

KG

11366

v.848

Record of Observations
by F. W. Grover
— 1898 —

1898phae.proj.1852G

June 19, 1899

June 19. 1899. (Monday)

Estimates of relative brightness of stars
with naked eye. F. W. Crocker, obs.

Diff

Cassiopeia

γ 3 β

eyes

$\gamma = 2.30$ $\beta = 2.42 \pm 0.12$

α 2 δ

$\alpha = 2.25$ $\delta = 2.84 \pm 0.59$

γ much br. than δ

γ 3 α

eyes

$\gamma = 2.30$ $\alpha = 2.25$
-0.05

9:27

9:45

9:48 Draco

η 4 ϵ

eyes

$\eta = 2.82$ $\epsilon = 3.27 \pm 0.45$

9:57 Cygnus

γ 3 ϵ

"

$\gamma = 2.31$ $\epsilon = 2.69 \pm 0.38$

10:10 Ursa Maj

α 1 ϵ

eyes

$\alpha = 1.96$ $\epsilon = 1.85 - 0.11$

10:12

β 2 γ

"

$\beta = 2.60$ $\gamma = 2.56 - 0.04$

10:13

μ 4 λ

"

$\mu = 3.12$ $\lambda = 3.57 \pm 0.45$

10:15

ζ 3 κ

"

$\zeta = 3.17$ $\kappa = 3.70 \pm 0.53$

10:17

h 3 v

"

$h = 3.71$ $v = 3.98 \pm 0.27$

20

θ 2 h

"

$\theta = 3.43$ $h = 3.71 \pm 0.28$

10:24 Cepheus

ϵ 3 δ

"

$\epsilon = 3.54$ $\delta = 4.00 \pm 0.46$

10:27

γ 1 β

"

$\gamma = 3.37$ $\beta = 3.39 \pm 0.02$

10:31 Ursa Min.

ζ 6 θ

"

$\zeta = 4.49$ $\theta = 5.31 \pm 0.82$

10:40 Draco

α 5 i

"

$\alpha = 3.63$ $i = 4.71 \pm 1.08$

10

ϕ 1 ψ

"

$\phi = 4.21$ $\psi = 4.52 \pm 0.31$

10:46 Aquila

δ 2 β

"

$\delta = 3.46$ $\beta = 3.95 \pm 0.49$

48

η 5 ζ

"

$\eta = 3.89$ $\zeta = 4.27 \pm 0.38$

Hercules

ξ 2 θ

"

$\xi = 3.91$ $\theta = 3.99 \pm 0.08$

11:03 Cygnus

ζ 1 κ

"

$\zeta = 3.89$ $\kappa = 3.94 \pm 0.05$

04

θ 4 θ

"

$\theta_1 = 3.80$ $\theta_2 = 4.07$

06

ξ 3 ν

"

$\xi = 3.73$ $\nu = 4.09 \pm 0.36$

11

χ 3 ϕ

"

$\chi = \text{var.}$ $\phi = 4.89$

11:15	Delphinus	$\gamma 2 \alpha$	eyes	//	$\gamma = 4.16$	$\alpha = 3.96 - 0.20$
18	"	$\beta 2 \alpha$	"	//	$\beta = 3.74$	$\alpha = 3.96 + 0.22$
20	"	$\beta 3 \gamma$	"	//	$\beta = 3.74$	$\gamma = 4.16 + 0.12$
20	"	$\gamma 5 \delta$	"	//	$\gamma = 4.16$	$\delta = 4.57 + 0.41$
21	"	$\gamma 3 \epsilon$	"	//	$\gamma = 4.16$	$\epsilon = 4.13 - 0.03$
22	Pegasus	$\beta 5 \eta$	"	\perp	$\beta = 2.56$	$\eta = 3.06 + 0.50$
23	"	$L 4 K$	"	\perp	$L = 3.99$	$K = 4.21 + 0.22$

π Pegasi, 1 Lacertae					4.14	
28	1 Lacertae + π Pegasi				$1 = \pi$	$\pi = 4.41 + 0.27$
33	Sagitta	$\gamma 2 \delta$	eyes	//	$\gamma = 3.65$	$\delta = 3.72 + 0.07$
35	"	$\beta 2 \alpha$	"	\perp	$\beta = 4.40$	$\alpha = 4.27 - 0.13$
37	"	$\delta 5 \beta$	"	//	$\delta = 3.72$	$\beta = 4.40 + 0.68$
45	Cygnus	$52, 3, 41$	"	\perp	$52 = 4.29$	$41 = 4.60 + 0.31$
46	Pegasus	$\mu 3 \lambda$	"	//	$\mu = 3.74$	$\lambda = 4.18 + 0.44$
49	Sagittarius	$\delta 3 \gamma 2$	"	//	$\delta = 2.83$	$\gamma_2 = 3.05 + 0.22$
51?	"	$\tau 1 \phi$	"	//	$\tau = 3.48$	$\phi = 3.33 - 0.15$
56	"	$\delta 2 \epsilon$	"	//	$\delta = 2.83$	$\epsilon = 2.89 + 0.06$
59	Aquarius	$\beta 1 \alpha$	"	//	$\beta = 3.14$	$\alpha = 3.16 + 0.02$
12:00	α Hercules	$5 K$	Ophiuchus eyes	//	$\alpha = 3.22$	$K = 3.37 + 0.15$
	Ophiuchus	$70, 3, 67$	letters		$70, 4.11, 67 = 4.02$	$- 0.09$

η Serpens, 1, star 17:53 - 9 $\frac{1}{2}$
(γ Ophiuchus)

June 21, 1899

Estimates of the relative
brightness of naked eye stars.
J. W. Esch.

8:45	Mars	3 α	Leo	eye		$\alpha = 1.42$
49	Leo	ϵ 5 μ	eye		$\epsilon = 3.61$ $\mu = 4.14 + 0.53$	
57	"	ϵ 3 η	"		$\epsilon = 3.61$ $\eta = 3.59 - 0.02$	
59	Virgo	β 4 η	"		$\beta = 3.72$ $\eta = 4.05 + 0.33$	
9:02	"	ν 3 σ	"		$\nu = 4.24$ $\sigma = 4.27 + 0.03$	
05	"	β 3 ν	"		$\beta = 3.72$ $\nu = 4.24 + 0.52$	
9:14	Leo	β 5 δ	"		$\beta = 2.23$ $\delta = 2.75 + 0.52$	
18	ξ Ursa maj	1	46 Leo	min	$\xi = 3.80$ $46 = 3.92 + 0.12$	
	Ursa maj	ν 5 ξ	"		$\nu = 3.78$ $\xi = 3.80 + 0.02$	
10:06	Dra	η 5 ϵ	"		$\eta = 2.82$ $\epsilon = 3.27 + 0.45$	
10:08	Ursa min	$\alpha = \beta$	"		$\alpha = 2.15$ $\beta = 2.13 - 0.02$	
12	Cepheus	γ 1 β	"		$\gamma = 3.37$ $\beta = 3.39 + 0.02$	
15	Ursa maj	h 2 ν	"		$h = 3.71$ $\nu = 3.98 + 0.27$	
16	"	σ 5 h	"		$\sigma = 3.43$ $h = 3.71 + 0.38$	
19	"	ι 3 κ	"		$\iota = 3.17$ $\kappa = 3.70 + 0.53$	
22	"	μ 5 λ	"		$\mu = 3.12$ $\lambda = 3.57 + 0.45$	
	"	η 2 ϵ	"		$\eta = 2.02$ $\epsilon = 2.38 + 0.36$	
23	"	ϵ 3 ϵ	"		$\epsilon = 1.85$ $\epsilon = 2.38 + 0.53$	
30	Lynx	γ 4 β	"		$\gamma = 3.29$ $\beta = 3.57 + 0.28$	
31	"	σ_2 3 ϵ	"		$\sigma_2 = 4.53$ $\epsilon = 4.34 - 0.19$	
34	Cygnus	γ 2 ϵ	"		$\gamma = 2.31$ $\epsilon = 2.69 + 0.38$	
37	"	σ_1 4 σ	"		$\sigma_1 = \begin{cases} 3.80 \\ 4.94 \end{cases}$ $\sigma_2 = 4.07$	
39	"	ξ 4 ν	"		$\xi = 3.73$ $\nu = 4.09 + 0.36$	
45	Aquila	δ 2 β	"		$\delta = 3.46$ $\beta = 3.95 + 0.49$	
50	"	δ 1 η	"		$\delta = 3.46$ $\eta = 3.89 + 0.43$	

10:53	Aquila	θ 2 β	eye	$\frac{1}{11}$	$\theta = 3.39 \beta = 3.95 + 0.56$
56	Delphinus	γ 2 α	"	$\frac{1}{11}$	$\gamma = 4.16 \alpha = 3.96 + 0.20$
59	"	β 3 α	"		$\beta = 3.74 \alpha = 3.96 + 0.22$
11:01	"	α 3 δ	"		$\alpha = 3.96 \delta = 4.57 + 0.61$
05	Pagitta	γ 3 δ	"	$\frac{1}{11}$	$\gamma = 3.65 \delta = 3.72 + 0.07$
	"	β 2 α	"	$\frac{1}{11}$	$\beta = 4.40 \alpha = 4.27 + 0.13$
07	"	δ 5 β	"	$\frac{1}{11}$	$\delta = 3.72 \beta = 4.40 + 0.68$
12	Cassiopeia	γ 1 β ?	"	$\frac{1}{11}$	$\gamma = 2.30 \beta = 2.42 + 0.12$
15	"	γ 1 α ?	"	$\frac{1}{11}$	$\gamma = 2.30 \alpha = 2.25 + 0.05$
16	"	γ 5 δ	"	$\frac{1}{11}$	$\gamma = 2.30 \delta = 2.84 + 0.54$
17	Pegasus	μ 3 λ	"	$\frac{1}{11}$	$\mu = 3.74 \lambda = 4.18 + 0.44$
20	"	L 5 K	"	$\frac{1}{11}$	$L = 3.99 K = 4.21 + 0.22$
24	Aquarius	β 2 α	"	$\frac{1}{11}$	$\beta = 3.14 \alpha = 3.16 + 0.02$
29	Cygnus	η 1 ν 2	"	$\frac{1}{11}$	$\eta = 4.13 \nu = 4.29 + 0.16$
35	Cassiopeia	η 2 ξ	"	$\frac{1}{11}$	$\eta = 3.64 \xi = 3.74 + 0.08$
40	Pegasus	ξ 1 θ	"	$\frac{1}{11}$	$\xi = 3.59 \theta = 3.76 + 0.18$
48	Cepheus	δ 3 ϵ	"	$\frac{1}{11}$	$\delta = 4.00 \epsilon = 4.24 + 0.24$
49	Pegasus	γ 5 η	"	$\frac{1}{11}$	$\gamma = 3.11 \eta = 3.93 + 0.82$
52	α Andromeda	2 β Pegasus	"	$\frac{1}{11}$	$\alpha = 2.08 \beta = 2.56 + 0.48$

