KG
11366
v.433

Fundamental Stars for Zones
From November 10, 1870 to April 24/5 1871
B 1

Charles W. Sever, University Bookstore, Cambridge.

Date Nov. 10 1870. Observer W. A. R. Barom. = 30.15 log B = − 0095

Att. Therm. = 71.0 log T = ~~+0132~~

n = +.25 Recorder A. M. Ex. Therm. = 33.5 log β = + 0037 − 0095 log γ + 0132

Star.	α Cygni	61 Cygni	α Cephei	δ Cephei	κ Cass.	ζ Cass	~~ζ Cygni~~		
	+ × √	× + √	× + √	× + √	× + √	+ ∪			
	20 37 h m s	21 1	21 16	22 25	0 26	0 30			
T_δ	20 39 4.5	21 2 54.4	22 17 10.0	22 26 7.8	0 27 13.0	0 31 30.5			
T_m	7.8	12.2	35.5	29.3	47.5	54.0	2	−2 6.48	
T_e	15.0	18.3	45.7	38.2	58.4	2.0		67	
T_f	18.0	21.3	50.8	43.0	63.5	6.1		52	
T_g	21.5	24.5	56.2	47.3	68.7	10.1		85	
T_h	25.6	27.7	1.1	52.2	74.0	14.3		67	
Sum	80.1	91.8	213.8	180.7	264.6	32.5		42	
Mean	20.02	22.95	53.45	45.18	66.15	8.12		359	
Red. to T_m	12.00	10.80	18.13	15.92	18.23	14.18		−2 6.60	22h 14m
Sum = s	8.02	12.15	35.32	29.26	47.92	33.94			
$\frac{1}{5}(T_m - T_s)$	−.04	+.01	+.04	+.01	−.08	+.01			
T	39 7.98	3 12.16	17 35.36	26 29.27	27 47.84	31 53.95			
RA	37 0.75	1 5.68	15 29.33	22.81	41.65	47.86			
RA − T	−2 6.23	2 6.48	6.03	6.46	6.19	06.09			
− n tang δ	−.25	−.19	−.44	−.39	−.48	33			
ΔT + m	−2 6.48	6.67	6.50	6.85	6.67	6.42			
$T_m - T_\delta$		17.8 .5	25.5	21.5	34.5	19.5			
A	1 50.8	4′ 1.3″	4 1.0	0 57.0 9	3 26.8	0 10.7	4 49.8		
C	52.8	−8.1	−2.2	56.4	22.3	5.9	59.9		
Sum	3.6	+.2	−1.2	~~154~~ 154	49.1	16.6	109.7		
Mean	1 51.80	+4 0.10	~~4 −.06~~ 3 59.4	0 ~~57.70~~ 57.73 ~~57.70~~	24.55	8.4 30	4 54.85		
Red. for runs		−.94	−.94	−.23	−.80	−.04			
Red. to hor. wire		(−16.51) ~~17.17~~	−14.10	−15.10	−~~10.46~~ 21.70	−13.78			
Red. to meridian		−.05	−.10	−.10	−.21	−.05			
Division error									
Sum		3 42.60	3 44.80	0 42.27	3 4.58	−0 54.7			
Pointer	35	10	15	35	5	10	35		
App. z		13 42.60	18 44.80	35 42.27	8 4.58	9 54.53			
log a′		1.7614							
A′ log β		−.0095							
λ log γ		+.0132	1.7651	1.7651	1.7651	1.7651			
log tang z		8.8727	9.5531n	9.4392n	9.5567n	9.2805n		−1′ 52.4″	
log r		.6378	1.3182n	1.2043n	1.3218n	1.0456n		49.9	
r		+4.34	−20.81	−16.0	−20.98	−11.11		52.9	
z		13 46.94	18 23.99	35 26.26	7 43.60	9 43.42		50.2	
φ − z = δ (O)		9 1.66	4 24.61	47 22.34	15 5.00	13 5.18		50.5	
δ (C)		7 9.30	2 34.7	45 29.4	13 14.15	11 14.7		255.9	
δ (C − O)		−1 52.36	49.9	52.9	50.2	50.5		−1′ 57.2″	

Date Nov. 13 1870 | Observer W.A.R. | Barom. = 29,65 | log B = +,0007

n = +,18 | Recorder A.M. | Att. Therm. = 66,4 | log T = −,0012

Ex. Therm. = 5,2 | log β = −,0005 | log γ −,0027

~~Altair~~ Star.	+ Gr. 3415 21 9	+ α Cephei 21 16	+ g Cygni 21 25	+ κ Cass. 0 26	+ ξ Cass. 0 30	+ α Cass (bod) (½ w.) 0 33	13th Cephei	
T_δ	21 10 21,1	17 26,5	26 41,0	0 27 33,2	0 31 45,0	0 35 12,3		
T_m	37,7	36,8	48,0	49,2	55,1	19,9		19,9
T_e	47,3	47,2	55,3	0,0	3,4	29,4	−87	
T_f	52,3	52,3	58,8	4,8	7,8	34,0	−133	
T_g	57,0	57,8	2,3	10,2	12,0	37,3	−136 2 7,78	12 19,7
T_h	62,2	3,0	6,0	15,8	16,0	42,0	7,75	2
Sum	21,88	22,03	24,24	30,8	39,5	143,0	8,11	2
Mean	54,76	55,04	60,60	7,4	9,84	35,75	7,89	2
Red. to T_m	−17,08	−18,37	12,44	18,61	14,48	15,49	7,66	2
Sum = s	37,62	36,56	48,13	49,09	53,39	20,31	8,25	1
$\frac{1}{5}(T_m - T_s)$	+,02	+,05	−,03	+,02	−,06	,08	−2 7,84	22h 55m
T	10 37,64	17 36,61	26 48,10	27 49,11	31 55,33	~~20,23~~ 19,80		
RA	8 30,17	15 29,20	~~40,47~~ 24	41,54	47,91	12,24		
RA − T	−2 47,47	7,41	7 ~~7,93~~ 86	4,54	7,42	7,99		
− n tang δ	−,31	−,34	−,18	−,35	−,24	−,26		
ΔT + m	−2 7,78	7,75	8,04	7,89	7,66	8,25		
$T_m - T_\delta$	~~8~~ 16,6 ,5	10,3	7,0	16,0	11,1	7,6	1	1
A	3 55,1	3 54,4	2 40,1	3 20,2	0 6,9	1 33,2	1	49,2
C	57,1	51,3	34,2	14,4	0,4	~~28,8~~ 0		43,7
Sum	6,2	6,0	74,3	34,9	7,6	61,~~8~~ 2		12,9
Mean	3 53,10	3 53,00	2 37,15	3 17,45	0 3,80	1 30,~~4~~ 60	1	46,45
Red. for runs	−,62	−,62	−,38	−,50	,00	−,24		
Red. to hor. wire	−9,88	−5,70	−5,83	−8,80	−7,84	−5,03		
Red. to meridian	−,08	−,03	−,01	−,08	−,03	−,01		
Division error								
Sum	3 42,58	3 46,61	30,93	8,04	−4,04	24,81		
Pointer	50 9?	15	20	5	10	30	20	
App. z	53 42,58	18 46,65	22 30,93	8 8,04	9 55,93	31 24,81		
log a′	1,7614							
A′ log β	−,0005							
λ′ log γ	+,0029	1,7582	1,7582	1,7582	1,7582	1,7582		
log tang z	9,4880n	9,5531n	8,7886n	9,5567n	9,2805n	9,3745n	−1′ 4,66″	
log r	1,2462n	1,3113n	,5468n	1,3149n	1,0387n	1,1367n	4,76	
r	−17,63	−20,48	−3,52	−20,64	−10,93	−13,70	4,90	
z	53 24,95	18 26,17	22 27,41	9 47,43	9 45,00	31 11,11	4,58	
φ − z = δ (O)	29 23,7	62 4 22,4	46 0 21,2	15 1,2	13 3,6	57 37,5	4,84	
δ (C)	59 24 37,1	62 2 34,8	45 58 32,2	62 13 15,4	53 11 15,2	55 49 50,3	47,2	
δ (C − O)	−1 44,6	47,6	49,0	45,8	48,4	47,2	1′ 47,43″	

Date Nov. 15 1870 Observer W.A.R. Barom. = 29.79 log B = +.0030

Att. Therm. = 40.3 log T = −.0015

n = +.17 Recorder A.M. Ex. Therm. = 34.0 log β = +.0015 log γ +.0124

−.16

Star.	30 Cephei	o Andr.	ξ Cass.	α Cass	o Cass	
	22 34 h m	22 56	0 30	0 33	0 38	
T_δ	22 36 0.0	57 58.0	0 31 48.0	0 35 56.6	0 39 28.0	−2 8.39
T_m	12.5	4.1	56.0	——	41.0	8.64
T_e	23.4	13.9	64.2	29.0	48.2	8.38
T_f	29.0	17.0	68.3	33.6	52.0	8.39
T_g	34.5	20.5	72.4	37.9	55.6	8.54
T_h	40.1	24.0	76.4	42.5	59.3	2.40
Sum	127.0	75.4	281.6	143.0	215.1	−2 8.48
Mean	31.75	18.85	40.40	35.75	53.78	h m
Red. to T_m	19.05	11.61	14.48	15.49	12.85	22 34.1
Sum = s	12.80	7.24	55.92	20.31	40.93	22 56.0
$\frac{1}{5}(T_m - T_s)$	−.04	−.03	+.02	.00	+.01	24 29.8
T	36 12.66	58 7.21	31 55.94	35 20.31	39 40.94	24 33.2
RA	34 4.62	55 58.69	29 47.79	33 12.17	37 32.55	24 37.5
RA − T	−2 8.04	−2 8.52	−2 8.15	−2 8.14	−2 8.39	19 10.6
− n tang δ	−.35	−.15	−.23	−.25	−.18	23 50
ΔT + m	2 8.39	8.67	8.38	8.39	8.57	
$T_m - T_\delta$	+ 12.5	9.1	8.0	−36.3	13.0	
A	0 32.5	2 2.7	4 0.0	4 56.4	0 28.8	−7 46.5
C	7 26.0	−4.9	−6.4	50.8	24.0	
Sum	9 58.5	~~−2.2~~	−6.7	7.5	52.8	
Mean	0 .75 29.~~25~~	1 58.90 ~~−1.10~~	3 56.65 ~~−3.35~~	4 53.75	0 26.40	
Red. for runs	−.08	−.32	−.64	−.79	−.07	
Red. to hor. wire	−6.71	−8.05	−5.65	+24.04	−10.34	
Red. to meridian	−.04	−.02	−.02	−.33	−.05	
Division error						
Sum	0° 22.42	−9.46 59.53	−9.66	22.92	15.94	
Pointer	0 ~~20~~	35 51.53	346 5 0	6 20	4 40	
App. z	20 22.42	36 50.54	4 50.34	25 16.67	40 15.94	
log a′	1.7614					
A′ log β	+.0015					
λ′ log γ	+.0127 1.7756	1.7756	1.7756	1.7756	1.7756	
log tang z	9.5734n	8.1186	9.2805n	9.3785n	8.9572n	
log r	1.3490n	9.8942	1.0561n	1.1541n	0.7328n	
r	−22.34	+.79	−11.38	−14.26	−5.40	
z	20 0.08	36 51.33	4 38.96	25 2.41	40 10.54	
φ − z = δ (O)	02 48.52	45 5.73	18 9.64	57 46.19	42 38.06	
δ (C)	62 55 2.0	41 38 5.9	53 11 15.56	55 49 50.2	47 33 44.0	
δ (C − O)	−7 46.5	−7 51.4	−7 54.1	−7 56.0	−7 54.1	

Date Nov. 16 1870 Observer W.A.R. Barom. = 30.14 log B = +.0078

Att. Therm. = 61.1 log T = −.0010

n = +.23 Recorder A.M. Ex. Therm. = 35.0 log β = +.0068 log γ +.0718

−.16

Star.	+ √61 Cygni	+ √ξ Cygni	+ √α Cephei ✓	+ √ο Andr.	+ √ρ Cass.	+ √β Cass.			11 Cephei.
	21 1	21 8	21 16	22 56	23 48	0 2			
T_δ	21 2 7.3	21 8 22.5	21 16 23.9	22 57 59.3	23 49 52.0	0 4 11.5			
T_m	14.0	34.0	37.0	7.0	50 5.2	26.7			
T_e	20.3	39.7	47.7	13.8	14.0	36.0			
T_f	23.5	42.3	53.0	17.0	18.8	41.0			
T_g	26.7	45.1	58.0	20.5	23.0	45.6			
T_h	29.7	48.0	63.4	23.7	27.9	50.6			
Sum	100.2	175.1	222.4	75.0	83.7	173.2			
Mean	25.05	43.78	55.60	18.75	20.92	43.30	−2 8.66	21 1.1	
Red. to T_m	11.03	9.99	18.51	11.61	15.83	16.57	63	21 7.4	
Sum = s	14.02	33.79	37.09	7.14	5.09	26.73	45	21 15.5	
$\frac{1}{5}(T_m - T_s)$	07	+04	−02	−03	+.02	−.01	67	22 56.0	
T	1+2 14.02	1+8 33.83	1+16 37.04	1+57 7.11	~~1~~+50 5.11	~~1~~+4 26.72	62	23 47.9	
RA	1 5.55	7 25.33	15 29.04	55 58.70 .67	47 56.84	2 18.40	.69	24 2.3	
RA — T	−2 8.47	−2 8.50	−3 8.00	8.44	8.27	8.32	3.72	14 10.2	
— n tang δ	.78 −.19	.57 −.13	1.86 −~~.45~~	−26	35	37	−2 8.62	22 22	
ΔT + m	2 8.66	8.63	8.45	8.67 .70	8.62	8.69			
	9.9695	0.0104	9.7426						
$T_m - T_\delta$	6.7	11.5	13.1	7.7	13.2	11.2			
A	3 49.4	2 51.7	2 50.2	1 52.5	3 18.4	3 59.1			
C	46.4	48.7	46.0	48.3	13.3	51.9			
Sum	15.8	100.4	96.2	100.8	31.7	111.0			
Mean	3 47.90	2 50.20	2 48.10	1 50.40	3 15.85	3 55.50	−7	53.8	
Red. for runs	−.60	−.46	−.45	−.30	−.50	−.64		55.3	
Red. to hor. wire	−6.22	−14.83	−7.24	−6.79	−8.52	−6.91		55.0	
Red. to meridian	−.01	−.03	−.05	−.02	−.05	−.03		58.5	
Division error								56.2	
Sum	3 41.07	2 34.88	2 40.36	1 43.29	3 6.78	3 47.92		54.3	
Pointer	5	30	10	35	25	45		3.31	
App. z	8 41.07	32 34.88	12 40.36	36 43.29	28 6.78	48 47.92	−7	55.52	
log a'	1.7614								
A' log β	+.0068								
λ' log γ	+.0718 1.7800	1.7800	1.7800	1.7800	1.7800	1.7800			
log tang z	8.8745	9.3523	9.5527n	8.1186	9.4093n	9.4590n			
log r	.6545	1.1323	1.3327n	9.8986	1.1893n	1.2390n			
r	+4.51	+13.56	−21.52	+.80	−15.46	−17.34			
z	8 ~~36.06~~ 45.58	32 48.44	12 18.84	36 44.09	27 51.32	48 30.58			
φ — z = δ (O)	~~45~~ 14 ~~56.98~~ 3.02	~~09~~ 50 ~~39.84~~ 0.16	10 29.76	46 4.51	54 57.28	34 18.02			
δ (C)	38 7 9.2	29 42 48.6	62 2 34.8	~~47~~ 41 ~~33~~ 38 ~~54.1~~ 60	56 47 1.03	56 26 23.70			
δ (C — O)	−7 53.8	−7 55.8	7 55.0	−7 58.5	7 56.2	7 54.3			

Date Nov. 17 1870
Observer W. A. R.
Recorder A. M.
n = +.30

Barom. = 30.22
Att. Therm. = 68.0
Ex. Therm. = 83.7

log B = +.0090
log T = −.0014
log β = +.0076

log γ +.0130

Runs = 13″.8

	+ 2.75 ✓	+ 1.53	+	× .11	+ 1.73				
Star.	× β Cephei	× 13 H. Cephei	× o Andr.	× β Aquarii	× γ Cass	ζ ~~Cygni~~	α Cephei		
	70 0 21 27	56 55 21.35	22 56	21 25	0 49				
T_δ	21 28 46.5	21 36 33.5		21ʰ 26ᵐ 40.8	0 50 54.0				
T_m	68.0	48		43.1	51 5.0				
T_e	24.0 30.5	14.2		45.6	15.1				
T_f	28.3 37.8	18.4		48.3	19.8				
T_g	35.5 44.9	23.0		53.1 ×	24.6			−2 8.68	21ʰ 3.49ᵐ
T_h	43.0 52.1	27.9		58.0	29.8			8.74	24 48.9
Sum	1278 68	83.5		60.6	89.3			14.2	6 238
Mean	31.95 21.0	20.88		63.0	22.35			2 8.71	23 12
Red. to T_m	25.36 28.3	15.89		65.6	17.36				
Sum = s	6.59 33.5	4.99		47.81	4.99				
$\frac{1}{5}(T_m - T_s)$	+.04 4.30	−.04			.00				
T	29 6.63 − 5.99	37 4.95		21 26 53.12	0 51 4.99				
RA	26 56.67 4 6.66	34 56.70		24 44.31	48 56.77				
RA — T	− 2 7.96	2 8.25		− 2 8.81	− 2 8.22				
— n tang δ	− .82	.46		+ .03	.52				
ΔT + m	− 2 8.78	~~8.68~~ .71		8.78	2 8.74				
	9.6035	9.8085							
$T_m - T_\delta$	20.3	11.3			11.0				
A	0 42.0	0 45.3	1 54.8		4 15.5	2 52.8	2 28.5		
C	35.0	34.4	56.2		13.6	49.8	22.2		
Sum	77.0	83.0	11.0		29.1	102.6	10.7		
Mean	0 38.50	0 41.50	1 55.50		4 14.55	2 51.30	2 25.85		
Red. for runs	−.07	−.07			−.53				
Red. to hor. wire	− 8.20	−7.27			−6.57				
Red. to meridian	−.11	−.03			−.03				
Division error									
Sum	0 30.12	0 ~~0.43~~ 34.13			4 7.42			−7 5.58	
Pointer	15	20	35		2 10	30	10	58.2	
App. z	15 30.12	20 ~~0.43~~ 34.13			2 14 7.42			90	
								7 54.50	
log a′	1.7612	1.7614			1.7614				
A′ log β	+.0076	.0076			.0076				
λ′ log γ	.0130	.0130			.0130				
log tang z	9.7186 ~~4389~~ n	9.4132 ~~1858~~ n			~~2388~~ n 9.5022				
log r	2.~~2207~~ n 1.5004 n	~~1.9678~~ 1.1952 n			~~2.0208~~ 1.2842 n				
r	−31.65	−15.68			−19.24				
z	14 58.47	~~19~~ 20 ~~45.25~~ ~~48.68~~ 18.45			13 48.18				
$\phi - z = \delta$ (O)	7 30.1	57 2 ~~43.4~~ 30.2			8 0.4				
δ (C)		56 54 34.4			60 1 7.2				
δ (C — O)	19 59 53.7 7 36.4	~~8~~ ~~29.0~~ 7 55.8			7 53.2				

Date Nov. 19 Observer W. A. R. Barom. = 29.75 log B = +.0022

Att. Therm. = 64.6 log T = −.0012

n Recorder A. M. Ex. Therm. = 30.1 log β = +.0010 log γ +.0161

Runs = +.13 R

Star.	φ ~~β~~ Persei	γ Urs. maj	η Urs. maj:	α Persei	ε Tauri	a Tauri	a Urs min. S.P.		~~θ Bootis.~~
	+ ×	+ ×	+ ×		+ ×	+ ×	+ × ✓		
	2 36	11 47	13 43	3 15	4 21	4 29	1 13		
T_δ	2 37 21.5	11 48 58.3	13 44 22.8		4 23 5.7	4 30 31.7	13 14 34.3	36.9	36.9
T_m	32.8	7.9	32.8		13.8	39.7	36.5 40.1		3
T_e	40.1	16.4	40.5		19.0	45.0	17 58.1		
T_f	44.0	20.6	44.1		21.5	47.6	62.3 65.5	62.0 3 26.2	35.8
T_g	47.7	24.9	48.2		24.0	50.1	19 40.4		
T_h	51.6	29.1	52.1		26.8	52.8	43.9	44.6	36.9
Sum	183.4	91.0	184.9		91.3	195.5	49.2	5 7.7	
Mean	45.85	22.75	46.22		22.82	48.88	21 23.0		
Red. to T_m	13.15	14.91	13.48		9.17	9.04	26.5	26.7	36.7
Sum = s	37 32.70	49 7.84	44 32.74		13.65	39.84	30.4	6 50.0	
$\frac{1}{5}(T_m - T_s)$	+.02	.01	+.01		+.03	−.03	23 9.7		
T	37 32.72	49 7.85	44 32.75		23 13.68	30 39.81	12.0	12.2	36.6
RA	35 24.07	46 59.36	42 24.34		21 4.91	28 30.99	14.9	8 35.6	182.9
RA — T	8.65	−2 8.49	−2 8.41		−2 8.77	−8.82	36.58	13 14	36.58
— n tang δ	−.35	−.43	−.37					12	14.80
ΔT + m	9.00	8.92	8.78					2	21.78
	−6 18	−10 12	−7 34						
	9.8913	9.8363	9.8798						
$T_m - T_\delta$	11.3	9.6	10.0						
A	4 21.6	0 38.2	2 41.0	4 29.0					
C	20.3	34.0	38.7	27.2					
Sum	41.9	72.2	79.7	16.2					
Mean	4 20.95	0 36.10	2 39.85	4 28.10					
Red. for runs	−.56	−.07	−.37						
Red. to hor. wire	−8.80	−6.59	−7.58						
Red. to meridian	−.03	−.03	−.03						
Division error									
Sum	4 11.56	0 29.41	2 31.87						
Pointer	30	34 50	70 15	10					
App. z	34 11.56	50 29.41	17 31.87		−2 9.00	2 2 35.4	−7' 53.8		
					8.92	35 47.0	49.6		
					8.78	37 42.4	52.8		
							156.2		
							7' 52.07		
log a'	1.7614								
A' log β	.0010								
λ log γ	.0161	1.7785	1.7785						
log tang z	9.0430n	9.2471n	9.1233n						
log r	0.8315n	1.0256n	0.9018n						
r	−6.78	−10.61	−7.97						
z	34 4.78	50 18.56	17 23.90						
φ — z = δ (O)	48 48 43.82	54 32 30.0	50 5 24.7						
δ (C)	48 40 50.00	54 24 40.4	49 57 31.9						
δ (C — O)	−7 53.8	7 49.6	7 52.8						

ε Tauri o = +2 8.77 + .34 } +.11 2 8.88

a Tauri o = 8.82 + .29 } +.09 8.91

Polaris. S.P. o = 2 21.78 − 41.55

o = 2 8.80 + .32

o = 12.98 − 41.89n

o = .31 − n

n = +.31

Date Nov 27 | Observer W. A. R. | Barom. = 29.89 | log B = +.0044

n = +.23 | Recorder A. M. | Att. Therm. = 68.5 | log T = −.0014

Ex. Therm. = 47.3 | log β = +.0030 | log γ +.0013

R = −.02″

Bootis.

Star.	2. Cygni 40° 40′ 20 53	61 Cygni 21 1	ζ Cygni 21 8	α Cephei 21 16	β Cephei 21 27	ο Andr. 22 56	ξ Persei h 1 30	φ Persei 1 36	η Urs Maj 13 43
T_δ	20h 54m 16.1	21 3 5.2	21 9 24.3	21 17 19.2	21 26 38.0	22 57 ~~31.8~~	1 31 58.9	1 37 33.8	13 44 22.6
T_m	28.5	13.5	33.5	36.5	~~20.4~~ 5.9	57.8	32 13.1	43.3	32.7
T_e	35.0	19.8	39.0	47.0	20.4	6.8	20.7	57.0	40.2
T_f	38.1	23.0	42.0	52.4	27.5	13.3	24.1	54.9	44.1
T_g	41.5	26.1	44.9	57.8	34.8	16.7	27.9	58.7	48.0
T_h	44.8	29.3	47.8	62.9	42.0	19.9	31.7	62.6	52.0
Sum	159.4	98.2	173.7	220.1	124.7	23.3 73.2	104.4	227.2	184.3
Mean	39.85	24.55	43.42	55.02	31.18	18.30	26.10	56.80	46.07
Red. to T_m	11.44	11.03	9.99	18.51	25.36	11.61	12.96	13.51	13.48
Sum = s	28.41	13.52	33.43	36.51	5.82	6.69	13.14	43.29	32.59
$\frac{1}{5}(T_m - T_s)$	+02	00	+.01	00	+.02	+.02	−.01	00	+.02
T	54 28.43	3 13.52	9 33.44	17 36.51	26 5.84	58 6.71	32 13.13	37 43.29	44 32.61
RA	52 20.19	1 5.34	7 25.14	15 28.61	26 58.10	55 58.38	30 4.96	35 35.27	42 24.55
RA — T	− 2 8.24	8.18	8.30	7.90	7.74	8.33	8.17	8.02	8.06
— n tang δ	− .20	−.18	−.13	−.43	−64	−20	26	27	−.27
ΔT + m	8.44	8.36	8.43	8.33	8.38	8.53	8.43	8.29	8.39
	9.95148								

This ~~transit~~ is to be rejected on account ~~of doubtful T~~

	2. Cygni	61 Cygni	ζ Cygni	α Cephei	β Cephei	ο Andr.	ξ Persei	φ Persei	η Urs Maj
$T_m - T_\delta$	12.4	8.3	9.2	17.3	27.9	14.8 7.0	14.2	9.5	10.1
A	4 37.8	2 52.0	2 47.1	2 51.4	0 44.9	1 55.2	1 46.5	2 52.9	~~33~~ 2 45.0
C	32.2	48.3	46.1	46.2	34.9	57.3	40.3	46.0	39.0
Sum	4 100	100.3	132	97.9	79.8	65	.68	98.9	84.0
Mean	4 35.00	2 50.15	2 46.60	2 48.95	0 39.90	1 53.25	1 43.40	2 49.45	2 42.00
Red. for runs	+.09	+.06	+.07	+.06	+.05	+.04	+.04	+.07	+.07
Red. to hor. wire	−11.09	− 7.70	− 9.43	− 9.56	−11.25	~~−7.93~~ 13.04	−11.21	−7.20	−7.66
Red. to meridian	−04	−.01	−.01	−.06	−15	−.02	−.05	−.03	−.03
Division error	–								
Sum	4 23.96	2 42.50	2 37.27	2 39.39	0 28.51	1 ~~45.34~~ 40.23	1 32.18	2 42.29	2 34.38
Pointer	10 30	4 5	2 30	340 10	2 15	0 35	45 ✗	10	352 15
App. z	34 23.96	7 42.50	32 37.27	12 39.39	15 28.51	36 ~~45.34~~ 40.23	1 32.18	12 42.29	17 34.38
log a′	1.7614								
A′ log β	.0030								
λ log γ	.0018	1.7657	1.7657	1.7657	1.7657	1.7657	1.7657	1.7657	1.7657
log tang z	8.4767	8.8745	9.3523	9.5527n	9.7186n	8.1186n	8.9906n	9.1281n	9.1233n
log r	8.4780	.6402	1.1180	1.3184n	1.4843n	9.8843n	.7563n	0.8938n	0.8890n
r	+.03	+4.37	+13.12	−20.82	−30.50	−.76	−5.71	−7.83	−7.75
z	34 23.99	7 46.87	32 50.39	12 18.57	14 58.01	36 ~~44.58~~ 39.47	1 26.47	12 34.46	17 26.63
ϕ — z = δ (O)	4 48 24.6	38 15 1.7	29 49 58.2	62 10 30.0	70 07 50.6	41 46 4.0	21 22.1	50 10 14.1	50 5 22.0
δ (C)	40 40 28.1	38 7 8.5	29 42 3.9	62 2 34.2	69 59 53.4	41 38 6.2	47 58 28.3	50 2 18.8	49 57 29.1
δ (C — O)	7 55.7	53.4	54.3	55.8	57.2	57.8	53.8	55.3	7 52.9

Date Nov 27 1870 Observer W.A.R. Barom. = log B =
Att. Therm. = log T =
n = +.23 Recorder W.A.R. Ex. Therm. = log β = log γ

X √+ + −6° 9' β Aquarii +

Star.	+ θ Bootis	+ Polaris S.P.	+ β Aquarii	+ β Cephei? ~~β Aquarii~~	Gr. 82	δ Cass.
	h 14 21 m	13 13	h 21 25	21 26	0 43	1 18
T_δ	14 22 44.6	13 37 5 54.0	21 26 42.1	21 26 40.2		
T_m	53.7	7 37.1	40.2	− 42.9		
T_e	1.8	9 20.4	42.9	45.0		
T_f	5.7	11 1.3	45.0	47.7		
T_g	9.9	14 29.9 ×	47.7	52.7		
T_h	13.8	17 55.1	52.7	57.7		
Sum	31.2	19 37.0	188.3	60.1		
Mean	7.80	21 19.2	47.07	62.6		
Red. to T_m	14.24	−23 − 4.0	87.2	65.0		
Sum = s	22·53.56	130 18.0	83.5	473.9		
$\frac{1}{5}(T_m - T_s)$	+.03	14 28.64				
T	22 53.59	12 10.73		21 26 52.66		
RA	20 45.37			21 24 44.19		
RA — T	−2 8.22	2 17.94		−2 8.47		
— n tang δ	−.30					
ΔT + m	− 8.52					
	9.8564					
$T_m - T_\delta$	9.1		β Aquarii	0 = +2 8.47 − 11		
A	3 2 2.3		Polaris S.P.	0 = +2 17.94 − 41.55	2 44.1	1 26.4
C	15.6			0 = −9.47 + 41.44	39.1	21.0
Sum	37.9			0 = −.23 + n	83.2	7.4
Mean	3 18.95			n = +.23	2 41.60	1 23.70
Red. for runs	+.07					
Red. to hor. wire	− 6.54					
Red. to meridian	−.03					
Division error		m s −2 8.44	h m 20 52.3	−7' 55.7"		
Sum	3 12.45	.36	21 1.1	53.4		
Pointer	344 45	43	21 7.4	54.3	40	40
App. z	48 12.45	33	21 15.5	55.8		
		38	21 27.0	[57.2]		
log a'		43	25 30.5	53.8		
A' log β		29	25 35.6	55.3		
λ log γ	1.7657	33		52.9		
log tang z	9.2488n	52		51.7		
log r	1.0142n					
r	− 10.33	−2 8.38		−7' 54.7"		
z	48 2.12					
φ — z = δ (O)	34 46.5					
δ (C)	52 26 54.8					
δ (C — O)	7 51.7					

Date 1870 Dec 1st Observer W. A. R

n Recorder

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	✗ α Aquarii	✗ θ Aquarii	✗ ζ Cephei	✗ 3 Lacertae ~~α Aquarii~~
	21 59	22 10	22 7	22 19
T_δ	21h 59m 3s.8	22h 9m 55s.6	22h 6m 16s.6	22 17
T_m	6.4	58.3	24.6	
T_e	8.8	0.8	38.8	
T_f	11.2	3.4	43.0	
T_g	16.3	8.5	48.0	
T_h	21.1	13.4	52.7	
Sum	23.6	15.8	282.9	
Mean	26.1	18.2	42.42	
Red. to T_m	28.7	21.0	−12.94	
Sum = s	146.0	75.0		
$\frac{1}{5}(T_m - T_\delta)$				
T	21 59 16.22	22 ~~9~~ 10 8.33	6 29.48	
RA				
RA − T				
− n tang δ				
ΔT + m				

