June 10, 1899.

X 8477 $^{4}_{2}$ γ Velorum,
Class Od Pec.
On superposing this image on X 7505 and X 8513, I see no differences except that the latter plate is isochromatic and shows the red end.
The spectrum has been measured and described from X 8513.

June 10, 1899

Over exposed

Copied from Book VII p. 208 7

Book VII p. 209

Book VII, p. 210

Book VII p. 211

	A.G.C 15305	A.G.C 8631	Image thin A.G.C 22713	ζ Puppis 46155	A.G.C. 9311 46265−	A.G.C. 9311 47231	ζ Puppis 47421	ζ Puppis 46257	ζ Puppis 48230	ζ Puppis 48188	ζ Puppis 48241	ζ Puppis 48228
~~X X~~												
Hβ		5	3	2~~5~~0	2~~0~~4, 2~~7~~8r.	15−	20	20				
~~4712~~ 4688		100 or 200	40	30	8	5	20	25	= ~~#~~ Binp Cont	15	15	10
4633	0.7 of 4688 in A.G.C. 8631		20	8	2, 2 double	2	7	8	= 1/5 of 4688	5	4	4
4606		7 double										
4620 Hγ' 4543		8		1 10	3 5 on gr. ledge	5	10	10				
~~H~~ 4514				0	5−	5	0	0				
4471	2			1	15− 3	15− 2	1	1				
4387 Hγ	2	7		2~~5~~2	25−	20	20	20				
Hδ' 4201		7		~~8~~ 10	5−	5	12	8				
Hδ		8 very wide		2~~5~~	25−	25−	20	20				
4059	2	7 well defined		0	3	20	0	0				
Hε' 4026		2		8 0	20	20	8	8				
Hε		~~7~~ 1		2~~5~~0−	25−	25−	20	20				
H				2	2	2	2	2				
Hζ' ~~Hζ~~				~~8~~ 7	2	3	8	~~4~~+ 6				
Hζ				2~~5~~0	25−	25−	20	20				
~~Hη'~~				5	Too ft.	~~2~~ 1	5	5				
Hη				2~~5~~0−	20	25−	20	20				
~~Hθ'~~				~~4~~ 3	Image to faint		3	3				
Hθ				~~22~~ 18		20	18	18				
Hι'				2			Image ft.	1				
Hι				1~~7~~8				15−				
Hκ'				2				12−				
Hκ				10~~4~~ 5				10				
Hλ												
Hμ												
Hν												

June 10. 1899.

Over exposed

	A.G.C. 15305	A.G.C. 8631	A.G.C. 22763	ζ Puppis	x6265 A.G.C. 9311	ψ7231 A.G.C. 9311	A.G.C. 22827	τ Canis maj. ~~A.G.~~ ψ7231
4144					3			
4120					2			
4116					3			
4096					18			
4089					6			
4059					3			
3819						15		
4688							100	
Hθ								25
Hι								20
Hκ								15
Hλ								10
Hμ								8

Monday, June 12. 1899

¥7421 ζ Puppis is comparable as to density w. ¥5663 μ Centauri, and there seems to be about the same amount of light in 4688 as in Hβ bright in μ Centauri.

~~Tuesday~~ Wednesday, June ~~13~~ 14. 189~~8~~ 9 0

Measures of D^3 in Orion stars.

α Scorpii

Retricle used. 1 div. = 1/5 mm

from 5896.0 ~~to~~ D^3 in α Crucis = 2'.5

" " " " " β Crucis = 2'.3

" " " " " β Cent. = 2'.5

" 5896.0 ~~to 5890.0~~ in α Scorp = 0.3

6.0 λs = 0.3 scale divisions

1 " = 0.05 " "

~~0.05) 2.40(~~

~~48~~

0.05) 1.4

$ 24.00

5896.0
24.0
5872.0

Wed. June 14. 1899.

		α Scorpii	α Crucis 48997 (1)		
D^1	5896.0	16526			
D^2	5890.0	16646			
D^3			14848	13	
Hβ	4861.5	43598	41658	40444	

Discussion of micrometer measures of D^3

	x8729 α Scorpii	α Crucis	~~β~~ α Crucis	β Crucis	α Crucis Corrected val.
D^1	49856	~~14602~~			
D^2	49976				
D^3		14848	50206	14361	50242
Hβ	76928	41658	77002	41217	76935
Hβ − D^2	26952				
Hβ − D^3		26810	26796	26856	26693

26810
26796
26856
3) 2462
26821 = mean uncorrected value of dist. from Hβ to D^3

Wed. June 14, 1899.

26952
26821
131 = dist. from D^2 to D^3

49976
49856
120 = dist. from D^1 to D^2.

From these measures, it seems that D^3 is ~~as nearly~~ almost as near D^2 on shorter wave-length side as D^1 is to D^2 on the side of greater wave-length. This is not so from my scale measures nor does it look so when x 8729 α Scorpii and ~~x~~ any plate showing D^3 are superposed. Error is probably due to using uncorrected values. Using corrected values for α Crucis, we get

26952
26693
259 = dist. from D^2 to D^3

5896.0
5890.0
6λ = 120 meas.
1λ = 20 "
13λ = 259 " appr.

20) 259
13

5896.0
13.0
5877.0 for approx. λ of D^3

Thursday, June 14, 1899, 22h

X 3851 ε Orionis for ~~red~~ violet end.

3819.2	15
Hθ	25
Hι	25
3760	3
Hκ	22
Hλ	20
3728	2
Hμ	18
Hν	15
Hξ	18

5781.6 3.80
5785.0
5857.8 0.88 1.98
Unk. ~~1.00~~ 0.62 ~~1.00~~ 1.10
5890.0 ~~0.46~~ 0.48
0.48
5896.0 0.00 0.00

Friday, June 16, 1899 0h

Measures of dark line in extreme end of greater wave-length in α + β Crucis, β Centauri, λ Scorpii and α Muscae. This line has somewhat shorter wave-length than the D lines of sodium in 2nd and 3rd type stars, as is seen by superposition upon α Scorpii, ε Scorpii and α Tucanae all showing the D sodium lines.
In order to measure this line the plates showing it must be in succession superposed on X8729 α Scorpii, which shows the D lines of sodium separate.

Scale D1339. 4

superposed on X8729 so that Hβ matches in the two stars

~~5890.0 = unknown dark line~~

	Scale D1339	Reticule on eye-piece	D13~~4~~39	D13~~4~~39	D1339
From 5896.0 in α Scorp. to unknown dark line in β Centauri X$\overset{9}{8}$199	0.6	1.7	0.7	0.6	0.6
From $\overset{5857.8}{5857}$ in α Scorp. to unknown	0.9	2.7	0.9	~~1.6~~ 0.9	~~1.7~~ 0.8
" 5896.0 in α Scorpii to unknown	1.1	2.3	1.1	1.1	1.1
" 5781-5785 " " " " "	3.8	9.4	3.6	3.9	3.9
5781.6 - 5785.0		Reject			

Friday, June 16. 1899

	*8997	*9186	*9201	*8739	*9199
From 5890.0 to unknown dark line	0.5 ~~0.7~~	0.7	Line too faint to measure.	0.5	0.7
	0.7	0.8		0.6	0.7

Friday June 16, 1899.

Measures of unknown Orion line with reticle divided to 1/5 mm.

5898.0 in α Scorpii unknown in β Cent.	1.1	1.5	1.1	1.23
5857.8 " " " " " " "	2.2	2.5	2.5	2.40
5896.0 " " " " " – –	2.0	2.1	1.7	1.93
5781.6 - 5785.0 " " " " "	9.5	9.5	9.6	9.53
	~~5879.8~~		5878.1	
	~~5879.6~~		5879.0	
	~~5878~~			
	5875.9			

3.63 : 1.23 = 30.2 : x = ~~10.0~~ 10.9

4.33 : 1.93 = 36.8 : x = 17.0

38.2
1.93
1146
3438
382
73726 | 433
433
3042
3031
116
17.0

32.2
123
322
644
966
39606 | 363
363
3306
3267
10.9

90.0
10.9

96.0
17.0

30.2
604
906
37146 | 363
363
84
102

36.8
193
1104
3312
368
71024 | 433
433
2772
2598
174
16.4
76.0

Saturday, June 17, 1899. $0^h 10^m$

Measures of dark line in ε, δ, & ζ Orionis,

ψ 8119 ε Or. superposed on ψ 8114 α Carinae.

Reticle ruled to 1/5 mm.

~~From line 5406.0 in α Carinae to unk. in ε Or.~~

Can not see the lines with the scale over them.

In α Carinae line 5410 is much fainter than in α Aurigae

The unknown Orion lines falls between 5406.0 and 5415.4 in α Carinae and appears to coincide nearly with the faint line 5410.0

Estimates made in tenths of the interval between 5406.0 and 5415.4

	ε Or	ε Or. Plate changed & superposed again	ε Or. Superposed again	δ Or.	δ Or.	δ Or.
From 5406.0 to unk.	0.4	0.6	0.7	0.8	0.8	0.8
" 5415.4 " "	0.7	0.5	0.3	0.4	0.2	0.3

~~ζ Or.~~	ζ Or.	ζ Or.	ζ Or.
From 5406.0 to unknown	0.4	0.6	0.6
" 5415.4 " "	0.7	0.4	0.5

Saturday June 17, 1899

Cont. of measures of dark line in ε δ and ζ Orionis.

X8119 ε and δ Orionis superposed on X8109 α Virg.

Unknown line falls between 5406.0 & 5410.0
Let distance between 5406.0 and 5410.0 be the interval.

	ε Or.	δ Or.	ε Or.	δ Or.	ε Or.	δ Or.	ζ Orionis	ζ Or.	ζ Or.
From 5406.0 to unk.	0.3	0.5	0.0	0.9	0.0		0.4	0.1	0.1
" 5410.0 " "	0.8	0.5	1.0	0.2	1.0	0.1	0.5	0.9	1.0
" ~~5410.0~~ 5415 " "						0.9			

Saturday June 17, 1899.

4811 ζ Or. and 8119 δ + ε Or.
superposed on 4811 3 κ ~~Saiph~~ Orionis

		ζ Or.	ε Or.	δ Or.	ζ Or.	ε Or.	δ Or.	ζ Or.	ε Or.	δ Or.
From ~~5046~~ 5406.0	Inch.									
" 5410	" "	0.9	0.4	0.2	~~0.3~~ 1.0	0.3	0.1	0.~~4~~ 7	0.7	0.2
" 5415	" "	0.1	0.5	0.8	~~0.7~~ 0.0	0.7	0.9	0.~~8~~2	0.3	0.8

Saturday, June 17, 1899.

Measure of same line as on preceding page, as seen on X 9184 θ Carinae

X 9184 superposed on X 8729 α Scorpii

Unknown line falls bet 5406.0 & 5410.0

X 8994 ζ Puppis also superposed on X 8729.

	θ Car.	θ Car.	θ Car.	ζ Puppis	ζ Puppis	ζ Puppis
From 5406.0 to unknown	0.5	0.5	0.5	0.5	0.5	0.5
" 5410.0 " "	0.5	0.5	0.5	0.5	0.5	0.5

In θ Carinae and ζ Puppis the unknown line is wider than the lines in α Scorpii and seems to extend from line 5406.0 to line 5410.0 in α Scorpii so that the centre of the unknown is half-way between the two solar lines. The lines 5406 & 5410 are too near together on two pr. plates to estimate accurately.

Monday, June 18, 1899 $22^h 40^m$

49189 isochromatic plate of α Lupi

Image 1. very dense, narrow,

Lines seen

1, 4, 6, 9 (D^3)

Image 2. D^3 not seen.

Measures of lines in red in image 2. Scale D1339

	Reading	Int.
Hβ	0	
1	4.8	10
4	11.6	4
6	13.8	3
8a	49.9	3
8b	50.7	3
	51.4	1
	51.9	1
8d	52.6	2

Monday June 19, 1899 $2^h 45^m$

Classification of Miss Maury's plates from Boxes 1, 2, 3, Classified independently, plate removed from cover marked side downwards

C 3273 χ^1 Orionis XIII a
Class G.

✓ C 5182 β Ceti XV a

K.

C 1409 ξ Herculis XV a Like α Cass.

G5–K. Hγ = 4326
Some absorption but not marked
Like A Carinae

✓ C 3019 γ Sagittae XVI a.

Class K5M.

✓ C 2552 β Urs. Minoris XVI a Eq.

Class K5M

Tuesday, June 19, 1899 23^h

Classif of Miss Maury's plates cont.

C 6195 α Tauri.
K5M

C 1029 α Hydrae XV – XVI.
K5M. 4 pr.

√ C 1657 β Cancri. XV – XVI
K2M.

C 5757 α Urs. Minor. ~~X~~III ac
~~G8K~~ F8G peculiar sharp lines.
Looks like δ Canis Majoris.

C 2$\overset{6}{\cancel{1}}$20 d Draconis. XIII c
G8K sharp lines
δ Canis Majoris?

√ C 730. α Cass. XV a

G5K. Comp?
Ultra violet well developed.
4277.0 ~~weak~~
Lines indistinct
Hγ nearly = 4326.0.

Tuesday, June 19. 1899.
Cont. of preceding.

√ C 5157 α Arietis XV a
K or K2M. Image thin two. violet

√ C 2310 ε Aurigae XII c
Exactly like α Scorpii
F5G, sharp lines.

√ C 865 XII ab. β Cass.
Image too dense. Good of violet
Probably F5G —

√ C 5170, $\overset{\beta\ \text{Cass.}}{\text{XII}}$ ab. Under α Canis Minoris.

Probably F2G.

√ C 4194 · α Aurigae XIV.
G5 ~~G~~K

√ C 5431 α Hydrae. XV – XVI.
Ma?
Image too thin to classify perfectly
from this plate

June 19. 1899.
Cont of preceding

√ C1773 XIII a β Virg.
F8 G.

C1610 α Urs. Min. XIII ac.
F8G, sharp lines
like δ Canis Majoris

√ C1543 α Persei XII^{ac} – XIII^{ac}
F8G. sharp lines
δ Canis Majoris?

C2396 ρ Cass. XIII c
Like ι' Scorpii
F5G sharp lines.

√ C6563 α Bootis XV a.
K
α Bootis?

June 19. 1899.
Cont of preceding

√ C2549 β Corvi. XIV^{a} – XV^{a}
G5K.

√ C1710 κ Gem. XIV a – XV a.
K? Narrow image.

C1446 η Aquilae XIV ac.
Comp. Hyd. lines strong. G band
almost obliterated.

C5132 ~~α Persei.~~ ~~XII ac~~ XII c – XIII c 35 Cygni.
Very poor. F5G, sharp lines.

C6208 α Persei, XII ac – XIII ac
F5G, sharp lines.
Like ι' Scorpii ?

√ C2416 ε Aurigae. XII c
F5G, Pec, sharp lines

C178 10 Camelop. XIV ac
Focus v. poor.
F5G or F8G sharp lines

June 19. 1899

✓ C1065 η Bootis. XIV a. remark 93.
F5 or 8 G sharp lines

✓ C2959 β Draconis. XIV a.
G

✓ C2437 δ Canis Majoris XIII c.
F8 G. sharp lines

C1970 η Bootis.
G

C1457 η Aquilae

Wednesday, June 20, 1899 22^h

C1610 α Urs. Min. & C2620 d Draconis classed XIII ac and XIII c respectively show no differences on these plates. The differences between divisions c and ac are probably too slight to appear on plates taken with one prism.

Group XII Div. c.
Typical star ε Aurigae

F5 G peculiar sharp lines.
Like ι Scorpii.

Wednesday, June 21. 1899.

Lines in α Persei.
The intensities of the lines at the G band of Fraunhofer differ from those in α Canis Minoris but are not essentially different from those in α Carinae.
Lines 4336.9, 4321.0, 4305.8, 4297.1, 4294.3 are all more intense than in ~~H~~ α Canis Minoris.
In general intensities of the solar lines and ~~in~~ of hydrogen lines, the spectrum of α Persei resembles α Canis Minoris.

Monday, June 25. 1899 $22^h 30^m$

Classif. of Miss Maury's plates

C 2527

H. P. 896 B3A. η Aurigae $^{Gr.}$ IV

H. P. 879 Comp. K & B Orion
ζ Aurigae XV c.

C. X373 Ma. β Androm. XVII a.

C 3070 Mb. λ Aquarii. XVII a appr. follow. prof.

C 1277 Ma $\overset{\delta}{\xi}$ Oph. XVII a.
Eryth. Poor plate

C 721 β Androm. XVII a.
Ma. 4227 very strong.

C 1675 α Orionis XVIII a.
This must be α Orionis. 4227 weak, hydrogen lines strong, bands 4954 and 47 more marked than in β Andromedae.

Monday. June 25. 1899

C2470 R Leonis $\overline{XX}$ a
Md
Bright hyd. lines
Hζ, Hδ, Hγ bright.
Hδ more intense.
Three breaks in bright seen in red.

C1465 η Gem. $\overline{XVIII}$ a.
Mb(1)

C2218 ρ Persei $\overline{XIX}$ a
Mb(2)

C1616 τ Persei Comp. $\overline{XIV}$ + $\overline{X}$, $\overline{XI}$ or $\overline{XII}$.
H.P.454. Comp. G with K narrower.

C1274 α Herculis $\overline{XIX}$ a – $\overline{XX}$ a.
Mb(2) or (3) α Herculis?
Nearly like g Centauri.

C1453 ρ Persei $\overline{XIX}$ a.
Mb(2)

Monday June 25, 1899.

C3094 γ Cap. Composite
Like α Circini?
4077.9 strong
G band faintly seen

In superposing this plate on X6514 α Circini, they seem very much alike. The solar lines are sharper and better defined in γ Cap. but appear to be the same in both stars.

C2642 α Scorpii. $\overline{XVIII}$ a Comp.
Ma. Eyth. poor focus.
hyd. lines strong.

C3087 β Androm. $\overline{XVII}$ a.
Too poor. Eyth.

Tuesday, June 26. 1899 $22^h 20^m$

C 2639   ν Virginis XVII a
Ma.

C 2228   β Pegasi XVIII a
Mb

C 6498   γ Androm. Comp. XV^a + 1st type
Composite   K + 1st type.