Table

Constell.	Stars	H. P. Diff.	mean June 19	Observed. diff. (grades) June 21	mean
Cassiopeia	γ, β	+ 0.12	+ 3	+ 1	+ .20
"	α, δ	+ 0.59	+ 2	+ 4 (calc.)	+ .30
"	γ, α	- 0.05	+ 3	+ 1	+ .20
"	γ, δ	+ 0.54	+ 5 (calc.)	+ 5	+ .50
"	η, ϵ	+ 0.08		+ 2	+ .20
Draco	η, ϵ	+ 0.45	+ 4	+ 5	+ .45
"	α, ι	+ 1.04	+ 5		+ .50
"	ϕ, ψ	+ 0.31	+ 1		+ .10
Cygnus	γ, ϵ	+ 0.38	+ 3	+ 2	+ .25
"	ι, κ	+ 0.05	+ 1		+ .10
"	ξ, ν	+ 0.36	+ 3	+ 4	+ .35
"	52, 39	+ 0.31	+ 3		+ .20
"	41, 52	+ 0.16	2	+ 1	+ .10
Ursa Min.	ϵ, θ	+ 0.82	+ 6		+ .60
"	β, α	+ 0.02	+ 1	0	+ .05
Ursa Maj.	α, ϵ	- 0.11	+ 1		+ .10
"	β, γ	- 0.04	+ 2		+ .20
"	μ, λ	+ 0.45	+ 4	+ 5	+ .45
"	ι, κ	+ 0.53	+ 3	+ 3	+ .30
"	h, ν	+ 0.27	+ 3	+ 2	+ .25
"	ϕ, h	+ 0.28	+ 2	+ 5	+ .35
"	ν, ξ	+ 0.02		+ 5	+ .50
"	η, ϵ	+ 0.36		+ 2	+ .20
"	ϵ, ϵ	+ 0.53		+ 3	+ .30
Cepheus	ϵ, δ	+ 0.46	+ 3		+ .30
"	γ, β	+ 0.02	+ 1	+ 1	+ .10
"	δ, ϵ	+ 0.24		+ 3	+ .30
Aquila	δ, β	+ 0.49	+ 2	+ 2	+ .20
"	η, ι	+ 0.38	+ 5		+ .50

	Pair	H.P. diff.	Observed diff in grades June 19 June 21.	
Aquila				
"	δ, η	+0.43		+1 ^{Me} +1.0
"	θ, β	+0.56		+2 ^{Me} +2.2
Hercules	ξ, σ	+0.08	+2	+2 ^{Me} +2.2
Delfphinus	γ, α	-0.20	+2	+2 ^{Me} +2.2
"	β, α	+0.22	+2	+3 ^{Me} +2.2
"	β, γ	+0.42	+3	+3 ^{Me} +2.2
"	γ, δ	+0.41	+5	+5 ^{Me} +2.2
"	γ, ϵ	-0.03	+3	+3 ^{Me} +2.2
"	α, δ	+0.61		+3 ^{Me} +2.2
Pegasus	β, η	+0.50	+5	+5 ^{Me} +2.2
"	ι, κ	+0.22	+4	+5 ^{Me} +2.2
"	μ, λ	+0.44	+3	+3 ^{Me} +2.2
Sagitta	γ, δ	+0.07	+2	+3 ^{Me} +2.2
"	β, α	-0.13	+2	+2 ^{Me} +2.2
"	δ, β	+0.68	+5	+5 ^{Me} +2.2
Sagittarius	δ, γ_2	+0.22	+3	+3 ^{Me} +2.2
"	τ, ϕ	-0.15	+1	+1 ^{Me} +2.2
"	δ, ϵ	+0.06	+2	+2 ^{Me} +2.2
Aquarius	β, α	+0.02	+1	+2 ^{Me} +2.2
Ophiuchus	γ_0, β_7	-0.09	+3	+3 ^{Me} +2.2
Leo	ϵ, μ	+0.53		+5 ^{Me} +2.2
"	ϵ, η	-0.02		+3 ^{Me} +2.2
"	β, δ	+0.52		+5 ^{Me} +2.2
Virgo	β, η	+0.32		+4 ^{Me} +2.2
"	γ, σ	+0.03		+3 ^{Me} +2.2
"	β, ν	+0.52		+3 ^{Me} +2.2
Lyra	γ, β	+0.28	+3	+4 ^{Me} +2.2
"	δ, ϵ	-0.19		+3 ^{Me} +2.2
Perseus	γ, η	+0.82		+5 ^{Me} +2.2

Const.	Stars	H.P. diff.
1 Lacertae and π Pegasi		+0.27
α Herculis + κ Ophiuchi		+0.15
η Serpentis + ν Ophiuchi		+0.11
ξ Ursae Maj + ϵ Leonis min.		+0.12
α Androm. + β Pegasi		+0.48

Observed diff. in grad.	
June 15	June 21
+ 4	+ 5
+ 5	+ 1
	+ 1
	+ 2

+ 0.40
+ 0.50
+ 1.0

+ 1 .10

+ 2 .20

Estimates of relative brightness of n. eye stars
 June 27, 1899

✓ 8:33	Ursamajor	ϵ 5 ϵ	eyes \perp	$\epsilon = 1.85$	$\epsilon = 2.38$	2.38
✓ 39	"	η 3 ϵ	" \perp	$\eta = 2.02$	$\epsilon = 2.38$	0.53
✓ 41	"	ϵ 1 η	" \perp	$\epsilon = 1.85$	$\eta = 2.02$	0.36
✓ 42	Draco	η 5 ϵ	" \perp	$\eta = 2.82$	$\epsilon = 3.27$	0.48
✓ 43	Leo	β 5 δ	" \parallel	$\beta = 2.23$	$\delta = 2.75$	0.52
✓ 46	Scorpio	δ 3 β	" \perp	$\delta = 2.52$	$\beta = 2.91$	0.39
✓ 48	"	ϵ 1 σ	" \parallel	$\epsilon = 2.90$	$\sigma = 2.99$	0.09
✓ 51	Libra	β 2 α	" \perp	$\beta = 2.74$	$\alpha = 3.02$	0.28
✓ 55	Ophiuchus	ϵ 1 η	" \parallel	$\epsilon = 2.84$	$\eta = 2.62$	-0.22
✓ 9:25	Corona	$\gamma = \alpha$	" \parallel	$\gamma = 2.30$	$\alpha = 2.25$	-0.05
	Clouds					
✓ 45	Scorpio	β 4 π	" \perp	$\beta = 2.91$	$\pi = 3.08$	0.17
✓ 52	Bootes	δ 1 β ?	" \parallel	$\delta = 3.50$	$\beta = 3.62$	0.12
✓ 55	ϵ Bootis / α Coronae	very close	" \parallel	$\epsilon = 2.56$	$\alpha = 2.37$	0.19
✓ 57	Bootes	β 4 ρ	" \parallel	$\beta = 3.62$	$\rho = 3.64$	0.02
✓ 59	Corona	β 5 δ	" \perp	$\beta = 3.79$	$\delta = 4.56$	0.77
✓ 10:01	"	β 2 γ	" \parallel	$\beta = 3.79$	$\gamma = 4.18$	0.39
✓ 02	Scorpio	σ 1 τ	" \parallel	$\sigma = 2.99$	$\tau = 2.90$	-0.09
✓ 12	ϵ Ophiuchi	3 μ Sagittae		$\epsilon = 3.37$	$\mu = 3.48$	0.11
✓ 17	α Hercules	4 κ Ophiuchi		$\alpha = 3.22$	$\kappa = 3.37$	0.15
✓ 20	Libra	γ 3 θ	" \parallel	$\gamma = 4.01$	$\theta = 4.31$	0.30
✓ 28	γ Librae	3 ϵ Scorpio	" \parallel	$\gamma = 4.01$	$\epsilon = 4.10$	0.09
✓ 30	Ursamajor	$\gamma = \beta$	" \parallel	$\gamma = 2.56$	$\beta = 2.60$	0.04
✓ 33	"	μ 5 λ	" \parallel	$\mu = 3.12$	$\lambda = 3.57$	0.45
✓ 40	Serpens	κ 1 γ	" \parallel	$\kappa = 4.25$	$\gamma = 4.00$	-0.25
✓ 42	"	β 3 κ	" \perp	$\beta = 3.84$	$\kappa = 4.25$	0.41
✓ 50	"	$\epsilon = \delta$	" \parallel	$\epsilon = 3.67$	$\delta = 3.96$	0.29
✓ 55	α Hercules	2 β Ophiuchi	" \parallel	$\alpha = 3.22$	$\beta = 2.90$	-0.32
✓ 11:00	Aug 17 53 - 9 30	2 stars 17 33 - 15 52		$\epsilon = 3.46$	$\epsilon = 3.62$	0.21

