



**Smithsonian Institution**

*Harvard-Smithsonian Center for Astrophysics*

## **Project PHaEDRA - Cecilia H. Payne #4**

Extracted on Dec-02-2022 11:28:51

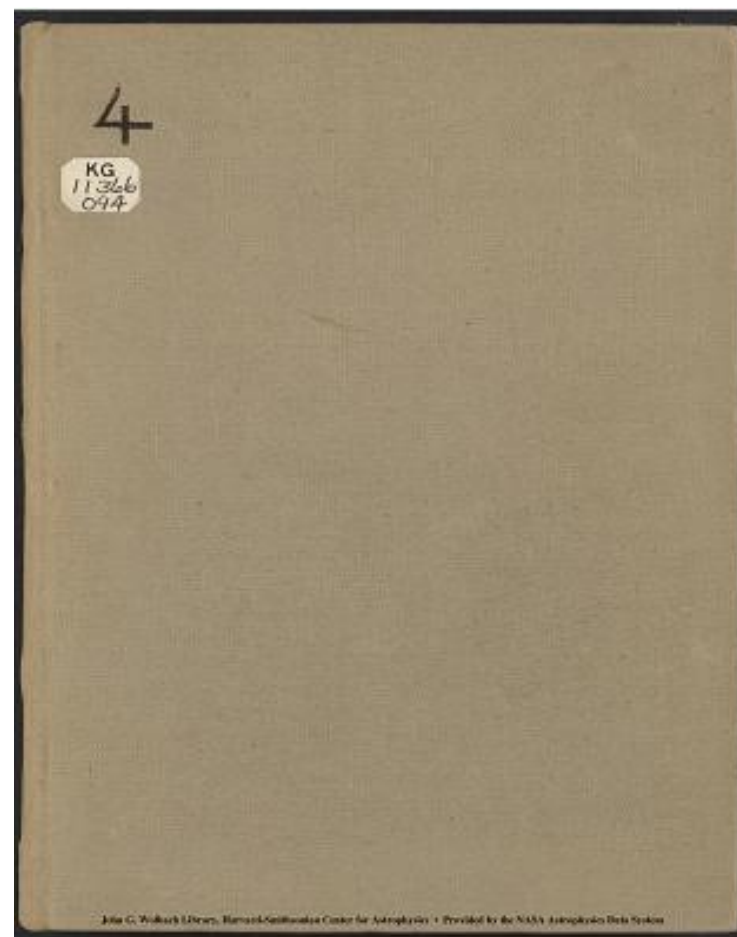
**The Smithsonian Institution thanks all digital volunteers that transcribed and reviewed this material. Your work enriches Smithsonian collections, making them available to anyone with an interest in using them.**

The Smithsonian Institution (the "Smithsonian") provides the content on this website ([transcription.si.edu](https://transcription.si.edu)), other Smithsonian websites, and third-party sites on which it maintains a presence ("SI Websites") in support of its mission for the "increase and diffusion of knowledge." The Smithsonian invites visitors to use its online content for personal, educational and other non-commercial purposes. By using this website, you accept and agree to abide by the [following terms](#).

- If sharing the material in personal and educational contexts, please cite the Harvard-Smithsonian Center for Astrophysics as source of the content and the project title as provided at the top of the document. Include the accession number or collection name; when possible, link to the Harvard-Smithsonian Center for Astrophysics website.
- If you wish to use this material in a for-profit publication, exhibition, or online project, please contact Harvard-Smithsonian Center for Astrophysics or [transcribe@si.edu](mailto:transcribe@si.edu)

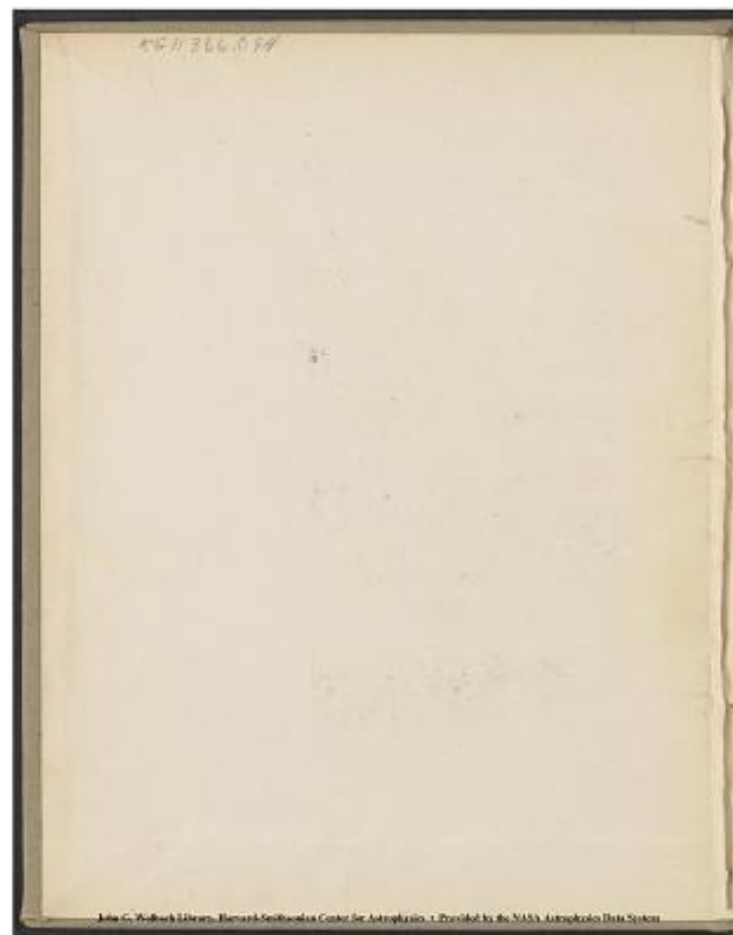
For more information on this project and related material, contact the Harvard-Smithsonian Center for Astrophysics. [See this project](#) and other collections in the Smithsonian Transcription Center.

4  
KG  
11 366  
094



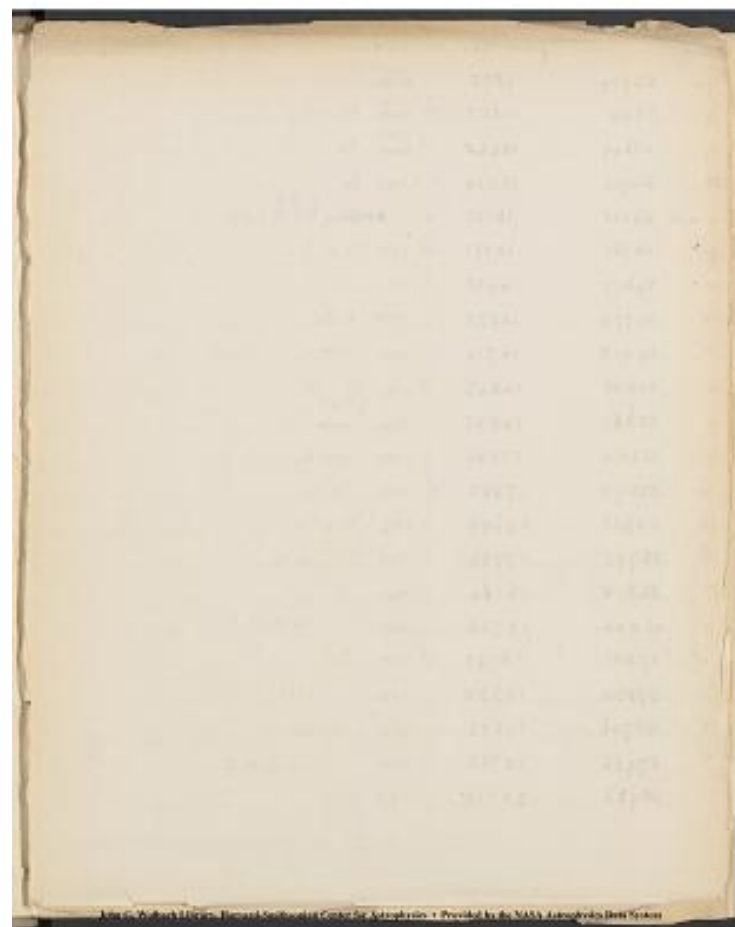
Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

KG 11 366.094



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[blank page]]



This image shows a blank, aged, cream-colored page, likely a flyleaf or separator page from an old manuscript. The paper has a slightly textured appearance with some minor discoloration and a dark border around the edges. There is no text or other markings on the page.

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

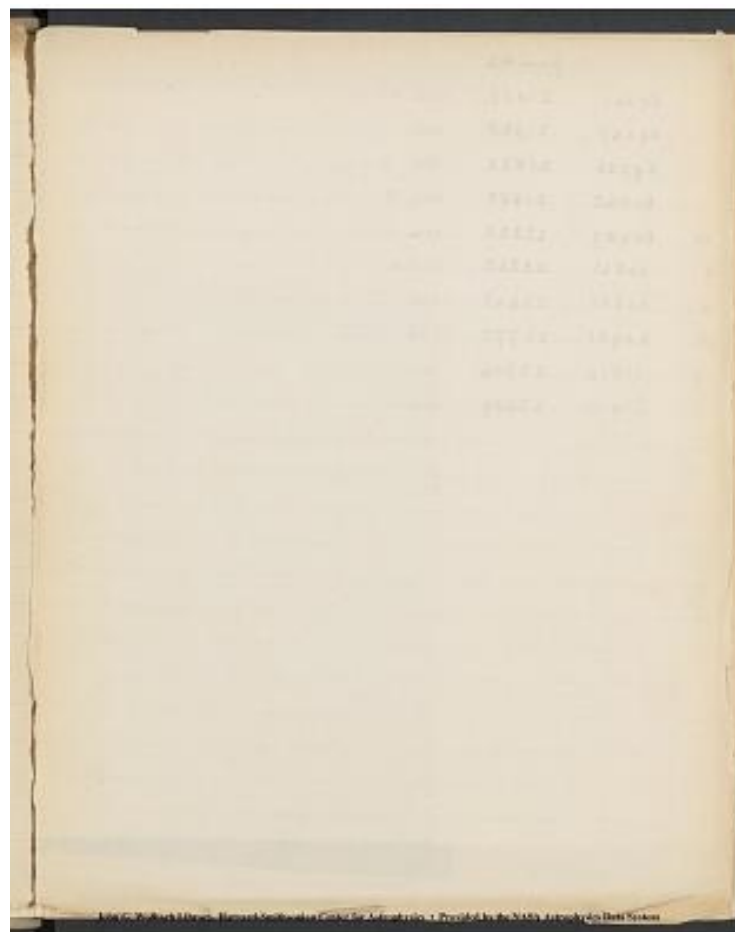
from H

9w	52729	14525	<del>5279</del> <del>5245</del> Cr?
9	53451	15247	<del>5281</del> <del>5279</del> Re +
?			
9	53649	15445	<del>5305</del> <del>5281</del> Te
10	53923	15719	5305 Fe
9 uih	54325	16121	<del>5227.19</del> <del>Fe Fe+</del>
			5328.04
9	54515	16311	5337 Ti + Fe
4	54657	16453	5347 Cr ?
5	54779	16575	5354 Fe Cr
4	54918	16714	5362 5363-
6	55051	16847	536 Fe Co
			(70,71)
4	<del>55041</del>	<del>55151</del>	16947 5376
Min			
9	55284	17080	? 5384 83.5 Fe
10	55592	17388	5398 Fe Fe
10	55803	17699	5419 Ti+
8	55993	17789	? 5426 ?Te 24 Fe
10	56318	<del>18104</del>	<del>18114</del> 5445 Fe
4	56926	18722	5481 Fe', Fe, Ti ?
6w	57001	18797	5484 Co ?
12	57534	19330	5520 5522
10	57706	19502	5532 5535Ba ?
8	57926	19722	5545 44.46 Fe, Fe
10	58923	20719	5568 Fe

Date	Time	Coordinates
9w	52729	14525
9	53451	15247
9	53649	15445
10	53923	15719
9 uih	54325	16121
9	54515	16311
4	54657	16453
5	54779	16575
4	54918	16714
6	55051	16847
4	<del>55041</del>	<del>55151</del>
Min		
9	55284	17080
10	55592	17388
10	55803	17699
8	55993	17789
10	56318	<del>18104</del>
4	56926	18722
6w	57001	18797
12	57534	19330
10	57706	19502
8	57926	19722
10	58923	20719

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

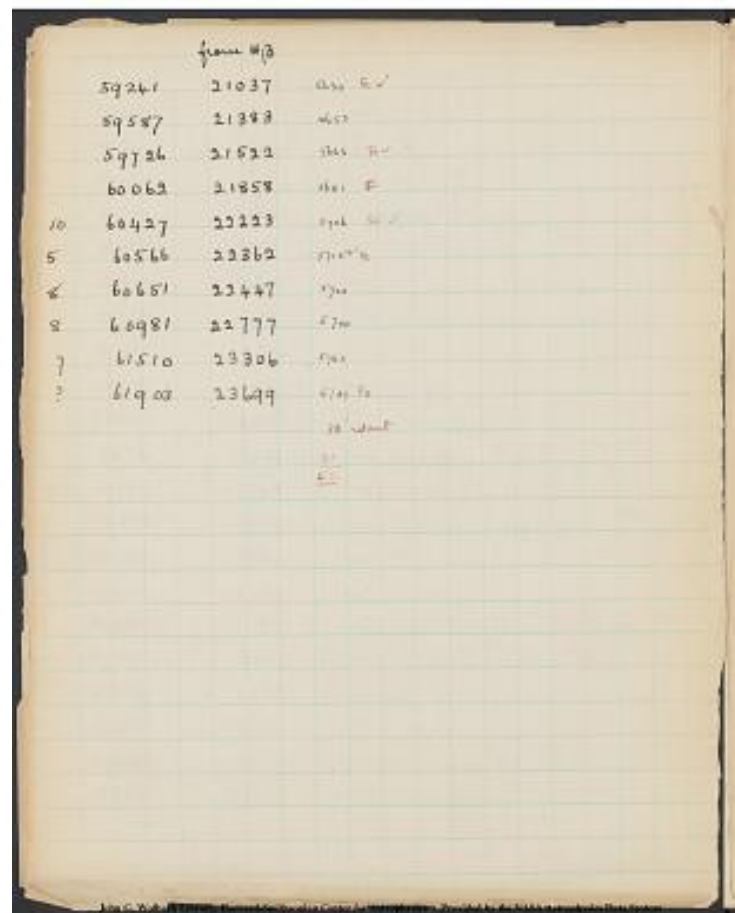
[[blank page]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

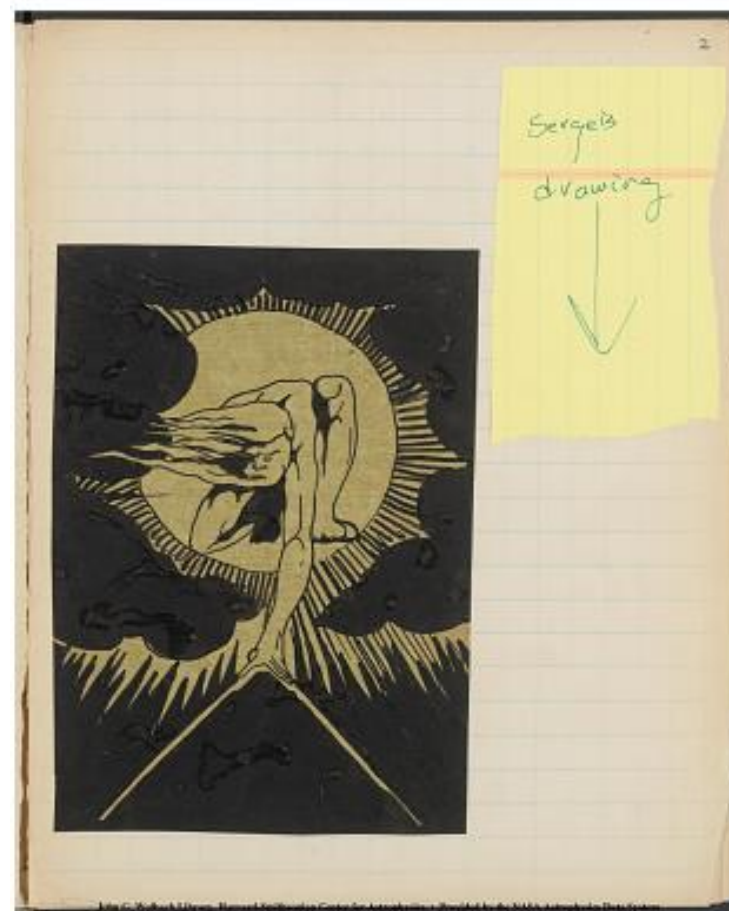
from HB

	59241	21037	5630 Fe
	59587	21383	5653
	59726	21522	5663 Fe
	60062	21858	5681 <del>[[strikethrough]] F</del> <del>[[/strikethrough]]</del>
10	60427	22223	5706 Fe
5	60566	22362	5715 Fe
8	60651	22447	5720
8	60981	22777	5740
7	61510	23306	5763
?	61903	23699	5789 Fe
		31 ident	
	<u>21</u>		
	<u>52</u>		



Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

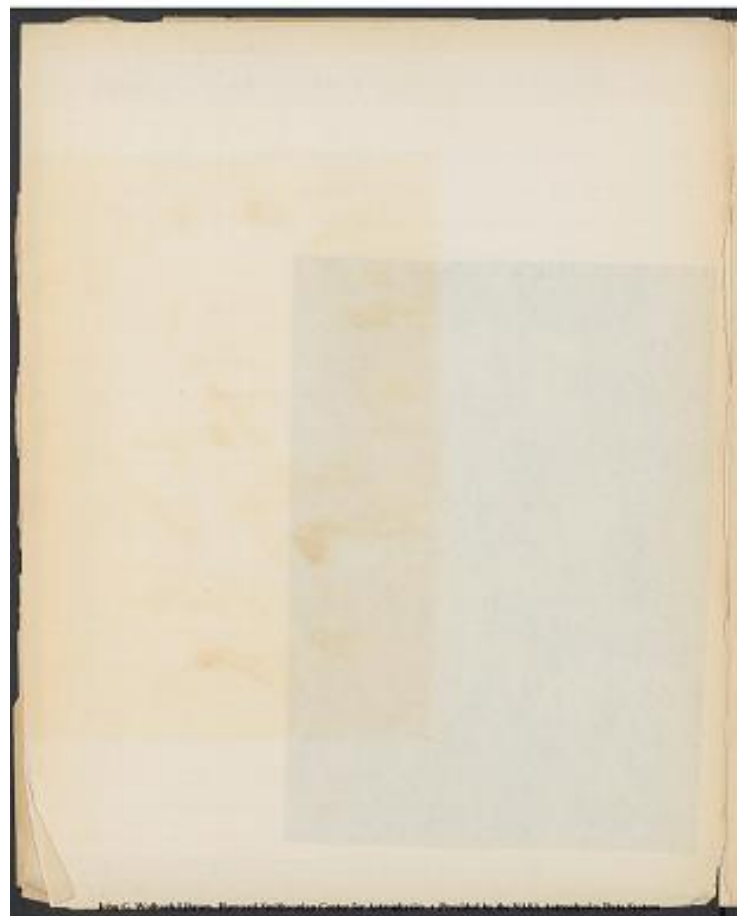
2  
Sergei's  
Drawing  
[[symbol-arrow]]  
[[Image]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[blank page]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

Ba 55.35.53 1000 -5270.36 30 Fe+ 5169.03 8  
 - Ba+ 4899.97 35 5227.19 40 - 5018.44 8\*  
 Y+ 4883.69 50 5767.49 40 out 4923.92 10  
 [[out]] 4900.11 30 -5216.28 10 5325.56  
 4  
 Ti+ 5418.77 1 -5194.95 10 - 5316.62 8  
 5381.02 (4) 5771.60 20 5276.01 6  
 5336.78 2 5041.76 10 5234.62 4  
 5226.56 3 5006.13 20 5197.56 4  
 5788.70 4 out 4985.56 7 C6 5483.34 40  
 -Te 5110.41 10 out 4957.61 60  
 - 5506.78 18 out 4920.52 60  
 - 5501.47 12 out 4919.01 30  
 - 5455.62 40\*out 4891.51 50  
 5446.92 40 5281.80 10  
 - 5434.53 30 ? 66.57 30 where?  
 5429.20 40 32.96 40  
 - 5405.28 40 5192.36 30  
 5397.14 40 ? 5139 20,10  
 5371.60 50 5324.20 30  
 5328.04 50 -5615.66 50  
 5269.54 60\* -5586.77 40  
 - 5051.64 10 -5572.86 30  
 - 5012.07 12 -5569.63 20  
 534.03 20  
 5328.53 15 +6



Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

$$= 2733.14 + [ [-2.02 \times 10^{18}] / 38204 - 133206 ]$$

$$o = 133191$$

$$c = -2.00697 \times 10^{18}$$

$$o = 2748.44 \text{ [2112.89 added above 2748.44]}$$

[[line]]

Table with 5 columns, the fifth is in blank, has no data.

n	-0	c/-0	0 + c/-0	
38204	-94981	2112.89	4861.33	
49739	-83452	2404.93	5153.37	
49977	-83214	2411.81	5160.25	
50777	-82414	2435.23	5183.67	
50949	-82242			
51104	-82081			
51326	-81865			
52224	-80967			
52481	-80710			

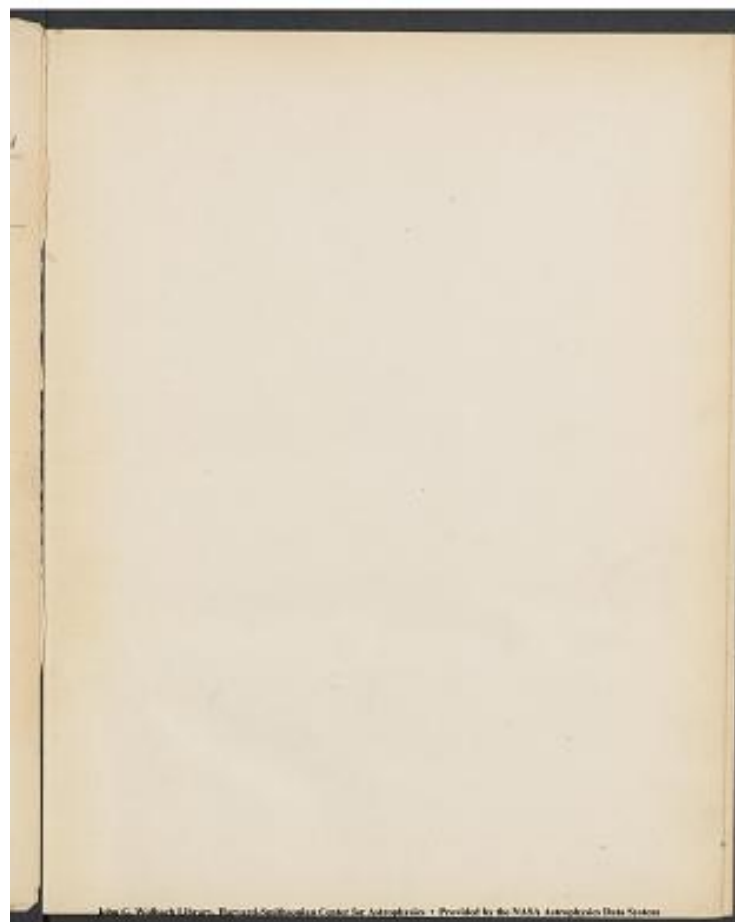
$$\lambda = 2733.14 + \frac{-2.02 \times 10^{18}}{38204 - 133206}$$

$$M_0 = 133191, \quad C = -2.00697 \times 10^{18}, \quad \lambda_0 = 2748.44$$

n	M - M <sub>0</sub>	C	λ <sub>0</sub> + C / (M - M <sub>0</sub> )	
38204	-94981	2112.89	4861.33	
49739	-83452	2404.93	5153.37	
49977	-83214	2411.81	5160.25	
50777	-82414	2435.23	5183.67	
50949	-82242			
51104	-82081			
51326	-81865			
52224	-80967			
52481	-80710			

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[blank page]]



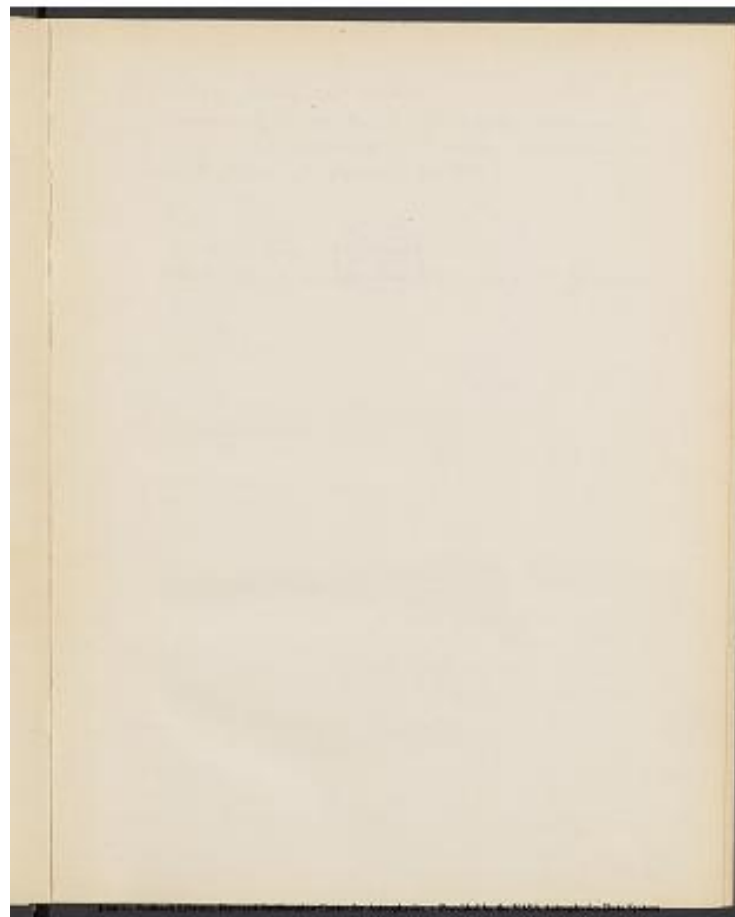
Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[blank page]]



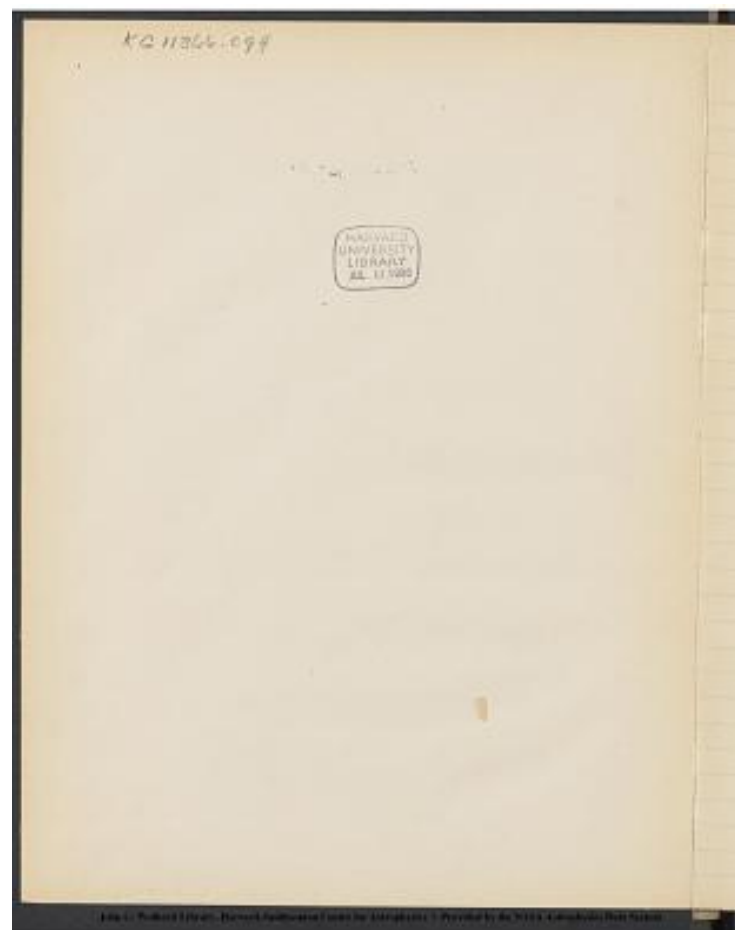
Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[Blank Page]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[start of page]  
KG 11366.094  
[[Stamp]]  
HARVARD  
UNIVERSITY  
LIBRARY  
JUL 17 1956  
[end of page]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 1 [[/preprinted]]

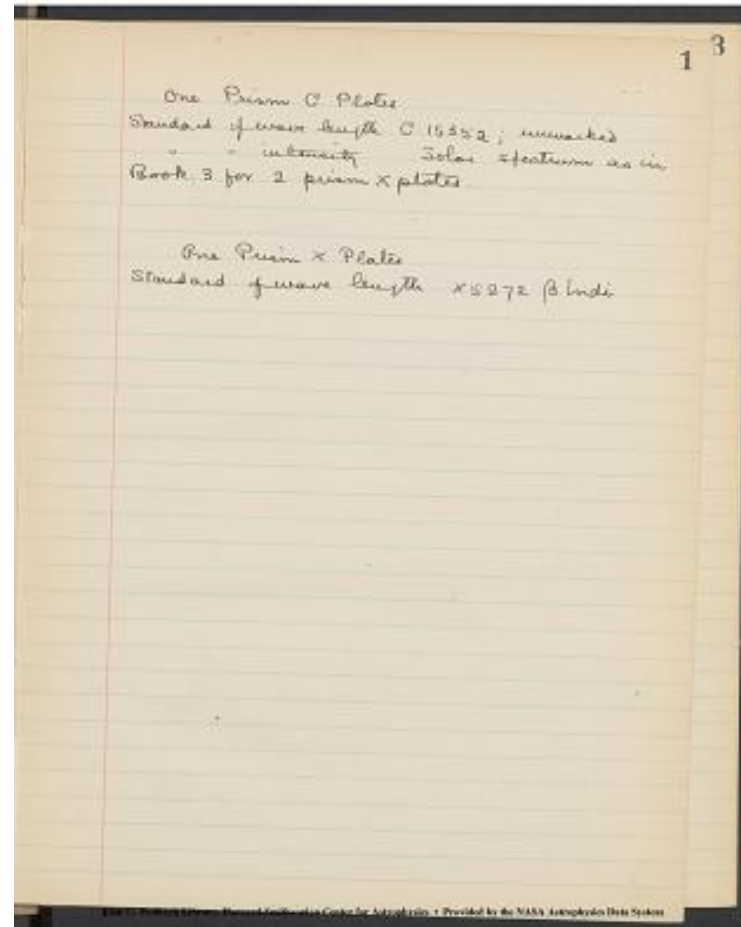
One Prism C Plates

Standard of wave length C 15352; unmarked

" "[ditto for Standard of] intensity Solar spectrum as in Book 3 for 2 prism X plates.

One Prism x Plates

Standard of wave length x5272 Indi

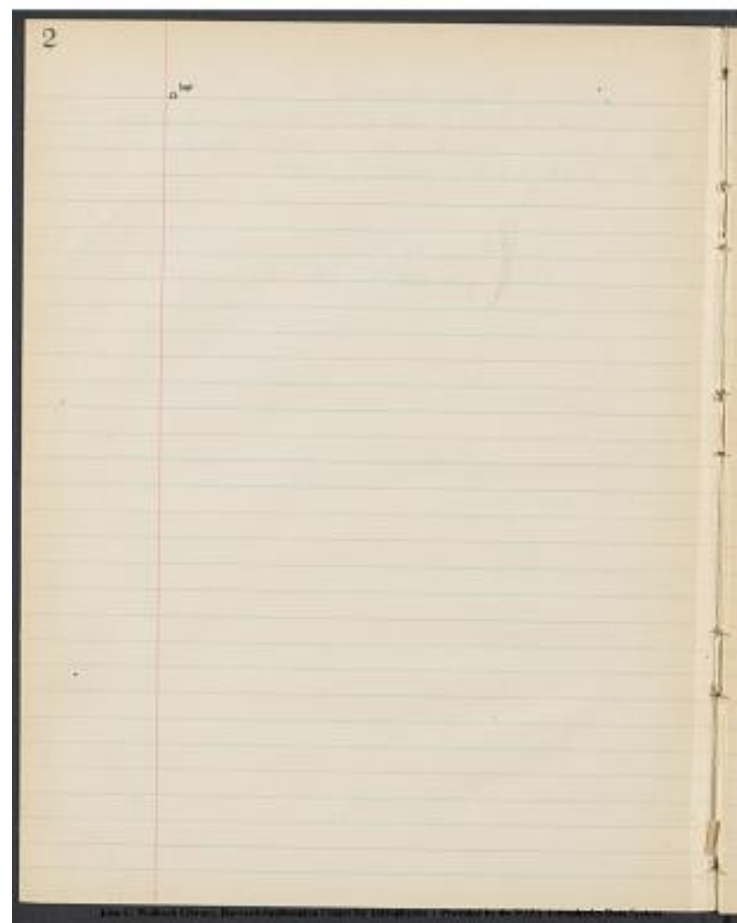


Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 2 [[/preprinted]]

o<sup>h</sup> [[/superscript]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 3 [[/preprinted]]

1<sup>h</sup> [[/superscript]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 4 [[/preprinted]]  
 [[table-5 columns]]  
 2h|Q|D|Page  
 15467|0 Cer|2 14 -3 4|5|4|30  
 15453|0 Cer|.....|3| -  
 15433|0 Cer|.....|4| -  
 [[end table]]

4					
	Q	D			Page
15467 0 Cer	2 14 -3 4	5	4		30
15453 0 Cer	.....	3	-		-
15433 0 Cer	.....	4	-		-

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 5 [[/preprinted]]

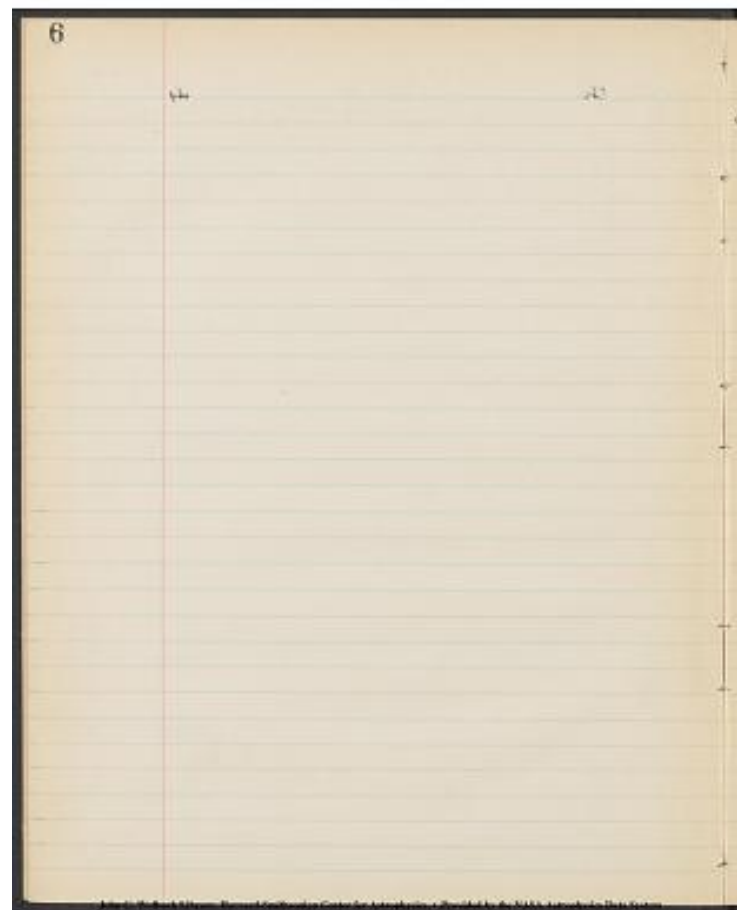
3h



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 6 [[/preprinted]]

4h



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 7 [[/preprinted]]

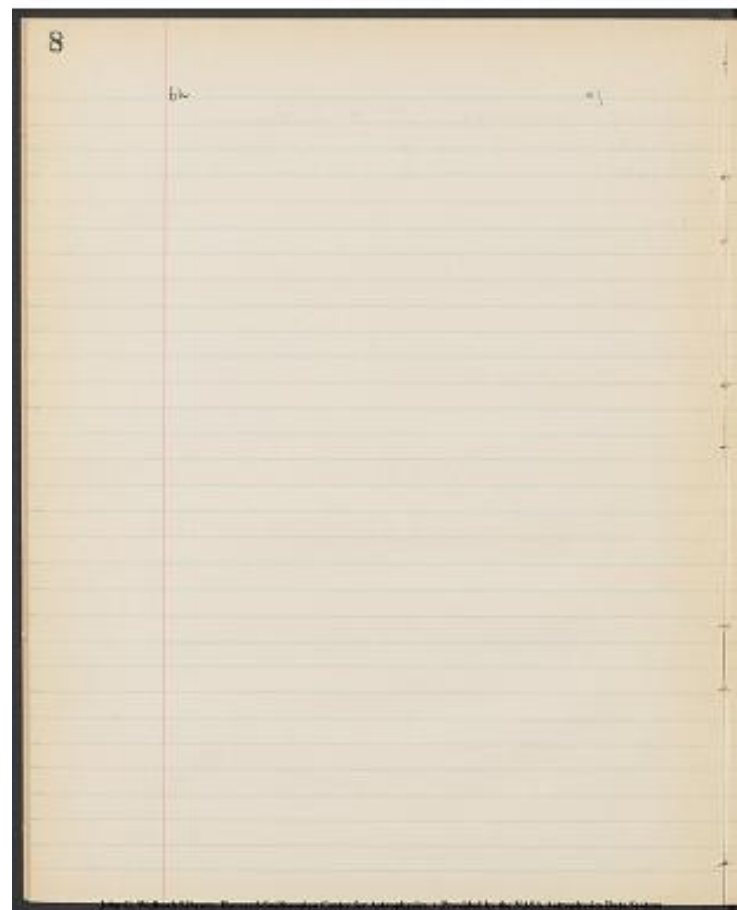
5h  
C15423 Ori 5 50 +7 23 4 3 omitted --  
15425 Ori 4 4 "[ditto for omitted]" --  
15417 Ori 4 4 "[ditto for omitted]" --



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 8 [[/preprinted]]

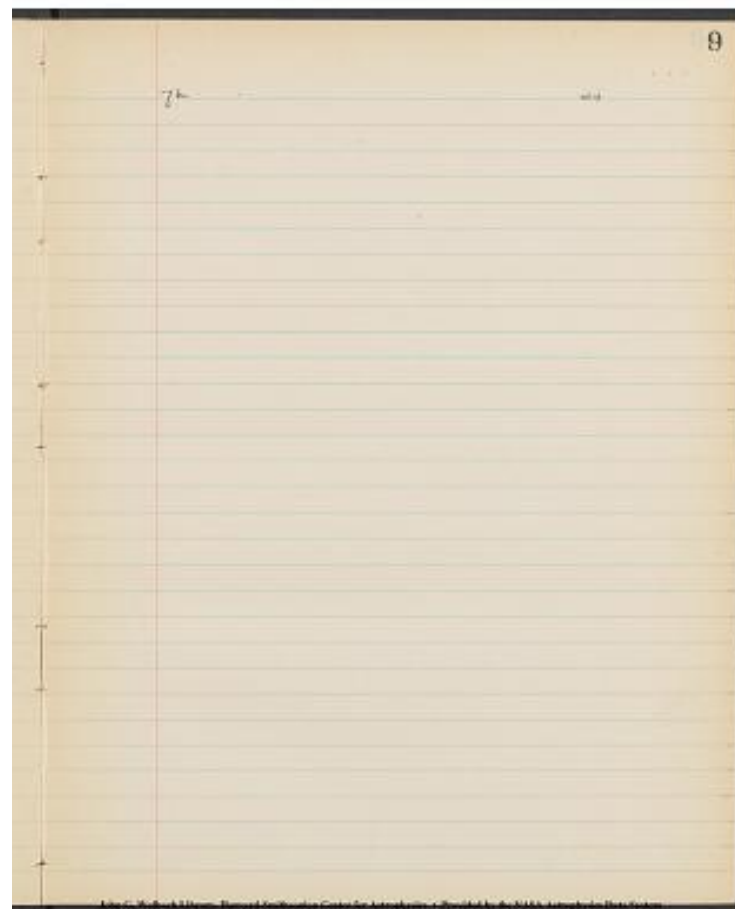
6h



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 9 [[/preprinted]]