Rej

No pole star

$T_m - T_\delta$				
A			1 17.0	4 44.8
C			12.2	40.9
Sum			9.2	5.7
Mean			1 14.60	4 42.85
Red. for runs				
Red. to hor. wire				
Red. to meridian				
Division error				
Sum				
Pointer			40 40	350 35
App. z				
log a′				
A′ log β				
λ log γ				
log tang z				
log r				
r				
z				
φ − z = δ (O)				
δ (C)				
δ (C − O)				

Date 1870 Dec 10 | Observer W. A. R. | Barom. = 30.16 | log B = +.0081

Att. Therm. = 65.1 | log T = −.0012

n +.30 | Recorder A. M. | Ex. Therm. = 29.4 | log β = +.0069 | log γ +.0168

runs = +.07 R

Star.	+ γ Cass ?	+ γ And	+ b Persei	+ 9 Camel ?	+ 4 Camel	+ 9 Camel	+ 10 Camel		
	0 49	1 56	2 5	3 46	4 38	4 42	4 52		
T_δ	0ʰ 47 49.5	1ʰ 56 46.0	2 5 57.2	3 45 46.3	4 37 15.1	4 41 53.1 54.3	4 52 1.1		
T_m	48 17.7	57 7.5 6	6 10.5	46 18.0	24.6	—	52 16.0		
T_e	9.6	13.0 4	18.4	28.0	33.5	45.7	26.0	8.54	1 55 59
T_f	13.0	16.4 7	22.1	33.3	38.0	50.6	30.8	8.64	2 5 2
T_g	17.1	19.7 20	26.0	38.3	42.6	58.1	35.7	118 8.590	4 01 01 2 00 30
T_h	not obs. 21.9	23.0 4	30.0	43.0	47.0	4.2	40.8		
Sum	~~60.7~~ ~~62.4~~	72.1 6	96.5	142.6	161.1	218.6	133.3		
Mean	~~15.18~~ 6.24	18.03 19	24.12	35.65	40.28	54.65	33.33		
Red. to T_m	~~48~~ ~~12.48~~ 12.48	11.62	13.63	17.74	15.72	21.42	17.48		
Sum = s	~~13.88~~ 58.60	7.41	10.49	46 17.91	37 24.56	4 42 3.23	4 52 15.85	8.53	4 37 17
$\frac{1}{5}(T_m - T_s)$		+.02	.00	+.02	+.01	−.10 s	±.03 .10 s	8.54	4 41 15
T		56 7.43	6 10.49	46 17.93	37 24.57	3.23 10	52 15.88 −10	8.60 167	4 51 58 13 0 30
RA	0 48 56.26	1 55 59.06	2 5 2.20	3 46 9.94	4 37 16.54	4 41 15.37	4 51 57.80	8.557	4 43 18
RA — T		−8.37	8.29	7.99	8.08	7.86	8.08	1147	6 43 48
— n tang δ	−.50	−.27	.27 36	.53	45	68	.52	−8.573	3 21 54
ΔT + m		−8.54	−8.64	8.52	8.53	8.54	−8.60	Rate = +.16	
				(v. opp. page)		9.68020 6.30516			5
$T_m - T_\delta$		21.5	13.3		9.5	~~20.1~~ −19.9	14.9	8.54	1 55 59
A		2 38.9	2 20.7		3 51.8	3 10.2	0 31.2	64	2 5 2
C		35.5	15.1		50.5	2.8	26.9	53 54	4 37 17 4 41 15
Sum		14.4	35.8		2.3	13.0	58.1	60 285	4 51 58 18 11 31
Mean		2 37.20	2 17.90		3 51.15	3 6.50	0 39.05	8.570	3 38 18
Red. for runs		−18.93 −19.45	−9.99 −10.25		−6.20 −6.35	−19.20 +9.76	−8.74 −8.96		
Red. to hor. wire		−.15	−.16		−.27	−.22	−.14		
Red. to meridian		+.13	+.05		+.03	+.09	+.05		
Division error									
Sum		2 17.99 .70	2 7.70 .54		3 44.65 .56	3 16.13 .00	0 20.20 .10		
Pointer		0 30	357 45		345 40	5	342 0		
App. z		32 17.99 .70	47 7.70 .54		43 44.65 .56	8 16.13	0 20.20 .10		
log a′		1.7614							
A′ log β		+.0069							
λ′ log γ		.0168	1.7851	1.7851	1.7851	1.7857	1.7857		
log tang z		1.7851 9.8815	9.1524n		9.4011n	9.6431n	9.5083n		
log r		9.8666	.9375n		1.1862n	1.4282n	1.2934n		
r		+.74	−8.66		−15.36	−26.80	−19.65	O I 42 22 48.10	
z		32 18.73 44	46 59.04 58.88		43 29.29 .20	7 49.33	0 0.55 0.45	52.70	
φ — z = δ (O)		49 29.9 28.66	35 49.6 49.22		39 19.3 18.90	58.77	22 48.1 49.65	51.10 51.80	
δ (C)	60 1 11.1	41 41 37.0	50 27 58.1	60 43 41.8	56 31 21.1	66 7 9.1	60 14 57.6	49.70 50.10	
δ (C — O)		7 52.9 52.7	51.5 51.1		7 52.2 51.8	−7 49.6	7 50.5 50.1	255.4 51.08	51.8

Date 1870 Dec 10　　Observer A. M.　　Barom. =　　log B =

Att. Therm. =　　log T =

n = +30　　Recorder W. A. R.　　Ex. Therm. =　　log β =　　log γ

Star.	v Persei	θ Persei	η Persei	τ Persei	Gr 716	9 H Camel	c Persei	1 Camel	
		2 36	2 42	2 45	3 31	3 46	4 00	4 22	
T_δ	1 30 51.5	2 35 9.0	2 40 57.0	2 45 2.0	3 30 41.8	3 45 46.3	3 59 8.1	4 21 39.0	
T_m	31 3.3	32.5	26.8	16.0	31 7.9	18.0	26.8	58.0	
T_e	11.1	40.0	35.3	24.0	18.6	28.0	34.1	22 6.1	
T_f	Moving 14.8	43.8	39.8	28.0	24.0	33.3	37.7	10.3	
T_g	18.7	47.5	44.0	32.1	29.3	38.3	41.3	14.6	
T_h	22.5	51.2	48.3	36.2	34.7	43.0	45.2	18.7	
Sum		182.5	167.4	120.3	106.6	142.6	158.3	49.7	
Mean		45.63	41.85	30.07	26.65	35.65	39.58	12.43	
Red. to T_m		13.14	15.26	14.16	18.97	17.74	12.81	14.63	
Sum = s		2 35 32.49	2 41 26.59	2 45 15.91	3 31 7.68	3 46 17.91	3 59 26.77	4 21 57.80	
$\frac{1}{6}(T_m - T_s)$		.00	+.04	+.02	+.04	+.02	+.01	+.04	
T		35 32.49	41 26.63	45 15.93	31 7.72	46 17.93	59 26.78	21 57.84	
RA		2 35 24.00	2 41 18.39	2 45 7.59	3 30 59.63	3 46 9.94	3 59 18.38	4 21 49.76	
RA — T		8.49	8.24	8.34	8.09	8.03	8.60	8.08	
— n tang δ		.34	44	39	59	54	33	42	
ΔT + m		8.83	8.68	8.73	8.68	8.58	8.73	8.50	
$T_m - T_\delta$		23.5	27.8	14.0	26.1	21.7	18.7	19.0	
A		4 31.2	3 58.7	1 19.5	2 47.2	1 55.7	3 23.3	2 46.9	
C		28.7	57.3	15.9	45.6	58.37	22.1	46.0	
Sum		59.9	16.0	15.4	12.8	9.8 4	5.4	.9	
Mean		4 29.95	3 58.00	1 17.70	2 46.40	1 54.~~50~~ 40	3 22.70	2 46.45	
Red. for runs		−.31	−.28	−.09	−.19	−.13	−.23	−.19	
Red. to hor. wire		−18.29 −18.79	−18.63 −19.18	−10.11 −18.38	−13.95 −14.46	−18.33 −18.82	−14.98 −15.35	−13.33 −13.65	
Red. to meridian		+.15	+.20	+.05	+.15	+.23	+.09	+.09	
Division error									
Sum		4 11.20 .00	3 38.84 .74	1 7.45 .28	2 32.15 31.90	1 35.81 .78	3 7.40 .21	2 32.84 .70	
Pointer		30	6 50	0	25	30	50	35	
App. z		34 11.20 11.00	58 38.89 38.74	1 7.45 7.28	27 32.15 31.90	31 35.81 35.78	58 7.40 7.21	37 32.84 32.70	
log a′									
A′ log β									
λ log γ		1.7851	1.7851	1.7851	1.7851	1.7851	1.7851	1.7851	
log tang z		9.0430n	9.3622n	9.2396n	9.5704n	9.5203n	8.9405n	9.2980n	y 49.63
log r		.8281n	1.1473n	1.0247n	1.3555n	1.3074n	0.7256n	1.0831n	50.60 52.00
r		−6.73	−14.04	−10.58	−22.64	−20.21	−5.32	−12.11	53.60 50.73
z		34 4.47 .27	53 24.85 .70	0 56.87 .70	27 9.54 .20	31 15.60 57	53 2.08 1.89	37 20.73 20.59	51.61 50.51
φ — z = δ (O)		48 44.1 43.83	29 23.7 23.40	21 51.7 51.40	55 39.1 38.90	51 33.0 32.53	29 46.5 46.21	45 27.9 27.51	358.78
δ (C)		48 40 54.2	55 21 32.8	52 13 59.4	62 47 45.3	60 43 41.8	47 21 54.6	53 37 37.0	y 51.25
δ (C — O)		−7 49.9 7 49.63	50.9 50.60	52.3 52.00	53.8 53.60	51.2 50.73	51.9 51.61	50.9 50.51	51.6

Date 1870 Dec 13 Observer W. A. R. Barom. = 29.87 log B = +.0041
Att. Therm. = 67.6 log T = -.0012
n +.31 Recorder A. M. Ex. Therm. = 36.8 log β = +.0029 log γ +.0103

Runs = -.16 R.

Star.	+ γ Cass	+ γ Andr	+ b Persei	+ 4 Camel	+ 65° 17' 2.26 9 Camel		
	0 49	1 56	2 5	4 38	4 42		
T_δ	0 47 57.3	1 55 55.1	2 5 4.3	4 37 15.1	4 41 9.2		
T_m	48 3.4	56 6.9	10.0	24.1	23.0		
T_e	13.6	13.5	17.7	33.0	35.0		
T_f	18.8	16.8	21.6	37.5	41.3		
T_g	23.4	20.1	25.6	42.0	47.3		
T_h	28.5	23.3	29.5	46.7	53.5	8.03	
Sum	843	737	944	1592	1771	8.05	
Mean	2108	1842	2360	3980	4428	8.20	
Red. to T_m	17.36	11.62	13.63	15.72	21.42	8.07	
Sum = s	0 48 3.72	1 56 6.80	2 5 9.97	4 37 24.08	4 41 22.86	8.18	
$\frac{1}{5}(T_m - T_s)$	+1 -.06	+.02	+.01	00	+.03	53 8.106	
T	48 3.66	1 56 6.82	5 9.98	37 24.08	4 22.89		
RA	0 48 56.15	1 55 59.05	2 5 2.15	4 37 16.48	4 41 15.41		
RA — T	- 7.51	7.77	7.83	7.60	7.48		
— n tang δ	- .52	28	37	47	70		
ΔT + m	- 8.03	- 8.05	- 8.20	- 8.07	- 8.18		
$T_m - T_\delta$	12.1	11.8	5.7	9.0	13.8		
A	4 26.4	2 33.4	2 15.9	3 54.3	3 26.4		
C	20.3	27.1	8.2	49.1	16.5		
Sum	4 36.7	60.5	24.1	103.4	42.9		
Mean	4 ~~18~~ 23 35	2 30.25	2 12.05	3 51.70	3 21.45		
Red. for runs	-.68	-40	-.34	-.61	-53		
Red. to hor. wire	-8.98	-10.39	-42.78 4.28	-5.87	-6.60		
Red. to meridian	-.04	-.05	-.01	-.03	-.04		
Division error							
Sum	4 8.65	2 19.42	2 ~~28.92~~ 7.42	3 45.19	3 14.28		
Pointer	10	0 30	35 45	40	5		
App. z	14 8.65	32 19.42	47 ~~28.92~~ 7.42	43 45.19	8 14.28		
log a'	1.7614						
A' log β	+.0029						
λ log γ	.0103	1.7746	1.7746	1.7746	1.7746		
log tang z	9.5022 n	8.0815	9.1524 n	9.4011 n	9.6431 n		
log r	9.5725 1.2768 n	9.8561	0.9270 n	1.1767 n	1.4177 n		
r	-18.92	+.41	-8.45	-15.00	-26.17		
z	13 49.73	32 20.13	47 ~~20.47~~ 58.97	43 30.19	7 48.11		
φ — z = δ (O)	8 58.9	50 28.5	35 ~~28.39~~ 49.6	39 18.4	15 00.5		
δ (C)	60 1 11.4	41 41 37.1	50 27 58.5	56 31 27.7	66 7 10.0		
δ (C — O)		7 51.4	57.1	50.7	7 50.5		50.9

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Date 1870 Dec 13 | Observer A. M. | Barom. = | log B =

n | Recorder W. A. R. | Att. Therm. = | log T =

Ex. Therm. = | log β = | log γ

Star.	θ Persei	η Persei	τ Persei	9H Camel	ο Persei	1 Camel fol Gr 716	
	2 36	2 42	2 45	3 46	4 00	4 22	3 31
T_δ	2 35 19.4	2 41 12.4	2 45 3.7	3 45 53.9	3 57 19.1	4 21 44.0	
T_m	32.0	26.0	15.4	46 17.4	26.2	57.3	
T_e	39.3	34.7	23.4	27.7	33.6	22 5.8	
T_f	43.0	39.0	27.5	31.8	37.1	10.0	
T_g	46.8	43.5	31.6	37.9	40.8	14.0	
T_h	50.5	47.9	35.6	42.8	44.7	18.3	
Sum	179.6	165.1	118.1	140.2	156.2	48.1	
Mean	44.90	41.28	29.52	35.05	39.05	12.02	
Red. to T_m	13.14	15.26	14.16	17.74	12.81	14.63	
Sum = s	2 35 31.76	2 41 26.02	2 45 15.36	3 46 17.31	3 59 26.24	4 21 57.39	
$\frac{1}{5}(T_m - T_s)$	+.05	.00	+.01	+.02	−.01	−.02	
T	35 31.81	41 26.02	45 15.37	46 17.33	59 26.23	21 57.37	
RA	2 35 24.00 3.98	2 41 18.36	2 45 7.56	3 46 9.94	3 59 18.37 .40	4 21 49.78	
RA − T	7.83	7.66	7.81	7.39	7.83	7.59	
− n tang δ	35	45	40	55	34	42	
ΔT + m	−8.18	−8.14	8.21	7.94	−8.17	−8.07	
$T_m - T_\delta$	12.6	13.6	11.7	23.5	7.1	13.3	
A	4 20.7	3 50.0	1 19.2	1 52.2	3 15.1	2 46.0	2 44.3
C	16.8	47.9	13.0	46.6	11.1	40.5	39.9
Sum	37.5	97.9	32.2	98.8	26.2	86.5	84.2
Mean	4 18.45	3 48.95	1 16.10	1 49.40	3 13.10	2 43.25	2 42.10
Red. for runs	−.69	−.60	−.20	−.30	−.51	−.43	
Red. to hor. wire	−9.81	−9.11	−8.45	−13.54	−5.68	−9.33	
Red. to meridian	−.05	−.05	−.04	−.13	−.01	−.05	
Division error							
Sum	4 8.2	3 39.2	1 7.4	1 35.4	3 6.9	2 33.4	
Pointer	30	6 50	0	30	50	35	25
App. z	34 8.2	53 39.2	1 7.4	31 35.4	53 6.9	37 33.4	
log a′							
A′ log β							
λ log γ	1.7746	1.7746	1.7746	1.7746	1.7746	1.7746	
log tang z	9.0430n	9.3622n	9.2396n	9.5203n	8.9405n	9.2980n	
log r	0.8176n	1.1368n	1.0142n	1.2949n	0.7151n	1.0726n	
r	−6.57	−13.7	−10.3	−19.7	−5.2	−11.8	
z	34 1.6	52 ~~50.2~~ 25.5	0 57.1	31 15.7	53 1.7	37 21.6	
φ − z = δ (O)	48 47.6	29 ~~58.4~~ 23.1	21 51.6	51 32.9	27 46.9	45 27.0	
δ (C)	48 40 56.8	55 21 33.8 3.4	52 14 0.0	60 48 42.6	47 21 55.8	53 34 37.6	
δ (C − O)	7 52.3	49.7	7 51.6	7 50.3	7 51.1	7 49.4	

09

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Date Dec 14 1870　　Observer W. A R　　Barom. =　　log B =

Att. Therm. =　　log T =

n　　Recorder W. A. R.　　Ex. Therm. =　　log β =　　log γ

Star.	+ α X α Peg.	+o 6/24 √ β Ceph.	+κ ϑ, X α Piscium	+ X λ Andr.	+ T X ψ Andr.	+ X ω Piscium	+ X √ Polaris S.P.	ge + X Geminorum	+ X ρ Cass
	22 59	23 13	23 21	23 31	23 34	23 53	1 13	13 28	23 48
T_δ	22 58 14.0	23 13 7.0	23 21 22.4	23 31 15.0	23 34 0.4	23 52 35.8	8 5.37 5.56 5.51 5.78	13 28 1.4	23 47 57.4
T_m	16.7	36.4	25.0	22.0	10.4	38.4		3.7	6.5
T_e	19.0	39.4	27.4	29.3	17.3	40.8	12 1.88 2.25 2.25 2.62	6.2	15.1
T_f	21.7	45.9	32.3	32.8	20.7	43.2		8.8	24.3
T_g	26.8	52.3	37.4	36.5	24.0	48.4	15 4.50 4.84 4.84 5.18	13.7	41.9
T_h	31.9	58.8	39.8	39.8	27.4	53.2		18.7	59.2
Sum	34.5	196.4	42.3	138.4	89.4	55.7	17 2.64 3.06 3.07 3.50	21.0	82
Mean	37.0	49.10	44.9	34.60	22.35	58.3		23.5	16.4
Red. to T_m	39.6	22.56		12.43	11.98	60.7	19 9.8 12.8 13.4 17.6	26.0	26.0
Sum = s	241.2	26.54	291.5 32.39	22.17	10.37	434.5		123.0	375.3
$\frac{1}{5}(T_m - T_s)$	22 58 26.80	+.03		-.03	.401		20 5.45 5.78 5.81 6.20	13.66	41.70
T	58 26.80	23 13 26.57	23 21 32.39	23 31 22.14	23 34 10.37	23 52 48.28		13 28 13.66	23 48 41.70
RA	22 5 18.81	13 19.38	24.20				18 22.65 6 0.70	6.45	Rej
RA — T	-7.99	-7.19	-8.19				12 21.95 .06	8.21	
— n tang δ			Rej				1 12 22.11		
ΔT + m	ε								
$T_m - T_\delta$									
A		1 10.0		4 31.7	2 55.1				
C		00.0		26.0	50.0				
Sum		10.0		57.7	105.1				
Mean		1 05.0		4 28.85	2 52.55				
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer		50		25	35				
App. z									
log a'									
A' log β									
λ' log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Dec 18 1870 Observer W. A. R.
n Recorder A. M.

Barom. = 29.88
Att. Therm. = 61.0
Ex. Therm. = 27.5

log B = +.0042
log T = −.0011
log β = +.0031

log γ +.0184

Star.	ζ Cass	α Cass	η Cass	γ Cass.	γ Persei	γ Cephei α Persei	Polaris S.P.	ζ Virginis	α ~~α Bootis~~ η Urs Maj.
	0 30	0 33	0 42	0 49	2 56	~~23~~ 34	1 13	13 28	13 43
T_δ	0 29 42.3	0 33 6.3	0 41 12.7	0 48 49.7	2 55 17.9	23 33.--	1 12 10.3	13 28 1.4	13 42 20.6
T_m	55.0	19.4	25.9	39	36.0	--	14.5 14.3 18.0	4.0	33.1
T_e	3.3	28.2	34.9	13.8	44.3	33 ~~27.2~~	15 34.9	6.4	40.7
T_f	87.3	32.6	39.7	18.7	48.5	33.0	39.4 40.1 46.1	9.0	44.5
T_g	10.6	37.0	44.0	23.5	52.6	49.3	17 21.0	13.8	48.6
T_h	15.6	41.2	48.8	28.6	56.7	10.8	23.0 23.7 27.3	18.8	52.5
Sum	37.8	139.0	167.4	84.6	202.1	32.6	19 27	21.2	186.3
Mean	9.45	34.75	41.85	21.15	50.52	43.4	6.8 8.3 7.7	23.6	46.58
Red. to T_m	14.48	15.44	15.98	17.36	14.41	54.7	13.0	26.2	13.47
Sum = s	55.03	19.31	25.87	3.79	36.11	5.5	20 48.7 51.5 51.9 55.5	124.4 13.82	33.11
$\frac{1}{5}(T_m - T_s)$	+01	+02	01	+02	−02		18 15.55		
T	55.04	0 33 19.33	0 41 25.88	0 49 3.81	2 55 36.09		6 0.70	13 28 13.82	42 33.11
RA							12 15.15		
RA − T							−17		
− n tang δ							12 14.98		
ΔT + m									

$T_m - T_\delta$									
A	4 2.2	0 29.3	2 27.0	4 56.3 18.2	for i 26.8 430.1		for i 3 47.7 4 16.1		2 57.2
C	59.4	25.9	23.7	51.1 13.0	21.9 26.2		37.2 5.6		56.2
Sum	1.6	15.2	9.7	7.4 11.2	8.7 56.3		84.9 21.7		13.4
Mean	4 0.80	0 27.60	2 24.85	4 53.70 15.60	24.35 4 28.15		3 42.45 4 10.85		2 56.70
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	0	25	5	10	15 10		50		15
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ − z = δ (O)									
δ (C)									
δ (C − O)									

Date Dec 18 1870 Observer A. M. Barom. = log B =

Att. Therm. = log T =

n Recorder W. A. R. Ex. Therm. = log β = log γ

Star.	α Persei	2 H Cam	ο Persei	α Aurigae	ο Aurigae	
	3 15	3 19	3 22	5 7	5 36	
T_δ	3 14 550	3 18 147	3 22 200	5 8 553	5 35? 51.6?	
T_m	155	467	361	104	~~+2.2~~	
T_e	230	56.6	435	181	− 7.65 205	12.82
T_f	269	13	473	220	− 11.49 245	13.01
T_g	307	62	507	258	− 15.29 283	13.01
T_h	345	110	547	295	19.21 320	12.79
Sum	130.6 ~~115.1~~	307.8 ~~15.1~~	232.3 ~~186.2~~	105.8 ~~93.4~~	102.3 5	
Mean	26.12 ~~28.78~~	19 0.36 ~~3.78~~	46.46 ~~49.05~~	21.16 ~~23.85~~	~~25.38~~ 26.32	
Red. to T_m	−10.66	−13.66	−10.28	−9.96	−13.42	−10 s
Sum = s						
$\frac{1}{5}(T_m - T_s)$						
T	3 15 15.46	18 46.70	22 36.18	5 9 11.20	36 ~~35~~ 12.46 .91	
RA						
RA — T						
— n tang δ						
ΔT + m						
$T_m - T_\delta$						
A	1 22.7	for. i 1 19.6	0 10.2	for. i 3 28.8	4 27.3	
C	20.2	(1 36.7) ~~3~~ 17.5	7.0	(4 14 0.0) 28.7	26.3	
Sum	2.9	11.2 17.1	17.2	(4 0.70) 1.5	13.6.	
Mean	1 21.45	35.60 18.55	0 8.60	3 28.75	4 26.80	
Red. for runs		~~for. i~~			ο Aurigae	
Red. to hor. wire	1 22.7	for. i 1 36.7 19.6	0 10.2	for. i 4 1.4 3 28.8	4 27.3	
Red. to meridian	20.2	34.5 17.5	7.0	0.0 28.7	26.3	
Division error						
Sum	1 21.45	1 35.60 18.55	0. 8.60	4 0.70 3 28.75	4 26.80	
Pointer	50	45	50	20	25	
App. z						
log a′						
A′ log β						
λ log γ						
log tang z						
log r						
r						
z						
φ — z = δ (O)						
δ (C)						
δ (C — O)						

Date Dec 22 1870 Observer W. A. R. Barom. = 30.24 log B = +.0094

n Recorder A. M. Att. Therm. = 64.2 log T = −.0012

Ex. Therm. = 16.2 log β = +.0082 log γ +.0286

Star.	+ × α Cass	+ × η Cass	+ × ~~β~~ γ Cass	+ × β Persei	+ × ι Aurigae ~~Polaris~~	+ × δ Aurigae	+ × β Aurigae	+ × ~~Polaris~~ ✓	+ × ~~ζ Virginis~~	+ × ~~α Bootis~~
	0 33	0 42	0 49	3 0	5 43	5 49	5 50	1 13	13 28?	14 40
T_δ	0 33 8.9	0 41 9.3	0 48 46.0	3 0 44.8	5 42 27.5	5 48 51.4	5 50 1.0			
T_m	18.7	25.0	2.9	54.4	54.40 40.8	2.0	11.5			
T_e	27.3	34.4	12.8	−6 52 0.8	54 28 46.9	10.6	18.6			
T_f	31.8	38.7	18.0	—	49.9	14.7	22.0			
T_g	35.8	43.1	22.8	—	53.0	18.9	25.7			
T_h	40.6	47.7	27.8	—	56.6	23.3	29.0			
Sum	~~135.5~~ 154.2	~~153.7~~ 188.9	~~81.4~~ 84.3		~~206.4~~ 247.2	~~61.5~~ 69.5	~~95.3~~ 106.8			
Mean	~~33.88~~	~~40.78~~	~~20.35~~		~~51.60~~	~~14.88~~	~~23.82~~			
Red. to T_m	30.84	37.78	16.86		49.44	13.90	21.36			
Sum = s	−12.35	−12.78	−13.88	− 6.52 54.28	−8.94	−11.87	−9.80			
$\frac{1}{5}(T_m - T_s)$										
T	0 33 18.49	41 25.00	49 2.98	0 54.34	42 40.51	49 2.03	50 11.56			
RA										
RA — T										
— n tang δ										
ΔT + m										
$T_m - T_\delta$										
A	0 ~~29.5~~ 14.9	2 ~~27.0~~ 13.2	4 58.9 ~~56.3 18.2~~	2 27.9	3 26.2	3 52.1	4 5.0			
C	~~25.9~~ 11.8	~~22.7~~ 9.1	53.0 ~~51.3 13.0~~	18.9	25.4	50.0	2.8			
Sum	~~15.2~~ 6.7	~~9.7~~ 22.3	~~7.6~~ 31.2	41.8	11.6	2.1	7.8			
Mean	0 ~~27.60~~ 13.35	2 ~~24.85~~ 11.15	4 ~~53.80~~ ~~53.95~~ 15.60	2 20.90	3 25.80	3 51.05	4 3.90			
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum										
Pointer	25	5	10	45	5	55	15			
App. z										
log a′										
A′ log β										
λ log γ										
log tang z										
log r										
r										
z										
φ — z = δ (O)										
δ (C)										
δ (C — O)										

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Date Dec 22 1870 Observer A. M.

n

Recorder W. A. R.

Barom. =

Att. Therm. =

Ex. Therm. =

log B =

log T =

log β =

log γ

Star.	+ + α Persei	+ + ✓ 2 He Camel	+σ + o Persei	+○ + δ Aurigae
	3 15	3 19	3 22	5 36
T_δ	3 14 45.4	3 18 32.1	3 21 16.5	5 35 32.2
T_m	15 14.8	46.0	36.7	36 2.2
T_e	22.4	56.0	44.0	9.7
T_f	26.3	0.8	47.2	13.7
T_g	29.9	5.4	51.5	17.4
T_h	33.7	10.5	55.0	21.4
Sum	~~142.3~~ 127.1	~~15.9~~ 298.7	~~147.1~~ 234.4	~~82.2~~ 64.4
Mean	~~28.08~~ 25.42	~~3.18~~ 59.74	~~49.42~~ 46.88	~~15.55~~ 12.88
Red. to T_m	− 10.66	− 13.66	− 10.28	− 10.73
Sum = s				
$\frac{1}{5}(T_m - T_s)$				
T	3 15 14.76	18 46.08	21 36.60	5 36 2.15
RA				
RA − T				
− n tang δ				
ΔT + m				
$T_m - T_\delta$				
A	1 13.7	1 4.7	2 14.0	4 17.0
C	9.7	59.1	9.2	16.0
Sum	23.4	3.8	23.2	13.0
Mean	1 11.70	1 1.90	2 11.60	4 16.50
Red. for runs				
Red. to hor. wire				
Red. to meridian				
Division error				
Sum				
Pointer	50	45	40	25
App. z				
log a′				
A′ log β				
λ log γ				
log tang z				
log r				
r				
z				
φ − z = δ (O)				
δ (C)				
δ (C − O)				

Date Dec 26 1870 Observer W. A. R.

n Recorder W. A. R. & A. M.

Barom. = 30.1

Att. Therm. = 63.5

Ex. Therm. = 24.5

log B = +.0073

log T = −.0012

log β = +.0061

log γ +.0211

Star.	α Piscium	α Andr.	ξ Cass	α Cass	ο Cass	ζ Cass	δ Cass ~~Polaris~~ S.P.	Polaris	ζ Persei	
	23 53	0 2	0 30	0 33	0 38	0 42	1 18	1 13	1 30	
T_δ	23 52 33.7	0 1 34.2	0 29 37.5	0 32 58.3	0 37 25.8	0 41 4.5	4 30.65	1^h 2 59.4	1 30 17.8	
T_m	36.3	37.0	52.6 0.9	16.9	37.7	23.4		66.3 73.8	−7.42 21.5	14.08
T_e	38.7 41.2	38.8	5.0 9.0	25.7	45.0	32.5	(4 52.4 8 35.6)	4 48.7 57.9	−11.10 25.0	13.90
T_f	46.2	42.6	13.2	30.2	48.7	37.0		56.6	−14.76 28.9	14.24
T_g	51.2 53.6	48.2 53.9		34.5	52.3	41.6	5 35.5	5 31.6 35.5	18.55 33.5 32.5	13.95
T_h	56.0	56.7 59.5		38.9	56.0	46.2	+5 7.7	39.3		16.17
Sum	58.6 415.5	2.4 433.3	20.7	146.2	239.7	180.7	8 17.0	8 13.5 16.7 20.8		
Mean	46.17	48.14	30 40.14	29.24	47.94	36.14	+3 26.2	10 37.3 41.9		
Red. to T_m			−11.58	−12.35	−10.28	−12.78	10 42.2	44.3		
Sum = s								14 4.2 9.7		
$\frac{1}{5}(T_m - T_s)$							14 9.3 − 3 26.2	14.0		
T	23 52 46.17	0 1 48.14	29 52.56	33 16.89	37 37.66	41 23.36			30 ~~8.23~~ 14.04	
RA							10 43.2			
RA — T							43.2			
— n tang δ							42.2 43.5			
ΔT + m							10 43.02			
$T_m - T_\delta$										
A			4 1.2	0 31.5	0 25.3	2 26.7	1 25.3		1 16.5	
C			0.0	28.0	21.9	24.9	20.5		12.8	
Sum				59.5	7.2	11.6	5.8		9.3	
Mean			4 0.60	0 29.75	0 23.60	2 25.80	1 22.90		1 14.65	
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum										
Pointer			0	25	40	35	40		15	
App. z										
log a′										
A′ log β										
λ log γ										
log tang z										
log r										
r										
z										
φ — z = δ (O)										
δ (C)										
δ (C — O)										

Rej

Date Dec 31 1870
n ~~+29~~

Observer W. A. R.
Recorder A. M.