June 27, 1899

✓ 11:26	Cassiopeia	η 3 ϵ	$\eta = 3.64$ $\epsilon = 3.74$ 0.10
✓	Cassiopeia	γ 1 β	$\gamma = 2.30$ $\beta = 2.42$ 0.12
✓ 11:05	Ursa Min	$\alpha = \beta$	$\alpha = 2.15$ $\beta = 2.13$ 0.02
✓ 07	Cepheus	ϵ 4 μ	$\epsilon = 3.54$ $\mu = 3.92$ 0.38
✓ 09	Sagittarius	ϵ 1 σ	$\epsilon = 2.12$ $\sigma = 2.30$ 0.18
✓ 10	"	δ 3 γ	$\delta = 2.83$ $\gamma = 3.05$ 0.22
✓ 12	"	δ 2 ϵ	$\delta = 2.83$ $\epsilon = 2.89$ 0.06
✓ 16	"	τ 1 ϕ	$\tau = 3.48$ $\phi = 3.33$ -0.15
✓	"	ξ 3 σ	$\xi = 3.55$ $\sigma = 3.91$ 0.38
✓ 20	"	δ 3 λ	$\delta = 2.83$ $\lambda = 3.06$ 0.23
✓ 21	Aquila	δ 4 β	$\delta = 3.46$ $\beta = 3.95$ 0.49
22	"	η 1 β	$\eta = 3.89$ $\beta = 3.95$ 0.06
✓ 28	"	λ 3	$\lambda = 3.62$ $\lambda = 4.02$ 0.40
✓ 30	Ophiuchus	70.1	70.4.11 67.4.02 0.09
✓ 34	Hercules	π 2 η	$\pi = 3.36$ $\eta = 3.69$ 0.36
✓ 36	"	ϵ 4 π	$\epsilon = 3.09$ $\pi = 3.36$ 0.27
✓ 41	β Serpens	γ 1 Hercules	$\beta = 3.44$ $\gamma = 3.83$ -0.01
✓ 44	Star 12.42 + 4	3 star	$\gamma = 3.42$ $\sigma = 4.42$ 0.60
✓	Hercules	ξ 4 σ	$\xi = 3.91$ $\sigma = 3.99$ 0.08
✓ 50	"	σ 3 ν	$\sigma = 3.99$ $\nu = 4.63$ 0.64
✓ 51	"	μ 3 ξ	$\mu = 3.47$ $\xi = 3.51$ 0.04
✓ 55	"	τ 2 ϕ	$\tau = 3.87$ $\phi = 4.22$ 0.42

June 29, 1899

10	17	Botes	δ 1 β	$\delta = 3.10$ $\beta = 3.62$
	18	"	γ 5 β	$\gamma = 3.10$ $\beta = 3.62$
✓	26	Serpens	δ 4 β	$\delta = 2.52$ $\beta = 2.91$
✓	27	"	τ 1 σ	$\tau = 2.90$ $\sigma = 2.99$
✓	28	"	σ 1 π	$\sigma = 2.99$ $\pi = 3.08$
✓	31	Ophiurus	η 2 ϵ	$\eta = 2.62$ $\epsilon = 2.84$
✓	32	"	δ 3 ϵ	$\delta = 2.77$ $\epsilon = 2.84$
✓	34	Serpens	ϵ 2 δ	$\epsilon = 3.67$ $\delta = 3.96$
✓	37	α Serpens	2 δ Ophi	$\alpha = 2.71$ $\delta = 2.77$
✓	41	α Heculi	2 β Ophi	$\alpha = \text{var.}$ $\beta = 2.90$
✓	43	Ophiurus	γ 5 σ	$\gamma = 3.82$ $\sigma = 4.42$
✓	45	Serpens	β 3 δ	$\beta = 3.84$ $\delta = 3.96$
✓	49	ϵ Ophi.	+ μ Serp	$\epsilon = 3.37$ $\mu = 3.48$
✓	52	Serpens	γ 1 K	$\gamma = 4.00$ $K = 4.25$
✓		Heculi	μ 3 ξ	$\mu = 3.49$ $\xi = 3.91$
✓	11:10	Sagittarius	δ 2 γ_2	$\delta = 2.83$ $\gamma_2 = 3.05$
✓		"	λ 4 ϕ	$\lambda = 3.06$ $\phi = 3.33$
✓	14	"	ϕ 1 ϵ	$\phi = 3.33$ $\epsilon = 3.48$
✓	18	"	λ 3 π	$\lambda = 3.06$ $\pi = 3.11$
✓	23	"	λ 4 ϕ	$\lambda = 3.06$ $\phi = 3.33$
✓	26	Delphinus	β 4 γ	$\beta = 3.74$ $\gamma = 4.16$
✓	33	"	α 1 γ	$\alpha = 3.96$ $\gamma = 4.16$
✓	34	Aspid	δ 5 β	$\delta = 3.46$ $\beta = 3.95$
✓		Delphinus	η 1 β \perp	$\eta = \text{var.}$ $\beta = 3.95$
✓		"	δ 2 λ	$\delta = 3.46$ $\lambda = 3.62$
✓	40	Delphinus	γ 3 δ	$\gamma = 4.16$ $\delta = 4.57$
✓		"	α 2 ϵ	$\alpha = 3.96$ $\epsilon = 4.13$
✓	45	Sagitta	γ 1 δ	$\gamma = 3.65$ $\delta = 3.72$

✓	1206	β Cygni	5- γ Cygni	$\beta = 2.99$	$\gamma = 3.22$
✓		γ Cygni	γ β	$\gamma = 3.12$	$\beta = \text{var.}$
✓		γ Cephei	1 β Cephei	$\gamma = 3.37$	$\beta = 3.39$
✓		γ Cygni	γ β	$\gamma = 2.31$	$\epsilon = 2.69$
✓	108	γ Cygni	β β δ	$\beta = \text{var.}$	$\delta = 4.03$
✓	12	γ Cygni	ϵ β	$\xi = 3.73$	$\nu = 4.09$
✓		γ Cygni	δ β	$\delta = 4.03$	$\epsilon = 4.34$
✓	20	γ Cygni	$\alpha = \beta$	$\alpha = 3.14$	$\beta = 3.16$
✓	23	Hercules	109 3 110	// 109 = 3.92	110 = 4.25
✓	24	"	110 2 111	110 = 4.25	111 = 4.02
✓	27	Ophiuchus	67 1 70	67 = 4.02	70 = 4.11
✓	28	Hercules	ξ β δ	$\xi = 3.91$	$\delta = 3.99$
✓		"	0 β ν	$\delta = 3.99$	$\nu = 4.63$
✓	31	"	π β η	$\pi = 3.36$	$\eta = 3.69$
✓		"	δ β ϵ	$\delta = 3.28$	$\epsilon = 4.04$
✓	34	"	π β δ	$\pi = 3.36$	$\delta = 3.28$
✓		"	δ β μ	$\delta = 3.28$	$\mu = 3.49$
✓	38	η Serpens	2 β Ophi.	$\eta = 3.35$	$\nu = 3.46$
✓	41	ν Ophiuchus	β ξ Serpens	$\nu = 3.46$	$\xi = 3.67$
✓	54	δ Serpens	ϕ β δ	$\phi = 4.21$	$\tau = 4.54$
✓		"	ϕ β ν	$\phi = 4.21$	$\nu = 4.52$
✓		"	ϵ β δ	$\epsilon = 4.57$	$\delta = 4.64$
✓	1259	Cepheus	ϵ β δ	$\epsilon = 3.54$	$\delta = \text{var.}$

June 30, 1899

Estimates of brightness of δ Cephei
 $\delta: 48$ $\epsilon 5 \delta$ eyes I $\epsilon = 3.54$
 52 $\delta 5 \epsilon$ eyes II $\epsilon = 4.24$

$\delta 1 \delta$ (very close) eyes II $\epsilon = 3.62$
 $9:04 = \text{star pair } 22 - 46 + 66^\circ$

$9:04$ $\delta 2.47$ Lacertae II $7 \text{ lac} = 3.90$

$$\begin{array}{r} 3.74 \\ 3.62 \\ \hline 3.70 \\ 0.1510 \\ \hline 3.69 \pm 0.2 \end{array}$$

μ Cephei

$9:13$ $\mu 2 \delta$ II
 18 $\eta 2 \mu$ I $\eta = 3.59$
 28 $\mu = \delta 6$ $\epsilon = 3.62$
 $\begin{array}{r} 3.79 \\ 3.62 \\ \hline 7.041 \\ 3.70 \end{array}$

$10:36$ $\eta 4 \epsilon$ η Aquilae $\epsilon = 4.27$

$9:31$ $\eta 5 \epsilon$ II
 35 $\beta 2 \eta$ II $\beta = 3.95$
 41 $\eta 2$ 12 Aquilae II (two for 12 = 4.02)
 44 $\eta 1 \beta$ Delphi II $\beta \text{ Del.} = 3.74$
 $10:32$ $\beta 1 \eta$ II $\eta 1 \epsilon$ $\epsilon = 4.07$
 β Lyrae $\eta 1 \epsilon$ $\epsilon = 4.07$
 $\begin{array}{r} 3.87 \\ 3.77 \\ 4.15 \\ 3.82 \\ 3.64 \\ 4.05 \\ 3.97 \\ \hline 27.27 \\ 3.89 \\ \hline 9.7 \\ \pm 0.6 \end{array}$

$9:46$ $\gamma 3 \beta$ I $\gamma = 3.22$
 49 $\beta 4 \delta 2$ II $S_2 = 4.53$

54 $\beta 3$ 10 η Herculis (pair 18-19 + 22) II
 $10:43$ μ Herculis 2 β Lyrae II $\mu = 3.92$
 52 $\beta 2 \delta$ Herculis II $\theta = 4.00$
 $\beta 2 \epsilon$ " $\xi = 3.91$
 $\beta 4 0$ " $\theta = 3.79$

$$\begin{array}{r} 3.52 \\ 4.13 \\ \hline 3.62 \\ 3.69 \\ 3.80 \\ 3.71 \\ \hline 4.82 \\ 3.70 \\ \hline \pm 0.3 \end{array}$$

δ Libra $\overset{5.38}{=} = 5.37$
 11:22 about as bright as γ and μ Libra
 Too faint for any accurate det.