C 769.   β Pegasi XVIII a
Mb

C 2217   R Cass. XXIII
Md H_γ, H_δ, H_ζ, H_η H_θ H_ι ~~bright~~
bright Another line bright between
H_ζ and K.
C 843
A5 F   Lines hazy.

C 2789   χ Cygni XX Pec.
Md, H_β, H_γ, H_δ, H_ζ, H_η, H_θ, ~~H_ι~~, H_ι,
bright. Another br. line bet. H_ζ and K

Tuesday, June 26. 1899.

C 6135   χ Cygni XX Pec.
Md. H_β, H_γ, H_δ bright.

C 2772   Composite. α Scorpii.
Composite. K very hazy.
hydrogen lines strong.
Sp. Ma, fainter star A or B.

C 2959   ~~β~~   β Draconis XIV a
G

Tuesday, June 27, 1899.

ρ Puppis & α Carinae compared.
48211 + 47801 respectively.
H & K bands wider in ρ Puppis
Hyd. lines less intense " " "
4227 more " " "
4077.9 " " " " "

Lines 4365, 4308, 4309, are more intense in ρ Puppis

Lines sharp & well defined in both stars.

ρ Puppis resembles α Persei.

Friday, June 29, 1899 $22^h 20^m$

49312 η Centauri.

✓

$H\beta$ dark, single and well-defined
$H\gamma$ " " slightly hazy on edges though the line itself is well-defined
$H\delta$ somewhat broad & hazy, perhaps due to focus
$H\epsilon$, $H\zeta$, $H\eta$, broad,

Orion lines very broad and indistinct
4471 is double, and 4387 probably also double

Monday, October 2, 1899

✓ 49348 $_{2}^{5}$ α Piscis Aust. & α Phoen.
α Piscis Aust.
K = ½ H = 0.8 Hδ.
K is hazy towards end of gr. λ.
All lines somewhat ill-defined.
α Phoenicis
Sp. K

✓ 49349 γ Phoenicis
K5 M. The heads 5762 & 5944
are faintly seen.

49350 $_{2}^{2}$ δ Erid. Too poor.
✓ 49351 $_{2}^{3}$ β Pictoris
K = H = 1.1 Hδ
A5 F.
Solar lines indistinct and hazy.

✓ 49352 $_{2}^{3}$ γ Phoen.
K5 M. poor.

✓ 49353 $_{2}^{3}$ τ_4 Eridani
Mb

✓ 49354 $_{2}^{3}$ β Phoen.
G5 or 8 K
Line 4227 a little less intense than in
Sp. K. Line 4215 is nearly as intense as
4227.

October 2, 1899.

✓ 49355 $_{2}^{3}$ g Erid.
K? Too thin image.

✓ 49356 $_{2}^{3}$ β Pictoris
Image too thin. A5 F?
Lines indistinct.

✓ 49357 $_{2}^{3}$ β Indi.
Too thin. K?

✓ 49358 $_{2}^{3}$ ζ Gruis
Too thin. K?

✓ 49359 $_{2}^{3}$ δ Phoen.
Too thin K?

49360 $_{2}^{3}$ θ Pisc. Aust.
Too thin. 1st type. A?

✓ 49361 $_{2}^{3}$ ι Gruis
Too thin G5 K or K.

49362 $_{2}^{2}$ b Aquarii
Too thin 2nd type.
Omit no. Quality 2.

49363 $_{2}^{2}$ ν Ceti Omit

October 2, 1899.

✓ X 9364 2^4 α Pis. Aust.
A 3 F. This is α Pis. Aust.
The wide haziness on side of greater λ of the line K is well marked.
Hydrogen lines are well-defined, not very broad, but ~~are~~ ~~enveloped~~ have ~~in~~ a haziness extending on both sides.
Solar lines fairly sharp.

✓ X 9365 2^3 η Phoen.
Image thin.
K = H = 1.1 Hδ. β Pictoris?
Solar lines hazy.

X 9366 $^2_2$ σ Puppis. Too poor.
Omit.

✓ X 9344, ^{2} S. M. P. 7168 Too poor
Omit.

✓ X 9345, ^{3} S. M. P. 146 ζ ~~in~~ Phoenicis
very poor focus.
K = H = 1.2 Hδ.
Some appearance of haziness at the G band but this may be due to the focus.
Spectrum appears to be A 5 F.

October 2, 1899.

✓ X 9346, ^{3} S. M. P. 337. φ Phoenicis
Focus poor.
Hyd. lines only are clearly seen.
B 8 A or A.

✓ X 9347, ^{2} S. M. P 369. Too poor
Omit. 2nd type.

✓ X 9367, ^{2} S. M. P. 1685. Too poor
2nd type. Omit.

✓ X 9368, ^{3} S M. P. 2171 in Puppis.
Poor. ~~probably~~ A 3 F. or A 2 F.
Solar lines faint.

✓ X 9369, ^{3} S. M. P. 2707. in Vela
Cover marked "Lines double"
The spec. is B 5 A or B 3 A.
The Orion lines are ill-defined.
4120 is not distinctly seen.
4471 appears double but this seems to be due to the presence of line 4481.
Spectrum to be classed B 5 A, lines not well-defined.

October 2, 1899.

✓ X 49370,^{3} S.M.P. 3428. r Carinae
Images too thin.
r Carinae appears to be sp. K5M.

✓ X 49371,^{3} S.M.P. 3933 in Hydra
Too poor. 2nd type.

✓ X 49372,^{3} S.M.P. 4452 in Centaurus
B5A. Lines hazy.

✓ X 49373,^{3} S.M.P. 4521 in Centaurus
Too poor. 2nd type. G?

✓ X 49374,^{3} S.M.P. 2321. in Puppis.
Very thin. Probably A2F.

✓ X 49375,^{2} S.M.P. 2849 Plate does not show spectrum of S.M.P. 2849.
Sp. on edge of plate is B5A.
Several images, all poor.

✓ + X 49376,^{2} S.M.P. 3308 in Vela.
Too poor.
γ Velorum appears on the edge of this plate. Hβ is on the extreme edge, and appears wholly dark.

October 2, 1899.

✓ X 49377,^{2} S.M.P. 4365 in Crux.
Quality better than some quality "3" plates. Very poor focus. B3A?

✓ + X 49378,^{3} S.M.P. 4470. η Muscae
Too poor. B3 or 5A, or may be B8A.

✓ X 49379,^{2} S.M.P. 5282 in Lupus
Too poor.

✓ + X 49380,^{3} S.M.P. 1583 in Puppis
Thin. G5-K or K

✓ X 49381,^{2} S.M.P. 2277 in Vela
Too poor.

✓ + X 49382,^{4} S.M.P. 2707. in Vela.
Probably B5A. Lines hazy and ill-defined.

✓ X 49383,^{3} S.M.P. 3662 z Carinae
K. Very poor.

✓ X 49384,^{3} S.M.P. 4453 in Centaurus
Focus too poor. The hydrogen lines are broad, and there is barely a suggestion of Orion lines seen in B8A

October 2, 1899.

✓ 49385,^{2} S.M.P. 4480 in Musca.
Too poor.

✓ 49386,^{3} S.M.P. 5486. ι' Normae
Too poor. Probably A.

✓ § 49387,^{3} S.M.P. 4467. in Centaurus
Focus poor. F5 or 8G.

✓ 49388,^{4} S.M.P. 2543 e^{2} Carinae
Sp. K. e' Carinae superposed
at end of pr.? of e^{2}.
e' is B3A probably.

✓ + 49389,^{3} S.M.P. 2313 B Carinae
F5G?' Poor focus, and solar
lines are faint.

49390,^{3} S.M.P. 4522 ι' Muscae
✓ K? or K5 M? Thin image.
Probably K.

✓ 49391,^{3} S.M.P. 5625 ζ Triang. Aust.
Very poor focus, Probably F8G.

✓ 49392,^{4} ~~S.M.P. 5980~~ S.M.P. 5972 ι Apodis.
Probably B8A. Very poor focus.
Image too poor to classify spectrum

October 2, 1899.

✓ 49393,^{3} S.M.P. 6857. ι Telescop.
Too poor. 2nd type.

✓ 49394,^{3} S.M.P. 2729. in Vel.
Too narrow. F8G?

✓ 49395,^{4} S.M.P. 2729. in Vel.
+ F8G
S.M.P. 2744 ✓+ also on plate B5A.

✓ + 49396,^{3} S.M.P. 3308 in Vel.
Very poor. 2nd type.

✓ 49397,^{3i} S.M.P. 4453 in Centaurus
Too narrow and dense
Sp. 1st type.

✓ 49398,^{3} S.M.P. 5282 in Lupus.
Too poor.

✓ + 49399,^{3} S.M.P. 2415 in Puppis.
K? very poor.

Wednesday October 4, 1899

√ 49400, 4i S. M. P. 3428 r Carinae
(Iden. from 49249 & 44054)

S. M. P. 3428 √ K5 M? Focus poor.

" 14536 √ B3 or 5 A. Focus poor.

" 14295 √ F5 G. Pec. like b Velorum.

Several other stars on plate with images distinct enough to show the general type of spectrum to which they belong but the focus is not sharp enough to show their fine lines clearly.

√ 49410, 3 S. M. P. 5625 γ Triang. Aust.
Too poor. F5 G?

√ 49411, 3 S. M. P. 5898 k Scorpii.
Too poor. Several narrow spectra on the plate but they are so dense that they show no lines.

√ 49412, 3 S. M. P. 6857 ι Telescop.
Sp. K

√ 49413, 3 S. M. P. 7009 ξ Telescop.
Ma
Focus poor but bands at 5762 & 5954 are more distinct than at F.

October 4, 1899.

√ 49414, 3 S. M. P. 1996 l Carinae.
Too thin. 2nd type

√ 49415, 4 S. M. P. 2707 H Vel.
B5 A? Poor focus. Orion lines look double. Orion lines seen are 4471, 4387, 4144, 4128–4131 (very indistinct) & 4026. 4471 & 4026 look double. The effect for 4471 may be due to the presence of line 4481

√ 49416, 3 S. M. P. 6019 ν Scorpii.
Too thin. A?

√ 49417, 1 Nothing seen

49418, 4 S. M. P. 2303 – Velorum or A. G. C. 10861.

A. G. C. 10861 √ + B3 A probably.

" 10863 γ Vel. Too dense.

" 10873 √ + B3 A.

" 10986 √ + B3 A.

+ 10985 (7 3/4) There is no trace of the sp. of A. G. C. 10985. Star not given double in S. M. P.

" 10920 + √ B3 A.

" 10781 √ + B3 A.

" 10853 Too poor. Probably B8 A.

October 4, 1899.

✓ X 49419, ^{4} S. M. P. 2543 e² Carinae

Sp. K.

✓ e¹ Carinae overlaps at end of gr. λ, and is itself in Class B3A judging from Orion lines between Hγ & Hβ. The region near Hδ and of shorter λ is obscured by the spectrum of e².

✓ X 49420, ^{3} S. M. P. 2536 C Vel.

Too thin 2nd type. Prob. K.

X 4942~~0~~1, ^{4} γ Puppis

B, A. Lines wide.

✓ X 49422, ^{3} S. M. P. 2313 B Carinae

Too poor.

1st type or I-II.

✓ + X 49423, ^{3} S. M. P. 2277 - Vel.

Too poor.

S. M. P. 2277 2nd type? very narrow.

✓ X 49424, ^{3} S. M. P. 3428 r Car.

K?, very poor focus.

X 49425, ^{3i} S. M. P. 3662 z Car.

✓ Sp. K.

October 4, 1899.

✓ X 49426, ^{3i} S. M. P. 4422 γ Cent.

1st type. Too dense to see lines.

✓ X 49427, ^{3} S. M. P. 5282 - Lupi.

Too poor K?

✓ X 49428, ^{3} S. M. P. 5980 ζ Ap.

K? very poor.

✓ X 49429, ^{3} S. M. P. 6093 σ Arae.

B8 or 9A. or possibly A

✓ X 49430, ^{4} S. M. P. 2433 B Vel.

B ~~3~~ 2 A.

X 49431, ^{3i} γ Velorum

✓ γ Velorum is only partly on this plate Hβ is the only line incl~~uded~~uded

Hβ is dark.

✓

A. G. C. 14295 Wholly on the plate.

Like b Velorum.

October 4, 1899.

✓ 49402, 4 S.M.P. 4365 Broken. Slide 2015

λ Crucis B3A. Lines ill-defined.

✓ 49401,^{3} S.M.P. 3933 – Hyd.
Too poor. 2nd type

✓ 49403,^{3} S.M.P. 4480 – Muscae
Too narrow & poor.

✓ ~~4~~ 49404,^{2} S.M.P. 5486 i Normae
A2F.

✓ 49405,^{4} S.M.P. 2321 – Puppis.
A3F or A5F.

✓ + 49406,^{3} S.M.P. 2849 – Vel.
Too poor.
2nd type.

✓ 49407,^{2} S.M.P. 3308 – Vel.
S.M.P. 3308 (1) Sp. B2? Image poor.
J Velorum. ✓ (2) B3A? Hβ dark. Image poor.

✓ 49408, 4 S.M.P. 4467 – Centauri
S.M.P. 4453 (1) B8A
✓
S.M.P. 4467 (2) F5 or 8G.

October 4, 1899.

✓ 49409,^{3} S.M.P. 4470 η Muscae.
B8A? 4471 & 4481 are seen, but 4026 is very faint. Focus too poor.
49432,^{2} A.G.C. 20695 in Circinus.
Too poor. Dual. 2 not to be entered.

49433 ^{2i} A.G.C. 20695 in Circinus
Too poor. Dual. 2. not to be entered

✓ 49434,^{4i} A.G.C. 9181. in Canis Major.
Image too faint near Hβ to see this line distinctly. It does not appear bright. Sp. B3A?

✓ ω Canis Majoris also on plate. Hβ bright but faint, in this spectrum. Sp. B3A
49435 (see p77)
✓ 49436,^{3} S.M.P. 4521. m Centauri.
Too thin.

49437,^{1} Too poor. Dual. 1 not to be entered.

✓ 49438,^{3} S.M.P. 6264 – Scorpii.
Too thin. 2nd type?

✓ 49439,^{3} S.M.P. 6857 ι Telescop.
Too thin. 2nd type

October 4, 1899.

✓ X 9440,³ S.M.P. 6202. — Scorp.
Too thin. 1st type.

For 9441, 9442, 9443 see p. 76.

✓ X 9444³ S.M.P. 5486. ι¹ Normae
Too thin. 1st type.

✓ X 9449,⁴ J Puppis.
Lines wide. Sp. B1A. 4649 = 4471,
but 4116 is fainter than in ε Orionis

✓ A.G.C. 10534 is on the plate from
$H\gamma$ to end of shorter λ.
Lines wide almost separated.

✓ X 9450,⁴ S.M.P. 2433 B Vel.
B2A. Lines wide. 4144 double

✓ X 9451 4 A.G.C. 20695 — Circini
A.G.C. 20695.+ Like τ Canis Majoris as far as can be judged
from this plate. The additional hydrogen lines are present.

✓ " 20649 Probably like τ Canis Majoris. The lines 4543 &
4200 are undoubtedly present.
✓ " 20640 Faint. Orion type. 4471, 4387, & 4026 seen

✓ " 20775 F5 or 8G.

October 4, 1899.

✓ X 9452,³ A.G.C. 22297 — Normae
Too thin and faint. Numerous lines seen
between $H\beta$ and $H\gamma$. These appear the
Orion lines, and spectrum may be like
β Centauri.

✓ X 9453,⁴ S.M.P. 6202. — Scorpii
B8 or 9A. Orion lines ft.
4026 is hardly intense enough for
B8A. Sp. probably B9A.

✓ X 9454,³ S.M.P. 7009 ξ Telescop.
K5M or Ma. probably Ma.
Poor focus.

✓ X 9455,³ ε Capricorni
Lines hazy and broad.
$H\beta$ much fainter than $H\gamma$ or the other
lines of hydrogen. This may be due to
the exposure, but I think a variability
of the line $H\beta$ has been suspected on
other plates of this star

October 4, 1899.

✓ X9456, 3 J Puppis.
Lines double? Hγ and 4649
look double.

✓ A.G.C. 10534 on plate. Lines double.
Separation = 7.8 Fainter comp.
towards red. Br. = 2 fainter

✓ X9457, 3 ~~J Puppis~~ A.G.C. 14295 or S.M.P. 3369
in Carina

S.M.P. 3369 Sp. ~~F8G~~ F5G per. Like
b ~~Pup~~ velorum

A.G.C. 14145 J velorum which was intended to be taken, is partly on
the edge of the plate, from Hβ to λ4471. Hβ is dark & single

✓ X9458, 4 S.M.P. 4365 λ Crucis
B3A. 4144 looks double

✓ X9459, 3 S.M.P. 4480 – Muscae

Very faint. K?

✓ X9460, 3i S.M.P. 5625 J Triang. Aust.

F5 or 8G, Probably F8G.

✓ X9461, 3 S.M.P. 6264 – Scorpii

Sp. K. Faint image.

October 4, 1899.

X9462, 3 A.G.C. 9181
A.G.C. 9181 is not on plate.

X9463, 2 S.M.P. 2849. Too poor.

✓ X9464, 3 A.G.C. 14145 J velorum

Hβ dark.

✓ X9465, 4 S.M.P. 4453 – Centauri.
1st type, probably B8A.
Orion lines very poorly defined.

✓ S.M.P. 44~~73~~67 also on plate.
F8G.

✓ X9466, 3 S.M.P. 4522 ι ~~Normae~~ Muscae
Too poor. K?

✓ X9467, 3 A.G.C. 14145 J Vel.
Hβ dark. Orion lines look double
but this may be due to focus

✓ X9468, 3i S.M.P. 3662. z Carinae.
Sp. K.

✓ X9469, 4 S.M.P. 4467 – Cent.
S.M.P. 4467 (1) F8G.
" 4453 (2) B8A.

October 4, 1899.

√ X9470,² S.M.P. 5282 – Lupi
Too poor.

√ X9471,⁴ A.G.C. 14145 ζ Velorum
Hβ strongly dark.
Orion lines especially near the violet end of the spectrum look double. This is probably due to the focus.