7h

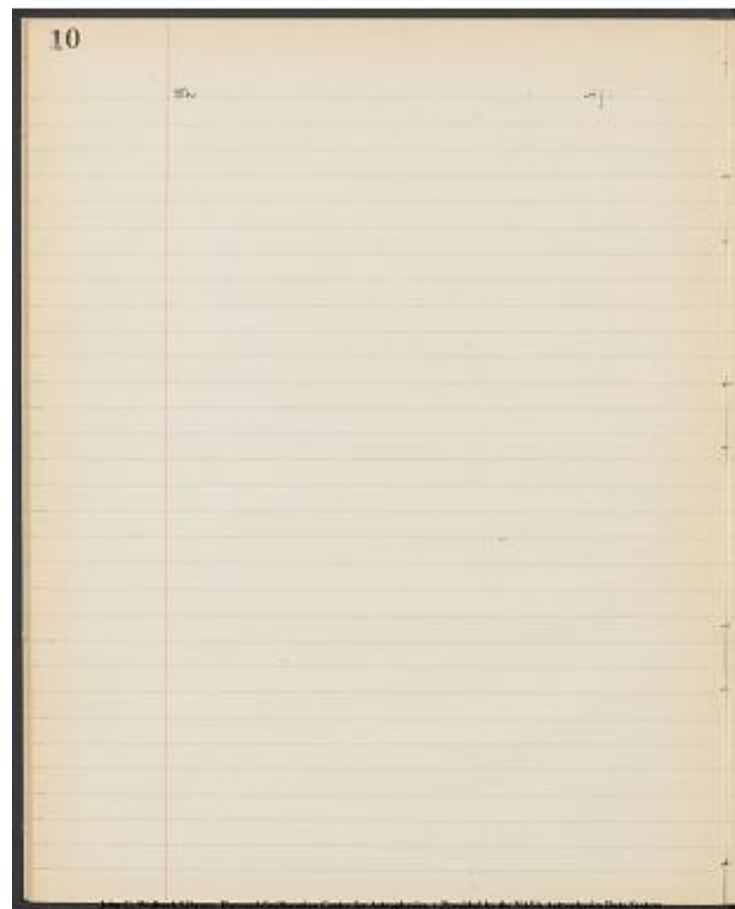


Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 10 [[/preprinted]]

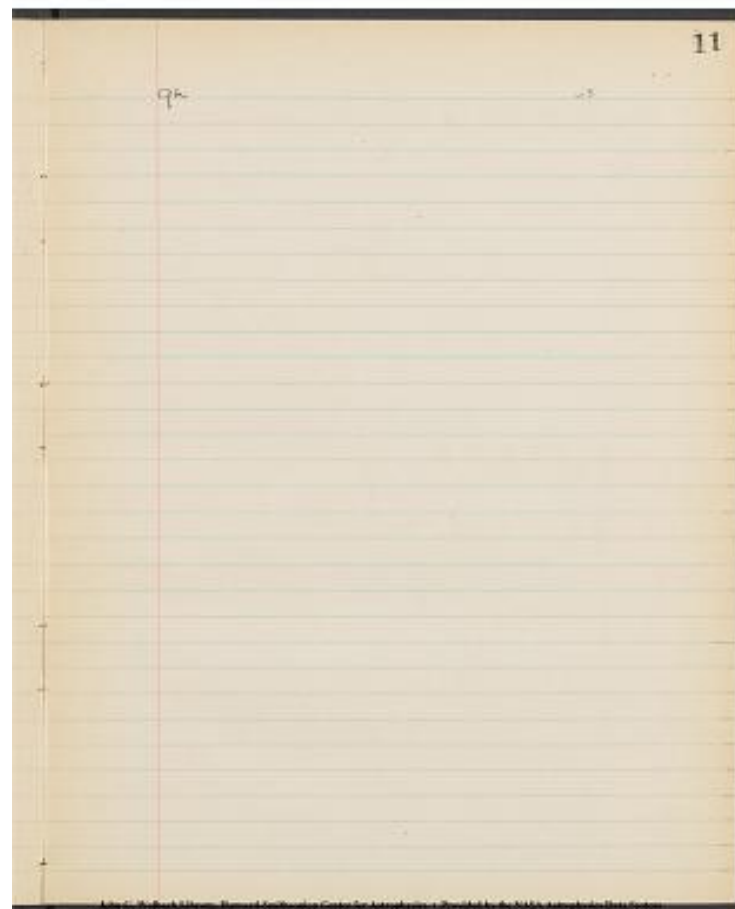
8h



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 11 [[/preprinted]]

9h



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 12 [[/preprinted]]

10h | Q | D | Page  
15437 | UH gamma a | 10 | 33 | -12 | 9 | 4 | 3 | 31

15426 | UH gamma a | "[[ditto for 10]] | "[[ditto for 33]] | "[[ditto for -12]] |  
"[[ditto for 9]] | 4 | 3 | ~~3~~

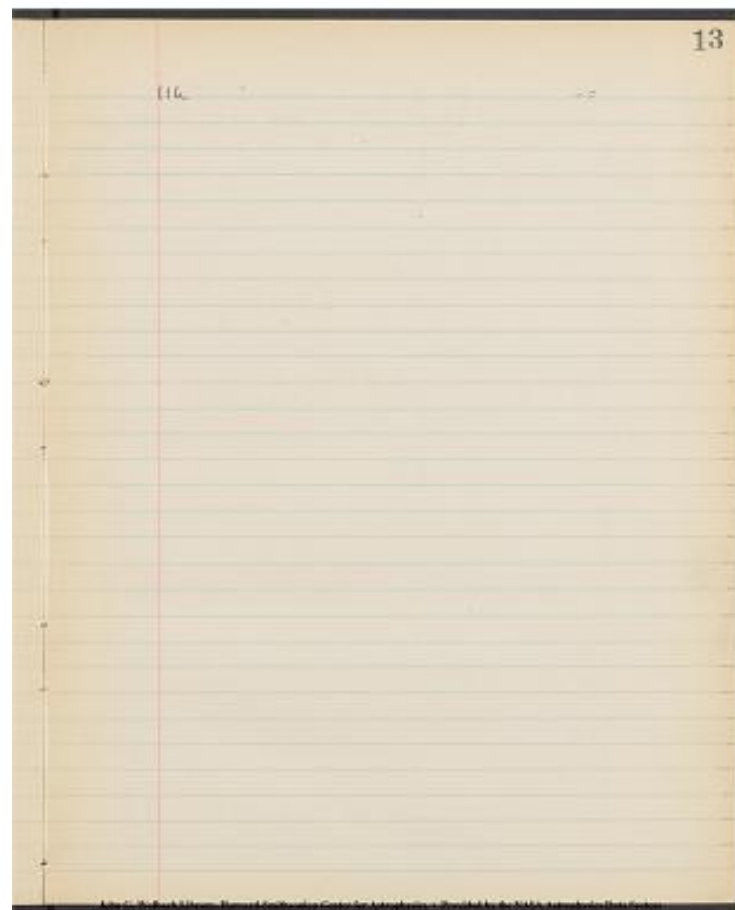
15384 | UH gamma a | "[[ditto for 10]] | "[[ditto for 33]] | "[[ditto for -12]] |  
"[[ditto for 9]] | 4 | 3 | --

12							
	10h			Q	D		Page
15437	UH gamma	n	33	-12	q	4	3
15426	UH gamma	"	"	"	"	4	3
15384	UH gamma	"	"	"	"	4	3

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 13 [[/preprinted]]

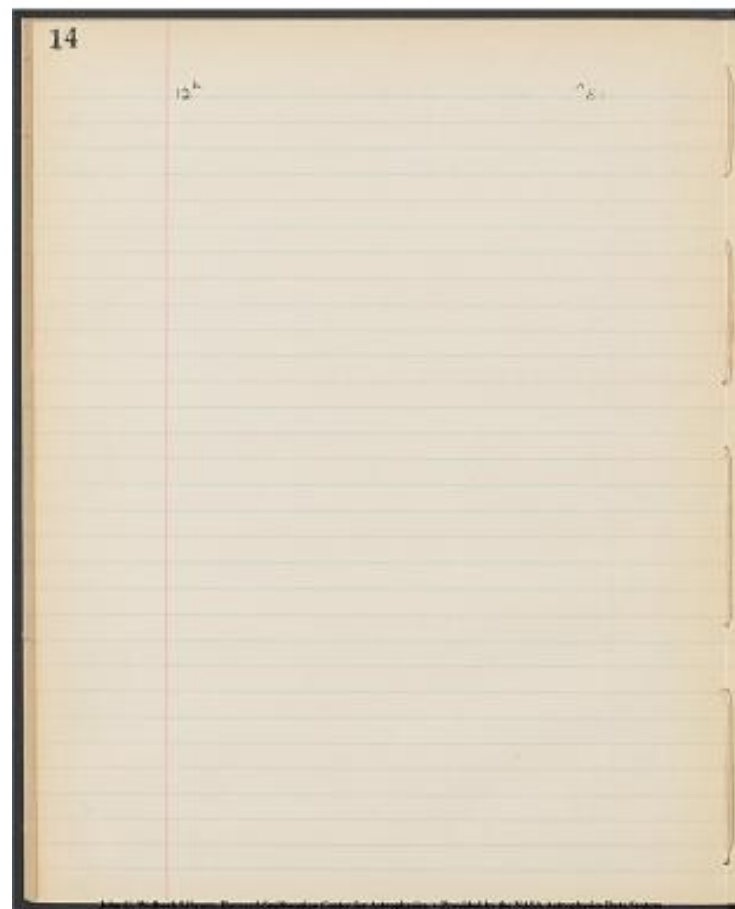
11h



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 14 [[/preprinted]]

12 <sup>h</sup>



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

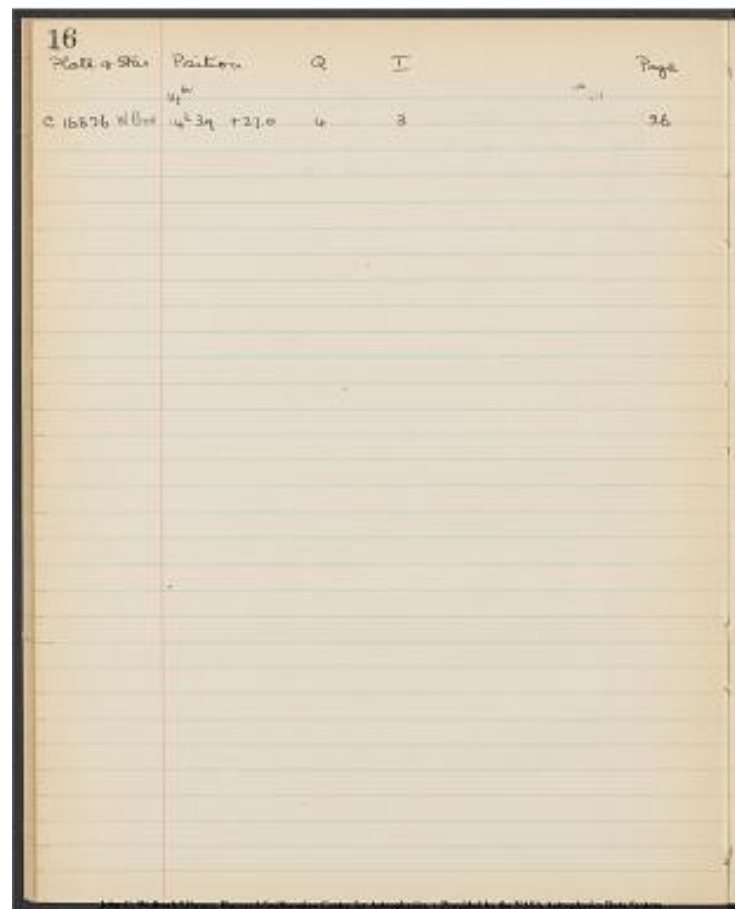
[[preprinted]] 15 [[/preprinted]]  
 [[table-4 columns]]  
 13 ^[[h]]|Q|D|Page  
 16822 83UMa13 37 +55.2|4|3|29  
 15396 RH gamma a 13 24.2 -22 8|4|2|32  
 15385 RH gamma a --- -----|3|2|

				15
	13 <sup>h</sup>	Q	D	Page
16822 83UMa13 37 +55.2	27	4	3	29
15396 RH gamma a 13 24.2 -22 8	22	4	2	32
15385 RH gamma a --- -----		3	2	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 16 [[/preprinted]]

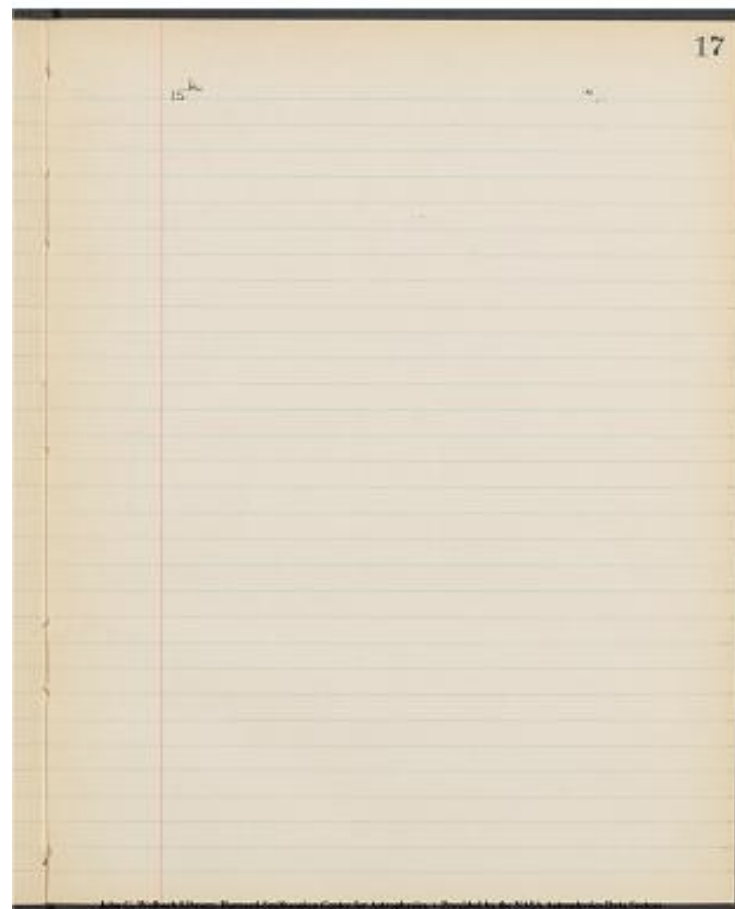
Plate & Star	Position	Q	I	Page
	14 ^[[h]]			
C 16826 W Boo	14 ^[[h]] 39 +27.0	4	3	26



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 17 [[/preprinted]]

15<sup>h</sup>

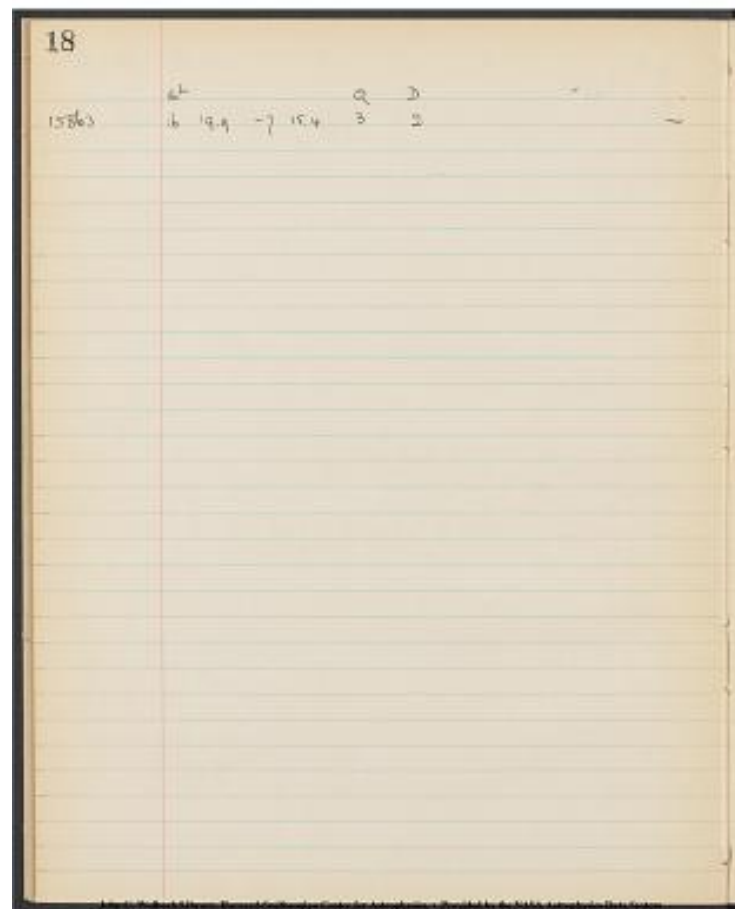


Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



18

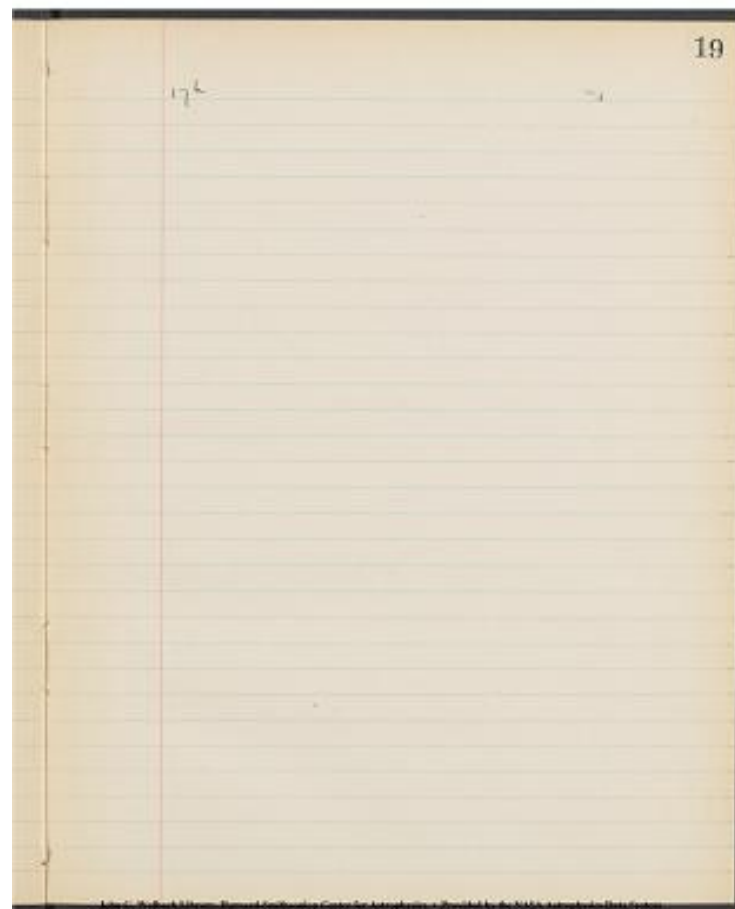
15863 | 16<sup>19.9</sup> -7 15.4 | 3 | 2 | —



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 19 [[preprinted]]

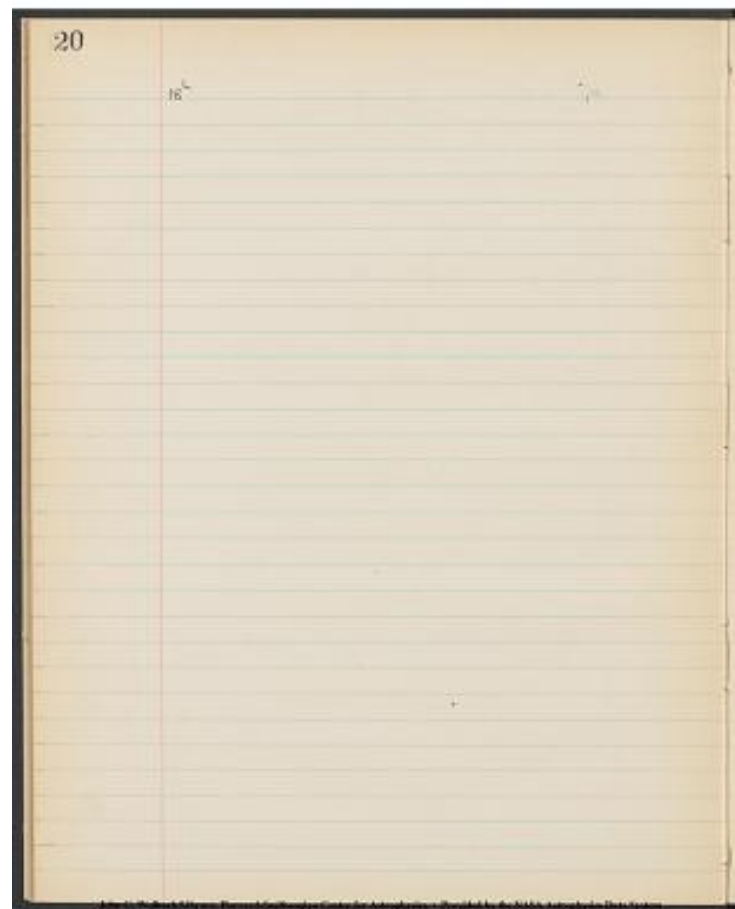
17<sup>h</sup>



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 20 [[preprinted]]

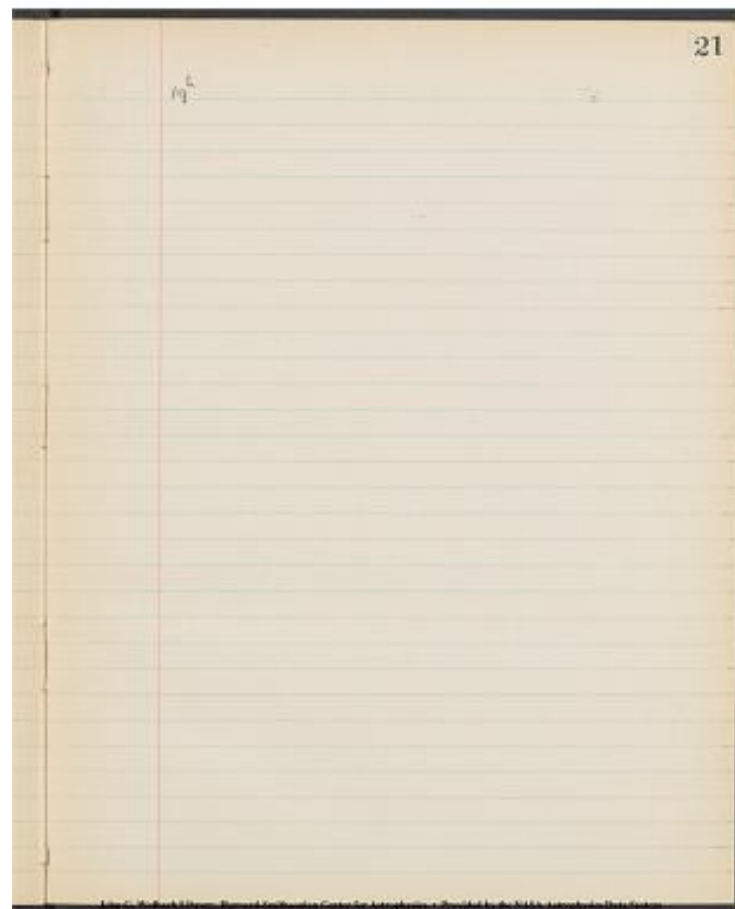
18<sup>h</sup> [[/superscript]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 21 [[preprinted]]

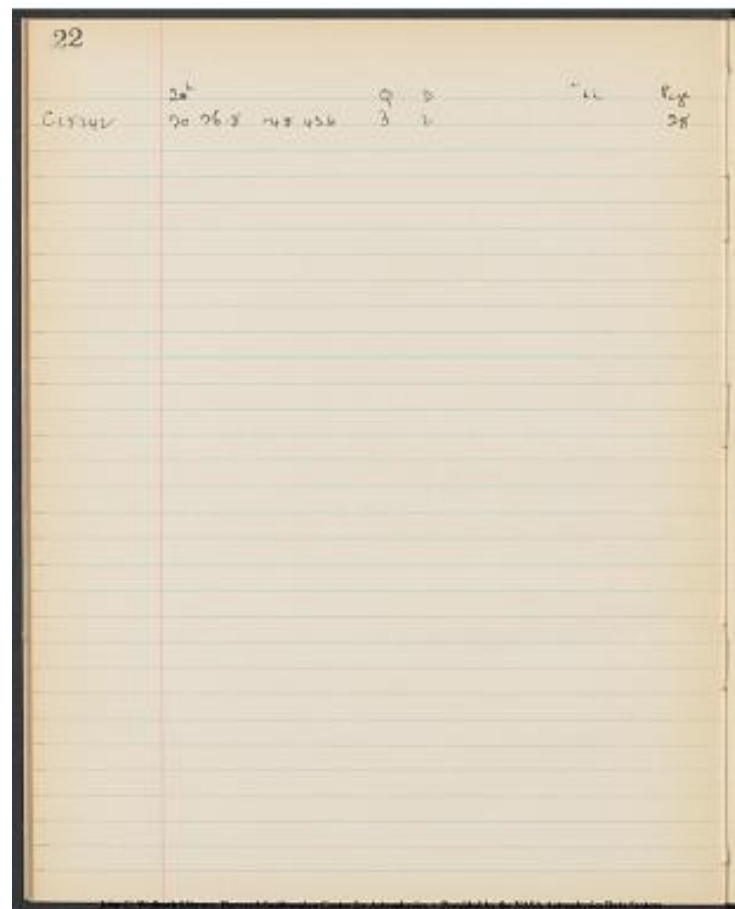
19<sup>h</sup>



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 22 [[preprinted]]

20 <sup>h</sup>	Q	D	Page
C15242   20 26.8 +48 43.6	3	2	28



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 23 [[/preprinted]]

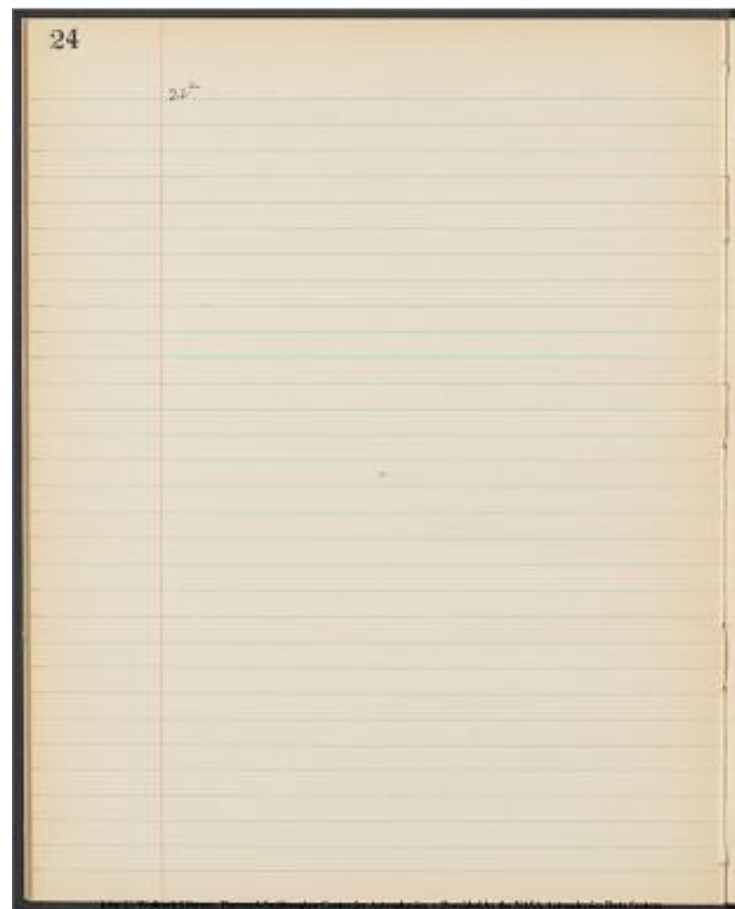
21<sup>h</sup> | 15899 | 21<sup>h</sup> | 42 | +60.7 | 3 | 2 | 27



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 24 [[/preprinted]]

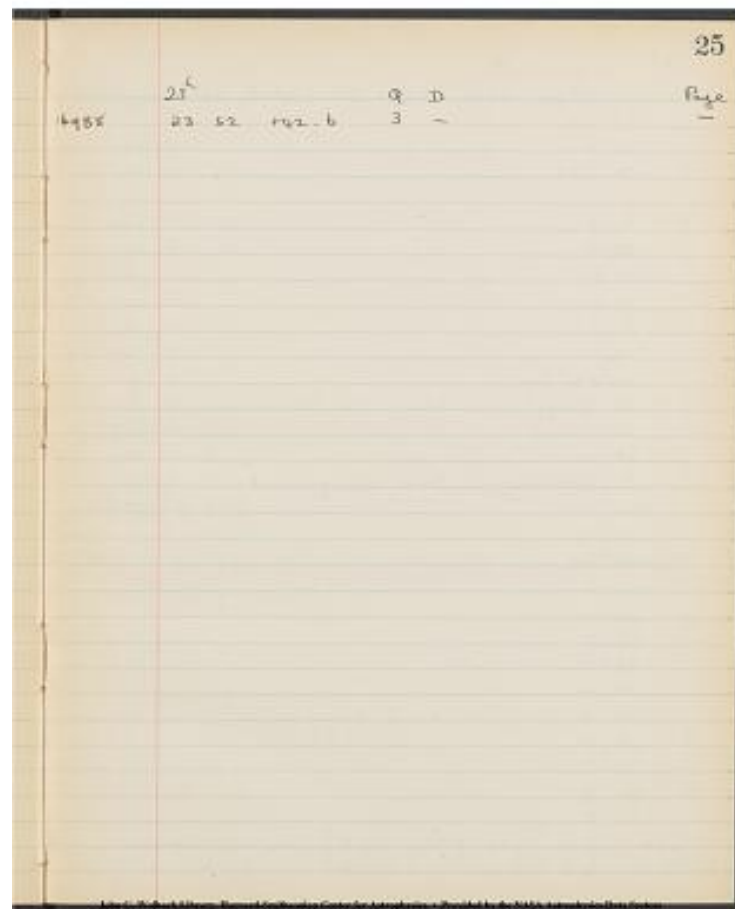
22^h



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 25 [[/preprinted]]

23<sup>h</sup> | Q | D | Page  
16988 | 23 | 52 | +42.6 | 3 | -- | --



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]26[[/preprinted]]

W Bootis

C 16826 ||| 14 <sup>h</sup>3q | +27.0 | Q4 D3 whole sp. hazy

15-18 ||| 7w  
19 ||| 3  
20 ||| 5w  
21 ||| 5  
21a ||| 3  
22 ||| 3  
23 ||| 6  
24 ||| 6w  
25, h ||| 5w  
26 ||| 5  
30 ||| 5w? hazy  
35 ||| 2 hazy  
36 ||| 11 hazy  
43 ||| 9w  
G ||| wide hazy, no lines distinguished

4315 ||| —

44 ||| 7

45, a ||| 6

47 ||| 6

49a? ||| 6

50 ||| 2

53 ||| 4

56 ||| 4

57 ||| 5

58,9 ||| 5

6, b ||| 5

63 ||| 5

69 ||| 2

C15423 ||| 5 50 | +7 23 | alpha Obi | Q4 D3 120 not measured

C15962 ||| 19 36 | +42.6 | Q4 D1 " "[ditto for not measured]]

26		W Bootis		C 16826	
		15-18	7w	15-18	7w
		19	3	19	3
		20	5w	20	5w
		21	5	21	5
		21a	3	21a	3
		22	3	22	3
		23	6	23	6
		24	6w	24	6w
		25, h	5w	25, h	5w
		26	5	26	5
		30	5w? hazy	30	5w? hazy
		35	2 hazy	35	2 hazy
		36	11 hazy	36	11 hazy
		43	9w	43	9w
		G	wide hazy, no lines distinguished	G	wide hazy, no lines distinguished
		4315	—	4315	—
		44	7	44	7
		45, a	6	45, a	6
		47	6	47	6
		49a?	6	49a?	6
		50	2	50	2
		53	4	53	4
		56	4	56	4
		57	5	57	5
		58,9	5	58,9	5
		6, b	5	6, b	5
		63	5	63	5
		69	2	69	2
		C15423	5 50   +7 23   alpha Obi   Q4 D3 120 not measured	C15423	5 50   +7 23   alpha Obi   Q4 D3 120 not measured
		C15962	19 36   +42.6   Q4 D1 " "[ditto for not measured]]	C15962	19 36   +42.6   Q4 D1 " "[ditto for not measured]]

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 27 [[/preprinted]]

12 Cephei

C 15899 21<sup>h</sup> 42 +60.7 Q 3 D2

35 ?  
36 9  
38a 9  
40 7  
41.a 10w  
44 8  
44a 4  
45;a 8  
+376 3  
47 7  
49 8  
50 6  
53 5  
54 5  
57 5  
58,9 6w

C15863 16 19.9 -7 15.4 Q 3 D2 poor but possible

12 Sep 11

C 15899 21<sup>h</sup> 42 +60.7 Q 3 D2

35	?
36	9
38a	9
40	7
41.a	10w
44	8
44a	4
45;a	8
+376	3
47	7
49	8
50	6
53	5
54	5
57	5
58,9	6w

C 15863 16 19.9 -7 15.4 Q 3 D2 poor but possible

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 28 [[/preprinted]]

w<sup>2</sup> 46 Cygni

C15242 20 26.8 148 43.6 Q 3 D2

35 seen

36 10?

43 8

G strong, con.

44 8

45 8

46 6

47 7

48a 7

[[strikethrough]] 49 [[/strikethrough]] 50 3

57 5

58,9 7d

63 7w

69 suspected: 1?



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 29 [[/preprinted]]

83 U Ma

C16822 13 37 +55.2 Q + D 3 very good

violet end badly scratched

23 8 ?  
24 9 ?  
26 6 ?  
29 6  
30 7  
35 3  
36 12  
38-40 13w  
41.2 12  
43 10w  
G strong, con  
4315 -  
44 9  
44a 4  
45 8  
46 4  
4360 4  
4370 3  
4376 3  
47 8  
49a 9  
50 4  
54 4  
55, 6 sli  
57 4  
58 5  
59 5  
63 8  
69 5

[[preprinted]]

John G. Wedbach Library, Harvard Smithsonian Center for Astrophysics

• Provided by the NASA Astrophysics Data System

[[/preprinted]]

83 U Ma

216822 13 37 +55.2 Q + D 3 very good  
violet end badly scratched

23 8 ?  
24 9 ?  
26 6 ?  
29 6  
30 7  
35 3  
36 12  
38-40 13w  
41.2 12  
43 10w  
G strong, con  
4315 -  
44 9  
44a 4  
45 8  
46 4  
4360 4  
4370 3  
4376 3  
47 8  
49a 9  
50 4  
54 4  
55, 6 sli  
57 4  
58 5  
59 5  
63 8  
69 5

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 30 [[/preprinted]]

o Ceti

C15467 2 14 -3 4 Q5 D4

6 11

7 8

4

9 ~~4~~ ~~4~~ ^4 8

10 10

3999 7

14 6

15-18 10W

19 3

20 8

21 4

23 8

24 11we

25,a 4,4

2b 4

30 6

35 6

36 11

38a 9

41,a 9

G 5,5

4315? 6w

44 -

45 10we

46 6

50 3

rest obliterated by bands

30	
C 15467	o Ceti
6 11	2 14 -3 4 Q5 D4
7 8	
4	
9 <del>4</del> <del>4</del> ^4 8	
10 10	
3999 7	
14 6	
15-18 10W	
19 3	
20 8	
21 4	
23 8	
24 11we	
25,a 4,4	
2b 4	
30 6	
35 6	
36 11	
38a 9	
41,a 9	
G 5,5	
4315? 6w	
44 -	
45 10we	
46 6	
50 3	
rest obliterated by bands	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 31 [[/preprinted]]

C15437 10 33 -12.9 U Hya Q4 D3

Suies uncertainty identified

35 6 G baud us, con.

36 7

43 6

44 5

45 -

47 7

50 6

53 -

54 -

55 3

56 3

9

9

10

61G 7

C15426 U Hya. Q4 D3 haze Not measured

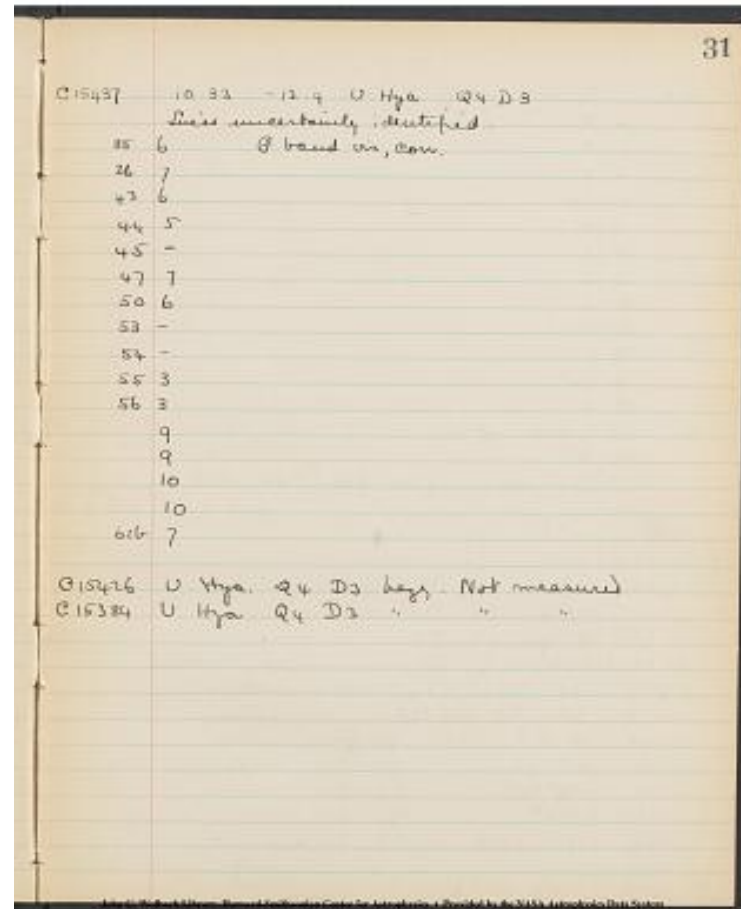
C15384 U Hya Q4 D3 " " [[ditto for haze Not measured]]

[[preprinted]]

John G. Wedbach Library, Harvard Smithsonian Center for Astrophysics

• Provided by the NASA Astrophysics Data System

[[/preprinted]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprint]] 32 [[/preprint]]

C15396 13 24.2 -22.8 R Hga ☒ Q4 D2 good in violet

7 8

9 8

10 9?

15-18 11w

19 4

20 8

21 2

23 7

24 8e

26 5

30 7w

36 9

35 to 36 wide and nr.

38a 8

Red end in poor focus, bonded

C15453 | o Ceti Q3 n.m.

C15433 | o Ceti Q4 ""

☒ C15425 | ☒ Ori Q5 D4 iso n.m.

☒ C15417 | ☒ Ori Q4 D4 iso ""

C15385 | R Hga Q3 D2 n.m.

16836.3 | DM 39<sup>0</sup>0<sup>0</sup>2193 Q4 D1 n.m. too faint

16988 | 2352 + 42.6. Q3i narrow. useless

17277 | 21h. Mb and Md useless

16795 | 10 56.8 -1<sup>0</sup>57 Q3.focus.useless

14866 | 21<sup>h</sup>39.6 Q3i. D2 useless.

16061 | +18<sup>0</sup>3817 Q4 D2 ""

16067 | 4<sup>h</sup>28<sup>m</sup>28<sup>s</sup> m<sup>0</sup>28<sup>s</sup> m<sup>0</sup>28<sup>s</sup>

Q4 D2 ""

16818 | 1347 +35.0 Q3 D4 narrow "

16647 | useless

16715 | 0 15.3 +37 57 ""

32

C15396 13 24.2 -22.8 R Hga ☒ Q4 D2 good in violet

7 8

9 8

10 9?

15-18 11w

19 4

20 8

21 2

23 7

24 8e

26 5

30 7w

36 9

35 to 36 wide and nr.

38a 8

Red end in poor focus, bonded.

C15453 | o Ceti Q3 n.m.

C15433 | o Ceti Q4 ""

☒ C15425 | ☒ Ori Q5 D4 iso n.m.

☒ C15417 | ☒ Ori Q4 D4 iso ""

C15385 | R Hga Q3 D2 n.m.

16836.3 | DM 39<sup>0</sup>0<sup>0</sup>2193 Q4 D1 n.m. too faint

16988 | 2352 + 42.6. Q3i narrow. useless

17277 | 21h. Mb and Md useless

16795 | 10 56.8 -1<sup>0</sup>57 Q3.focus.useless

14866 | 21<sup>h</sup>39.6 Q3i. D2 useless.