α Hercules
 11:31 β Hercules 1 β Ophiuchi $\beta H = 2.76$
 $\beta, O = 2.90$
 Hercules $\alpha = \beta$
 32 " $\alpha \gamma \delta$ $\delta = 3.28$
 " $\alpha \gamma \kappa$ Ophi. $\kappa = 3.37$
 δ Hercules = κ Ophi. $\delta = 3.28$ $\kappa = 3.37$

0	2.80
4	2.76
2	2.78
7	2.87
13	2.87
<hr/>	
11.21	
2.80	
.02	

ϕ 2 χ Cygni
 $\phi = 4.20$
 Too faint

July 1, 1899

19:58	Hercules	μ 5 ξ	$\mu = 3.49 \xi = 3.91$
19	"	ξ 3 0	$\xi = 3.91$ 0 = 3.99
17	"	ϵ 4 δ	$\epsilon = 3.09$ $\delta = 3.28$
19	"	π 3 η	$\pi = 3.36$ $\eta = 3.69$
20	"	ϵ 4 π	$\epsilon = 3.09$ $\pi = 3.36$
21	"	η 2 τ	$\eta = 3.69$ $\tau = 3.87$
24	"	σ 3 ϕ	$\sigma = 3.87$ $\phi = 4.22$
24	Serpens	β 2 γ	$\beta = 3.84$ $\gamma = 4.00$
38	"	$\kappa = \gamma$	$\kappa = 4.25$ $\gamma = 4.00$
39	"	κ 5 ι	$\kappa = 4.25$ $\iota = 4.05$
42	"	β 2 κ	$\beta = 3.84$ $\kappa = 4.25$
43	Ursa Major	h 3 v	$h = 3.71$ $v = 3.98$
43	Draco	ξ 4 v	$\xi = 3.93$ $v = 4.16$
50	Hercules	θ 1 ι	$\theta = 4.00$ $\iota = 3.92$
50	Draco	ϵ 3 ρ	$\epsilon = 3.93$ $\rho = 4.58$

β Lyrae
 γ 3 β
 $\beta = \mu$ Hercules
 β 4 θ
 γ 2 β

$\mu = 3.49$
 $\theta = 4.00$
 $\gamma = 3.22$

3.49	1
3.60	10
3.42	8
<hr/>	
1051	
3.50	
	$\pm .03$

11:05 η 3 ι Aquilae $\iota = 4.27$

β 3 η ? not confirmed later

ϵ 1 η very close $\epsilon = 4.07$

star just west of $\lambda = \eta$ very nearly

perhaps 1 just west

11:19 β 1 η $\beta = 3.95$

3.97	3
3.97	2
4.02	2
4.05	5
<hr/>	
16.01	13
4.00	
	$\pm .03$

1000.
0.5

15
25

δ 3 ϵ ,
L 3 δ

α Lacertae 1 δ

δ 3 ϵ
 $\eta = \delta$
L 3 η

δ Cephei
 $\epsilon = 4.24$
 $\epsilon = 3.62$
 $\alpha L = 3.90$

$\epsilon = 4.24$
 $\eta = 3.59?$
 $\epsilon = 3.62$

3.84
3.92
4.00
3.94

3.59
1170
3.90
1.01

$109 = 3.42$ $102 = 4.48$
 4 102 $\eta = 3.64$ $\xi = 3.74$
 $41 = 4.13$ $\sqrt{2} = 4.29$
 $\eta = 2.62$ $\xi = 2.81$
 $\eta = 3.35$ $\nu = 3.46$
 $\phi = 4.19$ $\chi =$
 $\beta = 3.14$ $\alpha = 3.14$
 $\xi = 3.81$ $\gamma = 4.07$

July 3, 1899

8:42	Ursa Maj	η 3 ζ	$\frac{1}{1}$	$\eta = 2.02$	$\zeta = 2.38$
43	"	ϵ 5 γ	$\frac{1}{1}$	$\epsilon = 1.85$	$\gamma = 2.38$
44	"	ϵ 2 η	$\frac{1}{1}$	$\epsilon = 1.85$	$\eta = 2.02$
45	"	$\gamma = \beta$	$\frac{1}{1}$	$\gamma = 2.56$	$\beta = 2.60$
45	Cygnus	γ 3 ϵ	$\frac{1}{1}$	$\gamma = 2.31$	$\epsilon = 2.69$
48	Libra	β 3 α	$\frac{1}{1}$	$\beta = 2.74$	$\alpha = 3.02$
51	Ophi.	4 μ	11	$\epsilon = 3.37$	$\mu = 3.48$
9:00	δ Boos	3 β Corona		$\delta = 3.50$	$\beta = 3.79$
51	Corona	β 4 γ		$\beta = 3.79$	$\gamma = 4.18$
	Boos	γ 5 δ		$\gamma = 3.10$	$\delta = 3.50$
	Corona	γ 4 θ		$\gamma = 4.18$	$\theta = 4.27$
06	Boos	δ 1 ρ		$\delta = 3.50$	$\rho = 3.64$
	Serpens	β 2 γ		$\beta = 3.84$	$\gamma = 4.00$
12	"	$\gamma = \kappa$		$\gamma = 4.00$	$\kappa = 4.20$
13	Corona	γ 2 ϵ		$\gamma = 4.18$	$\epsilon = 4.13$
19	"	ϵ 4 δ		$\epsilon = 4.13$	$\delta = 4.56$
23	θ Corone	μ Boos		$\theta = 4.27$	$\mu = 4.58$
27	Leuculus	τ 3 ϕ		$\tau =$	$\phi =$
28	"	ϕ 4 ψ		$\phi =$	$\psi =$
	"	τ 3 σ	"		
30	"	σ 2 θ	$\frac{1}{1}$		
32	"	η 3 τ			
36	"	η 4 ϵ			
	"	π 3 η	scant		
39	"	ϵ 3 π			
	"	ϵ 3 δ			
43	"	δ 3 μ			
46	κ 1 Serpens	ρ Serpens			

July 3, 1899

9:55 / ϵ Coronae = γ Bootis
 10:07 Draw 17 3 μ very faint
 10h. μ Vulpecula in P. equi
 22 Sagitta γ 1 δ +
~~Cephei δ 1~~

δ Cephei
 33 δ 1 ϵ δ 2 ϵ
 α Lacertae 2 δ
 δ 3 21 26
 4.14 - 2
 4.10 - 6
 4.25 + 9
 4.16 \pm .06

μ Cephei
 11:01 ϵ 3 μ
 η 2 μ
 ι 2 μ
 μ 2 α Lacertae
 3.75 - .01
 3.79 + 3
 3.82 + 6
 3.70 - 6
 3.06 .04
 3.76 \pm .04

η Aquilae
 Rotten haze all through Aquila
 11:06 η 4 ϵ (not confirmed)
 11:08 β 3 η
 12 η 2 μ
 16 η 2 ϵ
 12 1 μ
 η 2 ϵ
 Haze was bad
 4.25 10
 4.12 3
 4.07 8
 .44 21
 4.15 \pm .07

11:20 γ 3 β
 μ Herculis 7 β faints very close
 β 3 ϵ n.b. I usually estimate
 3.52 2
 3.09 4
 3.50 11.8
 11.61
 3.54 \pm .04
 (See estimate of μ Herculis 3 faints above)

July 5, 1899.

Partly cloudy

8:40 Ursa Major μ δ λ ||
 41 " " ϵ γ K ||
 42 " " ν δ ξ ||
 46 " " δ γ X ||
 48 " " ψ 1 μ \perp (dist. in
 50 Boötes $\rho = \beta$ || all in twilight
 52 " δ 1 β (close) ||
 53 α Corone 1 ϵ Boötes ||
 55 Corona β γ δ ||
 " β γ δ 2 probably mag
 " γ δ ϵ
 9:01 " γ 2 ϵ

Clouds coming across sky

9:15 Corone θ γ δ ||

19 θ Corone = μ Boötes

23 Hercules δ 2 λ

Scud floating across sky

26 Hercules β γ ϵ ||

July 5, 1899.

β Lyrae
 9:43 β 2 θ Hercules ϕ 1 θ 3.90
 β 1 0 " μ 2 θ 3.89
 μ Hercules 3 ξ Hercules " 3.90
 Clouds at 9:50

July 10, 1899

δ Cephei
 9:24 ϵ 2 δ 3.65 3
 ϵ = δ 3.62 10
 δ 4 α Lacertae 3.50 12
 η 1 δ 3.69 7
 246
 3.62 ± 0.6

β Lyrae
 9:33 γ 4 β 3.62
 μ Hercules 2 β 3.79
 ξ = β 3.79
 β 3 = ξ Hercules 3.69
 β 3 0 " 3.80
 β 2 θ " 3.69
 3.74
 ± 0.7

η Aquilae
 9:48 η 3 ϵ 3.0
 β 4 η 4.35 0
 η 3 μ 4.38 3
 12 3 μ 4.32
 105
 4.35 ± 0.2

$\mu = 4.68$ H.P.
 $\epsilon = 4.27$ H.P.

July 10, 1899
 α General
 β 2 α
 $\alpha = \beta$ of pl. and. $\begin{array}{r} 2.96 \\ 2.90 \\ \hline 2.93 \pm 0.03 \end{array}$

Comparison with Phoenice
 β Lyrae and 2nd star from it
 Const. star made to double

~~142.7~~
 206.6 X
 319.0
 230.7 R
 147.1

14.1 $\begin{array}{r} 128.4 \\ 131.4 \\ \hline 259.8 \end{array}$
 146.5
 195.1
 326.5

R
~~311.5~~
 24.8
 137.6
 223.3
 324.0

cloud coming up.
 1128
 100.7

22.3
143.7
1.98.7
32

Tuesday July 11, 1899

β Lyrae

9:00

$\beta = \delta_2$

$\beta \approx \epsilon$, $\beta \approx \kappa$

θ Herculis 2 β

0 3 β

9:13

$\beta \approx \theta$ Lyrae

$\kappa = 4.37$ H.P.

$\epsilon = 4.34$ H.P.

$\delta_2 = 4.53$ H.P.

4.17

4.20

4.29

4.14

4.20 $\pm .04$

(I always see δ_2 and this one in accordance with H.P.)

(ϵ Delph = 4.13)

δ Cephei

9:17

δ 4 ϵ , ϵ 3 δ

δ 1 \times Lacertae

ϵ 4 δ

9:23

η 3 δ

3.84

3.92

3.80

3.85

3.89

4.30

3.86 $\pm .04$

η Aquilae

Rather hazy near it

9:38

η 17 ϵ η 3 ϵ

β 3 η

12 1 η

$\eta = \epsilon$ Delphinii

θ Serpentis 1 η

4.25

4.12

4.13

4.18

6.8

4.17 $\pm .04$

(ϵ Delph = 4.13)

θ Serp = 4.08

repetition

θ ϵ

recession

always see

21. faint

see H.P.

Tuesday July 11, 1899

α Herculis

9:15 ²	$\alpha = \alpha$ Serpens	2.71	$\sqrt{}$
	$\alpha = \beta$ Herculis	2.76	0
	$\alpha = 1$ β Ophiuchi	2.80	4
		2.27	
		2.76	$\pm .03$

Comparison of β Lyrae with
star about 30' S. by photometer V

286.6

54.5 comp. star dis. 127.7

107.4

237.3

R.I

289.8

57.6

108.5

238.6

Peri. Ph.

288.6

54.5

106.5

236.3

291.5

100.0

240.7

414.3

286.6

127.7

360.