√ X9472,⁴ S.M.P. 4422 ζ Cent.
B 3 or 5 A.
Line 4481 is not well defined, lines 4120, 4128-4131 are faint.
Other lines are as in B3A.

49473,³ S.M.P. 4521 m Cent.

S.M.P. 4521 √ m Centauri (1) Sp. G

A.G.C. 18232 √ (2) F5 or 8 G.

√ X9474,³ A.G.C. 22297 – Normae
Too poor.

October 4, 1899.

√ X9489,⁴ ζ Puppis
Hζ double
This shows more doubling than any plate yet examined of ζ Puppis.

√ A.G.C. 10534 is on the plate from Hζ toward of shorter wave length. Lines are broad in this spectrum. λ4387 barely on the plate, is double, fainter component towards the red.

ζ Puppis should be closely followed.

√

X9490,4 ζ Velorum

Hβ dark and intense.
Orion lines broad.

√ X9491,⁴ A.G.C. 20675 – Circini
This phot. was repeated because the violet end of this sp. on a plate of ζ Circini showed the line 4201. due to hydrogen. On X9491, the region bet. Hγ and Hζ is shown, and the additional hydrogen line Hβ', 4543, is well marked.
This spectrum resembles τ Canis Majoris in the two sets of hydrogen lines in the presence of 4685 & 4849, but 4712 appears absent or very faint, whereas it is well marked in τ Canis Maj.

Oct. 4, 1899.

45101 γ Cir.
A. G. C. 20695 partly on the plate.
At region of Hδ lines 4089 is distinctly seen, but 4116 is not visible.

✓ 49492 ^{3} A. G. C. 22297 - Normae
Too poor. This spectrum seems somewhat peculiar in the number of lines bet. Hβ and Hγ.

✓ 49493 ,^{4} ε Capricorni
Very poor focus.
No peculiarity noted.

✓ 49494 $_2^4$ ζ Centauri May 18, 1899
Lines double. Br. comp. towards violet.
Br. = 1.8^5 fainter.
Lines seen double,
4471
4387
Hγ
4144
4120 (indistinct)
4026
4009
The hydrogen lines are broad,

Oct. 4, 1899.

✓ 49495 $_2^4$ η Centauri

Orion lines broad and hazy.
Hβ is dark, very narrow, and well-defined, with bright edges, and faint dark lines on each side of the bright edges. Thus Hβ dark really appears to be triple having the middle component sharp and narrow, the two outside components faint and indistinct, and the spaces between the three components bright.

✓ 49496 ^{5} η Lupi.
B3 $\overset{2}{A}$.

✓ 49497 $^5_2$ α Arae
Hβ bright, superposed on a dark band.
Hγ is very wide, slightly double or triple.
Sp. appears to be B3 A, with 4120 very faint.

✓ 49498 $_2^5$ ζ Centauri May 20, 1899.
Lines double. Br. comp. towards red.
Lines 4925, 4471, 4387, 4144, 4120, 4026, 4009 are double. The hydrogen lines are not so clearly separated, due to their greater intensity.

October 4, 1899.

✓ X9499 $_2{}^5$ η Centauri.

✓ $H\beta$ is ~~dark, sharp, well-defined~~ as described on p. 59 X9495 except the dark component of shortest wave-length is on X9499 a little more intense and more distinct than on X9495, and is on X9499 more intense than the line of greatest wave-length of the three dark components of $H\beta$. The spaces between the dark components are bright

Thursday ~~[illegible]~~ October ~~5~~ 4 1899 ~~[illegible]~~ 22^h.

✓ X9502 $_2{}^4$ α Arae.
$H\beta$ is bright, superposed on a dark band extending on either side of the bright $H\beta$.

$H\gamma$ is complex. There appears first to be a wide hazy dark band, on which is centrally superposed a faint bright band. On this bright band is a narrow dark line. The effect of the whole makes $H\gamma$ look triple, consisting of three dark portions of which the central is narrow & well-defined, the two outer ones, hazy; the spaces between the three dark portions are bright.
Spectrum appears to be B3A. Lines 4128-4131 are a little fainter than line 4120. 4481 = 1/2 (4471)

✓ X9503 $_2{}^4$ η Lyrae
B3A. Lines broad,

✓ X9504 $_2{}^5$ ζ Centauri. May 22, 1899.
Lines single. B2A. Lines 4649, 4641 seen

X9505 (see p. 65)

October $\overset{4}{5}$, 1899.

✓ X 9506 2^{5} β Lupi. May 22, 1899
Lines single and narrow.
Sp. B2A

✓ ζ Cent. on plate.
B3A! Lines very sharp.

✓ X 9507 2^{4} η Lupi. May 22, 1899

Lines hazy. Does any plate of η Lupi show narrow lines? The focus was sharp when this plate was taken, as may be seen from the preceding plate.

✓ X 9508 2^{4} α Arae
Lines very broad and hazy.
Hβ bright.
Hγ has the same triple ~~effect~~ aspect as described on p. 61, but it is not here so sharply defined.

✓ X 9509 2^{5} ζ Centauri May 23, 1899.
B2^{2}A. Lines single + sharp.
X 9510 (see p. 64)
✓ X 9511 2^{5} β Lupi
B$\overset{2}{2}$A. Lines fairly well-defined.

October $\overset{4}{5}$, 1899

✓ X 9512 2^{4} η Lupi
λ4387 is double
other lines hazy.

✓ X 9514 2^{4} ζ Centauri May 24, 1899.
Lines a little broad

✓ X 9516 2^{4} β Lupi
Lines a little broad

✓ ζ Cent B3A.

✓ X 9517 2^{4} α Arae
Hβ bright, superposed on hazy dark band. Hγ very wide and ill-defined and appears triple as on X 9502 (see p. 61)

✓ X 9518 2^{4} ζ Centauri May 25, 1899.
Lines closely double
Components appear nearly equal in intensity. This is probably due to the closeness of the lines.

October ~~5~~ 4, 1899.

✓ X 9519 $_2{}^5$ η Centauri.

Hβ resembles same on X 9495 (see p. ~~61~~ 59)
The component of Hβ dark on X 9519 towards end of gr. λ is very indistinct.
The middle line is sharp and well-defined.
Other hydrogen lines are sharp on edges of shorter and somewhat hazy on edges of gr. wave-length.
Orion lines are broad, and the more intense ones look double.
Numerous faint Orion lines are seen on this plate.

✓ X 9510 $_2{}^5$ η Centauri.

The central dark line of Hβ is the most noticeable part of the complex Hβ. This sharp dark line is superposed on a bright band. The hazy dark lines on each side of the bright band are very faint. The Orion lines are broad.

October ~~5~~ 4, 1899

✓ X 9505 $_2{}^5$ η Centauri.
Hβ very faint ~~or invisible~~.
Lines Hγ and Hδ are not as well-defined on this plate as on most of the others examined, but are broader and hazier. The hydrogen lines are almost as broad as the Orion lines.
Hβ appears like two or three ~~very~~ extremely faint dark lines. No brightness is seen
λ 4387 looks double

✓ X 9515 $_2{}^5$ η Centauri.
Hβ dark, well-defined, narrow with bright edges, the ~~one~~ bright edge towards end of gr. wave-length being more intense than the edge on the side of shorter wave-length. The dark lines beyond these bright edges are indistinct.
The other hydrogen lines are sharp.
The Orion lines are very broad.

October ~~5~~ 4, 1899.

√ X 9520 $_{2}^{5}$ β Lupi.
Lines single, quite well defined.

√ κ Centauri. Lines sharp. ~~B2A~~ B3A.

√ X 9521 $_{2}^{4}$ η Lupi.

Lines double? 4471 looks double.

√ X 9522 $_{2}^{4}$ ζ Centauri. May 26, 1899.
Lines double, brighter comp. towards violet. Lines seen double,
4471, 4387 ^{He} 4144, 4120, 4026, 4009.
Hydrogen lines Hβ, H~~γ~~δ are broad.

√ X 9523 $_{2}^{4}$ η Centauri.

Hβ is as on X 9519 (see p. 64) except that the brightness is less marked on this plate. The dark Hβ is sharp and well-defined. Other hyd. lines are well-defined. The Orion lines are very broad. 4120 is distinctly double.

October ~~5~~ 4, 1899.

√ X 9524 $_{2}^{5}$ β Lupi.
Lines fairly well-defined.

κ Cent. B3A. Lines very sharp.

√ X 9525 $_{2}^{4}$ η Lupi.
Lines hazy.

√ X 9526 $_{2}^{4}$ ζ Centauri. May 27, 1899.

Lines a little broad + hazy, but single.

√ X 9527 $_{2}^{5}$ η Centauri.
~~Lines~~
Hβ dark, narrow, sharp, superposed on a ~~black~~ bright band. The faint dark edges hitherto referred to are not as distinctly seen as on some plates. Other hydrogen lines are sharp. Orion lines are broad + hazy.

√ X 9528 $_{2}^{5}$ η Lupi.
Lines hazy! 4120 looks double.

October ~~5~~ 4, 1899.

√ X 9529 $_{2}^{4}$ α Arae
Hβ bright superposed on a dark band.
4387 looks double.
Hζ is triple as described on p. 61,
All other lines broad.

√ X 9530 $_{2}^{4}$ ζ Centauri. May 29, 1899.
Lines wide
4144 & 4120 look double.

√ X 9531 $_{2}^{5}$ η Centauri,
Hβ dark, narrow, with bright edges
the one of gr. λ being more intense than
the one of shorter λ. Faint dark lines
give the triple look, noted before.
Hydrogen lines sharp.
Orion lines very broad.

√ X 9532 $_{2}^{5}$ β Lupi.
Lines single & well-defined

√ ζ Cent. Lines very sharp.

October 5, 1899. 0^{h}

√ X 9533 $_{2}^{4}$ η Lupi,
Lines a little hazy,

√ X 9534 $_{2}^{4}$ π Scorpii
Lines wide. Double? A trace of ft. component seen on side of sh. λ.

√ X 9535 $_{2}^{4}$ α Arae.
Hβ bright superposed on dark band,
All lines broad.
Hζ triple, but not as well-marked
as on some plates examined.

√ X 9536 $_{2}^{4}$ ζ Centauri. May 30. 1899.
Lines single, but slightly hazy,

√ X 9538 $_{2}^{5}$ ζ Centauri. May 30. 1899
Lines single

√ X 9539 $_{2}^{4}$ η Cent.
Hβ sharp dark with little if any brightness.
Orion lines broad. λ4387 looks double.
Hβ dark in η Cent. is always less intense
than the other hyd. lines and less intense
than the apparent Orion line 4925.

October 5, 1899.

✓ X 9540 $^{3}_{2}$ ζ Centauri. May 30, 1899.

Lines single.

✓ X 9541 $^{4}_{2}$ β Lupi.

Lines single & well-defined.

✓ η Centauri. Lines very sharp.

✓ X 9542 $^{4}_{2}$ ζ Centauri.

Lines single.

X 9543 $^{4}_{2}$ π Scorpii.

Lines double, well separated. Br. comp. tow. violet. The fainter line is best seen at 4387 & 4144. Doubling not well seen on all the lines.

✓ X 9544 $^{4}_{2}$ η Lupi.

Lines a little hazy.

✓ X 9545 $^{4}_{2}$ α Arae.

Hβ bright with dark edges.

Hγ is broad and dark with a bright narrow line superposed a little towards the end of shorter wave-length of the dark Hγ.

October 5, 1899.

✓? X 9546 $^{3}_{2}$ o Sag.

Too thin. X?

✓ X 9547 $^{4}_{2}$ ζ Centauri May 31, 1899.

Lines single.

✓ X 9548 $^{4}_{2}$ η Centauri.

Hβ is dark with bright edges. The bright line on the gr. λ side of Hβ is quite well-marked, the line ~~of~~ on the sh. λ side is fainter. The faint dark lines on the sh. & gr. λ sides of these bright lines are then faintly seen.

Line 4387 is double, and probably line 4471.

✓ X 9549 $^{4}_{2}$ β Lupi.

Lines single but slightly hazy.

✓ η Cent. on edge. Lines very sharp.

✓ X 9550 $^{4}_{2}$ η Lupi.

Lines hazy.

October 5, 1899.

√ X 49551 $_{2}^{4}$ α^1 Arae

Hβ bright.
Hγ triple as before noted.
Other lines broad but not double.

√ X 49552 $_{2}^{4}$ π Scorpii
Lines a little hazy, but not double.

X 49553 $_{2}^{5}$ ~~μ_2 Scorpii.~~
√ μ^1 Scorpii.
Lines double.
Br. comp. towards violet.

√ μ^2 Scorpii B3A. Line 4649 faintly seen

√ X 49554 $_{2}^{3}$ ξ Sag.

Sp. K very thin image

√ X 49555 $_{2}^{4}$ γ Gruis.
B8A. Lines not sharply defined

√ X 49556 $_{2}^{4}$ ζ Centauri. June 1, 1899.

Lines single

October 5, 1899.

√ X 49557 ^{4} β Centauri.
B1A

X 49560, A.G.C. 22297. Too poor

√ X 49561, ^{3} A.G.C. 22297 in Norma.
Lines doubly. Hγ and 4471 look double with the comp. of gr. λ somewhat fainter than the one of [illegible] shorter λ.
Line 4649 also may be double.
This image is very faint. Sp. may be like β Centauri!

√ X 49562, ^{3} S.M.P. 6857 in Telescop.
very thin. G5K or K.
Probably K.

October 5, 1899

✓ X 9563,$_2^5$ ζ Centauri. June 2, 1899.
Lines double. Separation slight.
Br. comp. towards violet?

✓ X 9564,^{5} θ Centauri.
Sp.' K.

✓ X 9566,^{4} A.G.C. 20695 – Circinus
A.G.C. 20695 Like τ' Canis Majoris? Lines 4685, 45~~8~~43, 4200, are present. Lines ~~4712~~ 4649, 4471, 4026, and one that appears to be the reversal of bright 4059 also seen. ~~4649~~ 4514 not seen.

" 20640 ✓ B 3 A. Partly superposed in R.A. on A.G.C. 20649. The images are wide on this plate.

" 20649 ✓ Lines 4543, 4200 are present. 4649, if present, is very faint. 4685 & 4712 are seen. This image is faint.

" 20775 ✓ F5 or 8 G.
The G band looks well-formed but the focus is not perfect.

October 5, 1899.

✓ X 9567,^{4} S.M.P. 6124 λ Arae
F5 or 8 G. Impossible to tell which because the focus is so poor.

✓ X 9568,^{3} S.M.P. 7809 ξ Telescop.
Too faint. B8? Ma.
No breaks are seen, but the two bands I & I-II stand forth somewhat as in Mb.

✓ X 9569,$_2^5$ ζ Centauri. June 3, 1899.
Lines double, separation slight.
Br. comp. towards violet.

✓ X 9570,$_2^4$ β Lupi.
Lines double?

✓ X 9571,$_2^4$ ζ Centauri. June 3, 1899.
Lines double.
Br. comp. towards violet.

✓ X 9572,$_2^5$ π Scorpii.
Lines double well-separated. Br. comp. towards red. Br. = (2) fainter at line 4471

October 5, 1899.

✓ X 9573,$_2$ 4 α Arae
Hβ bright is superposed on a wide dark band and shows a tiny dark line through the centre of the brightness, that is, it appears to be doubly reversed.
Hγ consists of two bright lines on a wide hazy dark band, giving it a triple look.
Line 4387 is double.
4471 looks double.
All the Orion lines are wide, ill-defined and perhaps double.

✓ X 9441,4 A.G.C. 9881. – Canis Maj.
Hβ dark.

✓ ω Canis Majoris also on plate.
~~Hβ br. on edge of gr. wave length.~~
Hβ bright is faint and is superposed on a dark band. The brightness of Hβ seems less marked than on other plates of this star, but it may be due to the exposure.

✓ X 9442,4 J Puppis.
Lines hazy. 4649 = 4471

✓ A.G.C. 10534. Lines hazy.
✓ " 10390 B3A.

October 5, 1899.

✓ X 9443,4 A.G.C. 20695. – Circini

Image too faint.

✓ A.G.C. 20649 shows add. hyd. line 4543.
other stars are to faint.

✓ X 9435,4 J Velorum

Hβ dark. Image ft. at this point.

Friday October ~~6~~ 5, 1899 21h.

√ X9574 $^{5}_{2}$ ζ Centauri June 4, 1899.
Lines a little wide.
Hζ looks double.

√ X9575 $^{5}_{2}$ ζ Centauri June 5, 1899.
Lines double. Br. comp. towards red.

√ X9576 $^{4}_{2}$ η Centauri
Hβ dark, narrow sharp, with bright lines on each side and faint dark lines on each side of these bright edges. Thus Hβ dark appears triple, having the central line much better defined than those on the edges, and having the spaces between the three dark lines bright. Other hydrogen lines are dark and narrow.
The Orion lines are broad. 4144 and 4120 look double.

√ A.G.C. 20695 X9579 ^{4} A.G.C. 20695 - Circini
Lines seen, Hβ, 4685, 4649, 4543, 4471, H 4387$^{H\gamma}$?, 4200, $^{H\delta}$?, 4026, Hε.
Spectrum appears to be like τ Canis Majoris.

√ " 20640 B3A.

October ~~6~~ 5. 1899.

√ A.G.C. 20649 X9579 (cont.)
This is like A.G.C. 20695. - Circini
Lines seen are Hβ, 4712 (very faint) 4685, 4649, 4543, 4471, Hγ, 4200, 4144, 4120, Hδ, 4059 (?), 4026, Hε, Hζ.

Identification of lines 4649, & 4685 are made by superposing on X9557 β Cent. which is of like dispersion.

√ X9580 ^{3} S.M.P. 6202 - Scorpii
B8A. Good image. 4026 > K.
4481 = 4471

√ X9581,4 α Indi.
G8K. 4227 less intense than in K,
* Hγ is a little less intense than 4327.

√ X9582 $^{4}_{2}$ ζ Centauri. June 6, 1899.
Lines ill-defined, some appear double, notably 4120.

October ~~8~~ 5, 1899.

√ X 9583 $_{2}^{4}$ η Centauri
Hβ is well-defined as a dark line.
It is superposed on a bright band.
On the side of gr. λ of the bright band,
there is a hazy dark line. On the side
of shorter λ of the bright band, there appear
to be two faint hazy dark lines.