Barom. = 2978
Att. Therm. = 629
Ex. Therm. = 31.6

log B = +.0026
log T = −.0012
log β = +.0014 ✓
log γ .0149

	1,73 +	1,70 +	1,14 +	1,45 +	1,33 +	+ 85	+ 1,17	+ 1,70	+ 1,09
Star.	+ γ Cass	+ δ Cass.	+ ο Persei	+ η Persei	+ γ Persei	+ β Persei	+ α Persei	+ 2 H Camel	+ σ Persei
	0 49	1 18	2 36	2 42	2 56	3 00	3 15	3 19	3 22
T_δ	0 48 48.0	1 17 11.6	2 35 14.3	2 41 5.7	2 55 8.4	2 59 41.3	3 14 54.3	3 18 20.5	21 0.0
T_m	59.0	26.7	27.7	21.8	31.7	50.7	11.2	42.3	33.1
T_e	9.2	36.9	35.0	30.4	40.0	57.0	18.9	52.0	40.4
T_f	14.2	41.5	38.8	34.6	44.0	0.4	22.5	56.8	44.0
T_g	18.9	46.4	42.6	39.0	48.1	3.8	26.3	1.8	47.8
T_h	23.8	51.3	46.3	43.4	52.1	7.0	30.2	6.7	51.6
Sum	661	1759	1627	1474	1842	2482	979	2373	1838
Mean	16.52	43.98	40.68	36.85	46.05	62.05	24.48	59.32	45.95
Red. to T_m	17.98	17.11	13.13	15.25	14.40	11.39	13.32	17.07	12.84
Sum = s	59.05	26.87	27.55	21.60	31.65	30.66	11.16	42.25	33.11
$\frac{1}{5}(T_m - T_s)$	−.01	−.03	+.03	+.04	+.01	+.01	+.01	+.01	.02
T	0 48 59.05	1 17 26.84	2 35 27.52	2 41 21.64	2 55 31.66	2 59 50.67	3 15 11.17	3 18 42.26	3 21 33.11
RA	48 55.61	17 23.26	35 23.77	2 41 18.10	55 28.04	59 46.77	15 7.49	18 38.73	21 29.32
RA − T	−3.44	−3.58	−3.75	−3.54	−3.62	−3.90	−3.68	−3.53	−3.79
− n tang δ	51	49	33	42	39	24	34	49	32
ΔT + m	3.95	4.07	4.08	3.96	4.01	−4.14	4.02	4.02	4.11
$T_m - T_\delta$									
A	4 14.6	1 31.5	4 22.1	3 50.4	0 27.3	2 40.9	1 17.5	1 11.0	2 26.1
C	11.0	27.2	17.1	48.3	22.7	36.9	14.7	6.0	22.4
Sum	5.6	58.7	39.2	98.7	10.0	77.8	12.2	17.0	8.5
Mean	4 12.80	1 29.35	4 19.60	3 49.35	0 25.00	2 38.90	1 16.10	1 8.50	2 24.25
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	10	40	30	50	15	45	50	45	~~224~~ 40
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ − z = δ (O)									
δ (C)	60 1 12.4	59 33 59.2	48 40 56.7	55 21 36.1	53 0 2.3	40 27 27.2	49 24 5.2	59 29 24.0	47 32 54.7
δ (C − O)									

3.55
4.07
4.08
3.96
4.01
4.14
4.02
4.02
4.11
36.36
4.04

9
3
4
2
3
10
2
2
7

3.55
4.07
8.02
4.01
4.05
3.56
4.01
4.14
16.19
4.05
4.02
4.02
4.11
15
4.05

Date Dec 31 1870
Observer W.A.R.
Recorder W.A.R.
n +33

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

					1.19 49.56 ~~19.03~~	2.14 64.59	36 19.51	130 52.77	4.09 76.16
Star.	Polaris		Polaris S.P.		η Urs. Maj.	α Draconis	α Bootis	δ Bootis	5 Urs. Min.
	1 13				13 43	14 1	14 10	14 21	
T_δ	Ta 1 3 3 {-46 05 63	3 06.4 Tm 8 35.6	13 11 56.1 {0.7 66	12 1.13	13 42 12.0	14 0 48.1	14 9 35.0	14 20 31.0	14 26 57.3
T_m	Tb 4 {40.2 45.6 50.4	4 45.50 Td 6 50.0	15 {23.2 27.8 33.3	15 28.10 3 26.2	29.3	55 55.3	38.4	50.0	27 7.7
T_e	Tc 6 {21.1 27.6 33.0	6 27.23 Tc 7 7.7	17 {3.8 10.6 16.0	17 10.13 5 7.70	34.0	6.9	41.2 43.9	58.3	18.3
T_f	Td 8 {6.4 12.1 16.3	8 11.70 Tb	18 {41.8 53.0 58.1	18 53.30 6 50.0	40.8	12.9	49.2	2.3	28.8
T_g		3 26.2 Ta	20 {33.0 39.2 44.0	20 38.73 8 35.6	44.9	18.8	54.5	6.4	27 50.0
T_h	Tm 11 39				48.8	24.6	57.0	10.6	10.5
Sum					171.5	63.2	59.7	257.6	20.4
Mean		5 51.28		12 1.0	42.88	15.80	2.2	64.40	31.0
Red. to T_m		1 11 36.3		1.9	13.47	20.50	~~40.64~~	14.23	41.9
Sum = s		35.5		2.4	29.41	55.30		30.17	266.2
$\frac{1}{5}(T_m - T_s)$		35.4		3.3	-0.3	02		-0.3	18.0
T		37.9		3.1	13 42 29.38	14 0 55.30	14 9 49.05	14 20 50.14	446.2
RA		25.6		117	25.83	0 51.95	9 45.14	14 20 46.52	27 49.58
RA − T		1 11 36.40		13 12 2.34	-3.55	-3.35	-3.91	-3.62	27 46.63
− n tang δ		11 44.89		49.49	40	71	12	43	-2.95
ΔT + m		+8.49		+17.85	-3.95	-4.06	-4.03	-4.05	1.36 -4.31
$T_m - T_\delta$	-1 1	0 54 42.0	-1	13 9 43.0	+1 13 48 43.5	-14 59 05.0 1		-14 19 24.8	-14 24 10.0
A	2	1 2 8.0	-2	11 32.0		- 0 0.0		+ 22 4.0	- 25 8.8
C	3	4 20.8	+1	14 54.0		+ 3 16.3			- 26 4.8
Sum	4	5 59.5	+2	17 30.5					- 26 49.3
Mean	5	7 49.8	2c	19 15.0					+ 29 0.0
Red. for runs	-6	10 31.0		21 7.0					+ 30 3.0
Red. to hor. wire				22 13.1					+ 30 57.8
Red. to meridian				23 20.4					+ 31 47.8
Division error				24 21.2					
Sum				25 17.2					35.5
Pointer				26 12.0					4.06 4.03
App. z				27 2.0					4.05 16.09
				27 59.0					-4.02
log a′				28 47.8					
A′ log β				30 4.0					
λ log γ				31 58.5					
log tang z				32 0.8					
log r				32 47.8					
r				33 47.0					
z				35 17.0					
φ − z = δ (O)				36 28.9					
δ (C)				37 39.5	19 2 43.3	64 59 24.0			
δ (C − O)									

Date Dec 31 1870   Observer H. M.   Barom. =   log B =

n +29   Recorder W. A. R.   Att. Therm. =   log T =

Ex. Therm. =   log β =   log γ

Star.	+ 109 + S Persei 3 34	+ 91 + δ Persei 3 37	+ 436 + 1 Camel ~~α Aurigae~~ 4 22	+ 1.96 + 17 Camelop. 5 18	+ 119 + ο Aurigae 5 36	chf α Aurigae 5h 7m	
T_δ	3 33 32.0	3 36 18.8	4 21 33.7	5 17 45.7	5 35 47.3		
T_m	48.7	30.1	53.4	4.0	58.9		
T_e	56.0	36.8	1.9	14.8	66.5		
T_f	59.8	40.0	6.3	20.3	70.3		
T_g	3.5	43.4	10.5	25.7	74.0		
T_h	7.0	46.9	14.7	31.3	78.0		
Sum	24.63	16.71	33.4	92.1	28.88		
Mean	61.58	41.78	8.35	23.02	72.20		
Red. to T_m	12.80	11.70	14.62	19.06	13.42		
Sum = s	48.78	30.08	53.73	39.6	58.78		
$\frac{1}{5}(T_m - T_s)$	−02	0	−.06	+1	+2		4.10
T	3 33 48.76	3 36 30.08	4 21 53.60	5 18 39.7	5 35 58.80		09 27
RA	44.98	36 26.25	49.79	17 60.86	35 54.96		18 19
RA — T	−3.78	−3.83	−3.88	−3.61	−3.84		.83
— n tang δ	32	36	39	57	35		−4.17
ΔT + m	4.10	4.09	4.27	4.18	4.19		

4.10
4.09
4.23
46
4.15

$T_m - T_\delta$							
A	2 55.5	4 61.4	2 45.8	3 ~~24.2~~ 13.3	4 16.5	3 24.2	
C	54.3	58.4	44.2	~~24.0~~ 11.4	17.0	24.0	
Sum	9.8	119.8	10.0	4.7	13.5		
Mean	2 54.90	~~4~~ 3 59.90	2 45.06	3 12.35	4 16.75	3 24.10	
Red. for runs							
Red. to hor. wire							
Red. to meridian							
Division error							
Sum							
Pointer	50	0	35	20	25	20	
App. z							
log a'							
A' log β							
λ log γ							
log tang z							
log r							
r							
z							
φ — z = δ (O)							
δ (C)	47 22 24.4	42 10 9.0	58 37 41.0	62 57 21.0	49 45 58.7		
δ (C — O)							

Date Jan. 1 1871 Observer W. A. R.

n = +.35 Recorder

Barom. = 29.98
Att. Therm. = 61.4
Ex. Therm. = 19.0

log B = +.0056
log T = −.0011
log β = +.0045

log γ +.0261

	+ ✓	+1.11	+1.19	+1.45	+1.33	+.85	+1.17	+.70 ✓	+.09
Star.	+ Polaris	+ ν χ Persei	+ ο Persei	+ η Persei	+ γ Persei	β Persei	+ α Persei	+ 2 H Cam	+ ο Persei
	1 13	1 30	2 36	2 42	2 56	3 00	3 15	3 19	3 22
T_δ	1 2 47.4	1 29 58.2	2 35 10.8	2 41 1.3	2 55 19.5	2 59 34.5	3 14 54.0	3 18 21.5	3 21 15.8
T_m	55.0 60.7	02 54.4 8.0	27.3	21.3	31.4	50.4	10.9	41.7	32.8
T_e	4 35.3	15.2	34.4	30.0	39.4	56.4	18.5	57.9	40.2
T_f	39.6 41.7	4 41.2 19.1	38.5	34.3	43.4	60.1	22.2	56.5	43.4
T_g	(48.3) 6 13.9	23.6	42.2	38.8	47.8	63.4	26.2	61.4	44.6
T_h	24.6 28.9	6 22.5 16 ~~27.5~~	46.1	43.0	51.9	66.4	29.8	66.4	51.2
Sum	8 2.8	844	1615	1461	1831	2469	967	2362	1827
Mean	6.9 10.9	8 6.9 11 21.~~35~~	4038	3652	4578	6172	2418	5905	4568
Red. to T_m	11 26.6	11 33.0 12.95	13.13	15.25	14.41	17.40	13.33	17.08	12.85
Sum = s	33.0 39.3	8.~~40~~ 45	27.25	21.27	34.37	50.32	10.85	41.97	32.83
$\frac{1}{5}(T_m - T_s)$	14 56.5	16 −.03	+.01	+.01	+.01	+.02	+.01	−.05	−.01
T	59.4 65.5	15 0.3 13 30 8.~~37~~	27.26	21.28	31.38	50.34	10.86	41.92	32.82
RA	16 33.0	30 4.43	23.75	18.08	28.02	46.25	7.47	38.71	29.30
RA − T	41.2 47.0	16 40.4 3.69	3.51	3.20	3.36	3.59	−3.39	−3.21	−3.52
— n tang δ	18 20.8	18 26.5 39	40	51	47	30	41	59	38
ΔT + m	24.0 31.7	4.08	3.91	3.71	3.83	3.89	3.80	3.80	3.90
	20 5.3 10.9 16.5	20 10.9 235.1							
$T_m - T_\delta$		255.1 33.7							
A		1 47.6	4 24.0	3 52.6	0 19.2	2 44.8	1 19.8	1 12.3	2 25.1
C	1 11 32.99	43.3	21.0	51.~~8~~ 2	16.1	43.0	15.0	7.1	20.9
Sum	11 44.10	10.9	5.0	3.~~4~~ 8	15.3	7.8	14.8	19.4	6.0
Mean	17.31	1 45.45	4 22.50	3 51.9~~5~~ 0	0 17.65	2 43.90	1 17.40	1 9.70	2 23.00
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer		15	30	50	15	45	50	45	40
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

4.08
3.91
3.71
3.83
3.89
3.80
3.80
3.90
30.92
3.86

22
5
15
3
3
6
6
4
70
08

Date Jan 7/187 Observer W.A.R. Barom. = 3020 log B = .0088
n +25 Recorder A.M. Att. Therm. = 619 log T = -.0011 log γ .0346
Ex. Therm. = 9.5 log β = +.0077

83
84
80
101
103
81
98
104
754
94

Star.	ε Cass.	α Cass	o Cass	η Cass	ι Persei	η Persei	γ Persei	β Persei
	+1.34	+1.47	+.09	+1.15	+.14	+1.45	+1.33	+.85
	0 30	0 33	0 38	0 42 40 520	2 36	2 42	2 56	3 00
T_δ	0 29 27.4	0 33 42.4	0 37 25.0	0 41 17.9	2 35 12.6	2 41 9.2	2 55 13.3	2 59 36.7
T_m	47.0	11.3	32.3	27.0	24.6	18.5	28.6	47.5
T_e	55.4	20.3	39.7	31.5	31.9	27.1	36.9	54.6
T_f	59.3	24.8	43.1	36.4	35.6	31.6	40.9	57.3
T_g	3.7	29.0	47.0	41.0	39.4	36.0	45.0	0.5
T_h	8.0	33.2	50.4	/	43.0	40.3	49.0	3.8
Sum	2464	1073	1802	1359	1499	1350	1718	2356
Mean	6160	2682	4505	3398	3748	3375	4295	5890
Red. to T_m	14.48	15.44	12.85	15.98	13.14	15.26	14.41	11.40
Sum = s	47.12	11.38	32.20	18.00	24.34	18.49	28.54	47.50
$\frac{1}{5}(T_m - T_s)$	-02	-02	+.02	-02	+5	0	+1	0
T	47.10	11.36	32.22	17.98	24.39	18.49	28.55	47.50
RA	46.57	10.88	31.56	17.38	23.65	17.91	27.86	46.69
RA — T	-.53	-.48	-.66	-.65	-.74	-0.58	-0.69	-.81
— n tang δ	-32	-35	26	39	27	35	32	20
ΔT + m	-.85	-.83	-.92	1.04	1.01	.93	1.01	1.01
$T_m - T_\delta$								
A	4 89 ~~480~~ 438	0 07	0 250	2 860	4 21.3	3 45.0	0 20.2	2 39.8
C	60 ~~450~~ 370	57.5 ~~25~~	227	888	18.2	44.0	17.3	37.0
Sum	149	118.2	7.7	9.3	39.5	9.0	37.5	16.8
Mean	4 7.45	59 59.10	0 23.85	2 34.65	4 19.75	3 44.50	0 18.75	2 38.40
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	0	25	40	5	30	50	15	45
App. z								
log a'								
A' log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

85
83
82
104
364
-91

104
101
83
101
101
87
102
689
98

Omitted in its proper place

Date Dec 21 1870 Observer

n Recorder

Barom. =

Att. Therm. =

Ex. Therm. =

log B =

log T =

log β =

log γ

Star.	~~i Cephei~~	~~α Piscium~~	~~ο Cephei~~	Polaris		3 Virginis	η Ursæ Maj		
T_δ				1 13 +1ᵐ 13 1 24.6? ~~12 40~~	~~1 24.6~~ +1ᵐ	13 28 13 29ᵐ 1.0	13 43 13 43 18.7 +1ᵐ		
T_m				4 31.9 37.0 45.2	4 38.0	3.7 4.0	32.8 40.6		
T_e						8.6 13.5	44.4 48.0		
T_f				6 15.0 28.6 30.7	6 24.8	18.4 21.0	52.0		
T_g						23.3 25.9			
T_h				8 0.3 5.4 12.0	8 5.9				
Sum						121.4	217.8		
Mean				9 43.1 46.6 50.8	9 46.8	13.49	43.56		
Red. to T_m							10.77		
Sum = s				13 8.2 13.4 20.4	13 14.0				
$\frac{1}{5}(T_m - T_s)$									
T				16 35.0 39.7 41.6 48.1	16 41.1	13.29 13.49	43 32.79		
RA			18 22.0 24.7 28.8						
RA — T				19 58.1 4.7 7.1 11.0	18 23.2				
— n tang δ					19 5.5				
ΔT + m				21 46.0 50.7 56.6	21 51.1				
$T_m - T_\delta$				T	13 8.05				
A									
C									
Sum									
Mean									
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer									
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

(continued)

Date Jan 7 1871 Observer W. A. R. Barom. = log B =

Att. Therm. = log T =

n +.24 Recorder A. M. Ex. Therm. = log β = log γ

Star.	+ 1.57 α Persei	+ 2 H Camel.	+ 1.09 ? o Persei		+ Jan 7 Polaris 41.66		Jan 9 Polaris		
	3 15	3 19	3 22		1 13		1 13		
T_δ	3 14 56.	19 36.3	21 13.6		0 54 16.7		0 44 39.2	17 15.2 22.5 27.5 (9)	
T_m	8.0	46.4	30.0	2 50.6	2 43.0 50.1 58.6		0 53 7.5 13.3 (1)		
T_e	15.6	-9.78 58.0	48.22 37.4	4 36.9	4 31.5 36.3 43.0	(1) 0 53 13.7	19.3	18 53.0 4.0 (10) 9.8 11.7	
T_f	19.3	-14.63 3.5	48.87 40.9	6 17.6	6 12.1 16.7 23.9	(2) 1 1 49.1	44.0 ~~27.0~~ 48.8 (2)		
T_g	23.0	-19.46 8.0	48.54 44.6	8 2.8	7 53.6 2.2 3.8 9.6	(3) 3 32.7	54.6		
T_h	26.8	-24.46 12.8	48.35 48.3	11 29.7	−11 20.7 30.8 37.7	(4) 29.735 15.7	3 27.0 32.0 (3) 39.2	36 14.0 16.9 19.8 (11)	
Sum	847	2623	1712	14 54.2	14 46.0 54.7 2.0	(5) 7 0.8			
Mean	21.18	65.58	42.80	16 38.6	16 33.9 37.7 39.7 45.1	(6) 10 23.45	5 9.9 15.8 (4) 21.4		
Red. to T_m	13.32	17.07	12.84	18 18.7	18 13.0 17.8 19.3 24.6	(7) 13 53.2			
Sum = s	7.86	48.57	29.96			(8) 15 35.6	6 56.7 0.0 (5) 5.6		
$\frac{1}{5}(T_m - T_s)$	3		+.01	20 3.4	19 57.4 2.7 10.0	(9) 19 2.7			
T	~~14~~ 15 7.89	19 48.50	29.97	103 12.5		(10) ~~19 5.1~~	10 22.3 24.6 (6)		
RA	7.30		29.21	11 28.05	9 ~~11 2.93~~	(11) ~~36 11.9~~	13 44.7 54.0 (7) 0.8		
RA — T	0.59		0.76		11 ~~38.0~~				
— n tang δ	28		26				15 31.0 33.0 (8) 36.8 41.6		
ΔT + m	.87		1.02						

$T_m - T_\delta$					0 2 50.6	49.1	2 49.1		
A	1 15.4	2 46.1	2 24.6		4 39.6		4 32.7		
C	9.9	41.8	20.4		6 17.6		6 15.7		
Sum	25.3	7.9	5.0		8 2.8		8 0.8		
Mean	1 12.65	2 43.95	2 22.50		11 29.7		11 23.4		
Red. for runs					14 54.4		14 53.2		
Red. to hor. wire					16 39.1		16 35.6		
Red. to meridian					18 18.7		18 21.7		
Division error					20 3.4		20 5.1		
Sum							102 57.3		
Pointer	50	40	40				11 26.37		
App. z									
log a'									
A' log β									
λ' log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Jan 8 1871　　Observer A. M.　　Barom. =　　log B =

Recorder W. A. R.　　Att. Therm. =　　log T =

n +24　　Ex. Therm. =　　log β =

log γ

Star.	1.94 + C 716	+ δ Persei	+ 2 Persei	1.36 + 1 Camel	1.03 + α Aurigae	1.56 + 17 Camel	1.19 + o Aurigae	
	3 31	3 34	3 37	4 22	5 7	5 18	5 36	
T_δ	3h 30 21.1			4 21. 30.8	5 6 53.3	5 17 34.6	5 35 39.6	
T_m	59.8			50.3	10.8	1.0	56.0	
T_e	10.4			58.6	18.0	11.9	3.6	
T_f	15.8			2.7	21.4	17.1	7.1	
T_g	21.1			6.9	24.9	22.8	11.0	
T_h	26.4			11.0	28.5	28.4	14.9	
Sum	74.2			259.2	928	802	366	
Mean	18.55			64.80	23.20	20.05	9.150	
Red. to T_m	18.96			14.62	12.45	19.08	13.43	
Sum = s	59.59			50.18	10.75	0.97	55.72	
$\frac{1}{5}(T_m - T_s)$	+04			+02	+1	+1	+06	87
T	59.63			50.20	10.76	18 0.98	55.78	83 89
RA	3 30 59.22			49.70	10.12	0.31	54.96	1 14 1 10
RA — T	-.41			-.50	-.64	-.67	-.82	4 83
— n tang δ	46			33	25	47	28	-.97
ΔT + m	-.87			-.83	-.89	-1.14	-1.10	

$T_m - T_\delta$							
A	2 24.0	2 52.4	4 35.6	2 47.0	3 28.5	3 18.2	4 19.3
C	22.0	49.7	33.0	44.8	26.0	15.3	18.7
Sum	6.0	102.1	8.6	11.8	14.5	13.5	18.0
Mean	2 23.00	2 51.05	4 34.30	2 45.90	3 27.25	3 16.75	4 19.00
Red. for runs							
Red. to hor. wire							
Red. to meridian							
Division error							
Sum							
Pointer	25	2	0	35	20	15	25
App. z							
log a'							
A' log β							
λ log γ							
log tang z							
log r							
r							
z							
φ — z = δ (O)							
δ (C)							
δ (C — O)							

Date Jan 10 1871 Observer W. A. R. Barom. = 30.20 log B = +0088

n Recorder A. M. Att. Therm. = 70.0 log T = −0015

Ex. Therm. = 7.9 log β = +0073 log γ .0317

Star.	+ o Persei	+ o Persei		+ 6 Persei	+ i Cass.	+ 9 H Camel	+ φ Persei	
	2 36	3 22		2 5	2 19	× ×	× ×	
T_δ	2 35 5.8	3 21 23.2		2 4 49.5	2 17 58.8	2 22 24.6	2 25 15.3	
T_m	22.9	28.8		1.0	26.7	33.2	29.2	
T_e	30.5	35.8		8.8	39.3	40.7	37.0	
T_f	34.0	39.6		12.8	45.6	44.7	41.0	
T_g	37.7	43.1		16.6	52.0	48.5	44.9	
T_h	41.8	46.9		20.6	58.2	52.0	49.0	
Sum	166.9	194.2		59.8	221.8	219.1	201.1	
Mean	33.38 ~~35.38~~	38.84		11.96	44.36	43.82	40.22	
Red. to T_m	−10.51	−10.28		−10.90	−17.63	−7.00		
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	35 22.87 ~~24.87~~	21 28.56		5 1.06	17 26.73	22 36.82		
RA								
RA — T								
— n tang δ								
ΔT + m								
$T_m - T_\delta$						9 H. Camel.		
A	4 24.5	2 15.2		lost 5	1 20.9	1 50.1 2 28.0 0 33.1	4 1.7 2 11.1 3 17.6	
C	22.3	14.1			17.5	45.9 25.1 30.9	0.1 8.4 15.4	
Sum	6.8	9.3			38.4			
Mean	4 23.40	2 14.65			1 19.20	1 48.00 2 26.55 0 32.00	4 0.90 2 9.75 3 16.50	
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	30	40			25	30	~~50~~	50
App. z								
log a′								
A′ log β								
λ′ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Jan. 12 1871 Observer W A R Barom. = log B =

n Recorder W. A. R. Att. Therm. = log T =

Ex. Therm. = log β = log γ

Star.	α Andr.	γ Pegasi	ζ Cass	α Cass	ο Cass	η Cass	Br. 82	γ Cass.	Polaris
	0 2	0 7	0 30	0 33	0 38	0 42	0 43	0 49	1 13
T_δ	0^h 1^m — 30.3 33.0 35.7 41.5 47.0 49.9 52.7 55.7 0 47.1 2 49.7	0^h 6 20.1 22.7 26.3 27.8 33.0 38.0 40.6 43.2 45.7 6 0.3 7 33.5	0^h 29 25.0	0 31 55.0	0^h 37 39.5	0 41 29.2 71.3	0 42 21.3	0 48 30.7 53.0	Ta = 1 0 54 1.0 6.0 11.0 0 54 6.0
T_m			−28 35.5 44.4	33 8.7 −32 9.0	−36 47.0 29.5	15.0	43 —	49 2.9	
T_e			52.7	17.2	36.6	23.5	2.6	7.9	1 2 33.1 38.9 47.9 2 40.0 8 35.6 11 15.6
T_f			+30 52.4 56.9	22.0 +34 17.7	+38.45.0 40.7	28.9	8.2	+50 36.5 12.7	4 15.7 22.1 26.0 4 22.3 6 57.0 11 12.3
T_g			1.0	26.3	44.5	33.2	+44 49.3 13.8	18.0	6 4.5 10.1 15.7 6 10.1 5 7.7 11 17.8
T_h			5.2	31.0	48.1	38.1	19.4		
Sum	One second wrong	296.4	30.2	105.2	199.4	139.7	44.0	3 44.5	7 45.6 7 45.6 3 26.2 11 11.8
Mean		32.93	56.04	21.04	39.88	27.94	11.00	49 6 8.90	11 11.3 15.4 20.4 11 15.7 11.8 14.8 12.3 15.4 73.0 14.6
Red. to T_m			−11.58	−12.35	−10.28	−12.78	−19.47	−13.88	
Sum = s									
$\frac{1}{s}(T_m - T_s)$									
T		0 6 32.93	29 44.46	33 8.69	37 29.60	41 42 15.16	42 51.53	48 3 55.02	1^h 11^m 14.60
RA	0 01 42.03	0 6 34.39		0 33 10.74					1 11 33.90
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A									
C									
Sum									
Mean									
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer									
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Jan 17 1871 Observer W. A. R. Barom. = 30.15 log B = +0076

Att. Therm. = 67.0 log T = −.0013

n Recorder A. M. Ex. Therm. = 28.5 log β = +0063 log γ +.0176

	+ ✓		×	+	+	+	×	✓ +
Star.	+ Polaris		+ γ Cass	+ υ Persei	+ δ Persei	+ o Persei	+ c Persei	+ 1 Cam.
	1 13		0 49	1 30	2 36	3 22	4 00	4 22
T_δ	0 45 25.5		0 49 10.9	1 30 21.5	2 35 5.0	3 21 19.1	3 58 56.6	4 21 ~~48.9~~ 28.4
T_m	0 54 1.9		—	—	20.0	25.4	14.8	45.9
T_e	1 2 39.4		1.2	−7.42 —		27.6	33.0	22.0	54.2
T_f	4 25.9		6.3	−11.10 11.8 2	.70 31.8	36.6	25.7	58.3
T_g	6 8.6		11.3	−14.76 15.6	.84 35.0	40.1	29.3	2.6
T_h	7 51.5		16.2	−18.55 19.0	.45 38.8	44.0	33.1	6.6
Sum	11 16.6		35.0		1.99 152.7	179.4	124.9	37.6
Mean	14 42.4		8.75		30.54	35.88	24.98	57.52
Red. to T_m	16 24.1		17.36	0.70 0.84	−10.51	−10.28	−10.24	−11.70
Sum = s	18 7.4		0 40 51.39	0.45				
$\frac{1}{5}(T_m - T_s)$	19 52.4							
T	28 29.8	1 11 16.60	0 ~~49~~ 57.39	1 30 ~~10.66~~	2 35 20.03	3 21 25.60	59 14.74	21 45.82
RA	57 5.6	1 11 29.71	48	0.66				
RA − T								
− n tang δ								
ΔT + m								
$T_m - T_\delta$								
A			3 56.8	1 20.8	4 23.8	2 17.0	3 22.6	2 44.0
C			53.0	15.6	20.0	13.0	19.0	39.9
Sum			9.8	36.4	3.8	10.0	41.6	83.9
Mean			3 54.90	1 18.20	4 21.90	2 15.00	3 20.80	2 41.95
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer			10	15	30	40	50	35
App. z								
log a'								
A' log β								
λ log γ								
log tang z								
log r								
r								
z								
φ − z = δ (O)								
δ (C)								
δ (C − O)								

Date 1871 Jan 17 Observer A. M.
n +.23 Recorder W. A. R.
Barom. =
Att. Therm. =
Ex. Therm. =
log B =
log T =
log β =
log γ