16061 | +18<sup>0</sup>3817 Q4 D2 ""

16067 | 4<sup>h</sup>28<sup>m</sup>28<sup>s</sup> m<sup>0</sup>28<sup>s</sup> m<sup>0</sup>28<sup>s</sup>

Q4 D2 ""

16818 | 1347 +35.0 Q3 D4 narrow "

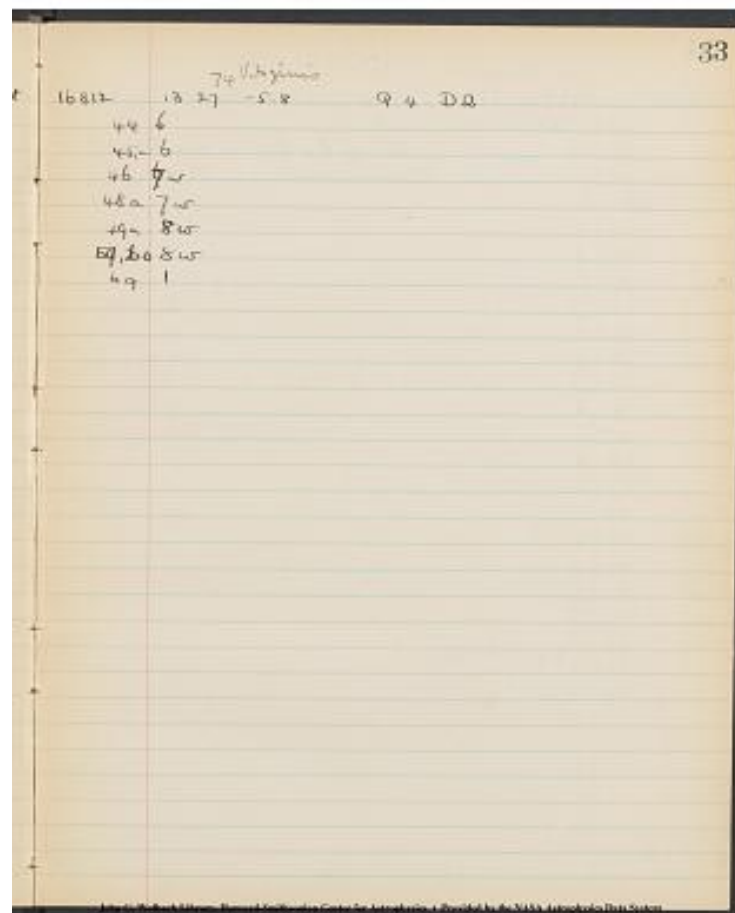
16647 | useless

16715 | 0 15.3 +37 57 ""

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 33 [[/preprinted]]

74 Virginia  
16812 13 27 -5.8 Q4 D2  
44 6  
45 6  
46 7w  
48a 7w  
+9a 8w



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 34 [[/preprinted]]

7 Pegasi  
14875 21h37 +5.2 Q4 D3 excellent  
44 7  
44a 4 Is this ~~is~~  
~~1~~ the star in question?  
45 7 Class more K  
436 6  
4360 5  
4370 5  
4376 5  
47 6  
48a 7  
50 4  
53 6  
54 6  
55 4  
56 5  
57 6  
58 5  
59 6  
60 4  
61 4  
61a 5  
62 5 bright between  
63 5  
69 -

34  
7 Pegasi  
14875 21h37 +5.2 Q4 D3 excellent  
44 7  
44a 4 Is this the star in question?  
45 7 Class more K  
46 6  
4360 5  
4370 5  
4376 5  
47 6  
48a 7  
50 4  
53 6  
54 6  
55 4  
56 5  
57 6  
58 5  
59 6  
60 4  
61 4  
61a 5  
62 5 bright between  
63 5  
69 -

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 35 [[/preprinted]]

57 Pegasi Mb  
16q85 23 4.5 + 8.8 Q4D2  
contrast very slight  
35 -  
36 12?  
43 107  
G con  
4315 2  
44 6  
45 6  
46 5  
47 5  
49 6  
50 2  
53 3  
54 4  
57 4

57 Pegasi Mb			35
16q85	23 4.5 + 8.8	Q4D2	
		contrast very slight	
35	-		
36	12?		
43	107		
G	con		
4315	2		
44	6		
45	6		
46	5		
47	5		
49	6		
50	2		
53	3		
54	4		
57	4		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 36 [[/preprinted]]

55 Pegasi

16q87 23 oq -6,6 Q4D3 good

15-18 q

19 2

20 6

21 6

22 6

23 6

24 6

28 6

30 5?

35 4

36 11

38a 12

43 Q

G 5,

11

4315 i?

44 9

45 9

46 8

47 9

49 10

50 4

53 4

54 4

55 [and] 56 8w

57 6

5819 7w

63 7

69 -

36	
16q87	23 oq -6,6 Q4D3 good
15-18 q	
19 2	
20 6	
21 6	
22 6	
23 6	
24 6	
28 6	
30 5?	
35 4	
36 11	
38a 12	
43 Q	
G 5,	
11	
4315 i?	
44 9	
45 9	
46 8	
47 9	
49 10	
50 4	
53 4	
54 4	
55 [and] 56 8w	
57 6	
5819 7w	
63 7	
69 -	

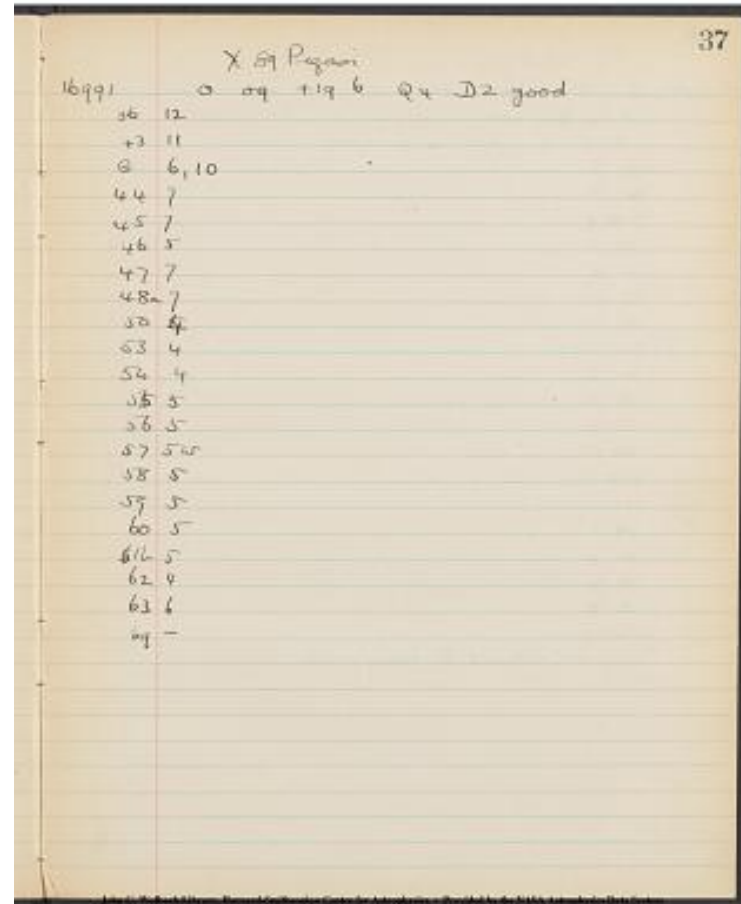
Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 37 [[/preprinted]]

X S9 Pegasi

16991 O 09 +19 6 Q4 D2 good

36 12  
43 11  
G 6,10  
44 7  
45 7  
46 5  
47 7  
48a 7  
50 4 [overwritten 5]  
53 4  
54 4  
55 5  
56 5  
57 5w  
58 5  
59 5  
60 5  
61b 5  
62 4  
63 6  
69 -



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[preprinted]38[/preprinted]  
 HR1693  
 C17222.3 5<sup>h</sup> 4 36.9. MG. Q 3 D4 very narrow  
 6|12 focus poor  
 10|14 " "  
 3999|5  
 14|5  
 15-18|9  
 20|7  
 21|4  
 23|6  
 26|5  
 30|5w  
 35|2  
 36|11  
 43|6  
 4300|5  
 4308|2  
 4315|-  
 4 ~~3~~ ~~3~~ |3  
 45|4  
 46|4  
 50|3  
 54|4  
 rest obscured by heavy bands

38	
HR 1693	
C 17222.3	5 <sup>h</sup> 4 36.9 MG. Q 3 D4 very narrow
6	12 focus poor
10	14 " "
3999	5
14	5
15-18	9
20	7
21	4
23	6
26	5
30	5w
35	2
36	11
43	6
4300	5
4308	2
4315	-
4 <del>3</del> <del>3</del>	3
45	4
46	4
50	3
54	4
rest obscured by heavy bands	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 39[[/preprinted]]  
 30 Piscium Mb  
 C 17007.2 23 56.8 -6 35 Q4 D2  
 plate heavily fogged except just around spectrum. Poor and hazy  
 [[table- 2 columns]]  
 44| 8  
 45| 8  
 46| 5  
 4360| 4  
 4476| 4  
 47| 7  
 48a| 8  
 50| 3  
 53| 4  
 54| 5  
 [[arrow pointing down to two rows below]] 63| 7  
 69| 1  
 57| 1  
 58,9| 7

39

30 Piscium Mb

C 17007.2 23 56.8 -6 35 Q4 D2

plate heavily fogged except just around spectrum - poor and hazy

44	8
45	8
46	5
4360	4
4476	4
47	7
48a	8
50	3
53	4
54	5
63	7
69	1
57	1
58,9	7

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]40[[/preprinted]]  
 51 geminorum Mb  
 C 16410 7 7 7.7 +16 3 Q3 D4  
 very narrow  
 [[table-2 columns]]  
 15-18|9  
 20|7  
 23|4  
 24|2  
 26|1  
 30|2  
 35|-  
 36|11  
 43|7  
 G| wide hazy  
 44|8  
 45|5  
 46|3  
 47|2  
 [[end table]]  
 nothing else measurable  
 C16755 6 2.8 -21 48 useless. hazy.

40

51 Geminorum Mb

C 16410 7 7.7 +16 3 Q3 D4

very narrow

15-18	9
20	7
23	4
26	2
30	1
35	2
36	11
43	7
G	wide hazy
44	8
45	5
46	3
47	2

nothing else measurable

C16755 6 2.8 -21 48 useless. hazy.

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]41[[/preprinted]] Psi Virgins MG  
 C 16807 12 49 -9.0 Q3 D3  
 very narrow  
 [[table-2 columns]]  
 15-18|9  
 20|7  
 23|2  
 24|4  
 28|2  
 35|1  
 36|11 hazy  
 43|4  
 G| wide hazy  
 44|4  
 45|5  
 46|3  
 47|2  
 [[end table]]  
 nothing else measurable



Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



17055|23 53 +24.6 Pegasi Ma ~~[[strikethrough]]~~ Mb ~~[/strikethrough]~~  
 Excellent. Q5D3  
 15-18|10 50|6  
 20|7|53|7  
 21|5|54|7  
 22|5|55|4  
 23|7|56|5  
 24|8|57|5w  
 26|7|58|7  
 30|6|59|7  
 35|2|60|7  
 36|11|61|6  
 38a|9|61b|6  
 40|7|62|6  
 41a|8|63|6  
 42|8|69|1?  
 43|8  
 G|7  
 J|8  
 4315|5  
 J|3  
 44|8  
 J|3  
 59|9d  
 46|7  
 4360|5  
 70|5  
 76|6  
 47|7  
 48|3  
 48a|3  
 49|7  
 49a|7

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]43[[/preprinted]]  
 Other plates- 119 Lauri Ma  
 C17262, 63, 64, 67 and ~~C172819, 2532, 2622, 10493,~~  
 26272, 10493.  
 C17247 HP 1003. 5, 26 +18.5 P3i D3  
 [[table-2 columns]]  
 15-18|10  
 19|4  
 20|7  
 21|3  
 22|3  
 23|8  
 24|7  
 26|5  
 30|6  
 35|6  
 36|8  
 43|7  
 G|wide  
 44|6  
 45|8  
 46|6  
 47|7  
 48a|7  
 53|4  
 54|6  
 57|6  
 58|4  
 59|4  
 61G|5  
 62|5  
 63|7  
 69|5

43

Other plates - 119 Lauri Ma  
 C17262, 63, 64, 67 and ~~C172819, 2532, 2622, 10493,~~  
 26272, 10493.  
 C17247 HP 1003. 5, 26 +18.5 P3i D3

15-18	10
19	4
20	7
21	3
22	3
23	8
24	7
26	5
30	6
35	6
36	8
43	7
G	wide
44	6
45	8
46	6
47	7
48a	7
53	4
54	6
57	6
58	4
59	4
61G	5
62	5
63	7
69	5

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]44[[/preprinted]]

DM12707 26 [[best guess- Eridani]] Ma  
C17197 3 41 -12.4 Q3 D5 burnt out in red end.

[[table-two columns]]

6|11  
7|7  
9|7  
10|11  
3999|6  
14|5  
15|11  
19|3  
20|7  
21|6  
22|4  
23|7  
24|6  
25,a|5  
26|6  
30|5  
35|3  
36|9  
43|6  
G|5  
|6  
44|6  
45|6  
46|3  
47|5  
48|5  
50|3

[[end table]]  
rest burnt out

44	DM12707 26 Eridani Ma
17197	3 41 -12.4 Q3 D5 burnt out in red end.
6	11
7	7
9	7
10	11
3999	6
14	5
15	11
19	3
20	7
21	6
22	4
23	7
24	6
25,a	5
26	6
30	5
35	3
36	9
43	6
G	5
	6
44	6
45	6
46	3
47	5
48	5
50	3
	rest burnt out

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 45 [[/preprinted]]

HR 1105 - Camelopardalis Ma  
c17183 HP 583. 3 34 + 62.9 + 62.597. Q3D3 very poor.  
23 8 background much fogged  
24 8  
35 7  
36 8  
43 8  
44 6  
45 7  
47 4  
48 7 w  
63 7  
c17181 1 52 33 + 62 558 (Md) + 62° 2007. useless

45

HR 1105 - Camelopardalis Ma

c17183 HP 583. 3 34 + 62.9 + 62.597. Q3D3 very poor.  
background much fogged

23	8
24	8
35	7
36	8
43	8
44	6
45	7
47	4
48	7 w
63	7

c17181 1 52 33 + 62 558 (Md) + 62° 2007. useless

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 46 [[/preprinted]]

Map  
C 15424 5 50 +7 23 Orionis Q5 D 4 isochromatic?  
6|13 58|6w  
9|6 63|7  
10|12 69|6  
3<sub>999</sub> 6  
14|5  
15|11  
20|9  
21|5  
[[22?]]|4  
23|8  
24|9  
26|6  
30|7w  
35|5  
36|10  
+3|8  
G|7  
|7  
4315|3  
44|7  
45|7  
46|4  
4360|3  
47|7  
4[[greek delta symbol]]a|7  
53|4  
54|4  
55  
58[[bracket symbol encloses both 55 & 58]] 9w  
57|6

46		Map		C 15424 5 50 +7 23 Orionis Q5 D 4 isochromatic?		X
6	13	58	6w			
9	6	63	7			
10	12	69	6			
3999	6					
14	5					
15	11					
20	9					
21	5					
[[22?]]	4					
23	8					
24	9					
26	6					
30	7w					
35	5					
36	10					
4315	3					
44	7					
45	7					
46	4					
4360	3					
47	7					
4[[greek delta symbol]]a	7					
53	4					
54	4					
55						
58	9w					
57	6					

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 47 [[/preprinted]]

X5270 HR583. 1 55 -21 34 Ceti Q 4 D4 excellent

15|11 48|4

19|3 48a|8

20|8 49|6

21|6 50|7

21a|3 53|7

22|6 54|7

23|8 55|6

24|6,[[underlined]] 6 [[/underlined]] 56|6

26|7 57|7

30|7w 58|7

35|6 59|7

36|11 61|5w

36b|5 61b|6

38|6 62|5

39|8 63|6

40|7

41|6

42|6

43|7

G 4300|6

4308|9

4315|4

44|8

45|5,5

46|7

4360|6

4370|6

4376|6

47|8

X 5270				HR 583. 1 55 -21 34 Ceti Q 4 D4 excellent			
15	11			48	4		
19	3			48a	8		
20	8			49	6		
21	6			50	7		
21a	3			53	7		
22	6			54	7		
23	8			55	6		
24	6, 6			56	6		
26	7			57	7		
30	7w			58	7		
35	6			59	7		
36	11			61	5w		
36b	5			61b	6		
38	6			62	5		
39	8			63	6		
40	7						
41	6						
42	6						
43	7						
G 4300	6						
4308	9						
4315	4						
44	8						
45	5,5						
46	7						
4360	6						
4370	6						
4376	6						
47	8						

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

MG  
X5312 360 -61 22 gamma Reticuli Q4 D3  
[[table-2 columns]]  
35|7  
36|11  
43|8  
4300|6  
4305|8  
4315|5  
44|7  
45|7  
[[~~strikethrough~~]]4360[[/del]]46|6  
4360|5  
4370|3  
4376|5  
47|6  
48a,9|10  
50,6  
53,4|6,6  
57|6  
58|5  
59|5  
61G|5 [[bracket over this to the end of table]]  
62|6  
63|6  
in band

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]49[[/preprinted]]

[[table headings-two columns]]

Ma | KS

delta Reticuli | iota Reticuli

[[table-4 columns]]

44|8 | 44|9

45|8 | 4

46|7 | 45|8

4360|5 | 46|7

4370|4 | 47|8

4376|5 | 48,9|8

47|8 | 50|6

48,9|8 | 53|4

50|5 | 54|4

55|5 | 57|5

56|6 | 58,9|8

57|6 | 60|3

58|5 | 63|7

59|6 |

60|4

61|3

616|5

62|4

63|6

[[end table]]

X5297 same region Q3D3 good. [[nw?]].

Ma		KS	
delta Reticuli		iota Reticuli	
44	8	44	9
45	8		4
46	7	45	8
4360	5	46	7
4370	4	47	8
4376	5	48,9	8
47	8	50	6
48,9	8	53	4
50	5	54	4
55	5	57	5
56	6	58,9	8
57	6	60	3
58	5	63	7
59	6		
60	4		
61	3		
616	5		
62	4		
63	6		
X5297 same region		Q3D3 good. nw.	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]50[[/preprinted]]

x4717 10 34 -78 6  $\gamma$  Chamaeleontis Q4 D3 excellent  
[[table-2 columns]]

26|8

30|7

35|6

36|12

43|7

4300|6

4308|9

4315|~~6~~5

44|7

45|8wd

46|7

4360|5

4370|5

4376|6

47|8

48,a|9

50|7

53|7

54|7

55|4

56|8

57|7

58|6

59|7

60|4

61|4w

61b|6

62|5

63|6

[[end table]]

50	
x4717	10 34 -78 6 $\gamma$ Chamaeleontis Q4 D3 excellent
26	8
30	7
35	6
36	12
43	7
4300	6
4308	9
4315	<del>6</del> 5
44	7
45	8wd
46	7
4360	5
4370	5
4376	6
47	8
48,a	9
50	7
53	7
54	7
55	4
56	8
57	7
58	6
59	7
60	4
61	4w
61b	6
62	5
63	6

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]51[[/preprinted]]  
 X4782 A Capricorni 21 1 -25 24 Q3 D2  
 44 qw  
 45 7  
 46 6  
 4360 5  
 4370 2?  
 4376 2?  
 47 8  
 48,9 8  
 50 6  
 53 5  
 54 5  
 57 5  
 03 8w



Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 52 [[/preprinted]]

X4387 20 45.9 -27 17 omega Capricorni AGC 28598 Q3D4

[[table-2 columns]]

35|5

36|11

43|6

4308|7

44|8

45|7

46|6

4376|4

47|7

48.9|7

50|5

53|5

54|5

55|3

56|4

57|6

61b|4

62|4

63|7

[[end table]]

X9413 19 59.7 -5310 too hazy

52	
X4387	20 45.9 -27 17 omega Capricorni AGC 28598 Q3D4
35	5
36	11
43	6
4308	7
44	8
45	7
46	6
4376	4
47	7
48.9	7
50	5
53	5
54	5
55	3
56	4
57	6
61b	4
62	4
63	7
X9413	19 59.7 -5310 too hazy

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 53 [[/preprinted]]

X5562 9 17.1 -25 32 Theta Pyocides[[?]] phi3D3 very hazy useless

X5070 H Scorpii 1630-353 phi3D3 very hazy

35|7

36|12

43|6

G|5

|8

|4

| (4)

44|7

|4

45|7

46|6

4360|4

4370|4

4376|5

67|8

48|6

48aq|8

[[strikethrough]]69[[/strikethrough]]50|6

53|6

54|6

56|5

57|6

58|6

59|6

619|2

612|5

62|2

63|6

53

X5562 9 17.1 -25 32 Theta Pyocides phi3D3 very hazy useless.

X5070 H Scorpii 1630-353 phi3D3 very hazy

35	7
36	12
43	6
44	5
45	8
46	4
47	4
48	7
49	6
50	6
51	6
52	6
53	6
54	6
55	6
56	6
57	6
58	6
59	6
60	2
61	5
62	2
63	6

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]54[[/preprinted]]

X5271 3 15 -22 7 Tau<sub>4</sub> Eridani. Q5D3 excellent.

15|10

20|10

21|6

22|4

23|7

24|6w

26|6

30|5w

35|5

36|11

37|5

38|6

38a|7

40|6

41,2|12w

43|7

4300|6 [[sidenote]]not con[[/sidenote]]

4308|8 [[sidenote]]not con[[/sidenote]]

4315|6 [[sidenote]]not con[[/sidenote]]

44|8

|4

45|10d

46|8

4360|5

4370|5

4376|6

47|8

48|10d

50|7

53|7

54|7

55|5

56|5

57|7

58|7

59|7

60|4

54			
X 5271	3 15 -22 7	Eridani Q5D3 excellent	
15	10	55	5
20	10	56	5
21	6	57	7
22	4	58	7
23	7	59	7
24	6w	60	4
26	6		
30	5w		
35	5		
36	11		
37	5		
38	6		
38a	7		
40	6		
41,2	12w		
43	7		
4300	6	} not con	
4308	8		
4315	6		
44	8		
	4		
45	10d		
46	8		
4360	5		
4370	5		
4376	6		
47	8		
48	10d		
50	7		
53	7		
54	7		
55	5		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]55[[/preprinted]]

Edee & Valuita

Home

I1 Head of 4314 loud very pronounced; running too

[[table-2 columns]]

5 KCl|4047,4044 only lines

6 Rb|4216,4202

7 Co|4593,4555

8-10 Ca salts|6265 very strong

|5543,5517

12 SrCl<sub>2</sub>|4608

II 3-5 Cu|4651 not strong

7 MnCl<sub>2</sub>|4035,33,31

8 Pb|4062

III. 1 Mg|4571

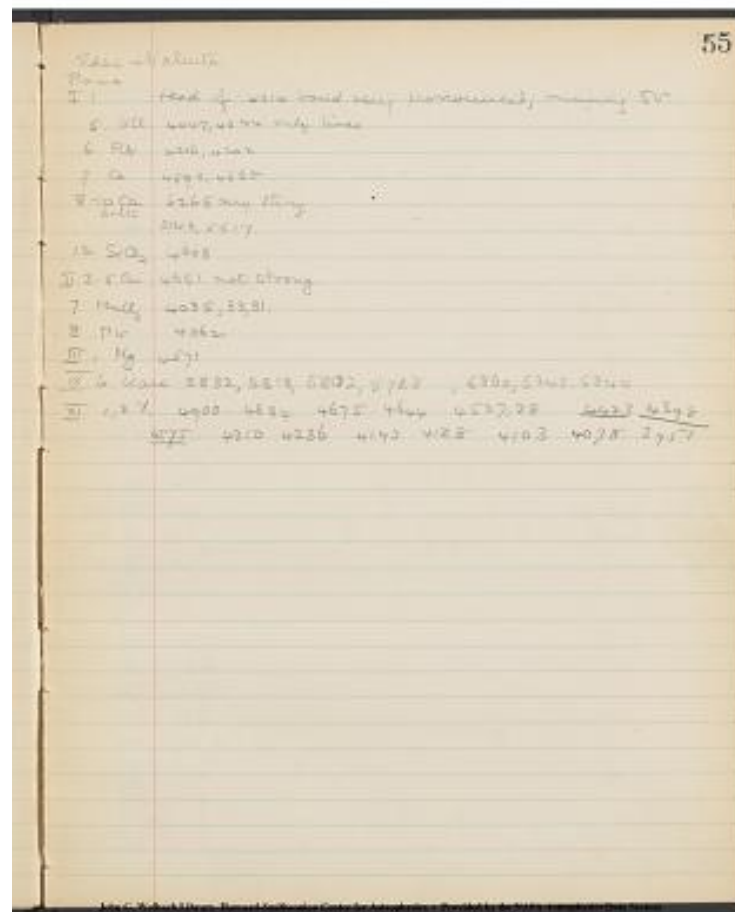
IX.6 [[arc?]]|5832,5813,5802,5783,6360,5343,5340

XI. 1,2 Y.|4900. 4884. 4675 4644 4527,28

[[underlined]]4423[[/underlined]] [[underlined]]4398[[/underlined]]

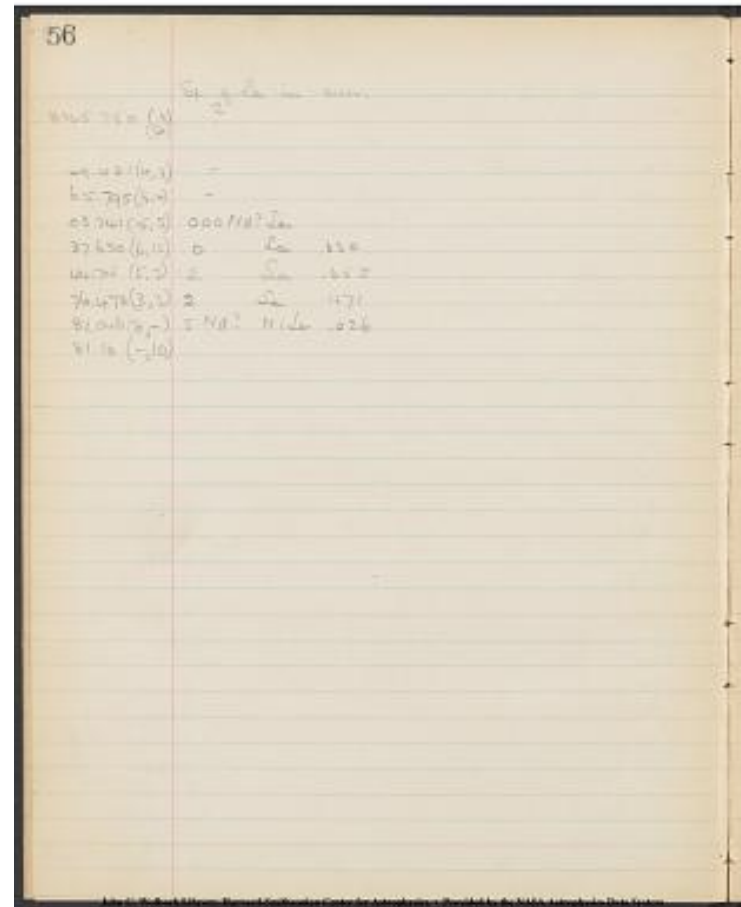
[[underlined]]4375[[/underlined]] 4310 4236 4143 4128 4103 4078 3951

[[end table]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]56[[/preprinted]]  
 Sp. of Sa in sun.  
 [[table-2 columns]]  
 3245.250 (5)?  
 (4)|  
 49.481(4,3)-  
 65.795(5,4)-  
 03.241(5,5)|000Nd? La  
 37.630(6,15)|0 La .630  
 44.705(5,7)|2 Sa .655  
 76.472(3,3)|2 Sa .471  
 81.046(8,-)|5Nd? NiLa .026  
 81.10(-,10)|  
 [[end table]]



Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

Identification of standard lines in C15698.2  
 12<sup>h</sup> 22.2 +24° 24.6 m=5.7  
 +24° 24.6  
 marked on plate  
 7|H  
 11|K On 2 prism Xstd alpha Centauri  
 15=~~15~~3999  
 16=~~20~~14  
 18=15  
 19=20  
 20=21  
 21=21a  
 22=22  
 23=23  
 25=24  
 28=26  
 30=30  
 35=35  
 3~~4~~5=35  
 3~~5~~6=36  
 37~~38~~=38  
 38~~39~~=39  
 40~~41,a~~=41,a  
 44=44  
 45=45  
 46=46  
 5~~4~~0=47  
 51=48a  
 53=~~4~~53,4  
 57=57  
 74=69  
 [[end table]]

57

Identification of standard lines in C15698.2

marked on plate		12° 22.2	+24° 24.6	m=5.7	+24° 24.6
7	H				
11	K	On 2 prism Xstd alpha Centauri			
15	<del>15</del>	3999			
16	<del>20</del>	14			
18	15				
19	20				
20	21				
21	21a				
22	22				
23	23				
25	24				
28	26				
30	30				
35	35				
3 <del>4</del>	5	35			
3 <del>5</del>	6	36			
37 <del>38</del>		38			
38 <del>39</del>		39			
40 <del>41,a</del>		41,a			
44	44				
45	45				
46	46				
5 <del>4</del>	0	47			
51	48a				
53	<del>4</del>	53,4			
57	57				
74	69				

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

H 2293 epsilon ori x | 16 | 5 | 4 | lines weak  
 H 2210 alpha Lyr x | 14 | 5 | 4 | [[empty]]  
 H 2213 alpha Lyr x | 13 | 4 | 4 | focus rather poor  
 H 2283 alpha CMa [[tick]] | - | - | - | too dark  
 H 2158 alpha Lyr x | 13 | 4 | 3 | xx Quartz prisma  
 H 2212 alpha Lyr x | 14 | 4 | 4 | [[empty]]  
 H 2226 alpha Cyg x | 18 | 4 | 5 | violet strong  
 H 2218 alpha Oph [[tick]] | 12? 13? | 4 | 3 | " weak  
 H 2282 gamma Ori x | 13 or 14? | 3 | 4 | focus rather poor lines  
 H 2211 alpha Lyr x | 14 | 4 | 4 | weak  
 H 2280 alpha CMa [[tick]] | 14 | 4 | 5 | violet strong  
 H 2275 beta Ori x | 16 | 4 | 5 | [[empty]]  
 H 2276 beta Ori x | 15 | 4 | 5 | [[empty]]  
 H 2273 beta Ori [[crossed tick]] | 16 | 4 | 5 | [[empty]]  
 H 2277 beta Ori [[crossed tick]] | 16 | 4 | 5 | focus rather poor

## Miscellaneous plates

Plate + Prisma | Star | No. lines | Q | D  
 C6156 | 2 x beta Ori | 15 | 5 | 3 | 16 suspected. vt ft  
 C 171 | 1 x alpha [[?]] | 13 | 4 | 4 | vt ft. focus poor.  
 C 170 | 1 x alpha [[?]] | 14 | 4 | 4 | vt ft  
 C 173 | 1 x alpha [[?]] | 14 | 4 | 4 | " "[ditto for vt ft]  
 C 287 | 1 x gamma Lyr | 15 | 4 | 4 | vt falls off  
 C 1984 | 1 x alpha Cyg | 17 seen | 4 | 4 | vt falls off  
 x 7632 | 2 x beta Cru | 13 | 5 | 3 | 3 expo continued  
 x 9652 | 2 x beta Cru | 13 | 5 | 3 | [[empty]]  
 x 9665 | 2 x beta Cru | 13 | 4 | 3 | [[empty]]  
 x 9695 | 2 x beta Cru | 13 | 4 | 3 | [[empty]]  
 x 4857 | 1 x gamma Cen | 14 | 4 | 4 | [[empty]]  
 C 3104 | 1 x beta Ori | 16 | 5 | 5 | excellent.

59

H 2293	epsilon ori	16	5	4	lines weak
H 2210	alpha Lyr	14	5	4	
H 2213	alpha Lyr	13	4	4	focus rather poor
H 2283	alpha CMa	-	-	-	too dark
H 2158	alpha Lyr	13	4	3	xx Quartz prisma
H 2212	alpha Lyr	14	4	4	
H 2226	alpha Cyg	18	4	5	violet strong
H 2218	alpha Oph	12 <sup>2</sup> 13 <sup>2</sup>	4	3	" weak
H 2282	gamma Ori	13 or 14?	3	4	focus rather poor lines
H 2211	alpha Lyr	14	4	4	weak
H 2280	alpha CMa	14	4	5	violet strong
H 2275	beta Ori	16	4	5	
H 2276	beta Ori	15	4	5	
H 2273	beta Ori	16	4	5	
H 2277	beta Ori	16	4	5	focus rather poor

Miscellaneous plates

Plate + Prisma	Star	No. lines	Q	D	
C 6156	2 x beta Ori	15	5	3	16 suspected. vt ft
C 171	1 x alpha [[?]]	13	4	4	vt ft. focus poor.
C 170	1 x alpha [[?]]	14	4	4	vt ft
C 173	1 x alpha [[?]]	14	4	4	" "
C 287	1 x gamma Lyr	15	4	4	vt falls off
C 1984	1 x alpha Cyg	17 seen	4	4	vt falls off
x 7632	2 x beta Cru	13	5	3	3 expo continued
x 9652	2 x beta Cru	13	5	3	
x 9665	2 x beta Cru	13	4	3	
x 9695	2 x beta Cru	13	4	3	
x 4857	1 x gamma Cen	14	4	4	
C 3104	1 x beta Ori	16	5	5	Excellent.

[[preprinted]]60[[/preprinted]]

[[table-7 columns]]

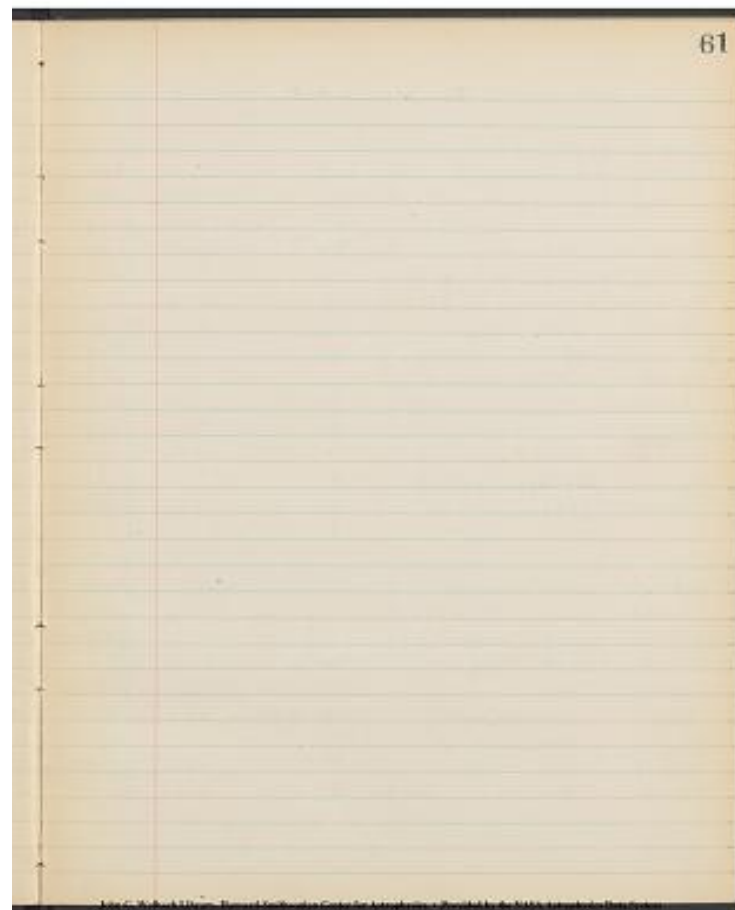
e6106[X] [[symbol-check mark]] Beta Ori|16|4|4| very good  
e32[X] [[symbol-crossed check mark]] Beta Ori|15|3|3| focus poor. maybe  
16  
e1800|1| [[symbol-crossed check mark]] Beta Ori|16|4|4| very good.  
maybe 17  
e1993|1| [[symbol-crossed check mark]] alpha Lyr|15|4|4| very good  
X4597|1| [[symbol-check mark]] alpha Car|14|4|4| more, vt cut off  
X4057|1| [[symbol-crossed check mark]] Beta Cen|13|4|4| excellent  
X3892|1| [[symbol-crossed check mark]] alpha Cav|19|4|5  
X3877|1| [[symbol-crossed check mark]] alpha Cav|19|4|4|  
X6163|1| [[symbol-check mark]] alpha Cav|16+|4|4| vt cut off  
X3865|1| [[symbol-check mark]] alpha Cav|18|4|4|  
X3861|1| [[symbol-check mark]] alpha Cav|16+|4|3| vt cut off  
X3862|1| [[symbol-crossed check mark]] alpha CMa|14|4|4|  
X3869|1| [[symbol-crossed check mark]] alpha CMa|14|4|4|  
X4058|1| [[symbol-crossed check mark]] Beta Cen|13|4|4| [[symbol-  
downward arrow to next row]] focus poor  
X4056|1| [[symbol-crossed check mark]] Beta Cen|13|4|4|  
X4059|1| [[symbol-crossed check mark]] Beta Cen|13|4|4|  
X4778|1| [[symbol-crossed check mark]] Q Sco|13|4|3| horrible, 14.vb ft  
X4591|1| [[symbol-crossed check mark]] alpha Cru|12|seen|3| focus  
poor.  
X9733|1| [[symbol-crossed check mark]] Beta Cru|13|3|5| very poor focus  
X3856|1| [[symbol-crossed check mark]] gamma Ori|14+|3|4| focus very  
poor  
X7402|1| [[symbol-crossed check mark]] Beta Cru|13|4|4|  
X7364|1| [[symbol-crossed check mark]] Beta Cru|13|4|4| no vr  
X6295|1| [[symbol-crossed check mark]] Beta Cru|13|4|4|  
X4192|1| [[symbol-crossed check mark]] Beta Cru|13|3|3| focus poor  
X3859|1| alpha Eri|14|3|4|  
X4498|1| alpha Eri|14|4|3|  
X4085|1| [[symbol-check mark]] alpha CMa|14|4|4|  
X4488|1| alpha Eri|13+|4|3| vt cut off  
X2577|2| [[symbol-check mark]] Beta Cen|13|4|4|  
[[end table]]

60					
e 6106	2.5	16	4	4	very good
e 32	2.5	15	3	3	focus poor, maybe 16
e 1800	1.5	16	4	4	very good, maybe 17
e 1993	1.5	15	4	4	very good
X 4597	1.5	(14)	4	4	more put into off
X 4057	1.5	13	4	4	excellent
X 3892	1.5	19	4	5	
X 3877	1.5	19	4	4	
X 6163	1.5	16+	4	4	vt cut off
X 3865	1.5	18	4	4	
X 3861	1.5	16+	4	3	vt cut off
X 3862	1.5	14	4	4	
X 3869	1.5	14	4	4	
X 4058	1.5	13	4	4	
X 4056	1.5	13	4	4	focus poor
X 4059	1.5	-	-	-	
X 4778	1.5	13	4	4	
X 4591	1.5	12	3	3	possibly 14.vb ft
X 9733	1.5	13	3	3	focus poor
X 3856	1.5	14+	3	4	focus very poor
X 7402	1.5	13	4	4	
X 7364	1.5	-	-	-	no vr
X 6295	1.5	13	4	4	
X 4192	1.5	13	3	3	focus poor
X 3859	1.5	14	3	4	
X 4498	1.5	14	3	4	
X 4085	1.5	14	4	4	
X 4488	1.5	13+	4	3	vt cut off
X 2577	2.5	13	4	4	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 61 [[/preprinted]]

[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 62 [[/preprinted]]

Balmes series A stars  
/Plate/Boss/DM/Lines/Intensity/Rema\*\*/ HD/  
20914.51(52)/4328/5615/10/10+/PF  
17420.18/5761/5741/12/10/PF/212061  
17412.16(15)/5904/5904/14/10+/PF/216627  
17410.13/5427/6174/12/10//200761  
10078.32/4859/4876/11/8/\*edge/177756  
4941.4/4445/11661/11-12/6/lines wide/59217  
17417(14657.8)/5171/3911/13/10//191692  
11077/4566/4292/11+/8/PF/165040  
(20144.8)//13/8//  
B4118/5315/3501/15/10/ex/197051  
B2938/5214/5642/11+/8/no move V/193432  
B44062"/"/11/6/PF/"  
B8391/4360/4467/13/7//155125  
I37218/4346/3142/9/8/PF/154494  
I37028/5837/3770/12/8/PF/214454  
"/5813/3875/11/10/10/ts line very strong/213558  
I37277/5608/2288/11/9/\*edge/207260  
I37333/5270/1821/10+/9/PF/195725  
I37609/4284/2220/10/9/PF/152107  
I37730/4220/2724/11/10/PF/149630  
I37811/useless////  
I37971/5195/2376/10/8/PF/192696  
I37891/useless////  
I37938/5323/4403/10/8/vpf/197461  
I37874/5320///too bright useless//

62						
Balmes series A stars						
Plate	Boss	DM	Lines	Intensity	Rema**	HD
20914.51(52)	4328	5615	10	10+	PF	
17420.18	5761	5741	12	10	PF	212061
17412.16(15)	5904	5904	14	10+	PF	216627
17410.13	5427	6174	12	10		200761
10078.32	4859	4876	11	8	at edge	177756
4941.4	4445	11661	11-12	6	lines wide	59217
17417(14657.8)	5171	3911	13	10		191692
11077	4566	4292	11+	8	PF	165040
(20144.8)	13	8	13	8		
B4118	5315	3501	15	10	4X	197051
B2938	5214	5642	11+	8	no move	193432
B44062	"	"	11	6	PF	"
B8391	4360	4467	13	7		155125
I37218	4346	3142	9	8	PF	154494
I37028	5837	3770	12	8		214454
I37277	5608	2288	11	10	at edge	207260
I37333	5270	1821	10+	9	PF	195725
I37609	4284	2220	10	9	PF	152107
I37730	4220	2724	11	10	PF	149630
I37811	useless					
I37971	5195	2376	10/8	8	at edge	192696
I37891	useless					
I37938	5323	4403	10/8	8	PF	197461
I37874	5320				too bright useless	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]63[[/preprinted]]