The Orion lines are faint and indistinct on this plate. They appear to
be double.

√ X 9585 $_{2}^{4}$ δ Centauri. June 6, 1899.
Lines very hazy.

√ X 9586 $_{2}^{4}$ A.G.C. 20695 – Circini
A.G.C. 20695 Line 4685 has approx. as great intensity
as 4471.
Like τ Canis Majoris.

√ " 20640 B1A. Line 4649 surely seen.
This is the best spectrum yet seen
of this star.

√ " 20649 Like A.G.C. 20695
4685 = 4471

October ~~8~~ 5. 1899.

√ X 9587 ^{4} S.M.P. 5625. ξ Triang. Aust.
F8G. Good plate.

√ X 9588, ^{4} ε Capricorni.
B5A.
This spectrum resembles that of η Cent.
in having sharp hydrogen and wide
Orion lines. Some of the Orion lines
appear double.
Hβ is dark with no brightness.

√ X 9589 $_{2}^{5}$ δ Centauri. June 7, 1899.
Lines well-defined & single.

√ X 9592 ^{4} A.G.C. 20695 – Circini
A.G.C. 20695 Like τ Canis Majoris.

√ " 20640 Too thin to determine whether it is B1A, B2A, or B3A.

√ " 20649 Like A.G.C. 20695.

√ X 9593 ^{3} S.M.P. 5980. ζ Ap.
Too thin. K2M or K5M.
G band not dissolved. Breaks not
seen. Probably K2M.

October ~~4~~ 5, 1899.

√ X9594,^{4} S.M.P. 6093 σ Arae
Sp. A.

√ X9595,^{4} ζ Centauri June 8, 1899.
Lines single, fairly well-defined.

√ X9596,^{4} κ, Apodis.
Hβ br. on edge of pl. ?
Lines all broad and indistinct.
Clock out?

κ² Apodis also on plate.
√ B8A? Very poor image.

√ X9598,^{5} A.G.C. 20695. – Circini
A.G.C. 20695 Like τ Canis Majoris

√
" 20640 B1A or B2A 4649 clear.

√
" 20649 Like τ Canis Majoris.

√
γ Circini Composite

October 6, 1899. 0

√ X9599,^{4} S.M.P. 5898 k Scorpii.

This Hβ has a bright band on which a dark line is superposed, resembling Hβ in Orion stars having Hβ bright, but this line is not in position of a known line. It falls near wave-length 4543, but a little more towards the red.
Is this a double star?
The brightness may be a defect. It extends beyond image.
4649 is double, but line 4641 may be present.

√ X9600,^{3} S.M.P. 6264 – Scorpii

Image thin. K2M?

√ X9601,^{5} ζ Centauri June 9, 1899.
Lines hazy.

X9602,^{5} η Centauri
Hβ presents a slightly different appearance than on plates first examined. ~~The brightness appears to be more intense on the side of gr. wave-length than on that of shorter, and the faint hazy dark line~~
See following page.

October 6. 1899.

✓ X 9602,^{5} η Centauri.

Hβ dark and well-defined, has a bright edge only on the side of greater λ. The dark line on the greater λ side of this brightness is fairly well-marked so that the complex Hβ appears like two dark lines with a brightness between them. There is little if any brightness on the sh λ side of Hβ.

Orion lines broad, perhaps double.

Other hydrogen lines well-defined.

✓ X 9603,^{4} A. G. C. 20695. – Circini

A. G. C. 20695 Like τ Canis Majoris

" 20640 ✓ B1A or B2A. Too faint to see all the fine lines.

" 20649 ✓ Like τ Canis Majoris

" 20775 ✓ F5G. May be peculiar like b Velorum, but there are not enough solar lines visible to tell.

October 6. 1899.

✓ X 9605^{3} A. G. C. 22297. – Normae

Too faint. Probably B1A.

✓ X 9606,^{4} S. M. P. 6019. – Scorpii

B8A. Good plate

✓ X 9607,^{3} S. M. P. 6857. – Telescop.

K. Fair plate.

✓ X 9608,$^{4}_{2}$ ζ Centauri. June 10, 1899.

Lines double. Br. comp. towards violet.

✓ X 9609.$^{4}_{2}$ η Centauri

Hβ is very faint. The central dark line is not as well-marked as on many plates examined. The bright lines or spaces are also fainter. The two outlying dark lines are nearly equal to the central dark line in intensity.

Orion lines very broad.

✓ X 9610 $^{5}_{2}$ β Lupi,

Lines single and well-defined.

B2A.

✓ κ Centauri on plate

B3A

October 6, 1899.

X9615 $_2^{1}$ π Sag.
Too poor.

✓ X9616 $_2^{4}$ ζ Centauri. June 11, 1899.
Lines double. Br. comp. towards violet.

✓ X9617 $_2^{4}$ ζ Centauri. June 11, 1899.
Lines double. Br. comp. towards violet.

Saturday, October 6. 22^h 30^m

✓ X9618 $_2^{4}$ ζ Centauri.
Lines hazy. Double?

✓ X9619 $_2^{4}$ η Centauri.
Hβ dark with bright lines on each side
The hazy dark lines on the sides of
the bright lines are barely seen.
Orion lines very broad & hazy.
Hyd. lines well-defined.

✓ X9620 $_2^{4}$ ζ Centauri.
Lines slightly hazy.

✓ X9626 $_2^{5}$ ζ Centauri. June 13, 1899.
Lines well separated. Br. comp. tow. red.

✓ X9627 $_2^{1}$ S.M.P. 4365 λ Crucis.
B3A.
Cover marked ~~Lines~~ "double?"
Lines very hazy.
β Crucis also on plate, but image too dense.

X9628 $_2^{2}$ S.M.P. 5282 — Lupi
Too poor. 2nd type?

✓ X9629 $_2^{4}$ S.M.P. 5486 ι Normae
A3F.

October 6, 1899.

✓ X9630,^{3} S.M.P. 5980. ζ Ap.
K or K2 M. Image thin

✓ X9631,^{3} S.M.P. 6572. - Par.
Too poor. A or A2 F.
probably A2 F.

X9632,^{3} ~~S.M.P. 6919~~ A.G.C. 27100.
A? very poor.
Omit. Spectrum too faint.

✓ X9633,$^{4}_{2}$ γ Centauri. June 14, 1899.
Lines double? Br. comp. towards red?

X9634,^{3} S.M.P. 3662. z Car.
z Carinae ✓ G5 K.
very thin image.

A.G.C. 15269 ✓ Very thin 1st type. 4481 = 2(4471)
Region of K is too faint.
Other lines not well seen except
those of hydrogen.

+✓ X9635,^{3} S.M.P. 4480. - Muscae
K5 M? very faint.

X9636,^{2} S.M.P. 5282 - Lupi.
Too poor.

October 6, 1899.

✓ X9637,^{3} S.M.P. 5625 ζ Triang. Aust.
F8 G. Good plate.

✓ X9639.^{3} S.M.P. 6124 λ Arae
A5 F? very poor, image too thin,
very little seen except the lines of hydrogen.

✓ + X9640,^{4} S.M.P. 6661.
Too thin. 1st type.
" ~~Probably not S.M.P. 6661.~~ Image too poor.

X9641,^{2} S.M.P. 7009 ξ Tel.
Too poor.

✓ X9642,$^{4}_{2}$ γ Centauri. June 15, 1899.
Lines single, slightly hazy.

✓ X9643,$^{4}_{2}$ π Scorpii
Lines double. Br. comp. tow. violet.
Br. = 2 fainter

✓ X9644,^{4} S.M.P. 4453 - Cent.
S.M.P. 4453 B8 A?
✓
" 4467 F8 G.

October 6, 1899.

✓ X 9645,^{4} S.M.P. 4470. η Muscae
B8A.

A.G.C. 18039 ✓ S.M.P. 4480. Star on edge,
K or K5 M.

✓ X 9647,^{3} S.M.P. 7009. ξ Tel.
Poor. Ma?

X 9648; S.M.P. 7168 ξ Indi
Too poor.

✓ X 9649,^{4} ε Cap.
B5A. Orion lines broad
Hβ not as well defined as Hγ.

✓ X 9650,^{4} ι Phoen. S.M.P. 7816.
A2F, pec.

✓ X 9651,$^{4}_{2}$ π Scorpii.
Lines a little hazy.

October 6, 1899.

✓ X 9652 λ Crucis.
Lines double?
B3A.

✓ β Crucis on edge of plate.
B, A.

X 9654,$^{4}_{2}$ π Scorpii. Not π Scorpii
Two very thin hazy images. Orion type
π Scorpii?

X 9655,$^{4}_{2}$ π Scorpii. Not π Scorpii.
Like X 9654
Lines hazy, but image is very thin.

✓ X 9656,^{4} S.M.P. 6019 – Scorp.
B8A.

✓ X 9657,^{3} S.M.P. 6264. – Scorp.
K or K2 M. thin,
~~probably K2 M~~

✓ X 9658 ^{3} S.M.P. 6857 ι Tel.
very thin. K or K2 M.

✓ X 9659,$^{4}_{2}$ π Scorpii.
Lines double. Br. comp. wr. ed.

October 6.1899.

√ X 9660, 4 θ ~~Micros.~~ Scorpii.
Sp. F. Like α Carinae.

X 9661, 4 ~~S.M.P. 6979.~~

A.G.C. 27237 (1) Too thin. ~~B 8 A~~? A.

" 27100 (2) A? or A2F. Solar lines seem more numerous than in A.G.C. 27237. Lines 4383-4385 well-marked.

√ X 9662, 3. α Micros.
K.

√ X 9665,$^{5}_{2}$ γ Crucis.
B3A. Lines wide & hazy

√ β Crucis also on plate.
B1A.

√ X 9666,$^{4}_{2}$ η Centauri.

Hβ is very faint. It has a slight triple look, with the spaces a little brighter.
Orion lines very broad.
4387 is distinctly double, with the ~~brighter~~ more intense line towards the violet.

October 6.1899.

√ X 9668,$_{2}$4 α Arae.

Hβ is doubly reversed. There is a fine dark line running through the bright Hβ.

Hγ also doubly reversed and appears quite complex. There seems to be a broad dark band on which is superposed a faint bright band, on which are superposed three ~~very~~ dark lines, of which dark lines the middle one is the only well-defined one.
Orion lines appear double

Monday, October 8, 1899, 23^h

√ X 9653 $_2^5$ J Centauri June 16, 1899
Lines single, slightly hazy.

√ X 9663 $_2^3$ π Scorpii
Very poor image.
Lines a little hazy.

√ X 9664 $_2^3$ π Scorpii.
Lines double?.
Br. comp. towards red.

√ X 9667 $_2^5$ π Scorpii
B2A. Lines single

√ X 9669 $_2^3$ θ Arae
Lines 4649, 4641, 4630 stand out as
a prominent group
B1A pec.

√ X 9672 $_2^4$ π Scorpii
B3A Lines single?
Narrow image.

October 8, 1899.

√ X 9675 $_2^4$ ζ Centauri June 20. 1899.
Lines double? Not separated
far enough to ~~tell~~ distinguish the brighter from
the fainter component.

√ X 9676 $_2^4$ β Lupi
Lines single. Sp. B3A, lines 4649 & 4641
barely seen.

√ X 9677 $_2^4$ J & β Arae

√ J Arae. Lines double. In centre of plate.

√ β Arae. On edge. Lines well-defined.

√ X 9678 $_2^2$ ε Indus.
Sp. A

√ X 9680 $_2^5$ α Pis. Aust.
A3F. Lines well-defined.

√ X 9681 $_2^3$ γ Tucanae
A2 or 3 F. Image too faint
Region of K line barely seen

October 8, 1899.

✓ X 9682 $_2^4$ ζ Centauri. June 21, 1899.
Lines double. Br. comp. towards red.

✓ X 9685 $_2^4$ ζ Centauri
Lines double. Br. comp. twr. red

✓ X 9686 $_2^5$ ζ Centauri.
Lines double. Br. comp. twr. red

✓ X 9689 $_2^5$ ζ Centauri
Lines hazy.

✓ X 9691 $_2^4$ ζ Centauri
Lines double? Br. comp twr. red,

✓ X 9693 $_2^5$ π Scorpii.
Lines double? Br. comp. twr. violet?

✓ X 9694 ζ Centauri
Lines single

A.G.C. 18859 ✓ Hβ bright.
Image too faint to determine class

" 18819 ✓ B3A.

October 8, 1899.

✓ X 9695 $_2^4$ S.M.P. 4365 λ Crucis
Lines broad and hazy.

✓ β Crucis also on plate.
B1A.

✓ X 9696 $_2^5$ π Scorpii
Lines single.

✓ X 9697 $_2^4$ π Scorpii
Lines double? Not clearly separated

✓ X 9698 $_2^4$ π Scorpii.
Lines single.

✓ X 9699 $_2^4$ α Crucis.
Lines a little wide.
4026 appears to have a faint companion on the side of greater wave-length.

✓ X 9670 $_2^4$ θ Arae.
B.A. pec.

✓ X 9671 $_2^3$ β Indi.
K? Too thin.

October ~~8~~ 9, 1899. 0^h 05^m

✓ X 49673 $_2^4$ ζ Centauri June 20. 1899.
Lines single?

✓ X 49683 $_2^3$ π Scorpii
Lines double. Br. comp. twr. violet?
Companion lines not seen clearly at 4387 & 4471.

✓ X 49687 $_2^3$ π Scorpii.
Lines single? Hγ looks double, but 4387 & 4471 are single. Sp. on extreme edge of plate.

✓ X 49679 $_2^4$ α Gruis.
Lines wide.

✓ X 49688 $_2^4$ π Scorpii
Lines double. Br. comp. twr. red

✓ X 49690 $_2^4$ π Scorpii
Lines double. Br. comp. twr. red.

✓ X 49692 $_2^4$ π Scorpii.
Lines double. Br. comp. twr. red.

✓ X 97~~00~~ $_2^5$ ζ Centauri. June 24. 1899.
Lines single

✓ A. G. C. 18859 Hβ bright. Image ft. B3A? 4471 & 4387 seen

✓ " 18819 B3A.

October 9, 1899.

✓ X 49701 $_2^4$ π Scorpii. June 24. 1899.
Lines double. Br. comp. twr. violet.
Poor focus.

✓ X 49702 $_2^4$ π Scorpii June 25. 1899.
Lines double. Br. comp. twr. red.

✓ X 49703 $_2^4$ π Scorpii. June 25. 1899.
Lines double. Br. comp. twr. red.

✓ X 49704 $_2^5$ π Scorpii June 26. 1899.
Lines double. Br. comp. twr. violet.

✓ X 49705 $_2^4$ ζ Centauri.
Lines double. Separation slight.
Br. comp. twr. violet?

✓ X 49706 $_2^4$ ζ Centauri.
Lines double. Separation slight.

✓ X 49707 $_2^4$ π Scorpii.
Lines double. Separation not the greatest
Br. comp. twr. violet.

✓ X 49708 $_2^4$ π Scorpii.
Lines single?

October 9, 1899

✓ 49709, ^{4} δ Sag.
B3A.
Lines broad.

✓ 4$\overset{97}{\cancel{77}}$10. ^{3} S. M. P. 7009. ξ Telesc.
Ma.

✓ 49711 $_2^4$ π Scorpii June 27, 1899.
Lines single.

✓ 49712 $_2^4$ ζ Centauri.
Lines double.
Components appear equal in intensity.

49713 $_2$ π Scorpii (broken)

✓ 49714 $_2^4$ ζ Centauri
Lines double.
Components nearly equal. One tow. violet br.?

✓ 49715 $_2^4$ π Scorpii.
Lines single.

✓ 49716 $_2^4$ ζ Centauri.
Lines double. Separation slight
Br. Comp tow. violet?

October 9, 1899.

✓ 49717 $_2^4$ π Scorpii.
Lines double.?
Br. comp. tow. violet? Line 4387
has a ft. component on the edge
of gr. λ. the other lines look
hazy but do not show the fine
lines distinctly.

✓ 49718 $_2^4$ π Scorpii June 28, 1899.
Lines double.
Br. comp. towards red.

✓ 49719 $_2^3$ ζ Centauri.
Lines single? Too thin and poor.

✓ 49720 $_2^4$ π Scorpii.
Lines double Br. comp. tow. red

✓ 49721 $_2^{3c}$ ζ Centauri.
Too poor.

✓ 49722 $_2^4$ π Scorpii
Lines double. Br. comp. tow. violet

✓ 49723 $_2^4$ ζ Centauri.
Lines double. Br. comp. towards red

✓ 49724 $_2^4$ β Lupi.
Lines single.

October 9, 1899.

✓ X49726, 4 ζ Centauri
Lines double
Br. comp. towards red.

✓ X49727, 4 γ & β Arae
γ Arae. Lines hazy.

✓ β Arae — K or K2 M.

✓ X49728, 4 π Scorpii
Lines double?
Br. comp. tow. violet.

✓ X49729, 4 S.M.P. 6202 — Scorp.
B8A. Good image

✓ X49730, 3 S.M.P. 7009 ξ Telescop.
Ma

✓ X49731, 4 ε Cap.
ε Cap. (1) Peculiar double line of gr. λ than
4144.

✓
A.G.C. 29544 (2) F5 or 8 G.

October 9, 1899.

✓ X49732, 4 S.M.P. 3662. z Carinae
K.

A.G.C. 15269 ✓ 4481 = 1.5 (~~4471~~)
4387 is seen.
4128-4131 is as intense as 44~~7~~81.
K is seen, sp. hazy at this point.
Line seen of slightly gr. λ than
solar line 4227 and appears to be
the solar line 4233.

Like α Doradus?

✓ X49733, 4 S.M.P. 4365 λ Crucis
B3A. Lines hazy.

✓ β Crucis on plate
B1A? Image too dense.

X49734, 4 S.M.P. 4480 — Muscae
✓
S.M.P. 4480 1. K or K2 M.
Image faint.
✓
η Muscae S.M.P. 4470 2. B8 or 9 A. 4026 double.
✓
A.G.C. 17939 3. A.

October 9. 1899.

✓ X9735.^{4} S.M.P. 5625 ζ Triang. Aust.
S.M.P. 5625 + ✓ 1. F8G.