Star.	6 ψ Aurigae	+ 4 Camel	+ ε Aurigae	+ η Aurigae	+ α Aurigae	+ 2 Lyncis	+ ψ' Lyncis aurigae - ψ Lyncis	8 Lyncis	+ 15 Lyncis	+ 19 Lyncis double
	7 9 6s	4 38	4 53	4 58	5 7	6 9	6 15	6 26	6 46	7 13
T_δ	+41° 6'	4h 36m 54s.2	4 52 36.5	4 57 12.1	5 6 49.4	6h 7m 46.5	6 14 34.4	6 25 38.7	6 45 47.7	7 11 50.7
T_m		37 12.8	40.0	25.0	6.4	8 11.7	54.9	37.1	46 3.3	6.7 16.7
T_e		21.7	46.7	31.7	13.6	21.3	2.6	1.7	12.8	17.4 24.9
T_f		26.3	50.3	35.0	17.3	25.0	6.3	6.8	17.6	26.0 29.0
T_g		30.7	53.5	38.3	20.7	31.8	10.0	12.0	22.5	30.4 33.5
T_h		35.2	56.8	41.6	24.4	35.7	14.0	17.1	27.1	34.6 38.0
Sum		126.7	247.3	171.6	76.0	125.5	27.8	28.7	83.3	39.3 141.6
Mean		25.34	49.46	34.32	19.00	25.10	15 5.76	26 5.74	16.66	28.32
Red. to T_m		-12.58	- 9.58	-9.20	12.46	-13.48	-10.65	-14.57	-13.30	- 12.25
Sum = s					6.54					
$\frac{1}{s}(T_m - T_s)$					-.04					
T		4 37 12.76	52 39.88	57 25.12	7 6.50	6 8 11.62	14 55.11	25 51.17	46 3.36	7 12 16.07
RA					5 7 10.08					
RA — T					+3.58					
— n tang δ					-.24					
ΔT + m					3.34					

$T_m - T_\delta$										
A	0 0.6	3 57.0	2 17.0	1 43.6	3 27.3	2 20.8	4 21.8	0 2.3	0 12.4	4 9.0
C	59.1	54.6	13.8	40.3	26.0	15.9	20.2	58.5	10.0	6.6
Sum	119.7	11.6	10.8	3.9	13.3	36.7	2.0	0.8	2.4	15.6
Mean	59 59.85	3 55.~~65~~ 80	2 15.40	1 41.95	3 26.65	2 18.35	4 21.00	0 0.40	0 11.20	4 7.80
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum										
Pointer	5	40	35	10	20	10	50	40	40	45
App. z										
log a'										
A' log β										
λ log γ										
log tang z										
log r										
r										
z										
φ — z = δ (O)										
δ (C)										
δ (C — O)										

Date 1871 January 22 Observer A. M.

n

Recorder

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.		✓ + × Polaris 1 13	X + ζ' Ceti X X	η? + 17? X Tauri -3 37						
T_δ	31.4 34.6	1^h 2^m 33.0	2^h 5^m 50.9 53.5	3 35^m 49.7 52.5						
T_m	13.4 17.7 20.9	4 17.3	56.0 58.5	55.2 57.9						
T_e	52.0 17.3	6 0.8	6 3.4	36 3.4						
T_f		7 44.8	8.4 11.0 13.5	8.7 11.5 14.1						
T_g	9.9 14.6	× 11 12.2	16.0	16.9						
T_h	24.5 12.2	14 32.5								
Sum		16 18.9	571.2	569.9						
Mean		18 1.0	63.47	63.32						
Red. to T_m	43.4 46.9	~~19 45.1~~								
Sum = s	10.3 5.1									
$\frac{1}{5}(T_m - T_s)$										
T		11 ~~9.51~~ 1.93	2 6 3.47	3 36 3.32						
RA		1 11 24.97	2 6 9.06							
RA — T										
— n tang δ										
ΔT + m										

$T_m - T_\delta$										
A		3 13.1	1 44.9							
C		3.1	34.1							
Sum										
Mean		3 8.10	1 39.50							
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum										
Pointer		40								
App. z										
log a'										
A' log β										
λ log γ										
log tang z										
log r										
r										
z										
φ — z = δ (O)										
δ (C)										
δ (C — O)										

Date 1871 Jan 25 Observer W. A. R.

n Recorder

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =
log γ

			+	×	×
	Star.		+ Polaris	+ η Tauri	+ ζ Persei
			1 13	3 40	3 46
	T_δ	57.2	0 45 4.2	3 39 27.9	3 45 39.0
	T_m	3.7 9.7		30.7	42.0
	T_e	12.6 4.3	10 4.3	33.1	44.8
10 53.3	T_f	50.3 53.0	1 10 53.3	35.9	48.0
58.2	T_g	56.7	i 14 20.9 −3 22.7	41.3	53.7
58.0 50.9	T_h	10.0 3.3 16.0 21.0 25.8	15 6.6 4 8.6	46.8	57.5
57.8	Sum	55.9 62.1	16 24 5 51.5	49.3	2.5
55.3 52.8	Mean	63.4 68.3 41.5 49.9	17 49.3 6 57.5	52.1 54.9	5.1 8.1
55.19	Red. to T_m	56.3		372.0	482.7
	Sum = s	23.8 30.7 32.3	19 30.9	3 39 41.33	3 45 53.63
	$\frac{1}{5}(T_m - T_\delta)$	36.9	8 35.6		
	T	40.9 46.2 51.3	19 36 46.13	39 41.33	45 53.63
	RA	138.4 46.1	10 5.33 1 11 21.98	3 39 48.83	3 46 1.36
	RA — T		28.68	7.50	7.73
	— n tang δ				
	ΔT + m				

η Tauri o = −7.50 +.44 +.22 −7.28
ζ Persei o = −7.73 +.61 +.31 −7.42
Polaris o = −28.68 +41.52
−7.61 .52
o = 21.07 + 41.0
n = +.51

$T_m - T_\delta$

A

C

Sum

Mean

Red. for runs

Red. to hor. wire

Red. to meridian

Division error

Sum

Pointer

App. z

log a'

A' log β

λ log γ

log tang z

log r

r

z

ϕ — z = δ (O)

δ (C)

δ (C — O)

Date 1871 Feb. 7 Observer W. A. R. Barom. = log B =

Att. Therm. = log T = log γ

n Recorder A. M. Ex. Therm. = log β =

Star.	Polaris		β Arietis	α Arietis	θ Persei	τ Persei	γ Persei	β Persei
	1 13		1 48	2 00	2 36	2 45	2 56	3 00
Tδ	0 44 40.0 41.1 44.0		1h 47m 0.8s	1h 59m 23.8	2 34 52.0	2 44 30.7	2 54 48.0	2 59 19.0
Tm			3.5	26.6	35 5.7	50.0	10.7	30.0
Te	0 53 18.2 21.6 26.7		6.1	24.2	14.0	58.0	18.8	36.3
Tf			8.8	32.0	18.0	2.1	23.0	39.7
Tg	1 1 54.5 57.3 59.7		14.0	37.2	21.5	6.2	27.0	42.9
Th			19.2	42.7	25.4	10.3	31.2	46.2
Sum		1 57.23	21.8	45.3	85.6	6.6	110.7	195.1
Mean	3 40.4 43.2 47.2		24.5	48.0	17.12	45 1.32	22.14	39.02
Red. to Tm		3 43.60	27.3	50.7	−10.57	−11.33	−11.53	−9.12
Sum = s	5 22.6 25.0 28.9		126.0	335.5				
⅕ (Tm — Ts)		5 25.50	14.00	37.28				
T			1 47 14.00	1 59 37.28	2 35 6.61	44 49.99	55 10.61	59 29.90
RA	7 4.5 6.7 8.7	7 6.63	1 47 29.91	1 59 53.25				
RA — T			15.91	15.97				
— n tang δ	10 30.3 32.7 36.0	10 33.00						
ΔT + m								
	13 58.6 0.1 1.7	14 0.13						
Tm — Tδ								
A	15 39.2 40.6 42.0	15 40.60	2 35.2	1 3.3 2 10.9 0 35.12	11.7	4 8.1	3 36.8 11.8	0 27.0
C			35.0	26 9.2 35.0	8.8	4.3	32.7 6.8	24.2
Sum	17 23.8 25.4 27.7	17 25.63			20. ~~7~~ 5	12.4		11.2
Mean			2 35.10	1 2.95 2 10.05 0 35.05	2 10.~~35~~ 25	4 6.20	3 34.75 9.05	0 25.60
Red. for runs	19 6.1 8.0 10.2	19 8.10						
Red. to hor. wire		95 14.2						
Red. to meridian	1 27 43.21 44.9 47.1	10 33.49						
Division error		11 10.73						
Sum		37.24						
Pointer	1 36 11.7 13.7 16.0		10	30	40	5	20	55
App. z								
log a′								
A′ log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Polaris 0 = − 37.24 + 41.60
β Arietis 0 = − 15.91 + 37 + 19 − 15.72
α Arietis 0 = − 15.97 + 42 + 22 − 15.75
0 = − 15.94 + 40
0 = − 37.24 + 41.60
0 = − 21.30 + 41.20
n = + 5.2

Date

Observer

Barom. =

Att. Therm. =

Ex. Therm. =

log B =

log T =

log β =

log γ

n

Recorder

Star.	X +ε ε Persei	X ✓ +ι Camel.	
T_δ	~~3~~ 4 00 3 58 23.4	4 22 6.0 4 22 50.7 4 20 ~~32.3 40.7~~	
T_m	59 1.3	21 32.3	
T_e	8.7	40.8	
T_f	12.2	44.9	
T_g	16.0	49.0	
T_h	19.7	53.3	
Sum	57.9	220.3	
Mean	11.58	44.06	
Red. to T_m	−10.24	11.70	
Sum = s			
$\frac{1}{5}(T_m - T_s)$			
T	59 1.34	21 32.36	
RA			
RA — T			
— n tang δ			
ΔT + m			
$T_m - T_\delta$			
A	~~2~~ 1 21.8 0 25.8	0 45.5	4 52.0
C	18.8 23.2	40.9	49.1
Sum		6.4	101.7
Mean	1 20.30 0 24.50 0	43.2 0	4 50.85
Red. for runs			
Red. to hor. wire			
Red. to meridian			
Division error			
Sum			
Pointer	0	45	40
App. z			
log a'			
A' log β			
λ log γ			
log tang z			
log r			
r			
z			
φ — z = δ (O)			
δ (C)			
δ (C — O)			

Date 1871 Feb 7 Observer A. M. Barom. = log B =

Att. Therm. = log T = log γ

n Recorder W. A. R. Ex. Therm. = log β =

Star.	4 Camel	ε Aurigae	η Aurigae	α Aurigae	2 Lyncis	ψ ~~Lyncis~~? Aurigae ψ ~~Lyncis~~	8 Lyncis	15 Lyncis
T_δ	4 38 37 35.0 4 36 34.3	4 53 53 0.8 4 52 10.0	4 58 57 37.3 4 56 57.0	5 7 7 18.7 5 6 39.9	6 9 8 30.9 6 7 34.0	~~6~~ 15 12.0 6 14 28.5	6 26 6 25 19.7	6 46 6 45 22.3
T_m	59.5	26.5	57 12.0	53.3	58.4	41.6	37.7	~~57.0~~ 50.1
T_e	8.2	33.5	18.5	0.4	7.7	49.3	48.0	59.6 4.3
T_f	12.7	36.8	21.8	4.0	12.5	53.2	53.4	9.0
T_g	17.1	40.2	25.0	7.5	17.6	56.9	58.5	14.0
T_h	21.7	43.8	28.2	11.2	22.3	0.8	3.6	
Sum	59.2		105.5	23.1	58.5	261.8	261.2	17.0
Mean	37 11.84	180.8	21.10	5.78	8 11.70	52.36	52.24	46 3.40
Red. to T_m	−12.58	36.16 −9.58	−9.20	12.45	−13.48	−10.65	−14.57	−13.30
Sum = s				5 6 53.33				
$\frac{1}{5}(T_m - T_s)$				−01				
T	4 36 59.26	52 26.58	57 11.90	6 53.32	6 8 58.22	14 41.71	25 37.67	45 50.10
RA				57 9.79				
RA — T				+16.47				
— n tang δ				+ 54				
ΔT + m				15.93				

$T_m - T_\delta$								
A	1 43.0 fol 1.6	0 10.8 4 25.0	4 28.0 51.3	1 9.4 34.7	0 28.0 4 26.0	2 0.0 1 26.0	2 47.5	3 0.7
C	41.3 58.9 ~~−1.1~~	7.9 24.1	26.8 50.3	5.5 33.2	57.6 ~~−2.4~~ 23.9	56.7 22.0	45.0	58.0 ~~−2.0~~
Sum	4.3 0.5	18.7	16	14.9	0.4			118.7
Mean	1 42.15 0.25	0 9.35 4 24.55	4 27.40 50.80	1 7.45 0 33.95	0 0.20 4 24.95	1 58.35 24.00	2 46.25	2 59.35
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	50	45 40	15	30	20 15	0	45	45
App. z								

log a′	
A′ log β	
λ log γ	
log tang z	
log r	
r	
z	
φ — z = δ (O)	
δ (C)	
δ (C — O)	

Date Feb. 7 Observer A. M.

n Recorder W. A. R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	+ 64 Aurigae ×	+ 19 Lyncis ×
T_δ	7 9 9 25.0 7 8 23.4	7 13 12 52.0 7 11 47.4
T_m	48.2	4.2
T_e	54.7	13.0
T_f	57.7	17.2
T_g	1.0	21.6
T_h	4.4	26.2
Sum	36.0	82.2
Mean	57.20	16.44
Red. to T_m	−9.20	−12.25
Sum = s		
$\frac{1}{5}(T_m - T_s)$		
T	7 8 48.00	12 4.19
RA		
RA — T		
— n tang δ		
ΔT + m		

$T_m - T_\delta$		19 Lyncis
A	1 32.3 0 35.2	1 54.7 8.2
C	30.0 33.6	53.3 6.1
Sum		
Mean	1 31.15 0 34.40	1 54.00 1 7.15
Red. for runs		
Red. to hor. wire		
Red. to meridian		
Division error		
Sum		
Pointer	15	50
App. z		
log a′		
A′ log β		
λ log γ		
log tang z		
log r		
r		
z		
φ — z = δ (O)		
δ (C)		
δ (C — O)		

Date Feb. 11 1871　　Observer W. A. R.　　Barom. =　　log B =

n　　Recorder A. M.　　Att. Therm. =　　log T =　　log γ

Ex. Therm. =　　log β =

Star.	+ + 1 Camel ✓		+ + 4 Camel ✓		+ + 2 Lyncis		+ + ψ' Aurigae	
	4 22		4 38		6 9		6 15	14
T_δ	4 20 - 17.2	13.3 ~~[illegible]~~	4 35 34.8	-36 18.0 47.8	6 7 1.4 34.0	8 40.2	6 13 28.1	7.1 33.6
T_m	29.3	22 57 51.1	56.0	37 31.6 8	54.9		38.5	
T_e	37.4		4.8		4.6		46.0	
T_f	41.8		9.9		9.3		49.7	
T_g	46.0		13.9		14.0		53.4	
T_h	50.0		18.4		19.2		57.4	
Sum	204.5		42.5		42.0		245.0	
Mean	40.90		36 8.50		8 8.40		13 49.00	
Red. to T_m	−11.70		−12.58		−13.48		−10.65	
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	4 20 29.20		35 55.92		6 7 54.92		13 38.35	
RA								
RA — T								
— n tang δ								
ΔT + m								
$T_m - T_\delta$	0 27.7 1 5.3 ~~5.3~~	4 49.0	14.0. 2 18.4	1 31.2 1.1	0 39.5 4	58.8 0 21.2	1 5 28 2	42.2 14.3
A	20.8 0.0	~~0.3~~ 43.7	9.3 16.7	28.0 56.2	34.7	53.5 15.2	48.2	39.0 8.3
C	++							
Sum	0 24.25 1 2.65	4 46.35	11.65 2 17.55	1 29.60 0 58.65	0 37.10	4 56.15 0 18.20	1 50.50	2 40.60 11.30
Mean								
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	45 45	40	50		20	15	0	
App. z								
log a'								
A' log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Feb. 11 1871 Observer Barom. = log B =

Att. Therm. = log T =

n Recorder Ex. Therm. = log β = log γ

Star.	δ Lyncis		α Tauri	γ Gem.	51 Cephei				Feb. 16 Polaris
	6 26 – \		4 29	6 30	6 41				1 13
T_δ	6 ~~25~~ 23.0	26 23.0	4 27 58.9	6 29 43.6	6 34	39.0 39.7 40.8 42.0	6 34 40.4		
T_m	34.8	27 6.0	1.5	46.3	35	34.0 35.0 36.0	35 35.0		
T_e	45.0		4.0	48.9	36	23.0 24.5 25.8	36 24.4		
T_f	49.8		6.6	51.4	37	~~6.0~~ 16.0 17.0 18.6	37 17.2		
T_g	55.3		11.8	56.5	38	57.7 0.0 2.3	39 0.0		
T_h	0.5		16.8	1.8	40	42.3 43.2 44.1	40 43.2		
Sum	245.3		19.3	4.3	41	31.3 32.8 34.2	41 32.8		
Mean	49.06		21.9	6.8	42	23.3 24.3 25.2	42 24.3		
Red. to T_m	− 14.57		24.7	9.5	43	16.0 16.8 17.5	43 16.8		
Sum = s			10.54 11.71	509.0 56.56					
$\frac{1}{5}(T_m - T_s)$									
T	6 25 34.49		4 28 11.71	6 ~~30~~ 29 56.56			6 38 59.35		
RA									
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A	2 44.0	28.2 141.0							
C	40.0	4.3 36.9							
Sum									
Mean	2 42.00	2 6.25 1 38.95							
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	45								
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Feb. 20 1871 Observer W.A.R.

n Recorder A.M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	+ 1 Camel fol.	+ 4 Camel	+ 2 Lyncis	+ ψ' Aurigae
T_δ	4 22 4 21 4.4	4 38 4 35 36.4 36 26.0 37 34.8	6 35.3 6 9 6 7 26.7 8 25.9	6 15 6 13 32.9 14 12.3 15 6.2
T_m	23.9	36 ~~50.4~~ 50.70	50.0	33.1
T_e	32.3	−9.00 54.4 50.70	59.5	40.8
T_f	36.4	−13.47 4.2 50.73	4.3	44.6
T_g	40.6	−17.91 —	9.0	48.3
T_h	44.8	−22.51 13.2 50.69	13.8	52.2
Sum	178.0		16.6	219.0
Mean	35.60		8 3.32	43.80
Red. to T_m	−11.70		−13.48	−10.65
Sum = s				
$\frac{1}{s}(T_m - T_s)$				
T	4 21 23.90	4 36 50.70	6 7 49.84 ~~59.87~~	13 33.15
RA				
RA — T				
— n tang δ				
ΔT + m				
$T_m - T_\delta$				
A	0 ~~45~~ 23.2		0 4 29.0 ~~29.0~~ 4 ~~45~~ 59.0 22.5	2 34.7 4.1 1 20.8
C	21.8		23.6 ~~29.0~~ 52.2 14.2	28.9 57.8 14.3
Sum	5.0		12.6 11.2 36.7	63.6 1.9 35.1
Mean	0 22.50		0 26.30 4 55.60 18.35	2 31.80 0.95 1 17.55
Red. for runs				
Red. to hor. wire				
Red. to meridian				
Division error				
Sum				
Pointer	45		20 ~~15~~ 15	0 0
App. z				
log a'				
A' log β				
λ log γ				
log tang z				
log r				
r				
z				
φ — z = δ (O)				
δ (C)				
δ (C — O)				

Date Feb. 20 1871 Observer WAR Barom. = log B =

Att. Therm. = log T = log γ

n Recorder AM. Ex. Therm. = log β =

Star.	+ δ Lyncis		10 Camel		+ ζ Aurigae		+ η Aurigae		+ Polaris
T_δ	6 26 6 24 55.0	~~25 29.4~~ 26 3.7			5 51 5 50 28.2	51m 3.8	4 58 4 56 12.5	57 37.8 57.5	1 13 1h 3m 32.5 34.3
T_m	29.4 ~~25~~ 34.6				31.8		57 31.4	3 34.3 +6 49.9	36.1
T_e	44.6		ch. f.		41.6		10.0		5 4.6 11.2
T_f	50.0				46.8		13.1	5 11.9 +5 2.0	17.0
T_g	55.3				51.7		16.4	10 25.8	10 25.8
T_h					56.4		19.8		13 45.7 47.7
Sum	218.9				228.8		62.7	13 47.5 −3 26.9	49.2
Mean	43.78				45.76		12.54		15 29.9
Red. to T_m	−14.57				−8.71		−9.20	15 32.9 −5 7.1	32.1 34.4 35.1
Sum = s									
$\frac{1}{5}(T_m - T_s)$							10	24.2	
T	25 29.21				50 37.05		57 3.34	19.9 25.8 20.6 25.8	~~9 42.48~~ 10 23.26
RA									
RA — T									
— n tang δ									
ΔT + m									

$T_m - T_\delta$							middle	foll.	
A	2 54.5	13.8 foll			0 3.8 pr.	4 13.2 foll.	4 23.5	3 42.0	
C	49.7	8.1			59.0	9.1	18.3	47.3	
Sum	4.2	21.9			2.8	22.3	41.8	9.3	
Mean	2 52.10	10.95			0 1.40	4 11.15	4 20.90	3 44.65	
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	45				30	25	15		
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Feb. 20 1871 Observer F.A.R. Barom. = log B =
n Recorder A.M. Att. Therm. = log T =
Ex. Therm. = log β = log γ

Star.	× β Arietis	× γ α Ceti?	× 51 Ceph.	δ Can.	× δ Gem.		×× 51 Cephei		
	1 48	2 37 (59.6)	6 41	× ×	7 13		6 41		
T_δ	1 46 52.3	2 36 2.0		7h 2m 31.3	7h 11m 47.4		6h 38	54.3	
T_m	55.0	4.4		34.2	50.2 53.0		38 55.3	55.2 56.3	
T_e	57.7	6.9		36.9 39.7	55.4		40	36.9	
T_f	0.3	11.9		45.2	0.9		40 37.8	37.8 38.7	
T_g	5.5	16.8		50.7	6.2		−1 43.9		
T_h	10.8	19.2		53.6	9.0		41	27.8 28.6	
Sum	13.8	21.8		56.2 58.9	11.6 14.3		41 28.7 −2 33.5	29.7 18.7	
Mean	16.0	24.4		406.7 45.19	8.0 0.89		42 20.1 42 −3 25.0	20.1 21.3	
Red. to T_m	18.7	107.0					43 12.9 43	12.0 12.9	
Sum = s	49.5 5.50						−4 17.5	13.7	
$\frac{1}{s}(T_m - T_s)$									
T	1 47 5.50	36 11.89		7 2 45.19	7 12 0.89		38 55.3		
RA							53.9 55.2		
RA — T							55.1 55.4		
— n tang δ							54.98		
ΔT + m									
$T_m - T_\delta$									
A									
C									
Sum									
Mean									
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer									
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
ϕ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Feb 26　　Observer W.A.R.　　Barom. =　　log B =
n　　Recorder A.M.　　Att. Therm. =　　log T =
Ex. Therm. =　　log β =　　log γ

Star.	+ @ Aurigae 17C		+ 17 Camel		+ 2 Lyncis		+ ψ1 Aurigae		+ 8 Lyncis
T_δ	5ʰ 6 22.3 5 7 4 46.0	~~46.0~~ 7 56.4	5 18 16 4.6	59.6 18ᵐ 21.9	6 9 6 6 49.0	7ᵐ 27.8 8ᵐ 59.2	6 15 6 13 36.3	14 21.2 15ᵐ 9.5	6 26 25ᵐ 6.3 26ᵐ 14.8
T_m	53.0		17 36.7		~~6~~ 51.6		34.0		31.4
T_e	56.5		47.6		7 1.2		42.0		41.7
T_f	0.0		52.7		6.6		46.0		46.8
T_g	3.7		58.4		10.8		49.7		52.0
T_h			4.0		15.6		53.6		57.5
Sum	279.2		259.4		25.2		225.3		229.4
Mean	55.84		51.88		7 5.04		45.06		45.88
Red. to T_m	− 9.96		− 15.26		− 13.48		−10.65		−14.57
Sum = s									
$\frac{1}{5}(T_m - T_s)$									
T	5 ~~7~~ 6 45.88		17 36.62		6 51.56		13 34.41		25 31.31
RA									
RA − T									
− n tang δ									
ΔT + m									
$T_m - T_\delta$									
A					0 25.7	4 602 15.1	2 328	1 58.9 1 20.1	3 19.0 2 49.3 8.9
C					16.9	53.0 7.8	270	52.7 12.8	14.9 44.4 3.1
Sum									
Mean					0 21.30	4 56.60 11.45	2 29.90	1 55.80 1 16.45	3 16.95 2 46.85 6.00
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer					20	15	0	0	45
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ − z = δ (O)									
δ (C)									
δ (C − O)									

Date Feb. 21 1871 Observer A. M.

n Recorder W. A. R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	+ + ψ^5 Aurigae		+ + 15 Lyncis		+ + 64 Aurigae		+ + 19 Lyncis	
T_δ	6 38 6h 36m 44.3s	37m 43.9	6 46 44 46.0	45 26.6 46 24.5	7 9 7h 8m	9m 7.4s	7 13 11 26.3 41.2	12 29.2 43.3 33.75
T_m	37m 3.2s		45 43.5		40.7		56.2 57.4	56.8
T_e	10.1		53.0		47.2		12 4.9 6.1	5.5
T_f	13.4		57.8		50.6		9.3 10.7	10.0
T_g	14.8		2.4		54.0		13.9 15.0	14.4
T_h	20.3		7.3		57.2		18.2 19.2	18.7
Sum	63.8		284.0		249.7		45.4	
Mean	12.76		56.80		49.94		9.08	
Red. to T_m	−9.59		−13.30		−9.20		−12.25	
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	6 37 3.17		45 43.50		8 40.74		11 56.83	
RA								
RA — T								
— n tang δ								
ΔT + m								

$T_m - T_\delta$								
A	0 50.0	4 58.7						
C	46.3	54.3						
Sum								
Mean	0 48.15	4 56.55						
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	40	35						
App. z								
log a′								
A′ log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Observer Barom. = log B =

Att. Therm. = log T = log γ

n Recorder Ex. Therm. = log β =

Star.	× + 31 Lyncis		× + o Urs. Maj		× + Gr. 1450	+ 4AT	× + Gr 1460 ✓		
T_δ	8 14 8 13 1.8	14m 11.0	8 20 17 38.5	18 42.0 19 50.4	8 25 23 9.3	24 47.6 40.4	8 30 28 2.1	24 33.3 3.7	29 59.1
T_m	37.0		19 10.0		24 ~~47.4~~ 8.6		29 20.9		
T_e	43.8		20.3		14.7		29.2		
T_f	47.4		25.0		18.0		33.2		
T_g	50.7		30.5		21.0		37.5		
T_h	54.2		35.5		24.3		41.6		
Sum	233.1		121.3		86.6		162.4		
Mean	46.62		24.26		17.32		32.48		
Red. to T_m	−9.57		−14.37		−8.85		−11.56		
Sum = s									
$\frac{1}{5}(T_m - T_s)$									
T	8 13 37.05		19 9.89		24 8.47		29 20.92		
RA									
RA − T									
− n tang δ									
ΔT + m									
$T_m - T_\delta$									
A	2 18.6	1 16.0	0 7.0	4 31.8 3 507	1 11.9	0 35.4 4 45.0	4 10.3 3 52.3	29.8	2 47.7
C	14.0	12.3	2.0	29.0 480	100	34.1 44.1	8.1 47.0	26.8	43.4
Sum	2 16.30	1 14.15	0 4.50	4 3040 3 49.35	1 10.95	0 34.75 4 44.55	4 9.20 3 49.65	28.30	2 45.55
Mean									
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	45		15	10	55	50	10		
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ − z = δ (O)									
δ (C)									
δ (C − O)									

Date Feb. 28 1871 Observer A. M. Barom. = log B =

Recorder W. A. R. Att. Therm. = log T =

n Ex. Therm. = log β = log γ

Star.	+ ψ⁵ Aurigae		+ 15 Lyncis		+ 64 Aurigae		+ 19 Lyncis	
T_δ	6 6 38 5 36 10.8	37 41.9 37 27.1	~~6~~ 46 ~~5~~ 44 12.0	45 8.7 – 46 27.4	7 9 7 55.8 13.9	8 ~~13.9~~ 41.2	7 13 7 10 30.7	11 30.6 – 12 27.3
T_m	36 58.3		45 38.1		8 20.6		11 52.4	
T_e	37 5.1		47.6		23.7		1.0	
T_f	8.4		52.4		27.0		5.5	
T_g	11.9		57.0		30.4		9.7	
T_h	15.5		61.8		—		14.2	
Sum	39.2		256.9		115.6		22.8	
Mean	37 7.84		51.38		23.12		11 4.56	
Red. to T_m	–9.59		–13.30		–9.20		–12.25	
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	36 58.25		45 38.08		8 13.92		11 52.31	
RA								
RA — T								
— n tang δ								
ΔT + m								

Wrong star

$T_m - T_\delta$								
A	0 46.7	6.8	2 58.0	7.1				
C	41.4	2.0	52.6	1.6				
Sum								
Mean	0 44.05	4.40	2 55.30	4.35				
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	40		45					
App. z								
log a′								
A′ log β								
λ′ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

1870hae.proj.143R

Date Feb 28 1871 Observer A. M.
n Recorder W. A. R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	31 Lyncis?	+ o Urs. Maj	+ Gr. 1450	+ Ge. 1460	+ ψ Aurigae
		8 20	8 25	8 30	6 6 15
T_δ		8 17 32.9 – 18 37.9 – 19 44.0	23 9.4 – 51.2 – 24 33.0	27 58.0 – 29 0.0 – 29 53.0	13 23.8 – 14 7.5 – 15 8.6
T_m		19 4.4	24 4.1	29 16.0	14 29.6
T_e	Dup'	14.9	10.3	24.2	37.0
T_f		19.8	13.5	28.4	40.8
T_g		25.0	16.7	32.5	44.6
T_h		30.1	19.8	36.7	48.4
Sum		94.2	64.4	137.8	200.4
Mean		19 18.84	12.88	27.56	40.08
Red. to T_m		−14.37	−8.85	−11.56	−10.65
Sum = s					
$\frac{1}{s}(T_m - T_s)$					
T		19 4.47	24 4.03	29 16.00	14 29.43
RA					
RA — T					
— n tang δ					
ΔT + m					

$T_m - T_\delta$										
A		0 6.4	4 29.9	3 57.0	1 8.2	0 29.1	4 48.8	4 9.7	3 27.0	2 44.7
C		0.5	25.7	48.0	6.5	26.9	46.3	4.9	24.0	42.8
Sum										
Mean		0 3.45	4 27.80	3 49.50	1 6.85	0 28.00	4 47.55	4 7.30	3 25.50	2 45.25
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum										
Pointer		15	10		55	50		10		
App. z										
log a′										
A′ log β										
λ log γ										
log tang z										
log r										
r										
z										
φ — z = δ (O)										
δ (C)										
δ (C — O)										

Date Feb. 28 1871 ~~Mar. 1871~~ Observer ~~W. A. R.~~ A. M. Barom. = log B =
Att. Therm. = log T = log γ
n Recorder ~~A. M.~~ W. A. R. Ex. Therm. = log β =

Star.	× 8 ~~ψ~~ ψ Lyncis		× + γ Gem.	+ α Can. Min.	12 Can. Lat.		+ Br 2749 ✓ 7 Y. C 1879?
T_δ	6 26 6 24 58.5 ~~25 25.7~~	25 57.1 26 5.4	6 30	× ×	8		20 51 8 51 36.9
T_m	25 25.7		29 34.4	7 31 52.6			51.6
T_e	36.1		37.1	55.2			52 6.0
T_f	41.1		39.7	57.6			19.4
T_g	46.4		42.3	0.2			48.2
T_h	51.7		−47.4	5.1			53 56.0
Sum	201.0		52.5	10.1			83.0
Mean	40.20		55.0	12.6			46.2
Red. to T_m	−14.57		57.8	15.0			54 0.2
Sum = s			60.2	17.6			21 43.75 52 ~~48.50~~
$\frac{1}{8}(T_m - T_s)$			42 6.4 47.38	46.0 5.11			
T	25 25.63		29 47.38	31 5.11			52 48.~~50~~ 39
RA			6 30 15.69	7 32 38.36			
RA — T							
— n tang δ							
ΔT + m							
$T_m - T_\delta$							
A							
C							
Sum							
Mean							
Red. for runs							
Red. to hor. wire							
Red. to meridian							
Division error							
Sum							
Pointer							
App. z							
log a′							
A′ log β							
λ log γ							
log tang z							
log r							
r							
z							
φ — z = δ (O)							
δ (C)							
δ (C — O)							