257.6

102.4

1.60

127.8

102.1

130.1

1.61

257.1

125.9

1.55

104.3

129.8

476

255.7

1.579

~~125.5~~

123.7

Diff. = 1.59 mag.
 ± 0.01

21 : 40

42 ~ 430

29

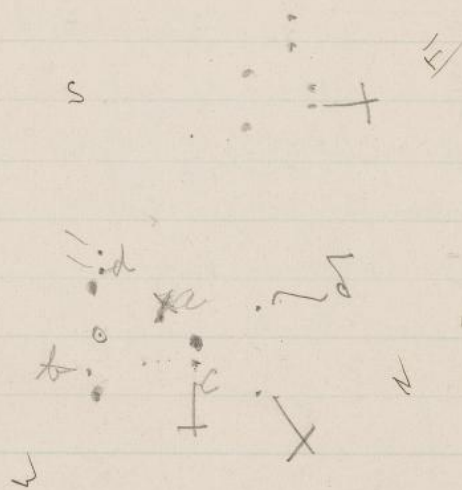
Thursday July 13, 1899.

 $\eta = 4.47$

9:06 β Lyrae:
 8:52 $\beta \frac{3}{2} \theta$ Herculis 3.70 1-
 9:05 μ Herculis 2 β 3.69 6
 $\beta \frac{2}{2} \theta$ Herculis 3.79 13 3.75 $\pm .10$
 9:10 $\gamma \frac{4}{4} \beta$ 3.62 $\frac{22}{50}$
 $\beta \frac{5}{5} \eta$ Lyrae 3.97
 δ Cephei 3.77
 75

9:20 δ 1 ϵ 4.14 $v = 4.50$
 δ Lacertae 2 δ 4.10 6 $\xi = 4.45$
 δ 2 v 4.30 10
 δ 2 ξ 4.25 10
 ξ 1 v .79 5
 4.25 $\pm .08$

11:50 η Aquilae
 η 3 β 4.14
 δ 2 η 3.65
 θ 3 η 3.66 2
 η 3 ϵ 3.69 1
 ~~η 3 ϵ Delphin~~ 2.00
 3.67 ± 0.02
 1



9:30±

S. S Cygni (with West Egan)

 δ 3 V, $\gamma = a$ b 4V c 2V
 V S d

Time 10:45 at this pt

~~in above~~

a above = m	10.90	-0.2
b " = l	11.32	+3K
δ " = K	10.73	-2V
	<hr/> 10.92	<hr/> ±.22

Friday July 14, 1899.

Clouds prevented work on variables at first

9:10

Serpens $\gamma = \kappa$

" $\beta 2 \gamma$

" $\epsilon 1 \delta$

Serpens $\sigma 1 \pi$

Sagittarius $\delta 3 \gamma$

Lyra $\gamma 30$

9:25 θ Lyrae \equiv { Scap.

9:35 $\gamma 2 \beta$, $\beta = \mu$ Herculis

3.42

4

3.49

3

3.46 $\pm .04$

9:49 $\eta = \beta$ η Aquilae

$\eta 50$, $\eta 112$

3.95

2 3.92

2 3.88

3.90 $\pm .04$

7 3.83

2.58

$\eta 2$ θ Serpens

$\eta 3$ ϵ Cephei

δ Cephei

Since I always see $\delta 9$
diff than H.P. I reject
will not include it in the

9:42 $\delta = \epsilon$, α Lacertae 3 δ

$\delta 1 \frac{1}{2}$, $\delta 3$ star 22.18 + 5.2

1 4.24

5 4.20

3 4.35

11 4.22

1.01

4.25

2 4.05

α Lacertae = 4.5

Friday Aug 14,

5.5 Cygni

$$c = 11.32$$

$$m = 10.90$$

$$n = 11.32$$

$$o = 11.77$$

$$p = 12.14$$

10:05

~~3~~ V $V \neq n$ (prel) ~~obs~~

11:00

0 1 V very close

V, o, + n are very close + fair

V 4 p ?

$$\begin{array}{r} 11.20 \\ 11.32 \\ 11.67 \\ \hline 11.19 \\ 11.40 \end{array} \begin{array}{r} 20 \\ 8 \\ 27 \\ \hline 55 \\ 18 \\ \hline \pm .18 \end{array}$$

A Lyrae Plot V

comp. star = nearest to p

$$152.15$$

$$36.0$$

$$188.5 < A \text{ dist}$$

$$329.5$$

$$7.3$$

$$R7$$

$$329.5$$

$$6.4$$

$$149.04$$

$$184.13$$

$$37.8$$

$$73.8$$

$$2.38 \quad 3.67.3$$

$$3.67.3$$

$$73.8$$

$$15.9$$

$$35.3$$

$$71.2$$

$$2.47 \quad 70.2$$

$$40.6$$

R. Plot

$$54.7$$

$$95.13$$

$$207.7$$

$$276.5$$

$$R7$$

$$241.5$$

$$276.7$$

$$62.5$$

$$40.6$$

$$38.8$$

$$79.4$$

$$2.21 \quad 149.8$$

$$149.8$$

$$D-H = 2.39 \pm 0.10$$

$$\begin{array}{r} 35.2 \\ 35.2 \\ \hline 70.4 \end{array} \quad \begin{array}{r} 2.49 \\ 7.55 \\ \hline 2.39 = \text{mean} \end{array}$$

Monday July 31, 1899

9:00

δ 1 δ Cephei
 ~~η 2 δ~~ η 1 δ
 δ 3 α Lacertae
 ϵ 3 δ
 β Lynce

9:11

β Lynce
 θ Herculis 1 β
 β 4 K
 β 3 ϵ
 θ Herculis 1 β

9:18

not γ Aquilae
 real clear near γ
 β 4 η
 β η 3 μ

ϵ 3 η
 12 3 η
 ϵ Delphini 1 η
 α Herculis

9:28

β 2 α
 α = β Ophi
 μ Ophi

9:29

ϵ 2 μ
 η 2 μ
 μ 4 ϵ
 μ 1 α Lacertae

Monday July 31,

9:36

δ Librae

15 Librae $1\frac{1}{2}$ mag α

δ 3 11 Librae ?

Phot. V.

β Lyrae, comp star = nearest

10:05

Monday July 31, 1899

Practice setting on a star
Mr. St. John obs.

35.3 < very diff. w 3 wires per

12-27.6

108.4

217.7

285.4

23.5

12:31.4

118.1

210.9

293.4

298.3

12 35.7

20.7

113.7

210.0

293.9

12 38.8

30.2

118.8

213.5

Mr. Grover observed

22.6[<] preceding
 12,473 28.0 following and slightly
 194.5 brighter star disappears
 308.1

14.7
 127.2
 12,520 204.8
 302.5

1, 1.2 115.5
 200.6
 292.6
 28.8

1, 5.0 114.2
 213.5
 23.0
 116.8

Tuesday Aug. 1, 1899

Observations with Photo-T
for practice on pairs of stars.

~~low, + w. Scorpions~~
near St. John vls

Two stars west of γ of Rind

~~305.2~~

9:18.5

311.5

6.7

122.3

197.4

right-hand disappears
5.52

75.1

130.3

307.5

14.9

123.3

191.4

0.74
left

130.3

135.5

165.9

172.6

20.5

292.2

135.5

604.3

151.08

26.0

109.0

204.6

297.5

83.0

82.9

165.9

24.5

116.3

211.5

292.5

91.8

80.8

172.5

9:24

7

Thurs Aug 1.

Practic with Photometer T by
Grover and St. John
Grover obs

9,39.5 250.0 Right hand star disappears
117.5
218.4 92.5

281.8 63.4 155.9
155.9

32.4 166.8
125.1

9,48.3 109.1 76.7 126.5

206.1 574.3
296.2 90.1

166.8 143.6

309.1

10,1.4 18.0 68.9

133.2

189.4 56.2

125.1

316.2

12.0 55.8

10,10 125.3

196.0 70.7

126.5

Tuesday Aug. 1.

Same fair

St. John's obs
Summer recs

10:28

310.6	63.4	
14.0		
124.5	86.7	1501
211.2		

302.3	78.2	
20.5		

26.0	72.4	150.6
198.4		

208.4	82.6	
291.0		

30.5	85.5	1681
116.0		

201.3	91.9	
293.2		

30.3	84.2	1761
114.5		

6449

161,2

Aug 1,
same star

Exposed ob,
sl. John recorder,

Jupiter
about as bright as Rhea

Friday Aug. 4, 1899

9:15 Looked at Saturn.
Identified 4 satellites &
possibly Japetus. Followed
large division in ring

Time
Tide Rhea Telling

(over)

Friday, Aug. 4, 1899
Photo T. Stars for practice

10:15.2	121.3	St. John obs
clouds	199.7	lens rec.
humble here	206.5	no. band disappear.
	30.1	(eastern)
		precip.
		mainly equal
		lens

Another pair of stars
clearer pair 2 day Hercules
St. J. obs.

1	110.4	lens rec.
	177.3	brighter dis.

11:25.0

325.2

1.4

36.2

147.5

30.0.

11:27

177.5

328.5

34.2

2.7

322.4

49.1

2.1

98.0

11:36.0

226.3

266.2

39.9

50.2

39.5

89.7

235.5

39.5

271.0

41.2

11:37.7

same pair
 Grover ob.
 St. John reculer

227.0 < bright star disappears.
 11:48 286.2 59.2
 43.4
 11:50 86.2 42.8
 233.5
 11:55 278.0 44.5
 44.5
 11:53 103.0 58.5
 824.0
 367.8 43.8

Monday, Aug. 7, 1899

δ Ophi

ϵ γ δ

8:32

$\delta = \alpha$ Lacertae

η γ δ

δ γ ϵ

β Lynce

α γ ϵ

8:36

β γ ϵ

β γ δ

α Herculis γ β

η Aquilae

β γ η

8:41

ϵ Delphini $= \eta$

η γ μ

α Herculis

8:46

$\alpha = \beta$ Ophi

β Her. γ α

Monday, Aug. 7, 1899
Practice pairs Phil: T.

Dr. St. John vs
Bever Rec.

9:40 117.5 left
211.0 right-hand dig 93.5

287.3 right
28.5 43.5

101.2

126.8

1947

204.5

82.7

9:47

295.0

286.9

31.2

1033

186.0

70.5

9:56

127.0

196.5

299.7

119.5

116.2

200.5

309.4

19.4

right

79.8

1508

866

10:06

right

70.0

15626

16.5
19.5
21.5
47.5

28.8
19.6

Aug 17, 1899
Practise with photom T
Grover ob. St. John Record

~~176.2~~ 320.4 Right disappears
3.8
145.4
176.5

326.2
1.0
149.5 149.2 151.5
173.5 173.8

Comp. α_1 and α_2 Capric
by Photo R

St John Obs
Beyond ^{prospers} power (5') but
although we could not make
the images cross we could bring
them close together. (and Receiver)

17.0 17.0
29.4 26.8
91.5 < following dis. 26.7
212.5 62.1 21.5
274.0 6.1 5 274.5 1.09

L cap. Phot. R.