I38015 | Boos | DM | Linies | Int. | Rem | I+D  
[[symbol arrowdown]] | 4460 | 1945 | 10+ | 8 | superposed mov. | 159560  
I38022 | 48020 | 3916 | [[empty]] | [[empty]] | poor focus. useless |  
175638  
I38067 | 4948 | 1345 | 10 | 8 | poor focus | 182564  
I38101 | 5910 | 4961 | 11 | 8 | [[empty]] | 216735  
I38118 | 5761 | 5741 | 10+ | 9 | poor focus | 212061  
I38118 | 5703 | 4961 | 9+ | 9 | poor focus | 210418  
I38464 | 4500 | 3403 | 12 | 8 | [[empty]] | 161868  
[[empty]] | 4552 | 3560 | 12 | 8 | p.f. | 164577  
I38480 | 4584 | 2925 | 10+ | 8 | very poor focus | 166014  
I38493 | [[empty]] | [[empty]] | [[empty]] | [[empty]] | useless. poor focus |  
[[empty]]  
I38505 | 4761 | 1809 | 10+ | [[empty]] | poor focus | 170073  
I38507 | 5301 | 4658 | 12? | 9 | " " | 196724  
I38596 | 5703 | 4961 | 13 | 10 | [[empty]] | 210418  
I38597 | 5858 | 4436 | 11 | 7 | violet weak | 214994  
I38607 | - | [[empty]] | [[empty]] | [[empty]] | [[empty]] | useless. p.f. |  
[[empty]]  
I38727 | 4182 | 3049 | 11+ | 7 | violet weak | 148112  
I38777 | useless  
I38779 | (10+) useless  
I38948 | 5282 | 4353 | 11? | 8 | p.f. | 196180  
I9700 | 4584 | 2925 | 12+ | 8 | p.f. | 166014  
B2589 | 46750 | 889 | 12 | 9 | excellent plate | 170000  
[[empty]] | 5788 | [[empty]] | [[strickethrough]]12+[[/strickethrough]] |  
[[empty]] | no plate | [[empty]]  
B3649 | 4434 | 13412 | 12+ | [[empty]] | [[empty]] | 158643  
B3682 | 4830 | 13855 | 11+ | [[empty]] | focus poor | 176638  
B2910 | 5301 | [[empty]] | 11+ | [[empty]] | no violet move | [[empty]]  
B574 | 4182 | 3049 | 13 | 9 | [[empty]] | 148112  
B1706 | 5282 | 4353 | 13 | 10+ | [[empty]] | 196180

63							
I	Boos	DM	Linies	Int.	Rem	I+D	
I 38015	4460	1945	10+	8	superposed	159560	
I 38022	48020	3916			poor focus. useless		
I 38067	4948	1345	10	8	poor focus	182564	
I 38101	5910	4961	11	8		216735	
I 38118	5761	5741	10+	9	poor focus	212061	
I 38118	5703	4961	9+	9	poor focus	210418	
I 38464	4500	3403	12	8		161868	
I 38480	4552	3560	12	8	p.f.	164577	
I 38493	4584	2925	10+	8	very poor focus	166014	
I 38505	4761	1809	10+		poor focus	170073	
I 38507	5301	4658	12?	9	" "	196724	
I 38596	5703	4961	13	10		210418	
I 38597	5858	4436	11	7	violet weak	214994	
I 38607	-				useless. p.f.		
I 38727	4182	3049	11+	7	violet weak	148112	
I 38777					useless		
I 38779					(10+) useless		
I 38948	5282	4353	11?	8	p.f.	196180	
I 9700	4584	2925	12+	8	p.f.	166014	
B 2589	46750	889	12	9	excellent plate	170000	
B 3649	4434	13412	12+			158643	
B 3682	4830	13855	11+		focus poor	176638	
B 2910	5301		11+		no violet move		
B 574	4182	3049	13	9		148112	
B 1706	5282	4353	13	10+		196180	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 64 [[/preprinted]]  
 May 28 | Boos | DM | lines | Int. | remarks | I+D

B 3904 | 4143 | 12037 | 11 | 8 | end | 146624  
 B5207 | useless | 11 [crossed out] | 8 [crossed out] | end [crossed out]  
 B3443 | 5473 | 10037 | 11 | 8 | end | 202730  
 B19946 | 4830 | 13855 | 12 | 9 | [?] | 176638  
 B4982 | ""[[ditto for 4830]] | ""[[ditto for 13855]] | 11 | 8 | [empty] | "  
 B4972 | " | " | 12 | 7 | [empty] | "  
 B5183 | 4155 | 12849 | 10+ | [empty] | end | 147084  
 B8598 | 6057 | 6437 | 10+ | [empty] | end | 211565  
 B5605 | [empty] | useless poor focus  
 B10106 | 4868 | 13350 | 12? | 9 | [?] | 178253  
 B8605 | " | " | 12 | 10 | [empty] | "  
 B2947 | star not identified  
 B10561 | 5551 | 5701 | 13 | 8 | g | 205767  
 10080 | [empty] | useless | [empty] | [empty] | [?] | [empty]  
 6228 | [empty] | ""[[ditto for useless]] | 12+ [crossed out] | [empty]  
 [crossed out] | end | [empty]  
 8199 | " [[ditto for empty]] | " [[ditto for useless]] | 12+ | 8 | end | "  
 B10871 | 4143 | 12037 | 12 | 8 | end | 146624  
 3664 | ""[[ditto for 4143]] | ""[[ditto for 12037]] | 11 | 8 | end | " [[ditto for 146624]]  
 B10086 | 4832 | 16575 | 14 | 9 | ex | 17668  
 5276 | ""[[ditto for 4832]] | ""[[ditto for 16575]] | 15 | 10+ | [empty] | " [[ditto for 17668]]  
 B6476 | star not on plate  
 5836 | useless. edge of plate  
 5762 | star not on plate  
 4033 | " " " [[ditto for star not on plate]]  
 B3650 | " " " [[ditto for star not on plate]]  
 B8392 | 4868 | 13350 | 10? | 9 | h.f. | 17825  
 B3721 | 5916 | 19370 | 13+ | 10++ | f.o | 216956  
 " | 5808 | 17126 | 11 | 8 | [empty] | 213398  
 5675 | 5464 | 16498 | 10 | 8 | h.f. | 202627

64	May 28	Boos	DM	lines	Int.	remarks	I+D
B 3904	4143	12037	11	8	end	146624	
B 5207	useless		11	8	end		
B 3443	5473	10037	11	8	end	202730	
B 19946	4830	13855	12	9	[?]	176638	
B 4982	""	[[ditto for 4830]]	11	8	[empty]	"	
B 4972	"	"	12	7	[empty]	"	
B 5183	4155	12849	10+	[empty]	end	147084	
B 8598	6057	6437	10+	[empty]	end	211565	
B 5605	[empty]	useless poor focus					
B 10106	4868	13350	12?	9	[?]	178253	
B 8605	"	"	12	10	[empty]	"	
B 2947	star not identified						
B 10561	5551	5701	13	8	g	205767	
10080	[empty]	useless	[empty]	[empty]	[?]	[empty]	
6228	[empty]	""	[[ditto for useless]]	12+	[crossed out]	[empty]	
	[crossed out]	end	[empty]				
8199	"	[[ditto for empty]]	"	[[ditto for useless]]	12+	8	end
B 10871	4143	12037	12	8	end	146624	
3664	""	[[ditto for 4143]]	""	[[ditto for 12037]]	11	8	end
	[[ditto for 146624]]						
B 10086	4832	16575	14	9	ex	17668	
5276	""	[[ditto for 4832]]	""	[[ditto for 16575]]	15	10+	[empty]
	[[ditto for 17668]]						
B 6476	star not on plate						
5836	useless. edge of plate						
5762	star not on plate						
4033	" " "	[[ditto for star not on plate]]					
B 3650	" " "	[[ditto for star not on plate]]					
B 8392	4868	13350	10?	9	h.f.	17825	
B 3721	5916	19370	13+	10++	f.o	216956	
"	5808	17126	11	8	[empty]	213398	
5675	5464	16498	10	8	h.f.	202627	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



[[preprinted]]65[[/preprinted]]

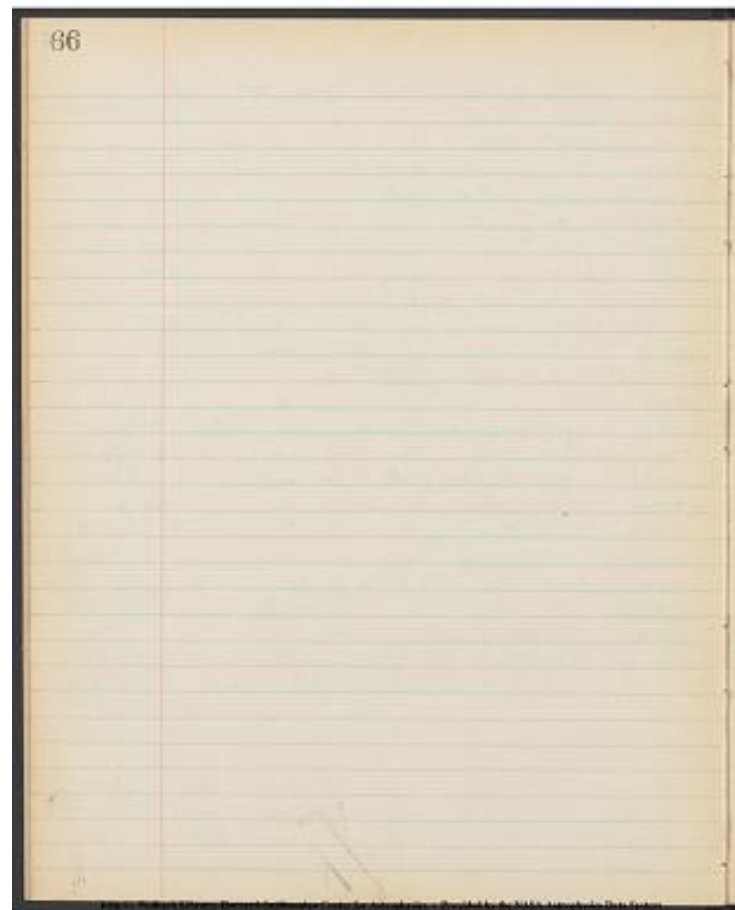
B5464 ditto | " | 11 | 8 | - | a  
B4483 6062 | 15420 | 11 | 9 | - | 221760  
10033 4119 | 4324 | 13 | 10++ | narrow | 145570  
8603 " | " | 10+ | 8 | end | "  
5712 star not on plate  
5824 too faint  
3907 4725 | 5071 | 10+ | 7 | end | 170296  
42692 4537 | 13731 | 12 | 9 | ex | 163955  
43815 star not identified  
44481 4832 | 16575 | 14 | 7 | ex | 176687  
43328 " | " | 14 | 7 | ex | "  
43208 star not on plate  
43194 " | " | 13 | 9 | p | "  
42846 5916 | 19370 | 13 | 9 | [[empty]] | 216956  
" | 5808 | 17126 | 12 | 7 | ex | 213398  
B41748 star not on plate  
B37259 6062 | 15420 | 12 | 8 | ex | 221760  
37250 useless vf  
B41857 star off plate  
B36512 4725 | 5071 | 12 | 9 | pf | 170296  
44234 " | " | 13 | [[empty]] | ex | "  
36837 too poor  
44239 5084 | 2086 | 11 | [[empty]] | pf | 188228

65									
B 5364	ditto	"	11	8	-	a			
B 4483	6062	15420	11	9	-		221760		
10033	4119	4324	13	10++	narrow		145570		
8603	"	"	10+	8	end	"			
5712	star not on plate								
5824	too faint								
3907	4725	5071	10+	7	end		170296		
42692	4537	13731	12	9	ex		163955		
43815	star not identified								
44481	4832	16575	14	7	ex		176687		
43328	"	"	14	7	ex	"			
43208	star not on plate								
43194	"	"	13	9	p	"			
42846	5916	19370	13	9	[[empty]]		216956		
"	5808	17126	12	7	ex		213398		
B41748	star not on plate								
B37259	6062	15420	12	8	ex		221760		
37250	useless vf								
B41857	star off plate								
B36512	4725	5071	12	9	pf		170296		
44234	"	"	13	[[empty]]	ex	"			
36837	too poor								
44239	5084	2086	11	[[empty]]	pf		188228		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 66 [[/preprinted]]

[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 67 [[/preprinted]]

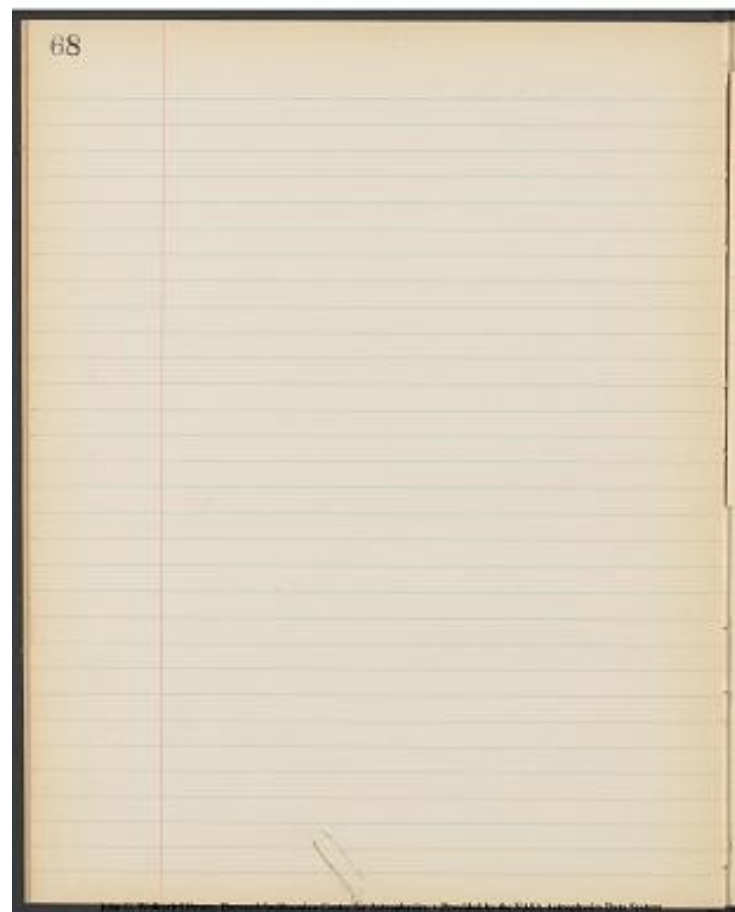
The c Stars



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 68 [[/preprinted]]

[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 69 [[/preprinted]]

[[on separate piece of paper]]

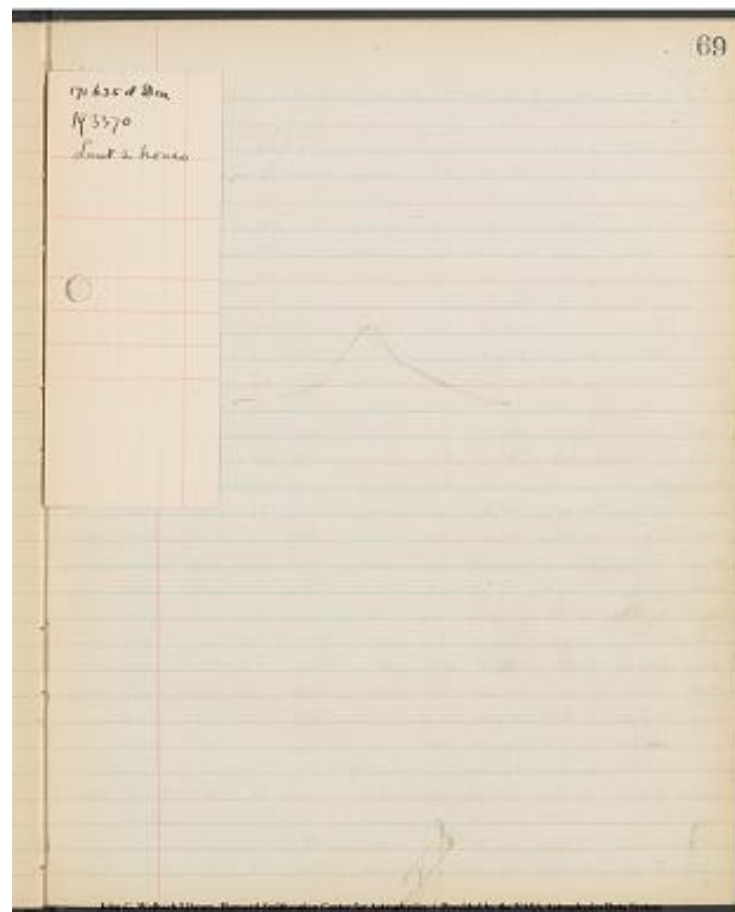
171635 d Dra

193370

Last 2 hours

[[/on separate piece of paper]]

[[image - sketch of a curve that starts at a low value rises to a peak and then descends to a low value]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

70

Oct 1925

|||List of Stars marked & in MT W Coutts.199 and data given for them.  
Boss|In list, p 88|Name|RA|Dec|Harv. vis map|μ|Spectrum Est|Spectrum  
Meas|Spec M|Spec |Trig | Auth.

325|[[checkmark]]| UMi|1 22.6|+88 46|2.1 |0.044|Fq|F8|-3.0|0.010|0.041  
Feral.

619| |14 Per|2 37.6|+43 42|5.6|0.004|Gop|F7|-2b|0.003

637| |SU Cas|2 43.0|+68 28|6.1|0.016|F4|F4|-1.4|0.003|0.010| W

772|[[checkmark]]| Per|3 17.2|+49 30|1.9|0.039|F5|F8|-1.3|0.023|0.017  
YeMF.

1074| |58 Per|4 29.8|+41 4|4.5|0.025|G4p|F8|4.2|0.002

..| |SZ Jau|4 31.4|+18 20|7.1|0.016|F8p|F6|-2.1|0.001

..| |SU Aur|4 49.6|+30 24|8.7|..|F7p|F8|-1.1|0.001

1185|[[checkmark]]|[[exponential key]]10B Cam|4

54.5|+60.18|4.2|0.013|F7p|F8|-2.9|0.004

..|RX Aur|4 54.5|+39 49|7.6|..|F9p|F7|-1.7|0.001

1187|[[checkmark]]|E Aur|4 54.8|+43 41|3.4|0.014|F5p|F9|-  
2.0|0.008|0.060 J

1347| |Sep|5 28.3|-17 54|2.7|0.003|F4p|F4|-0.7|0.021|0.014 M

1606|[[checkmark]]|46 Aur|6 17.2|+49 20|5.1|0.014|K2p|G5|-3.6|0.002

..|[[checkmark]]|T Mon|6 19.8|+7 8|6.2|0.029|G1p|G0|-2.0|0.003

1629|RT Aur|6 22.1|+30 33|5.3|0.024|F8p|F5|-1.9|0.003|0.031 W,S

..|[[checkmark]]|W Gem|6 58.2|+20 43|4.0|0.009|G0p|F6|-2.6|0.001

1815|[[checkmark]]|J Gem|6 58.2|+20 43|4.0|0.009|G0p|F9|-

3.4|0.003|0.015 A,S,M

1839|[[checkmark]]|SCMa|7. 4.3|-26 14|2.0|0.005|G2p|G0|-2.9|0.010|-  
0.052 F

2065|x Pup|7 45.1|-24 37|3.5|0.007|G6p|G1|-4.2|0.003

2155|2q Mon|8 3.6|-2 42|4.4|0.025|G3p|F9|-4.2|0.002

2153|[[arrow]]|[[scribble]]|p Pup|8 3.3|-24 1|2.9|0.100|F7p|F6|-  
2.1|0.010|0.031M

2224|2q8G Pup| 8 18.6|-26 2|5.9|0.017|F5p|F2|-2.0|0.003

2602| o Leo|9 35.8|+10 21|3.8|0.150|F5p|F6|-1.4|0.009|0.032 B,M

..|Su Dra|11 32.2|+67 53|9.2|..|A5|..|0.9|0.002

..|SE Dra|13 12.8|+70 4|10.0|..|F4|..|0.6|0.001

..|RY Boo|14 45.2|+23 27|7.2|0.051|[[double line]]|F2|F4|0.5|0.005

4443|B Dra| 17 28.2|+52 23|3.0|0.019|Gop|F8|-3.5|0.005|0.005 A,M

4493|[[checkmark]]|X Sgr|17 41.3|-27 48|4.7|0.023|F9p|F8|-1.3|0.006

4542|[[checkmark]]|V Jter|17 54.7|+30 12|4.5|0.004|F2p|F3|-0.2|0.012

4564|[[checkmark]]|W Sgr|17 58.6|-29 35|4.7|0.015|Gop|F5|-2.0|0.004

70											
Oct 1925											
I List of Stars marked & in MT W Coutts.199 and data given for them.											
Row	Name	RA	Dec	Harv	μ	Spectrum	Spec M	Spec	Trig	Vis	Auth
325	UMi	1 22.6	+88 46	2.1	0.044	Fq F8	-3.0	0.010	0.041	Feral	
619	14 Per	2 37.6	+43 42	5.6	0.004	Gop F7	-2.6	0.003			
637	SU Cas	2 43.0	+68 28	6.1	0.016	F4 F4	-1.4	0.003	0.010	W	
772	Per	3 17.2	+49 30	1.9	0.039	F5 F8	-1.3	0.023	0.017	YeMF	
1074	58 Per	4 29.8	+41 4	4.5	0.025	G4p F8	4.2	0.002			
..	SZ Jau	4 31.4	+18 20	7.1	0.016	F8p F6	-2.1	0.001			
..	SU Aur	4 49.6	+30 24	8.7	..	F7p F8	-1.1	0.001			
1185	10B Cam	4 54.5	+60 18	4.2	0.013	F7p F8	-2.9	0.004			
..	RX Aur	4 54.5	+39 49	7.6	..	F9p F7	-1.7	0.001			
1187	E Aur	4 54.8	+43 41	3.4	0.014	F5p F9	-2.0	0.008	0.060	J	
1347	Sep	5 28.3	-17 54	2.7	0.003	F4p F4	-0.7	0.021	0.014	M	
1606	46 Aur	6 17.2	+49 20	5.1	0.014	K2p G5	-3.6	0.002			
..	T Mon	6 19.8	+7 8	6.2	0.029	G1p G0	-2.0	0.003			
1629	RT Aur	6 22.1	+30 33	5.3	0.024	F8p F5	-1.9	0.003	0.031	W,S	
..	W Gem	6 58.2	+20 43	4.0	0.009	G0p F6	-2.6	0.001			
1815	J Gem	6 58.2	+20 43	4.0	0.009	G0p F9	-3.4	0.003	0.015	A,S,M	
1839	SCMa	7. 4.3	-26 14	2.0	0.005	G2p G0	-2.9	0.010	-0.052	F	
2065	x Pup	7 45.1	-24 37	3.5	0.007	G6p G1	-4.2	0.003			
2155	2q Mon	8 3.6	-2 42	4.4	0.025	G3p F9	-4.2	0.002			
2153	p Pup	8 3.3	-24 1	2.9	0.100	F7p F6	-2.1	0.010	0.031	M	
2224	2q8G Pup	8 18.6	-26 2	5.9	0.017	F5p F2	-2.0	0.003			
2602	o Leo	9 35.8	+10 21	3.8	0.150	F5p F6	-1.4	0.009	0.032	B,M	
..	Su Dra	11 32.2	+67 53	9.2	..	A5	..	0.9	0.002		
..	SE Dra	13 12.8	+70 4	10.0	..	F4	..	0.6	0.001		
..	RY Boo	14 45.2	+23 27	7.2	0.051	[[double line]]	F2 F4	0.5	0.005		
4443	B Dra	17 28.2	+52 23	3.0	0.019	Gop F8	-3.5	0.005	0.005	A,M	
4493	X Sgr	17 41.3	-27 48	4.7	0.023	F9p F8	-1.3	0.006			
4542	V Jter	17 54.7	+30 12	4.5	0.004	F2p F3	-0.2	0.012			
4564	W Sgr	17 58.6	-29 35	4.7	0.015	Gop F5	-2.0	0.004			

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

H.D|C list | HA  
from | 56,  
4 D.c. 162  
8890 | [[checkmark]] | ac

209 02| [[checkmark]]

[[scribble]]|ac

||c  
||ac

||ac

46595|[[checkmark]]  
52973|[[checkmark]]|ac  
54605|[[checkmark]]|c

||type F5, HA28  
70761|ac

161592|[[checkmark]]|ac  
164136|[[checkmark]]|ac  
164975|[[checkmark]]|ac

71

H.D. C. list	160
from 56,	
4 D.c. 162	
8890	✓ ac
209 02	✓
[[scribble]]	✓ ac
c	✓
ac	✓ ac
ac	✓ ac
46595	✓
52973	✓ ac
54605	✓ c
type F5, HA28	
70761	✓ ac
161592	✓ ac
164136	✓ ac
164975	✓ ac

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 72 [[/preprinted]]

Mt W Coutts [[?]] 199 (Contd)

Boss. | Name | RA | Dec. | Hour. m | mu | Spec Est. Meas. | Spec. M |  
Spec pi | Trig pi | Auth.

.. | W Ser | 18 4.1 | -15 34 | 9.0 | .. | Fqp G0 | -0.6 | 0.001 | | |

4632 | Y Sgr | 18 15.5 | -18 54 | 5.8 | 0.013 | G2p F8 | -1.6 | 0.003 | | |

.. | U Sgr | 18 26.0 | -19 32 | 6.9 | 0.012 | G0p F7 | -1.4 | 0.002 | | |

.. | YZ Sgr | 18 43.7 | -16 50 | 7.4 | .. | G1p F9 | -2.7 | 0.001 | | |

.. | TT Aql | 19 3.2 | +1 9 | 7.6 | .. | G2p F9 | -1.4 | 0.002 | | |

4874 [[ check mark ]] | pi Sgr | 19 3.8 | -21 11 | 3.0 | 0.040 | F4p F3 | -0.8 |  
| 0.017 | 0.017 | M

.. | RR Lyr | 19 22.3 | +42 35 | 7.3 | 0.221 [[ || ]] | F0p F3 | 0.3 | 0.004 | | |

.. | U Aql | 19 24.0 | -7 15 | 6.6 | 0.017 [[ || ]] | G0p F7 | -2.3 | 0.002 | | |

.. | U Vul | 19 32.3 | +20 7 | 7.0 | 0.031 [[ || ]] | G0p F9 | -2.0 | 0.002 | | |

.. | SU Cyg | 19 40.8 | +29 1 | 6.6 | .. | F7p F5 | -1.1 | 0.003 | | |  
ff

5071 [[ check mark ]] | eta Aql | 19 47.4 | +0 45 | 4.1 | 0.012 | F9p F9 | -  
2.7 | 0.004 | 0.004 | M

5098 | S Sge | 19 51.5 | +16 22 | 5.8 | 0.004 | G1p F8 | -2.5 | 0.002 | | |

5197 [[ check mark ]] | alpha ^[[ 1 ]] Cap | 20 12.1 | -12 49 | 4.6 | 0.015 |  
G0p F7 | -3.9 | 0.002 | -0.012 | M

5229 [[ check mark ]] | gamma Cyg | 20 18.6 | +39 56 | 2.3 | 0.003 | G0p  
G0 | -3.0 | 0.009 | 0.014 | A,M,Y,F

5244 rho Cap A | 20 23.2 | -18 9 | 5.1 | 0.026 | A9 F0 | -1.0 | 0.010 |  
0.024 M

5255 41 Cyg | 20 25.3 | +30 2 | 4.1 | 0.010 | F6 F4 | -1.1 | 0.009 | -0.018  
M

.. V Vul | 20 32.3 | +26 11 | 8.6 | .. | G7p G9 | -0.8 | 0.001 | [[empty]]

.. X Cyg | 20 39.5 | +35 14 | 6.5 | 0.018 | G3p G0 | -2.1 | 0.002 | 0.006 S

5370 T Vul | 20 47.2 | +27 53 | 5.8 | 0.015 | F9 F7 | -1.7 | 0.003 |

72  
Mt W Coutts 199 (Contd)

Obs. Name	RA	Dec	Hour	mu	Spec Est	Meas	Spec. M	Spec pi	Trig pi	Auth.
W Ser	18 4.1	-15 34	9.0	..	Fqp G0	-0.6	0.001			
4632 Y Sgr	18 15.5	-18 54	5.8	0.013	G2p F8	-1.6	0.003			
U Sgr	18 26.0	-19 32	6.9	0.012	G0p F7	-1.4	0.002			
YZ Sgr	18 43.7	-16 50	7.4	..	G1p F9	-2.7	0.001			
TT Aql	19 3.2	+1 9	7.6	..	G2p F9	-1.4	0.002			
4874 pi Sgr	19 3.8	-21 11	3.0	0.040	F4p F3	-0.8	0.017	0.017	M	
RR Lyr	19 22.3	+42 35	7.3	0.221	F0p F3	0.3	0.004			
U Aql	19 24.0	-7 15	6.6	0.017	G0p F7	-2.3	0.002			
U Vul	19 32.3	+20 7	7.0	0.031	G0p F9	-2.0	0.002			
SU Cyg	19 40.8	+29 1	6.6	..	F7p F5	-1.1	0.003			
5071 eta Aql	19 47.4	+0 45	4.1	0.012	F9p F9	-2.7	0.004	0.004	M	
5098 S Sge	19 51.5	+16 22	5.8	0.004	G1p F8	-2.5	0.002			
5197 alpha ^[[ 1 ]] Cap	20 12.1	-12 49	4.6	0.015	G0p F7	-3.9	0.002	-0.012	M	
5229 gamma Cyg	20 18.6	+39 56	2.3	0.003	G0p G0	-3.0	0.009	0.014	A,M,Y,F	
5244 rho Cap A	20 23.2	-18 9	5.1	0.026	A9 F0	-1.0	0.010	0.024	M	
5255 41 Cyg	20 25.3	+30 2	4.1	0.010	F6 F4	-1.1	0.009	-0.018	M	
V Vul	20 32.3	+26 11	8.6	..	G7p G9	-0.8	0.001			
X Cyg	20 39.5	+35 14	6.5	0.018	G3p G0	-2.1	0.002	0.006	S	
5370 T Vul	20 47.2	+27 53	5.8	0.015	F9 F7	-1.7	0.003			
5481 S Cyg	21 1.5	+43 31	3.9	0.087	K2p G5	-2.9	0.004	0.003	A	
5507 S Cap	21 21.0	-22 51	3.9	0.013	Gep Fq	-3.9	0.003			
5527 B Aql	21 24.2	-6 1	2.1	0.017	Fq F8	-2.1	0.007	-0.006	Fq	
5562 Y Cap	21 34.6	-17 7	2.8	0.188	Fq Fq	-2.7	0.013	0.018	M	
5676 A Aql	22 0.6	-0 48	3.2	0.018	G0 F8	-2.8	0.006	0.010	M	
5834 S Loe	22 28.4	+47 12	4.4	0.021	K2p G4	-2.8	0.003	0.005	A	
5887 G Cap	22 28.5	+47 54	4.4	0.012	G0 Fq	-2.7	0.004	0.011	A	
5931 G0 F8	22 35.9	+46 25	3.5	0.004	G0p G2	-2.6	0.002			
5963 G4p	23 4.6	+23 0	4.7	0.013	F8 Fq	-0.7	0.008			
6125 rho Cap	23 49.4	+56 27	4.5	0.007	Gep G4	-3.3	0.006	0.031	A,M	



[[empty]]

5431 Xi Cyg | 21 1.3 | +43 32 | 3.9 | 0.007 | K2p G5 | -2.9 | 0.004 | -  
0.003 A

5507 zeta Cap | 21 21.0 | -22 51 | 3.9 | 0.023 | G1p F9 | -3.9 | 0.003 |  
[[empty]]

5527 Beta Aqr | 21 26.3 | -6 1 | 3.1 | 0.017 | F9 F8 | -2.1 | 0.009 | -0.016  
F,M

5562 Gamma Cap | 21 34.6 | -17 7 | 3.8 | 0.188 | F4 F4 | -0.7 | 0.013 |  
0.018 M

567 [[tick symbol]] alpha Aqr | 22 0.6 | -0 48 | 3.2 | 0.015 | G0 F8 | -2.8 |  
0.006 | 0.010 M

5804 5 Lac | 22 25.4 | +47 12 | 4.6 | 0.021 | K2p G4 | -2.8 | 0.003 | 0.005  
A

5807 [[tick symbol]][[?]] Cap | 22 25.5 | +57 54 | 4.1 | 0.012 | G0 F9 | -2.7  
| 0.004 | 0.011 A

5931 [[claudator symbol]] [3 lines] [[first line]] Rad 5 911 [[/first line]]  
[[second line]] B.D. +560 [[/second line]] [[third line]] 2923 [[/third line]] |  
22 55.9 | +56 25 | 5.5 | 0.009 | G2p G2 | -2.6 | 0.002 | [[empty]]

5963 Sq Aqr | 23 4.6 | -23 0 | 4.9 | 0.013 | F8 F9 | -0.7 | 0.008 | [[empty]]

6135 [[tick symbol]] rho Cao | 23 49.4 | +56 57 | 4.8 | 0.007 | G5p G4 | -  
3.3 | 0.002 | 0.032 A,M

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]73[[/preprinted]]  
H.D. C lid  
from H.W.C.  
Doubly new Giyhr H lines

[[table-2 columns]]  
178524[[symbol-check mark]]

183344[[symbol-check mark]]]

187929[[symbol-check mark]]|ac  
188727[[symbol-check mark]]|  
192876[[symbol-check mark]]|  
194093[[symbol-check mark]]|c

|ac

197572[[symbol-check mark]]|  
198726[[symbol-check mark]]|

|ac

|ac  
[[symbol-check mark]]|

[[symbol-check mark]]|a

73

N.B. C list  
from  
W.D.C.  
Doubtly new Wright H. list.

178024 ✓  
183344 ✓  
  
187924 ✓ ac  
188727 ✓  
192872 ✓  
✓ 194093 ✓ z  
  
ac  
  
197572 ✓  
198726 ✓  
  
A  
  
F, H  
M  
H  
H  
H  
  
ac  
ac  
✓  
  
H, H  
✓ z

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]74[[/preprinted]]  
 III List of K starts with difference between Sp. Meas. and Est.  
 Mr.W. Contr. 199  
 [[table-10 columns]]  
 Boos[[?]]NameRA|Dec|m|mu|Esr[[?]]Meas|Stern|Spee[[?]] pi Trig pi  
 Auth  
 915 Cet|0 3.1|-3 0|6.3|0.006|K2|G4|1.2|0.010  
 84|48Psc|0.23.0|+15 54|6.5|0.018|K5|K1|0.5|0.006  
 121 phi...|0 31.3|+43 56|5.4|0.035|K2|G8|1.4|0.016  
 131 ..|0 33.6|+48 48|5.7|0.019|K5|G9|0.5|0.009  
 191 20 Cot|0 47.9|-1 41|4.9|0.017|K6|K0|0.3|0.012  
 355..|1 316|+57 28|5.7|0.004|K0|G6|0.3|0.006  
 430..|1 50.0|+36 47|6.1|0.005|K3|G9p|1.0|0.009  
 572..|2 26.3|+1 49|5.4|0.013|K3|G9|1.0|0.013  
 581..|2 29.5|+36 52|5.9|0.010|K3|G9|0.9|0.010  
 639 nu [[?]]|2 43.4|+55 29|3.9|0.030|K4|G5|0.4|0.020  
 746..|3 12.5|+33 57|4.9|0.013|K2|G8|0.2|0.012 0.012A  
 765..|3 16.0|+64 14|5.6|0.019|K2|G5|1.3|0.013  
 832..|3 34.5|+59 39|6.0|0.002|K2|G7|2.0|0.016  
 862 BU. 1854Br|3 40.2|+41 9|8.6|1.372|K0|G6|6.3|0.035  
 0.030M[[subscript]]1[[/subscript]]Ye [[subscript]]1[[/subscript]]D, eval  
 915 gamma Eri|3 53.4|-13 48|3.2|0.130|K5|K0|0.5|0.029 0.019 M  
 1136 qb Jau|4 44.0|+15 44|6.3|0.017|K2|G8|0.9|0.008  
 1234..|5 5.9|+15 55|5.4|0.004|K6|K1|0.5|0.010  
 1334..|5 26.3|+74 59|6.4|0.019|K5|K1|0.4|0.006 0.011 A,Jo  
 1348..|5 28.4|+54 22|6.0|0.007|K6|K0|0.4|0.008  
 .. AG Bonn[[?]] 4686|5 37.0|+43 31|7.7|0.033|K0|G6|2.8|0.010  
 1511..|5 59.2|-26 17|5.2|0.104|K2|G8|1.4|0.017  
 1596..|5 59.2|+14 42|6.0|0.019|K6|K1|0.6|0.008  
 ^[[8C]]1606 46 Our[[?]] Previous list  
 1608 5 Lyn|6 18.1|+58 28|5.5|0.011|K6|K2|0.6|0.011  
 1632 47 Our[[?]]|6 22.6|+46 45|6.0|0.007|K5|K1|0.5|0.008 0.017M  
 1643..|6 24.9|+78 5|5.9|0.019|K5|K1|0.7|0.009 0.007 W  
 1818..|6 59.2|-5 11|5.9|0.006|K2|G6|0.5|0.008  
 1987 nu gem|7 29.8|+27 7|4.2|0.119|K6|K2|0.5|0.018|0.015A  
 2023 J gem|7 37.1|+29 8|4.3|0.247|K1p|G7|2.6|0.046|0.027  
 A[[subscript]]1[[/subscript]]Ye[[subscript]]1[[/subscript]],Jo

74

III List of K stars with difference between Sp. Meas. and Est. Mr.W. Contr. 199

Star Name	RA	Dec	m	$\mu$	Est. Meas.	Spec. M	Spec. T	Trig. T	Auth.
915 Cet	0 3.1	-3 0	6.3	0.006	K2 G4	1.2	0.010		
84 48 Psc	0 23.0	+15 54	6.5	0.018	K5 K1	0.5	0.006		
121 phi...	0 31.3	+43 56	5.4	0.035	K2 G8	1.4	0.016		
131 ..	0 33.6	+48 48	5.7	0.019	K5 G9	0.5	0.009		
191 20 Cot	0 47.9	-1 41	4.9	0.017	K6 K0	0.3	0.012		
355..	1 316	+57 28	5.7	0.004	K0 G6	0.3	0.006		
430..	1 50.0	+36 47	6.1	0.005	K3 G9p	1.0	0.009		
572..	2 26.3	+1 49	5.4	0.013	K3 G9	1.0	0.013		
581..	2 29.5	+36 52	5.9	0.010	K3 G9	0.9	0.010		
639 nu	2 43.4	+55 29	3.9	0.030	K4 G5	0.4	0.020		
746..	3 12.5	+33 57	4.9	0.013	K2 G8	0.2	0.012 0.012 A		
765..	3 16.0	+64 14	5.6	0.019	K2 G5	1.3	0.013		
832..	3 34.5	+59 39	6.0	0.002	K2 G7	2.0	0.016		
862 BU. 1854 Br	3 40.2	+41 9	8.6	1.372	K0 G6	6.3	0.035 0.030 M, K2 G6		
0.030 M	3 40.2	+41 9	8.6	1.372	K0 G6	6.3	0.035 0.030 M, K2 G6		
915 gamma Eri	3 53.4	-13 48	3.2	0.130	K5 K0	0.5	0.029 0.019 M		
1136 qb Jau	4 44.0	+15 44	6.3	0.017	K2 G8	0.9	0.008		
1234..	5 5.9	+15 55	5.4	0.004	K6 K1	0.5	0.010		
1334..	5 26.3	+74 59	6.4	0.019	K5 K1	0.4	0.006 0.011 A, Jo		
1348..	5 28.4	+54 22	6.0	0.007	K6 K0	0.4	0.008		
.. AG Bonn	5 37.0	+43 31	7.7	0.033	K0 G6	2.8	0.010		
1511..	5 59.2	-26 17	5.2	0.104	K2 G8	1.4	0.017		
1596..	5 59.2	+14 42	6.0	0.019	K6 K1	0.6	0.008		
^[[8C]] 1606 46 Our	5 37.0	+43 31	7.7	0.033	K0 G6	2.8	0.010		
1608 5 Lyn	6 18.1	+58 28	5.5	0.011	K6 K2	0.6	0.011		
1632 47 Our	6 22.6	+46 45	6.0	0.007	K5 K1	0.5	0.008 0.017 M		
1643..	6 24.9	+78 5	5.9	0.019	K5 K1	0.7	0.009 0.007 W		
1818..	6 59.2	-5 11	5.9	0.006	K2 G6	0.5	0.008		
1987 nu gem	7 29.8	+27 7	4.2	0.119	K6 K2	0.5	0.018 0.015 A		
2023 J gem	7 37.1	+29 8	4.3	0.247	K1p G7	2.6	0.046 0.027		
A[[subscript]]1[[/subscript]]Ye[[subscript]]1[[/subscript]], Jo	7 37.1	+29 8	4.3	0.247	K1p G7	2.6	0.046 0.027		

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]75[[/preprinted]]  
Diff.

Diff.