A.G.C. 22293 + ✓ 2. K or K5M.
Prob. K.

✓ X9736,^{4} S.M.P. 6202 – Scorp.
B8A.

X9737,^{0} S.M.P. 6857 (Broken)
ι Telescop.

✓ X9738 4 S.M.P. 3933 – Hyd.
Too thin. 2nd type

✓ X9739 4 S.M.P. 4522. ι Muscae
K2 or 5M
Image faint

✓ X9741,^{3} S.M.P. 6093. σ Arae
Image too faint 1st type

✓ X9742,^{4} S.M.P. 6124 λ Arae.
F5 or 8G. probably F5G.

October 9. 1899.

✓ X9743.^{4} S.M.P. 146. ρ Phoenicis
F5G? Focus poor.

✓ X9744.^{0} S.M.P. 216. ν Phoen.
~~F8G.~~ G.

✓ X9740,^{3} S.M.P. 5898 k Scorpii
Very poor Two exposures partly superposed. Orion type, but some lines appear double.

✓ X9745 $_{2}^{4}$ π Scorpii
Lines double. Br. comp. tow. violet.

✓ X9746 $_{2}^{5}$ ζ Centauri.
Lines single.

✓ X9747 $_{2}^{30}$ π Scorpii.
Lines double. Br. comp. tow. violet

✓ X9748 $_{2}^{4}$ π Scorpii.
Lines double. Br. comp. tow. violet.

✓ X9749.^{4} S.M.P. 6572 – Par.
A2F.

October 9, 1899.

A.G.C. 27237 ✓ X9750.^{3} S.M.P. 6979.
1st type. Too thin
Not S.M.P. 6979.

✓ X9751,^{3} S.M.P. 7168. γ Indi
Too poor.

✓ X9752,^{3} S.M.P. 3933. – Hyd.
K or K2 M.
Too thin.

✓ X9753,^{4} S.M.P. 4522 ι Muscae
K.

✓ X9754,^{4} S.M.P. 5625 δ Triang. Aust.
G or F8 G

✓ X9755,^{4} S.M.P. 6264 – Scorp.
K.

✓ X9756,^{3} S.M.P. 6276. – Scorp.
Ma. Thin image.

✓ X9757,^{3} S.M.P. 7009. ξ Telescop.
Ma? very thin.

✓ X9758,^{4} ε Cap.
ε Cap. 1, B3A pec.
A.G.C. 29544 2. F5 G.

October 9, 1899.

✓ X9759,^{4} S.M.P. 4365 λ Crucis
B3A. Lines broad & ill-defined

✓ β Crucis also on plate.
B1A. very dense.

X9760,^{2} S.M.P. 5282 – Lupi
Too poor.

Tuesday October 9. 1899. 21h 30m

√ X49761, 3 S.M.P. 6264. – Scorp.

K? Image too thin.

√ X49762, 4 S.M.P. 6124. λ Arae

Too poor.

A5F or F or F5G.

Hyd. lines strong, solar lines all out of focus.

√ X49763, 3 ~~Ar~~ S.M.P. 6857. ι Telescop.

K? Poor focus

√ X49764, 3 S.M.P. 7168. ζ Indi.

Too poor. 2nd upper

√ X49765, 3 S.M.P. 7573. ν Tucanae

mb.

√ X49766, 4 S.M.P. 4522 ι' Muscae

K.

X49767, 4 S.M.P. 4467 – Cent.

√ S.M.P. 4453 1. B8A

√ S.M.P. 4467 2. F8G.

October 9. 1899.

√ X49768, 4 S.M.P. 5486. ι' Normae

A3F? very poor.

X49771, 4 S.M.P. 6661. ε Coron. Aust.

√ S.M.P. 6661 ε Cor. Aust. 1. F?

√ A.G.C. 25886. 2. B8A. focus poor.

√ X49769, 4 S.M.P. 5898. κ Scorp.

Hβ double, or dark with a thin bright line superposed.

4649 looks double.

Peculiar spectrum. Like A.G.C. 22297

A line having slightly greater λ than 4543 (Hβ') is seen

√ X49770, 3 S.M.P. 6019. – Scorp.

B8A.

Wednesday, October 10, 1899 23h

✓ X 9725 $^{4}_{2}$ π Scorp (broken)
Lines double Br. comp. towr. violet

✓ X 9713 $_{2}$ π Scorp broken
Lines single.

Thursday, October 11, 1899 22h 40

X 9113 ; ι Crucis (re-examined for fainter stars)

ι Crucis K

A.G.C. 17472 ✓ A or A2F. Solar lines are seen but the focus is poor. The spectrum may resemble ζ Puppis in having peculiarly well-marked solar lines

✓ " 17504 A?
K line as in A stars
Solar lines faintly seen.

" 17518 ✓ & other stars. Identified by Miss Wells as η Crucis and other stars superposed. B3A is the type of the brightest image. Some fainter lines may belong to the superposed stars

" 17270 On the plate from Hβ to beyond Hζ.
Image is as bright as that of ι Crucis.
Hβ is ~~broad~~ double. Hζ is nearer the edge of the plate than Hβ but shows no doubling

" 17411 β Crucis. Too dense.
So black that no lines are seen.

October 11. 1899.

49266,^{4} ι Crucis
K

ι Crucis A.G.C. 17472 ✓ sharp lines. Class A. Sp. may resemble α Doradus in the intensities of some of the solar lines.

" 17504 Sp. A.

" 17518 and other stars superposed. Brightest spectrum appears to be B3A, numerous faint lines seen which probably belong to adjacent spectra

Friday, October 13, 1899.

✓ 49821,^{4} S.M.P. 6202 – Scorp.
B8A.

49819,^{2} S.M.P. 5282 – Lupi.
Bright line Leak.?
This 2nd type image on plate

✓ 49818,^{4} S.M.P. 4470 η Muscae
B8A?

✓ 49817,^{4} S.M.P. 4422 f Centauri

f Centauri 1. B3A with 4481 almost as intense as 4471. 4128-4131 are not seen as distinctly as in B5A stars This is a good image

✓ ξ^{1} Centauri 2. A

✓ ξ^{2} Centauri 3. On the plate from λ4144 to end of shorter wave length, excellent image. B3A.

✓ 49816,^{4} S.M.P. 216. ι Phoen.
G or F8G

✓ October 13, 1899.

X 49815, 4 S.M.P. 146. ρ Phoen.
F or F5G. Focus not good.

✓ X 49814, 3 S.M.P. 6264 – Scorp.
K. Image very thin.

✓ X 49813, 4 S.M.P. 6093. σ Arae
A

✓ X 49811, 4 S A.G.C 20695 – Circini.
A.G.C. 20695 The following dark lines are present
$H\beta$, 4685, 4649, 4543, 4471, $H\gamma$, 4200, $H\delta$,
4089, 4026, $H\varepsilon$
4543 + 4200 are equal in intensities.
4026 is twice as intense as 4200 or 4543. This is probably due to the presence of the Orion line 4026. 4649 looks hazy or double.
4685 is well-marked.

" 20649 ✓
δ Circini. Like A.G.C 20695 except that 4387 is here distinctly seen, and 4089 is fainter than in A.G.C 20695.

October 13, 1899.

✓ X 49811 (contd)
A.G.C. 20640 B3A.

✓
" 20775 F8G.

X 9810, 2 A.G.C. 22297. – Normae
Too poor.

✓ X 49833 4 θ Gruis.
F5G.

✓ X 49832, 4 S.M.P. 6093. σ Arae
A.

✓ X 49831, 3 S A.G.C. 22297. – Normae
Too poor.
$H\gamma$ double? or a ~~narrow~~ less intense line is present on the side of greater wave-length

October 13, 1899.

✓ A.G.C. 20695 X 9829,^{4} A. G. C. 20695 – Circini
Like ε Canis Majoris or nearly like it.

✓ " 20649 Lines a little hazy. Same lines present as in A. G. C. 20695.

✓ " 20640 B 3 A? Poor image.

✓ " 20775 F 5 or 8 G.

✓ S. M. P. 4453 X 9828,^{4} S. M. P. 4453. – Cent.
B 8 A? Focus poor.

✓ " 4467. F 8 G.

X 9827,^{21} γ Sculptoris
2nd type.
Too poor.

✓ X 9834,^{3} γ Sculptoris
R.

October 13, 1899.

Unidentified Mch. 27. 1900. X 9826 θ Gruis. Identify.
1st type. Focus too poor to show the fine lines.

X 9825 ^{2} ε Indi. (Not ε Indi)
Too poor.

✓ X 9824,^{3} η Pavonis.
Too poor.

X 9861,$_{2}^{5}$ η Centauri and β Lupi } on same plate by mistake

✓ η Centauri
Hβ dark with a bright edge on side of greater wave length.

Orion lines double.

✓ β Lupi
Lines single, slightly hazy.

Saturday, October 14, 1899. 0h 35m

√ X9841, 4 ι Phoenicis.
A.
Very poor. Little seen except the lines of hydrogen and the line K.

√ X9824, 3 κ Pavonis.
Too poor? 1st type. A or A2 F.
Probably not κ Pavonis, which is F8G?

√ X9823, 4 S. M. P. 337 φ Phoen.
B9A or A.
Image poor. K > 4026.

√ X9822, 3 S. M. P. 142 λ Hyd.
Very poor. 2nd type.

√ X9845, 4 o Lupi.
B5A.

√ X9844, S. M. P. 4480 – Muscae.
K
Image thin Hγ nearly = 4826.

October 14 1899.

√ X9843, 3 S. M. P. 220 ζ Tucanae.
F5G?
Focus too poor to show solar lines well.

√ X9842, 4 S. M. P. 146 ρ Phoenicis
F5G.

√ X9840, 3 A Capricorni.
Image too faint.
K?
Red end extended and spectrum may be Ma.

√ X9839, 3 c Sag.
Mb.

√ X9838, 3 ν2 Sag.
Two images. Of ν1 Sag?
~~Images too thin.~~
Both have spectrum of 2nd type.

√ X9837, 4 k Hydrae
K5M

√ X9836, 4 S. M. P. 4470 η Muscae.
B8A.

October 14, 1899.

√ 49835^{4} S. M. P. 337. φ Phoen.
B9 A or A.
Line K is very faint, but 4026 is not distinctly seen.

√ 49869_{2}^{5} π Scorpii.
Lines single, well-defined.
Spectrum clearly B2 A.

√ 49868_{2}^{5} β Lupi.
Lines single, Sp. B2 A.

√ η Centauri is on the edge of plate.
B 3 A. Sharp lines.

√ 49867_{2}^{5} ζ Cent.

Lines single but slightly hazy.

√ 49866_{2}^{5} α Gruis.
B5-8 A.
Lines wide. Double?

October 14, 1899.

√ 49865_{2}^{5} α Pavonis
B 3 A.

√ 49864_{2}^{4} α Arae
Hβ doubly reversed. The bright Hβ has a faint dark streak running through it.
Hγ very wide and hazy.
Orion lines wide

√ 49863_{2}^{4} α Arae
Image thin.
Hβ appears doubly reversed.
Hγ wide and triple.
Orion lines wide too double.

√ 49862_{2}^{4} π Scorpii.
Lines double. Br. comp. twr. red,

√ 49860_{2}^{4} α Arae
H~~γ~~β is doubly reversed.
Hγ consists of a wide hazy dark band on which is superposed a faint bright band, which has a dark line superposed on it. Thus Hγ dark looks triple & Hγ bright double. Other hydrogen lines are wide. λ4387 appears double.

October 14, 1899.

✓ X 9858,$^{5}_{2}$ ζ Centauri.
Lines double, separation slight
Bo. comp. towards red.

✓ X 9856,$^{5}_{2}$ ζ Centauri.
Lines single.

✓ + X 9855, 4 S.M.P. 5625 ζ Triang Aust.
G.

X 9857, 4 A.G.C. 1931 Identify.
A?

✓ X 9850, 3 η Sculptoris
Mb?

✓ X 9849, 4 A.G.C. 3195 — Phoen.
A2F.

✓ X 9848, 3 ε In~~d~~di.
K5M.

✓ X 9847, 4 α Micros.
G5-K.

October 14, 1899.

X 9846, 4 g Lupi.

f Lupi. ✓ 1. F5G.

d Lupi. ✓ 2. B3A.

✓ X 9809, 4 ε Cap.
B5A.
Line bet. 4387 + 4471 more intense
than in ordinary B5A stars.
Orion lines hazy, hyd. lines intense

✓ X 9805, 4 k Scorpii.
Peculiar.

✓ X 9808, 3 S.M.P. 7009. ξ ~~Phoen.~~ Telescop.
Southern
2nd type, or 3rd type.

✓ X 9807, 3 S.M.P. 6857. ι Telescop.
K.

✓ X 9806, 4 S.M.P. 6019. — Scorp.
B8A, but 4387 is somewhat
more intense than in γ Grus.

October 14, 1899.

√ X 9802^{3} S.M.P. 337. φ Phoen.
very poor. Sep images partly superposed.
B8A, B9A or A.

√ X 9801,^{3} γ Phoen. S.M.P. 216.
G.

√ X 9800,^{4} ε Cap.
B5A. Slightly peculiar.
Orion lines very broad.

√ X 9799,^{4} S.M.P. 6202 – Scorp.
B8A.

√ X 9798,^{3} S.M.P. 5980. ζ Ap.
~~Not~~ A? Too thin.

√ X 9797,^{4} S.M.P. 5625 ζ Tri. Aust.
G. Good image.

X 9796,^{1} S.M.P. 4480. – Muscae.
nothing seen.

October 14, 1899.

√ X 9795,^{3} S.M.P. 220 γ Tucanae.
Too poor. F5 or G.

√ X 9794,^{3} S.M.P. 142 λ Hydri.
Probably Ma.

√ X 9793,^{3} S.M.P. 7009. ξ Tel.
Too thin. 2nd or 3rd type.

√ X 9792,^{3} S.M.P. 5980. ζ Ap.
K.

X 9791,^{2} S.M.P. 5282, – Lupi.
Too poor. 2nd type?

√ X 9789,^{4} ζ Cent.
Lines single, well-defined.

√ X 9788,^{4} π Scorpii.
Lines double. Br. comp. tow. violet.

October 14, 1899.

✓ X 49787, 4 π Scorpii.
Lines double. Br. comp. trov. rel.

X 49786, 2 S. M. P. 369 χ Phoen.
Too poor, 2nd type.

✓ X 49785, 3 S. M. P. 146 ρ Phoen.
F5G. fair plate.

✓ X 49784, 3 S. M. P. 142 λ Hyd.
Ma

X 49783, 2 S. M. P. 6276. - Scorp.
Too poor 2nd type.

✓ X 49782, 4 S. M. P. 5625 γ Tri. Aust.
G. Excellent plate.

✓ X 49781, 2 S. M. P. 4521. m Cent.
G5K

October 14, 1899.

✓ X 49780, 4 S. M. P. 4453. - Cent.
S. M. P. 4453 1. B8A.
S. M. P. 4467. ✓ 2. F8G.

✓ X 49779, 4 S. M. P. 6093 o Arae
A.

✓ X 49778, 4 S. M. P. 6202 - Scorp.
B8A.

✓ X 49777, 4 S. M. P. 5486 ι Normae
A3F.

✓ X 49776, 4 S. M. P. 4480. - Muscae
K? Too thin.

✓ X 49775, 4 S. M. P. 4422 f Cent.
B 1/3 A, with line 4481 about as in B5A. Lines 4120 & 4128-4131 are both faint and hazy.

✓ X 49774, 3 S. M. P. 7573 ν Tucanae
Mt

Friday, October 19, 1899 $21^h 30^m$

A.G.C. 21469 ✓ + X 9654 $^{2.4}$ b Scorpii
B 3 A.   Image thin

" 21521 ✓ + A Scorpii also on plate.
B 3 A.   Image thin.

X 9655 $^{2.4}$ b Scorpii
" 21469 ✓ + B 3 A.

" 21521 ✓ + A Scorpii
B 3 A.

Friday October 20, 1899 1^h

✓ X 9758, 4 = Cap.
Orion lines broad and hazy. This spectrum resembles that of η Centauri and ζ^1 Apodis in showing the hydrogen lines much better defined than the Orion lines. Hβ also appears to vary in intensity on the different plates of this star.

C 12017   β Lyrae   Isochrom
Bright line in the red is seen having slightly shorter wave-length than D^1_2 in α Orionis C 11802 and this bright line is probably D^3 due to helium

C 12035.   β Lyrae
Bright line in red which appears to be D^3.

October 20, 1899.

C 12039 β Cephei Dso
C 12046 α Virginis "
C 12059 " " "
C 12038 β Cephei "
C 12037 β Scorpii "
C 12020 α Virginis "
C 12033 β Cephei "
C 12032 α Virginis "

The ~~above~~ plates named above do not show the dark line D^3 at wave-length 5875. This region is included very faintly in these photographs and if the line is present, it is too faint to be seen.

Saturday, Oct. 20, 1899 21h 30m
~~[illegible]~~

Measures of ft. lines in red end of spectrum of α Crucis. X 8997.

Image 1.

Hβ	0	
4922	4.8	
3	10.9	
4	11.7	
6	13.8	
8b	50.9?	
8d	52.8?	
D3	57.9	Bottom of spectrum measured.

Image 2

H.β	0	
4922	4.8	
3	10.6	very ft.
4	11.6	
6	13.8	
8a	49.9	
8b	50.7	
8c	51.9	
8d	52.8	
D^3	58.8.	

October 20, 1899.

Measures of lines in red in θ Carinae

X 9184

Hβ 0

4.6

11.1

35.9

48.6?

49.2

Monday, October 22, 1899.

X 49731 ε Cap. (for iden. of lines)

A fine double line is seen of greater wave-length than 4144.
Superposing this plate on the spectrum of A.G.C. 14295 X 49249, the double line in ε Cap. coincides with the double solar line 4172.4179 This line is well-marked in α Cygni, ζ Puppis, and δ Canis Majoris.
ε-Capricorni may be composite type, or may be a spectroscopic binary.