Date Mar. 1 1871 Observer M. A. R. Barom. = log B =

n Recorder A. M. Att. Therm. = log T =

Ex. Therm. = log β = log γ

v = 42.17 v = 54.47 v = 59.38

Star.	53 Camel		10 Urs. Maj.		Gr. 1501		v Urs. Maj.		19 Leo. Min.	
	7 51		8 53		8 55		9 42		9 50	
T_δ			8 49 54.4	57 10.3	52 56.0	53 45.0 54 35.6	8 40 34.2	41 11.3 42m 5.0	9 48 21.2	49 46
T_m			50 25.3		54 4.7		41 20.4		18.6	49 54.2
T_e			38.6		13.2		30.0		25.3	
T_f			45.4		17.4		35.0 ~~34.8~~		28.6	
T_g			52.0		21.8		39.8 ~~34.8~~		32.0	
T_h			58.7		26.2		44.9		35.3	
Sum			220.0		83.3		170.1		139.8	
Mean			44.00		16.66		34.02		27.96	
Red. to T_m			−9.37		−12.02		−13.71		−9.28	
Sum = s										
$\frac{1}{5}(T_m - T_s)$										
T			50 34.63		54 4.64		41 30.31		49 18.68	
RA										
RA − T										
− n tang δ										
ΔT + m										
$T_m - T_\delta$										
A	0 34.2	4 54.2	0 58.8	37.9 3.3	1 19.8	0 44.3 10.8	4 54.1	31.9 3 59.3	3 31.6	2 52.5 1 6.7
C	26.2	46.3	49.1	28.6 54.0	13.8	40.3 4.7	48.7	25.7 50.7	27.4	47.7 59.7
Sum	0.4	0.5	7.9	6.5 117.3	13.6	4.6 15.5	2.8	57.6 10.0	59.0	0.2 6.4
Mean	0 30.20	4 50.25	0 53.95	33.25 59 58.65	1 16.80	0 42.30 7.75	4 51.40	28.80 3 55.00	3 29.50	2 50.10 1 3.20
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum										
Pointer	30	25	15	15	35	35	40	40	40	40
App. z										
log a′										
A′ log β										
λ′ log γ										
log tang z										
log r										
r										
z										
φ − z = δ (O)										
δ (C)										
δ (C − O)										

Date Mar. 1 1871
Observer W. A. R.
Recorder A. M.
n
Barom. =
Att. Therm. =
Ex. Therm. =
log B =
log T =
log β =
log γ

Star.	32 Urs. Maj. ✓		+ ω Urs. Maj.		× α Leonis	× 79 Draco. ✓	× 9 Draco. ✓	× α Leonis	
	× ×		10 15		10 2	× ×	10 24	10	2
T_δ	10 8 25.3	9m 6s.3	13 34.1	15 19.0 7.3				10h 0	49.4 52.0
T_m	8 11.2	11.2	15 10.4						54.6
T_e	1 23.3	-12.1 11.1	17.0						57.2
T_f	29.3	-18.2 11.1	20.4						2.0
T_g	35.3	-24.2 11.1	23.6						~~7~~ 7.1
T_h	41.5	-30.3 11.2	27.0						9.8
Sum	140.6	11.12	98.4						12.2
Mean	28.12		19.68						14.8
Red. to T_m			- 9.35						19.1 2.12
Sum = s									
$\frac{1}{s}(T_m - T_s)$									
T	8 11.12		10 15 10.33					10 1	2.12
RA									
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A	3 9.2	2 43.5	4 30.0	3 50.2 7.1					
C	0.3	35.1	24	44.9 1.0					
Sum	9.5	78.6	54.2	95.1 8.1					
Mean	3 4.75	2 39.30	4 27.10	3 47.55 4.05					
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	35	35	10	10					
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Mar. 2 1871 Observer W.A.R. Barom. = log B =

Att. Therm. = log T =

n Recorder A.M. Ex. Therm. = log β = log γ

Star.	+ Polaris		+ a ~~Leonis~~ Arietis	+ o Aurigae	+ ϑ Aurigae		+ δ Aurigae		+ 36 Camel
	1 13		2 00	5 36	5 43		5 49		6 00
T_δ	0ʰ 3 22.0 24.0		1 59 10.7	5	5 41 53.6	~~42~~ 42 ~~5.3~~ 348	5 48 10.7	49 18.1	5ʰ 58 19.3 0ᵐ 10ˢ 52.2
T_m	26.7 29.6	3 25.6 +6 48.5	13.4 16.0 18.6		42 5.3		27.0		59 25.8
T_e	5 0.0 4.0		24.1		11.7		35.5		37.9
T_f	7.3 9.7	5 5.3 5 10.6	10 14.1 29.4		14.7		39.8		44.0
T_g	6 49.1		15.9 32.0		18.1		44.0		49.9
T_h	57.5	6 50.3 3 27.3	17.0 34.8 17.6 37.4		21.1		48.3		55.9
Sum	10 18.8	10 18.8	~~16~~ 216.4		70.9		194.6		213.5
Mean		−1.2	18.0 24.04		14.18		38.92		42.70
Red. to T_m	17 6.9	17 6.9			−8.94		−11.87		−16.87
Sum = s		−6 48.9							
$\frac{1}{5}(T_m - T_s)$									
T	.1 10 16.52		1 59 24.04		42 5.24		48 27.05		59 25.83
RA									
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A				1 59.0	1 19.2	0 40.1	2 14.0 pr.	1 45.2 fol	4 10.2 ³55.8 ³15.3
C				55.2	14.9	35.7	8.1	39.8	21 46.9 6.8
Sum				14.2	14.1	75.8	22.1	85.0	12.3 2.7 22.1
Mean				1 57.10	1 17.05	0 37.90	2 11.05 pr.	1 42.50 fol	4 6.15 ³51.35 ³11.05
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer				35	15		5	5	35
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Mar. 2 1871 Observer W.A.R.
n Recorder A.M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =
log γ

Star.	+ 2 Lyncis		+ 63 Aurigae		+ 24 Lyncis		+ 26 Lyncis	
T_δ	6 9 6 6m 38.6	7m 21.5 ~~8 55.0~~	7 3 7 1 33.8	2 57	7 32 7 30 48.3	31 17.1	7 46 7 43 58.3	44 35.7 45 18.8
T_m	7 47.5		19.6		31 38.7		44 52.0	
T_e	57.1		26.0		48.0		59.2	
T_f	2.0		29.1		53.0		3.0	
T_g	6.9		32.2		57.8		6.7	
T_h	11.7		35.6		2.6		10.6	
Sum	5.2		142.5		260.1		11.5	
Mean	8 1.04		28.50		52.02		45 2.30	
Red. to T_m	−13.48		−8.99		−13.46		−10.34	
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	7 47.56		2 19.51		31 38.56		44 51.96	
RA								
RA — T								
— n tang δ								
ΔT + m								
$T_m - T_\delta$								
A	0 21.8	4 57.7	1 38.1	1 8.2	2 55.2	2 37.2	4 42.3	12.3 3 36.1
C	17.0	50.4	34.4	4.3	49.3	31.3	37.3	7.2 31.9
Sum	38.8	8.1	12.5	12.5	4.5	8.5	79.6	.19.5 8.0
Mean	0 19.40	4 54.05	1 36.25	1 6.25	2 52.25	2 34.25	4 39.80	9.75 3 34.00
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	20	15	50	50	20	20	25	25
App. z								
log a′								
A′ log β								
λ′ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Mar. 5 1871 Observer ~~W. A. R.~~ A. M. Barom. = log B =

n Recorder ~~A. M.~~ W. A. R. Att. Therm. = log T = log γ

Ex. Therm. = log β =

Star.	ψ Draconis		36 Camel	Aurigae	27 Lyncis	31 Lyncis		o Urs. Maj.	
	17 44 ?		?	?	7 59	8 14	13	8 20	
T_δ	7 57 53.3					8 ~~13 22.9~~ 12 38.4	~~30.9~~ 20.4	8 17 45.4 18 33.2	19 40.4
T_m	58 15.8	-15.8				13 30.9		19 3.2	
T_e	23.8	-8.0 15.8				37.8		13.4	
T_f	27.8	-12.0 15.8				41.2		11.5	
T_g	31.7	-16.0 15.7				44.7		23.5	
T_h	35.8	-20.0 15.8				48.0		28.8	
Sum	134.9	15.78				202.6		87.4	
Mean	26.98					40.52		17.48	
Red. to T_m						-9.57		-14.37	
Sum = s									
$\frac{1}{5}(T_m - T_s)$									
T	58 15.78					13 30.95		19 3.11	
RA									
RA — T									
— n tang δ									
ΔT + m									

$T_m - T_\delta$									
A					0 31.5	2 30.0 1 57.4	1 1.5	4 57.4	28.0 3 48.1
C					25.7	26.5 47.8	57.6	57.9	24.6 44.4
Sum					57.2	56.5 99.2	119.1	9.3	12.6 12.5
Mean					0 28.60	2 28.25 1 49.60	0 59.55	4 54.65	26.30 3 46.25
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer					30	45		10	
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Mar. 5 1871

n

Observer ~~W.A.R.~~ A.M.

Recorder ~~A.M.~~ WAR

Barom. =

Att. Therm. =

Ex. Therm. =

log B =

log T =

log β =

log γ

Star.	+ + 10 Urs. Maj.		+ Gr. 1501		+ 2 Urs. Maj. +		+ 19 ~~Lyncis~~ Leo. Min +	
T_δ	8 58 8 49 17.8	54.7 50 31.4	8 55 8 53 24.5	42.1 5	9 42 9 40 42.2	40 41 54.6 55.8	9 50 9 48 43.5	49 49 07 48.9
T_m	50 24.9		54 3.9		41 12.7		49 18.2	
T_e	37.9		12.5		29.5		24.7	
T_f	44.8		16.8		32.4		27.9	
T_g	51.3		21.1		39.3		31.3	
T_h	58.0		26.5		44.2		34.8	
Sum	216.9		79.8		158.1		136.9	
Mean	43.38		15.96		31.62		27.38	
Red. to T_m	−9.37		−12.02		−13.71		−9.28	
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	50 34.01		54 3.94		41 17.91		49 18.10	
RA								
RA — T								
— n tang δ								
ΔT + m								

$T_m - T_\delta$								
A	0 50.7	35.9 ^{4}49.4	0 57.2	0 44.4	4 46.8	39.0 0.5	3 8.8	^{2}54.3 ^{2}8.0
C	43.3	28.2 42.0	54.2	40.6	42.4	36.2 57.7	6.1	50.2 5.9
Sum	94.0	64.1 11.4	11.4	5.0	9.2	15.2 118.2	14.9	4.5 13.9
Mean	0 47.00	32.05 ^{4}45.70	0 55.70	0 42.50	4 44.60	37.60 ^{3}59.10	3 7.45	^{2}52.25 ^{2}6.95
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	15	10	35	35	40		40	
App. z								
log a′								
A′ log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Mar. 5 1871 Observer W.A.R. ~~A.M.~~

n Recorder ~~A.M.~~ W.A.R.

Barom. =

Att. Therm. =

Ex. Therm. =

log B =

log T =

log β =

log γ

Star.	+ ω Urs. Maj.		+ 31 Leo. Min.		+ Polaris		+ β Arietis	+ α Arietis
	10 15	13 14	10 21	19 20	1 13		1 48	2 00
T_δ	10 ~~9~~ 13 43.5	50.7 43.7	10 ~~9~~ 19 24.9	33.4 26.0	1 13 39.6 43.1		1 46 47.0	1 59 10.2
T_m	14 9.8		19 56.5		46.5	13 43.1	49.8	12.8
T_e	16.9		2.8		15 24.6	3 27.3 15.8	52.3	15.5
T_f	19.7		5.8		27.0 29.2	15 26.9 5 10.4 16.5	54.9	18.1
T_g	22.0		9.0		17 7.1	17 7.1	60.3	23.5
T_h	26.4		12.1			6 48.9 18.2	65.5	28.9
Sum	95.2		26.2		18 50.8	18 ~~50.8~~	68.0	31.5
Mean	19.04		20 52.4		54.2 57.6	18 54.3 19.8 8 34.0 18 ~~55.9~~	70.8	34.2
Red. to T_m	− 9.35		− 8.72				73.4	37.0
Sum = s							57 54 2.0 0.22	21 1.7 23.52
$\frac{1}{5}(T_m - T_s)$								
T	14 9.69		19 56.52		1 10 17.58		1 47 0.22	23.52
RA								
RA — T								
— n tang δ								
ΔT + m								

$T_m - T_\delta$								
A	4 17.5	4 11.6 3 23.2	1 8.3	0 60.4 8.9				
C	15.9	9.3 20.6	7.7	58.8 7.3				
Sum	13.4	20.9 3.8	16.0	0 119.2 16.2				
Mean	4 16.70	4 10.45 3 21.90	1 8.00	0 ~~59~~ ~~2~~ 59.60 0 8.10				
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	10		0					
App. z								
log a'								
A' log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Mar 5 1871 Observer ~~A M.~~ W A R. Barom. = log B =

n Recorder ~~W A R~~ A M Att. Therm. = log T = log γ

Ex. Therm. = log β =

Star.	22 Lyncis	24 Lyncis	26 Lyncis		53 Camel		A ψ' Draconis	Auriga	36 Camel	
	6 9	7 32	7 46		7 51	2	17 44	5 49	6 00	
T_δ	6 6 56.4	7 31 8.8	7 44 18.1	5 45 28.5	7 50 [illegible]	51 42.8	5 42 4.5	5 47 1.6	5 57 16.7	
T_m	44.7	31 35.8	42.8		11.4	2.3	12.0	24.5	52.1	
T_e	54.0	45.3	49.7		21.5	10.0	20.3	33.0	58 22.6	
T_f	59.1	50.1	57.0		26.5	14.2	28.2	37.4	34.6	
T_g	3.7	54.8	0.4		31.7	18.0	44.7	41.4	40.5	
T_h	8.7	59.9	4.4		36.8	22.1	43 0.9	45.7	46.4	
Sum	290.2	245.9	8.1 299.9		128.2	66.6	8.8	182.0	52.7	
Mean	58.04	49.18	59.98		25.64	13.32	17.1	36.40	59 3.8	
Red. to T_m	−13.48	−13.46	−10.34		−14.16	−14.16	25.1	−11.87	58 39.36	
Sum = s							401.6 44.62		−16.87	
$\frac{1}{5}(T_m - T_s)$										
T	6 44.56	31 35.72	44 49.64		51 11.48	50 59.16	42 44.62	47 24.53	58 22.49	
RA										
RA — T										
— n tang δ										
ΔT + m										
$T_m - T_\delta$										
A	4 35.7	2 41.1	4 24.2	3.7 3 26.1	2 10.5				4 11.4 3 54.8	3 17.1
C	29.9	35.1	19.9	58.5 21.0	4.6				1.1 43.8	6.0
Sum	65.6	76.2	44.1	2.7 7.1	15.1				12.5 98.6	23.
Mean	4 32.80	2 38.10	4 22.05	1.10 3 23.55	2 7.55				4 6.25 3 49.30	3 11.
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum									35	
Pointer	15	20	25		40					
App. z										
log a'										
A' log β										
λ log γ										
log tang z										
log r										
r										
z										
φ — z = δ (O)										
δ (C)										
δ (C — O)										

Date Mar. 7 1871 Observer W.A.R.
n Recorder A.M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =
log γ

	Star.	Polaris	α Arietis	o Aurigae	δ Aurigae		o Aurigae		36 Camel.	
		1 13	2 00	5 36	5 43		5 51		6 00	
	T_δ	$1^h 1^m$ 35.7 38.2	1 59 9.9 12.3	5 35 0.9	5 4[illegible] 7.3	^{41} 53.0	5 50 15.3	~~25.0~~	5 58 49.3	$6^h 1^m$ 2.8
	T_m	44.0 46.5	1 41.1 14.9 17.7	24.0	42 28		50 25.0		59 22.2	
	T_e	3 25.8 30.9	3 28.4 23.0	31.9	9.1		31.6		34.0	
	T_f		28.5 31.0	35.4	12.3		34.8		40.0	
	T_g	5 1.0 6.7	33.8	39.5	15.5		37.7		46.0	
	T_h	11.3	5 6.3 36.7 207.8	43.4	18.9		41.0		52.3	
	Sum	6 47.8 47.6	23.09	174.2	58.6		170.3		194.5	
	Mean	51.5	6 49.6	34.84	11.72		34.06		38.90	
	Red. to T_m	10 14.0 18.3	10	−10.73	−8.94		−8.71		−16.87	
	Sum = s	22.0	18.1							
	$\frac{1}{8}(T_m - T_s)$	13 40.8 42.8	+							
	T	45.0 48.0	1 59 23.09 1344.2	35 24.11	42 2.78		50 25.35		59 22.03	
	RA									
	RA − T	15 25.7 27.3 29.0	15 27.3							
	− n tang δ									
	ΔT + m	17 0.0 5.8 11.8	17 5.8							
		18 48.3 57.6								
	$T_m - T_\delta$	54.2	18 51.4							
3 17.1	A			2 5.0	2 2.9	1 17.6	~~2~~ 0 ~~5.0~~ 40.1		3 53.9	2 45.6
6.0	C			0.5	59.5	14.1	~~0.5~~ 39.3		47.7	37.2
23.1	Sum	1 41.1		5.5	2.4	11.7	79.4		101.6	82.8
3 11.55	Mean	3 28.4		2 2.75	2 1.20	1 15.85	0 39.70		3 50.80	2 41.40
	Red. for runs	5 6.3								
	Red. to hor. wire	6 49.6								
	Red. to meridian	10 18.1								
	Division error	13 44.2								
	Sum	15 27.3								
	Pointer	17 05.8		35	15		~~3~~570		35	
	App. z	18 51.4								
		10 16.91								
	log a′									
	A′ log β									
	λ log γ									
	log tang z									
	log r									
	r									
	z									
	φ − z = δ (O)									
	δ (C)									
	δ (C − O)									

Date Mar 7 1871 Observer Mar. 7 1871 W R Barom. = log B =

n Recorder A. M. Att. Therm. = log T = log γ

Ex. Therm. = log β =

Star.	22 Camel		2 Lyncis		ψ¹ Aurigae		3 Urs. Maj.	31 Lyncis	
T_δ	6 5 6 3 31.0	5 13.8	6 9 6 6 47.0	7 15.6 8 35.8	6 15 6 13 49.0	14 17.5 15 0.2	? 6 57 2.5	8 14 8 ~~7~~ 13 9.5	24.5 14 6.1
T_m	4 7.3		7 44.1		14 27.8		27.7 —	27.7 30.5	
T_e	21.5		53.9		35.2		41.6 -13.7	12.9 27.5 37.4	
T_f	28.4		58.7		39.0		48.0 20.6	27.4 40.7	
T_g	35.5		3.3		42.9		55.1 -27.4	27.7 44.1	
T_h	42.9		8.2		46.6		2.0 -34.3	27.7 47.5	
Sum	135.6		288.2		191.5		234.4	27.68 200.2	
Mean	27.12		57.64		38.30		46.88	40.04	
Red. to T_m	- 19.68		- 13.48		- 10.65			- 9.57	
Sum = s									
$\frac{1}{5}(T_m - T_s)$									
T	4 7.44		7 44.16		14 27.75		14 59 27.68	13 30.47	
RA									
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A			0 14.2	4 8.1	2 12.3	1 51.7 18.4	2 19.5	2 2.3 1	49.2 1 12.1
C			7.9	1.0	6.8	45.9 11.5	9.4	57.0	43.9 5.9
Sum			22.1	9.1	19.1	97.6 9.9	28.9	119.3	13.1 7.1
Mean			0 11.05	4 4.55	2 9.55'	48.80 14.95	2 14.45	2 59.65'	46.55' 3.55
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer			20	15	0	1	30	45	
App. z									
log a'									
A' log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Mar. 7 1871 Observer W.A.R.

n Recorder ~~J.A.M.~~ W.A.R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

	Star.	× t δ Leo.	t × ξ Urs. Maj	DM.	τ Leo.	× × υ ~~ϕ~~. Leo.
		11 7	11 12	11h 16 + 9 8 ×4	?	11 31
46.1	T_δ	11h 6m 49.7s	11h 10m 32.6	11 16 19.8	11 2~~1~~ ~~7.8~~ 36.7	11 29 38.7
	T_m	32.4 35.0 37.7 40.3 45.6 50.8 53.7 56.3 59.0 39.0?	34.1 37.2 40.0 42.8 45.7 54.4 57.5 0.5 3.4	24.7 27.3 29.8 32.2 37.2 42.0 44.6 47.0 49.7	20 31.2 41.5 44.1 49.1 54.0 (56.5) 59.0 1.5	39.4 41.6 44.2 46.5 51.7 56.6 59.9 1.4 4.0
	T_e					
	T_f					
	T_g					
	T_h					
	Sum	410.8	439.2	334.5	441.6	464.7
	Mean	45.65	48.80	37.17		51.63
	Red. to T_m					
	Sum = s					
	$\frac{1}{5}(T_m - T_s)$					
	T	11h ~~7~~ 6 45.65	10 48.80	16 37.17	20 49.07	29 51.63
	RA					
	RA — T					
	— n tang δ					
	ΔT + m					
	$T_m - T_\delta$					
12.7	A	3 34.9	~~3~~ 2 ~~50.0~~ 41.2	3 50.0	2 40.4	3 52.3
5.9	C	36.7	~~53.5~~ 41.2	53.5	46.0	59.3
7.1	Sum	11.6	3.5	3.5	6.4	11.6
3.55	Mean	3 35.80	2 41.20	3 57.75	2 43.20	3 55.80
	Red. for runs					
	Red. to hor. wire					
	Red. to meridian					
	Division error					
	Sum					
	Pointer	5	~~15~~ 5	15	45	25
	App. z					
	log a′					
	A′ log β					
	λ log γ					
	log tang z					
	log r					
	r					
	z					
	ϕ — z = δ (O)					
	δ (C)					
	δ (C — O)					

Date May 9 1871 Observer A. M.

n Recorder W. A. R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	2 Lyncis		ν' Aurigæ		Gr. 1450		Gr. 1460 ✓	31 Lyncis		
T_δ	6 9 6 6 58.4	7 30.4 8 28.0	6 15 6 13 48.5	14 3.9 15 7.9	8 25 8 24	24 29.6 24 57.6	8 30 8 28 32.0 49.4	8 13 · 23.2 29 57.2	14 8 14 8.6	
T_m	13.6		14 27.0		1.6		29 13.8	30.0		
T_e	53.3		34.7		8.0		22.0	36.8		
T_f	58.1		38.5		11.1		26.1	40.2		
T_g	2.7		42.2		14.2		30.2	43.7		
T_h	7.8		46.0		17.3		34.3	47.1		
Sum	255.5		188.4		52.2		126.4	197.8		
Mean	57.10		37.68		10.44		25.28	39.56		
Red. to T_m	−13.48		−10.65		−8.85		−11.56	−9.57		
Sum = s										
$\frac{1}{5}(T_m - T_s)$										
T	7 48.62		14 26.93		1.59		29 13.72	13 29.99		
RA										
RA — T										
— n tang δ										
ΔT + m										

$T_m - T_\delta$										
A	0 7.4	4 49.3 13.3	2 14.2	1.3 1 15.4	4 45.1	4 18.0	3 41.0	26.1 2 38.8	1 49.2	7.7
C	2.5	44.2 7.5	8.7	56.7 9.0	42.3	16.8	35.2	22.0 33.5	44.1	3.2
Sum	9.9	13.5 20.8	12.9	118.0 24.4	7.4	14.8	76.2	8.1 12.3	13.3	10.
Mean	0 4.95	4 46.75 10.40	2 6.45	1 59.00 12.20	4 43.70	4 17.40	3 38.10	3 24.05 36.15	1 46.65	54
Red. for runs										
Red. to hor. wire										
Red. to meridian										
Division error										
Sum										
Pointer	20	15	0		50		10		45	
App. z										
log a'										
A' log β										
λ log γ										
log tang z										
log r										
r										
z										
φ — z = δ (O)										
δ (C)										
δ (C — O)										

For Mar 14th see after 25th

Date Mar 9 1871 Observer A.M.

n Recorder W.A.R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

+ ι Cancri	Star.	+ 36 Lyncis		+ 38 Lyncis		+ 40 Lyncis		ι Hydrae		+ 1 Draconis
8 39 8 39m	T_δ	9 h 6 m 9 3 15.3	42.4 4m 32.4	9 11 9h 8m 47.6	9m 0.2	9 13 9h 11 16.0	29.2 12 14.7			9 19 9h 15m 36.6
26.8	T_m	52.0		9m 19.0		41.8				54.7 16 11.7
	T_e	4 58.7		25.0		47.8				24.2
	T_f	~~5.1~~ 2.0		28.3		50.9		M.f.		17 4.1
	T_g	5.6		31.4		53.8				
	T_h	8.8		34.6		56.9				39.8 57.0
	Sum	7.1		138.3		251.2				18 13.8
	Mean	~~4~~ 5 1.42		27.66		50.24				32.3 39.2
	Red. to T_m	−9.60		−8.72		−8.46				17 4.36
	Sum = s									
	$\frac{1}{5}(T_m - T_s)$									
	T	9 ~~3~~ 4 51.82		9 18.94		~~11~~ 12 41.78				17 4.36
	RA									
	RA — T									
	— n tang δ									
	ΔT + m									
	$T_m - T_\delta$									
7.7	A	2 24.6	58.3 15.4	2 20.7	2 6.3	1 47.6	35.8 0 49.8			
3.2	C	20.6	55.3 10.3	17.9	5.0	48.0	35.2 49.0			
10.9	Sum	5.2	136 57	386	11.3	156	10 .8			
5.45	Mean	2 22.60	56.80 12.85	2 19.30	2 5.65	1 47.80	35.50 49.40			
	Red. for runs									
	Red. to hor. wire									
	Red. to meridian									
	Division error									
	Sum									
	Pointer	35		0		25				
	App. z									
	log a'									
	A' log β									
	λ' log γ									
	log tang z									
	log r									
	r									
	z									
	φ — z = δ (O)									
	δ (C)									
	δ (C — O)									

(for Mar. 14 see 4 pages ahead)

Date 1871 Mar 22d Observer W. A. R.
n Recorder A. M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	+ 31 Lyncis		+ o Urs Maj		+ Gr 1450		+ Gr 1460	
	8 14	14m 22	8 20		8 25		8 30	
T_δ	8 13m 25.7	42.1 22.4	8 18m 37.8	54.0	8 23 58.7	24 46.7	8 28 54.7	29 6.1 30 6.0
T_m	47.2		19 ~~14.0~~ 14.3		24 18.7		29 30.8	
T_e	54.0		29.4		25.1		38.9	
T_f	57.2		34.4		28.2		43.2	
T_g	0.7		39.5		31.4		47.3	
T_h	4.0		44.7		34.6		51.4	
Sum	283.1		167.0		138.2		211.6	
Mean	56.62		33.40		27.64		42.32	
Red. to T_m	−9.57		−14.37		−8.85		−11.56	
Sum = s								
$\frac{1}{s}(T_m - T_s)$								
T	8 13 47.05		19 19.03		24 18.79		29 30.76	
RA								
RA — T								
— n tang δ								
ΔT + m								
$T_m - T_\delta$								
A	1 9.6				0 30.3	4 45.0	3 34.7	26.1 2 42.5
C	5.0				28.4	44.2	30.0	21.3 38.3
Sum	14.6				58.7	9.2	4.7	7.4 0.8
Mean	1 7.30				0 29.35	4 44.60	3 32.35	23.75 40.40
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	45				55	50	10	
App. z								
log a′								
A′ log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date 1871 March 22 Observer W. A. R.

n Recorder A. M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	×10 q Urs Maj	× h Urs Maj	× λ Urs Maj	× μ Urs Maj	× i Cephei ✓
	8 51	9 22	10 10 9	10 15 14	~~10~~ 22 45
T_δ	8 51 33.8 43.8	9h 20 50.0	10 8 37.8 58.8 43.3	10 13 58.6 21.8	10 44 19.8
T_m	52 2.9	21 8.1	9 6.4	26.0	26.0 32.0
T_e	9.7	19.3	13.3	32.8	37.8
T_f	12.9	24.9	16.5	36.0	49.8
T_g	16.3	30.4	20.0	39.2	45 1.8
T_h	19.7	36.0	23.4	42.7	7.8 13.5 19.7
Sum	61.5	118.7	79.7	176.7	448.2
Mean	12.30	23.74	15.94	35.34	44 49.80
Red. to T_m	−18.61	−15.60	−9.57	−9.35	
Sum = s					
$\frac{1}{5}(T_m - T_s)$					
T	8 51 53.69	9 21 8.14	10 9 6.37	14 25.99	10 44 49.80
RA					
RA — T					
— n tang δ					
ΔT + m					

$T_m - T_\delta$					
A	0 33.0 25.1 20.7	0 44.6	4 41.8 ⁴22.8 ³43.0	4 18.0 57.1	1 14.0 ¹5.3 ⁰29.2
C	30.5 22.0 17.0	39.0	39.0 18.8 38.6	13.1 53.7	11.8 1.3 25.5
Sum	3.5 7.1 37.7	3.6	0.8 41.6 1.6	11.1 10.8	5.8 6.6 14.7
Mean	0 31.75 23.55 18.85	0 41.80	4 40.40 ⁴20.80 ³40.80	4 15.55 55.40	1 12.90 ¹3.30 ⁰27.35
Red. for runs					
Red. to hor. wire					
Red. to meridian					
Division error					
Sum					
Pointer	5	45	45	10	10
App. z					
log a′					
A′ log β					
λ log γ					
log tang z					
log r					
r					
z					
φ — z = δ (O)					
δ (C)					
δ (C — O)					

Date 1871 March 22 Observer W. A. R. Barom. = log B =
Att. Therm. = log T =
n Recorder A. M. Ex. Therm. = log β = log γ

Star.	Tyn *		δ Leonis	ε Hydrae	~~ι Hydrae~~	March 26th λ Urs Mino		ι Can
	+ +		11 7	8 40		1 13		
T_δ	11h 1m 48.2	57.6 2m 41.4	11h 6m 49.3	8 39 31.5 34.0 36.5		1 1 51.6 53.8 56.8		
T_m	2 12.2		52.0	39.0			1 54.1	
T_e	19.7		54.5 57.3	— 44.0			+8 35.8	10 29.9
T_f	22.8		2.6 7.8	49.0 51.5		3 33.4 36.6 38.7	3 36.3	24.8
T_g	26.3		10.4	53.9		5 10.7	6 48.5	
T_h	29.8		13.2 15.8	56.5		18.4 25.3	5 18.1	
Sum	110.3		22.9 7 2.55	395.9 43.99		6 57.0	5 10.5	28.6
Mean	22.06					3.0 9.4	8 3.8	
Red. to T_m						10 26.0	7/8 27.3	31.1
Sum = s						29.2 32.6	10 29.3	28.1
$\frac{1}{5}(T_m - T_s)$						13 51.2	— 1.2	
T			11 7 2.55	8 39 43.99		54.1 56.2	13 53.8	26.5
RA				8 39 57.04			2 27.3	
RA — T						15 34.8 37.2 39.8	15 37.3	26.9
— n tang δ							5 10.4	
ΔT +- m								10 27.99