8

4

4

6

6

4

4

4

4

49

4

7

5

4

5

4

5

4

46

04

44

45

4

44

44

4  
6

4

44



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]

76

[[/preprinted]]

K stars

[[table with 11 columns]]

Bos | Name | RA | Dec | m | | Sp Est Meas | Spec M | Spec | Irig | Outh  
2208 | 31 Lyn | 8 16.0 | +43 31 | 4.4 | 0.0107 | K5 K1 | 0.7 | 0.018 | 0.009  
| A, Ab  
... | AGLei 3648 | 8 39.3 | +33 36 | 8.0 | 0.011 | [[?]] | K2 | G8 | 1.1 | 0.004 | |

2529 | 28 Hya | 9 20.4 | -4 41 | 5.8 | 0.023 | K4 | G9 | 0.6 | 0.009 | |

2533 | alpha Hya | 9 22.7 | -8 14 | 2.2 | 0.035 | K5 | K0 | 0.1 | 0.038 | 0.004 |  
Y,F

2550 | lambda Leo | 9 26.0 | +23 25 | 4.5 | 0.056 | K6 | K2 | 0.5 | 0.016 | 0.039 |  
M

2573 | 11 Leo Min | 9 29.7 | +36 16 | 5.5 | 0.753 | K1 | G6 | 5.4 | 0.096 | 0.140 |  
A,S,Y,JG

2580 | 8 Leo | 9 31.5 | +16.53 | 5.9 | 0.021 | K1 | G7 | 0.6 | 0.009 | |

2603 | 13 Leo | 9 35.9 | +26 22 | 6.4 | 0.049 | K2 | G8 | 0.7 | 0.008 | 0.012 | W |

2622 | 18 Leo | 9 41.0 | +12 16 | 5.9 | 0.016 | K5 | G9 | 0.6 | 0.008 | |

2639 | 23 Leo | 9 45.6 | +13 32 | 6.7 | 0.037 | K7 | K0 | 0.2 | 0.005 | |

2701 | .. | 10 5.0 | +41 9 | 6.5 | 0.017 | K2 | G8 | 0.6 | 0.007 | |

2751 | mu U Ma | 10 16.4 | +42 0 | 3.2 | 0.084 | K5 | G8 | 0.7 | 0.032 | 0.051 | Y |

2844 | 35 H U Ma | 10 35.9 | +69 36 | 5.2 | 0.023 | K4 | G9 | 0.7 | 0.013 | |

2922 | .. | 10 54.5 | +46 4 | 5.7 | 0.016 | K5 | K0 | 0.5 | 0.009 | |

2931 | 61 Leo | 10 56.7 | -1 57 | 5.0 | 0.041 | K6 | K1 | 0.3 | 0.012 | |

C1361 | Bu 5695 A | 11 5.6 | +31 0 | 8.8 | 0.623 | K7 | K3 | 8.4 | 0.083 | 0.048 |  
Y |

2985 | gamma [[?]] U Ma | 11 13.1 | +33 38 | 3.7 | 0.027 | K4 | G9 | 0.4 | 0.022 | |

3029 | 81 Leo | 11 25.2 | -2 27 | 5.1 | 0.026 | K4 | G9 | 1.1 | 0.016

C1511 | Groom 1855 | 12 4.6 | +40 49 | 7.4 | 0.325 | K0 | K6 | 5.7 | 0.046 | 0.046 | K

3177 | .. | 12 6.5 | +82 16 | 6.3 | 0.019 | K3 | G9 | 0.8 | 0.008 | |

3179 | 68 U Ma | 12 6.8 | +57 37 | 6.5 | 0.020 | K4 | K0 | 0.8 | 0.007 | |

3193 | 2 CVn | 12 11.1 | +41 13 | 5.8 | 0.057 | K6 | K2 | 0.6 | 0.009 | |

3336 | 7 Dra | 12 43.5 | +67 20 | 5.7 | 0.008 | K3 | G8 | 0.7 | 0.010 | |

3348 | 32 Com | 12 47.2 | +17 37 | 6.5 | 0.023 | K4 | G9 | 0.6 | 0.007 | |

3374 | 36 Com | 12 54.0 | +17 57 | 5.0 | 0.036 | K6 | K1 | 0.9 | 0.015 | |

3488 | .. | 13 23.6 | +72 55 | 6.1 | 0.030 | K4 | G9 | 0.3 | 0.007 | |

3931 | 9 Ser | 15 21.2 | +15 47 | 5.5 | 0.033 | K6 | K0 | 0.2 | 0.009 | |

4048 | .. | 15 50.2 | +20 36 | 5.8 | 0.083 | K4 | G8 | 0.8 | 0.010 | 0.040 | W

..AU Lei 4734 | 16 | 11.4 | +32 24 | 8.5 | 0.035 | [[?]] | K4 | G8 | 1.0 | 0.003 | |

..AG Lund | 16 | 13.2 | +38 53 | 8.0 | 0.026 | [[?]] | K3 | G9 | 0.9 | 0.004 | |

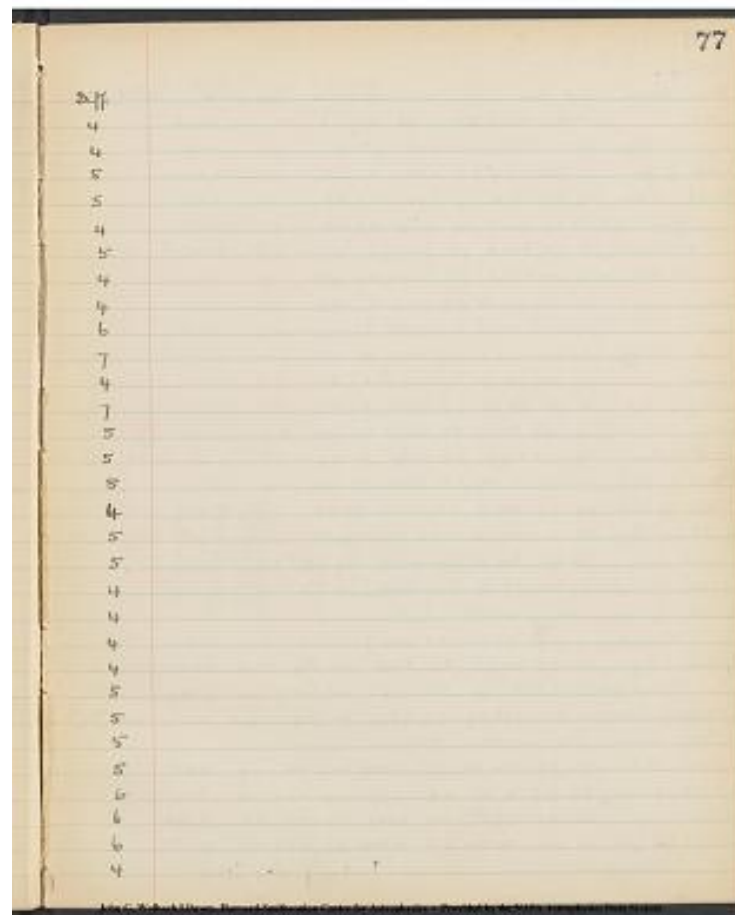
6656

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 77 [[preprinted]]

Diff

4  
4  
5  
5  
4  
5  
4  
4  
6  
7  
4  
7  
5  
5  
5  
4  
5  
5  
4  
4  
4  
4  
5  
5  
5  
5  
6  
6  
6  
4



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

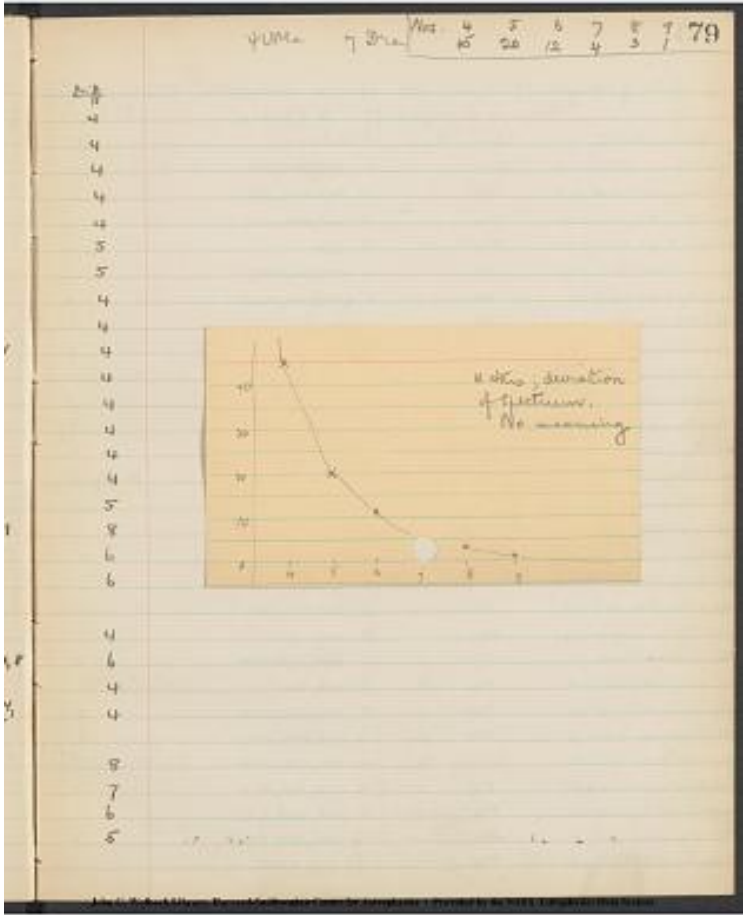


Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

Psi UMa nu Dra Nos.  
[[table-6 columns]]  
4|5|6|7|8|9  
45|20|12|4|3|1  
[[preprinted]]79[[/preprinted]]

Diff.  
4  
4  
4  
4  
4  
5  
5  
4  
4  
4  
4  
4  
4  
4  
5  
8  
6  
6  
  
4  
6  
4  
4  
  
8  
7  
6  
5

[[graph]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]80[[/preprinted]]

IV List of bright Mu stars with spectra available. Brt. thau  
5<sup>[[superscript]]</sup>m<sup>[[/superscript]]</sup>0  
a. From H.A.28,195 <sup>[[Class.]]</sup>(1A.V.)<sup>[[/superscript]]</sup> N. [[underline]]X  
plates<sup>[[underline]]</sup>

[[table-6 columns]]  
Name + Position|m|Class|Row[[?]]|Peales|Pr

7 eta Sel 022.9 -33 34|4.81|Mb|-12. 5056,5147,5176|1

33 psi Pha 1 49.6 -46 48|4.11|Mb|-12 4931,5024,5202,|1

41 nu Cet 1 55.3 -21 34|3.83|Ma|-11 4446,4536,5253,|2

68 alpha Cet 2 57.1 +3 42|2.68|Ma|-<sup>[[circled]]</sup>1<sup>[[/circled]]</sup> 7944|3

72 tau<sub>4</sub><sup>[[subscript]]</sup>Eri 3 15.1 -22 7|3.79|Mb|-9  
5271,7257,7807,|2

95 gamma Jtyi 3 48.8 -74 33|3.12|Ma|-8  
~~[[strikethrough]]~~8~~[[strikethrough]]~~4336,6262,5485|3

98 delta Ret 3 57.2 -61 41|4.31|Ma|-14 5161,5287,5312|1

99 gamma Ret 3 59.5 -62 27|4.41|Mb|-11 5297,5312,5131|1

135 -Ori 5 24.7 -1 11|4.90|Ma|-<sup>[[circled]]</sup>1<sup>[[/circled]]</sup> 3856|1

172 alpha Ori 5 49.8 +7 23|0.91|Ma|21|6 3875,3883,4533,|3

186 eta<sup>[[superscript]]</sup>2<sup>[[/superscript]]</sup>Dor 6 11.1 -65 34|4.81|Mb|-  
<sup>[[circled]]</sup>1<sup>[[/circled]]</sup> 0088|1

225-Pup 753.6 -48 35|4.91|Ma|-<sup>[[circled]]</sup>2<sup>[[/circled]]</sup> 0081,0117|1

247 L<sup>[[superscript]]</sup>2<sup>[[/superscript]]</sup>Pup 7 10.5 -44 29|var.|Md|215| |H

256-CMa 7 12.6 -27 43|4.92|Mb|-<sup>[[circled]]</sup>1<sup>[[/circled]]</sup> 4417|1

428 gCar 9 13.4 -57 7|4.16|Ma|-5 5506,6321,6406|2

431 theta Pyx 9 17.1 -25 32|4.93|Ma|-<sup>[[circled]]</sup>1<sup>[[/circled]]</sup> 5562|1

488 gamma Cha 10 34.3 -78 6|4.09|Ma|-<sup>[[circled]]</sup>3<sup>[[/circled]]</sup> 4717,6414,6686|1

596 epsilon Mus 12 12.1 -67  
74|4.15|Mb|214|<sup>[[circled]]</sup>3<sup>[[/circled]]</sup> 4791,5576,6669|1

80					
II List of bright M stars with spectra available. Brt. thau					
a. From H.A.28,195 <sup>[[Class.]]</sup> (1A.V.) <sup>[[/superscript]]</sup> N. <u>[[underline]]</u> X					
plates <sup>[[underline]]</sup>					
Name + Position	m	Class	Row	Peales	Pr
7 eta Sel 022.9 -33 34	4.81	Mb	-	12. 5056,5147,5176	1
33 psi Pha 1 49.6 -46 48	4.11	Mb	-	12. 4931,5024,5202,	1
41 nu Cet 1 55.3 -21 34	3.83	Ma	-	11. 4446,4536,5253,	2
68 alpha Cet 2 57.1 +3 42	2.68	Ma	-	①. 7944	3
72 tau <sub>4</sub> Eri 3 15.1 -22 7	3.79	Mb	-	9. 5271,7257,7807,	2
95 gamma Jtyi 3 48.8 -74 33	3.12	Ma	-	8. 4336,6262,5485	3
98 delta Ret 3 57.2 -61 41	4.31	Ma	-	14. 5161,5287,5312,	1
99 gamma Ret 3 59.5 -62 27	4.41	Mb	-	11. 5297,5312,5131	1
135 -Ori 5 24.7 -1 11	4.90	Ma	-	①. 3856	1
172 alpha Ori 5 49.8 +7 23	0.91	Ma	21	6. 3875,3883,4533,	3
186 eta <sup>[[superscript]]</sup> 2 <sup>[[/superscript]]</sup> Dor 6 11.1 -65 34	4.81	Mb	-	①. 0088	1
225-Pup 753.6 -48 35	4.91	Ma	-	②. 0081,0117	1
247 L <sup>[[superscript]]</sup> 2 <sup>[[/superscript]]</sup> Pup 7 10.5 -44 29	var.	Md	215		H
256-CMa 7 12.6 -27 43	4.92	Mb	-	①. 4417	1
428 gCar 9 13.4 -57 7	4.16	Ma	-	5. 5506,6321,6406	2
431 theta Pyx 9 17.1 -25 32	4.93	Ma	-	①. 5562	1
488 gamma Cha 10 34.3 -78 6	4.09	Ma	-	②. 4717,6414,6686	1
596 epsilon Mus 12 12.1 -67		Ma	-	⑤. 4791,5576,6669	1

599 F Cen 12 13.6 -54 35|4.97|Ma|-[2]/2] 9105,9253|1

611 gamma Cru 12 25.6 -56 33|1.55|Mb|-|9 3982,3988,3989| 2

671 g Cen 13 43.6 -33 58|4.28|Mb|214|[2]/2] 4756,5601|1

739 tau Lib 14 58.3 -24 53|3.25|Mb|-|8 4186,4187,4189|2

816 delta'Apo 16 5.3 -78 27|4.73|Mb|204|20 4175,4758,4807|2

829 alpha Sco 16 23.2 -26 13|1.06|Ma comp|212|16 4093,5730,6588|3

835 Eta Sco 16 29.8 -35 3|4.08|Ma|-|8 4796,5015,5070|1

895 -Sco 17 50.7 -41 42|4.71|Ma|-|5 9100,9256,9333|1

913 eta Sgn 18 10.9 -36 48|2.96|Mb|-|16 4365,5030,5085|2

999 -Pav 19 53.3 -59 39|4.87|Mb|-|[2]/2] 9119,9888|1

[[end table]]

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]81[[/preprinted]]

Remarks  
From HA28

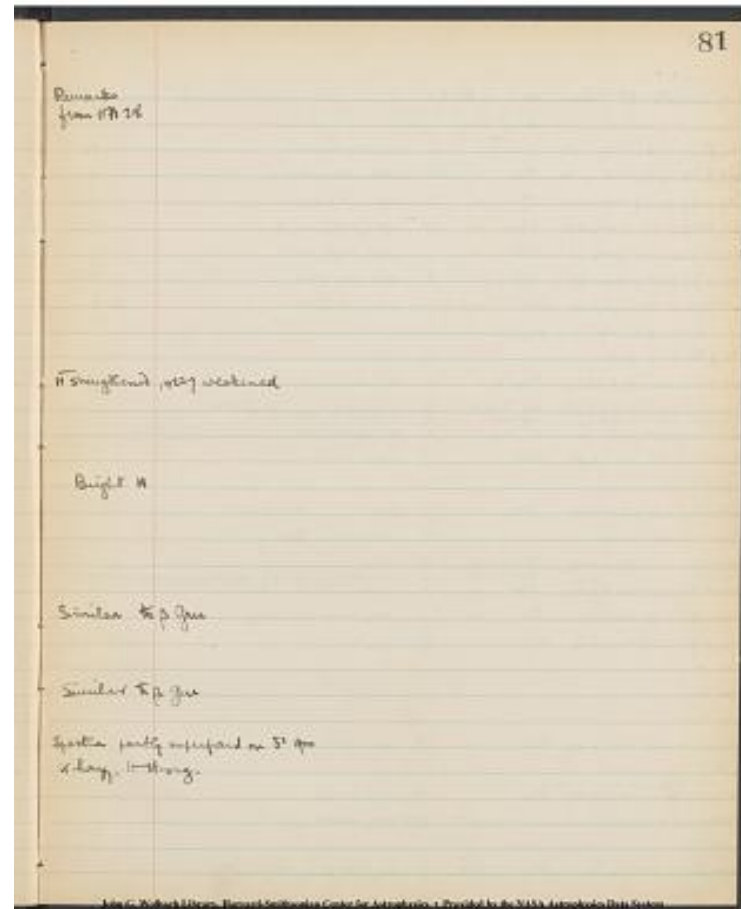
Eta shaigshend[[?]], 4227 weakened

Bright Eta

Similar to Beta gru

Similar to Beta gru

Spectra partly [[?]] on delta<sup>2</sup> [[?]]  
Kappa hazy, Eta strong.



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 82 [[/preprinted]]

Bright M stars. a. x Plates

Name + position / m / Class / Rev. [unreadable] / Plates / Pr  
/ / / Class CIA.V.

1002 C Sgr 19 / 56.5 / -2759 / 4.69 / MG / - / 11 / 4844,4938,5105 / 1  
1008 xi Tel 19 / 59.7 / -5310 / 4.82 / Ma / - / 15 / 9258,9413,9454 / 1  
1027 omega Cap 20 / 45.9 / -2717 / 4.43 / Ma / - / 11 / 4292,4387,4939 / 1

1036 A Cap 21 / 1.3 / -2524 / 4.63 / Ma / - / 15 / 4782,4981,4996 / 1  
1073 delta^2 Gru / 22 / 23.8 / -4415 / 4.26 / Mb / - / 7 / 4345,4971,5053 / 1

1075 nu Tuc 22 / 26.2 / -6229 / 4.80 / Mb / - / 6 / 9130,9319,9329 / 1  
1083 beta gru 22 / 36.7 / -4724 / 2.09 / Mb / 213 / 174182,4296,5650 / 3  
From H.A. 28. C plates  
30 7 Cet / 0 / 9.6 / -1930 / ... / - / 1 / 777

185 beta Aur / 1 / 4.1 / +35 / 5 / 2.37 / MaMo / - / 12 / 721,725,945, 965  
370 o Cet / 2 / 14.3 / -3 / 26 / 2.82 / MdMq / 131 / 16 /  
(many) / Bright / H

482 alpha Cet / 2 / 57.1 / +3 / 42 / var MaM2 / 6 /  
291,1561,5172,5193

489 rho Per / 2 / 58.8+3827 / Var / MbM4 / - / 5 / 283,690[[last two digits  
written over previous unreadable text]], 967,1453

533 zeta 4 Eri / 3 / 15.1 / -22 / 7 / 3.95 / Mb / 1 / 3048 /  
612 -

821 -  
[[strikethrough]] 850 O' Ari / 4 / 46.9 / +14 / 5 / 5.19 / Ma / - 1 /  
813 [[strikethrough]] / too faint

[[strikethrough]] 855 / 5Ori / 4 / 48.2 / +2 / 20 / / 20 / 2 /  
1580,1762 [[strikethrough]] / too faint

1072 nu Aur / 5 / 44.2 / +37 / 16 / 4.99 / Ma / - / 1 / 774

1091 alpha Ari / / / / 0.92 / Ma / 128 / 11 / 803,1043,1182,1203 /  
(H strong, 4227 weak)

1102 pi Aur / 5 / 52.5 / +45 / 56 / 4.59 / Ma / - 1 / 775

1160 eta Gem / 6 / 8.8 / +22 / 33 / var / Ma / - 5 / 878, 1465, 1481, 2599

1194 mu Gem / 6 / 16.9 / +22 / 34 / 3.19 / MaM3 / 2 / 773,  
2219

1292 -  
1360 - | | | | | too faint [[written across this row and next  
row]]

1361 - | | | | | too faint [[written across this row and  
previous row]]

1638 rho U Ma / 8 / 53.5 / +68 / 1 / 4.99 / Ma / - 2 / 804, 1700  
1752 -

1782 pi Leo / [[strikethrough]] 10 / 1.9 / +19 / +5 [[strikethrough]] 9 / 54.9  
/ +8 / 32 / 4.89 / Ma / 2 / 1788, 1854

[[strikethrough]] 1893 nu Hyi / 10 / 44.7 / -15 / 40 / 125 / 2 /  
1100, 6545[[strikethrough]]

195[[smudge]] -

1988 lambda Dra / 11 / 25.5 / +69 / 53 / 4.06 / Ma / 32? / 4 /  
814, 2579, 2594, 4939

82

Bright M stars. a. x Plates

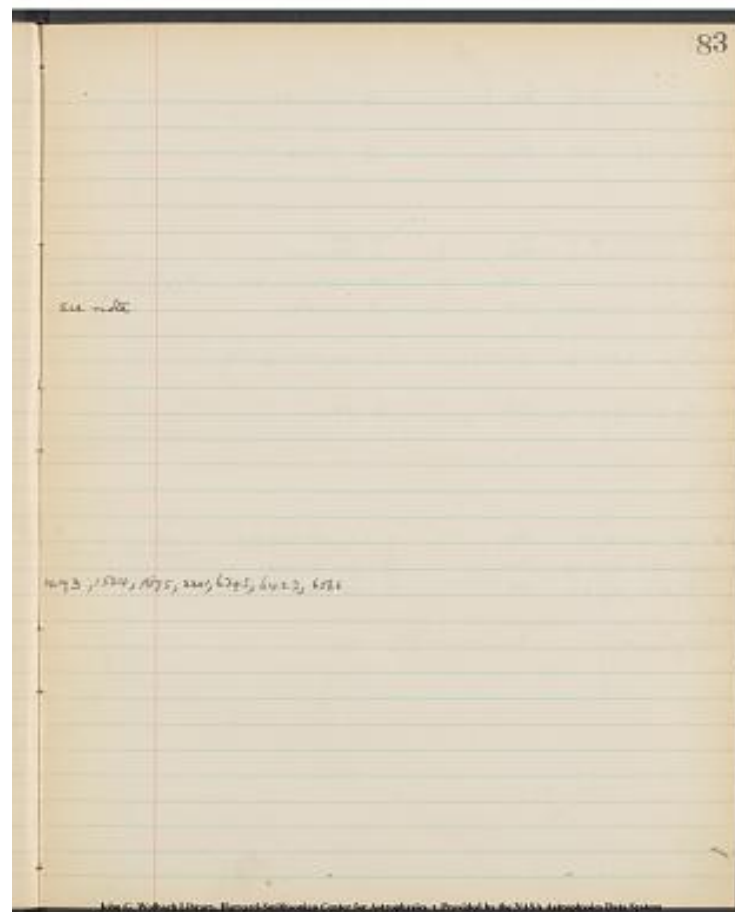
Name + position	m	Class	Rev.	Plates	Pr
1002 C Sgr 19 / 56.5 / -2759 / 4.69 / MG / - / 11 / 4844,4938,5105 / 1					
1008 xi Tel 19 / 59.7 / -5310 / 4.82 / Ma / - / 15 / 9258,9413,9454 / 1					
1027 omega Cap 20 / 45.9 / -2717 / 4.43 / Ma / - / 11 / 4292,4387,4939 / 1					
1036 A Cap 21 / 1.3 / -2524 / 4.63 / Ma / - / 15 / 4782,4981,4996 / 1					
1073 delta^2 Gru / 22 / 23.8 / -4415 / 4.26 / Mb / - / 7 / 4345,4971,5053 / 1					
1075 nu Tuc 22 / 26.2 / -6229 / 4.80 / Mb / - / 6 / 9130,9319,9329 / 1					
1083 beta gru 22 / 36.7 / -4724 / 2.09 / Mb / 213 / 174182,4296,5650 / 3					
From H.A. 28. <u>C plates</u>					
30 7 Cet / 0 / 9.6 / -1930 / ... / - / 1 / 777					
185 beta Aur / 1 / 4.1 / +35 / 5 / 2.37 / MaMo / - / 12 / 721,725,945, 965					
370 o Cet / 2 / 14.3 / -3 / 26 / <u>2.82</u> / MdMq / 131 / 16 / (many) / Bright / H					
482 alpha Cet / 2 / 57.1 / +3 / 42 / var <u>MaM2</u> / 6 / 291,1561,5172,5193					
489 rho Per / 2 / 58.8+3827 / Var / MbM4 / - / 5 / 283,690[[last two digits written over previous unreadable text]], 967,1453					
533 zeta 4 Eri / 3 / 15.1 / -22 / 7 / 3.95 / Mb / 1 / 3048 / 612 -					
821 -					
[[strikethrough]] 850 O' Ari / 4 / 46.9 / +14 / 5 / 5.19 / Ma / - 1 / 813 [[strikethrough]] / too faint					
[[strikethrough]] 855 / 5Ori / 4 / 48.2 / +2 / 20 / / 20 / 2 / 1580,1762 [[strikethrough]] / too faint					
1072 nu Aur / 5 / 44.2 / +37 / 16 / 4.99 / Ma / - / 1 / 774					
1091 alpha Ari / / / / 0.92 / Ma / 128 / 11 / 803,1043,1182,1203 / (H strong, 4227 weak)					
1102 pi Aur / 5 / 52.5 / +45 / 56 / 4.59 / Ma / - 1 / 775					
1160 eta Gem / 6 / 8.8 / +22 / 33 / var / Ma / - 5 / 878, 1465, 1481, 2599					
1194 mu Gem / 6 / 16.9 / +22 / 34 / 3.19 / MaM3 / 2 / 773, 2219					
1292 -					
1360 -           too faint					
1361 -           too faint					
1638 rho U Ma / 8 / 53.5 / +68 / 1 / 4.99 / Ma / - 2 / 804, 1700					
1752 -					
1782 pi Leo / [[strikethrough]] 10 / 1.9 / +19 / +5 [[strikethrough]] 9 / 54.9 / +8 / 32 / 4.89 / Ma / 2 / 1788, 1854					
[[strikethrough]] 1893 nu Hyi / 10 / 44.7 / -15 / 40 / 125 / 2 / 1100, 6545[[strikethrough]]					
195[[smudge]] -					
1988 lambda Dra / 11 / 25.5 / +69 / 53 / 4.06 / Ma / 32? / 4 / 814, 2579, 2594, 4939					

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 83 [[/preprinted]]

see note

1493, 1504, 1675, 2201, 6395, 6423, 6566



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 84 [[/preprinted]]

^[2019 mu Vir 1140.7 +7 6 4.20| Ma M1 Class IAU|(2) 1824, 2639

2124 -

2193 delta Vir<sub>1</sub> 12<sub>1</sub> 50.6 +357 3.66| Ma|(4)  
881,914,1805, 2600

2201 -

2356 -

2510 -

2514 <sup>[[?]]</sup> gamma Sco 1458.3 - 2453 ~~14~~ ~~14~~  
- Mb (1) 1298

~~2563 tau<sub>1</sub> 1~~ ~~Ser~~ <sup>[[?]]</sup> 1521.1 +  
1547 5.46 Ma 65 (2) 1871, 1905 ~~1905~~

2726 delta Oph 169.1 - 326 3.03 Ma  
127 (4) 1277,1295,6911,6912 Absorption bands not well defined

~~2772 g Her 16 25.3 +4265.06 Mb 129 (2) 1902,2607~~  
~~1902,2607~~

2879 alpha <sup>[[superscript]]</sup> Her <sup>[[superscript]]</sup> 1710.1 +1430 3.48 Mb M5  
7 459,1261,1274,1281

3065 -

3210 <sup>[[?]]</sup> delta <sup>[[superscript]]</sup> 2 <sup>[[superscript]]</sup> Lyn 18 51.0 +36 47 4.52  
Mb (1) 810

3224 -

3357 -

~~3434~~

3498 -

3649-

3792-

3845 mu Cep 21 40.4 +5820 uar Ma 126 5 1439, 1478, 1525, 3005  
4227 not strong and sp./]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[image]] dot[[/image]] Provided by the NASA Astrophysics



Data System [[/preprinted]]

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 85 [[/preprinted]]

too faint

too faint

too faint



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]86[[/preprinted]]

List of plates of cepheid variables selected from OR2, p.3n

Name [[space]] Plates

& UMi [[space]] C12731,36,41;13079,13668,13737,39,40,14671 [[check mark above each number]]

3 gem [[space]] C704,727,739,747,825,1469 [[check mark above every number except 825]]

C car [[space]] x8267 [[check mark above number]]

n Aql [[space]] C687,691,748,1430,1446,1451 [[check mark above each number]]

8 Cep [[space]] see list and colls 3q plates. [[check mark]]

kPav [[space]] x7768,8645,8660,8843 [[check mark above each number]]

[[dividing line]]

Further list:- brighter than [[number 6 overwritten with number 7]] m.0

su cas 2 43.0 +68 28

[[check mark]]T Mon 6 19.8 +7 8 see below

RT Aur 6 22.1 +30 34

[[check mark]]S Muo 12 7.4 -69 36 F8 x11998

S ToA 15 52.2 -63 30

[[check mark]]x Sgr see below

y oph 17 47.3 -6 7

[[check mark]]W Sgr see below

U Sgr 18 26.0 -19 12

U Aql 19 24.0 -7 15

SU Cyg 19 40.8 +29 1

S Sgc see below

X Cyg 20 39.5 +35 14

T Vul 20 47.2 +27 52

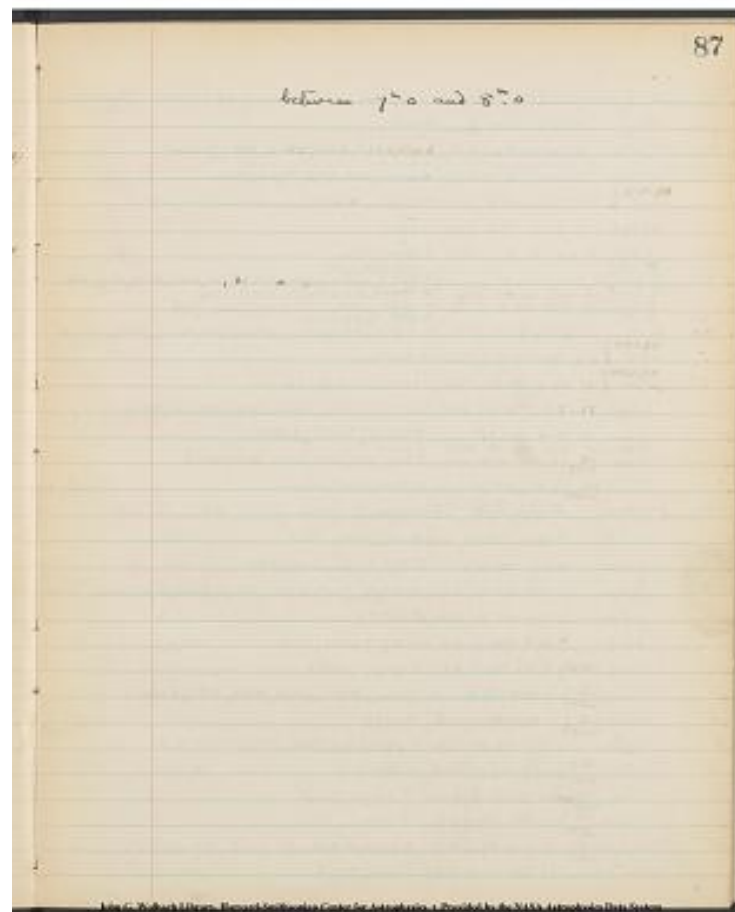
B Cep 21 27.4 +70 7

86	
List of plates of cepheid variables selected from OR2, p.3n	
Name	Plates
4VNG	C12731,36,41,13079,13668,13737,39,40,14671
3 gem	C704,727,739,747,825,1469
C car	x8267
n Aql	C687,691,748,1430,1446,1451
8 Cep	see list and colls 3q plates.
kPav	x7768,8645,8660,8843
Further list - brighter than $m = 0$ .	
SU Cas	2 43.0 +68 28
T Mon	6 19.8 +7 8 see below
RT Aur	6 22.1 +30 34
S Muo	12 7.4 -69 36 F8 x11998
S TrA	15 52.2 -63 30
x Sgr	see below
y oph	17 47.3 -6 7
W Sgr	see below
U Sgr	18 26.0 -19 12
U Aql	19 24.0 -7 15
SU Cyg	19 40.8 +29 1
S Sgc	see below
X Cyg	20 39.5 +35 14
T Vul	20 47.2 +27 52
B Cep	21 27.4 +70 7

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 87 [[/preprinted]]

between  $7^{\text{m}} . 0$  and  $8^{\text{m}} . 0$



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]88[[/preprinted]]

Plates Wos

List of available bright c stars in order of spectral class.

[[table]]

Class[Star] |m|Plates

[[checkmark]]B3-Car|10 38.9 -58 42|5.44|X4044,4709

[[checkmark]]B5 O^[[2]]CMA|6 58.8 -23 41| 3.12| X4511,6225,6232, 6255,8198,8326

eta CMA|7 20.1 -29 6|2.43| X4470,7206,8346[[checkmark]],8955,0150

[[checkmark]]-Vel HR3494|8 43.1 -45 32|5.54|X12380 X4515

67oph|17 55.6 +2 56|3.92|C1333

[[checkmark]]B0 15Sgr|18 9.3 -20 46|5.60|X5103,5930

[[bracket beside next two entries in the last column]]

(HP3069)|[[8471, 8476, 9287

[[checkmark]]B1

S^[[1]]Sco|[[X5058,4400,4985,5753,6325,6463,6598,7691,7865

[[checkmark]] [[?]] CMA|6 54.7 -28

50|1.49|X[[strikethrough]]84[[/strikethrough]]|4012,8396,8940,0008,0154

[[checkmark]] Theta Ara| 17 58.8 -50 6| 3.84| X8651, 4008, 5715, 7599, 9669, 9670

[[checkmark]] B2 X2Ori|[[C1801,2468,2502

[[checkmark]] B8 Beta Ori|5 9.7 -8

19|0.32|X7945,8704,3879,4084,4101,4532,7896,7966,8096

[[checkmark]] -Vil HR3708|9 15.4 -51 8|5.87| X11934

[[checkmark]] -Car HR4250|10 48.4 -56 43|5.57| X12305,12326,12451

[[checkmark]] Mu Sgr|18 7.8 -21

5|4.08|X5796,9034,4904,5103,5122,5930

[[checkmark]] 4 Lac|22 20.4 +48 58|[[C2424,6015,2433

[[checkmark]] Alpha Dra|16 28.2 +68 59|4.98| C14914

[[checkmark]]B9 -Cam HR1035|3 21.0 +59

36|4.42|C2159,3023,6067,6075, 6081,6094

[[checkmark]] -Cam HR1040|3 21.9 +58 32|4.76|C3023,6075,6081

[[checkmark]]Ao [[strikethrough]]T13[[/strikethrough]]| Mon|6 27.5 +7 24

[[strikethrough]]6 19.8 +7 8[[/strikethrough]]|4.50|

[[strikethrough]]C2504[[/strikethrough]]|C16176

[[checkmark]] a Vel|8 42.6 -45 40|4.01|X4515,6259,8368

[[checkmark]] Eta Leo| 10 1.9 +17 15|[[C1771,6530,5489,6581

[[checkmark]]A2 Beta2 Juc|0 27.0 -63 31| 4.33| X5299,7247,4984,

5158,5445,5704,6963,^[[7160]],7085

[[checkmark]] iPer|2 15.3 +55 23|5.22|C16683

[[checkmark]] iPup|7 39.8 -28 43|4.10| C6157 X4379,6181

[[checkmark]] -Car HR4169|10 33.6 -58 13|5.57|X9094,4053

[[checkmark]] -Car HR4228|10 44.2 -59

24|6.12|4044,4709,4846,4869,5568, 6480

[[checkmark]] -Cen HR4438|11 26.6 -6 0.43|6.36|X11473

[[checkmark]] O2Cen|11 27.1 -58 58|5.30|X4728,6340,7356,7357, 7377,7431

[[checkmark]] -Cen HR4541|11 45.5 -62 5|5.65|X12364

[[checkmark]] -Cen HR[[strikethrough]]4772[[/strikethrough]]|4563|11

50.0 62 43|6.05|X4772,6246

[[checkmark]] -Cru HR4578|11 53.7 -63 47|5.66|X4772,6246

[[checkmark]] -Cir HR5379|14 16.8 -67 44|5.71|X11226,11560

[[checkmark]] I^[[2]]Sco|17 43.1 -40 4| 4.89|X4421,5778

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[large dot]] Provided by the NASA Astrophysics Data  
System[[/preprinted]]

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

Suggested corup Data ITA

Rev. 40 Narrow lines. Intensities abnormal  
96 Remakrs on individual

As O2 CMr in certain lines

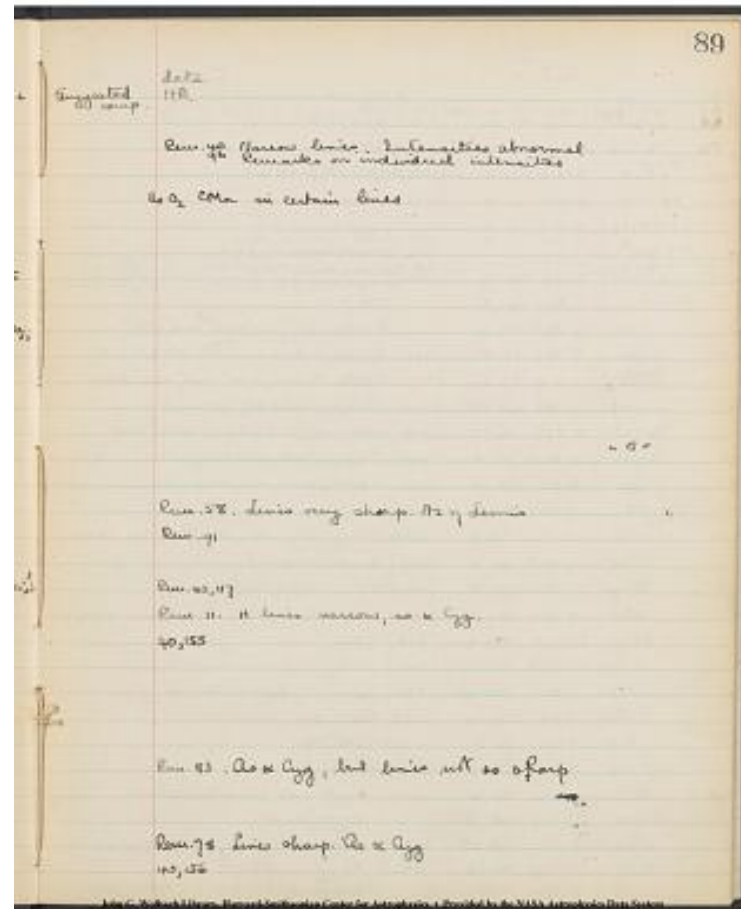
Rev. 58. Lines very sharp. As N Leonis  
Rev. 91

Rev. 40, 117  
Rev. 11. H lines narrow, as L Cyg.  
40, 155

Rev. 83. As & Cyg, but lines not as sharp

Rev. 78 lines sharp as & Cyg 40, 156

[[preprinted]] G. Wolbach Library Harvard Smithsonian Center for  
Astrophysics. Provided by the NASA Astrophysics Data System [[/pre-  
printed]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]90[[/preprinted]]

Bright c-stars.