X 9899 ε Cap.
Lines 4415.1 - 4417.5 are well-marked,

October 23, 1899 0h

X9805. k Scorpii (for iden. of lines)

This spectrum appears to resemble that of ζ' Scorpii in the intensities of the ~~fain~~ fainter Orion lines. It is difficult to compare the lines in k Scorpii with those in ζ' since the dispersion differs on the plates taken noon.

Lines seen in k Scorpii (X9805)

Hβ very faint
4649 } a double, almost equal
4641 }
4553.4
4568
4576.
4481
4471 ← 4415
4387 4417
4350, = 1/2 Hγ.
Hγ
Other lines faint. Image thin.

Tuesday October 24, 1899 1h 45m

List of stars down to magnitude 5 not yet photographed and those not satisfactorily photographed.

Not photographed		Not satisfactory	
S. M. P	1066	~~S. M. P.~~ Plate 9894 taken	~~369.~~
"	1214	"	1685
"	1293	"	2313
"	1310	"	2849
"	1388	"	3308
"	1416		
"	1649		
"	1775		
"	1943		

Thursday October 26. 1899   0h

Measures of length of spectrum from Hβ to Hε.
Scale D 1339.

X 7905	α Lyrae		3 prisms
Hβ - Hε		148.8	
		148.7	
X 8089	α Pav.	148.5	"
X 7945	β Orionis	148.5	

$2\overline{)148.6}$
74.3

1 division on scale = 1/2 mm.

∴ the spectra on plates taken with one prism are 22.4 mm
" " " " " two " " 48.6 "
" " " " " three " " 74.3 "
from Hβ to Hε.

October 26, 1899.

Measures from Hβ to Hε   Scale D 1339

X 6293	γ Cent.	45.0	1 pr.
X 5268	α Pav.	44.8	"
X 6280	θ Car.	44.9	"
X 7364	β Crucis	45.0	"

$2\overline{)44.9}$
22.4

X 8203	γ Can. Maj.	$9\overset{7}{5}.2$	2 pr.
X 8361	β Crucis	97.4	"
X 8651	θ Arae	97.1	"
X 8407	θ Car.	97.4	"

$2\overline{)97.3}$
48.6

October 26. 1899
Measures of width of spectra.

X7364 β Crucis 1 pr. 13.0 ~~mm~~

X8407 β Car. 2 p. 9.0 ~~mm~~

X7945 β or. 3 p. 21.1

X8361 β Crucis 2 pr. 15.4

Friday October 26. 1899 ~~Wednesday~~ 21h 35m

Measures of separation of the lines in π Scorpii.
Scale divided to hundredths of an inch.

✓ X9543
Lines double. Br. tow. violet.
λ4387 Br.- to fr. = ~~1~~ 1.0 scale div.
Ft. line seen poorly.
The doubling on this plate is seen at lines 4387 and 4471. Other lines are wide and hazy.

✓ X9534
Lines wide, and more intense on the edge of greater wave-length.

Width of line 4471 = 0.6
Measure made from centre of broad edge of greater wave-length.

✓ X9572
Lines double. Br. comp. tow. red.
Doubling well seen on all Orion lines.
λ4471 Br.- fr. = 1.0

✓ X9552
Lines single, slightly hazy
width of 4471 = 0.5

October 26, 1899.

√ X9659.
Lines double. Br. tow. red.
Sep. = 1.2 (λ4471)
Extreme edges of lines measured.

√ X9657
Lines single, slightly hazy.
width of 4471 = 0.5

√ X9643
Lines double. Br. tow. violet.
λ4387 Sep = 0.9

√ X9701
Lines double. Br. tow. violet.
Plate poor and lines are too hazy to measure satisfactorily.
Two images & both show double lines.

√ X9698
Lines single, slightly hazy,

October 26, 1899.

√ X9683
Lines double. Br. tow. violet?

√ X9672
Lines single, well-defined at 4387 & 4471,

√ X9667
Lines single well-defined.

√ X9664
Lines double. Br. tow. red.
Sep = 0.8 at 4471

√ X9663
Too poor. Lines double?
Br. tow. violet?

√ X9693
Lines hazy.
4387 = 1.0 wide.

√ X9692
Lines double. Comp. close.
Sep. 4471 = 0.5 Br. tow. red.

√ X9690
Lines double. Br. tow. red.
Sep. 4471 = 0.5

October 26, 1899

✓ X 9688
Double. Br. twr. red.
Sep. 4471 = 0.9.

✓ X 9687
Double? Br. twr. red?
Plate poor.

✓ X 9708
Lines single, somewhat broad.

✓ X 9707
Lines hazy.
More intense on edge of ~~λ~~ shorter λ?

✓ X 9704
Double. Br. twr. violet.
Sep 4387 = 0.9.

✓ X 9703
Double. Br. twr. red.
Sep. 4471 = 1.2

✓ X 9702
Double. Br. to red.
Sep 4387 = 1.1

October 26, 1899.

✓ X 9699 α Crucis.
Single. Image dense

✓ X 9697
Lines broad. Stronger on edge
of greater wave-length

✓ X 9696
Single, fairly well-defined

✓ X 9722
Double. Br. comp. to violet.
Sep. 4387 = 0.8

✓ X 9720
Double. Br. comp to red.
Sep. 4387 = 0.9
" 4471 = 0.9
Lines sharp & distinct.
X 4471, 4387, 4144, 4120, 4026, 4009 double

✓ X 9718
Double. Br. comp to red
Sep. 4387 = 0.8

✓ X 9728
Lines double. Br. to violet.
Sep. slight. Doubling not seen
distinctly at 4471, but is seen at 4387
4144, 4120. Sep. 4387 = 1.9

October 26, 1899.

✓ x 9717
Double ? All lines broad,
4387 looks double, with br.
comp. towards violet.

✓ x 9715
Single, ~~somewhat~~ slightly hazy.

✓ x 9711
Single well-defined.

✓ x 9869
Single, well-defined.

✓ x 9862.
Double. Br. comp. to red.
Sep. 4387 = 0.5

✓ x 9788
Double. Br. to violet
Sep. 4387 = 0. 8.

✓ x 9787
Double. Br. to red.
Sep. 4471 = 0.7

✓ x 9748
Double. Br. to violet.
Sep. 4387 = 0.9

October 26, 1899.

✓ x 9747
Double. Br. to violet.
Sep. 4387 = 1.0

✓ x 9745
Double. Br. to violet.
Sep. 4387 = 0.8
All principal Orion lines and H γ double.

Saturday, October 28. 1899 1h 10m

√ X8574 α Arae
(One of my missing plates)
Hβ is doubly reversed. It consists of, first, a very wide hazy dark band on which is superposed a bright band. This bright Hβ as superposed on bright Hβ of δ Centauri X8295, appears to be 0.7 as bright as Hβ in δ Centauri. Superposed on this bright Hβ is a narrow dark line.
The dark Hβ is visible on each side of the bright Hβ. The dark Hβ which is doubly reversed is faint and narrow but distinctly seen.

Other lines seen
λ4712 dark, somewhat wide.
Faint bright lines or bands between 4712 and 4481. These are the same bright bands seen in μ and δ Centauri. Line 4553 is here also faintly seen as a dark line superposed on a faint bright band. At least 4 bright bands are seen between 4712 and 4481.

λ4481 ft. and dark.
λ4471 intense wide.

October 28, 1899.
X8574 α Arae (cont.)
λ4387 wide.

Hγ. triple or double reversed, consists first of a very wide hazy dark band second, of a bright band superposed on the dark one, third, of well-marked, sharp, dark line dividing the bright band into two distinct bright lines. This is the best example of the double reversal of Hγ seen on any plate yet taken of α Arae. It resembles the line H~~γ~~β in η Centauri on X9510 except that the broad dark band in α Arae is faint in η Centauri, and the central dark line of double reversal is stronger in η Centauri.

λ426~~8~~7 dark
A ft. dark line of shorter λ than 426~~8~~7 which is superposed on a faint bright band. Probably same line as seen in μ Cent. λ4232, See Book V, p. 9.

Tuesday, October ~~28~~ 31, 1899. 0^h -

✓ x8574 α Arae (cont.)
Several ft. hazy dark lines seen between 4232 and 4144.
λ4144, dark wide and hazy.
4128-4131 barely seen
4120 = 1/3 (4144)

Hδ dark shows no brightness.
The dark Hδ appears to consist of a fairly well-marked line superposed on a hazy dark band.
4026 & 4009 dark and wide.
Hε dark and broad does not show the decided line seen in Hδ.

✓ x~~8792~~ 8500, 4 α Arae
(Another missing plate.)
Hβ very ~~complex.~~ bright with ~~two~~ a well-marked dark band on each side and with a faint dark line running through the bright line.
Hγ triple with bright spaces.
Other hydrogen lines broad.
Orion lines almost double.

October 31, 1899.

✓ x8792 α Arae.
The broad dark bands on sides of greater and shorter wave-lengths of the bright Hβ appear distinctly double especially the one towards violet.
Lines 4471 and 4387 are double.
Hγ is complex. It appears to consist ~~first~~ of a wide, hazy, dark band on which are superposed 3 distinct dark lines. The spaces between the dark lines do not appear any brighter than the continuous spectrum.
There is a faint dark line on the bright Hβ.
Other Orion and hydrogen lines look double.

October 31, 1899.

X6266 γ Vel.
X5708 δ Scorpii } superposed for estimating wave lengths of centres of bright bands.

Centre of band 4633 in γ Vel. has slightly greater λ than the dark line 4649.2 in δ Scorpii. Rough estimate gives the centre of this band the wave-length 4655.

Centre of band 4688 in γ Velorum has a very slightly greater wave-length than dark line 4685 in δ Scorpii. Roughly, the ~~one~~ wave-length 4688 appears nearly right for this band

X6155 ζ Puppis
X5708 δ Scorpii } superposed

Band 4633 in ζ Puppis lies greatly towards end of shorter wave-length from line 4649 in δ Scorpii. As superposed on X θ Arae, this band nearly coincides with line 4630
Band 4688 is near line 4685 in δ Scorpii

October 31, 1899.

X6266 γ Vel.
X6155 ζ Puppis.

The band 4633 in ζ Puppis comes at the extreme greater wave-length of the intense bright band in γ Vel. Band 4688 is about same in both stars.

X6155 ζ Puppis
X4512 A.G.C. 8631
Band 4633 in ζ Puppis is at extreme edge of ~~shorter~~ greater λ of band in A.G.C. 8631.
Band 4688 (that is, the centre) is practically same in both stars

Hence it seems that band 4688 is the same in these stars except for varying width and intensity.
Band 4633 either shifts greatly both towards red and violet, or the bands near this wave-length are due to different causes. In A.G.C. 8631 the band centre at about 4614; in ζ Puppis at 4633.3 in γ Velorum at 4655.

Thursday, November 2, 1899 1h 30m

Measures of lines in ζ ~~Eridani~~ Orionis 47978 from Hε to Hδ

			Intensity	
39~~70.2~~64.6	3964	0	5	3964.6 + 4.3 r.
3970.2	Hε	1.3	30	3970.2
		4.1	1	3982.2
3994.9	3994 ~~4009~~	7.2	5	3995.6
4009.5	4009	10.8	20	4011.0
4026.4	4026	14.4	25	4026.5
		16.2?	1	4034.3
4036.0		16.6	2	4036.0
4042.2		18.0	2	~~4037.7~~
		18.5	1	4039.8
4069.4		24.2	3	4068.7
4072.0		24.8	3	4071.2
4075.9		25.7	3	4075.1
		27.2	1	4081.6
		28.6	1	4087.6
		29.1	1	4087.7
4101.8	Hδ	31.2	30	4098.8

November 2, 1899

Measures of lines in ζ Orionis 47978

Measure Int.

		Hε ~~HΣ 0~~	measure from p.152 when Hε = 0		Mean	3970.2 + 4.3 r	Resid.
3970.2	Hε	0	0	30	0	3970.2	0
		3.1	2.8	1	2.95	3982.9	
3994.9		5.9	5.9	5	5.9	3995.6	+0.7
4009.5		9.2	9.5	10	9.35	4011.2	+1.7
* 4026.4		13.2	13.1	20	13.15	4026.7	+0.3
		14.5	14.9	~~½~~ 1	14.7	4033.4	
4036.0 ?		15.1	15.3	2	15.2	4035.6	−0.4
4042.2		16.5	16.7	2	16.6	4041.6	−0.6
		17.1	17.2	1	17.15	4043.9	
4069.4		22.9	22.9	3	22.9	4068.7	−0.7
4072.0		23.5	23.5	3	23.5	4071.2	−0.8
4075.9		24.2	24.4	3	24.3	4074.7	−1.2
		26.1	25.9	1	26.0	4082.0	
		27.0	27.3	1	27.15	4086.9	
		27.9?	27.8	1/2	27.85	4090.0	
4101.8	Hδ	29.9	29.9	30	29.9	4098.8	−3.0

3970.2	0	0	3970.2
4026.4	13.2	52.8	3973.6
4101.8	29.9	119.6	3982.2

	λ	Scale
*	4036.0	15.2
	4026.4	13.2
2.0	9.6	2.0
1 scale =	4.8 λ	
	1.5	14.7
	7.2	13.2
		1.5

4026.4
7.2
4033.6

4069.4
4042.2
6.3) 27.2 (4.3
25.2
200
189
3.2

22.96
16.6
6.43

1 scale = 4.3 λ

17.2
16.6
0.6
4.3
2.58

4042.2
2.6
4044.8

Friday, November 3, 1899 $1^{h}45^{m}$

Table showing the class of typical stars of Part I of Vol. 28 according to my classification given in Book VII. J. 199 is incomplete in groups VIII - IX ac, IX a, IX b.

C 425 δ Urs. Majoris.
A $\overset{2}{3}$ F, wide lines.

C 6546 γ Boötes
A5F

C 2354 β Trianguli
K = 0.8 H = 1.2 Hδ
Solar lines numerous but faint

C 1839
A 2 or 3 F, broad lines

C 2526 δ Urs. Majoris
A2F

C 6641 γ Boötis
A5F

C 6161 β Trianguli
A5F

November 3, 1899.

C 2707 δ Urs. Majoris
very faint. A 2 F, broad lines

C 2882
No lines clearly seen except 4026 & the hydrogen, and traces of 4471 & 4481.

C 3076 η Aquarii
B 8 A

C 6277 η Aquar. 2 pe,
Orion lines barely visible.
4026 seems more intense than K.
B8A, lines broad.

C 2522 τ Arges.
very poor. A 2 F or A.
No lines clearly seen except hydrogen lines and the line K.

C 5995 α Aquilae.
K = 0.8 H
K = Hδ.
Solar lines somewhat broad

Saturday, Nov. 3, 1899   22h

C 2790   ζ Aquilae
K = (1.1) H = 1.7 Hδ

Sp. A

C 5886   o Herculis
A broad lines.

C 3027
A   o Hercules

C 2796   ζ Aquilae
A broad,
Solar lines very faint.

C 5879   +H ζ Aquilae
A, broad lines.

C 2027   α Piscis Aust.
A3 F

C 663   α Pis. Aust.
A3F!   Lines hazy.

C 584   α Aquilae
Lines very broad
A5F

Nov. 3, 1899

C 6157   τ Argus.
Same peculiar intensities of lines seen as in α Cygni, but the solar lines are fewer.
Class A peculiar sharp lines.

C 6604   τ Argus
Very nearly like α Cygni compared with C 5929. The differences appear to be due to the different magnitudes of the two stars.

C 2506   γ Crateris
K = 0.8 H = 0.9 Hδ
Solar lines numerous and somewhat broad.
A5F.

C 1417   δ Aquilae
F.

C 2565   γ Virginis
K = 1.1 H = 2. Hδ
Solar lines faint.

C 1072   γ Virg
F.

Nov. 3. 1899.

C2544 {
C2566 { γ Bootis

Too poor. A5F or F.

C758 22 Androm.
F pec.
Very much like α Circini.

C2524 ζ Leonis
F or F2G

C1747 ζ Leonis
F

C2553 $\overset{\nu}{\chi}$ Urs. Majoris.
F2G.

C2243 α Leporis
F sharp lines.
Exactly like X6443 ν Carinae and therefore like α Carinae

Monday, Nov. $\overset{6}{4}$, 1899. 0^h

C1738 ζ Canis Majoris

B3A with 4120 a little less intense and 4128-4131 somewhat more intense than in α Pavonis. Lines broad.

X4491 { ζ Canis Maj. show very
X6161 { well. defined lines!

X8203 shows lines a little broader but not broad enough to have remark 18 entered.

C1710 ~~η Aquilae~~ η Gem.
G5K?

C1451 η Aquilae
F8G? pec.
Superposed on C2245 δ Canis Maj. and no differences that seem real are observed.

Nov. 6. 1899

C Z86
χ' Orionis
Sp. G.

C 1773 β Virginis
F8 G. good example.

C 3273 χ' Or.
G.

X 9324 $\overset{k}{\kappa}$ Scorpii }
X 450$\overset{5}{\cancel{0}}$8 ζ' Scorpii }

These two spectra appear to be alike in general intensities of Orion lines. k Scorpii like ζ', shows lines 3994.5 and 4350 well-marked, and 4009 faint. Plates of k Scorpii do not show the lines narrow and sharp as in ζ', in fact the lines look double on X 9324, but the variation of intensity from the normal star β Cent. appears to be the same in k Scorpii as in ζ'.

Monday, Nov. 13, 1899 3h 45m

C 2220 δ Gem.
F. good example

C 2597 δ Gem.
F excellent example.

Both of these plates show narrow lines and are more nearly like Sp. F than γ Bootis

C 5132 35 Cygni
Poor plate, lines not in good focus. Appears to resemble β Doradus.

Monday, Nov. 19, 1899   21st

Ft. lines bet. 4712 + Hβ

X8115	ζ Orionis.	Lines not seen
X8739	λ Scorp.	" " "
X8093	α Erid.	" " "
X9201	α Muscae	" " "
X8940	ε Can. Maj.	Lines seen.
X9189	α Lupi	" "
X9203	δ Scorp.	Lines not seen.
X7647	σ Sag.	" " "
X9197	δ Cent.	" " "
X8926	α Erid.	" " "
X8743	δ Scorp.	Image too poor.
X8092	α Gruis	Lines not seen.
X8955	η Can. Maj.	" " "
X8084	α Gruis	" " "
X7638	α Crucis	" " "
X8407	θ Carinae	" " "
X8997	α Crucis	Not distinctly seen

Nov. 19. 1899.