Monday, Aug. 7. 1899.

186.0

Grover ob. St. John room

88.1			
204.1			
262.8	56.7	55.4	
34.0	54.1		1.40
	<u>110.8</u>		

12.5 9.0 0.0 9.0 mean 7.6

112.	120.	117.	117.5	"	116.6	
194.5	191.0	188.0			191.2	74.6
296.5	297.3	292.			295.3	73.5
						72.3
						<u>146</u>
						90.64

118.6		
179.0	60.4	62.9
296.0	65.5	
1.5	<u>135.9</u>	.66
91.0		
197.5		
281.2		

34.0	30.0	32.0	mean	70.0
103.0	101.0	102.0		67.7
207.5	209.0	202.0	206.3	65.4
279.0	267.0	273.0	271.7	135.4
	268.0	6.5		0.87

Aug 7

Same again

206,0 204,0 199,0 197,0 202,0

269,5 265, ment 268,8 66,5

36,0 32,5 36,4 34,6 65,2

90,0 99,0 100,3 98,1 63,5

130 3 0.97

293,5 295 294,2

0,0 5,0 5,0 3,3 69,1

118,115 109,5 108,0 108,120 ~~108,8~~

189,0 182 185 182 112,8

184,0

71,2

140,3 0.77

10:00

β Persei
 β 4 β Antares
 γ Ant. 2 β

14:00

o Ceti
 δ Ceti 3 o
 o + ϵ Perseus
~~o = Perseus~~

Aug. 8, 1899 (Tuesday)

Sursae Majoris Phot 1

Comparison star g (Circump.
Pamph.)

Index above + left from rec.

	206.7		
12:16:45	299.7	< var. dir. (right)	93.0
	41.4		66.8
	108.2		

	208.6		80.4
12:20:25	289.0		72.2
	40.4		
	112.6		

Index right + below

	205.6		96.9
12:27:20	302.5		
	11.5		104.8
	116.3		

	207.5		96.0
12:28:45	303.5		
	9.6		108.4
	118.0		

Aug. 8, 1899

Same again
Index right

200.5
12:37:30 296.2
21.4
121.6

95.7

100.2
145.9

164.1

0.30

200.5
~~193.9~~
12:41:15 297.3
17.0
124.0

96.8

117.0
213.8

146.2 0.65

(48)

Index left

208.7
12:48:00 284.6
28.6
113.0

75.9

84.4
160.3

0.35

208.4
12:51 290.7
45.5
106.4

82.3

60.9
143.2

0.71

(54)

0.51

avg 8.1889
 same again
 Index left + blow 9. obs.

289.0
 121.57 40.0 111.0
~~118.8~~ 121.0
~~308.0~~ 197.206.0 85.0
 19.0. 164 0.20

298.0
 25.8 87.8 (0.22)
 112.0
 211.5 99.5
 187.3 172.7 0.14

11.8 ~~12.5~~ 14.5
~~128.5~~ 130.0
~~196.0~~
 15.0
 125.5 110.5
 198.0
 299.0 101.0
 211.5 148.5 0.60

11.0
 125.0 114.0 (0.64)
 200.0
 301.5 101.5
 215.5 144.5 0.68
 0.43

Aug. 14, 1899 (Monday)

Sursae Maj. Given Obs. & rec.

302.6

45.3 < ~~comp. obs.~~

136.5 < ^{91.2} ~~var. obs.~~

215.5 < ~~emp. obs.~~

~~313.5~~ 99.5

315.0

190.7

136.7

80.3

217.0

312.5

81.5

41.0

168.8

401.0

115.5

88.5

Aug. 14. 1899.

J. Wro. mag.
Index to right.

Error obs.

10. 40.

$$\begin{array}{r}
 52.5 \\
 120.7 < \text{var. dis.} \\
 231.3 \quad 6A.2 \\
 305.0 \quad \underline{73.7} \\
 141.9
 \end{array}$$

- 0.74

$$\begin{array}{r}
 49.1 \\
 124.3 \quad 75.2
 \end{array}$$

(-0.60)

$$\begin{array}{r}
 227.0 \quad 20.2 \\
 307.2 \quad \underline{155.4}
 \end{array}$$

- 0.47

Index to left.

$$\begin{array}{r}
 313.5 \\
 \underline{36.5} \quad 2A.1 \\
 41.6
 \end{array}$$

$$\begin{array}{r}
 129.5 \quad \text{images not reversed.} \\
 139.0 \quad 75.7 \\
 214.7 \quad \underline{163.2}
 \end{array}$$

- 0.31

10 51

$$\begin{array}{r}
 319.5 \quad 77.2 \\
 36.7 \\
 135.5 \quad 26.6 \\
 222.1 \quad \underline{163.4}
 \end{array}$$

(-0.31)

- 0.31

mean - 0.46

Aug. 14. 1899.
Index left.

Grover do.

Same again.

309.0 - var. dis.

41.2 92.8

137.5 21.2
212.7 174.0

- 0.11

317.5 20.5
302.0

+ 0.02

122.0 107.0
229.0 127.5
172.5

+ 0.14

Index right.

223.5 24.5
300.0 91.5
315.0

53.5 72.0
125.5 163.5

- 0.31

229.6 70.9
300.5 36.5

- 0.31

42.0 93.5
135.5 164.5

- 0.30

mean - 0.14



Aug. 14, 1899.

Sirena maj.

Dr. St. John obs.
Sirena Rec.

Index right—

11:25.30 224.5 < var. dis
306.0 81.5
41.5 85.0
126.5 166.5

var. right

var. left

11:27.15 227.2 75.4
292.6
217.7 95.3
313.0 170.7

var. left

from

Clouds troubled here on

Index left—

1

var. right

Prospect was hopeless.
Sirena up at 11:55
St

Aug. 15, 1899 (Tuesday)

δ Cephei

same obs,

8.06

$\delta = 6$

$\delta \frac{1}{2} \xi$

α Lacertae 2 δ

8.26

β Lyrae

$\gamma 1 \beta$

$\beta = \mu$ Hercules

δ Hercules 2 β

8.46

η Aquilae

$\beta 4 \eta$

$\eta 3 \mu$

ϵ Delphini 1 η

8.50

α Hercules

β Ophi, 2 α

β Herci. 3 α

$\alpha = \epsilon$

Occlusion of 6 or 7th mag.
star. West Eq. same obs,
Watch 9 03 11

Watch was $3\frac{1}{4}$ secs. fast by
standard clock

Corrected time 9 03 07

Aug. 15, 1899. (Tuesday)

S. Ursae Majoris.

Dr. St. John obs.
Linden rec.

Index left

g - cont. star

301.1
9.58.57 53.8 < var. to right
121.1
231.6
var. left 112.7
110.5 0.84
223.2
136.8

(0.79)

303.0
10:01:12 39.7? 49.7
118.0
229.6
var. right 106.7
111.6 0.74
218.3

Index right

48.0
10:06:35 130.6
218.7
314.0
var. right 82.6
92.6
var. left 95.3
95.3 0.15
187.9
172.1 0.20
0.18

42.2
10:09:18 136.3
221.9
315.5
96.1
94.6
190.7
169.3
0.48

Aug. 15, 1899 (Tuesday)
 Same again
 Index right
 Dr. St. John obs
 Birca rec.

10:12:32
 216.0
 312.7 96.7 van rph
 45.3
 128.6 83.3 van lph
 221.5 180.0 .00

10:14:10
 221.5
 299.5 78.0
 37.5 103.0
 140.5 181.0 van right .02

Index left

10:29:
 303.5 101.5 van right
 55.0
 127.6 97.9
 225.5 199.4 van left 0.37
 160.6

10:31:20
 299.0 van left
 45.3 106.3 0.34
 126.8 91.4
 218.2 197.7
 162.3 0.35

aug 13, 1858

Saine again

Grove obs.

St. John mende

In deck bfe.

10:35 117.2 van right;
 227.2 110.0
 316.5 v left 913 0.41
 47.8 201.3
 158.7

10:45 129.2 40.46
 224.5 953
 312.4 van right 1116 0.51
 54.0 206.9
 153.1

In deck right

10:52 83.2 v right 104.3
 137.5
 224.2 v left 916 0.30
 315.8 195.9
 164.1

10:53 40.3 960 0.57
 136.3 1138
 205.2 v right 209.8
 322.0 150.2

-0.45

Aug, 13, 1889
Same again

Lower obs.

St. John 2

Index right-

28,8

✓ Right- 109,8

~~150,8~~ 137,8

99,5

0,56

215,3

✓ left-

209,3

314,8

150,7

-0,42

38,0

95,2

10:58

133,2

100,2

0,24

213,0

✓ right.

195,4

313,2

164,6

Index left.

306,5

✓ right-

106,7

11:4:30

53,2

134,0

✓ left-

86,6

0,25

220,6

293,3

166,7

-0,26

309,6

91,0

0,27

11:8:

40,6

124,0

✓ right

103,0

194,0

227,0

166,0

-0,34

Aug. 15, 1899
Same again Dr. St. John. obs.
Barren rec,

Index left.

11:14.5 116.7 var. right 115.0
 231.7 47.6
 306.6 var. left 212.6 0.63
 44.2 147.4

11:16:45 120.3 93.9 (0.61)
 214.2 var. right 117.1
 298.4 211.0 0.59
 55.5 149.

Index right

11:20:46 217.4 221.2 88.3
 299.8 309.5 var. right 82.3
 217.5 170.6
 299.8 var. left 189.
 37.5 88.8
11:24:00 126.3 var. left 96.2
 218.3 196.0 -0.27
 313.5 var. right 197.0
 166

0.44
48
35
127
0.42
-0.42

Aug 15; 1899.

Same again

Lower obs.

Step 1st

Index Right

208.2 V.R

823.0

40.5 V left

137.8

114.8

97.3

212.1

147.9

0.62

223.6

90.6

(-0.49)

319.2

108.4

0.36

34.6

V right

199.0

142.0

141.0

Index left

300.5 V right

54.8

128.8

219.8

V left

115.3

91.0

206.3

153.7

0.50

(-0.56)

305.8

99.1

0.61

44.9

112.5

120.8

V Right

211.4

235.3

148.4

0.52

45

34

3 | 13.1

- 0.44

Aug. 15, 1899

R DraconisDr. St. John obs.
Green rec.