[[|Position|m|]]

A2|proportional to Cyg|C477,1486,1984,5929

[[checkmark]]A3|HR 2874|7 25.6 -22

49[[/strikethrough]]4.80[[/strikethrough]]4.80|X0138

[[checkmark]]A5|19 Aur|5 13.4 +33 52|5.16|C16214, 16327

[[checkmark]]F0|22 Aud|0 5.1 +45 31|C758, 731

[[checkmark]]^[[HR3291]]\_Pup|8 18.6 -26 1|5.86|B8826, B13092

[[checkmark]]HR3496|8 43.9 -45-48|5.83|X12380 [[blue slash]]

[[checkmark]]HR3739|9 20.6 -51 18|6.14|X11934[[blue slash]]

[[checkmark]]Nu Her|17 54.7 +30 11|4.48|C1382, 1390, 2946 , 2994

[[checkmark]]F2 Proportional to Sep|2.69|[[/strikethrough]]C2946,  
2994[[/strikethrough]] C1088, 2243

[[checkmark]]Sgr|19 3.8 -21

11|3.11|X4009,[[/strikethrough]]illegible[[/strikethrough]][[23.?]]5764

\*[[box]]HR3712,X12316(F2)[[/box]][[this box continues to the next page]]

[[checkmark]]F5 Proportional to Per|3 17.2 +49

30|1.9|X7983,[[downward arrow under comma after X4009 on the  
previous row]] C371,[[underlined]]1543[[/underlined]], 2113, 2253, 2257,  
5207, 5257, 6208

[[checkmark]]Nu Per|3 38.4 +42 16|x|C3870

[[checkmark]]Epsilon Aur|4 54.8 +43

41|x|[[underlined]]C1086[[/underlined]],^[[checkmark]][[underlined]]1466[[  
/underlined]],[[checkmark]]1460,[[checkmark]]2310,[[checkmark]]2416,[[  
checkmark]]4564

[[checkmark]]Beta Dor|5 32.7 -62

33|3.70|[[underlined]]X4500[[/underlined]],4431, 5497, 6196, 8213,  
8335[[checkmark]]

[[checkmark]]Delta Vol|7 16.9 -67

47|3.92|[[/strikethrough]]C4514[[/strikethrough]] X4514[[checkmark]],  
6221[[checkmark]], 7245[[checkmark]],8345[[checkmark]], 9102

[[checkmark]]HE2957|7 35.5 -48 22|5.65|B8951, B18559

[[checkmark]]b Vel|8 37.3 -46 18|4.06|X4502[[checkmark]],

4515[[checkmark]], 6259[[checkmark]], 6405[[checkmark]],  
8367[[checkmark]], 9102[[checkmark]]

[[checkmark]]HR4110|10 23.7 -57  
8|4.94|[[underlined]]X9094|[[underlined]], 7430, 9086, 9249, 9431, 9457

[[checkmark]]Y Car|11 8.3 -59  
46|4.73|[[underlined]]X4065|[[underlined]]|[[checkmark]],  
4754|[[checkmark]], 6291|[[checkmark]],  
6292|[[checkmark]], 7355|[[checkmark]], 7382|[[checkmark]], 7417|[[checkmark]]  
ark]]

DM3938|9 52.9 ~~18~~|48|6.27|

?---R Cru

[[checkmark]]Nu^|2| Cen|13 55.4 -45  
7|4.50|[[underlined]]X4766|[[underlined]]|[[checkmark]], 5778|[[checkmark]]  
, 7657|[[checkmark]], 8638|[[checkmark]]

[[checkmark]]L^|1| Seo|17 40.5 -40  
6|3.10|[[underlined]]4421|[[checkmark]], 5778|[[checkmark]],  
7657|[[checkmark]], 8638|[[checkmark]]

[[checkmark]]W Sgr|17 58.6 -29 35|var.|X5739|[[checkmark]],  
5909|[[checkmark]], 9200|[[checkmark]]

[[checkmark overlaid by back slash]]|Pav|18 46.6 -67 21|var.|see  
above, p 86. X7768|[[checkmark]], 8645|[[checkmark]],  
8660|[[checkmark]], 8843|[[checkmark]]

[[checkmark]] 35 Cyg|20 14.8 +34  
40|5.18|[[underlined]]C5132|[[checkmark]]

[[checkmark]] 41Cyg|20 25.3| +30 2|5.45|C1397

[[checkmark]] F8 proportional to VMi|1 22.6 +88 46|2.12|See above,  
p86, for plate nos.|[[checkmark]]

[[checkmark]] [[blue checkmark]] Delta C Ma|7 4.3 -26  
14|1.85|X6275|[[red dot]], 8274|[[red checkmark]], 8948|[[red checkmark]],  
0156|[[red dot]]

[[checkmark]] [[blue checkmark]] Pup|7 52.6 -22 37|4.35|X5331|[[red  
checkmark]],  
7329|[[red checkmark]]

[[checkmark]] HR3232|8 8.9 -46 20|5.68|B8952

[[checkmark]] [[blue checkmark]] X Car|11 4.4 -58  
26|4.02|[[underlined]]X4733|[[underlined]]|[[red checkmark]], 4043|[[red  
checkmark]], 4064|[[red checkmark]], 6348|[[red checkmark]]

[[checkmark]] Theta M 3216|11 5.4 -58  
18|[[underlined]]X4733|[[underlined]]|[[red checkmark]], 4064|[[red  
checkmark]]

[[checkmark]] [[blue checkmark]] o'Cen|11 27.1 -58 18||X4728[[red checkmark]], 6340[[red checkmark]], 7356[[red checkmark]], 7357[[red checkmark]], 7377[[red checkmark]], 7431[[red checkmark]]

[[checkmark]] HR4511|11 38.8 -61  
56|5.18|[[underlined]]6499[[/underlined]]|[[red checkmark]], 6417[[red checkmark]]  
||Pi Sgr, Continued||\*5901, 6540, 6541, 7606, 7611, 7624, 7834

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[large dot]] Provided by the NASA Astrophysics Data  
System[[/preprinted]]

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 91 [[/preprinted]]  
Suggested comp. data from IIA

[[Res.?]] 42. ^metallic lives As in [[symbol: Epsilon]] Aur.  
[[Res.?]] 43. Lines appear to be sharp  
[[Res.?]] 50. Sharp lines. as I, Sco  
[[Res.?]] 55 Between [[symbol: infinity]] Cyg and [[symbol: Epsilon]] Aur

[[equation]] iCha (F<sub>2</sub>) X12349. [[symbol: lower case epsilon]]  
UMes [[sT2?]] C.16,78,2553.

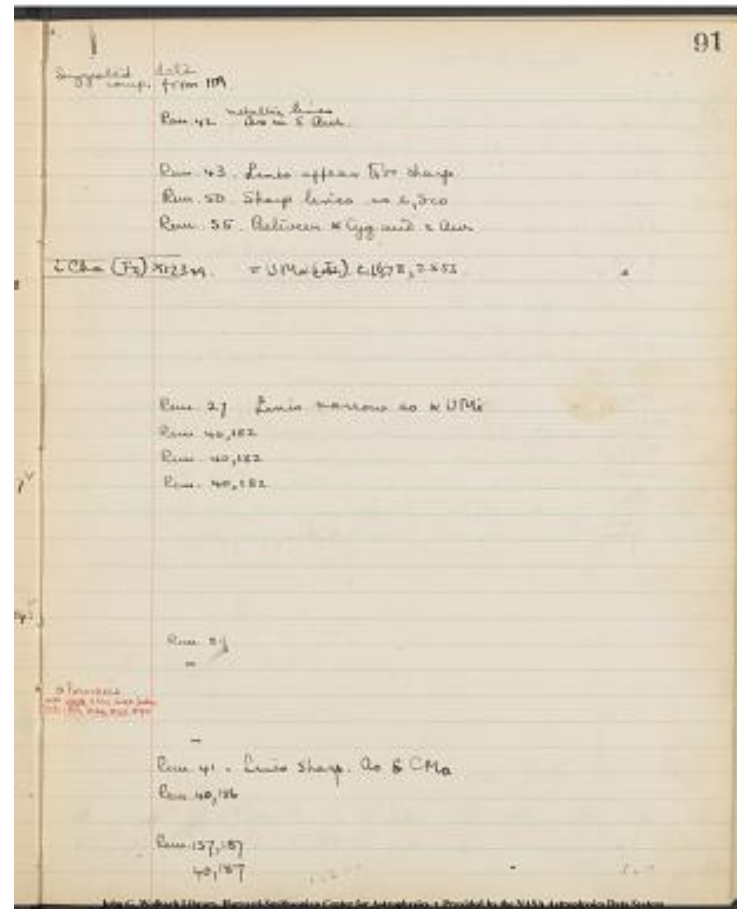
[[Res.?]] 27 Lines narrow as [[infinity]] UMi  
[[Res.?]] 40, 182  
[[Res.?]] 40, 182  
[[Res.?]] 40, 182

[[Res.?]] 89

-  
[[alpha]] Fornacis  
4433, 4.508, 5334, 6192, 626[[b?]], 7116, 7856, 8060, 8142, 8190

-  
[[Res.?]] 41. Lines sharp. Qs & CMa  
[[Res.?]] 40, 186

[[Res.?]] 157, 187  
40, 187



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]92[[\preprinted]]

### Bright C-Stars

#### F8(cont)SMus

HR4768 12 26.1 -58 52 5.44  
X 12357, 12390, 12503  
HR5621 15 0.6 -66 42 5.80  
X 12397, 12435

'Nor 16 9.6 -49 49 4.95  
X 5888, 4789, 6531

xSgr 17 41.3 -27 48 var  
X 7057

d Dra 18 30.9 +56 58 4.95  
C 2620

Cyg 20 18.6 +39 56  
C 615, 2018, 5889, 505, 618, 634

Cos 23 49.4 +56 57  
C 2396, 6992

GO 10Cam 4 54.5 +60 18  
C 849, 1786, 2602, 2610

TMon 6 19.8 +7 8 var.  
C 2504

H.R.2650

J Gem } 6 58.2 +20 43 var.

See above, p.86., for plate

HR 4276

U Car } 10 53.7 -59 12 var.

X 4050

HR7956((crossed out))

(?) T Cru } 12 15.9 -61 44 var.

5.20((crossed out))

B plate only. See H.D.G.

H.R.6062

S Nor 16 10.6 -57 39 var.

X 12096

HR7570

Agl 19 47.4 +0 45 var.

See above, p. 86, for plates

HR 8414

Aqr 22 0.6 -0 48 3.19

C 1328, 3069, 5971

HR 8571

Cep 22 25.4 +57 54 var.

See above, p. 86, for plates

HR 4210

Pec no Cai 10 41.2 -59 10 var.

X 4044, 4709, etc((?))

B0 B1 B2 B3 B5 B8 B9 A0 A2 A3 A5 F0

1 3 1 1 4 6 2 3 13 1 1 6

F2 F5 F8 G0 Pec

5 17 15 9 1

92		Bright C-stars	
F8(cont) SMus			
✓ HR 4768	12 26.1 -58 52	5.44	X 12357, 12390, 12503
✓ HR 5621	15 0.6 -66 42	5.80	X 12397, 12435
✓ ✓ 'Nor	16 9.6 -49 49	4.95	X 5888, 4789, 6531
✓ ✓ xSgr	17 41.3 -27 48	var.	X 7057
✓ ✓ d Dra	18 30.9 +56 58	+45	C 2620
✓ ✓ γ Cyg	20 18.6 +39 56		C 615, 2018, 5889, 505, 618, 634
✓ ✓ ρ Cas	23 49.4 +56 57		C 2396, 6992
✓ GO	10Cam 4 54.5 +60 18		C 849, 1786, 2602, 2610
✓ T Mon	6 19.8 +7 8	var.	C 2504
✓ HR 4276		var.	See above, p.86, for plates ✓
✓ ✓ U Car	10 53.7 -59 12	var.	X 4050 ✓
✓ ✓ HR 7956	12 15.9 -61 44	var.	Plate only. See H.D.G.
✓ ✓ (?) T Cru	12 15.9 -61 44	var.	X 12096 ✓
✓ ✓ H.R.2650		var.	See above, p.86, for plates ✓
✓ ✓ J Gem	6 58.2 +20 43	5.44	C 1328, 3069, 5971
✓ ✓ S Nor	16 10.6 -57 39	var.	See above, p.86, for plates ✓
✓ ✓ HR 7570		var.	X 4044, 4709, etc

B0	B1	B2	B3	B5	B8, B9	A0	A2	A3	A5	F0	F2	F5	F8	G0	Pec
1	3	1	1	4	6	2	3	13	1	1	6	5	17	15	9

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]93[[/preprinted]]

Suggested comp.

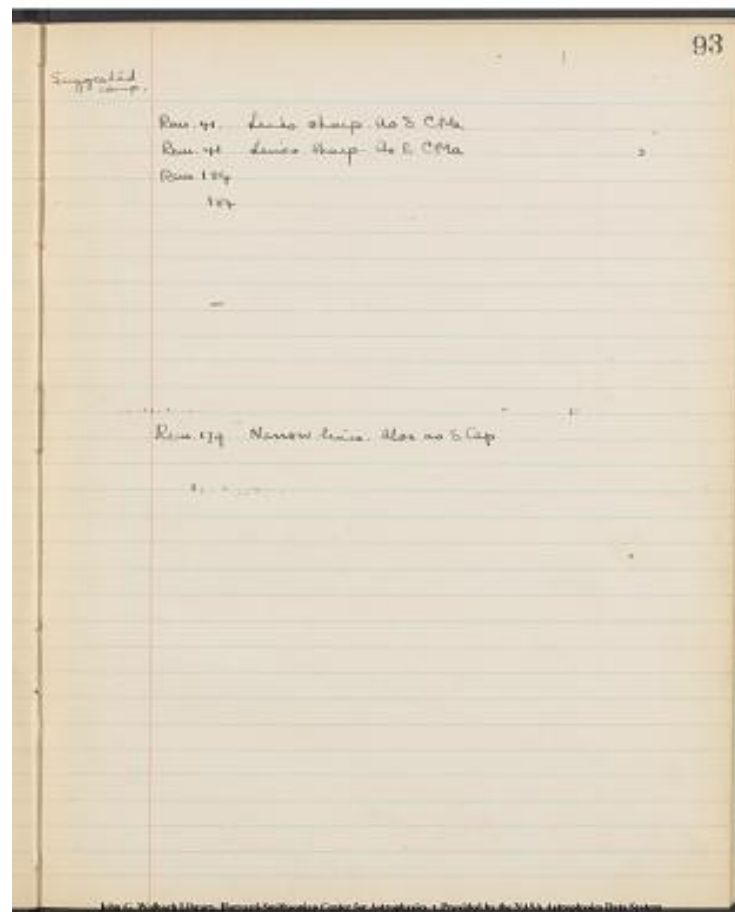
Row. 41. Lines sharp. As delta CMa

Row. 41 Lines sharp. As delta CMa

Row. 184

184

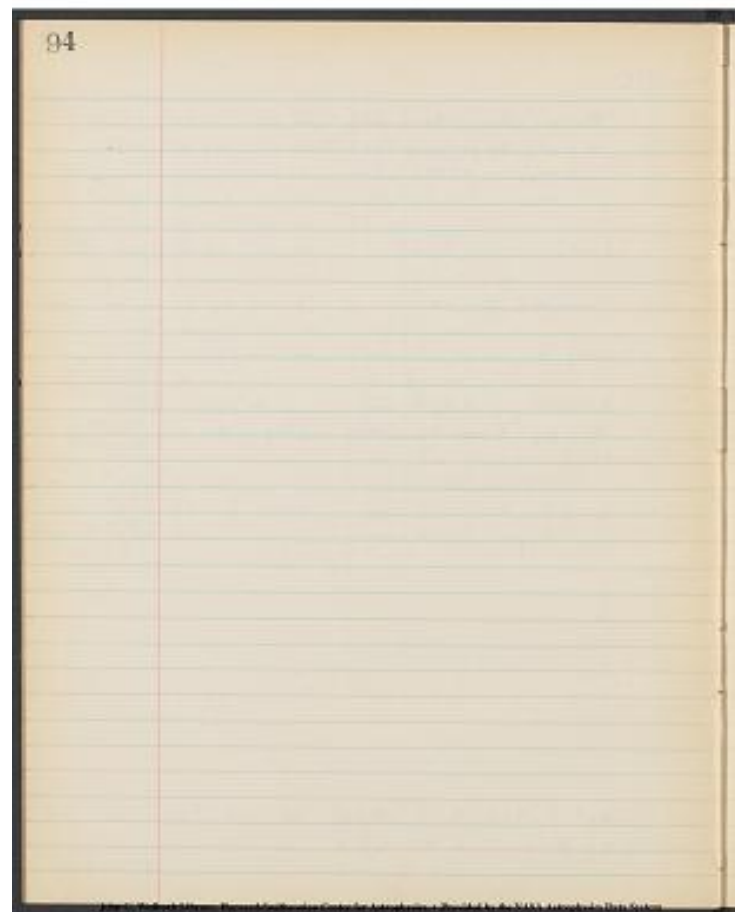
Row. 179 Narrow lines. Also as delta Cep



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 94 [[/preprinted]]

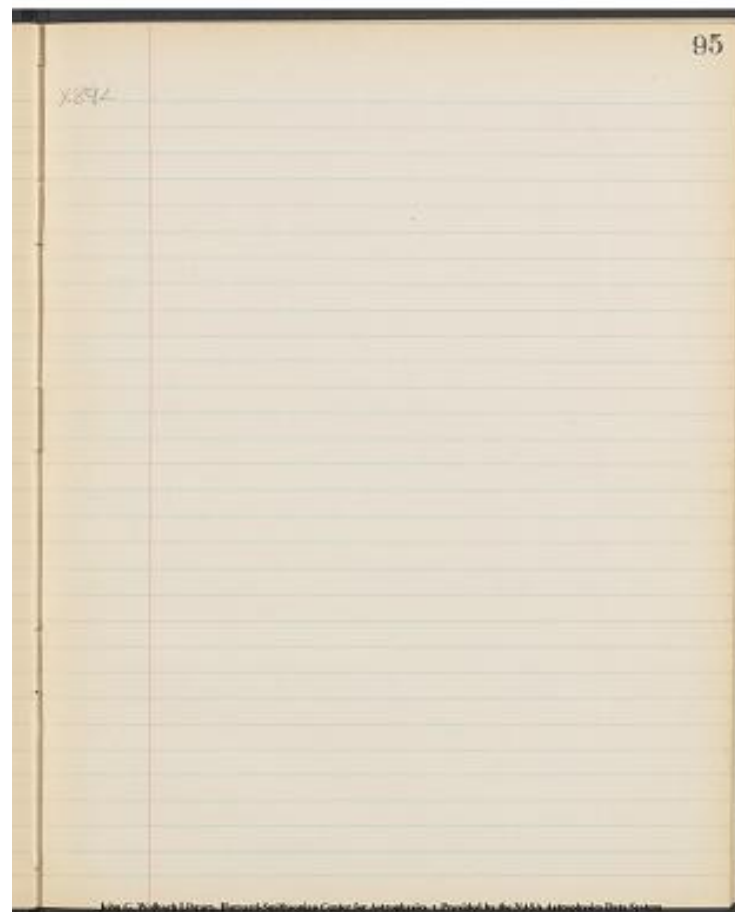
[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 95 [[/preprinted]]

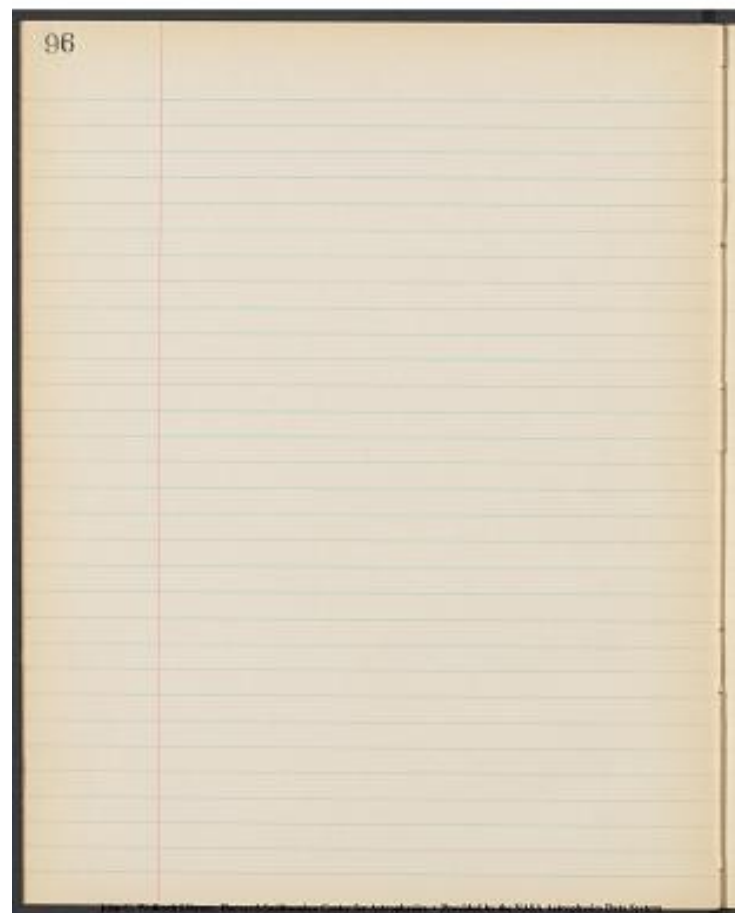
x89l



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 96 [[/preprinted]]

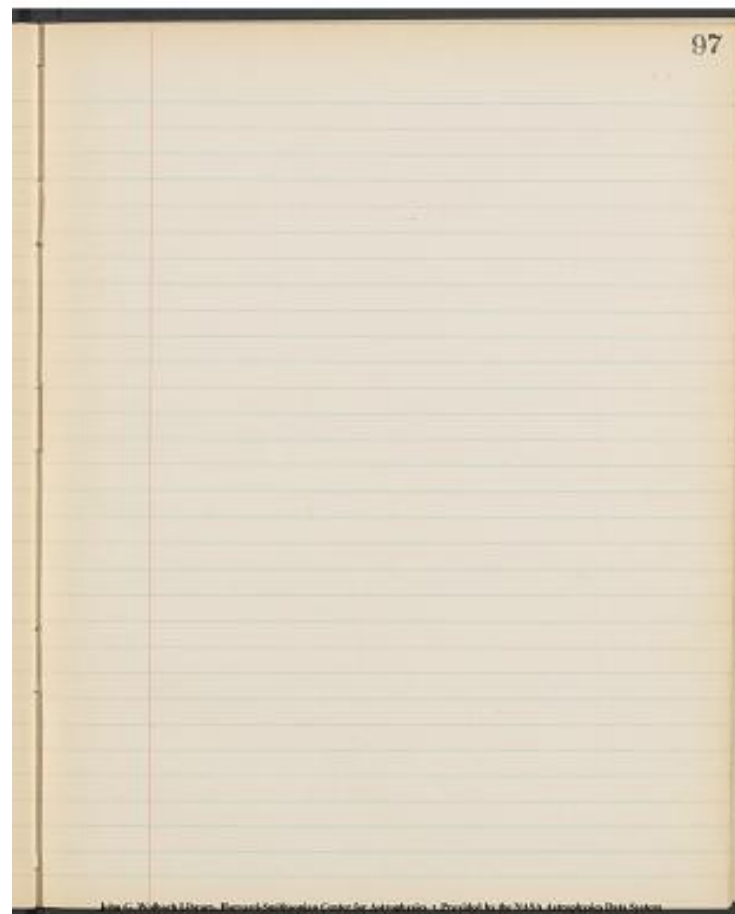
[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 97 [[/preprinted]]

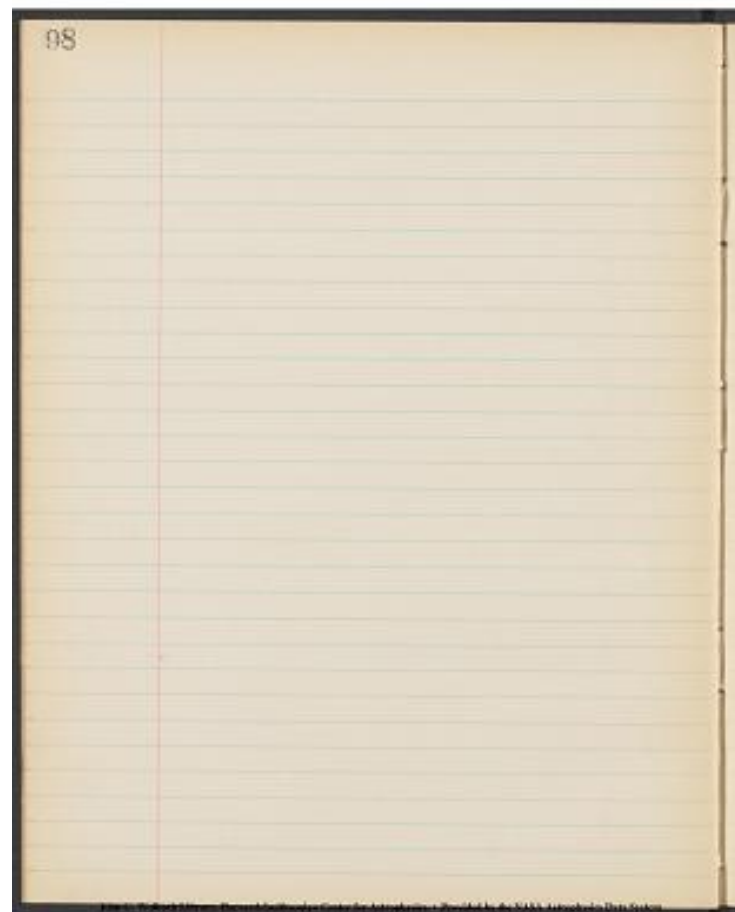
[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 98 [[/preprinted]]

[[no entries]]

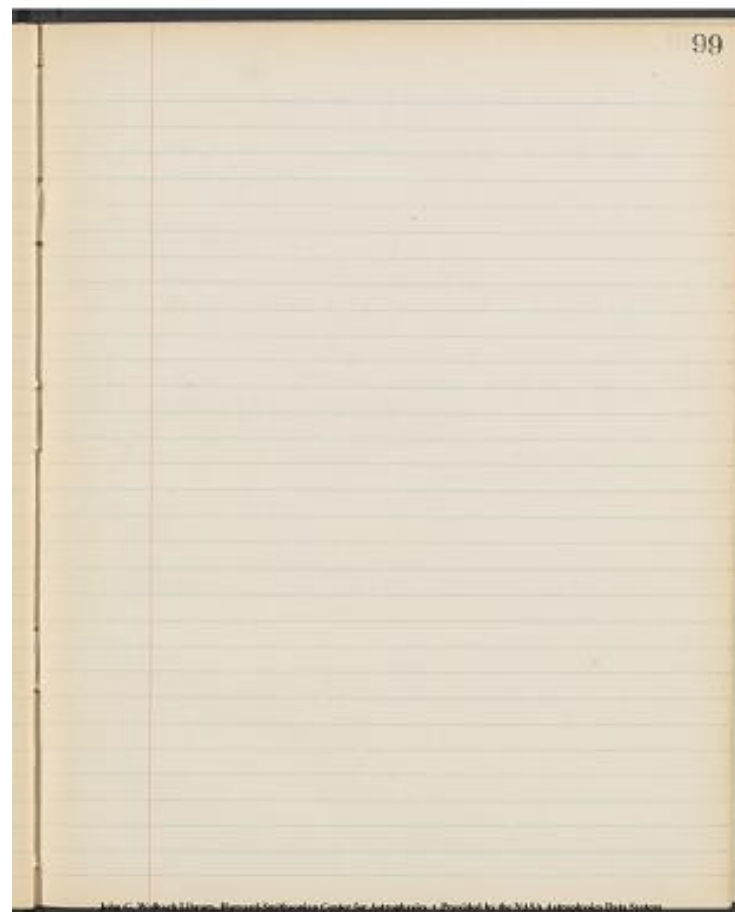


Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 99 [[/preprinted]]

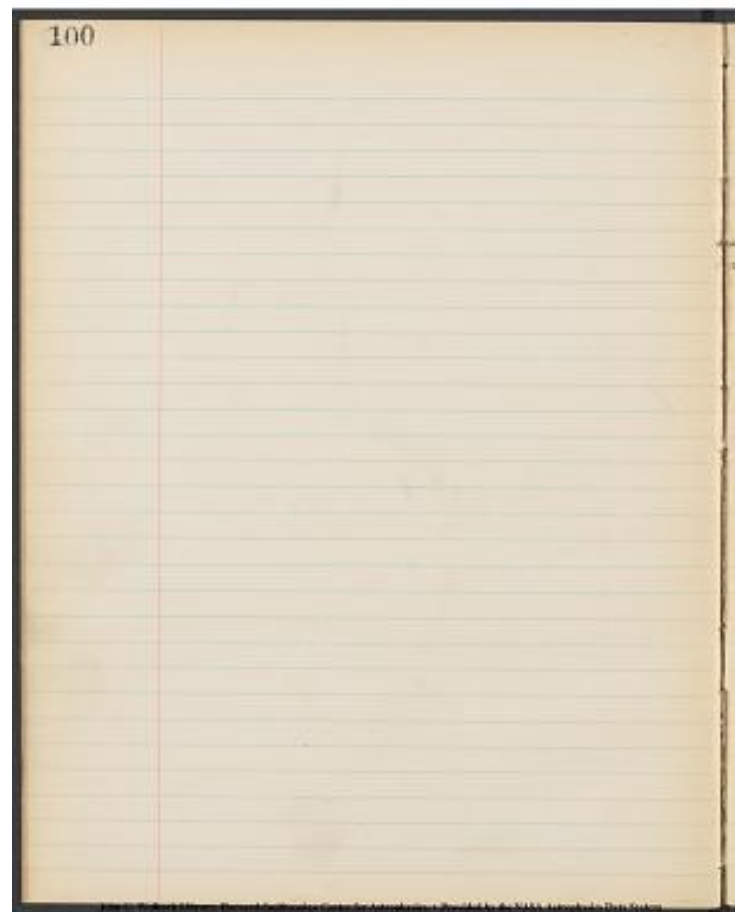
[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 100 [[/preprinted]]

[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]101[[/preprinted]]

^[[ c-stars Estimates [[g?]]line intensity  
 standard: solar spectrum as for second list of cooler stars.  
 [[underlined]] [[symbol lamda]] Standards [[/underlined]]  
 [[double underlined]]F8[[/double underlined]]  
 x 1pr short [[symbol - alpha]] For 7116,626i  
 " " [[ditto for x 1pr]] long A8C 8279 x 11433 6 h 41.6 -31.41  
 (72 CMa) large pm(L0V3)  
 x 2pr [[symbol - alpha]] For x 8142  
 c 1pr long HP1522, C17200. Short X, Orionis C286  
 2pr [[symbol - alpha]] Aur C5256 /]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
 Astrophysics Provided by the NASA Astrophysics Data System  
 [[/preprinted]]



Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]102[[/preprinted]]

[[1 Prim x Carinae?]] [[Standard ? x 7116]]

X4064

Q = 5, D = 4

[[1 Prism Line?]] For x Car

Ca + 16 16

3944 3 5

3948-51 1 ~~6~~7

3952-56 1 ~~5~~6

al 3952-56 3 5

Ca + 14 16

2990 - 7

3999 - 7w

4003 5 7

Fe 4005 6 6

4012 - 52

3 5

4022 6

4024 3

Ti+ 4028 - 8

Mn 4031 8 8

Mn 4041 3 5

Fe 4046 6 5

Mn 4049 - 5

4154 2 5

4064 4 7

4067 1 4

72 2 5

77 5 8

4084 4 6(5s)

Fe 4096 - 2

Fe 8 - 1

+1 4101 9 7

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics Provided by the NASA Astrophysics Data System  
[[/preprinted]]

102	1 Prim	Standard x Fornax
X4064	x Carinae	X 7116
Q = 5, D = 4		
Line	Q For	x Car
Ca +	16	16
3944	3	5
3948-51	1	6.7
3952-56	1	5.6
al 3952-56	3	5
Ca +	14	16
2990	-	7
3999	-	7w
4003	5	7
Fe 4005	6	6
4012	-	5.2
3		3
4022		5
4024		6
Ti+ 4028	-	3
Mn 4031	8	8
Mn 4041	3	5
Fe 4046	6	5
Mn 4049	-	5
4154	2	5
4064	4	7
4067	1	4
72	2	5
77	5	8
4084	4	6(5s)
Fe 4096	-	2
Fe 8	-	1
+1 4101	9	7

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

alpha FOR		chi Car
4106.06	-   2	
4110	-   5	
[[ <del>4113.4</del> ]]		3 [[ <del>4113.4</del> ]]
4118.9	3w   6w	
4122	3   6	
4128	3   7	
4132.4	3   6	
4137	-   3	
4144	5   7	
49 [[symbol - bracket]]		5
54 [[symbol - bracket]]	4w	[[symbol - bracket]]5w
56 [[symbol - bracket]]		
62	-   5	
64	-   2	
67	-   2	
4172	2   9	
4177	5   7	
85	2   4	
87	2   4	
91	2   4	
96 [[symbol - bracket]]		4 [[symbol - bracket]]
98 [[symbol - bracket]]		4 [[symbol - bracket]]
4203 [[symbol - bracket]]	5w	4 [[symbol - bracket]]
4205 [[symbol - bracket]]		4 [[symbol - bracket]]
4210?	-   4	
4215	4   6	
19	-   2	
1922	-   3	
4227	6   7	
4233	3w   6	
36	-   4	
40	-   4	
42	-   3	
4247	3w   6	

103

	$\alpha$ For	$\alpha$ Car
4106.06	-	2
4110	-	5
4113.4	3w	3
4118.9	3	6w
4122	3	7
4128	3	6
4132.4	-	3
4137	5	7
4144	5	5
49	4w	5w
54	4w	5w
56	-	5
62	-	2
64	-	2
67	2	9
4172	5	7
4177	5	7
85	2	4
87	2	4
91	2	4
96	4	4
98	4	4
4203	5w	4
4205	4	4
4210?	-	4
4215	4	6
19	-	2
1922	-	3
4227	6	7
4233	3w	6
36	-	4
40	-	4
42	-	3
4247	3w	6

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 104 [[/preprinted]]

x4064 cont.

	For	Car
4250	3	4
4261	1	3
4272	5	5
4290	4w	6
4294-7	-	5
4300.3	5w	4,4
4208-9	-	4
4314	4	6
4321	-	3
4326	-	5
4330	5	4
4333	-	2
Ti+ 4337	-	6
H 4340	8	5
4344		2
52	4	6
55		1
59	2	6
68 <del>[[/del]]</del> 74 <del>[[/del]]</del> - 6		
74 <del>[[/del]]</del> 84 <del>[[/del]]</del> 2 6		
79		2
83	4w	6
[[?]]		
85		3
95		4
99		5
4405		3
Gd 4408		4
4415	3w	6
4422	2	4
27-35	3w	6w
4444	2	8

104  
X4064 cont.

	For	Car
4250	3	4
4261	1	3
4272	5	5
4290	4w	6
4294-7	-	5
4300.3	5w	4,4
4208-9	-	4
4314	4	6
4321	-	3
4326	-	5
4330	5	4
4333	-	2
Ti+ 4337	-	6
H 4340	8	5
4344		2
52	4	6
55		1
59	2	6
68 <del>[[/del]]</del> 74 <del>[[/del]]</del> - 6		
74 <del>[[/del]]</del> 84 <del>[[/del]]</del> 2 6		
79		2
83	4w	6
85		3
95		4
99		5
4405		3
Gd 4408		4
4415	3w	6
4422	2	4
27-35	3w	6w
4444	2	8

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 105 [[/preprinted]]

[[3 columns]]

	Alpha For x Cau
4450	-   4
55	-   3
62	-   3
69	-   4
4481	5   5
4489	-   5
94	-   4
4501	-   4
4508	-   5
34	2   5
41	-   3
44	-   3
49	2   4
54	2   4
64	4
[[/strickethrough]] 72 [[/strickethrough]]	-
72	3
84	4
95	3   2
19	3
29	4
46-48	3
57	4
63	4
4668	3
4670[[/strickethrough]]4668,70[[/strickethrough]]	2   5
4709	+   3w
4765	1w   7
4798	2
4805-8	2
4824	4

[[/3 columns]]

	α For	α Cau
4450	-	4
55	-	3
62	-	3
69	-	4
4481	5	5
4489	-	5
94	-	4
4501	-	4
4508	-	5
34	2	5
41	-	3
44	-	3
49	2	4
54	2	4
64	-	4
<del>72</del>	<del>-</del>	<del>3</del>
72	-	3
84	-	4
95	3	2
19	-	3
29	-	4
46-48	-	3
57	-	4
63	-	4
4668	-	3
4670 <del>4668</del>	2	5
4709	+	3w
4765	1w	7
4798	-	2
4805-8	-	2
4824	-	4

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]106[[/preprinted]]

|||Alpha For|Chi Car|

4836|||2

48|||4

55|||4

H 4861|||7

4872|->|4w

4878[[/strikethrough]]4891[[/strikethrough]]|->|4w

4891[[/strikethrough]]4903[[/strikethrough]]|->|4

4900[[/strikethrough]]4919-20[[/strikethrough]]|->|4

4920[[/strikethrough]]4933[[/strikethrough]]|->|3

4935|->4958|3

|||||8

|||||4

|||||3

? 5028|||3

5040|||7

After this, the excess in the sense(?) (c-sFar - comparison star) will be stated in the second column.

Where the live comet be traced clearly in the comparison star, no entry will be made in the second column.

106			
	$\alpha$ For	$\chi$ Car	
4836		2	
48		4	
55		4	
H 4861		7	
4872		4w	
4878		4	
4891		4	
4900		3	
4920		3	
4935		8	
	4958	4	
		3	
		2	
		7	
	5028		
	5040		

After this, the excess in the sense (c-sFar - comparison star) will be stated in the second column.

Where the live comet be traced clearly in the comparison star, no entry will be made in the second column.

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 107 [[/preprinted]]

x7057 x Sagittarii Q4D3

x Sgr | excess

Kappa 16 | 3

5 | 0

4 |

4 |

5 | -10

Eta 16 | 3

3982 5 | +3

3987 3 |

3995 3 |

4003 6w | +1

4005 4 | -1

4025 5w | +3

4030 8w | 0

4041 3 | 0

4046 4 | -2

4054 3 | 2

67 3 | 1

72 3 | -2

77 9 | 2

87 5w | -1

?96 2 | 0

4104 7 | -1

4118 5w | 2

4128 4 | 0

4144 5 | 0

4172 6 | 0

4177 4 | +2

4215 4 | 0

4227 6 | -1

107

x7057 x Sagittarii Q4D3

	X Sgr	excess
K	16	3
	5	0
	4	
	5	-10
H	16	3
3982	5	+3
3987	3	
3995	3	
4003	6w	+1
4005	4	-1
4025	5w	+3
4030	8w	0
4041	3	0
4046	4	-2
4054	3	2
4064	3	-2
67	3	1
72	3	-2
77	9	2
87	5w	-1
?96	2	0
4104	7	-1
4118	5w	2
4128	4	0
4144	5	0
4172	6	0
4177	4	+2
4215	4	0
4227	6	-1

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]108[[/preprinted]]

1 Prism

|||X Sgr|Excess

4290|5|0

4300|5w|0

4308|2|-2

4315|5|+3

4326|5|-1

4337|not seen|||

4340|9|0

52|5|0

60|2|+2

68|4|+3

75|5|+1

83|5|0

95|3|+2

99|4|+3

4415-7|4|+2

4435|3|-1

44|5|+1

4481|5|0

4668|5|+1

4861|9|+1

All the lines in this spectrum inclined to be fuzzy, not entirely due to quality,  
Only of[[?]] of X Sgr with this dispersion?

108			1 Prism ✓
	X Sgr	excess	
4290	5	0	
4300	5w	0	
4308	2	-2	all the lines in this spectrum inclined to be fuzzy, not entirely due to quality.
4315	5	+3	
4326	5	-1	
4337	not seen		
4340	9	0	Only of X Sgr with this dispersion?
52	5	0	
60	2	+2	
68	4	+3	
75	5	+1	
83	5	0	
95	3	+2	
99	4	+3	
4415	4	+2	
4435	3	-1	
44	5	+1	
4481	5	0	
4668	5	+1	
4861	9	-1	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]109[[/preprinted]]

1 Prism[[^checkmark]]

||j Puppis||Q4D3  
||j Pup.||Ex  
||16||+2  
||16||+3||<- intermediate lines too hazy (Haziness probably plate quality)  
3982|4|+2  
3998|5w|+2  
4005|5w|+1  
4028|4|+4  
4030|7w|+1  
4041|-|-(2)  
4046|5|-2  
4064|4w|-1  
4067|4w|-2  
4072|3|-1|||rest of plate too hazy to be measured  
4077|7|+2  
4084|3|0  
4101|9w|0  
4110|4|+4  
4118|4|+1  
4144|3|-1  
4172|5|0  
4215|4|+2  
4227|5|-1  
50|4w|0  
61|4w|0  
72|4w|-2  
90|5w|0  
4300|~~4~~||~~8w~~||~~0~~||~~0~~||~~1~~  
08||~~8w~~||~~2~~||~~0~~||~~0~~||~~3~~  
15|3|0  
26|4w|-2  
4340|8|0

1 Prism ✓			109
X.7329	j Puppis	R Sp D3	
	16	+2	intermediate lines too hazy (Haziness probably plate quality)
3982	4	+2	
3998	5w	+2	
4005	5w	+1	
4028	4	+4	
4030	7w	+1	
4041	-	-(2)	
4046	5	-2	
4064	4w	-1	rest of plate too hazy to be measured
4067	4w	-2	
4072	3	-1	
4077	7	+2	
4084	3	0	
4101	9w	0	
4110	4	+4	
4118	4	+1	
4144	3	-1	
4172	5	0	
4215	4	+2	
4227	5	-1	
50	4w	0	
61	4w	0	
72	4w	-2	
90	5w	0	
4300	4	-3	
08	8w	0	
15	3	0	
26	4w	-2	
4340	8	0	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]110[[/preprinted]]

1 Prism ☒ Standard  $\alpha$  ☐ ☐

☐ ☐

X4728 O<sub>1</sub> Centauri . Q4 D3 Super on O<sub>2</sub> Cen qo.

O<sub>1</sub> Cen |  $\Sigma$  x).