$T_m - T_\delta$								Mar 25 ι Cancri
A								4 10.0 3 54.8	2 35.5
C								11.0 57.0	36.7
Sum								1.0 11.8	12.
Mean								4 10.50 3 55.90	2 36.
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer								5
App. z								
log a'								
A' log β								
λ' log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

See April 5th 1871

Date Mar 25 1871 Observer A. M.

n Recorder W. A. R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

ι Cancri	57 Cancri	Star.	10 Urs. Maj.	36 Lyncis	h Urs. Maj.	λ Urs. Maj.	ω Urs. Maj.
		T_δ	8 53 8 51 37.0 51 51.2	9 6 4 5 9 4 47.7 56.8 37.1	9 22 20 42.0 9 21 8.0	10 10 8 9 10 10 8 41.2 49.4 31.4	10 15 16 14 14 0.0 12.5 48.0
		T_m	52 2.9	5 9.0	19.2	9 6.2	14 26.0
		T_e	9.6	15.9	24.7	13.2	32.6
		T_f	12.7	19.2	30.3	16.5	36.0
		T_g	16.2	22.6	35.8	20.0	39.2
		T_h	19.4	26.2		23.4	42.6
		Sum	60.8	92.9	118.0	79.3	176.4
		Mean	12.16	18.58	23.60	15.86	35.28
		Red. to T_m	−9.37	−9.60	−15.60	−9.57	−9.35
		Sum = s					
		$\frac{1}{5}(T_m - T_s)$					
		T	8 52 27.9	9 5 8.98	21 8.00	10 9 6.29	14 25.93
		RA					
		RA — T					
		— n tang δ					
		ΔT + m					
25							
cri		$T_m - T_\delta$					
3 54.8	2 35.5	A	1 4 1.4 3 41.8	3 9.0 3 0.5 2 25.0	0 47.6	4 37.9 4 30.1 3 55.5	4 16.0 4 4.0 3 32.4
57.0	36.7	C	3.0 43.2	4.8 57.0 22.3	43.3	36.4 28.8 52.4	13.7 2.6 29.8
11.8	12.2	Sum	4.4 5.0	13.8 117.5 7.3	10.9	14.3 58.9 7.9	9.7 6.6 62.2
55.90	2 36.10	Mean	4 2.20 42.50	3 6.90 ~~1~~ 2 58.75 2 23.65	0 45.45	4 37.15 4 29.45 3 53.95	4 14.85 4 3.30 3 31.10
		Red. for runs					
		Red. to hor. wire					
		Red. to meridian					
		Division error					
		Sum					
		Pointer 15		35	45	45 45	10
		App. z					
		log a′					
		A′ log β					
		λ′ log γ					
		log tang z					
		log r					
		r					
		z					
		φ — z = δ (O)					
		δ (C)					
		δ (C — O)					

Date 1871 March 14 Observer W. A. R. Barom. = log B =

Att. Therm. = log T = log γ

n Recorder A. M. Ex. Therm. = log β =

Star.	4 ✓ + 57 Cephei	+ 15 Lyncis		+ 63 Aurigae		+ 64 Aurigae		+ ε? θ Draconis	
T_δ	6 41 6 40 26.4	6 46 6 44 53.6	45 15.8 46 12.6	4 3 7 1 49.3	2 6.3	7 9 7 8 7.4	θ D	19 49 7 47 27.0	
T_m	41 12.5		35.4	2 16.0		33.2		34.7 41.5	
T_e	20.0	41 16.3	44.8	22.6		39.6		49.0	
T_f	42 {9.3 10.0 11.4}		49.3	25.8		43.0		48 3.7	
T_g		42 10.2	54.0	29.0		46.4		18.0 24.9	
T_h	43 {2.5 3.5}	43 3.0	59.0	32.1		49.6		32.3 39.6	
Sum			242.5	125.4		211.8		30.7	
Mean	44 53.7	44 53.7	48.50	25.08		42.36		48 3.41	
Red. to T_m			−13.30	−8.99		−9.20			
Sum = s	45 {15.8 16.3}	45 16.1							
$\frac{1}{5}(T_m - T_s)$									
T	6 38 44.50	6 45	35.20	7 2 16.09		7 8 33.16		48 3.41	
RA									
RA — T									
— n tang δ									
ΔT + m									
	6 41 16.3 −2 33.5	38 42.8							
$T_m - T_\delta$	42 16.2 3 25.0	45.2							
A	43 3.0 4 17.5	45.5 4 0.1	3 46.8 2 10.6	1 18.6	1 3.0	1 25.6	0 18.7		
C	~~44 13.7~~	56.5	42.9 5.7	17.2	2.0	23.3	17.1		
Sum	~~45 16.1~~	116.6	9.7 16.3	15.8	5.0	8.9	15.8		
Mean		3 58.30	44.85 2 8.15	1 17.90	1 2.50	1 24.45	0 7.90		
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer		45		50		15			
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Mar 14 1871 Observer

n Recorder

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	+ 31 Lyncis		+ o Urs Maj		+ Gr 1450	+ Gr 1460			
	8 14		8 20		8 25	8 30			
T_δ	8 13 5.9	16.3 14 2.7	8 18 48.3	19 41.7	8 23 37.3	8 28 49.0	29 1.9		
T_m	29.5		19 1.8		45.6 48.8 51.8 55.0	29 13.4			
T_e	36.4		12.0			21.5			
T_f	39.8		17.3		24 1.2	25.7			
T_g	43.2		22.3		7.7 10.8 13.9 17.0	24.7			
T_h	46.7		27.6			34.0			
Sum	195.6		81.0		10.8	124.3			
Mean	39.12		16.20		24 1.20	24.86			
Red. to T_m	−9.57		−14.37			11.56			
Sum = s									
$\frac{1}{5}(T_m - T_s)$									
T	8 13 29.55		19 1.83		24 1.20	29 11.56			
RA									
RA — T									
— n tang δ									
ΔT + m									

$T_m - T_\delta$									
A	2 0.9	1 51.7 10.4	4 15.3	3 43.0	1 32.3	3 26.2	17.5		
C	59.0	49.0 7.7	12.2	40.9	33.2	24.3	14.7		
Sum	119.9	0.7 18.1	7.5	3.9	5.5	10.5	122		
Mean	1 59.95	1 50.35 9.05	4 13.75	3 41.95	1 32.75	3 25.25	16.10		
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	45		10		55	10			
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Mar 28 1871 Observer W.A.R. Barom. = log B =

Att. Therm. = log T = log γ

n Recorder A. M. Ex. Therm. = log β =

Star.	+ 19 Lyncis +	+ Pi VII 67		+ 31 Lyncis +		+ o Urs. Maj +		+ Gr 1400	+ 1450
	7 13	+ +	16	8 14	13 14	8 20	18	8 25	24 24
T_δ	7 11 57.0	7 16 25.2	42.4	8 13 30.1	39.8 15.1	8 18 43.8 —	53.3	8 24 0.1	12.4 57.0
T_m	12 6.5	17 12.4	–12.4	46.7		19 18.0		24 18.4	
T_e	15.1	25.9	-13.6 12.3	53.5		28.9		24.8	
T_f	19.4	32.6	-20.4 12.2	57.0		33.9		27.9	
T_g	23.8	39.7	-27.2 12.5	0.3		39.2		31.0	
T_h	28.1	46.4	-34.0 12.4	5.9		44.3		34.2	
Sum	92.9	157.0	12.36	281.4		165.1		136.3	
Mean	18.58	31.40		56.28		33.02		27.26	
Red. to T_m	–12.25			–9.57		–14.37		–8.85	
Sum = s									
$\frac{1}{s}(T_m - T_s)$									
T	7 12 6.33	17 12.36		8 13 46.71		19 18.65		24 18.41	
RA									
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A	1 43.2	4 54.0	4. 47.2	1 55.3	46.8 14.9	4 27.3	3 47.4	0 29.3	16.8 4 33.9
C	40.7	46.9	40.2	51.1	42.3 9.3	22.9	42.0	27.5	14.0 31.6
Sum	3.9	0.9	7.4	6.4	9.1 24.2	10.2	9.4	16.8	$1\overset{0}{2}.8$ 5.5
Mean	1 41.95	4 50.45	4 43.70	1 53.20	44.55 12.10	4 25.10	3 44.70	0 28.40	$1\overset{5}{6}.40$ 4 32.75
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	50	35		45		10		55	50
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date
Observer
Barom. =
Att. Therm. =
Ex. Therm. =
log B =
log T =
log β =
log γ
n
Recorder

	Star.	Gr. 1460		1 Draconis		α Hydrae	α Gem.
24 57.0	T_δ	8 30 8 29 1.9	29 15.1	9 19 9 16 51.8	16 51.8	9 21 9 20 49.6	7 27 7 26 17.7
	T_m	30.5		17 8.9		52.1	8.5
	T_e	38.7		9.5 10.2	17 9.5	54.5	14.4
	T_f	42.9		17 26.6		57.0	17.4
	T_g	46.8		27.5 28.4	17 27.5	2.2	20.3
	T_h	51.0		17 43.9		7.1	23.2
	Sum	209.9		44.6 45.4	17 44.6	9.5	83.8
	Mean	41.98		18 19.4		12.0	16.76
	Red. to T_m	−11.56		26.2 21.0	18 20.2	14.6	−8.19
	Sum = s			54.2		1.36 21 ~~7.4~~	
	$\frac{1}{5}(T_m - T_s)$			18 55.0 56.0	18 55.1		
	T	29 30.42		19 12.2		9 21 ~~1.40~~ 2.07	7 27 8.57
	RA			12.8 13.7	19 12.9		
	RA — T			29 26.0			
	— n tang δ			29.07 30.6	19 29.4		
	ΔT + m			19 47.1			
				47.8 48.9	19 47.9		
	$T_m - T_\delta$				18 19.88		
33.9	A	3 30.4	20.1				2 15.3
31.6	C	25.9	14.8				13.0
5.5	Sum	56.3	34.9				8.3
32.75	Mean	3 28.15	17.45				2 14.15
	Red. for runs						
	Red. to hor. wire						
	Red. to meridian						
	Division error						
	Sum						
	Pointer	10					10
	App. z						
	log a′						
	A′ log β						
	λ log γ						
	log tang z						
	log r						
	r						
	z						
	φ — z = δ (O)						
	δ (C)						
	δ (C — O)						

Date Mai 29 1871 Observer A. M.
n Recorder W. A. R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =
log γ

W. A. R. Obs ~~with S. C.~~ North Clock

	(Add'l Star)		Polaris 1 13	β Arietis 1 48	α Arietis 2 00	19 Leo Min 9 50	λ Urs Maj 10 10	30 Urs Maj 10 15		ν Urs Maj 11 3	
	Tδ		1 0m 57.2	1 46s 23.7	1 58 28.5	9h 49m 22.8	10h 8m 51.1	10 14 30.3	15m 25.7	11 1 43.6	2m 7.0 2 35.0
	Tm	1h 0m 53.3s	53.2 55.5	f 26.2 g 29.0	31.0 33.6	34.0	5.9	36.1		12.0	
	Te		1m 53.0 53.6	h 31.6	36.5 41.7	40.5	12.8	48.7		18.9	
	Tf	1 54.1	55.8	30.5	47.1	44.0	16.2	54.4		22.4	
10 29.9	Tg	+8 35.8 ~~2 9.8~~	2 (9.8)	46.27.63	49.7 52.3 55.0	47.2	19.6	0.9		25.9	
	Th					50.5	23.0	7.1		29.5	
	Sum	(2 37.1)	2 34.7 37.0 39.5		15.0	216.2	77.5 ~~71.6~~	267.2		108.7	
	Mean			46.27.63	58.41.~~75~~ 66	43.24	9. 15.50 ~~17.90~~	53.44		21.74	
	Red. to T_m		4 13.8 16.4 19.8	-9.28		-9.28	-9.57	-17.19		-9.84	
10 27.2	Sum = s	+14 16.7 5 10.5									
	$\frac{1}{5}(T_m - T_s)$	+1	5 37.7 0.8 2.9								
	T	6 1.1 3 27.3		46 18.35	58.41.66	49 33.96	9 5.93	14 36.25		2 11.90	
10 28.4	RA		09 25.6 28.0	47.29.42	59.52.70						
	RA — T	(− 9 28.9)	30.4 31.5	1.11.07	1 11.04						
	— n tang δ	+1	12 52.0 53.7								
	ΔT + m	12 53.6 3 27.3	55.2								
10 26.3 10 22.8		14 33.2 5 10.4	14 32.0 33.1 34.5								
	$T_m - T_\delta$		16 15.7 18.1	α Arietis. 0 = −71.04 + .42		2 44.0	4 30.4	0 7.2	4 40.3	1 18.6	0 59.5 0 34.0
	A	16 17.8	19.6	Polaris. 0 = −75.60 + 41.42		2 42.0	26.0	59.4	32.5	15.4	55.6 31.0
10 24.2	C	68 ~~37.7~~ 33.6	17 57.6 18 0.7 3.6	0 = +4.56 − 41.00		6.0	56.4	6.6	72.8	14.0	15.1 5.0
10 23.3	Sum	18 1.0 88 37.7		n = +.11		2 43.00	4 28.40	0 3.30	4 36.40	1 17.00	0 57.55 0 32.50
10 23.60	Mean	86 03.5									
	Red. for runs	60 33.72		dT + m. for N. clock							
	Red. to hor. wire			+13.43							
	Red. to meridian			runs 1.6							
	Division error										
	Sum										
	Pointer					40	45	10	5	10	
	App. z										
	log a'										
	A' log β										
	λ log γ										
	log tang z										
	log r										
	r										
	z										
	φ — z = δ (O)										
	δ (C)										
	δ (C — O)										

Date Mar 29 1871 Observer A. M.

n Recorder W. A. R.

Barom. = 30.18
Att. Therm. = 61.0
Ex. Therm. = 32.0

log B = +.0084
log T = −.0011
log β = +.0073

log γ +.0145

Runs — −34 R. + ✓ × + 1.40 ✓ + .39 ✓ .13

Star. Gr 1757	3 Draconis		X Urs. Maj.		g Urs. Maj.		δ Leo.		10 06 40 + 9 20
11 10	11 35??		11 39		11 47		11 7		× × 18
T_δ 11 10 58.5	11 34 29.1	49.7	11 38 38.8	50.0	11 46 40.5	47m 19.1s	11 6 31.1	53.5	10 5 16.0
T_m 14.9	4.3 17.3	35m 44.1s	39 1.9	39m 29.6s	46 50.2		7. 2.2		27.6
T_e 20.0	23.8		9.2		58.7		7.5		32.9
T_f 23.1	30.0		13.0		3.1		10.0		35.4
T_g 25.1	36.7		16.7		7.2		12.7		37.8
T_h 27.8	11 2.1		20.5		11.5		15.5		40.1
Sum 110.9			61.3		20.5		5.7		27.2
Mean 22.18	22.42		12.26		11. 47 5.13		11 7. 11.43		5 36.55
Red. to T_m −10.82	18.07		−10.46		−14.91		9.28		8.76
Sum = s					46.50.22		7. 2.15		5. 28.31
$\frac{1}{5}(T_m - T_s)$									27.79 .04
T 11.36	35 4.35		39 1.80		46.50.22		7 2.16		5. 27.83
RA					47. 3.83		7.15.65		+13.43
RA — T					13.61		13.49		+.01
— n tang δ					−.15		−.04		10. 5. 41.27
ΔT + m					13.46		13.45		
					6.4118 5.2422 9.7	−28.3	6.2651 053 31.1	−51.3	0796 0645 11.6
$T_m - T_\delta$					3.21.7	2.55.1	4 9.4	3.44.0	4.4.8
A	0 57.8	51.6 22.2	3 30.0	20.7 49.2	19.7	52.0	10.3	45.4	8.0
C	50.2	43.8 15.0	27.1	17.3 45.0					
Sum	8.0	95.4 37.2	$\overset{5}{\cancel{4}}$7.1	38.0 14.2	41.4	7.1	19.7		
Mean	0 54.00	47.70 18.60	3 $\overset{2}{\cancel{4}}$8.55	19.00 47.10	3 20.70	2.53.$\overset{55}{\cancel{6}}$	4.9.$\overset{85}{\cancel{7}}$	3.44.70	4.6.40
Red. for runs					−1.1	−.9	−1.3	−1.2	−1.3
Red. to hor. wire					−6.96	+19.96	−35.12	+57.92	−18.9
Red. to meridian					+.08	+.21	+.18	+.49	0
Division error					−8.08	−19.27	−36.94	57.21	−15.2
Sum					3 12.67	12.87	3 33.66	4 41.91	3 51.2
Pointer	55		50		55.		5.		0.
App. z					58 12.47		8 33.66		3 51.2
log a′					1.7614				
A′ log β					+.0073				
λ log γ					+.0145	1.7832	1.7832		1.7832
log tang z					1.7832 9.3286		9.5875		9.8466
log r					1.1113		1.3707		1.6298
r					−12.92		+23.48		+42.6
z					57 59.85		8 57.14		4 33.8
$\phi - z = \delta\,(O)$					24 48.8		13 51.5		18 14.8
δ (C)					~~54~~ 24 43.4 2		24 13 44.4		−6.7
δ (C — O)					−5.4		−7.1		+4 18, 8′ 31 202

Wrong star.

2 33.50

34.0′
31.0
5.0
32.50

Date Mar 29 1871 Observer A. M. Barom. = log B =

Att. Therm. = log T =

n Recorder W. A. R. Ex. Therm. = log β = log γ

	Star.	10h 11m 0s +7° 3'	11 17 01 +9 0 41		11 20 40 +8 53	11 25 01 +8 35		× v δ Leonis	✓		× β Leonis .21
	T_δ	×× foll 11 20.7 10 10 40.6	×× 11 16 32.6		×× 11 20 15.8	×× 11 24 31.0	25m 12.1	11 31 11 29 47.5	33.6	11 43 11 41 46.4	42 2.0 ~~45~~ 42 42.0
	T_m	47.6	40.6 43.6			48.0		~~54.7~~		3.3 6.0	
	T_e	52.8	46.3 48.7		31.8	52.9		8.2		8.5 11.1	
	T_f	55.1	53.3 58.6 61.0		34.4	55.6		13.1		16.2	
	T_g	57.6	3.8		36.9	58.4		15.8		21.4 24.0	
	T_h	0.2	6.3		39.5	0.7		18.3 20.7		26.5 29.0	
	Sum	25.5	32.2		22.6	27.6		57.8		146.0	
	Mean	10.56.38	16.53.58		20.35.65	24.56.90		30. ~~14.45~~ 17.22		11.42,16.22	
	Red. to T_m	8.76			8.76	8.76		8.67			
	Sum = s	10.47.62				24 48.14		30. ~~5.78~~ 8.55			
	$\frac{1}{5}(T_m - T_s)$					03					
	T	10.47.62	16 53.58		20.26.89	24.48.11		Rej		42 16.22	
	RA	+13.43	+13.43		+13.43	+13.43		30.41,55		42.29.63	
	RA — T									+.13.41	
	— n tang δ	+.01	+.02		+.02	+.02		00		—.03	
	ΔT + m	11.01.06	17.07.03		20.40.34	25.01.56				13.38	
5.8457 7.0		.0764 —33.1	.0780 1.3160		.0780 1.0453	.0780 1.2304	1.3820			6.14 20 .0676 1.4742	1.4116
3.36.7	$T_m - T_\delta$	5158 2.49.0	20.7		11.1	+17.0	—24.1			298	2.58
40.6	A	53.2	3.49.0		2.34.2	2.57.8	2.4.9	25—0 4.0	3 49.2 2 8.3	5 0 16.2	4 11.3
	C		52.0		36.9	61.0	9.0	5.2	55.0 9.8	9.0	58.6 0.3 8.0
17.3	Sum	102.2			71.1	118.8	13.9	9.2	42 13.1	252	118.9 19.3
3 38.7	Mean	2.51.10	3 50.50		2 35.~~6~~55	2.59.40	2.~~7.0~~ 6.95	0 4.60	3 5210 6.55	0 1260	59.45 4 9.65
—1.2	Red. for runs	—.9	—1.2		—.8	—1.0	—.6			—0.06	—1.39
—8.4	Red. to hor. wire	+39.7	—24.8		—13.3	—20.4	+28.9			—34.82	+30.14
—9.6	Red. to meridian	+38.8	—26.0		—14.1	—21.4	+28.3			+.08	+.07
3 29.1	Division error	29.9	3 24.5		2 21.5	2 38.0	35.3			—34.80	+28.82
	Sum									4 37.80	4 38.47
45.	Pointer		15.		25.	45.		25	25 5	4 38.130	
4	App. z	48 29.5	18 24.5		27 21.5	47 38.0	47 35.3			4 38.13	
	log a'										
	A' log β										
	λ log γ	1.7832	1.7832		1.7832	1.7832				1.7802	
	log tang z	9.8506	9.8178		9.8268	9.8257				9.7090	
	log r	1.6338	1.6010		1.6040	1.6089				1.4922	
	r	+43.0	40.0		40.2	40.6				+31.06	
	z	49 12.5	19 04.5		28 01.7	48 18.6				+5 09.19	
	φ — z = δ (O)	33 36.1	0 3 44.1		54 46.9	34 30.0				17 39.4	
	δ (C)	—6.7	—6.7		—6.7	—6.7				15 17 31.9	
	δ (C — O)	/ 33 29.4	9 3 37.4		85 44 0.2	8 34 23.3				—7.7	

Date Apr. 5 1871 Observer W. A. R.

n Recorder A. M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =
log γ

Apr 4-5 41.42 .42

A. M - Obs A. M Obs

Star.	Polaris		α Arietis		27 Lyncis		36 Lyncis ~~Urs. Maj~~		~~3 Draconis~~ 5 Urs Maj ? 10 Leo Min
	1 13		2 00		7 59		9 6		9 27
T_δ	1ʰ 1ᵐ 43.3 45.3		1ʰ 59ᵐ 21.2		7 58 12.0	57.0	9 4 51.6	5 28.7	9 24 53.7 45.3
T_m	48.4		23.9 26.6		26.3 34.3		5 3.3		5.5 17.0
T_e	3 28.8 31.9		29.1 34.6		38.1 42.0		10.4		23.2
T_f	35.9 5 18.1		40.1 42.7		46.3		13.8		26.4
T_g	6 51.1 55.7		45.4 48.1				17.1		29.4
T_h	61.3						20.7		32.6
Sum	−10 12.3 18.0		31.17		187.0		65.3		128.6
Mean	22.0	10. 17.40 (5 2 3)	59. 34.63		37.40		13.06		25.72
Red. to T_m	13 33.4 35.7	10 44.17			−11.23		−9.60		−8.68
Sum = s	38.9	26.77							wrong star
$\frac{1}{5}(T_m - T_s)$	15 12.6 14.7 18.0								
T	20.8		1. 59. 34.63		58 26.17		5 3.46		17.04
RA	16 58.6 1.4 5.7		59 52.69						19.51
RA — T	18 43.1		18.06						
— n tang δ	46.9 50.0		−.09						
ΔT + m			17.97						

$T_m - T_\delta$									
A		Polaris 26.77			0 24.7	4 48.7	3 17.4	2 57.5 24.9	4 30.8 ⁴19.3 ³40.8
C		α Arietis 8.06			18.2	45.6	13.8	54.0 21.3	30.5 20.8 41.4
Sum		41.00 8.710 (.22 8200 5100			42.9	14.3	11.2	11.5 6.2	1.3 0.1 2.2
Mean					0 21.45	4 47.15	3 16.60	2 55.75 23.10	4 30.65 ⁴20.05 ³41.10
Red. for runs		n = +22							
Red. to hor. wire		δT + m = 18.50.+							
Red. to meridian									
Division error									
Sum									
Pointer					30	25	35		15
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Apr. 5 1871 Observer ~~WAR~~ A.M. Recorder ~~A.M.~~

WAR Obs A.M. Rec

for the remainder of the zero stars Apr 5 see after Apr. 24.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

n

Star.	♯ Urs. Maj.		λ Urs. Maj.		10 5 +7	40 18	10 42 45 +4 52	ζ Leonis
	9 42		10 10		+ +	+ +	+ +	11 7
T_δ	9 40 45.2	41 12.4 42 15.5						
T_m	30.4 4 40.0							
T_e	45.6							
T_f	49.8							
T_g	54.9							
T_h								
Sum	220.1							
Mean	44.02							
Red. to T_m	−13.71							
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	41 30.31							
RA								
RA — T								
— n tang δ								
ΔT + m								
$T_m - T_\delta$								
A	4 43.1	26.7 3 48.2						
C	40.0	23.5 44.4						
Sum	3.1	10.2 12.6						
Mean	4 41.55	25.10 3 46.30						
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	40							
App. z								
log a′								
A′ log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Ap. 5/71 Observer Barom. = log B =

Att. Therm. = log T = ________ log γ

n Recorder Ex. Therm. = log β =

Star.	11 11 26 +9 20	11 17 06 +8 04		11 19 47 +8 49	11 20 40 +8 53	11 25 51 +8 31		X + ν Leo	+ β Leo.
	+ +	+ +		+ +	+ +	+ +		11 31	11 43
T_δ									
T_m									
T_e									
T_f									
T_g									
T_h									
Sum									
Mean									
Red. to T_m									
Sum = s									
$\frac{1}{s}(T_m - T_s)$									
T									
RA									
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A									0 71 ^{4}55.8 ^{3}57.1
C									— 58.7 57.5
Sum									14.5 6
Mean									4 57.25 ^{3} 57.30
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer									5 0 0
App. z									
log a′									
A′ log β									
λ′ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date 1871 March 19 Observer A. M. Barom. = 30.37 log B =
Att. Therm. = 63 log T =
n Recorder A. M. Ex. Therm. = 35 log β = log γ

	+ ✓	+	+ ✓	+	+ ✓	+ ✓	+ ✓	
Star.	+ # 9 Draconis	+ l Leonis	+ δ Leonis	W 325	+ ν Leonis	+ γ Cephei	+ β Leonis	
	10 24	10 43	11 7	+ +	11 31	23 34	11 43	
T_δ	10 ~~8~~ 22 44.0	10~~9~~ 41 41.8	1~~2~~1 6 28.8	10 19 10.4	1~~0~~1 29 36.0		10 41 44.1	
T_m	54.8 23 50	45.6 48.1	31.1 33.8	7.6 10.4	38.0 40.6	1~~0~~ 33 27.2	45.4 48.3	
T_e	15.4 36.4	50.8 53.2	36.4 39.0	12.5 15.3	43.0 45.4	49.7	50.7 53.4	
T_f	57.5	58.2	44.5	20.2	50.4	0.1	58.3	
T_g	24 7.8 18.2	3.1 5.7	49.7 52.3	25.0 27.4 29.8	55.2 57.9	11.6 22.6	3.4 6.1 8.6	
T_h	29.7	8.3 10.7	55.0 57.6	32.4	00.3 2.8	291.2 ~~23.8~~	11.3	
Sum	27 328.8	523.7	39.4		3.6	58.24 10.33.~~6.95~~	75.5	
Mean	23 36.53	41 58.19	10 6.44.38	19 ~~11.91~~ 20.07	50.40	−30.67	10.41.58.39	
Red. to T_m								
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	10 23 36.53	41 58.19	11 6 44.38		29 50.40	33 ~~5.95~~ 27.57	41 58.39	
RA								
RA — T								
— n tang δ								
ΔT + m								
$T_m - T_\delta$								
A		3 52.3	3 54.8	4 6.8	3 51.1		4 59.8	
C		54.4	56.5	10.8	57.1		62.2	
Sum		6.7	11.3	17.6	8.2		2.0	
Mean		3 53.35	3 55.65	4 8.80	3 54.10		5 1.00	
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer		5	5	30	25		0	
App. z								
log a′								
A′ log β								
λ′ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date 1871 Mar 25 Observer A. M
n Recorder

Barom. =
Att. Therm. =
Ex. Therm. =

Apr 2 : continued from following page →

log B =
log T =
log β =
log γ

Star.	ν Leonis	γ Leonis	β Leonis
	11 31		11 44
T_δ	11 29 56.0 58.6 0.9 3.3 8.4 13.4 15.1 18.2 20.7	11 32 57.4 33 2.3 13.3 24.2 46.1 34 8.3 19.3 30.6 41.2	11 42 3.7 6.2 8.7 11.4 16.3 21.6 24.2 26.7 29.3
T_m			
T_e			
T_f			
T_g			
T_h			
Sum	75.4	27 416.7	148.1
Mean	30 8.38	33 46.30	42 16.46
Red. to T_m			
Sum = s			
$\frac{1}{5}(T_m - T_s)$			
T	30 8.38	33 46.30	42 16.46
RA			
RA — T			
— n tang δ			
ΔT + m			

	μ Urs Maj:	31 Seo	37 Urs Maj:	35 Urs Maj:	42 Seo
$T_m - T_\delta$					
A	4 10.0	0 55.4	3 26.3	2 48.7	1 11.5
C	5.3	54.2	21.3	39.3	10.4
Sum	15.3	9.6	7.6	88.0	1.9
Mean	4 7.65	0 54.80	3 23.80	2 44.00	1 10.95
Red. for runs					
Red. to hor. wire					
Red. to meridian					
Division error					
Sum					
Pointer	10	0	35	35	0
App. z					
log a'					
A' log β					
λ' log γ					
log tang z					
log r					
r					
z					
φ — z = δ (O)					
δ (C)					
δ (C — O)					

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v. preceding page.