Index left-

13:34

158.0	van right	39.5	
197.5	amp. 1st. dis		Comp. star f user
		42.5	(circum. sample)
158.5			
201.0	van. left	2.0	214
			1.89
			2.02
330.4	van left	49.4	403
19.8		41.6	
155.8	van. right	91.0	
197.4			

Index right-

13:39.42

247.5		36.5	
284.0			
61.7	van left	53.8	
115.5		90.3	191.
			163
			1.77
241.0		52.5	354
293.5		48.7	379
67.3		101.2	+86
116.0	van. right		198

Aug 13, 1855
Sunk again
Summer obs.

Index right
1:57: 248.0 V.R. 39.0
287.0 47.0
61.0 V.L. 86.0 2.02
108.0

1:58: 245.0 42.4
287.4 38.8
70.5 V.R. 81.2 2.16
109.3

(209)

Index left
2:3 155.0 V.R. 42.5
197.5 41.0
335.0 V.L. 83.5 2.09
16.0

2.16

2:8 ~~206.8~~
337.17 36.3 2.23
~~155.0~~
~~197.5~~
155.5 V.R. 42.5
198.0 78.8

2.12

Aug. 15, 1899

SS Cygni

 $\alpha = V$ $V 3 p$

[4:53

 δm 30 30 $\beta 2 V$ $\gamma 3 V$

15:15

o Ceti

15:22

 $\delta = 0$ $\alpha 40$ ~~00~~ 01 a~~02b~~

a . b

. r . d

Aug. 16, 1899 (Wednesday)

Ursae maj and Alcor
Index right. telus Phot V.

10.5v 194.5K L Diaphanes
316.1 68.0
1.3 45.2
113.2

128.3
182.6 54.3
313.3 48.5
1.8 102.8

Index above

222.6 44.4
267.0 53.3
42.0 97.7
95.3

219.4 53.5
272.9 51.6
41.6 105.1
93.2

Aug. 16, 1899 (Wednesday)

Same again
Index above.

221.4
272.7
40.4
89.2

51.3
48.8
100.1

+ 1.65

~~273.~~
222.4
271.4
40.2
91.0

49.0
50.8
99.8

+ 1.66

(1.66)

Index below.

131.0
180.7
310.2
358.5

51.7
48.3
100.0

+ 1.66

(1.66)

129.6
176.8
310.7
0.8

53.2
50.1
103.3

+ 1.58

+ 1.64

11:50

Aug. 17. 1899. (Thurs Day.)

✓ Mrs. Neaj. Phot. T. Grover obs.
Comp. with star g.

for 49.2

314.1 < Var. dis.

32.3

129.3 Index left.

227.2

92.5

122.7 177.3

+ 0.05

304.4

103.4

+ 0.14

42.6

22.3

30.3

192.1

167.9 + 0.23

135.2

223.5

Index right.

~~303.7~~ wrong reading reject.

43.5

122.1

72.6

219.5

92.4

317.9

177.0

- 0.06

37.2

101.2

(-0.0K)

139.0

222.6

307.0

72.4

179.6

- 0.01

mean + 0.05

10 2.1

Aug. 17. 1899.

Same again.

Lower obs.

10 4.9

45.9 241 Index right,
 130.0 96.1
 212.0 120.2
 314.1 179.4 +0.00

43.4 29.6 (-0.12)
 133.0 72.0
 234.5 161.6 -0.35
 306.5

Index left.

44.6 90.9
 135.5 72.0
 230.0 162.9 -0.32
 302.0

(-0.32)

10 14.0

52.0 71.2
 123.2 91.3
 223.5 162.5 -0.33
 314.2 *

mean -0.25

Aug. 17, 1899.

Same again.

Grover obs.

Index left.

10 32.9

309.5

45.7

96.2

+ 0.13

131.5

222.0

90.5

126.7

173.3

+ 0.05

312.2

36.0

23.2

130.1

94.6

- 0.03

224.7

174.4

Index right.

222.6

319.7

309.6

27.0

53.0

120.4

67.4

154.4

- 0.49

- 0.32

10 49.0

231.6

302.0

76.4

41.3

136.7

95.4

171.2

- 0.16

mean - 0.14

Aug. 17. 1899.
Same again. Grover obs.
Index right.

10 $\sqrt{2.1}$

$$\begin{array}{r} 216.1 \\ 319.2 \\ 46.7 \\ 127.4 \end{array} \quad \begin{array}{r} 103.1 \\ 20.7 \\ 123.2 \end{array} \quad \begin{array}{r} \\ \\ \\ 176.2 \end{array}$$

$$\begin{array}{r} +0.07 \\ (+0.04) \end{array}$$

$$\begin{array}{r} 224.2 \\ 302.1 \\ 37.2 \\ 137.4 \end{array} \quad \begin{array}{r} 22.3 \\ 92.2 \\ 120.5 \end{array} \quad \begin{array}{r} \\ \\ \\ 179.5 \end{array}$$

$$\begin{array}{r} +0.01 \end{array}$$

Index left.

$$\begin{array}{r} 307.4 \\ 47.6 \\ 131.5 \\ 212.0 \end{array} \quad \begin{array}{r} 97.2 \\ 26.5 \\ 123.7 \end{array} \quad \begin{array}{r} \\ \\ \\ 176.3 \end{array}$$

$$\begin{array}{r} +0.07 \\ +0.09 \end{array}$$

11 $2\sqrt{}$

$$\begin{array}{r} 314.6 \\ 44.2 \\ 303.0 \\ 44.2 \end{array} \quad \begin{array}{r} 137.6 \\ 222.3 \\ 101.2 \\ 121.9 \end{array} \quad \begin{array}{r} 24.7 \\ \\ \\ 17.1 \end{array}$$

$$\begin{array}{r} +0.11 \\ \text{mean } +0.06 \end{array}$$

Aug. 17, 1899 (Thursday)
S.S. Cygni

13: ~

V 3 0

L 3 V

?

(was night-

star

identified)

13: 15

n 2 V

Aug. 18, 1899 (Th Friday)

E. Vane Maj + Alcon Photo V

Index above

Index ab

27.6 ~~262.8~~

< E disp. 54.0

10:05.5 81.6

215.0

262.8

47.8
101.8

+ 1.61

(1.65)

31.8

10:16.0

81.8

213.0

261.5

Index below

50.0

48.5
98.5

+ 1.69

Clouds began to come

~~252.0~~

10:23

125.0

172.0

304.0

353.5

53.0

49.5

102.5

1.60

(1.68)

10:30 124.5

172.5

304.6

353.0

48.0

48.4

96.4

1.75

Mean. + 1.66

Aug. 14, 1899
~~Same again~~

Tuesday, Sept. 5, 1899

SS Cygni

same obs.

13 00

~~V 4 f~~ V 4 g
V 1 f
e 3 v

12103

2m 42 .33.38

V = β

V 3 γ

δ 1 v

f

Wednesday, Sept. 6, 1899

12 h

0 Ceti
 0 1 α Piscium
 0 2 δ Ceti
~~0 γ Ceti 2 0~~

12:30

Dr 42 3338 W. E. g.
 v 2 f
 α 4 v
 v = δ

12 + 5

55 Cygnus W. E. g.
 f 4 v
 g 1 v used low power
 v 3 h

Saturday, Sept 9, 1899

$Dm^{40} 4338$

W. Eq.

11:50

ET

$\beta 1 V$

$V 3 \gamma$

$\delta 3 V$

W. Eq. $\beta \beta$ Cygni at minimum (nearly) again
 Owing to haze an estimate was very
 difficult but the following are
 perhaps near the truth

12:20

$V 20$

$n 2 V$

$l 3 V$

12:25 haze became a little worse
 and made them almost invisible

Wednesday, Sept. 13, 1899
 W. Equ. 9.20 am obs.
 Dm 42 3338

12:15
 ET

β 1 V
 V 3 γ
 S 3 V

S 5 Cygni

m 2 V
 V 2 l
 V 2 n

12:30

Friday, Sept. 15, 1899

W. E. G.

Summer 06

12:30
ET

~~Box~~ $V \approx \beta$
 $\alpha \approx V$
 $V = \sigma$

Saturday, Sept. 16, 1899

ET
12:45

pm 42 3338

$\beta 3V$
 $v = \gamma$

April 30, 1901.

Note by Leon Campbell:-

The visual estimates in this record book are all ledgered.

$\beta + \rho$ Persei			
	Light scale	H.P.	def. name
Star	A. S.	Pl. 1.	def. name
β Aurigae	—	2.07	—
γ Andromedae	22.1	2.14	c
β Cassiopeiæ	—	2.42	—
ϵ Aurigae	—	2.72	—
β Arietis	A 16.1	2.79	h
δ Cassiopeiæ	—	2.84	—
γ Pegasi	—	3.04	—
ϵ Persei	A 12.4	3.04	e
ζ " A	—	3.10	e
γ " A	10.9	3.11	x
β Trianguli	4.2	3.12	b
δ Persei	3.8	3.18	d
ϵ Aurigae	A	3.18	e
α Trianguli	8.7	3.58	a
κ Persei	A	3.95	k
γ " A	—	4.00	y
θ " —	—	4.01	—
γ Trianguli	A	4.15	y
θ Persei	—	4.24	—

λ Tauri			
Star	Light scale	H.P.	def. name
A. S.	Pl. 1.	def. name	
ϵ Tauri	7.8	3.67	e
θ Tauri	9.0	3.77	o
ζ " —	4.5	3.77	s
γ " —	6.1	3.86	x
ν " —	3.0	3.99	v

ϵ Aurigae			
Star	Light scale	H.P.	def. name
A. S.	Pl. 1.	def. name	
θ Aurigae	—	2.67	—
ϵ Aurigae	—	2.72	—
ϵ Persei	—	3.04	2
β Trianguli	—	3.12	b
γ Aurigae	—	3.33	n
ζ Aurigae	—	3.96	s

Comparison Stars in variable α Cassiopeiae

γ
β
α

H.P. mag.