Measures of line "X" in ε, δ + ζ Or.

X8119 superposed on α Aurigae X8109.
For ε Orionis.
α Aurigae Sp. above.

"X" corresponds w. line 5587-5589 in
α Aurigae.

ε Orionis spectrum ~~n. f.~~ above.
"X" falls near line 5598. but can
not be accurately determined from
this edge, as the image is poor.

For δ Or.
α Aurigae above
"X" falls on line 5587-5589

δ Or. above
"X" appears to fall on line 5594 but
the line "X" is curved on this
side + its exact coincidence with
any other line is hard to determine

Nov. 19, 1899.
Position of line "x" in ζ Orionis.

α Aurigae above
"x" nearly falls on 5587–5589

ζ Orionis above
"x" has slightly shorter wave-length than 5595.94, and is approximately at wave-length 5592.

Position of line "y" in δ Orionis

δ Orionis above
bright "y" corresponds to space bet. 5688.5 and 5701.9

α Aurigae above
bright "y" not well seen at this ~~end~~ edge of spectrum of δ Orionis.

Nov. 19, 1899.
Line "y" in ζ Orionis

α Aurigae above
Line "y" comes between 5688.5 & 5701.9

5688.5
5701.9
2) 13.4
6.7

5688.5
6.7
5695.2

ζ Orionis above
Line "y" comes between 5688.5 & 5701.9

Tuesday Nov. 20, 1899 $22^h 30^m$

Lines in red in spectra of classes A, A2 F

X8736 ε Sag.

Superposed on X8729 α Scorpii. Only one line seen distinctly in red ε Sag. and that ~~appears to be~~ is the b line, and appears to be the lines 5167 & 5172. It is not clearly separated.

X9196 ε Sag.

Numerous faint lines appear in the red. They are not sharply defined enough to identify with solar lines on X8729. Lines 5167 & 5172 seen together are the most intense. These lines match lines in δ Canis Maj. & much better than those in α Scorpii. δ Canis Maj. is probably nearer like the solar spectrum. There is no isochromatic plate of α Aurigae of this dispersion.

Nov. 20, 1899.

α Scorpii X9195

Lines in red ~~almost~~ resembles those in δ Canis Majoris except that they are less intense and less narrow. This shows that α Scorpii will not do to use in identifying lines in red in classes A, A2 F, A5 F.

Thursday, November 22, 1899 22^h

X 6367 η Carinae Chart plate.

η Carinae has a star near it, so it appears double. This star is not given in the A. G. C. nor in the cluster numbers at the back of the A. G. C. It is fainter than A. G. C. 14723 which is 9 mag. Miss Wells estimated the companion of η Carinae as about 10 mag by comparing it with an adjacent star of the 9¾ mag. Is this star bright enough to give the bright lines in the spectrum of η Carinae? On X 6480 and other plates of η Carinae taken with very narrow images the spectrum of A. G. C. 14273 is distinctly seen alongside of the spectrum of η Carinae. In the spectrum of A. G. C. 14723, the lines Hγ and Hδ only are distinguished. Could a star one magnitude fainter than A G C 14723 give lines as bright as those in η Carinae? If so, the composite character of the spectrum of η Carinae might be accounted for.

Nov. 22, 1899.

X 6592 η Carinae.
Dark lines hardly visible.

X 6480 η Carinae
Dark lines appear as edges of bright bands and are on the edge of shorter wave-length of the bands.

Friday, Nov. 30, 1899. 23^h

X 4999 [illegible] d Oph.
X ~~618~~ 3980 ρ Puppis.

These two spectra are alike on these two one-prism plates. The lines are perhaps a little sharper and more distinct in ρ Puppis but the differences are slight and may be wholly accidental.
Line 4077.9 is well-marked, being as intense as any of the solar lines. Lines 4172.3 or 4172.9 and 4173.6 form one well-marked line. Lines 4177.8 and 4179.5 seen as one are also fairly well-marked. The last two lines are perhaps slightly more intense in ρ Puppis than in d Oph.

X4042 α Canis Minoris
Too poor to compare fine lines with the above plates.

Nov. 30, 1899
X4789 γ' Normae
Like ρ Puppis X 3980.

X5888 γ' Normae
Appears nearest like ρ Puppis. Hydrogen lines are stronger than in δ Canis Majoris. Some of the solar lines resemble those in δ Canis Majoris in intensities. The H & K bands are as wide as in δ Canis Majoris. These photographs are rather thin.

X5418 G Carinae.
Like ρ Puppis X 3980.
Line 4077.9 is no more intense than in ρ Puppis. So remark 149 is not needed.

Saturday, Dec. 2, 1899. 1h 30m

Estimates of the intensities of the lines and bands in γ Velorum. Wave-lengths from corrected column in paper marked γ Velorum.

Plate 48513.

5829-5796	10	
5720-5672	70	
5483-5460	~~1~~ 4	
5426-5406	~~3~~ 4	
5107	2.	Compare with ζ Puppis

Tuesday, Dec. 4, 1899. 23h

γ Velorum cont. from preceding page.

4876-4865	2	
Hβ	3	
4858-4850	2	
4799-4782	2	
4699-4681	30	
4669-4640	100	probably more than 100 as compared with the other bands.
4637-4633	3	This appears to be a somewhat broad dark band on the side of shorter wave-length of the intensely bright band 4669-4640.
4550-~~[illegible]~~	2	
4540	2	~~48~~
4513	2	
~~4498~~	~~2.5~~	Not seen.
4486-4475	3	This band is crossed by a faint dark line which appears to be line 4481. It has intensity 1.
4472	6	
4467-4462	2	This is the space between lines 4471 & 4458. It appears brighter than the cont. spectrum

Dec. 4, 1899.

γ Velorum cont.

4458 5. Wider, more diffuse, not quite as intense as 4471.

4452-4437 $\underline{5}$ a decided bright band.

4355 1

4351-4344 $\underline{2}$ Space between the line 4355 & Hγ

4340 (Hγ) 7 or 8,

4337-4315 $\underline{4}$ a wide diffuse br. band on the side of shorter λ of Hγ.

4283-4253 $\underline{4}$ a band similar to 4317-4315.

4238-4224 $\underline{2}$

4197-4175 $\underline{1}$ This appears to be a faint hazy bright band on the side of shorter wave-length of the dark line λ4201, Hγ.

I do not understand why this dark line H$\overset{\delta}{\gamma}$ was not seen under the micrometer. It is certainly present. Superposed on λ8234 ζ Puppis, this line matches exactly with Hγ in ζ Puppis.

December 5, 1899. 0h

γ Velorum (cont.)

4201 (H$\overset{\delta}{\gamma}$) 2.

4129-4117 $\underline{2}$ or $\underline{3}$ wide hazy band on side of gr. λ of dark line 4114.

4114 2.5 wide, ill-defined. Superposed on λ8261 this line matches line 4116.5.

4114-4105 $\underline{2}$ or $\underline{3}$ band bet. line 4114 and Hδ.

4102 Hδ 9 or 10. A little more intense than Hγ. also wider than Hγ.

4098-4091 $\underline{2}$

4088. 3 or 4, very wide.

4083-4066 $\underline{5}$ very wide band.

4034-4030 $\underline{2}$

4027 4

4004 Do not see this line, "37" that was marked on the plate is too near Hδ.

Dec. 5, 1899.
γ Vel. cont.

3970 ($H\epsilon$) 9, about equal to $H\delta$, no more intense, certainly, than $H\delta$.

3967 – 3952 $\underline{3}^2$ wide bright band, faint, but spread out.

3939 – 3926 (K) $\underline{.3}$ wide. Superposed on 4 δ^2 ξ^6 ι Centauri, the line K in the latter spectrum does not come in the middle of the bright band in γ Velorum, but almost at the extreme edge of greater wave-length in γ Velorum. This agrees with the measure of this band, for the ~~central~~ wave-length of the centre is 3932.7, whereas the line K is at wave-length 3933.

3898 – not comp. $\underline{1}$ on side of gr. λ of $H\zeta$

3888 ($H\zeta$) 6

3885 – 3876 $\underline{1}$ space bet. $H\zeta$ and unknown dark band.

Dec. 5, 1899.

3875 Unknown dark band not seen in any other spectrum. Int. 8. This band is wider than $H\zeta$.

3836 $H\eta$ Too hazy to est. int.

3820 " " " "

3~~8~~02 $H\theta$ " " " "

X 8476 $^5_2$ γ Velorum. Slide 1997.
Not isochromatic

$50\overset{1}{\cancel{7}}\overset{5}{1}$ $\underline{1}$ may be faintly dark on edge of shorter wave-length!

$492\overset{2}{5}$ 2 with a bright band on the edge of greater wave-length. Band has wid. ~~4~~ $\underline{1}$

$H\beta$ 4 (dark) superposed on a bright band. The band has wid. $\underline{2}$ or $\underline{3}$ on each side.

4799 – 4782 $\underline{2}$

4688 $\underline{20}$

4633 $\underline{100}$

Dec. 5, 1899. 22^{h}

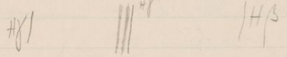
X 8478 γ Vel. (cont.)

The space bet. bands 4633 and 4688 seems like a dark line. Also the shorter wave-length edge of 4633 seems darker than the continuous spectrum. This edge seems like a decided dark line or band.

4550 2 br. band on side of gr. wave-length of Hγ'

4540 Hγ', well seen as a dark line. Int. = 3

At the region of Hγ' there are three dark lines, thus



The one at gr. λ side is Hγ'.
The one at sh. λ side is 4514 as seen by superposing X 6266 γ Vel. on X 6265 29 Canis Maj. where λ 4514 is well-marked; also by superposing X 8478 (plate under discussion) on X 8476 where the line 4514 is shown in A. G. C. 22748 and 22843. Gill gives a very faint line in β Crucis at 4522. Miss Maury gives line 4531. Line in γ Vel. is wide enough to embrace several

4531? Int = 3. This is in position of 4531 in X 8457 A Arae but is wider.

Dec. 5, 1899.

X 8478, γ Vel.

4514 This dark line appears to be superposed on a faint bright band. Int = 3. Br. on each side of 4514 = 1

4471 6 superposed on a bright band Br. = 2 on each side of 4471

4458 5 wide & hazy.

4452-4437 6

4387 1 faintly seen by superposing on β Crucis X 8 $\overset{2}{3}$61.

There is also a very faint line of slightly shorter wave-length than 4387, having approx. λ of 4377.

4355 2

4351-4344 1

Hγ 8

4337-4315 6 less intense but wider than 4452-4437.

4283-4253 5

Dec. 5, 1899
γ Vel. (cont.) X 8478

4238-4221 2

Hδ' 3 , brightness on side of gr. λ = 1.
on side of shorter λ brightness = 3

No trace of lines 4144 & 4120
are seen.

4129-4117 2

4114 agrees with 4116.5 in β Crucis
Int = ~~3~~ 2.

Hδ 10 wide.

Brightness on each side of Hδ = 2

4089 3

4083-4060 6

4026 7
Superposed on br. band Band = 2
on each side of 4026.

Dec. 5, 1899
γ Vel.

Hϵ 10

K There is a bright band in this region.
Int. = 3
It appears to be the space between
the lines Hζ' and K in ζ Puppis
as is seen by superposing X 8234
on this plate. The dark lines K and
Hζ' are not seen in γ Vel. The
edge of shorter wave-length of this br.
band is slightly dark and may be
Hζ. The edge of gr. λ is not any
darker than the continuous sp.

Hζ^{H} 10

3875 10−

Dec. 5, 1899.

X8514 γ Vel.

This plate is not good for the dark lines in general, but ~~several~~ ~~5023~~ 4922 ~~are~~ is seen here better than on the other plates.

4922 ~~5025~~ Seen as a well-defined dark line Int = 3.

X6266 γ Vel.

5023 3 or 4 extends ~~on~~ greater λ of position of 5023 as seen on X 5268 α Pav. The edge of sh. λ of this br. band may be dark, but, if so, it is indistinct

4922 2, bright on edge of gr. λ = 2

Hβ	4	3819	8
Hγ	6	Hθ	10
Hδ	10	Hι	10
Hε	10	Hκ	10
Hζ	10	Hλ	10
Unknown	15		
Hη	10		

Space bet. Hι & Hκ is like a bright band.

Wide hazy band at λ of Hξ & one [illegible] sh. λ.

2

Monday, December 11, 1899

On superposing X8513 γ Vel. on X8261 β Crucis it is seen that the interval between the two unknown dark bands 4457 & 3875 in γ Vel. is exactly the same as that between Hβ & Hδ in β Crucis. In the place of Hγ in β Crucis comes the bright band 4060 to 4083 intensity 5. There is no ~~sign~~ trace of a dark line crossing this bright band. Hence, while it seems rather remarkable that the interval between those bands seen as yet only in γ Vel. should be the same as between Hβ and Hδ, yet if they are Hβ and Hδ of another spectrum, it seems difficult to account for Hγ. Hγ should be dark enough to be seen through the bright band above mentioned in a spectrum where Hδ is as intense as the band 3875 in γ Velorum

Wednesday, Dec. 12, 1899   22^h

η Centauri

I find faint lines in this spectrum that are not Orion lines. Two faint lines close together near the Orion line 4553.4 are the most conspicuous of these ~~faint~~ lines. These two lines fall on either side of the Orion line 4553.4, the one of shorter λ being more intense than the one of greater. These lines may be solar.

X8778 α Phoenicis compared w. η Centauri

Approx. λs of two lines in η Centauri above referred to are 4550 and 4~~4~~555. There is no strong line in α Phoenicis at 4550 but there appears to be a faint line at this point. Both lines in η Centauri seem to fall on lines in a band in α Phoenicis

X8493 η Centauri

Two lines 4550 and 4555 well seen on this plate. They agree in position with two lines of similar intensities in α Carinae X7813. If these are solar lines it is very strange that the K line is not seen in η Centauri. These two lines are also seen in β Carinae X8473, but 4555 is very faint.

Dec. 12. 1899.

X8493 η Cent. (cont.)

The wave-lengths of the two lines in α Carinae are 4549.7 and 4556.0. It is not likely, however, that these lines in η Centauri are solar lines, for if so ~~4481~~ would not 4481 be stronger and also the line K?

4233 (a solar line) appears to be very faintly seen. On this plate, the pair of lines above referred to are the most conspicuous of the lines not common to the Orion system.

These solar lines (if they are solar) are narrow, while the Orion lines are very broad. These lines agree in width with the hydrogen lines on this plate.

Thursday, Dec. 14, 1899. 0h

X9519 η Centauri.

The fine solar lines are distinctly seen on this plate. They are narrow as in α Cygni. Superposing X7990 α Cygni on this plate, the following lines of α Cygni are seen in this spectrum.

	Int.	
4163.9	1	
4173.6	2	
4179.5	2	
4233.6	2	
4307.2	1.5	
4312.6		
4315.2	2	
4352.0	3	~~This may be the Orion line 4352.0~~ By superposing on X8261 β Crucis it is found that this is not the Orion line.
4481.		This line is narrow while the adjacent line 4471.8 is broad and hazy.

From 4481 to the pair of lines 4549.7, 4556.0 there are numerous faint lines that appear to agree closely in wave-lengths, (though differing somewhat in intensities) with those in α Cygni.

	Int.
4549.7	2
4556.0	2
4558.9	Not seen, may be joined to 4556.0

Dec. 14, 1899.

X9519 η Cent. (cont.)

λ	Int.
4584.0	2
4586.1	1
4619.2	1
4629.9	1
4634.8	1

The line K is not seen, but the region is very hazy.

On this plate X9519, Hβ is dark very faint, with bright edges on both sides.

X9861 η Cent.
solar lines faint.
Image very thin.

X9602 η Cent.

Solar lines well seen, perhaps more distinctly than on X9519.

Hβ dark double, stronger component is of shorter λ. Space between is bright. The bright Hβ seems to agree with Hβ in α Cygni. The solar lines are the same as on X9519. Between 4481 & 4549 the lines on this agree with α Cygni, though faint

Dec. 14, 1899.

X9548 η Cent.
Solar lines seen.

X9539 η Cent.
The lines 4489.6 to 4491.6 are here distinctly seen, almost as intense, taken together, as 4482, Hβ dark. This 'dark' Hβ matches with the dark Hβ on X9602, and not with the bright space on that plate. This dark Hβ is very faint. = 0.2 Hγ.

X9531 η Cent.

Almost perfect co-incidence of faint solar lines bet. 4482 & 4549. as in α Cygni.

4482.0	3
4489.6	1.5
4491.6	
4501.5	1
4508.5	1
4515.4	1
4520.3	1
4522.9	
4534.2	1 very faint line bet. 4534 & 4541.
4541.6	1
4549.4	

Dec. 14, 1899.

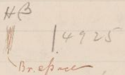
X9527 η Cent.
Solar lines especially well seen
4227.0
This line is soft certainly seen
4417.9 is present on all the plates. Orion & solar lines may be superposed.
Line 4584.0 seems slightly bright on both edges, or, rather, to be superposed on a bright band.

X9053 η Cent.
Solar lines not seen, or very faint, on this plate.
Orion lines very broad.
4387 looks double with more intense line towards the violet.
4471 looks double with more intense line towards the red.
Hβ is extremely faint on this plate
Hγ is not as well-defined as on most plates. It has a slight look of doubling, as if the fainter line is towards the red. Hδ & Hε appear double with the fainter line towards the red.
Hβ = 0.1 Hγ. Hβ is bright on the edge of shorter wave-length.

Dec. 14, 1899.

X9053 (cont.)

$H\beta$ consists of two dark lines very faint with a moderately bright space between them.



The line towards red is sharper, but not more intense than the line towards the violet.

On superposing this plate on X8519 α Pavonis I can not tell whether the bright space or one of the dark lines of $H\beta$ agrees with $H\beta$ in α Par. The bright space appears to match with $H\beta$, but the displacement of the dark lines is so slight that accurate measurements would have to decide this question.

Plates 9050 and 9051 taken the same night as 9053 & 9052 show very narrow images.

Dec. 14, 1899.

X9052 η Cent.

