0	765.1	4860	4861.8	765.0
	99161			775.7	4794		
		2479025	790.2	790.4	4793	4794.2	
				848.4	4649		
	99397	2484925	849.2	749.3	4647	4649.0	
				882.4	4572		
	99531	2488275	882.8	883.4	4570	4573.0	
				900.5	4533		
	99603	2490075	900.8	901.1	4532	4534.4	
				917.4	4500		
	99671	2491775	917.8	917.7	4499	4498.8	
				934.0	4466		
	99738	2493450	934.5	934.6	4465	4465.0	
				953.3	4428		
	99815	2495375	953.8	954.3	4426	4426.7	
Hδ	1000004	2500000	1000.0	999.4	4342		
	100245	2506100	1061.0 *	1000.7	4340	4340.6	
				1072.5	4219	4236.1	
	100291	2507275	1072.8	73.5	4217	4217.4	
				1102.7	4170		
	100417	2510425	1104.2	1104.9	4168	4168.4	
				1124.4	4139		
	100501	2512525	1125.2	25.6	4137	4136.8	
				1152.1	4099		1152.3
Hε	100610	2515250	1152.5	52.9	4098	4097.6	1152.8
				1181.1	4059		
	100727	2518175	1181.8	1182.6	4057	4057.2	
				1204.8	4027		
	100821	2520525	1205.2	1206.3	4025	4025.3	
				1250.4	3969		
H_2	101004	2525100	1257.0	1257.9	3967	3967.0	
				1316.5	3891		
H_β	101271	2531775	1317.8	1318.5	3889	3888.4	
				1366.8	3836		
H_γ	101470	2536750	1367.5	1367.7	3835	3833.9	
			* *	1060.5	4234		
			1061.0	1061.7	4236	4236.1	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday April 17 1899

~~Roth~~ Constants for Reduction
Wavelengths of X8729 α Scorpii
Measures in C.S.M. No 17 page 84.

	x'	y'
# ~~32~~	− 23578	+ 370.5
# β	+ 23072	− 520.8
log y'	2.568788	2.716671 n
log x'	4.372507 n	4.363085
	8.196281 n	8.353586 n

Eqs. $+370.5^- - 0.0157138\,c + d = 0$
$-520.8^- - 0.0225728\,c + d = 0$
$+891.3 + 0.0068590\,c = 0$

2.950024 n $c = -129946$
7.836261
log c 5.113763 n
8.196281 n
3.310044

+2042.0
+370.5
2412.5

$d = +2412.5^-$

5.113763
8.353586
~~6.760177~~
3.467349

2933.2
520.8
2412.4

log d = 3.382449 n

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

Monday April 17, 1899.

Constants for Reduction to wave lengths.

β X8722 a Scorpii Measures C.S.M No 17 1.8"

Using Hβ − 5172.9 & 5896.0

	x'	y'
~~5896.0~~ Hβ	− 10083	+ 311.4
−5896.0	+ 16989	− 723.1

log y'	2.493319	2.859198 n
log x'	4.003590 n	4.230178
	8.489729 n	8.629030 n

Eq's

$$+311.4 - 0.0308837\,c + d = 0$$
$$-723.1 - 0.0416869\,c + d = 0$$
$$1034.5 + 0.0108032\,c = 0$$

3.014730 n
8.006740
~~8.033552~~
4.947320
~~4.981178~~ n
8.489729 n
~~3.470907~~
3.437049 n

4.947320
8.629030
3.576350

$c = -\frac{88577.}{9578.6}$

2735.6
+311.4
3047.0

2957.4
311.4
2646.0
3268.8

4075.5
723.1
3352.4

3770.1
723.1
3047.0

$d = -3047.0$

$\log d = 3.483872$ n

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

1564
4341
624
468
624
17704

1564 / 32978 (2

1564
210
1560
812

36

1564
2101
30440
3128
34,3440

1564
2101
1564
1564
31284
3285964

$$\frac{d}{s-s_0}$$

$$\chi = \chi_c + \frac{d}{s-s_0}$$

$$\chi' = \chi_c' + \frac{d}{(s-s_0)}$$

$$s' = \frac{d}{\chi}$$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924k

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1905phae.proj--924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1895phae.proj..924K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System