2.30

2.42

2.84

	Light scale of Arge	0 Ceti Klin	Photo. mag.	name in Arg.	name in Arg. Ceti
α Tauri	50.0	—	1.00	g	
β "	42.0	—	1.90	d	
α Arctis	44.0	—	2.04	e	
β Amigae	40.6	—	2.07	c	
β Ceti	42.4	—	2.13	β	
ε Pegasi	—	—	2.41	—	
α Ceti	35.3	39.1	2.68	α	
ι Amigae	—	—	2.72	i	
β Arctis	32.8	37.7	2.79	f	
γ Pegasi	—	—	3.04	—	
δ Ceti	—	—	3.57	—	
γ Ceti	28.3	30.8	3.59	✓	
θ "	—	—	3.77	—	
η Eridani	—	—	3.95	—	
α Piscium	26.5	28.5	3.99	d	
δ Ceti	20.8	24.6	4.13	δ	
μ "	19.1	19.0	4.38	μ	
ξ ² "	20.9	20.2	4.41	ξ ²	
ξ' Ceti	19.1	—	4.45	ξ'	
λ "	16.1	14.5	4.60	λ	
ν "	13.0	10.0	4.90	ν	
75 "	8.6	—	5.55	5	
70 Ceti	(R.A. 226.0 -1°34')	—	5.62	70	
69 "	0.0	—	5.78	69	
63 "	0.0	—	6.08	63	

Star	Light Years	It P. mag	name
α Aurigae	9.1	0.18	α
β Orionis	5.9	0.32	β
Procyon	5.5	0.46	c
Antares	2.2	1.00	d
β Semina.	0	1.12	e

ϵ Seminaurum

ξ Sem.	9.3	3.36	ξ
λ "	8.1	3.58	λ
σ "	9.6	3.65	σ
γ "	2.0	3.98	γ
ϵ "	—	4.03	—
ν "	4.9	4.18	ν

α Leonis	α Hydrae
γ Orionis	1.42 —
β Canis. maj.	1.86 γ
β Lemis	2.01 b
α Corvinae	2.23 β
σ Leonis	2.37 —
γ Virginis	2.75 σ
	2.84 —

Ra 10-1.5 +10°35 A

A Leonis	33.5
ξ Leonis	30.4
ν "	27.4
18 "	25.5

R Leonis

4.60	A
5.20	ξ
5.30	ν
6.10	2

Ra. 9 41.1 +11°54

R Hydrae

Ra. 13 23.1 +22°40

γ Hydrae	3.35	γ
π "	3.51	π
61 Virginis	4.82	f
ψ Hydrae	5.13	ψ
57 Virginis	5.41	c
Corvinae. 12 57.4 -19°57'	5.56	a
55 Virginis	5.76	d
73 "	5.98	k

Star	Light	H. Phot.	Design.
37 Librae	15.2	4.86	f
Librae Pa. 15 27.9 - 8 ^h 47 ^m	15.5	4.95	d
E Librae	12.5	5.15	e
Librae Pa. 15 30.2 - 8 ^h 24 ^m	3.5	5.65	c

α Herculis			
β Herculis	7.5	2.76	b
β Ophi.	5.8	2.90	c
δ Herculis	2.8	3.28	d
K Ophi.	2	3.37	a
L " A		4.41	b

U Ophi.	Pa.	17	10.5	10.2
5.56				
5.94				
5.94				
6.10				
6.23				
6.58				
6.67				

α Cent.			
1 Cent.	18 28.7 - 80 20'	4.01	
6 " (40.8 - 40.53)	7.7	4.35	f
2 Cent.	(18 35.7 - 90 0')	4.75	
3 " (18 37.0 - 82.4)		5.10	
9 Cent.	(18 50.7 - 60 0')	5.14	k
14 Aquila	18.0 15.9	5.49	g
15 " 19.8 15.9		5.59	h

β Lyrae			
γ Lyrae	12.7 14.6	3.31	γ
μ Herculis	- 13.1	3.49	μ
ϵ Lyrae	4.8 4.2	4.57	e
ζ Herculis	9.8 10.5	3.96	ζ
θ " 7.6 8.0		3.98	θ
η " 8.7 7.3		4.00	η
κ Lyrae	2.2 2.5	4.11	κ
λ " 2.5 0.8		4.37	λ
δ " 2.0 1.8		4.53	δ

	Light	Scale	χ Cygni	design	arg.
	A	S			
ϵ Cygni	34.4	—	3.89	ϵ	
η ..	32.1	46.9	4.04	η	
ϕ ..	27.0	40.8	4.29	ϕ	
17 ..	24.2	38.2	5.04	h	
9 ..	20.3	33.5	5.43	b	
Cygni. Ha. 19.36.1 + 0.41	17.9	29.3	5.84	f	

	Light	Scale	η Aquilae		
γ Aquilae	15.3	—	2.77	—	
θ ..	13.3	—	3.39	—	
δ ..	13.3	13.5	3.46	δ	
β ..	8	8.2	3.95	β	
ϵ ..	A	5.8	4.07	ϵ	
ζ ..	13.3	3.2	4.27	l	
μ ..	1.4	1.7	4.68	μ	
ν ..	A	1.6	4.80	ν	

	Light	Scale	δ + μ Cephei		
γ Cephei	—	15.6	3.37	γ	
ϵ ..	11.4	12.2	3.44	ϵ	
ζ ..	10.6	10.2	3.62	ζ	
(7) α Lacertae	7.4	6.9	3.90	2	
ϵ Cephei	2.0	2.1	4.24	ϵ	
δ ..	3.0	2.8	4.44	δ	
ν ..	8.4	—	4.50	ν	
14 ..	2	—	5.49	b	
Cep. 21 35.2 + 56.57	—	—	5.17	c	

	Light	Scale	β Pegasi		
α Androm.	7.0	—	2.08	2	
ϵ Pegasi	5.6	—	2.41	ϵ	
α ..	3.0	—	2.61	α	
γ ..	A	—	3.04	γ	
η ..	1.0	—	3.06	η	
μ ..	A	—	3.74	μ	

Pair	J.P. Diff	June 19	21	27	29 July
Delphinus γ, δ	0.41	✓			3
γ, ϵ	-0.03	3			
α, δ	0.61		0		
α, ϵ	0.17				2
Pegasus β, η	0.50	✓			
ϵ, κ	0.22	4	✓		
μ, λ	0.44	3	3		
Sagitta γ, δ	0.07	2	3	—	1
β, α	-0.13	2	2		
δ, β	0.68	✓	✓		
Sagittarius δ, η	0.22	3	3		2
ϵ, ϕ	-0.15	1	1		-1
δ, ϵ	0.06	2	2		
ϵ, σ	0.18		1		
ν, θ	-0.38		3		
δ, λ	0.23		3		
λ, ϕ	0.27		—	—	4 times
λ, π	0.05				3
Aquarius ρ, α	0.074	2			0
ϵ, γ	0.26				1
Ophiuchus γ, δ	-0.09+3		1		-1
" η, ϵ	0.22		-1		2
γ, σ	0.60		3		5
δ, ϵ	0.07				3
Leo ϵ, μ	0.53		5		
ζ, η	-0.02		3		
β, δ	0.52		✓	✓	

Pair	H. P	diff	Estimate			
			June 19	21	27	29
Cassiopeia γ, β		+0.72	3	1	1	
" α, δ		0.59	2	4		
" γ, α		-0.05	3	1	0	
" γ, δ		+0.54	(5-)	5		
" η, ϵ		+0.08		2	3	
Draco η, ϵ		+0.45	4	5	5	
" ϕ, ψ		+0.31	1			1
" ϕ, ϵ		+0.33				2
" ϕ, ψ		+0.31				3
" ρ, θ		+0.06				
" ϵ, δ		+0.60				
Cygnus γ, ϵ		+0.38	3	2		3
" ι, κ		0.05	1			
" ξ, ν		0.36	3	4		3
" ν_2, γ_9		0.31	3			
" η_1, ν_2		0.16		1		
" β, γ Lyrae		0.23				5
Ursa Minor ϵ, θ		0.82	+6			
" β, α		+0.02	1	0	0	0
Ursa Major α, ϵ		-0.11	1			
" β, γ		-0.04	2		0	
" μ, λ		0.45	4	5	5	

9

30

July
17

2

3

2

0

0

Pair	$\Delta \log$	June 19	21	27	29	July
Ursae Major						
ϵ, κ	+0.01 +0.53	3	3			
η, ν	0.27	3	2	—	—	3
θ, η	0.28	2	5			
ν, ξ	0.02		5			
η, ζ	0.36		2	3		
ϵ, ζ	0.53		3	5		
ϵ, η	0.17			1		
Cepheus						
δ, β	+0.02	1	1		1	
Aquila						
δ, β	+0.49	2	2	4	5	
"	θ, β +0.56		2			
	λ, ι +0.40			3		
	δ, λ +0.16			2		
Hercules						
ξ, θ	+0.08	2		4	3	3
"	π, η 0.36			2	3	3
"	ζ, π 0.27			4		4
	θ, ν 0.64			3	5	
	μ, ξ 0.42			3	3	5
	ζ, ϕ 0.35			2		3
	109, 110 0.33				3	
	109, 102 0.27				2	
	δ, ϵ 0.76				5	4
	π, δ -0.08				3	
	δ, μ 0.21				3	
	ζ, δ 0.19					4
	η, τ 0.19					2
	θ, ϵ -0.08					1
Delphinus						
γ, α	-0.20	2	2		-1	
β, α	0.22	2	3			
β, γ	0.42	3			4	

		19	21	27	29	July 1
η Lac. γ Off.	0.11	1			2	0
Boris δ, β	0.11			1	1	
... β, ρ	0.02			+		
ϵ Boris α Corona	0.19			-1	0	0
Boris γ, β	0.52				5	
Corona β, δ	0.87			5-		
	ρ, γ 0.39			2		
α Herculis β Off.				2	2	
Off Cygnus ϕ, χ					2	2

Par.	Li	P	on.	June 19	21	27	27 July
Virgo β, η	0.33				4		
ν, θ	0.03				3		
β, ν	0.52				3		
Lynx δ, ϵ	-0.19				3		2
1 Lacertae π Peg.	0.27	-4					
α Hirculis κ Ophi.			5			4	
ξ Ursae Major γ 46 Ser	min.	$+0.12$			1		
α Androm β Pegasus	$+0.40$				2		
Serpens δ, β	0.39					3	4
" ϵ, σ	0.09					1 and 1	1
β, π	0.17				4		
σ, π	0.09					1	
Libra β, α	0.28				2		2
γ, θ	0.30				3		
γ Librae δ Serpente	0.09				3		
Serpens κ, γ	-0.25				1	-1	0
β, κ	0.41				3		2
ϵ, δ	0.29				0	2	1
β Serpente γ Hirc.	0.01				1		
α Serp. δ Ophi.	0.03					2	
Serpens β, δ	0.12					3	
Ophi. μ Serp.	0.11					4	
Serp. γ Ophi.							
Ophi. ξ Serp.	0.21				2	3	
Serpens β, γ	0.16						2
" κ, ϵ	0.30						5

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