Solar lines faint or invisible.

$H\beta$ dark seems to have a faint companion line on each side.

4387 & 4471 wide and appear stronger on the side of gr. λ.

X9298 η Cent.

Rather dense negative.

Solar lines well seen.

Line 4558.9 does not seem to be present as in α Cygni. The two lines 4549.7 and 4556.0 stand out noticeably on this plate.

Hazy band seen at position of line K.

$H\beta$ consists of two dark lines the one tow. red being sharp and well-marked the one towards violet is about 0.6 as intense as the one towards red and is hazy. The space between these two dark lines is bright, and the gr. λ side of the sharp $H\beta$ is brighter. The brightness is nearly equal, but a little sharper on the gr. λ side of the sharp $H\beta$.

Friday, December 15, 1899 0h

X9141 η Cent.
Solar lines wide, and not as well marked as on X9290.
$H\beta$ dark = 0.2 $H\gamma$.
Edges very faintly bright.

X9499 η Cent.

$H\beta$ || Bright spaces.
Central line dark well defined. Line of shorter λ well seen but fainter and hazier than the central line. Line of gr. λ barely seen.
Solar lines well seen.

X9162.
Double hazy ~~look~~ appearance of all the lines. $H\beta$ consists of 2 dark lines, with a bright space. $H\gamma$ has a faint component on side of ~~[illegible]~~ shorter λ. The separation between this line and $H\gamma$ is just about the same as between $H\beta$ and its fainter component on this plate.

Dec. 15, 1899.
X9162 (cont.)
4144 & 4120 are distinctly double. Components equal.
Solar lines very indistinct on this plate.
4387 & 4471 very wide.

X9495
$H\gamma$ has a faint component on side of greater wave length.
~~Can this be the Orion line 4350~~
This faint line near $H\gamma$ has shorter λ than the fine double line
4345.50 } as given by Gill
4347.30 }

seen in β Crucis X8361.
It appears to have a little greater λ than a very fine line in β Crucis which appears the line 4342.6 suspected by Gill.
Nearest solar line is 4344.7.

Orion lines broad and hazy.

Dec. 15, 1899.

X9619 η Cent.
Solar lines seen
K is seen as a very faint dark line. Its intensity is not more than 1 at the most. It is narrow; Orion lines broad.

X9666 η Cent.

Saturday, Dec. 16. 1899 2^h

η Centauri.
X8493, & 9499 superposed
Both these plates show solar lines and there is no change in their position.

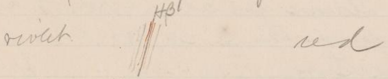
X8493 & X9527 superposed.
No shift in solar lines.

X8493 & X9666 superposed.
Hβ on X9666 is very faint and consists of two or possibly three faint dark lines with slightly bright spaces. Hβ in X8493 matches up with the middle line of greater the triple Hβ on X9666. The line of greatest wave-length in this triple Hβ is very indistinctly seen. Solar lines are hazy on X9666. 4549 and 4556 on X9666 appear to have slightly shorter wave-lengths than on X8493. This difference is so slight that the shift may not be real.

Dec. 16. 1899.

x9583

Hβ is very complex.



Hβ appears to consist of 4 dark lines. The most intense of these lines maps up with Hβ on x8493, and is bright on both edges as represented above by red ink. Beyond the bright line towards the ~~violet~~ red is a faint hazy dark line; towards the ~~red~~ violet are 2 hazy dark lines.

The hydrogen and Orion lines on this plate show striking differences in definition. The hydrogen lines are well-defined, the Orion lines are very broad and hazy. 4144, 4120, 4387, 4471 look double.

Lines 4173 & 4179 are distinctly seen, but they are not broad like 4144 & 4120!

Hγ and Hδ appear to have faint companion lines on the sides of greater wave-lengths, and very faint lines on the sides of shorter wave-lengths.

Solar lines show no shift as compared with x8493

Dec. 16. 1899

x9224

Hβ dark double, with bright space between. Hβ on x8493 coincides with the line of greater wave-length of Hβ dark on x9224.

No shift in the solar lines as compared with those on x8493

x9575

No shift in solar lines as compared with x8493.

Hβ dark maps up with Hβ

Monday, Dec. 17, 1899 22^h

X9609 η Centauri.
Superposed on X8493, Lines 4549 and 4556 appear where slightly shorter wave-lengths on 9609 than on 8493. Other solar lines, however, match in both spectra and the effect at 4549 and 4556 is ~~due~~ probably due to slight irregularities in the direction of the lines.

Hβ dark is triple. The central line is well defined and has a narrow bright line on the edge of gr. λ. The edge of shorter λ is but faintly bright. The dark lines of greater and shorter wave-lengths are faint and hazy.

✓ X9312 η Cent.
Narrow image
Solar lines not seen or very faint.
Hβ single & sharply defined.
4471 looks double.
Superposed on X8493.
solar lines seen and show no shift as compared with those on X8493

Dec. 17, 1899.
X9576 η Cent.
Superposed on X8493
Solar lines well seen on X9576 and show no shift from those on X8493.
Hβ dark is triple. The central one is darker, narrower than the others. The gr. λ side of the central Hβ is brighter than the shorter λ side.

X9523 η Cent
Superposed on X8493
Solar lines match exactly in both spectra.
Hβ dark certainly has a faint line on the side of shorter wave-length, and there is a suspicion of one on the side of greater wave-length also. The edges of Hβ are very faintly bright
4387 and [illegible] 4120 look double
Hydrogen lines Hγ is well defined. Hδ and those of shorter wave-length are somewhat broad.

Dec. 17, 1899.

✓ X 49207 η Cent.
Superposed on X 8493
Solar lines match. There appear to be slight differences in intensities for the extremely faint lines of shorter wave-lengths than 4549, but the lines are too faint to decide with certainty.
Hβ consists of 2 dark lines of nearly equal intensities, these lines are both bright on the edge of greater wave-length, the brightness is about equal. The dark Hβ is about 1/8 as intense as Hγ. Hγ is hazier than on most plates. It has no appearance of doubling but appears to have faint hazy lines on each side. Other lines ill-defined.
Hβ on X 8493 matches with dark Hβ of greater wave-length on this plate.

Dec. 17, 1899.

X 49510 η Cent.
Superposed on X 8493
Solar lines match exactly.
Hβ consists of a dark line with brightness on both sides. This dark line is 0.2 as intense as Hγ
If there are dark lines at Hβ beyond the bright edges, they are extremely faint and hazy.
4387 looks double, stronger component being towards the violet.

X 49505 η Cent.
All lines ill-defined.
The focus was excellent on X 9504 and X 9506 taken immediately before and after this plate.
Superposed on X 8493.
Solar lines faintly seen on X 9505
Hβ almost invisible on X 9505. By far fainter than on any other plate. No brightness seen. There appears to be a group of very faint dark lines.

December 18, 1899 0h

✓ X9290 η Cent.
Superposed on X 8493
No shift in solar lines

The dark line of greater wave-length of Hβ (see p. 191) corresponds with Hβ on X8493.

X9290 & X9602 compared
Hβ is double on both these plates.
On X9290 the more intense component is towards the red; on X9602, it is towards the blue.

X9499 } taken May 20, 1899
X9510 } " " 23, "

The images appear nearly alike on these two plates. On 9499, however, the companion line of Hβ ~~is~~ towards end of shorter wave-length is more intense than on X9510.

On X9510, the comp line of shorter λ is very faint, and a faint line of greater λ is also seen.

Dec. 18, 1899.

η Cent cont.

✓ X949~~9~~5. Taken May 19, 1899.
Hβ dark, bright on edge of gr. λ
faint comp. line on side of shorter λ
hazy " " probably present on side of gr. λ also.

X9499 — May 20, 1899.
Hβ dark, bright on both sides.
Brightness equal.
Dark companion line on side of shorter λ, probably also on side of gr. λ.

X9505 — May 22, 1899.
No brightness seen at Hβ.
2 or 3 extremely ft. dark lines
see (p. 201)

X9510 — May 23, 1899.
Hβ dark, slightly bright on both edges. faint companion dark lines on both sides.

X9515 — May 24, 1899
Hβ dark with bright edges.

X9519 May 25, 1899
Hβ dark with bright edges.
like X9515

Dec. 18, 1899.

x9523 η Cent. May 26, 1899.

Hβ. dark and well-defined, both edges bright, dark companion line of shorter wave-length distinctly seen, of greater wave-length is very faint.

The image on this plate seems to be almost exactly like that on x9499 taken May 20, 1899.

x9527 η Cent May 27, 1899.
Hβ dark superposed on a bright band, intensities equal on both sides. Faint hazy dark lines seen on both sides of the bright lines.

Dec. 18, 1899. 22h

C 12265 H. P. 1368
Isochromatic
Too poor. Hβ not seen in either star.

C 12257. H. P. 1368. Iso.
Hβ barely seen in H. P. 13~~77~~68.
The image is so narrow that most of the lines are burned out.
Hβ, however, appears to be dark.

C 12253 H. P. 1368. Isochrom.
Image too poor.

C 12261 H. P. 1368 Iso.
Image too poor. Region of Hβ very faint.

C 12267 H. P. 1368 Iso.
Image too poor

Dec. 18, 1899.

X 6240 ο Columbae.

For A.G.C. 6182.

This star was classed as somewhat peculiar in the marked intensity of a line that was identified as the Orion line 4237.4.

Since the study of the spectrum of η Centauri, it is found that this line is the solar line 4233. It maps up exactly with line 4233 in l Puppis. Lines 4173.6 and 4179.5 are very indistinctly seen. 4128–4131, and the line K are too strong for a spectrum showing the Orion lines 4471, 4387, 4120 4026 as intense as in this.

Solar lines of the G band 4300.2, 4312.6 (seen together) and 4315.2 are faintly seen.

The Orion lines are much broader than the solar lines in this spectrum. Line 4233 is very sharp and narrow. Line 4481 is sharp, while the adjacent line 4471 is broad.

The solar lines are seen much better than on X5759, one prism plate of η Centauri.

Other solar lines seen

4549.7 very hazy
4556.0 " "
4584.0 rather sharp.

Dec. 18, 1899

X 6240 ο Columbae (cont.)

Several hazy lines are seen bet. 4549 & 4482, which appear to be solar.

4520.3 }
4522.9 } faint.

Wednesday, Dec. ~~7~~ 19, 1899. 21^h

C12289
H. P. 1368. Iso.
H. P. 13~~70~~ 68. Hβ seen, dark,
Image very narrow.

C12271 Iso.
H. P. 13~~70~~ 68
Image too dense.

C12252 Iso.
H. P. 1368.
Image too thin at region of Hβ.

C12323
H. P. 1368.
Image too poor.

C12315 H. P. 1368.
Image too narrow and dense.

C12310 H. P. 1368 Iso.
Image too narrow and dense.

Thursday, Dec. 20, 1899 22^h

49720 π Scorpii. Lines double. Br. comp. towards red.
The following lines are seen

4922 hazy.
Hβ double
4712 single, ft.
4649 " " hazy
4641 " " "
4568 " " "
4553 " " "
4481 " "
447.1 double
4415 + 4417 a fine double as in β Crucis. The faint lines match with the more intense component of the double lines. These faint lines may be double but, if so, the fainter component is so faint and hazy as not to be distinctly seen.
4387 double
Hγ double
Lines near Hγ (shorter λ) are seen as in β Crucis. They are faint and are not seen double

December 20, 1892.

X9720	π Scorpii.
4144	double
4120	"
Hδ	"
4089	ft. hazy
4172	" "
4159	" "
4026	double
4009	"
Hε	wide.

X9646 α Arae.
Hβ bright superposed on a wide dark band. Hγ wide and dark. The bright lines are not seen at Hγ. Orion lines wide.
4120 is very faint.

√ X9737;³ R. S. M. P. 6857

Index

A
Aquarius, b, 39.

Apus, ι, 44.
ζ, 49, 81, 88, 124, 125, γ', 82,

Ara, α, 59, 61, 62, 63, 68, 69, 70, 72, 76, 93, 121, 146–149, 210. σ, 49. 82, 104, 114, 115, 127,
λ, 75, 89, 104, 108,
θ, 94, 97, β+γ, 95, 102,

B

C
Canis Major, A.G.C. 9181, 57, 76, 205, 208,

Capricorn ε, 53, 133, 58, 81, 98, 102, 106, 123, 124, 129, A, 119,
Circinus, A.G.C. 20695, 52, 57, 74, 77, 78, 79, 81, 82, 84, 114, 116.
γ, 56,

C Plates, 130.

Carina α, 36, S.M.P. 3369, 54, e^{2}, 44, 48. θ, 132,
β, 44, 48. ~~η, 168, 169~~ G. 171,
ε, 42, 46, 48, 55, Q, 47. Z, 43, 48, 88, 103.

C
Centaurus β, 73.
g, 49, 56, 113, 127, m, 51. 56, 126,
θ, 74,
η, 37, ~~57~~, 59, 60, 64, 65, 66, 67, 68, 69, 71, 78, 80, 83, 84, 85, 87, 92, 117, 184–204
S.M.P. 4422, 42.
" 4521, 42.
" 4453, 43, 127; 45, 55, 89, 116,
" 4467, 44. 50. 55, 108.
ζ, 58, 59, 61, 62, 63, 66, 67, 68, 69, 70, 71, 72, 74, 75, 78, 79, 80, 81, 82, 83, 85, 86, 87, 88, 89, 94, 95, 96, 98, 99, 100, 101, 102, 105, 120, 122, 125, ~~184–204~~.
κ, 62, 66, 67, 68, 70, 71, 85, 120,
Columba, o, 206.

Classification of Miss Maury's stars, 23-35, 154-161.
Corona Aust.
ε, 109.

Crux, α, 97. 131.

S.M.P. 4365, 43. λ, 50. 54, 87, 91, 92, 97, 103, 107,
ι, 110, 111

D
D³, 130.

E

Estimates of intensities, 2–5,

Eridanus

τ^4, 38.

g, 39.

F.

G

Grus, α, 98, 120, 5, 39, 72,

γ, 39,

θ, 115,

H

Helium line D^3, 7–10, 11–14, 130.

Hydrogen line $H\beta'$, 15–21,

Hydra,

L, 119,

S.M.P. 3933, 42., 50, 104, 106,

λ, 118, 125, 126,

I

Indus, α, 79. β, 39. 97,

ζ, 90. 106, 108,
2, 122,

Intensities of lines, 2-5,

Lines in red, 131, 132, 166,
List of stars of mag. 5.0 or br. obs. phot. 135,
Lines between 4712 and Hβ. 162

L

Length of spectrum, 136. 137.
Lines "X". 163. 164
Line "Y", 164, 165,

Lupus, β, 62, 63. 66, 67, 68, 70, 71, 75, 85, 95, 101, 117, 120,
S. M. P. 5282, 43, 45, 49, 88, 107. 113, 125,

η, 57, 61, 62, 63. 66, 67, 68, 69, 70, 71,

o, 118, g, 123.

Lyra, β, 129.

M

Musca,
η, 43. 90, 113, 119,
S. M. P. 4480, 44, 50, 54, 88. 103, 118, 124, 127. ι', 44, 104, 106, 108,

Microscopium, α, 92, 122,

ε, 95,

N

Norma. ι¹, 44. 50. 52, 55, 87, 109. 127,
γ¹, 171.

A.G.C. 22297, 53, 58, 73. 8$\overset{5}{4}$, 115,

O

Orion ε, 10,
γ, 152, 153.

Ophiuchus, d. 170.

P

Piscis Aust. α, 38. 40, 95, θ, 39,
κ. 40,

Pictor β, 38, 39,

~~Puppis~~ ~~ξ, 6,~~

~~ρ 36.~~
Pavo, α, 121, κ. 117. 118.
S.M.P. 6572, 88, 105.

Phoenix, α, 38. β, 38,
γ, 38, δ, 39,

P

κ. 40.
ν, 105, 113, 124, ρ, 40. 105, 114, 119, 126, θ, 41, 118, 120, 124,
ι, 90, 118,
A.G.C. 31955, 122, χ, 12$\overset{6}{5}$

Puppis

ξ, 6, 150, 157,

ρ, 48, 52, 54. 57, 76,
ρ, 36. 170,

S.M.P. 2171, 41.
" 2321. 42. 50,
" 1583, 43.
" 2415, 45.

R

S

Sagittarius ρ ε, 166, o, 71. ξ, 72, c, 119, π, 86, υ², 119, υ, 100.
Scorpii, κ 46, 83, 105, 109, 123, 134, μ¹, 72,
θ, 72, 167, δ, 150.
S.M.P. 6019, 47, 85, 91, 109, 123, (π, 69, 72, 75, 89, 90, 91, 94, 96, 97, 98, 99, 100, 101, 102, 105, 110, 120, 121, 125, 126, 139-145, 209, 210,
" 6264, 51, 54, 83, 91, 106, 108, 114,
" 6202, 52, 53, 79, 102, 104, 113, 124, 127,
" 6276, 106, 126,

A 128 b, 128.

Sculptor η, 122,
γ, 116.

T Triang. Aust. ζ, 44. 46, 54, 88, 89.
104, 106, 122, 124, ,26.

Telescopium, L, 45, 46, 51, 73, 85, 91, 108, 123.
ξ, 46, 53, 75, 89, 90, 100. 102. 106. 123, 125,

Tucana
γ, 95. κ, 119, 125, ν, 108, 127.

V Vela B, 49, 52,
γ, 1, 150, 151. 172–183. C, 48. J, 49, 55. 56,
H, 47. 57, 77.
w, 45
S.M.P. 2707, 41, 43,
" 3308, 42, 45, 50.
" 2277, 43, 48,
" 2303, 47
" 2849, 50.

W. Width of spectrum, 138.

Double Stars A.J. Vol. 18. Dr. Lee.

	mag	θ
p Velorum	4.6 : 5.2	268°.9
α Centauri	5 : 5	104.8
λ Lupi	4.9 : 5.6	178.9
ι' Normae	6.6 : 6.8	266.1
λ Normae	5.2 : 6	152.0
ζ' Scorpii	5 : 5.7.	185.0

The companion of α Centauri is now in apastron and moving slowly.

Period of T Androm. A.J. vol. 18 p. 4. S.C.C

1891, Dec 14 + 274 E.