4012-14 | 7 | -

4024 | 7 | -

4031 + c | 8w | +1

4046 | 5 | -2

4064 | 6 | +2

68 | 4 | +1

72 | 5 | -1 ~~[[strange symbol]]~~ w ~~[[strange symbol]]~~

77 | 6 | +1 (w)

83-85 | 5w | 0

4101 | 9 | 0

4110 | 8w | +4

18 ~~[[symbol - bracket]]~~ 5 | +2

to

28 ~~[[symbol - bracket]]~~ 5 | +2

32 ~~[[symbol - bracket]]~~ 5 | +1

to 37 ~~[[symbol - bracket]]~~ 5 | +2

44 | 5 | 0

4162 | 4 | -

72 | 8 | +3

77 | 7 | +4

4215 | 5 | +3

4227 | 6 | 0

4233 | 5 | +3

40 ~~[[strange symbol]]~~ 36 ~~[[strange symbol]]~~ 3 | 0

42494 | 25 | 0 | 4 | +2

50 | 6 | 1 | 4 | +2

61 | 7 | 2 | 5w | +3

72 | 9 | 0 | 8w | +5

90 | 5 | +2

110	1 Prism	Standard $\alpha$ Form	Super on O <sub>2</sub> Cen qo.
X4728	O <sub>1</sub> Centauri	Q4 D3	Very narrow and rather faint
4012-14	7	-	
4024	7	-	
4031 + c	8w	+1	
4046	5	-2	
4064	6	+2	
68	4	+1	
72	5	-1 <del>[[strange symbol]]</del>	
77	6	+1 (w)	
83-85	5w	0	
4101	9	0	
4110	8w	+4	
18	5	+2	
28	5	+2	
32	5	+1	
37	5	+2	
44	5	0	
4162	4	-	
72	8	+3	
77	7	+4	
4215	5	+3	
4227	6	0	
4233	5	+3	
4036	3	0	
41474150	4	+2	
50	6	+2	
61	7	+3	
72	9	+5	
90	5	+2	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]111[[/preprinted]]

[[underlined]] O<sub>2</sub> Cen  $\sigma_x$  [[/underlined]]

4300	5	[[?]]	+2
08	+ G		-1
15	6 Gd		+4
21	3		-
26	5		-1
33	3		-
[[symbol - bracket]] 37			
13			-6
[[symbol - bracket]] 40			
52	5		+2
60	4		-
68	5		+3
75	5		+2
83	7		+2
4395	4		+3
4399	5		+3
4415	7		+4
35	4		+1
4444	7		+3
69	5		+3
81	5		+2
89	5		+2

rest very faint

	O <sub>2</sub> Cen	$\sigma_x$
4300	5	+2
08	4	-1
15	6	+4
21	3	-
26	5	-1
33	3	-
{ 37	5	-6
{ 40		
52	5	+2
60	4	-
68	5	+3
75	5	+2
83	7	+2
4395	4	+3
4399	5	+3
4415	7	+4
35	4	+1
4444	7	+3
69	5	+3
81	5	+2
89	5	+2

rest very faint

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 112 [[preprinted]]

[[symbol - checkmark]] 1 Prism

x124356 AGC 20470 Q

[[subscript]]4[[/subscript]]D[[subscript]]2[[/subscript]] Faint, but good sp.  
lines rather hazy (quality?)

4077	8		^[[excess]] +3
83-5	4w		0
4101	9		-1
4101	4		-
4144	4		-1
4172	7		+4
77	7		+2
4215	4		0
27	8		0
32	3		-
4290	6		+1
4300	6		+1
08	3		-2
15	5		+2
4321	3		-
4325	5		-2
4331	3		-
4337	[[symbol-bracket]]		
40	[[symbol-bracket]]   10   +2		
4352	5		+1
4360	3		-
4368	3		-
4375	5		+1
4383	6		+1
4395	3		-
4399	4		-
4408	3		-
4415	5		+2
4435	4		-2
4444	6		+1

112	1 Prism		
x12435	AGC 20470	Q & D 2	Faint, but good sp. Lines rather hazy (quality?)
4077	8	-3	
83-5	4w	0	
4101	9	-1	
4110	4	-	
4144	4	-1	
4172	7	+4	
77	7	+2	
4215	4	0	
27	8	0	
32	3	-	
4290	6	-2	
4300	6	-	
08	3	+2	
15	5	-	
4321	3	-2	
4325	5	-	
4331	3	+2	
4337	10	-	
40			
4352	5	+1	
4360	3	-	
4368	3	-	
4375	5	+1	
4383	6	+1	
4395	3	-	
4399	4	-	
4408	3	-	
4415	5	+2	
4435	4	-2	
4444	6	+1	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 113 [[/preprinted]]

AGC 20470

4461 | 5 | +3

81 | 6 | +1

89 | 5 | +2

4765 | 5 | +2

4861 | 8 | 0 Rest very faint & hazy

AGC 20470			113
4461	5	+3	
81	6	+1	
89	5	+2	
4765	5	+2	
4861	8	0	Rest very faint & hazy

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]114[[/preprinted]]  
 ^[[checkmark]] 1 Prism  
 x4789 | 1 Normae. Q4 D2 Good op. but small  
 density.  
 4031|10w|-  
 4077|10|+2  
 4083|5|-  
 4101|11|+2  
 4110|6|-  
 4128|6|+2  
 ?4134|4|0  
 4144|5|0  
 4172|7|+2  
 4177|6|+3  
 4215|4|+1  
 4227|7|-1  
 4233|4|+2  
 4260|5|0  
 4270|6|0  
 4290|5|+1  
 4300|5|+1  
 4308|2|-2  
 4315|5|+3  
 4326|5|-1  
 4340|11|+2  
 43|4|-  
 4352|5|0  
 4360|5|+3  
 4368|5|+3  
 4375|5|+2  
 4383|7|+1  
 4395|3|-  
 4399|4|-

114			
1 Prism			
X4789	$\gamma$ Normae	Q4 D2	good op but small density
4031	10w	-	
4077	10	+2	
4083	5	-	
4101	11	+2	
4110	6	-	
4128	6	+2	
?4134	4	0	
4144	5	0	
4172	7	+2	
4177	6	+3	
4215	4	+1	
4227	7	-1	
4233	4	+2	
4260	5	0	
4270	6	0	
4290	5	+1	
4300	5	-2	
4308	5	+3	
4315	5	-1	
4326	11	+2	
4340	4	-	
4352	5	0	
4360	5	+3	
4368	5	+3	
4375	5	+2	
4383	7	+1	
4395	3	-	
4399	4	-	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



[[preprinted]]115[[/preprinted]]

4408|2|-  
4415|4|0  
4435|3|-2  
4444|6|+1  
4468|4|+2  
4481|5|-1  
4489|3|+1  
4584|4|+1|||Hazy from here on  
4668|5|+1  
4765|5|-

too faint to go further

115		
4408	2	-
4415	4	0
4435	3	-2
4444	6	+1
4468	4	+2
4481	5	-1
4489	3	+1
4584	4	+1
4668	5	+1
4765	5	-
Hazy from here on		
too faint to go further		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 116 [[/preprinted]]  
 ^[[checkmark]] 1 Prism Comp X6261 FOV  
 X12390 | AGC 17062 Q4 D2 Excellent though faint  
 [[bracket to the left of first three entries followed by the 'AGC 17062  
 focus rather hazy']]  
 4077|9+1  
 4083|3-2  
 4101|9|0  
 -2|-2  
 -2|-2  
 4133|3-1  
 4144|4-1  
 4172|6+1  
 4177|5+2  
 4215|4+1  
 4227|6-2  
 4232|3+2  
 4260|4-1  
 4272|5w|-1  
 4290|6+1  
 4300|5-1 G band v.s. in FOV  
 4308|2-3 absent in 17062  
 4315|6+4  
 4321|3+2  
 4326|5-2  
 4331|3|0  
 [[bracket to the left of the first two numbers in the next two rows]]  
 4337||  
 4340|11|0  
 4356|6+2  
 4360|4+2  
 4368|6+4  
 4375|6+2  
 4383|7|0  
 4395|4|-  
 4399|4|-

[[preprinted]] John C. Wolbach Library, Harvard-Smithsonian Center for  
 Astrophysics [[/large dot]] Provided by the NASA Astrophysics Data  
 System [[/preprinted]]

116	✓ 1 Prism	Comp. X6261 a For
X12390	AGC 17062	Q4 D2 Excellent though faint
4077	9	+1
4083	3	-2
4101	9	0
-	2	-2
-	2	-2
4133	3	-1
4144	4	+1
4172	6	+1
4177	5	+2
4215	4	+1
4227	6	-2
4232	3	+2
4260	4	-1
4272	5 w	-1
4290	6	+1
4300	5	-1
4308	2	-3
4315	6	+4
4321	3	+2
4326	5	-2
4331	3	0
4337	11	0
4340	6	+2
4356	4	+2
4360	4	+2
4368	6	+4
4375	6	+2
4383	7	0
4395	4	-
4399	4	-

AGC 17062 focus rather hazy  
 G band v.s. in FOV  
 absent in 17062

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 117 [[/preprinted]]

[[3 columns]]

4408	3	-
4415	5w	+2
4435	2	-2
4444	5	+3
4454	-	4
64	4	-(FOV)
81	5	-(hazy)
89	4	-
4501	4	-
08	4	-
15	4	-
34	5	-
54	5	-
64	4	-
72	4	-
84	6	+2
4619	5	-
29	5	-
4668	6	+1
4765	4	0
4824	3	-
4861	10	0

[[/3 columns]]

117		
4408	3	-
4415	5w	+2
4435	2	-2
4444	5	+3
4454	-	4
64	4	-(FOV)
81	5	-(hazy)
89	4	-
4501	4	-
08	4	-
15	4	-
34	5	-
54	5	-
64	4	-
72	4	-
84	6	+2
4619	5	-
29	5	-
4668	6	+1
4765	4	0
4824	3	-
4861	10	0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]118[[/preprinted]]

X8645 Kappa Pavonis[[?]]<sup>✓</sup> Q4 D8 Excellent, 2 Prisms  
Comparison alpha Fornacis[[?]] x 8142

Lines of Kappa Pav not very sharp but sharper  
than alpha For

|||Kappa Pav|||

3970|30|+15

3982|4w|-

3997|10|+5

4005|9|0

4012|4|+2

4014|5|+2

4024|7|+3

4031|6|+1

4033|6|+1

4034|5|+1

4041|6w|+1

4046|9|0

4049|6w|+2

4054|5w|+2

64|7|0

67|7|0

72|7|0

4077|10w|+2

83|6w|+2

4101|10|+1

4110|5vw|-

18|6|+2

22|5|+2

28|5|-

32|5|-

34|5|-

118		
X 8645	✓ K Pavonis Q4 D8 Excellent, 2 Prisms Comparison alpha Fornacis X 8142 Lines of K Pav not very sharp but sharper than alpha For	
	K Pav	
3970	30	+15
3982	4w	-
3997	10	+5
4005	9	0
4012	4	+2
4014	5	+2
4024	7	+3
4031	6	+1
4033	6	+1
4034	5	+1
4041	6w	+1
4046	9	0
4049	6w	+2
4054	5w	+2
64	7	0
67	7	0
72	7	0
4077	10w	+2
83	6w	+2
4101	10	+1
4110	5vw	-
18	6	+2
22	5	+2
28	5	-
32	5	-
34	5	-

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 119 [[/preprinted]]

KPav  
 4137 5 | -  
 4144 7 | +1  
 49 5 | -  
 54 3 | -  
 56 3 | -  
 61 5 | -  
 63 3 | -  
 67 4 | +1  
 72 11w | +3  
 77 10 | +2  
 79 8w | +2  
 88 8 | +2  
 91 8 | +2  
 96 7 | +2  
 98 8 | +2  
 4202 5 | -  
 4205 6 | -  
 4215 7 | +4  
 4227 12 | +2  
 4233 6 | -  
 36 5 | -  
 40 5 | -  
 4247 6 | +1  
 50 5 | +1  
 54 3 | -  
 59-60 7w | +2  
 4272 4 | 0  
 4274 3 | 0  
 4290 9 | +2  
 94 3 | -  
 97 3 | -  
 4300 8 | +1  
 03 8 | -

KPav		
4137	5	-
4144	7	+1
49	5	-
54	3	-
56	3	-
61	5	-
63	3	-
67	4	+1
72	11w	+3
77	10	+2
79	8w	+2
88	8	+2
91	8	+2
96	7	+2
98	8	+2
4202	5	-
4205	6	-
4215	7	+4
4227	12	+2
4233	6	-
36	5	-
40	5	-
4247	6	+1
50	5	+1
54	3	-
59-60	7w	+2
4272	4	0
4274	3	0
4290	9	+2
94	3	-
97	3	-
4300	8	+1
03	8	-

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 120 [[/preprinted]]

N Pav | Ex  
 4305 3 | -  
 4308 5 | -2  
 4315 8 | - no G band to N Pav  
 4321 5 | -  
 4326 3 | -1  
 4331 6 | +1  
 4333 3 | -  
 4337 - | -  
 4340 10 | 0  
 52 4 | +1  
 60 8 | +2  
 68 5 | +2  
 75 6 | +2  
 83 8 | +1  
 95 7 | +1  
 99 8 | +1  
 4405 6 | -  
 4408 7W | -  
 4415 10W | +4  
 4423 5W | -  
 27 5W | -  
 31 |  
 4435 5W | 0  
 4444 6 | +1  
 4455 3 | -1  
 4462 3 | -  
 69 6 | +1  
 81 8 | 0  
 89 8 | +2  
 94 4 | -  
 97 3 | -

120		
	N Pav	Ex
4305	3	-
4308	5	-2
4315	8	-
4321	5	-
4326	3	-1
4331	6	+1
4333	3	-
4337	-	-
4340	10	0
52	4	+1
60	8	+2
68	5	+2
75	6	+2
83	8	+1
95	7	+1
99	8	+1
4405	6	-
4408	7W	-
4415	10W	+4
4423	5W	-
27	5W	-
31		
4435	5W	0
4444	6	+1
4455	3	-1
4462	3	-
69	6	+1
81	8	0
89	8	+2
94	4	-
97	3	-

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 121 [[/preprinted]]

kPav | Ex

4501 6 | -

4508 6 | -

4515 6 | -

4528 5 | +2

4534 7w | +3

4541 4 | -

4544 4 | -

4550 6 | +1

4554 6 | +1

64 6 | -

72 6 | +1

76 3 |

80 3 |

4584 7 | +3

95 4 | -

4619 4w | -

4629 5w | -

4754 ~~[[/strikethrough]]~~ 4657 ~~[[/strikethrough]]~~ 6w | +1

4765 ~~[[/strikethrough]]~~ 68 ~~[[/strikethrough]]~~ 8 | +3

4824 6 | -

4840 4 | -

4855 4 | -

4861 11 | +2

	kPav	SK
4501	6	-
4508	6	-
4515	6	-
4528	5	+2
4534	7w	+3
4541	4	-
4544	4	-
4550	6	+1
4554	6	+1
64	6	-
72	6	+1
76	3	-
80	3	-
4584	7	+3
95	4	-
4619	4w	-
4629	5w	-
4754	6w	+1
4765	8	+3
4824	6	-
4840	4	-
4855	4	-
4861	11	+2

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]122[[/preprinted]]

x8267 Carinae Q 4 D 3 2 prisms  
violet very faint  
Comparison Fornacis X 8142  
Car  
4077 | enh  
4083 | o  
4087 | enh | Sp very faint in the  
4096 | enh | violet  
4110 | "[[ditto for enh]] | No measures possible  
4123 | "[[ditto for enh]]  
28 | "[[ditto for enh]]  
32 | "[[ditto for enh]]  
34 | red  
4172 | enh  
77 | enh  
[[horizontal line]]  
4215 | 8 | +4  
17 | 5  
19 | 5  
4227 | 9 | 0  
1 | 4 | +1  
4233 | 6 | +4  
47 | 5 | +2  
50 | 5 | +2  
4261 | 4 | -2  
4272 | 5 | +1  
74 | 5 | +2  
4290 | 6w | 0  
4300 | 5w | 0 | G band stronger in Car  
4308 | 6 | -2 | than in For  
4315 | 7 | +2  
4321 | 3 | -

122		
X8267	Carinae Q 4 D 3 2 prisms	
	violet very faint	
	Comparison Fornacis X 8142	
	Car	
4077	enh	
4083	o	
4087	enh	Sp very faint in the
4096	enh	violet
4110	"	No measures possible
4123	"	
28	"	
32	"	
34	red	
4172	enh	
77	enh	
[[horizontal line]]		
4215	8	+4
17	5	
19	5	
4227	9	0
	4	+1
4233	6	+4
47	5	+2
50	5	+2
4261	4	-2
4272	5	+1
74	5	+2
4290	6w	0
4300	5w	0
4308	6	-2
4315	7	+2
4321	3	-

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]123[[/preprinted]]

	Car	Ex
4326	10	+1
4331	5	-
4333	5	-
4337	8	-
4340	9	0
45	5	-
47-8	5	-
52	8	+2
55.3	4	0
60	7	+3
68	6	+3
75	9w	+3
79	4	-
83	11	+2
85	3w	-
90	4w	+1
95	7	+1
99	9	+3
4405	7	+1
4408	9w	+1
4415	5	0
4417	5	0
4422	5w	-
27	4	-
30	4	-
4435	8	+2
4444	11	+5
47	4	-
57	5	-
4454	4	-
4460	3	-2

123

	Car	Ex
4326	10	+1
4331	5	-
4333	5	-
4337	8	-
4340	9	0
45	5	-
47-8	5	-
52	8	+2
55.3	4	0
60	7	+3
68	6	+3
75	9w	+3
79	4	-
83	11	+2
85	3w	-
90	4w	+1
95	7	+1
99	9	+3
4405	7	+1
4408	9w	+1
4415	5	0
4417	5	0
4422	5w	-
27	4	-
30	4	-
4435	8	+2
4444	11	+5
47	4	-
57	5	-
4454	4	-
4460	3	-2

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]124[[/preprinted]]

[[ 3 columns ]]  
 I Cor x  
 4462 4  
 69 12w +2  
 73?76? 3  
 81 11 +2  
 89 10 +4  
 94 5 -  
 4497 5 -  
 4501 8 +4  
 08 5w -  
 15 4 -  
 4534 9w +2  
 41 4 -  
 44 4 -  
 49 5 0  
 4554 6 +2  
 58 3 -  
 64 7w +2  
 72 6 +2  
 76 3 -  
 80 5 -  
 4584 6 -  
 ? 92 5w -  
 ? 95 5w -  
 ? 4613 3 -  
 ? 4616 4 -  
 4619 5 -  
 4626 3 -  
 4629 6 -  
 4657 10w +5  
 64 10w +4

124

I Cor	x
4462	4
69	12w +2
73?76?	3
81	11 +2
89	10 +4
94	5 -
4497	5 -
4501	8 +4
08	5w -
15	4 -
4534	9w +2
41	4 -
44	4 -
49	5 0
4554	6 +2
58	3 -
64	7w +2
72	6 +2
76	3 -
80	5 -
4584	6 -
? 92	5w -
? 95	5w -
? 4613	3 -
? 4616	4 -
4619	5 -
4626	3 -
4629	6 -
4657	10w +5
64	10w +4

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]125[[/preprinted]]

[[3 columns]]  
 I Car x  
 68 5 -  
 -70 12w +5  
 79 3 -  
 , 6w -  
 4699 4 -  
 4703 5 -  
 4709 7 +1  
 14 5 +2  
 37 6 -  
 ?54 4w  
 65 12w  
 4805 5  
 4808 3  
 4824 5  
 4840 4 -  
 4855 5 -  
 4861 10 0

125

	l. Car	Ex
68	5	-
<del>68</del> -70	12w	+5
79	3	-
,	6w	-
4699	4	-
4703	5	-
4709	7	+1
14	5	+2
37	6	-
?54	4w	
65	12w	
4805	5	
4808	3	
4824	5	
4840	4	-
4855	5	-
4861	10	0

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[Preprinted]]126[[/preprinted]]

^[checkmark]

C 4564 E Aurigae Q5 D4 Excellent

Comparison (i) Fornaris X8142

(ii) Aurigae

(iii) Canis Minoris C6294

[[[?]](i)(ii)(iii)]

3889.1 [[?]]11||+3| Comparisons

3900|8||+3| rather difficult

[[Column(ii)]]~~[[across next 4 entries]]~~too hazy[[/Column(ii)]]

3906|5||-1| because of plate

3913|8||+2| background to

?|4||0| C4564

?|4||-1|

3930|3||-1|

3933|13|-5||+3|

38|7||-1|

[[Column(ii)]]~~[[across next 4 entries]]~~too hazy[[/Column(ii)]]

45|5||-1|

53|4w||-1|

57-8|4w||-1|

3961|5||0|

3970|13|-5||+1|

3982 ~~[[[?]]83[[/?]]~~5|-||+1|

3987-9 ~~[[[?]]4005[[/?]]~~6|-||-1|

3997-8 ~~[[[?]]4025[[/?]]~~5|+1||-1|

4003 ~~[[[?]]4031[[/?]]~~5|+1||+2|

4005|6|-||-1|

4012|6|-||+6|

4015|3|-||~~[[[?]]~~+

4025|8||+1|

4030|4||~~[[[?]]~~+2[[/?]]-2|

~~[[[?]]~~>[[/?]]

46|6||~~[[[?]]~~-5[[/?]]0|

49|3||~~[[[?]]~~

54|6||+12|

>

64|7||0|

67|5||-1|

[[preprinted]]John G. Wolback Library, Harvard-Smithsonian Center for

Astrophysics [[large dot]] Provided by NASA Astrophysics Data

System[[/preprinted]]

126					
C 4564	E Aurigae	Q5 D4 Excellent			
	Comparison (i) Fornaris X8142				
	(ii) Aurigae				
	(iii) Canis Minoris C6294				
3889.1	11			+3	Comparison
3900	8			+3	rather difficult
3906	5			-1	because of plate
3913	8			+2	background to
	4			0	C 4564
	4			-	
3920	3			-	
3933	13	-5		+3	
38	7			-1	
45	5			-1	
53	4w			-1	
57-8	4w			-1	
3961	5			0	
3970	13	-5		+1	
3982	5			+1	
3987-9	6			-1	
3997-8	5	+1		-1	
4003	5	+1		+2	
4005	6			-1	
4012	6			+6	
4015	3			-	
4025	8			+1	
4030	4			-1	
	6			-1	
	3			+2	
	6			+2	
	7			+2	
	5			-1	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 127 [[/preprinted]]

	Aur	(i)	(ii)	(iii)
4072	6		0	
77	7	+2	0	
4101	12		+1	
4110	5w		-	
4113	4w		-	
4123	4w		-	
28	6		+4	
32	5		-1	
61, 63, 67	8w			+2
>			-4	
4172	10		+4	
4177	9		+5	
85	3			
87	3			
92	3			
98	3			
4202	3			
4205	3			
4215	7		0	
27	[[6 or 7?]]			-2
33	7		+4	
42	6		+3	
47	7		+3	
	4w			
[[hy?]]	4w			
	4w			
	4w			
	4w			
	4w			
4290	7		0	

127

	1.0mm	(i)	(ii)	(iii)
4072	6			0
77	7	+2		0
4101	12			+1
4110	5w			-
4113	4w			-
4123	4w			-
28	6			+4
32	5			-1
61, 63, 67	8w			+2
>				-4
4172	10			+4
4177	9			+5
85	3			
87	3			
92	3			
98	3			
4202	3			
4205	3			
4215	7			0
27	[[6 or 7?]]			-2
33	7			+4
42	6			+3
47	7			+3
	4w			
[[hy?]]	4w			
	4w			
	4w			
	4w			
	4w			
4290	7			0

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]128[[/preprinted]]

[[column (ii) rows 4 to 11]]too hazy[[/column (ii) rows 4 to 11]]

[[E Aur(i)(ii)(iii)]]

[[bracket to the left of the first two entries in the first column]]

4294|7w||-|

42[[~~strikethrough~~]]97|7[[~~strikethrough~~]]||-|

4350|8||+1|

4308|6w||0|

4315|9||+3|

4321|7||+4|

4326|7||0|

4331|6w||+2|

4333|3|||

4337|6||-|

4340|10||+2|

4352|8||+1|

60|(2)||-2|

68|4||-1|

70|4||-1|

4375|8||+2|

4383.5|9||+2|

4390|3||-|

4395|8||+2|

4400|7||+1|

4405|[[4?]]||-|

4417|9||+2|

4422|3||-|

4435|[[11?]]||-4|

4444|9||+2|

4450|5||+2|

4455|||-4|

69|6||+2|

82|7||0|

89|6||+1|

91-4|3w||-|

4501|5||-|

08|5||-|

15|4||-|

20-22|5w|||

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics [[large dot]] Provided by the NASA Astrophysics Data System[[/preprinted]]

128	2 Aug	(i)	(ii)	(iii)
4294	7w			-
4297	7			-
4300	8			+1
4308	6w	50		0
4315	9			+3
4321	7			+4
4326	7			0
4331	6w			+2
4333	3			-
4337	6			-
4340	10			+2
4352	8			+1
60	(2)			-2
68	4			-1
70	4			-1
4375	8			+2
4383.5	9			+2
4390	3			-
4395	8			+2
4400	7			+1
4405	4			-
4417	9			+2
4422	3			-
4435	11			-4
4444	9			+2
4450	5			+2
4455	6			-4
69	6			+2
82	7			0
89	6			+1
91-4	3w			-
4501	5			-
08	5			-
15	4			-
20-22	5w			-

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]129[[/preprinted]]

[[5 columns]]

[[?]]	(i)	(ii)	(iii)
4528	4		-
34	6		0
41	4		-
45?	3		-
50	7		+2
56	7		+1
59	3		
64	6		
72	6		
76	3		
84	7		
86	5		
4619	7w		
30	6		
35	6		
57	4		-3
64	3		+1
68	4		-2
70	4		
4789	3		
34	4w		
4756	3		
64	3		0
80	4		
4805	4		
24	4		+1
36	4		
4848	4		
4855	3		
4861	8		

	2. Qu	(i)	(ii)	(iii)
4528	4			-
34	6			0
41	4			-
45?	3			-
50	7			+2
56	7			+1
59	3			
64	6			
72	6			
76	3			
84	7			
86	5			
4619	7w			
30	6			
35	6			
57	4			-3
64	3			+1
68	4			-2
70	4			
4789	3			
34	4w			
4756	3			
64	3			0
80	4			
4805	4			
24	4			+1
36	4			
4848	4			
4855	3			
4861	8			

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]130[[/preprinted]]

1prism  
X4050 ^[[ ]] ~~U~~ Carinae Q3D5 edge of  
plate  
AGC 14910 Poor spectrum  
Comparison for X7116  
3958|6|+2|  
3961|6|+2|  
3970|11|-3|  
82|4|-|  
97|4|0|  
4003-5|5|0|  
12-14|6|0|  
4026|3|+1|  
4030|8w|0|  
4041|3|0|  
4046|7|0|  
4049|4|+1|  
4054|5|0|  
4064|5|0|  
4067|4|0|  
4072|~~7w~~ 5|0|  
4077|7w|0|  
4083|4|-1|  
4101|5|-4|  
4134|4|-1|  
4144|5|-1|  
4215|4|-|  
4227|5|-2|  
||G strong||  
||4315 abs.||  
4326|6|-1|  
4340|6|-4|

Spectrum very difficult  
quite burned out  
beyond 4340

wrong star  
(as expected)  
This is Carinae (KO)

130			
X4050	Carinae Q3 D5 edge of plate		AGC 14910 Poor spectrum
	Comparison of For X7116		
3958	6	+2	Spectrum very difficult quite burned out beyond 4200
3961	6	+2	
3970	11	-3	
82	4	-	
97	4	0	
4003	5	0	wrong star
4026	3	0	(as expected)
4030	8w	+1	This is in Carinae (KO)
4041	3	0	
4046	7	0	
4049	4	+1	
4054	5	0	
4064	5	0	
4067	4	0	
4072	5	0	
4077	7w	0	
4083	4	-1	
4101	5	-4	
4134	4	-1	
4144	5	-1	
4215	4	-	
4227	5	-2	
	G strong		
	4315 abs.		
4326	6	-1	
4340	6	-4	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 131 [[/preprinted]]

X4050| Upsilon Carinae Q3 D4 ceutei [[?]] of plate.  
 | AGE 15004 Same comp. lines sharp. poor  
 | Upsilon Car | Sigma x

3933 | 11 | -4  
 3970 | 13 | 0  
 3997-8 | 5 | +2  
 4005 | 5 | +2  
 4012-14 | 5 | -  
 4026 | 6 | -  
 4031 | 6 omega | +1  
 4046 | 4 | 0  
 4064 | 4 | +2  
 4067 | 4 | +2  
 4072 | 6 | -  
 4077 | 7 | +4  
 4083 | 7 omega | +3  
 4101 | 9 | 0  
 4119 | 3 | -  
 23 | 3 | -  
 28 | 3 | -  
 4144 | 5 | -  
 4172 | 5 | +3  
 4177 | 4 | -  
 4215 | 5 | +3  
 4227 | 7 | 0  
 4233 | 5 | -  
 4240 | 4 | -  
 47-50 | 6 | -  
 61 | 5 | -  
 72-4 | 5 omega | -  
 4290 | 5 | +2  
 94-7 | 3 | -

X4050		U Carinae	Q3 D4 ceutei of plate
		AGE 15004	Same comp. lines sharp. poor
		U Car	Sx
3933	11	-4	
3970	13	0	
3997-8	5	+2	
4005	5	+2	
4012-14	5	-	
4026	6	-	
4031	6	-	
4046	4	-	
4064	4	+1	
4067	4	0	
4072	6	+1	
4077	7	+2	
4083	7	+4	
4101	9	+1	
4119	3	0	
23	3	-	
28	3	-	
4144	5	-	
4172	5	-	
4177	4	-	
4215	5	-	
4227	7	-	
4233	5	-	
4240	4	-	
47-50	6	-	
61	5	-	
72-4	5	-	
4290	5	+2	
94-7	3	-	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 132 [[/preprinted]]

^[[symbol - checkmark]]  
 Upsilon Car | Sigma x  
 4300 | 8 | G Gaud [[?]] No G in  
 4308 | 5 | of curved Upsilon Car  
 4315 | 7 | G [[subscript]] y [[subscript]] plate background in alpha 7ry [[?]]  
 4321 | 4 |  
 4326 | 8 | +3  
 43313 | 3 | omega |  
 4340 | 10 | +1  
 4352 | 7 | -  
 4360 | 7 | -  
 4368 | 7 | +4  
 4375 | 7 | +4  
 4383 | 8 | +3  
 95 | 5 | - background obscures  
 99 | 5 | - comparison  
 4408 | 6 | - Upsilon Car Not good beyond 4383  
 -35 | 6 | omega | -  
 4444 | 6 | -  
 69 | 5 | -  
 81 | 5 | -  
 89 | 4 | -  
 4501 | 4 | -  
 4508 | 4 | -  
 4668 | 5 | omega | +1  
 4765 | 5 | -  
 4824 | 5 | -  
 4861 | 9 | 0

132		
	U Car	G
4300	8	G band
4308	5	observed
4315	7	by plate background in x 7ry
4321	4	
4326	8	+3
43313	3	W
4340	10	+1
4352	7	-
4360	7	-
4368	7	+4
4375	7	+4
4383	8	+3
95	5	-
99	5	-
4408	6	-
-35	6	-
4444	6	-
69	5	-
81	5	-
89	4	-
4501	4	-
4508	4	-
4668	5	-
4765	5	-
4824	5	-
4861	9	0

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 133 [[/preprinted]]

^[[symbol - checkmark]]  
X4733 | x Carinae Q5 D [[subscript]] 4 [[subscript]] Comp alpha For  
x7116  
K | 15 | 0  
3948 -51 | 7 | +4  
3970 | 15 | +2  
3982 | 5 | -  
3987 | 4 | -  
3995 | 4 | -  
3997-8 | 4 omega | -  
4003 | 3 | +1  
4005 | 4 | 0  
[[/strikethrough]] 4005 [[/strikethrough]] | [[/strikethrough]] 5 omega  
[[/strikethrough]] | -  
4012 | 4 | -  
4014 | 4 | -  
4018 | 3 | -  
4022 | 3 | -  
4025 | 7 | +4  
4031 | 4 [[symbol - right arrow]] | +1  
4041 | 4 | -  
4046 | 6 | 0 omega  
| [[/strikethrough]] 4 omega [[/strikethrough]] | -  
| [[/strikethrough]] 6 [[/strikethrough]] | -  
4049-50 | 4 |  
4053 | 5 omega |  
4064 | 7 | +4  
68 | 4 | +2  
72 | 5 | +1  
77 | 8 | +3  
84 | 5 | +2  
90-92 | 4 omega | -  
96-98 | 4 omega | -  
4101 | 8 | 0

133		
X4733 x Carinae Q5 D Comp alpha For X7116		
K	15	0
3948-51	7	+4
3970	15	+2
3982	5	-
3987	4	-
3995	4	-
3997-8	4	-
4003	3	+1
4005	4	0
<del>4005</del>	<del>5</del>	-
4012	4	-
4014	4	-
4018	3	-
4022	3	-
4025	7	+4
4031	4	+1
4041	4	-
4046	6	0 omega
<del>4049-50</del>	<del>4</del>	-
4053	5	-
4064	7	+4
68	4	+2
72	5	+1
77	8	+3
84	5	+2
90-92	4	-
96-98	4	-
4101	8	0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 134 [[/preprinted]]

	x Carinae   Ex
4106	3
4110	7
13-14	3
18	7   +4
22	7   +4
28	7   +4
32	7   +4
34	5   -
37	7   +2
49	6w
54-6	6w
61-3	6w
67	3
4172	9   +4
77	8   <del>[[+4?]]</del>
85-7	5   -
91	5   -
98	<del>[[420]]</del>   <del>[[2 and 3?]]</del>   5   +1
5	4   +2
6	4   +2
8	4
10	4
12	4
4215	6   +2
4227	7   +2
4233	5   -
4240	3   -
4247	6   <del>[[+3]]</del>
51	3   +3
54	3

134		
	x Carinae	Ex
4106	3	
4110	7	
13-14	3	
18	7	+4
22	7	+4
28	7	+4
32	7	+4
34	5	-
37	7	+2
49	6w	
54-6	6w	
61-3	6w	
67	3	
4172	9	+4
77	8	<del>+</del>
85-7	5	-
91	5	-
98	5	+1
5	4	+2
6	4	+2
8	4	
10	4	
12	4	
4215	6	+2
4227	7	+2
4233	5	-
4240	3	-
4247	6	<del>+</del>
51	3	+3
54	3	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]135[/preprinted]]

	x Carinae	Ex
58	3	
60	3	0
4272-4	[[/strikethrough]] 4290	[[/strikethrough]] 8w +3
4290	6	+1
94-7	5	
4300-3	5+5	+2
08-9	5	0
4315	8	+5
4321	3	
4325	5	0
4331	3	-
4333	3	-
4340	10	0
44	3	-
52	6	0
68	5	-
72	6	-
75	6	+2
4383	9	+4
85	3	
95	5	+2
99	6	+2
4405	3	-
4408	4	-
4415	9	+4
23	4	-
4444	9	+4
4450	4	-
4454	-	4
69	6w	
81	6	+1

135

	x Carinae	Ex
58	3	
60	3	0
4272-4	4290	8w +3
4290	6	+1
94-7	5	
4300-3	5+5	+2
08-9	5	0
4315	8	+5
4321	3	
4325	5	0
4331	3	-
4333	3	-
4340	10	0
44	3	-
52	6	0
68	5	-
72	6	-
75	6	+2
4383	9	+4
85	3	
95	5	+2
99	6	+2
4405	3	-
4408	4	-
4415	9	+4
23	4	-
4444	9	+4
4450	4	-
4454	-	4
69	6w	
81	6	+1

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]136[/preprinted]]

^[[x Car]]

89||5<||+1

9 [[symbol - plus or minus]]||5||+2

4501||5||+2

4508||5||

4515||4||

20||4||

23||4||

25||4||

28||4||

4534||5||

41||3||

44||3||

[[symbol]] line connecting the "3" on line 41 to the "3" on line

44[[/symbol]]

50||3||

54||5||

[[symbol]] line connecting the "3" on line 50 to the "3" on line

54[[/symbol]]

64||5||

72||3||

4584||6||

96||5w||

4613||3||

16||3||

19||6w||

29||6||

35||6||

46-8||6||+1

57||6||

63||3||

4668-70||7||+2

||4||

||3||

||3||

||4||

||4||

4765||6||

/]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[image]]dot[[/image]] Provided by the NASA Astrophysics  
Data System[[/preprinted]]

136		
	$\alpha$ Car	
59	5	+1
71-948	5	+2
4508	5	+2
4508	5	
4515	4	
20	4	
23	4	
25	4	
28	4	
4534	5	
41	3	
44	3	
50	3	
54	5	
64	5	
72	3	
4584	6	
96	5w	
4613	3	
16	3	
19	6w	
29	6	
35	6	
46-8	6	+1
57	6	
63	3	
4668-70	7	+2
	4	
	3	
	3	
	4	
	4	
4765	6	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 137 [[/preprinted]]

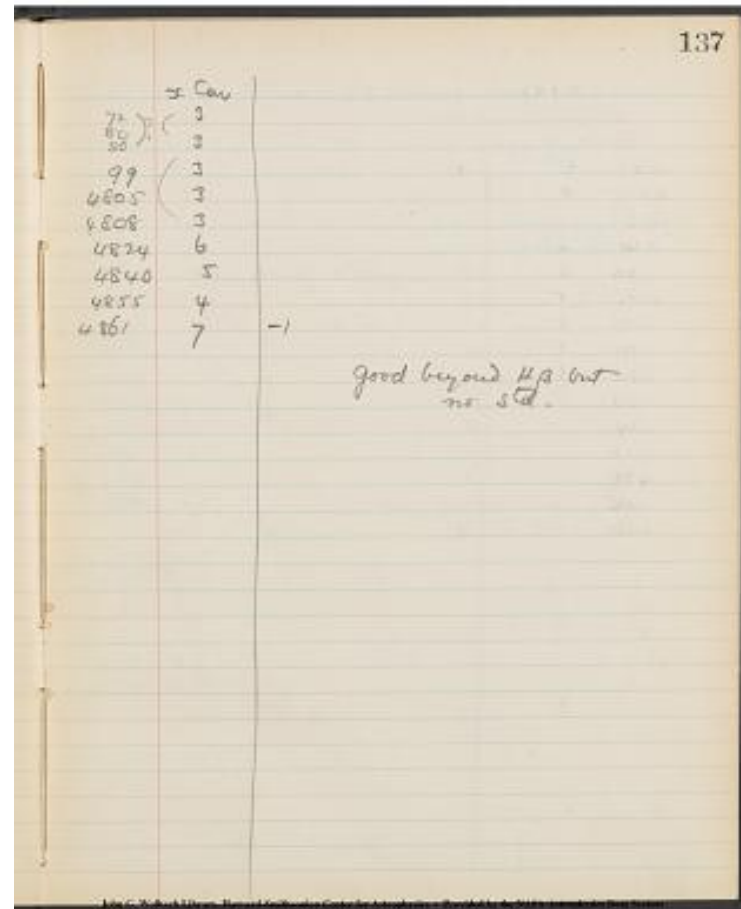
^[[ chi Car  
72 ||| 3  
80 ||| 3  
80 |||

[[symbol]] connection lines 72 and 80, the same line connecting the "3"  
in line 72 to the "3" in 80[[/symbol]]?

99 ||| 3  
4805 ||| 3  
4808 ||| 3  
[[symbol]] line connecting the "3" in line to the "3" in line 4808[[/symbol]]  
4824 ||| 6  
4840 ||| 5  
4855 ||| 4  
4861 ||| 7 ||| -1

Good beyond HBeta but no std.  
/]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[image - dot]] Provided by the NASA Astrophysics Data  
System [[/preprinted]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 138 [[/preprinted]]

^[[ Coup. x For xb261

4733 DM3216 1 p.... QB+ D2 Very faint

Ex

No est.... possible

[[Three Columns]]

4077 6 | +

4101 8w | -

4110 | +

4144 6? | +

4172 6? | +

4215 5 | +

4227 8 | -

4290 5 | +

4300 6 | +

4315 -? |

4340 10 | 0

4352 7 | 0

4375 | 0

4383 |

4668 5? | 0

/]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[image]]dot[[/image]] Provided by the NASA Astrophysics  
Data System [[/preprinted]]

138			Coup. x For xb261
X 4733	DM 3216	1 p.... QB+ D2 Very faint	
		Sm	
4077	6	+	No estimates possible
4101	8w	-	
4110		+	
4144	6?	+	
4172	6?	+	
4215	5	+	
4227	8	-	
4290	5	+	
4300	6	+	
4315	-?		
4340	10	0	
4352	7	0	
4375		0	
4383			
4668	5?	0	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]139[[/preprinted]]  
Comp proportional to FOV X6261

x5739 W Sagittarii Q3 D1 Very faint

Ex. No estimates

4215+1 Edge of plate

4227 0

4247+1

4272+1 Lines in W Sgr

4290-1 ? rather sharp

G band fairly strong.

4315+3

4321+3 ([[?]] in proportion to For)

4325 0

4331+3 " " " "

4340 0

4352+1

62 0

68 -

75+1

83+1

99+2

4508+2

15+1

44 0

4668 0

4765+1

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[large dot]] Provided by the NASA Astrophysics Data  
System[[/preprinted]]

		Comp $\propto$ For X6261	139
X5739	W Sagittarii Q3 D1	Very faint	
	W.	No estimates	
4215	+1	Edge of plate	
4227	0		
4247	+1		
4272	+1	Lines in W Sgr	
4290	-1.3	rather sharp	
4315	+3	G band fairly strong	
4321	+3 (min in $\alpha$ For)		
4325	0		
4331	+3		
4340	0		
4352	+1		
62	0		
68	-		
75	+1		
83	+1		
99	+2		
4508	+2		
15	+1		
44	0		
4668	0		
4765	+1		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 140 [[/preprinted]]

^[X5909

1 prism

W Sagittarii Coup for 6262 Q3 D2

Very faint lines rather wide & hazy but spectrum good. Near edge of plate.

4077| 7| +1

4083| 5W| 0

4101| 11| 0

4110| +1 Only the more conspicuous lines can be seen.