Date Apr. 2 Observer A. M. Barom. = 29.72 log B = +0018

n = +.09 Recorder A. M. Att. Therm. = 62 log T = −0012

Ex. Therm. = 33 log β = +0006 log γ +0136

Star.	36 Lyncis	40 Lyncis	α Hydrae	τ Leo	δ Crateris	λ Draco	Gr. 4163	Sp 8 47 18 +10 47	10 5 40 +7 18
	9 6	9 13	9 21	11 7		11 24			
T_δ	9 4 57.5	9 12 43.4	9 20 47.0	10 10 ~~25.9~~	11 12 26.2	11 22 53.6	11 47 31.1	8 46 50.3	10 5 9.7
T_m	5 6.3	56.0	49.9 52.2	11 6 46.4 ~~32.9~~ 49.2 ~~35.3~~ 52.0	28.9 31.3	23 1.2 8.4	39.6 48.4	47 2.7	13.1
T_e	13.3	2.2	54.5 57.2	54.7 ~~37.8~~ 59.8 ~~40.4~~	33.9 38.9	15.7 −30.1	57.4 48 15.0	7.8	15.7
T_f	16.6	5.3	4.4 6.9	5.2 ~~45.0~~ 3.6 7.3	44.0	44.6	32.6	10.6	18.0
T_g	20.0	8.3	9.7	10.6 ~~50.2~~ 13.3 ~~52.5~~	46.5 49.0	51.9 57.0	41.6 50.2	13.0	20.6
T_h	23.4	11.3	12.3	189.2 ~~55.0~~	51.7	6.5	59.6	15.5	25.4
Sum	79.6	23.1	10 0 −16.6		350.2	330.9	675.5	46.8	30.5 33.8
Mean	15.92	13 4.62	~~9−3.40~~ 4.39	6.59.91	11.12.38.91	27.09	48 15.05	47.11.70	35.6
Red. to T_m	−9.60	−8.46	9.20.59.68					~~11.93~~ 8.84	38.1
Sum = s								~~46 59.77~~	229.9 26: 154 6.9 1738:10
$\frac{1}{5}(T_m - T_s)$								47 2.86	~~10.5.24.61~~
T	5 6.32	12 56.16	9.20.59.68	11 6 59.91	12.38.91	11 23 30.10	48 15.05	03 47 2.83	10.5.25.54
RA			21 15.35	7.15.63	12 54.45	45.98		15.63	15.65
RA − T			+15.67	15.72	15.54	+15.88		+.03	.02
− n tang δ			+.02	−.06	+.07	− 25		47.18.51	.5.41.21
ΔT + m			+15.69	15.69	15.58	15.63			
	6.4369 9.9420	6.6790 9.9967						0755 .0792	.0756 .1959
$T_m - T_\delta$	14.8	12.6						12.0	15.7
A	3 5.1	1 38.0						0 8.7	4 15.0
C	0.3	37.2						9.1	18.7
Sum	5 4	15 2						17.8	33.7
Mean	3 2.70	1 37.60						0 8.90	4 16.7 85
Red. for runs	−.8	−.4						0	−1.1
Red. to hor. wire	−12.94	−5.94						−14.3	−18.8
Red. to meridian	+.24	+.16						−14.3	−19.9
Division error	−13.5							−58 54.6	3 57.0
Sum	2 49.2	−10.22							
Pointer	35	25 −.264						35	0
App. z	37 49.2	26 26.4						34 54.6	3 57.0
log a′	1.7614							~~1.7614~~	
A′ log β	+0006								
λ log γ	+0136 1.7756	1.7756						1.7756	
log tang z	8.3776	9.4164						9.7890	
log r	0.1532	0.8920						1.5646	
r	+1.42	+7.80						+36.70	4.26
z	37 50.6	26 34.2						35 31.3	4 39.6
φ − z = δ (O)	45 58.0	56 14.4						47 17.3	18 9.0
δ (C)	43 44 57.1	34 56 14.0						− 0.6	− 6
δ (C − O)	− 0.9″	− 0.4″						10 47 16.7	7 18 8.4

Date Ap. 6 Observer W. A. R. Barom. = log B =

Att. Therm. = log T = log γ

n +22 Recorder A. M. Ex. Therm. = log β =

Star.	+ ✕ 27 Lyncis	+ ✕ 36 Lyncis	✕̶ θ? Urs Maj	+ 10 Leo. Min. ✕		+ υ Urs Maj ✕		+ 19 Leo. ✕
T_δ	7 59 7 59 17.3	9 6 9 4 58.2	5 9 24 / 6 9.8 10	9 27 ~~9 4~~ 26 33	26 56.2	9 42		9 50
T_m	∼∼	25.4	5 23 51.3 24 17.1	22.8				
T_e	58.56.1 -80 40.1	48.06 32.2	25.3	29.0				
T_f	-120.3 ~~57~~	48.07 35.7	28.3	32.0				
T_g	-160.0 4.3	48.30 39.0	33.3	35.3				
T_h	-20.10 8.5	48.40 42.4	37.3	38.4				
Sum	~~24~~ 9.0	.83 174.7	142.3	157.5				
Mean	59 2.25	34.94	28.46	31.50				
Red. to T_m	-14.04	-9.60	-11.33	-8.68				
Sum = s								
$\frac{1}{5}(T_m - T_s)$								
T	58 48.21	5 25.34	24 17.13	26 ~~27~~ 22.82				
RA								
RA — T								
— n tang δ								
ΔT + m						312		

$T_m - T_\delta$								
A	4 49.7	3 10.8 3 1.2	2 15.7 3 16.8	4 45.2	3 53.5	4 41.1	28.5 3 43.2	
C	44.0	6.0 55.1	9.5 9.8	43.8	57.2	36.2	22.1 37.5	
Sum	13.7	16.8 116.3	25.2 26.6	9.0	4.7	77.3	106 80.7	
Mean	4 46.85	3 8.40 2 58.15	2 12.60 2 13.30	4 44.50	3. 52.35	4 38.65	25.30 3 40.35	
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	25	35	5	20		40		
App. z								
log a'								
A' log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Ap. 6 1871 Observer A. M.

n +.18 Recorder W.A.R.

Barom. = 29.57
Att. Therm. = 64.0
Ex. Therm. = 41.7

log B = +0054
log T = −0013
log β = + ✓ 214

log γ +.0059

	+ 3721	,76	5638 +	1.52	δ = 57.44 +	1.58	+ 3 Draconis	
Star.	21 Leo. Min.		36 Urs. Maj.		37 Urs Maj.		~~0 Urs Maj.~~	
	10 21 ×	20 21	10 23	21 23	10 27.	26 ~~27~~	11 35	34 36
T_δ	10 19 45.0	20.4 48.2	10 22 13.2	~~26~~ 48.7 4.6	10 25 40.4	39.8 ~~28~~	11 33 46.3	39.4 11.6
T_m	29.3		26.1		26 55.0		34 48.8	66
T_e	35.7		35.0		27 4.2		55.8	70
T_f	38.8		39.5		8.9		1.8 8.8	61 66
T_g	41.8		44.0		13.5		21.4	10 12.9 17.0
T_h	44.9		48.7		18.2		34.0	12.0 64
Sum	1612		1672		44.8		40.4	
Mean	40.30		41.80		27.11.20		47.1	6.7
Red. to T_m	10.91		15.76		16.21		53.7	6.6
Sum = s	19 29.39		22 26.04		26.54.99		31.16	
$\frac{1}{5}(T_m - T_s)$	−02		+01				191.6	
T	20 29.37		22 26.05		26 54.94		35 21.29	
RA	10 20 25.86		10 22 22.80		26.51.54		35 18.05	
RA − T	−3.51		−3.25		+3.45		−3.24	
− n tang δ	−13		−27		28		39	
ΔT + m	3.64		−3.52		−3.73		−3.63	
					6.3911 9.8104			
$T_m - T_\delta$					74.6	+15.2		
A	1 15.2	0 41.0	4 48.3 32.7	3 57.5	3 55.2	3 16.7	45.6 1 19.9	0 55.9 14.9
C	13.0	40.0	46.2 30.6	55.5	57.5	13.5	41.4 14.2	51.2 6.1
Sum	8.2		14.5 3.3	13.0	6.7	10.2	7.0 14.1	7.1 21.0
Mean	1 14.10	0 40.05	4 47.25 31.65	3 56.50	3.53.7 35	3.15.10	43.50 1 17.05	0 53.55 10.50
Red. for runs					−1.3	−1.1		
Red. to hor. wire					−48.20	−9.8		
Red. to meridian					+.1	.0		
Division error					−49.4	10.9		
Sum					3 4.0	4.2		
Pointer	0		40		35			
App. z					38 4.0	4.2	5 5	
log a′	1.7614							
A′ log β	+0041							
λ log γ	+0059				1.7714			
log tang z	1.7714				9.4390			
log r					1.2104			
r					−16.24	16.2		
z					37 47.8	48.0		
φ − z = δ (O)					45 00.8			
δ (C)					57 44 52.5			
δ (C − O)					−8.3			

Date Apr. 6 Observer Hall Barom. = log B =

Att. Therm. = log T = log γ

n Recorder W.A.R. Ex. Therm. = log β =

48.29 113 120 09 .16

Star.	~~Leo Min~~ Ursa Maj		~~10 42 46 + 4° 52'~~ 50 10 Gr. 1757		10 42 46 + 4° 52'		11 17 3 + 9° 04'		11 19 47 + 8 49
T_δ	11 39 11 38 22.8	39 1.8 ~~39 46.7~~	11 10 11 8 83.3	10 11.0 3.6	10 42 24.3		11 16 31.6	16 ~~17~~ 55.0 35.0	11 19 17.6 41.4
T_m	39 18.8		29.8		36.7		57.7		19 42.0
T_e	26.1		37.6		39.3		0.6		44.7
T_f	29.9		41.5		41.7		2.9		47.0
T_g	33.7		45.3		44.1		5.4		49.5
T_h	37.9		49.2		49.2		10.3		54.4
Sum	127.1		173.6		54.0		15.3		59.7
Mean	11.39. 31.78		43.40		36.6		17.7		.21
Red. to T_m	~~14.91~~		13.53		59.1		20.3		45
Sum = s	~~39 16.67~~		29.87		1.5		23.1		- 9.3
$\frac{1}{5}$ (T_m — T_s)	13.16 39 18.62		- 2		82.2		93.3		41.2
T	39. 18.65		29.85		10.42.49.13		11.17.10.37		11.19.54.58
RA	39 .15.23		11 9 26.44		- 3.63		- 3.63		- 3.63
RA — T	- 3 .42		3.41		+ .02		+ .03		+ 03
— n tang δ	-.20		22		42 45.52		6.77		50.98
ΔT + m	3.62		-3.63						
	6 4322 4.9040 1.7482	1.2380			0816 1.3962		.0780 1.5877	1.0031	0780 1.5658 11.39
T_m — T_δ	56.0	17.3			24.9		38.7	11.3	+ 36.8 + 13.0
A	3 53.2	3 21.2, 2.46.1	~~2 28.8~~, 2 15.0,	1 34.0	0, 5, 2		4, 7, 8	3 36.4	4. 39.4 4, 9, 0
C	48.8	18.0 42.5	25.0	11.4 30.3	11.5		11.0	39.0	42.5 13.7
Sum	20	39 2 8.6	~~12.8~~	6.4 4.3	16 7		18 8	15 4	1.9 22.7
Mean	3.51.00	3 19.60 2 44.30	~~2 26.4~~ 2	13.20 1 32.50	0. 8.7 35		4 9.40	3 37.70	4 ~~11.0~~ 4 0.95 4.11.7 35
Red. for runs	-1.3	-1.1			0		-1.3	-1.2	-1.5 -1.4
Red. to hor. wire	- 44.9	- 13.9			- 30.44		- 46.3	± 13.5	- 44.0 - 15.6
Red. to meridian	+ .8	+ .1			- 30.1		0		
Division error	- 45.4	1.49			- 38.3		- 47.6	- 14.7	- 45.5 + 14.8
Sum	3 5.6	4.7					3 21.8	23.0	3 55.5 3 54.4
Pointer	50 -		~~10~~	4	30		15		30
App. z	53 5.6	53 4.7			29 21.7		18 21.8 18 22.4		33 55.9
log a'									
A' log β									
λ log γ	1.7714								
log tang z	9.0192								
log r	0.7906				444		404		40.8
r	- 6.18								
z	52 59.4	52 58.5			30 06.4		19 02.8		34 36.0
φ — z = δ (O)	29 49.2				52 42.2		3 46.8		48 11.9
δ (C)	48 29 41.9				- 7.8		7.8		7.8
δ (C — O)	- 7.5				4 52 34.4		9 3 39.0		8 48 41

-7.8

Date Apr. 6 1871 Observer A. M. Barom. = log B =

n +1 8 Recorder W. A. R. Att. Therm. = log T = log γ

Ex. Therm. = log β =

Star.	11 21 08 +8° 36		11 25 01 +8° 35′		
T_δ	++ 11 20 57.8	21 48.5	++ 11 24 32.0	24 44.8	~~25 29.3~~
T_m	59.0	66	52.2		
T_e	71.8 4.3	~~4.5~~	55.0		
T_f	6.6		57.6		
T_g	11.5		0.0		
T_h	16.5		5.0		
Sum	19.3		9.9		
Mean	21.8		12.6		
Red. to T_m	24.1		14.9		
Sum = s	10 4.8		17.6		
$\frac{1}{5}(T_m - T_s)$	11.21.11.64		44.8		
T	−3.63		11.25.4.98		
RA	+.03		+ 3.63		
RA — T	21 8.04		−.03		
— n tang δ			25 1.38		
ΔT + m					
	0780 1.2945	1.5682	0780 1.5185	1.3053	1.3856
$T_m - T_\delta$	19.7	−37.0	+33.0	+ 20.2	24.3
A	2.1.5	0.55.1	3.16.2	2.59.1	2 7.0
C	5.0	58.2	19.0	63.3	9.4
Sum	6 5	13 3	.15 2	2.4	164
Mean	2.3.~~5~~ 25	0 56.~~7~~ 65	3.17.60	~~2~~ 3 .61.20	2 8.~~7~~ 20
Red. for runs	−.6	−.3	−1.1	−1.0	− .9
Red. to hor. wire	−23.6	+44.3	−39.5	+24.2	+29.1
Red. to meridian	−24.2	+44.0	40.6	+25.2	25.4
Division error	1 39.1	1 40.7	2 37.0	3 86.0	39.0
Sum	1 35.9		2 37.3		
Pointer	45		45		
App. z	46 39.9		47 37.3		
log a′					
A′ log β					
λ′ log γ					
log tang z					
log r					
r	41.0		41.0		
z					
φ — z = δ (O)	47 20.5		48 18.3		
δ (C)	35 29.8		34 30.3		
δ (C — O)	78 35 19.9		78 834 22.5		

Date Ap. 8　　Observer A.M.　　Barom. =　　log B =

Att. Therm. =　　log T = ______　　log γ

n　　Recorder A.M.　　Ex. Therm. =　　log β =

Star.	ν Urs Maj	31 Leo.	37 Urs Maj	35 Urs Maj	42 Leo.	i Ceph.	58 δ Leo	δ Crateris	λ Draco.
	10 15	10 21	10 27	10 34	10 39	22 45	11 7	✗✗ ✗	11 24
T_δ	10 14 19.5	10 20 15.5	10 26 10.5	10 32 58.3	10 38 5.3	10 44 11.3	11 6 40.8	11 12 20.0	11 22 48.5
T_m	17.8	—	36 30.0	28.7	20.6	17.0	43.4	22.8	55.9
T_e	24.6	20 6.24 10.7	4.46 39.5	43.2	26.4	22.9	45.9	25.3	2.9
T_f	27.9	-9.34 13.7	4.36 44.0	50.0	29.3	29.0	48.5	27.7	9.7
T_g	31.1	-12.42 16.9	4.48 48.9	57.5	32.1	41.0	- 53.8	32.7	- 24.7
T_h	34.4	-15.61 20.0	4.39 53.4	4.5	35.1	52.7	59.3	37.9	39.6
Sum	135.8	61.3	1.69 215.8	243.9	143.5	58.8	1.9	40.4	46.8
Mean	27.16	15.33	43.16	48.78	28.70	5.5	4.6	43.0	53.8
Red. to T_m	- 9.35	-10.91	-12.99	-20.02	-8.12	11.0	7.3	45.6	1.0
Sum = s						36.92	48.55	29.54	28.29
$\frac{1}{5}(T_m - T_s)$						10 44 21.02			6
T	14 17.81	20 4.42	26 30.17	32 28.76	38 20.58	45 30.0	6 53.93	12 32.82	22.29 23 24.77
RA							7 15.51	12 54.43	23 45.86
RA — T						+21.98	+21.58	+21.61	+21.09
— n tang δ						- 42	+ 08	- 05	
ΔT + m						21.56	21.66	21.56	
$T_m - T_\delta$									
A	3 53.0	0 16.9	3 14.1	3 15.2	0 59.9				
C	55.3	20.1	16.4	12.2	4.7				
Sum	8.3	37.0	10.5	7.4	4.6				
Mean	3 54.15	0 18.50	3 15.25	3 13.70	1 2.30				
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	10	0	35	35	0				
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

0 = -21.58 + .39 - .08

0 = -21.61 - .25 + .05

0 = -21.54 + .07

0 = -21.09 + 2.75

0 = -.50 - 2.62

n = -.79

Date Apr. 13 1871 Observer A. M. Barom. = log B =
Att. Therm. = log T = log γ
n Recorder A. M. Ex. Therm. = log β =

√ X X X X
Apr 13 – 14

Star.	+ o Virginis	+ 44 Drac	+ η Virg		+ Polaris	W. A. R. Obs		
	11 59	12 6	12 ?		1 13			
T_δ	11 57 59.4	12 4 45.1	12 12 40.1		1 10 18.2			
T_m	58 2.3	57.5	42.8		20.3 22.8 24.9	10 21.6	10 21.6	
T_e	4.9	10.1	45.3		13			
T_f	7.5	22.0	47.7		42.9 46.4			
T_g	12.5	46.5	52.6		51.0	13 46.8	19.5	
T_h	17.5	10.7	57.7		15	−3 27.3		
Sum	20.0 22.5 25.1 112.2	23.0 35.3 47.9 278.1	60.2 62.6 65.1 474.1		23.8 26.4 29.8	15 26.7	16.3	
Mean	11 58 12.47	12 5 46.46	12 12 52.68			−5 10.4		
Red. to T_m					17 7.0			
Sum = s					9.0 12.3	17 9.4 −6 48.9	20.5	
$\frac{1}{5}(T_m - T_s)$					18 54.7 54.1			
T	11 58 12.47	12 5 46.46	12 12 52.68		57.0	18 55.7	21.2	
RA	11 58 39.19	12 6 13.16	12 13 19.38		59.9	−8 34.5		
RA — T								
— n tang δ					1 10	19.82		
ΔT + m								
$T_m - T_\delta$								
A								
C								
Sum								
Mean								
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer								
App. z								
log a′								
A′ log β								
λ′ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)								
δ (C — O)								

Date Apr. 17 1871 Observer A. M. Barom. = log B =

Att. Therm. = log T = log γ

n Recorder W. A. R. Ex. Therm. = log β =

Star.	+ 36 Lyncis		31 Leo. min. ~~0 Urs Maj~~		37 Urs Maj ~~10 Leo Min~~		+ Urs Maj	+ 10 Leo Min	
T_δ	96? 9 44 8.0	14.6	11 20 4.7	17.7 21/3.7	10 26 24.0	33.5 9	9 24 28 39.3	2424 00 33.5	9 27 25 26 9 ~~10~~ 25 27.0 47.6 41.4
T_m	5 25.6		28.8		33.5		11.7		26 2.9
T_e	~~32.8~~		36.0		4.7		25.7		11.1
T_f	36.2		39.0		9.3		29.6		15.2
T_g	39.4		42.2		13.7		33.7		19.4
T_h	43.0		45.5		18.7		37.8		23.4
Sum	177.3						~~126.8~~ 144.5		72.0
Mean	35.46						24. ~~31.70~~ 28.96		14.40
Red. to T_m	−9.60						−11.33		−8.68
Sum = s									
$\frac{1}{5}(T_m - T_s)$									
T	5 25.86						24 17.57		26 5.72
RA									
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A	3 17.3	2 53.7 17.8					2 21.3 5.7	24.7	0 43.7 29.9 4 50.8
C	14.4	52.3 17.8					21.1 5.7	25.1	42.6 28.9 49.7
Sum	11.7	6.0						9.8	6.3 18.8 0.5
Mean	3 15.85	2 53.00 17.80					2 21.20 5.70	24.90	0 43.15 29.40 50.25
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer	35						5		45 44
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Apr. 17 1871 Observer W. A. R. Barom. = 29.97 log B = +0054

Att. Therm. = 58.2 log T = −0009

n +.07 Recorder A. M. Ex. Therm. = 41.5 log β = log γ +0060

	+ + 07.27		+	+	+ √				
Star.	3 Draconis		χ Urs Maj		β ~~Leonis~~ Virginis		12 10 54 – 1 20		
T_δ	11 35 11 34 25.6	35 ~~36~~ 00.0 ~~15.7~~	11 39 11 38 40.8	39 7.0 51.4	11 44 ~~11 42 26.3~~	43 37	+ + 12 10 25.1	10 11 51.7 34.0	
T_m	49.6		19.3		20.7		10 47.4		
T_e	35.9	63	26.7		23.4		50.0		
T_f	2.3	14 1.7	30.2		26.0		52.4		
T_g	9.0	12.4	34.2		28.9		54.8		
T_h	21.4	13.4	37.9		33.6		59.7		
Sum	34.8		148.3		38.4		.48		
Mean	41.2	64 −65	29.66		41.2		.70		
Red. to T_m	47.7	65	−10.46		43.8		.96		
Sum = s	54.2				46.9		12.3		
$\frac{1}{5}(T_m - T_s)$	9119 6)				30 2.4		53 8.0		
T	37 21.79		38 19.20		11.42 33.66		12.10.59.78		
RA	35 17.84				42 29.57		−4.09		
RA — T	−3.95				−4.09		12.10.55.69		
— n tang δ	− + 12				+ .02				
ΔT + m	−4.07				−4.11				
	6.2856 9.6663	+21.4			.0676		1.5391	0.5036	1.5353
$T_m - T_\delta$	55.8	from Ap. 14 − −.14				−30.1	34.6	+ 8.0	−34.3
A	0 54.1	δT = 4.1	3 35.4	14.4 2 47.8	4 46.3 13 Scorpii	4 1.8	2 57.8	2 28.2	1 33.9
C	57.3	0 42.8	8.0 0.3 34.0	11.7 35.7	(50.7)	6.2	59.7	29.1	39.2
Sum	94	36.9 79.7	8.3 9.4	6.1 3.5	970	80	11 17.5	12 3	13 1
Mean	0 54.70	85 0.39.7	415 3 3470	+ 13.05 2 41.75	4 48.50	4 .4.00	55.75 2 ~~58.8~~	15 2.26.2	55 1 36.6
Red. for runs	−.2	−.2				−.8	−.6	−.5	−.3
Red. to hor. wire	−25.86	−9.93				+35.2	−41.9	−9.7	+41.5
Red. to meridian	+1.30	+.08				.0	−42.5	−10.2	41.2
Division error	−24.8	−10.0				+34.4	2 16.3	1 6.0	2 17.8
Sum	0 29.9	29.9				4 38.4	2 16.7		
Pointer	55		50		0	0	40	40 16.9	
App. z	55 29.9					4 38.4	42 16.7		
log a′	1.7614								
A′ log β	+0045								
λ log γ	+0060					1.7719			
log tang z	9.6700n					9.7050		1.7719	
log r	1.4419n					1.4809		9.9802	
r	−27.65					+30.34		1.7521	
z	55 32.5					5 8.7	56.5	56.5	
φ — z = δ (O)	27 46.4					3 5.9	43 13.2	43 13.4	
δ (C)	67 27 39.6					15 17 33.4		−1 20 24.8	
δ (C — O)	−6.8					6.5		−7.3 1 20 32.1	

Date Apr. 17 1871 Observer Barom. = log B =

n Recorder Att. Therm. = log T =

Ex. Therm. = log β = log γ

×37.2' × × See after April 18

Cr.

Gr. 1757 Star.	12 12 31 +1 19'	12 14 22 42	12 21 52 03		31 Leo	37 Leo Min	10 42 46 +45 2	δ Leo	11 17 3 +9 04 ~~58.8~~
~~9 29 61~~ 44 10 T_δ	12 ~~13 34~~ ~~1 20~~ 12 12 0	~~25.6~~ 26.6	12 20 32.0	22 25.0 12 21 32.0	10 21 10 20 47 ~~17.37~~	10 27 10 26 24.0 33.5	11 42 17.1	11 4 11 6 53.9	1.0 11 16 44.9 55.8
T_m	23.9		48.7	21 41.6	29.8	55.5	42 37.1	~~6.0~~	16 58.0
T_e	25.9		57.2	44.0	36.0	4.7	39.8	8.8	17 0.9
T_f	28.5		53.8	46.5	39.0	9.3	42.2	11.6	8.3
T_g	31.0		56.2	48.9	42.2	13.7	44.4	14.2	5.8
T_h	36.0		1.3	54.0	45.5	18.7	49.6	19.5	11.0
Sum	40.7		6.0	58.8	162.7	41.9	54.6	24.7	15.8
Mean	43.4		8.5 11.1	1.3	20.40.68	27 8.38	57.3	27.5	18.3
Red. to T_m	45.6	68.5 4820	540.5 13.7	3.7	10.97	−12.99	59.5	30.0	20.8
Sum = s	48.3	380.5 61.17	44.490.5 54	6.3	20 29.71		61.9	32.8	23.5
$\frac{1}{5}(T_m - T_s)$	323.8		.148 2.0 8 5	48.51	.02		446.4	17.57 19.46 ~~16.9~~ 19.46	97.4
T	12 12 35.98		60.25	22 53.90	20 29.73	26 55.39	11.42 49.60	11. 7. ~~21.14~~	11.17.10.82
RA	4.09		12.21.~~0.07~~	4.09	20 25.71		4.09	7.15.52	4.09
RA − T	12 31.89		4.09	21.49.81	−4.02		42 45.57		17.6.73 +.02
− n tang δ			20.57.08		+.05		1		17 6.75
ΔT + m			What star is this?		4.07		10 42 45 52		
	9240 1,3872		.0832 1.4669	1.3424	6.4700 9.5833 1.3997		.0816 1.5119		.0720 1.4249 1.0482
$T_m - T_\delta$	~~24.0~~ 8.4		29.3	22.0	25.1		32.5		26.6 +11.2
A 3 38.3	1 24.3		4 36.1	4 27.0	~~0.50.9~~	3 3 2 24.2 17.0 37.5	0.14.2		3.54.0 3.35.3
C 43.0	29.9		43.2	33.8 ~~33.0~~	~~54.0~~	22.2 15.7 36.3	23.1		60.0 40.2
Sum 81.3	14.2		79.3	0.8 ~~0.5~~	4.9 11.3	6.4 12.7 13.8	37.3		114.0 75.5
Mean 3 40.65	1 27.10		4 39.1 65	4 30.40 ~~4 30.4~~	0 52.5 55.1	3 3 2 23.20 16.35 36.900	18.1 65		3.57.00 3-37.8 75
Red. for runs	−.3		−1.0	−.9	−.2 −.9		−.1		−.8 −.7
Red. to hor. wire	−10.2		−35.5	−26.6	−24.15 +32.62		−39.2		−31.8 −13.4
Red. to meridian	−70.5		−36.5	27.5	+17 +2				−32.6 −14.1
Division error	1 16.6		4 3.2	4 2.9	−24.2 31.5				3 24.4 3 23.7
Sum					0 28.37.6				
Pointer 5	40		0	20	0. 28.0	35	30		15
App. z	41 16.6		4 3.2	24 2.9	31 Leonis Min. 0.0.50.9 39.4	55.4 55.1	29 29.8		18 24.1
					54.0 40.3	56.2			
log a'					0 52.45 39.85	55.65			
A' log β									
λ log γ	1.7719		1.7719	1.7719	1.7719				
log tang z			9.9858	9.9514	8.9419				
log r			1.7577	1.8633	0.7138				
r	+56.5		+57.2	+45.8	+51.7		44.7		40.4
z	42 13.1		5 0.4	25 0.9	0 33.2		30 0.5.5		19 0 4.5
φ − z = δ (O)	−1 19 24.5		−1 42 11.8	2 12 12.3	15.4		52 43.1		3 44.1
δ (C)	3 7.3		7.3	7.3	37 22 6.4		7.3		−7.3
δ (C − O)	−1 19 21.8		1 42 18.1	2 2 19.6	8.7 5.7		4 52 35.8		9 3 35.8

Date Apr. 18 1871 Observer A. M.   Barom. =   log B =

n −14   Recorder W. A. R.   Att. Therm. =   log T = ________   log γ

Ex. Therm. =   log β =

	129 ✓ 5216					.50		
Star.	+ θ Urs Maj		+ 10 Leo. Min 3657		+ υ Urs Maj: 9208		42 Leo Min	
T_δ	9 24 9ʰ 29ᵐ 36.2	24 1.7 49.0	9 27 9 25 30.4	26 50.4, 43.1	10 15 10 14 17.3	15 28.2 10.5	Sink failed	
T_m	24 16.5		26 20		41.7			
T_e	24.7		10.0		48.6			
T_f	28.7		14.0		51.8			
T_g	32.8		18.0		55.2			
T_h	36.7		22.3		58.3			
Sum	122.9		66.3 ~~64.3~~		2139			
Mean	24. 30.73		13.26 26 16.08 − 8.68 10.84 ?		53.48			
Red. to T_m	1417				1169			
Sum = s	1656				4179			
$\frac{1}{5}(T_m - T_s)$	·01				− 2			
T	24 16.55		26 4.58		14 41.77			
RA	9 24 13.27		9 26 18.94		10 14 38.80			
RA − T	−3.28				−2.97			
− n tang δ	+13				9			
ΔT + m	−3.41				−3.06			
$T_m - T_\delta$								
A	2 23.2	4.8 1 28.0	0 41.2	26.2 4 47.3	4 8.9 3	57.7 20.2	1 18.3	3.1 0 23.8
C	22.0	3.8 28.0	40.0	24.8 46.3	70	58.2 19.8	20.3	50 25.6
Sum	5.2	8.6		11.0 13.6	15.9	15.9 40.0	38.6	8.1 9.4
Mean	2 2260	430 1 2800	0 4060	2550 4 4680	4 7.95 3	57.95 2000	1 19.30	405 0 2470
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	5		45		10		0	
App. z								
log a′								
A′ log β								
λ log γ								
log tang z								
log r								
r								
z								
φ − z = δ (O)								
δ (C)								
δ (C − O)								

Date Am. 8 1871 Observer A.M.

n Recorder W.A.R.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Am. 17 W.A.R. obs.

Star. × + a Urs Maj √ 1.92 188 × + ψ Urs Maj 1.01 45-11

	10 56		11 3		× ×		× ×	21	× ×	25
T_δ	10 55 15.0	56 23.6	11 ~~1~~ 46.8	2 5.8	11 19 22.0	41.5	11 20 58.4	49.3	~~17~~ 24 58.7	27.2
T_m		48.4	2 27.2	56.0?	42.6		59.7		52.8	
T_e	21.5	59.0	2 34.1		45.2		20.		55.5	
T_f	26.9	56 · 4.5	37.5		47.5		4.6		57.9	
T_g	32.1	. 9.7	41.2		49.9		7.3		0.5	
T_h	37.7	15.1	44.7		55.0		12.1		8.4	
Sum	~~118.2~~	434.9	1575		.02		17.2		10.5	
Mean	~~29.55~~	10.55 48.32	3938		.25		19.5		13.0	
Red. to T_m	~~−18.73~~	~~16.65~~	12.30		.52		22.0		15.5	
Sum = s			2708		.77	3	24.6		18.0	
$\frac{1}{5}(T_m - T_s)$		+1.00	+ .02		45.8		109.0		49.1	
T	~~55 10.82~~	55 48.32	2 27.02		19.55.09		21.12.11		25 5.46	
RA		55. 45.39	11 02 25.06		4.09		4.09		4.09	
RA − T		2.98	2.96		19 51.00		21. 8.02		25.1.37	
− n tang δ		±.99	.10							
ΔT + m		−3.12	−3.06				0780			
					5185	1.1612	1.1362	1.5821	1.0652	1.3463
					33,0	+14,5	13,7	−38,2	11.7	−22,2
$T_m - T_\delta$					4 30.3	4,7,2	1,57,5	0,57,3	2 58,2	2,61
A	1 24.3	0 46.7	1 21.0 3.4	0 20.7	36.0	12.3	56.8	56,8	52.1 ~~42.1~~	10.6
C	24.0	45.0	21.6 5.5	20.7	63	19 5	8 2	8 1	+20 3	16 7
Sum		11.7	8.9		4.33.~~2~~ 15	4.9.~~8~~ 75	1 54.~~2~~ 15	0 54.7 05	2.50.~~1~~ 15	2,8,~~4~~ 8,35
Mean	1 24.15	0 45.85	1 21.30 4.45	0 20.70	−1,0	−.8	−.4	−.2	−.6	−.4
Red. for runs					−39.5	−17.4	−16,4	+45,7	−14.0	+26.5
Red. to hor. wire					−40.6	−18.2	16.8	+45.5	14.6	+26.1
Red. to meridian					3 52.6	51.6	1 37.4	1 39.6	2 35.6	34.5
Division error										
Sum										
Pointer	55		10		30		45		45	
App. z					33 52.1		46 38.5		47 35.1	
log a′										
A′ log β										
λ log γ										
log tang z										
log r										
r					40.8		40.7		41.0	
z					34 32.5		47 19.2		48 16.1	
φ − z = δ (O)					48 15.7		35 25.4		34 32.5	
δ (C)					−7.3		−7.3		−7.3	
δ (C − O)					848 8.4		35 22.1		34 25.2	

Date Ap 18 1871 Observer W.A.R. Barom. = log B =

Att. Therm. = log T =

n +.10 Recorder A. M. Ex. Therm. = log β = log γ

+ 7.15 + ✓ 54.24 1.40 + 9.0 1.5 42 0.2 11 56 15

Star.	+ Gr. 1771 65 2		+ η Urs Maj		+ 8 Can. Ven.		11 21 08 +8 36	~~11 23 38~~ +0 42	
	11 15		11 47		12 26	27 28	++	++	
T_δ	11 14 17.0	55.6	11 46 46.0	47 42.5	12 27 16.4	27.3 ~~7.5~~	11 21 17.2	11 55 46.3	56 7.4 ~~4.57~~
T_m	15 15.0		47 6.5		41.0		11.1		18.6
T_e	26.8		15.0		47.6 6.6		16.1	6.4	23.5
T_f	32.6		19.1		50.8 32		18.3	8.9	26.1
T_g	38.4		23.5		54.0 32		21.0	11.1	28.5
T_h	44.4		27.8		57.5 35		23.5	13.5	30.8
Sum	1422		85.4		2099		789	39	167.4
Mean	3550		47.21.35		52.48		11.21.19.73	9.5	11.56.18.60
Red. to T_m	2056		14.91		11 67		8.76		+.07
Sum = s	14.94		6.44		40 81		10.96		−3.00
$\frac{1}{5}(T_m - T_s)$	+ 2		1		5		3		
T	1496		47 6.45		27.40.81		21.10.99		11 56 18.60
RA	11 15 11.72		47 3.71		38 0		−.01		
RA — T	−3.24		−2.74		−2.81		−3.00		
— n tang δ	+ .21		− 14		− 09		8.00		11 56 7.50
ΔT + m	−3.45		2.84		2.90				
			0.4118 9.8482 20.5	−36.0	5.5518 24.6	−13.7	0.7853 −6.1	1.5079 32.3	1.0492 +11.2
$T_m - T_\delta$			1.3117 3 22.8	1.5563 2 42.9	1.3509 4.32.3	1.6656 4.22.7 3 468	1.31.2	0 26.2	5.0.8
A	1 20.0 0.0	0 25.2	20.4	40.0	30.9	21.6 44.2	33.7	31.8	4.8
C	14.3 54.3	19.3	3 2	8 2 9	3 2	4.3 11.0	4 9	5 8 0	5 6
Sum	34.3 11.43	44.5	3 21.60	2.41.5 45	4.31.60	4 ~~2 2.2~~ 22.15 3 45.50	1 32. 45	0 29.00	5 2.80
Mean	1 17.15 0 57.15	0 22.25	−.8	−.6	−1.1	−1.1	−.3	−.1	−1.2
Red. for runs			−14.45	+25.40	−22.07	−12.84	+7.3	−38.5	−13.4
Red. to hor. wire			+10	+33	+16	+06	+7.0	−386	14.6
Red. to meridian	−		151	+25.1	−22.9	−13.9	1 39.5	− 50.4	48.2
Division error			3 6.5	3 6.6	4 0 8.7	8.3		− 45.3	
Sum									
Pointer	20		55.		15	13	45.	5	0
App. z			58 6.55		19 8.50		46 39.5	4 49.8	
log a′									
A′ log β									
λ′ log γ			1.7719		1.7719			1.7719	
log tang z			9.3281		7.7647			8.9709	
log r			1.1000		9.5366			1.7428	
r			−12.59		+0.34		41.0	55.3	
z			57 53.96		19 8.84		47 2.05	5 44.6	
φ — z = δ (O)			24 54.6		38.8		8 35 28.1	0 42 56.0	
δ (C)			54 24 48.3		42 03 32.7		−6.7	−6.7	
δ (C — O)			−6.3		−7.1		8 35 22.4	0 43.24 2.7	

Date Apr 18 1871 Observer WAR
n Recorder AM

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =
log γ

Star.	12 12 31 — 1 19		12.22 32 — ~~18~~ 42		12 38 40 — 3 11	ι Urs Maj!	κ Urs Maj!	
	+ +	13	+ +	43	+ +			
T_δ	12 11 52.4	12 20.4	~~7.5~~ 12 21 57.2	22 23.3 ~~13.0~~		12 39 16.0		
T_m		~~1.3~~ 12, 34.7		22 ~~36.5~~	12 38 43.0			
T_e	12 22.3	39.8	24.2	~~41.5~~	48.0			
T_f	24.8	42.1	26.7	~~44.0~~	50.4			
T_g	27.4	44.7	29.1	~~46.4~~	52.8			
T_h	29.8	47.1	31.7	~~49.0~~	55.4			
Sum		31 2.7	~~411.7~~	~~20.9~~	206.6			
Mean		12 12 34.79	~~12 21 27.43~~	9 ~~23.3. 45.23~~	51.65			
Red. to T_m		+ .00	~~30.4~~ 36.5		8.70			
Sum = s		−3.00	41.5		42.95			
$\frac{1}{5}(T_m - T_s)$		2 2.04	44.0					
T		12 12 34.79	46.4		42.96			
RA			49.0		−.00			
RA — T			32.91		3.00			
— n tang δ		31.79	12.22 36.57		39.96			
ΔT + m			3.00 − 2		21			
			33.59					
	1,6263	1,1553	1,5944	1.1206	1.5222			
$T_m - T_\delta$	42.3	14.3	39.3	13.2	−33.0			
						4		
A	21,7.3	1 .3 2.1 0349	0 31.9	4 61.1 082	1.3	0 4.6 24.8	3 13.7	2.7 2 17.9
C	12.7	38.2 34.3	38.0	65.8 6.5	6.8	2.8 22.9	13.0	2.3 16.4
Sum	20.0	10.3 142	9.9	6.9 7.3	8.1	7.4 4 7.7	.7	14.3
Mean	2 10.00	1 ~~35.2~~ 35.15 0	3710 0, ~~35.0~~ 34.95	4 63. ~~5~~ 45 3.65	2.4.~~x~~ 05	0 3.70 23.85	3 13.35	2.50 2 17.15
Red. for runs	−.5	−.3	−.1	−1.2	−.5			
Red. to hor. wire	−51.2	−17.3	−46.9	+15.6	+40.3			
Red. to meridian	−51.7	−17.6	−47.0	+17.6	+39.8			
Division error	1 18.3	17.6	− 48.0	40 46.5	2 43.9			
Sum								
Pointer		40	4 48.0	4 46.5	30 .	50 45	40	
App. z	41 18.0		4 47.2		32 43.9			
log a′								
A′ log β								
λ′ log γ								
log tang z								
log r								
r	56.5		+ 56.4		55.3			
z	42 14.5		5 43.6		33 40.2			
φ — z = δ (O)	−1 19 25.9		−~~4~~ 42 55.0		−3 10 54.6			
δ (C)	−6.7		−6.7		6.7			
δ (C — O)	1.19 32.6		~~4~~ 42 01.7		−3 11 01.3			

Date Jan. 21 1871 Observer A. M.

n Recorder

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	o Urs. Maj		+ a Leonis						
	?		10 2						
T_δ			10 1 14.7						
T_m			17.2 19.6						
T_e			22.2 27.2						
T_f			32.3						
T_g			35.0 37.5						
T_h			40.1						
Sum			245.8						
Mean			10 1 27.31						
Red. to T_m									
Sum = s									
$\frac{1}{5}(T_m - T_s)$									
T			10 1 27.31						
RA			10 1 30.43						
RA — T									
— n tang δ									
ΔT + m									
$T_m - T_\delta$									
A									
C									
Sum									
Mean									
Red. for runs									
Red. to hor. wire									
Red. to meridian									
Division error									
Sum									
Pointer									
App. z									
log a′									
A′ log β									
λ log γ									
log tang z									
log r									
r									
z									
φ — z = δ (O)									
δ (C)									
δ (C — O)									

Date Ap. 23 1871 Observer A. M.
n Recorder A. M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	+ λ Urs Maj	+ Urs Maj	+ 31 Leo Min	+ 37 Urs Maj	+ # 35 Urs Maj	λ Draco.	+ ν Leonis
	10 10	10 15	10 21	10 27	10 34	Reject	11 31
T_δ	10 8 57.5	10 14 23.0	10 20 9.1	10 26 23.0	10 33 14.2	11 23	11 30 6.1
T_m	9 16.2	35.9	22.8	48.3	46.9		8.7 11.1
T_e	23.0	42.7	28.9	57.6	34 1.0		13.5
T_f	26.5	45.9	32.0	2.0	8.3		18.5 23.5
T_g	29.9	49.0	35.3	6.8	15.3		26.2 28.6
T_h	33.3	52.7	38.5	11.7	22.7		31.2
Sum	128.9	226.2	157.5	6.4	34.2		167.4
Mean	25.78	45.24	31.50	27 1.08	34 6.84		30 18.60
Red. to T_m	-9.57	- 9.35	- 8.72	- 12.99	-20.02		
Sum = s							
$\frac{1}{5}(T_m - T_s)$							
T	9 16.21	14 35.89	20 22.78	26 48.09	33 46.86		30 18.60
RA							
RA — T							
— n tang δ							
ΔT + m							

$T_m - T_\delta$							
A	4 21.3	3 52.3	0 39.0	3 16.2	3 13.4		
C	21.8	53.7	41.7	16.0	10.0		
Sum	1.1	6.0	80.7		3.4		
Mean	4 21.55	3 53.00	0 40.35	3 16.10	3 11.70		
Red. for runs							
Red. to hor. wire							
Red. to meridian							
Division error							
Sum							
Pointer	45	10	0	35	35		
App. z							
log a′							
A′ log β							
λ log γ							
log tang z							
log r							
r							
z							
φ — z = δ (O)							
δ (C)							
δ (C — O)							

Date Apr. 24 1871 | Observer W.A.R. | Barom. = 30.21 | log B = +0048
n +.08 | Recorder A.M. | Att. Therm. = 54.4 | log T = −0009
Ex. Therm. = 45.0 | log β = +0084 | log γ +0032

40 Sy. ~~Star.~~ s	+ + o Urs Maj		42 Leo + Mini		+ + a Urs Maj	152	+ + ψ Urs Maj	101	
T_δ	9 24 9h Ink failed	24 39.5	10	Ink failed	10 56 10 55 ~~5~~ 8.3	56 18.7	11 3 11 1 52.7	2 13.3 54.0	
T_m					43.20		2 22.1		
T_e		18.3			54.0		29.1		
T_f		22.4			59.4		32.7		
T_g		26.6			4.7		36.2		
T_h		30.5			10.0		39.8		
Sum					8.1		1378		
Mean					10.55. 20.2		34.45		
Red. to T_m					18.73		12.33		
Sum = s					55.43.21				
$\frac{1}{5}(T_m - T_s)$					02				
T					55 43.27		22.12		
RA					55.46.22		11 2 25.04		
RA — T					+2.95		+2.92		
— n tang δ					+.16		+.18		
ΔT + m					+3.11		+3.00		
					6.3455 9.7483		8.4357 9.9313		
$T_m - T_\delta$	1 26.4 03.68	2 24.8	9.1 1 29.3	1 15.8 0 54.9 15.0	50.88 2.56 64.28 34.9	65.02 −35.5	46.83 29.4	29445 8.8	1.5038 −31.9
A	28.0 38.9	23.2 5.7	26.8 18.8	57.2 16.7	1 24.7	0 44.2	1.9.3	0.51.2	0.17.8
C					36 22.6	42.9	9.6	50.8	16.1
Sum	14.4 15.7	8.0 14.8	16.1 14.6	12.1 11.7	7.5	7.1	9	0	13.9
Mean	1 27.20 0 37.85	2 24.00 7.40	1 28.05 1 17.30	0 56.05 15.85	1 23.75 ~~23.6~~	55 0 43.6	.45 1.9.~~2~~	0, 57.00	16.95 0.~~17.0~~
Red. for runs					−.3	−.1	−.2	−.2	−.1
Red. to hor. wire					−19.55	+19.59	−25.10	−7.52	+27.22
Red. to meridian					+.28	+.28	+.23	+02	+28
Division error					−19.30	+19.97	+25.01	−7.70	+27.40
Sum					1 4.30	0 03.57	0 44.4	43.3	0 44.40
Pointer	25 5		0	0	55 ~~43~~		10	10	10
App. z					56 4.3	56 3.6	10 44.4	43.3	44.4
log a'					1.7614				
A' log β					+0089				
λ log γ					+0032				
log tang z					1.7735 9.5626n		1.7735 8.6920n		
log r					1.3361		0.4655		
r					−21.68	21.7	−2.92	−2.92	−2.9
z					55 42.6	55 41.9	10 41.5	40.4	41.5
φ — z = δ (O)					7 06.0	6.7	11 07.1	8.2	
δ (C)					62 26 59.2	59.2	45 11 08.4		
δ (C — O)					6.8	7.5	8.7		8.7

7.2 8.4

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Date Apr 24 1871 Observer W. A. R.

n Recorder A. M.

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star.	+ 8 Can. ven		+ α Bootis	Lb.	+ o Virg. −.08	+ 43 Com. coma	+ 20 Can. ven	
T_δ	12 26 12 27 ~~7.5~~	28 1.5 20.7 ~~58.5~~	~~AA~~ 0 33 12 32 44.3		13 3 13 3	13 6 13 5 40.4	13 13 11	12 19.8 30.8 12 12.3
T_m	35.1		49.0 53.3		14.3	49.2		43.7
T_e	41.7		57.7		19.4	53.0		50.3
T_f	45.0		4.6 15.4		20.9	57.8		53.5
T_g	48.3		19.9		24.3	0.6		56.9
T_h	51.7		24.2 25.8		26.9	3.3		0.2
Sum	221.8		59.2		92.5	285.9		264.6
Mean	44.36		12. 32. 6.58		13. 3. 23.13	57.18		52.92
Red. to T_m	−9.34		12		8.67	−7.89		−9.22
Sum = s					14.46			
$\frac{1}{5}(T_m - T_s)$					3			
T	12 27 35.02		33 6.58		13 3 14.43	5 49.29		11 43.70
RA					3. 17.43			
RA — T					+3.00			
— n tang δ					−.00			
ΔT + m					3.00			
					6.6622 .0816			
$T_m - T_\delta$								
A	4 30.7	19.5	3 41.2			0 39.8	2 52.6 42.8	4.3
C	31.9	19.1	49.5			43.3	54.2 43.1	5.2
Sum	2.6	.6	10.7			83.1	6.8 5.9	9.5
Mean	4 31.30	19.30	3 45.35			0 41.55	2 53.40 42.95	4.75
Red. for runs								
Red. to hor. wire								
Red. to meridian								
Division error								
Sum								
Pointer	15					50	5	
App. z								
log a'								
A' log β								
λ log γ								
log tang z								
log r								
r								
z								
φ — z = δ (O)								
δ (C)					=451 47			
δ (C — O)								

Date Ap. 24 1871 Observer W. A. R. Barom. = log B =
Att. Therm. = log T = log γ
n Recorder A. M. Ex. Therm. = log β =

Star.		11 11 26 + 9 20		11.2 5 8 36	11 56 15 −0 42	12 10 54 − 20	12 12 31 −1 19	12 14 22 −1 42	12 22 32 −1 42	
T_δ		+ + ~~11 10 47.7~~	11 12 11.0 38.8	+ + Pen failed	+ + 16.8 11 56. 7.0	+ + 12 10 39.7	+ + 12 12 5.0!	Pen failed	+ + 12 22 05.0	19.0
T_m		11 12.5	25 which?		12.9	42.7	16.5 18.8		18.0 20.7	
T_e		15.0 17.6	26 26		17.8	45.3 47.7	21.4 23.9		23.0	
T_f		20.2 23.3	51 48		20.2	52.6 57.4	29.0 33.9		25.7 30.6	
T_g		30.1 32.8	27		22.7	0.1 2.4	36.3 38.8		35.6 38.0	
T_h		35.3 37.7	9 (last wire lost)		25.0	57	41.2		40.6 43.0	
Sum		191.2 12 5			85.5	472.9	259.8		275.2	
Mean		11. 10. 23.90			56. 21.38	12.10. 52.54	12.12. 28.87		12. 22. 30.58	
Red. to T_m		178.7			8.67	~~8.67~~				
Sum = s		11 10 25.57			56 12.71	~~10.43.87~~				
$\frac{1}{5}(T_m - T_s)$					4					
T		11 10 25.57			56 12.75	12 10 52.54	12.28.87		22.30.58	
RA	δT+m	+3.00			3.00	3.00	3.00		3.00	
RA — T	n tan δ	+.02			00	00	00		00	
— n tang δ	2	11.11.28.59			56.15.75	12 10.55.54	12 31.87		22 33.58	
ΔT + m										
		1.5758	1.1335		0.7708	1.1071	1.3784		1.4082	1.0645
$T_m - T_\delta$		380	−13.6		5.9	13.8	23.9		25.6	11.6
A		02 57.8	2 22.4		4 40.6	2 28.0	1 42.7	4 46.2	4 57.6	
C		59.0	30.0		48.3	34.8	49.1	54.6	56.2	
Sum		111.8	52.4		8 9 9	x 28	11 8	100.8	2 8	
Mean		2 55.90	2 26.20		44.45 4.~~46.0~~	2 31.40	45 1 45.~~2~~	4 50 40	5 ~~4~~ 61.40	
Red. for runs		−.6	−.5		−1.0	−.5	−.4		−1.0	−1.0
Red. to hor. wire		−45.5	−17.0		−7.2	−15.5	−28.9		−31.0	−14.1
Red. to meridian		−46.1	17.5		−8.2	−16.0	−25.3		−32.1	−15.1
Division error		2 9.8	−2 08.7		4 37.8	2 15.4	1 16.6		~~4 29.2~~	4 46.3
Sum										
Pointer			0		0	40	40	0	0	
App. z		2 9.2			4 37.8	42 15.4	41 16.6		4 46.3	
log a′										
A′ log β										
λ′ log γ										
log tang z										
log r										
r		38.3			55.3	56.5	56.5		56.4	
z		2 47.5			5 33.1	43 11.5	42 13.1		5 42.7	
φ — z = δ (O)	+	5 26 11			−0 42 44.5	−1 20 23.3	−1 19 24.5		−1 42 54.1	
δ (C)		−7.9			−7.9	−7.5	7.9		7.5	
δ (C — O)		9 15 53.2			−0 42 52.4	−1 20 31.2	1 19 32.4		−1 43 02.0	

Date Apr 24 1871 Observer WAR

n Recorder AM

Barom. =
Att. Therm. =
Ex. Therm. =

log B =
log T =
log β =

log γ

Star. + Polaris Ap. 23-4 + Polaris S.P. Gr. 1771

	1 — 13		13 13			
T_δ	0h 2 57.3		13 14 4.8			
T_m	58.8	59.1	6.4			
T_e	0.7		8.6			
T_f	5 37.2 40.6	40.4	15 44.1			
T_g	43.5 7 20.3		48.3 54.6			
T_h	22.8 25.8	23.0				
Sum						
Mean	10 47.8 49.7	49.2 49.90T				
Red. to T_m	52.2	47.342				
Sum = s	14 12.6	−2.562−T				
$\frac{1}{5}(T_m - T_s)$	14.3 16.8	14.6				
T						
RA	15 55.4 57.3 0.3	57.7				
RA − T						
− n tang δ	17 37.7					
ΔT + m	40.0 42.7	40.1				
	19 22.4? 24.9?	23.6				
$T_m - T_\delta$						
A					1 9.3	0 21.9
C					5.8	17.2
Sum	13 10 49.90				15.1	39.1
Mean	47.51				17.55	0 19.55
Red. for runs						
Red. to hor. wire						
Red. to meridian	1 2 59.1	+8 35.5	10	$\boxed{34.9}$		
Division error	5 40.4	+5 10.6		51.0		
Sum	7 23.0	+3 27.3		50.3		
Pointer	10 49.2	− 1.2		48.0	20	
App. z	14 14.6	3 27.3		47.3		
	15 57.7	−5 10.4		47.3		
log a'	17 40.1	−6 18.9		51.2		
A' log β	19 23.6	−8 34.5		49.1		
λ log γ			1 10	49.14		
log tang z						
log r						
r						
z						
φ − z = δ (O)						
δ (C)						
δ (C − O)						

503

Date Apr. 5 1871 Observer N.R. Barom. = 29.87 log B = +.0040

n = 20 Recorder A.M. Att. Therm. = 57.8 log T = −.0010

Ex. Therm. = 32.3 log β = +.0030 log γ +.0142

Star.	+ X ψ Ursae Maj:		39 + σ Leo 71.13 X ✓		+ ρ Leonis ✓ +	0.1	+ 3 Draconis + 241 ✓		
T_δ	11 3 ~~11 2~~ 1 48 11 1	28.8 3 16.7 2 49.2 43.5	11 7 11 6 57.3	~~28.29.3~~ 49.8 ~~28.7~~	11 31 11 29 35.2	~~57.1~~ 30 31.9	11 35 33 58.5 11 34 26.0	36 9.0	
T_m	2 31.4	6.8	6x 10.3	41.1	50.6		34 59.1		
T_e	39.4	13.8	12.9	43.7	53.2	26 23	12.1		
T_f	43.4	17.2	15.2	46.6	55.5	24	18.5		
T_g	47.8	20.8	17.9	49.1	57.9	51	25.0		
T_h	51.3	24.3	22.8	51.7	3.0	50	31.6		
Sum		82.9	27.9	57.0	8.0	23	87.2		
Mean		2 16.58	30.4	:20	10.3	28	21.80		
Red. to T_m		− 9.84	32.7	5.0	13.0	27 25	22.62		
Sum = s			35.8	.77	15.5		34 59.18 −02		
$\frac{1}{5}(T_m - T_s)$				10.5	27.0		34 59.16		
T	11 2	6.74		57 3.6 3	11. 39. 3.00				
RA			11 .6. 5	7.07	30.21.53		11 35 18.07		
RA − T			7	15.68	18.53		+18.91		
− n tang δ			+	18.56 −.09	00		− 48		
ΔT + m				18.40	18.53		18.43		
				v. bottom of page. 1.2041	9832 1.4440	1.4609	0.7708		
$T_m - T_\delta$				15.97	27.80	−38.9	+5.9		
A	1 22.3	6.5 0 19.7		5. 4. 3.9 3 50.8	25 4 7.2 ~~51.8~~	3 25. 2.57.2 42.7	42.7 1 7.0	0 54.3	0 4.1
C	19.1	2.0 15.9		6.0 57.8	12.8 47.8	57.3	4.78 57.7	45.7	55.7
Sum	41.4	8.5 15.6		9.9	20 0		10.5 4.7	0.0	11.98
Mean	1 20.70	4.25 0 17.80		9. 4.9	29. 10 0	27. 57.3	45.25 1 2.35	0 57.00	59 59.90
Red. for runs				−0.20	−7.8	−1.5	− .4		
Red. to hor. wire				+18.01	± 33.66	+35.01	−8.5		
Red. to meridian				00	−32.86	+34.50	−8.9		
Division error				+17.81					
Sum				8 47.10	28 37.14	28 31.8	36.3		
Pointer		10	5 4 3.9	3 50.8	25 4 7.2 3	42.7 2 57.2 55		55	
App. z			6.0	51.8	12.8	47.8 57.3			
		mean	4 4.95	3 57.30	4 10.00 2	45.25 2 57.25			
log a′			1.7614		1.				
A′ log β			+0030						
λ′ log γ			+0142		1.7886				
log tang z			1.7886		9.9620				
log r			9.5875		1.7506				
r			1.3761		+5630	.5630	.563		
z			+23.77		29 33.44	28 28.1	32.6		
φ − z = δ (O)			9 10.87		6 44.8	39.5	44.0		
δ (C)			13 .37.7 21 13 47.0		−0 06 47.6				
δ (C − O)									

Date Apr 5 1871 Observer WAR

n Recorder AM

Barom. =

Att. Therm. =

Ex. Therm. =

log B =

log T =

log β =

log γ

AM obs. WAR rec'd (from this point)

	+ 113		+ 140	54.24					
Star.	χ Urs Maj		γ Urs Maj		8 47 18 + 10.47	10 5 40 + 7 18		10 42 45 + 4 5 2	
T_δ	11 39 11 38 19.3	43.0 39 27.8	11 47 11 46.38	~~28.0 30.8~~ 30.3 47	46 44.6	10 4 59.3	~~9.3~~ 49.8	10 41 48.3	~~57.7~~ 42 47.4
T_m	56.6		45.2		47.4	5 10.3	~~22.8~~	58.3	
T_e	41		53.6		49.8	12.9	~~27.9~~	42 0.9	wiry
T_f	7.8		57.9		52.6	15.2	~~30.4~~	3.3	
T_g	11.7		2.1		54.8	17.9	~~32.7~~	5.9	
T_h	15.4		6.5		47 00	22.8	~~35.3~~	11.1	
Sum	39.0		0.1		4.6	27.9		16.2	
Mean	97.5		60.02		7.1	30.4		18.8	
Red. to T_m	13.09		14.91		10.2	32.7		21.3	
Sum = s	56.66		45.41		12.7	35.3		wrong star 24.0	
$\frac{1}{5}(T_m - T_s)$	−01		02		59.2	20 5.4		99.8	
T	38 56.65		46.45.13		46.59.91	10.5.22.82		10.42.11.09	
RA	11 39 15.24		47 3 80		+18.39	+18.39		+18.39	
RA — T	18.59		18.67		+.04	+.03		+.02	
— n tang δ	−.22		−.38		47. 18.45 .33	5.41.35 24		10.42.29.61 50	
ΔT + m	18.37		18.36						
					.0755	6745		6816	
					1.1847	1.3714	1.1303	1.5159	
$T_m - T_\delta$			41 .33 − 45.17		15.31	23.52	+17.50	32.79	−36.3
A	3 38.8 20.3	2 43.1	55 ~~3.41.0~~	~~55.2.41.0~~	30. 4.63.5	0.4.19.0	0.4.5.8	25.4.56.3	no A or C.
C	36.2 16.3	38.2	~~38.5~~	~~37.1~~	67.8	21.8	9.6	61.0	
Sum	15.0 36.6	81.3		7 8 1	11.3	08	15 4	117 3	
Mean	3 37.50 18.30	2 40.65	58 ~~39.8~~	57. 39.1	35.5.1 65	4.20.40	9.7.7	29.58.7 65	
Red. for runs			−~~6.6~~ ~~58.39.8~~ −.7	−~~7.8~~ .5	−.9	−.8	−7	−.9	
Red. to hor. wire			−29.1	+3 1.9	−18.2	−28.0	−16.0		
Red. to meridian						28.8	16.7		
Division error					−19.1	3 51.6	51.0		
Sum			29.8	31.4	46.6				
Pointer	50		58 10.0	58 10.5					
App. z			58 10.25		34 46.6	3 51.3			
			55 3 41.0	25.2 2 41.0					
log a'			38.5	21.0 37.1					
A' log β		mean	3 39.75	23.10 2 39.05					
λ log γ			1.7886						
log tang z			9.3281						
log r			1.1167						
r			−13.10		36.7	+42.6		44.7	
z			57 57.15		35 23.3	4 33.9			
φ — z = δ (O)			24 51.5		47 25.3	18 14.7			
δ (C)			54 24 45.3		−7.8	−9.8			
δ (C — O)			− 6.2		17.5	18 6.9			

Date Apr. 5 1871　Observer W A Rogers　Barom. =　log B =
n　Recorder A M, Rec　Att. Therm. =　log T =
Ex. Therm. =　log β =　log γ

Star.	11 17 6 +9 4		11 19 47 +8 49	11 20 40 +8 53	11 25 01 +8 35		19 Leo Min.		
T_δ	+ + 11 16 17.0	41.1 —	++ 11 19 11.6	++ 11 20 48.0	++ 11 24 9.3	~~26.7~~ ~~4~~ 25 4.5	9 49 50		
T_m	48.7		20.1	20 21.7	30.5				
T_e	53.5		22.7	26.6	33.0				
T_f	56.0		25.4	29.2	35.4				
T_g	58.6		27.9	31.7	38.0				
T_h	1.2		32.8	34.1	43.0				
Sum	229.3		37.7	~~14 3 3~~	48.1				
Mean	11.16.57.33		40.3	12.16	50.5				
Red. to T_m	8.76		42.6	20.30.40	52.9				
Sum = s	16.48.57		45.3	8.76	55.5				
$\frac{1}{5}(T_m - T_s)$	.03		294.8	20.21.64	386.7				
T	16.48.60		11.19.32.76	.01	11.24.42.99				
RA	18.50 39		18.50 35	20.21.65	+18.50 39				
RA — T	+.02		.02	+.02 +18.50	+.02				
— n tang δ	17.07.~~12~~		19.51.~~28~~	20.40.17	25.01.~~51~~				
ΔT + m	01		17	06	.40				
	0780 1.4997	1.8751	0780 1.3263	0780 415 2 2.3	0780 1.5011	1.3324			
$T_m - T_\delta$	31.60	+ 7.5	21.16	33.65	31.69	−21.5			
A	15.4.1.8	15.3.33.2	30 4 17.2	25 1.52.0	45 3.16.0	45. 2.8.3	2 27.5	59	1 55.0
C	3.3	35.4	19.9	54.9	18.1	10.9	22.6	2.3	52.4
Sum	46	~~34~~	17.1	69	141	19.2	10.1	8.2	7.4
Mean	19. 2.30	14. 34.30	34. 18.6 55	26.53.5 45	48.17.7 .05	47. 9.60	2 2505	410	5370
Red. for runs	−.7	−.6	−.8	−.4	−.5	−.4			
Red. to hor. wire	−37.82	−9.0	−25.21	+31.5	−37.9	+25.8			
Red. to meridian	−38.5	−9.6	26.2	31.1	−38.4	25.4			
Division error	23.8	18 24.7	33 52.4	27 24.6	47 38.7	35.0			
Sum									
Pointer	1'						40		
App. z	18 24.2				47 36.9				
log a'	1								
A' log β									
λ log γ	1.7886		1.7886	1.7886	1.7886				
log tang z	9.8178		9.8219	9.8208	9.8257				
log r	1.6064		1.6105	1.6054	1.6143				
r	40.4	40.8	40.8	40.2	41.0				
z	19 04.6		34 33.2	28 04.8	48 17.9				
φ — z = δ (O)	3 44.0		48 15.4	54 43.8	34 30.7				
δ (C)	−6.2		6.2	−6.2	−6.2				
δ (C — O)	9 33 7.8		8 48 9.2	8 64 4 37.6	8 84 24.5				

38. Comp #'s
28
66