4144| 62| 0

4172| 6W| 0

4215| 4| 0

4227| 6| -2

4272| 6| -1

4290| 5| 0

4300| 5| 0

4308| 3?| -2

4315| 4| +2

4326| 4| -2

4340| 11| -1 too faint

4375| 5| 0

4454| -| -3

C3870

useless /]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics [[/preprinted]]  
[[preprinted]] Provided by the NASA Astrophysics Data System [[/preprinted]]

140	1 prism	
X5909	W Sagittarii Coup for 6262 Q3 D2	
	Very faint lines rather wide & hazy but spectrum good. Near edge of plate	
4077	7	+1
4083	5W	0
4101	11	0
4110		+1
4144	6?	0
4172	6W	0
4215	4	0
4227	6	-2
4272	6	-1
4290	5	0
4300	5	0
4308	3?	-2
4315	4	+2
4326	4	-2
4340	11	-1
4375	5	0
4454	-	-3
C 3870		
useless		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

^[[ [symbol]] check mark [/symbol]] Prism  
C2396 p Cassiopeiae Q5 D3 very good. Coup Fornacis x 6261

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics [[image]] dot [[/image]] Provided by the NASA AStrophysics Data System [[/preprinted]]

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 142 [[/preprinted]]

^[[ p Cas

4247| 5W  
50| +  
61| 5W| 0  
72-74| 8W| +3  
[[/strikethrough]] 4290 [[/strikethrough]] 4288| 3W| +  
[[/strikethrough]] 4290 [[/strikethrough]] 4290| 5| -1  
4294-7| 4| +  
4300-5| 6| +2  
4308| 4| -2  
4315| 6| +  
4321| 4| +  
4326| 5| -1  
4331| 4| +  
4340| 12| -2  
4344| 3| +  
4352| 7| +3  
60 [[/strikethrough]] 4355 [[/strikethrough]] 4W| +  
68 [[/strikethrough]] 4360 [[/strikethrough]] 5| +2  
75 [[/strikethrough]] 4368 [[/strikethrough]] 5?| +2  
83 [[/strikethrough]] 4375 [[/strikethrough]] 7| +3  
4395| 5| +  
98| 4| +  
4408| 3| +  
15| 7| +  
35| 3W| -1  
4444| 8  
54| 0| -3  
66| 8W| +2  
81| 6| -  
89| 6| -  
/]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics [[image]] dot [[/image]] Provided by the NASA Astrophysics Data System [[/preprinted]]

142		
4247	p Cas	
50	5W	+
61	5W	0
72-74	8W	+3
<del>4290</del>	3W	+
<del>4290</del>	5	-1
<del>4294-7</del>	4	+
4300-5	6	+2
4308	4	-2
4315	6	+
4321	4	+
4326	5	-1
4331	4	+
4340	12	-2
4344	3	+
4352	7	+3
60	4W	+
68	5	+2
75	5?	+2
83	7	+3
4395	5	+
98	4	+
4408	3	+
15	7	+
35	3W	-1
4444	8	
54	0	-3
66	8W	+2
81	6	-
89	6	-

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 153 [[/preprinted]]

^[p Cas

4508| 4W|  
4515| 3|  
34| 6W| +1  
?35| 5| +  
64| 3|  
72| 5|  
84| 5|  
95| 6W|  
4619| 4|  
29| 5|  
57| 4|  
4668| 6| +2  
4765| 5| +  
4861| 7| 0  
/]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[image]] dot [[/image]] Provided by the NASA Astrophysics  
Data System [[/preprinted]]

143

p Cas

4508	4W	
4515	3	
34	6W	+1
?35	5	+
64	3	
72	5	
84	5	
95	6W	
4619	4	
29	5	
57	4	
4668	6	+2
4765	5	+
4861	7	0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 144 [[/preprinted]]

^[[C 2620  
^[[checkmark]] 1 prism  
d Draconis Q5 D3 good  
Coup x For x7116

3933| 16| +3  
44| 6| +3  
| 7W| +4  
3961| 6| +3  
3970| 15| +2  
3979| 4|  
3982| 7| +4  
3991-5| 5W|  
3997-8| 8| +3  
4005| 7| -1  
4012-14| 4W|  
4022| 5|  
4024| 5|  
4031| 8W| +1  
4041| 4| 0  
4046| 6| 0  
4054| 5W| +1  
4062| 5| +1  
4067| 3| -1  
4072| 3| -1  
4077| 8| +2  
4087| 6W| 0  
4096| 3| 0  
4101| 10| 0  
4110| 6W| +  
18| 6| +1  
22| 6| +3  
28| 6| +1  
44| 6| 0  
4172| 6| +2  
77| 5| +3  
/]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for the Center for Astrophysics [[/preprinted]] dot [[/preprinted]] Provided by the NASA Astrophysics Data System

144		
C 2620	d Draconis Q5 D3 good	
	Coup x For x7116	
3933	16	+3
44	6	+3
	7W	+4
3961	6	+3
3970	15	+2
3979	4	
3982	7	+4
3991-5	5W	
3997-8	8	+3
4005	7	-1
4012-14	4W	
4022	5	
4024	5	
4031	8W	+1
4041	4	0
4046	6	0
4054	5W	+1
4062	5	+1
4067	3	-1
4072	3	-1
4077	8	+2
4087	6W	0
4096	3	0
4101	10	0
4110	6W	+
18	6	+1
22	6	+3
28	6	+1
44	6	0
4172	6	+2
77	5	+3

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 145 [[/preprinted]]

4215| 4| 0  
4227| 7| -1  
4232| 6| +4  
47|~~61~~| 5W| +1  
61|~~72~~| 6W| -1  
72| 6W| 0  
90| 6| 0  
4294-7| 3| +  
4300-3| 7W| 0 no G [[baum?]]  
4308| 3| -3  
4315| 6| +3  
4321| 3| +  
4325| 5| -1  
4331| 3| +  
4340| 10| +1  
4352| 5| 0  
4360| 3| +  
4368| 5| +3  
4375| 5| +2  
4383| 6| 0  
95| 5W| +  
99| 4| +  
4505-8| 6| +1  
4575| 6| +1  
55| 0| 4  
69| 5W| +  
81| 5| 0  
89| 5| +2  
4668| 6| +1  
4765| 6| +  
4814| 5|  
4861| 9| 0

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[image]]dot[[/image]] Provided by the NASA Astrophysics  
Data System

4215	4	0
4227	7	-1
4232	6	+4
47 <del>61</del>	5W	+1
61 <del>72</del>	6W	-1
72	6W	0
90	6	0
4294-7	3	+
4300-3	7W	0 no G-baum
4308	3	-3
4315	6	+3
4321	3	+
4325	5	-1
4331	3	+
4340	10	+1
4352	5	0
4360	3	+
4368	5	+3
4375	5	+2
4383	6	0
95	5W	+
99	4	+
4505-8	6	+1
4575	6	+1
55	0	4
69	5W	+
81	5	0
89	5	+2
4668	6	+1
4765	6	+
4814	5	
4861	9	0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 146 [[/preprinted]]

^[C5132

1 prism

35 Cygni Q3 D3 lines clean, sp very irregular

Coup x for X7116

3933| 14| 0

3970| 14| 0

400| 6| +1

4005| 5| -1

4077| 7| +2

4083| 3| -1

4101| 9| 0

4144| 4| -1

4172| 6W|

4215| 3| -1

4227| 5| -1

4233| 4| +

4290| 4|

4300| 5| +2

4308| 3| -3

4315| 4| +

4340| 10| +1

4368| 6| +2

75| 6| +1

4668| 6| 0

4765| 4| +

4861| 7| 0

/]]^

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[/image]]dot[[/image]] Provided by the NASA Astrophysics  
Data System

146	1 prism /
C 5132	35 Cygni Q3 D3 lines clean, sp very irregular x
	Coup x for X7116
3933	14 0
3970	14 0
400	6 +1
4005	5 -1
4077	7 +2
4083	3 -1
4101	9 0
4144	4 -1
4172	6W
4215	3 -1
4227	5 -1
4233	4 +
4290	4
4300	5 +2
4308	3 -3
4315	4 +
4340	10 +1
4368	6 +2
75	6 +1
4668	6 0
4765	4 +
4861	7 0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]] 147 [[/preprinted]]

x8843

Pavonis Q3 D3 lines hazy. Out of focus.  
Coup For X 6261

4215 4W 0  
4227 6W 0  
4261 4 -1  
4272 5 0

4290 6 +1  
G [[baud?]]  
apparently  
4328 5W -2  
4340 12 +1  
4375 7 +1  
4668 7 +1  
4861 10 +1

x8843		
Pavonis Q3 D3 lines hazy Out of focus. Coup a For x6261		
4215	4W	0
4227	6W	0
4261	4	-1
4272	5	0
4290	6	+1
G band		
apparently		
4326	5W	-2
4340	12	+1
4375	7	+1
4668	7	+1
4861	10	+1

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]148[[/preprinted]]

1 prism  
^[[checkmark]]  
X 11998 S Mascae Q4 D3 lines clear and sharp  
Comp 72 CMa X11433  
3997|6|+2  
4005|4|-1  
4025|4|+2  
4031|5w|+2  
4041|3|-1  
4046|5|-1  
4054|3|+  
4064|5|-1  
4068|4|-1  
4072|2|-2  
4077|7|+3  
4083|5|0  
4096|3|+  
4101|8|0  
4110|4|+  
4118|4|+1  
4128|4|-1  
4134|4|+  
4134|4|+  
4144|6|+1  
4154-6|4w|+  
62|4|+  
72|7w|+3  
77|6|+  
87|3|0  
91|4|0  
97|4|0  
4210|4|+  
4215|5|+3  
4227|7|0

[[preprinted]]John G. Wolbach Library Harvard-Smithsonian Center for  
Astrophysics [[/large dot]] Provided by the NASA Astrophysics Data  
System[[/preprinted]]

148	1 prism ✓		
X 11998	S Mascae Q4 D3 lines clear + sharp		
	Comp	72 CMa	X 11433
3997	6	+2	
4005	4	-1	
4025	4	+2	
4031	5w	+2	
4041	3	-1	
4046	5	-1	
4054	3	+	
4064	5	-1	
4068	4	-1	
4072	2	-2	
4077	7	+3	
4083	5	0	
4096	3	+	
4101	8	0	
4110	4	+	
4118	4	+1	
4128	4	-1	
4134	4	+	
4144	6	+1	
4154-6	4w	+	
62	4	+	
72	7w	+3	
77	6	+	
87	3	0	
91	4	0	
97	4	0	
4210	4	+	
4215	5	+3	
4227	7	0	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]149[[/preprinted]]

4233|5|+  
36|4|+  
40|4|+  
42|3|-1  
4274|5w|0  
72|~~59~~|~~5~~|+1  
74|~~64~~|~~3~~|0  
[[bracket column 2 beside next two entries]]  
|~~72~~|~~7~~|  
90|~~74~~|~~7~~|+3  
4305|3|  
430|~~090~~|~~3~~|8d|+4  
4308|4|0  
4315|6|+3  
4321|3|0  
4326|6|-1  
4330|3|0  
4340|11|+1  
4344|3|+  
4352|6|+1  
58|5|+2  
68|5w|+2  
75|6|+3  
79|3|+  
83|6|0  
90|3|+  
95|4|+  
99|5|+  
4405|3|+  
4408|5|+  
4415|6|+1  
4422|3|0

[[preprinted]]John G. Wolbach Library Harvard-Smithsonian Center for  
Astrophysics [[large dot]] Provided by the NASA Astrophysics Data  
System[[/preprinted]]

4233	5	+
36	4	+
40	4	+
42	3	-1
4274	5w	0
72	5	+1
74	3	0
90	7	+3
4305	3	0
430	3	+4
4308	4	0
4315	6	+3
4321	3	0
4326	6	-1
4330	3	0
4340	11	+1
4344	3	+
4352	6	+1
58	5	+2
68	5w	+2
75	6	+3
79	3	+
83	6	0
90	3	+
95	4	+
99	5	+
4405	3	+
4408	5	+
4415	6	+1
4422	3	0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51


[[preprinted]]150[[/preprinted]]

| S Muscae  
4435 | 3 | [[symbol line running down page dividing these cells]] |  
[[strikethrough]]-2[[/strikethrough]]0?  
4444 | 6 | +1  
50 | 4 | +2  
55 | 4 | 0 | No G band to S Muscae  
62 | 4 | +  
69 | [[strikethrough]]4[[/strikethrough]]5 | +  
4481 | 5 | 0  
89 | 4 | +1  
95-7 | 4 | +  
4501 | 4 | +  
08 | 4 | +  
15 | 4w | +  
49 | 4 | -1  
54 | 5 | +1  
58 | 3 | +  
64 | 4 | +  
72 | 4 | +  
77 | 3 | +  
84 | 5w | +1  
? | [[continues in next three rows]] | 3 |  
? | [[continued]] | 2 |  
? | [[continued]] | 2 |  
| 3 | -1  
46, 63 | 4 |  
46[[strikethrough]]68[[/strikethrough]] | 5 |  
4765 | 3 |  
4824 | 4 |  
48 | 3 |  
55 | 3 |  
4861 | 10 | 0

150		
S. Muscae		
4435	3	0?
4444	6	+1
50	4	+2
55	4	0
62	4	+
69	5	+
4481	5	0
89	4	+1
95-7	4	+
4501	4	+
08	4	+
15	4w	+
49	4	-1
54	5	+1
58	2	+
64	4	+
72	4	+
77	3	+
84	5w	+1
46	3	
63	2	
4668	3	-1
4765	3	
4824	4	
48	3	
55	3	
4861	10	0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 151 [[/preprinted]]

1 prism <sup>^</sup>[[checkmark]]  
AGC 17062. Plate x12503 Q4D3 lines sharp  
Couip 72 Cma X11433  
3933 | 17 |  11433 faint here  
44 | 5 | ?  
61 | 5 | +?  
3970 | 16 | +?  
82 | 5 | +  
87 | 4 | +  
98 | 5 | +1  
4005 | 5 | -1  
4026 | 3 | +  
4030 | 5 | +  
4046 | 5 | -1  
| 3 | +  
| 5 | +  
52 | 5 | 0  
64 | 4 | 0  
72 | 3 | -1  
77 | 8 | +4  
83 | 5 | 0  
4101 | 8 | 0  
10 | 5 | +2  
18 | 5 | +2  
22 | 5 | +2  
22 | 5 | +2  
28 | 5 | +2  
34 | 5 | -1  
44 | 5 | 0  
72 | 6 | +2  
77 | 6 | +  
85 | 4 | +  
87 | 4 | +

1 prism <sup>^</sup> [[checkmark]]			151
AGC 17062. Plate x12503 Q4D3 lines sharp			
Couip 72 Cma X11433			
3933	17	?	11433 faint here
44	5	?	
61	5	+?	
3970	16	+?	
82	5	+	
87	4	+	
98	5	+1	
4005	5	-1	
4026	3	+	
4030	5	+	
4046	5	-1	
	3	+	
	5	+	
52	5	0	
64	4	0	
72	3	-1	
77	8	+4	
83	5	0	
4101	8	0	
10	5	+2	
18	5	+2	
22	5	+2	
22	5	+2	
28	5	+2	
34	5	-1	
44	5	0	
72	6	+2	
77	6	+	
85	4	+	
87	4	+	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 152 [[/preprinted]]

AGC 17062

4191 | 4 | +  
96 | 4 | +  
98 | 5 | +1  
4202 | 3 |  
05 | 3 |  
08 | 3 |  
10 | 3 |  
4215 | 4 | +2  
27 | 6 | 0  
33 | 4 | + ~~0~~  
40 | 4 | +  
47 | 5 | +  
50 | 3 | -1  
72 | 5 | ~~[[omega]]~~ | 0  
74 | 3 | 0  
90 | ~~72-4~~ | 6 | +1  
94 | 3 | +  
4300 | 4 | +  
02 | 4 | +  
4308 | 3 | -3  
15 | 5 | +2  
21 | 3 | +1  
26 | 6 | -1  
33 | 3 | +1  
4340 | 11 | 0  
44 | 3 | +  
52 | 5 | +1  
60 | 4 | +1  
68 | 4 | +2  
75 | 5 | +2  
4383 | 6 | -1

152		
ABC 17062		
4191	4	+
96	4	+
98	5	+1
4202	3	
05	3	
08	3	
10	3	
4215	4	+2
27	6	0
33	4	<del>0</del>
40	4	+
47	5	+
50	3	-1
72	5	<del>[[omega]]</del>
74	3	0
90	<del>72-4</del>	6
94	3	+
4300	4	+
02	4	+
4308	3	-3
15	5	+2
21	3	+1
26	6	-1
33	3	+1
4340	11	0
44	3	+
52	5	+1
60	4	+1
68	4	+2
75	5	+2
4383	6	-1

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 153 [[/preprinted]]

4390 | 3 | +  
 95 | 4 | +  
 99 | 5 | +  
 4408 | 4 | +  
 15 | 5 | 0  
 4435 | 3 | -1  
 4444 | 6 | +2  
 4455 | 0 | -3 ^[[No G band to AGC 17062]]  
 69 | 4 | +1  
 81 | 5 | 0  
 89 | 2 | -2  
 4529 | 2 | -2  
 4534 | 2 | -2  
 50 | 4 | +  
 54 | 4 | +  
 64 | 4 | [[+?]]  
 72 | 4 | +  
 84 | 4 | +  
 4657 | 3 | + ^[[This plate has AGC 16962, excellent Mb spectrum]]  
 68 | 5 omega | +1  
 4765 | 4 | +  
 4848 | 3 |  
 55 | 3 |  
 4861 | 7 | 0

153		
4390	3	+
95	4	+
99	5	+
4408	4	+
15	5	0
4435	3	-1
4444	6	+2
4455	0	-3
69	4	+1
81	5	0
89	2	-2
4529	2	-2
4534	2	-2
50	4	+
54	4	+
64	4	+
72	4	+
84	4	+
4657	3	+
68	5	+1
4765	4	+
4848	3	
55	3	
4861	7	0

No G band  
 to AGC 17062

(This plate has  
 AGC 16962, excellent  
 Mb spectrum)

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 154 [[/preprinted]]

1 prism ^[[checkmark]]

x12096

S Normal Q5 D2 Very faint, esp. faint at violet end. Lines very sharp  
Comp 72C Ma x 11433

| 5 Nor |  
4077 | 8 | +2 ^[[These measures are of small weight]]

4084 | 4 |  
4087 | 4 |  
4101 | 8 | 0  
10 | 6 | +1  
18 | 5 | +  
28 | 5 | +  
^[[NB]]  
4132? | 5 | +  
4044 ~~[[strikethrough]]~~ 4175 ~~[[strikethrough]]~~ | 6 | -1  
72 | 8 | +2  
77 | 6 | +  
87 | 5 | +  
91 | 5 | +  
98 | 6 | +  
4210 | 4 | +  
4215 | 5 | +3  
4227 | 6 | -1  
33 | 4 |  
36 | 4 |  
40 | 4 | -1  
42 | 4 | -1  
~~[[strikethrough]]~~ 6 ~~[[strikethrough]]~~ 47-51 | 5 | -1  
58-60 | 5 | -1  
72 | 5 | 0  
74 | 3 |  
90 | 5 | 0

154	1 prism ✓
X12096	S Normal Q5 D2 Very faint, esp. faint at violet end. Lines very sharp
	Comp 72C Ma X11433
	5 Nor
4077	8 +2
4084	4
4087	4
4101	8 0
10	6 +1
18	5 +
28	5 +
28	5 +
4132?	5 +
4044	6 -1
72	8 +2
77	6 +
87	5 +
91	5 +
98	6 +
4210	4 +
4215	5 +3
4227	6 -1
33	4
36	4
40	4 -1
42	4 -1
47-51	5 -1
58-60	5 -1
72	5 0
74	3
90	5 0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



## S Novae

4294 | 3 | 0  
 4300-2 | 6[[omega]] | +1  
 4308 | 3 | -3  
 15 | 5 | +3  
 21 | 3 | 0  
 26 | 5 | -1  
 31 | 3 | 0  
 40 | 11 | +1  
 44 | 3 | +  
 52 | 5 | 0  
 60 | 4 | +2  
 68 | 4 | +  
 75 | 5 | +1  
 83 | 6 | +1  
 90 | 3 | -1  
 95-8 | 5 | +  
 4405 | 3 |  
 8 | 4 |  
 44/5 | 5[[omega]]  
 24 | 3 | -1  
 69 | 4 |  
 81 | 5 |  
 89 | 3 |  
 4501 | 4  
 08 | 4  
 15 | 3  
 29 | 3  
 34 | 4  
 41 | 3  
 50 | 4  
 54 | 4  
 64 | 4  
 72 | 4  
 8[[?]] | 45

S Novae		
4294	3	0
4300-2	6 w	+1
4308	3	-3
15	5	+3
21	3	0
26	5	-1
31	3	0
40	11	+1
44	3	+
52	5	0
60	4	+2
68	4	+
75	5	+1
83	6	+1
90	3	-1
95-8	5	+
4405	3	
8	4	
44/5	5[[omega]]	
24	3	-1
69	4	
81	5	
89	3	
4501	4	
08	4	
15	3	
29	3	
34	4	
41	3	
50	4	
54	4	
64	4	
72	4	
8[[?]]	45	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 156 [[preprinted]]

S Normal

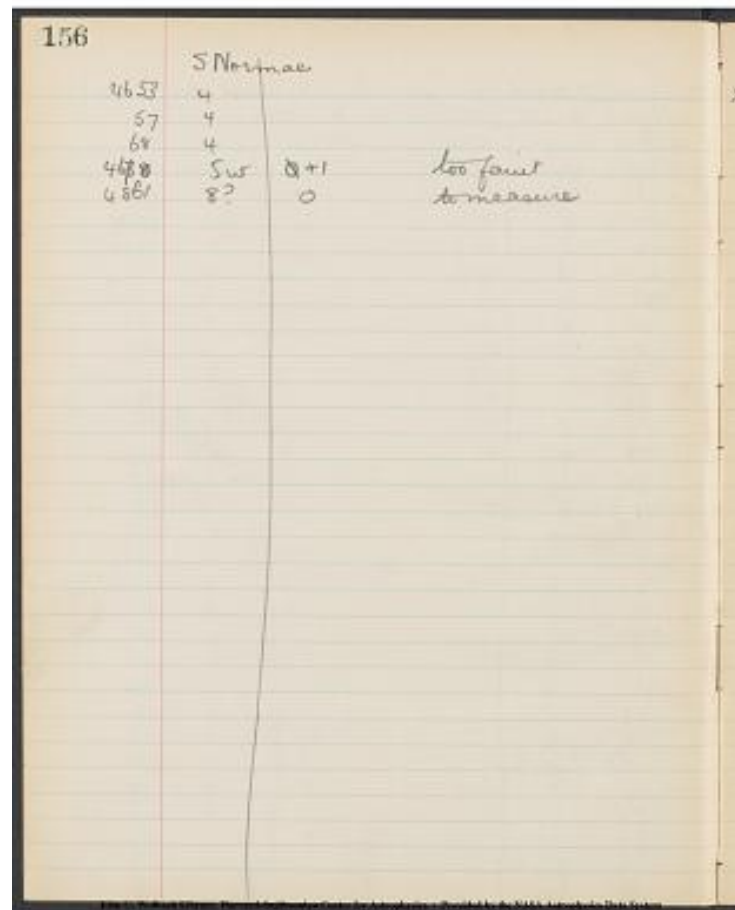
4653 | 4 |

57 | 4 |

68 | 4 |

46~~53~~ | 68 | 70 | 5w | 0+1 } too faint to measure

4861 | 8? | 0 }



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]157[[/preprinted]]

X11784 AGC 25456 Q4D3 Lines sharp  
Comp 72 CMA X11433

3933	15	0
3970	14	+1   Only <del>sharper</del> lines
3998	4	-1   to be seen.
4005	5	+1
4046	5	0
4064	<del>52</del>	<del>5</del>   -1
4068	3	0
4072	3	0
4077	5	+1
4101	7	0
4144	4	-1
72	6	+1
77	5	+
4215	4	+1
27	5	-2
90	6	+1
94	3	+
4300	5	+1
08	4	-1
4315	5	+3
21	4	
26	5	
31	4	
33	3	
40	8	-1
44	3	+
52	5	+1
60	4	-1
68	4	0
75	6	+2
82	6	0

X11784 AGC 25456 Q4D3 Lines sharp			157
Comp 72 CMA X11433			
3933	15	0	
3970	14	+1	Only sharper lines
3998	4	-1	to be seen.
4005	5	+1	
4046	5	0	
4064	5	-1	
4068	3	0	
4072	3	0	
4077	5	+2	
4101	7	0	
4144	4	-1	
72	6	+1	
77	5	+	
4215	4	+1	
27	5	-2	
90	6	+1	
94	3	+	
4300	5	+1	
08	4	-2	
4315	5	+3	
21	4		
26	5		
31	4		
33	3		
40	8	-1	
44	3	+	
52	5	+1	
60	4	-1	
68	4	0	
75	6	+2	
82	6	0	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 158 [[/preprinted]]

		DGC 25456	
4408		4	
15		5	-1
4435		4	-1
44		5	+1
4481		6	+1
4584		4	+
4668		4	0
4861		8	-1

158		
	550	
	25456	
4408	4	
15	5	-1
4435	4	-1
44	5	+1
4481	6	+1
4584	4	+
4668	4	0
4861	8	-1

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]159[[/preprinted]]

^[[checkmark]]

X7~~53~~356 O<sup>1</sup> Centauri Q3 D3 lines hazy.

Comp [[proportional to]] FOV X7116

4077|5|0

83|5|+1

4101|7|-1

10|5|

18|4|

22|4|

28|4|

32|4|

4144|6|+1

62|4|

72|6|+2

77|4|+

4215|4|0

27|6|-1

33|5|+

72|6|+2

90|5|0

4300|6|+1

05|4|[[+?]]

08|3~~5~~|-1

15|5|+2

21|4|+

26|5|-2

31|3|+

4340|8|-1

52|5|+1

60|4|+1

68|5|+2

7[[8]]|6|+2

83|6|+1

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics - Provided by the NASA Astrophysics Data  
System[[/preprinted]]

159		
✓		
35 X7536		
Q. Centauri Q3 D3 lines hazy		
Comp α For X7116		
4077	5	0
83	5	+1
4101	7	-1
10	5	
18	4	
22	4	
28	4	
32	4	
4144	6	+1
62	4	
72	6	+2
77	4	+
4215	4	0
27	6	-1
33	5	+
72	6	+2
90	5	0
4300	6	+1
05	4	+
08	5	-1
15	5	+2
21	4	+
26	5	-2
31	3	+
4340	8	-1
52	5	+1
60	4	+1
68	5	+2
75	6	+2
83	6	+1

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 160 [[/preprinted]]

		0 <sup>h</sup> [1]	Cen	
4395-9		4		+1
4408		4		0
15		5		-1
35		3		0
44		6		+2
54		0		-3
69		6		+
82		5		0
89		5		+1
Rest too faint				

160			
	0 Cen		
4395-9	4	+1	
4408	4	0	
15	5	-1	
35	3	0	
44	6	+2	
54	0	-3	
69	6	+	
82	5	0	
89	5	+1	
			Rest too faint

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]161[[/preprinted]]

^[[checkmark]] 1 prism

C17063 S. Cephei Q4 D3 excellent  
Comp C17200 HP 1522 very faint and hazy lines

3933|14|+2

38|4|+

44|5|0

53|5|+1

56-8|5|+1

61|6|+1

70|13|+1

73|4|+

76|4|+

3983|5|+

87|3|

91|4|

3997-8|6|+2

4003|3|

4005|5|+1

9|2|

12|2|

14|3|+1

18-22|2|

4028|2|

4030|7w|0

4041|5|

4046|6|0

||2|

||5|

||4|

64|5|

67|4|

72|3|

[[preprinted]]John G. Wolbach Library Harvard-Smithsonian Center for  
Astrophysics - Provided by the NASA Astrophysics Data  
System[[/preprinted]]

✓ prism

161

C17063 S. Cephei Q4 D3 excellent  
Comp C17200 HP 1522 very faint & hazy lines

2483	14	+2
38	4	+
44	5	0
53	5	+1
56-8	5	+1
61	6	+1
70	13	+1
73	4	+
76	4	+
3983	5	+
87	3	
91	4	
3997-8	6	+2
4003	3	
4005	5	+1
9	2	
12	2	
14	3	+1
18-22	2	
25	4	+2
4028	2	
4030	7w	0
4041	5	
4046	6	0
	2	
	5	
	4	
64	5	
67	4	
72	3	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]162[[/preprinted]]

S Cephei  
4077|7|3  
83|5w|0  
96|3|+  
4101|8|+1  
4110|4w|+  
18|3|+  
22|3|+  
28|4|+  
32|4|+  
44|4|+1  
49|3|+  
54-6|3w|+  
61-3|3|+  
72|6|+  
77|5|+  
82|3|+  
85|3|+  
87|3|+  
4215|3|+3  
4227|7|0  
33|3|  
36|3|  
47-51|4w|  
58-60|3|0  
72-4|5w|+1  
90|5|+3  
94|2|  
4300|6^|[2]|+2  
4315|5|+2  
[[4221?]]|3|+  
4326|4|-1+  
4331|2|-1

[[preprinted]]John G. Wolbach Library Harvard-Smithsonian Center for  
Astrophysics - Provided by the NASA Astrophysics Data  
System[[/preprinted]]

162	S Cephei	
4077	7	+3
83	5w	0
96	3	+
4101	8	+1
4110	4w	+
18	3	+
22	3	+
28	4	+
32	4	+
44	4	+1
49	3	+
54-6	3w	+
61-3	3	+
72	6	-1
77	5	+
82	3	+
85	3	-1
87	3	+
4215	3	+3
4227	7	0
33	3	
36	3	
47-51	4w	
58-60	3	0
72-4	5w	+1
90	5	+3
94	6	+2
9580	5	+
4315	3	+
4326	4	-1
4331	2	-1

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]163[[/preprinted]]

Delta Cephei

4340|11|+2

52|5|+1

62|4|

68|4|

75|5|+1

83|6|

95|3|

4408|3|

15|4|

35|3|

44|4|

54|0|-3

69|5|

81|5|0

89|4|

4668|6|+2

4765|4|

4825|4|

4848|3|

4855|3|

4861|8|+1

good further to red

([[ovd?]] plate)

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics - Provided by the NASA Astrophysics Data  
System[[/preprinted]]

163		
Delta Cephei		
4340	11	+2
52	5	+1
62	4	
68	4	
75	5	+1
83	6	+1
95	3	
4408	3	
15	4	
35	3	+1
44	4	
54	0	-3
69	5	
81	5	0
89	4	
4668	6	+2
4765	4	
4825	4	
4848	3	
4855	3	
4861	8	+1
good further to red (and plate)		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]164[[/preprinted]]

2 prism  
C5889 gamma Cygni. Q5 D4 Excellent. lamda std.  
Comp. proportional to Aurigal C5256  
gamma Cyg  
3933|30|+15 good to v  
3944|8|+1  
49|3|+2  
50|4|+1  
53|8|+1  
57|7|+1  
58|7|+2  
61|6|0 in wing of 3970 (gamma Cyg)  
3970|35|+20  
7348|~~00~~|~~4~~|~~7~~|+1  
76|~~00~~|~~4~~|0  
77|~~05~~|~~4~~|0  
79|~~08~~|~~3~~|0  
82|8|+3  
84|7|+2  
86|3|1  
88|3|-1  
91|3|1  
93|3|+2  
3996|5|+4  
3998|5|+2  
4000|3|+  
03-04|5w|+  
? 06.8|0|-3  
12|5|+3  
14|5w|+2  
18|5w|+1

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics - Provided by the NASA Astrophysics Data  
System[[/preprinted]]

164	2 prism		
C5889	$\gamma$ Cygni. Q5 D4 Excellent. $\lambda$ std.		
	Comp. $\propto$ Aurigae C5256		
	$\gamma$ Cyg		
3933	30	+15	good to v
3944	8	+1	
49	3	+2	
50	4	+1	
53	4	+2	
57	8	+1	
58	7	+1	
58	7	+2	
61	6	0	in wing of 3970 ( $\gamma$ Cyg)
3970	35	+20	
7348	7	+1	
76	00	0	
77	05	0	
79	08	0	
82	8	+3	
84	7	+2	
86	3	1	
88	3	-1	
91	3	1	
93	3	+2	
3996	5	+4	
3998	5	+2	
4000	3	+	
03-4	5w	+	
4005	8	+1	
? 06.8	0	-3	
12	5	+3	
14	5w	+2	
18	5w	+1	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 165 [[preprinted]]

[[Table with 3 columns]]

4022|4|+  
23|4|+  
24|7|+3  
28|4|+  
31|8|+2  
32|7|+2  
41|7|+1  
43|3|+ [[+ over 0]]  
44|3|+  
46|8|0  
49|3|+  
50|3|+  
52|3|+  
54|5|+2  
64|9|+1  
67|8|+1  
72|7|-1  
74|3|+  
77|10|+3  
79|3|0  
83|4|+1  
85|4|0  
86|4|0  
90|3|0  
92|3|-1  
96|4|+1  
98|4|+1  
4101|10|+1  
06|3|+  
07|3|+  
09|4|+  
11|4|+

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics - Provided by the NASA Astrophysics Data  
System[[/preprinted]]

40	22	4	+
23		6	+
24		7	+3
28		4	+
31		8	+2
32		7	+2
41		7	+1
43		3	0
44		3	+
46		8	0
49		3	+
50		3	+
52		3	+
54		5	+2
64		9	+1
67		8	+1
72		7	-1
74		3	+
77		10	+3
79		3	0
83		4	+1
85		4	0
86		4	0
90		3	0
92		3	-1
96		4	+1
98		4	+1
4101		10	+1
06		3	+
07		3	+
09		4	+
11		4	+

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

$$\begin{array}{l}
\text{gamma Cyg} \\
4113 \mid 3 \mid \\
15 \mid 3 \mid \\
18 \mid 8 \mid +1 \\
20 \mid 7 \mid +2 \\
22 \mid 3 \mid + \\
23-23.8 \mid 9d \mid +3 \\
25.6 \mid 3 \mid [\overline{\hspace{1cm}}] + [/\overline{\hspace{1cm}}] - \\
28.9[\overline{\hspace{1cm}}]28[\overline{\hspace{1cm}}] \mid 8 \mid +1 \\
36.7 \mid 29 \mid 7 \mid +1 \\
40.2[\overline{\hspace{1cm}}]32[\overline{\hspace{1cm}}] \mid 7 \mid 0 \\
44[\overline{\hspace{1cm}}]36.7[\overline{\hspace{1cm}}] \mid 9 \mid +1 \\
46 \mid 3 \mid \\
47 \mid 3 \mid \\
49 \mid 5 \mid +1 \\
52 \mid 3 \mid \\
54 \mid 5 \mid +1 \\
56 \mid 5 \mid +1 \\
59 \mid 3 \mid \\
62.3 \mid 6 \mid +2 \\
65 \mid 4 \mid + \\
? \mid 2 \mid + \\
67 \mid 4 \mid [\overline{\hspace{1cm}}] + [/\overline{\hspace{1cm}}] 0 \\
72 \mid 12d \mid +5 \\
77 \mid 10 \mid +4 \\
81 \mid 4 \mid 0 \\
84 \mid 5 \mid +1 \\
87 \mid 6 \mid +2 \\
91 \mid 6 \mid \omega \mid +1 \\
95 \mid 6 \mid +2 \\
98 \mid 7 \mid +3
\end{array}$$

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]167[[/preprinted]]

[[three columns]]

[[line down the page to right of 2nd column]]

2 6 +2  
5 7 +3  
9 3  
? 10-12 6w  
4215 8 +1  
19-20 3 +1  
22 3 +  
24-5 3 +3  
27 10 0  
30 2? 0  
33 7 +3  
36 6 +2  
39-40 6w +2  
42 5 +1  
47 8 +4  
50.09 5 +1  
54 3 +  
58 3 +  
58 4 ~~[[strikethrough]]~~ + ~~[[/strikethrough]]~~ -1  
60 4w ~~[[strikethrough]]~~ -1 ~~[[/strikethrough]]~~ +  
62 2 +  
71 7 0  
75 6 +1  
77-8 3 -1  
80-1 3 -1  
83 5 +  
88 3  
90 9 +3  
94 5 +1 ~~[[?]]~~  
96 5 +  
00 9 +1  
03 9 +3

167		
2	6	+2
5	7	+3
9	3	
? 10-12	6w	
4215	8	+1
19-20	3	+1
22	3	+
24-5	3	+3
27	10	0
30	2?	0
33	7	+3
36	6	+2
39-40	6w	+2
42	5	+1
47	8	+4
50.09	5	+1
54	3	+
58	4	+1
60	4w	+1
62	2	+
71	7	0
75	6	+1
77-8	3	-1
80-1	3	-1
83	5	+
88	3	
90	9	+3
94	5	+3
96	5	+
00	9	+1
03	9	+3

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]168  
 [[gamma Cyg]]  
 4305|5|+1  
 4308|[[6 omega]]|-2 no [[G band]]  
 4315|8|+5  
 21|5|+1  
 26|7|-1  
 31|5|+1  
 33|5|+1  
 37|8|+3  
 40|10|+1  
 (Nov 19) 44|5|+2  
 48|2|-1  
 52|7|+1  
 55|4|+1  
 58-9|7|+1  
 62-9|7|[[omega]]|+1  
 75|8|+1  
 79|4|+2  
 85|9|+1  
 87-8|3  
 91|5|+1  
 95|6|+2  
 4400|7|+3  
 05|4|-9  
 [[08g]]|4|+1  
 11|3|+  
 15|5|+  
 17|5|+1  
 22|5|+1  
 27|4|[[omega]]|0  
 30-3|4|[[omega]]|0  
 35|5|+1

168			
4305	5	+1	
4308	6.45	-2	no G band
4315	8	+5	
21	5	+1	
26	7	-1	
31	5	+1	
33	5	+1	
37	8	+3	
40	10	+1	
(Nov 19)	44	+2	
48	2	-1	
52	7	+1	
55	4	+1	
58-9	7	+1	
62-9	7.4	+1	
75	8	+1	
79	4	+2	
85	9	+1	
87-8	3		
91	5	+1	
95	6	+2	
4400	7	+3	
05	4	-1	
08g	4	+1	
11	3	+	
15	5	+	
17	5	+1	
22	5	+1	
27	4.4	0	
30-3	4.4	0	
35	5	+1	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

gamma Cyg

[[table-3columns]]

44	9	+3
47	3	0
50	5	+2
55	5	0
59	3	+
62	4	0
69	5	+
71	3	+
73	3	+
76	3	+
80	2	+
82.1	7	0
82.3	2	+
88.9	7	0
94	4	0
97	4	+1
4501	6	+1
08	5	+2
15	4	
18-20	4	
22-5	4w	
28-9	4w	
4534	6	+1
41	5	0
44	5	0
49	6	+1
54-6	6	+2
58	3	+
63.4	6	+1
68	2	+
72	5	[[/strikethrough]]-[[/strikethrough]]0

[[end table]]

169

	$\gamma$ Cyg	
44	9	+3
47	3	0
50	5	+2
55	5	0
59	3	+
62	4	0
69	5	+
71	3	+
73	3	+
76	3	+
80	2	+
82	7	0
82.3	2	+
88.9	7	0
94	4	0
97	4	+1
4501	6	+1
08	5	+2
15	4	
18-20	4	
22-5	4w	
28-9	4w	
4534	6	+1
41	5	0
44	5	0
49	6	+1
54-6	7	+2
58	3	+
63.4	6	+1
68	2	+
72	5	0

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]170[[/preprinted]]

gamma Cyg

[[table-3columns]]

4576 | 3 | +

80 | 3 | -1

84 | 6 | +3

92 | 3 | +

4600 | 3 | +

13-16 | 6 omega | +

19-20 | 3 | +

29 | 6 | +4

[[/strikethrough]] 46-49 [[/strikethrough]] 32-34 | 5 omega | +

46-9 | 7 omega | 0

52-5 | 3 | 0

57 | 7 omega | 0

64 | 4 | 0

67.70 | 8 omega | +1 (2nd [[left and in Ceres]]^5 gamma

78 | 4 |

82 | 5 omega

99 | 4 | +

4703 | 4 | +

08 | 5 | +3

15 | 4 | -1

19 | 3 | [[/strikethrough]] 0 [[/strikethrough]] +

28-31 | 5 omega | 0

37 | 3 | +

52-5 | 4 omega

64 | 7 | +1

[[07-70]] | 3 | -1

80 | 4 | +1

4805 | 5 | 0

11 | 5 | +1

| 3 | +

[[end table]]

170		
4576	3	+
80	3	-1
84	6	+3
92	3	+
4600	3	+
13-16	6 omega	+
19-20	3	+
29	6	+4
[[/strikethrough]] 46-49	5 omega	+
46-9	7 omega	0
52-5	3	0
57	7 omega	0
64	4	0
67.70	8 omega	+1 (2nd line out in alpha)
78	4	
82	5 omega	
99	4	+
4703	4	+
08	5	+3
15	4	-1
19	3	+
28-31	5 omega	0
37	3	+
52-5	4 omega	
64	7	+1
[[07-70]]	3	-1
80	4	+1
4805	5	0
11	5	+1
	3	+

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



| gamma Cyg |  
4824 | 7 | +3  
40 | 3 | +  
4848 | 6 | +2  
55 | 6 | +2  
61 | 9 | +1  
good to red  
(ord pl)

4824	7	+3
40	3	+
4848	6	+2
55	6	+2
61	9	+1

Good to red  
(over pl.)

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]172[[/preprinted]]

2 prism

Excellent  
x8211 rho Puppis Q5 D4 [[stronger]] than comp  
Comp proportional to FOV x8142  
3933|20|+5 lines not so  
36-8|8|+ sharp as gamma Cyg

3944|8|+  
61|8|+  
3970|18|+3  
3997-8|8w|+3  
4003|4|+  
4005|8w|0  
12-14|4|+2  
18-22|5w|+  
24|5|+2  
28|3|+  
30|5|+1  
31|5|+1  
41|4|+  
46|6|-1  
48|3|+  
50|3|+  
54|5|+  
59|5|0  
63|5|0  
67|6|+1  
72|4|-1  
75|3|0  
77|7|+2  
? 83|5|+  
87|6w|-1  
93|3|-1  
4101|11|0

rho Pup in rather poor focus until 4101

[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[/large dot]] Provided by the NASA Astrophysics Data  
System[[/preprinted]]

172	2 prism	Excellent
X8211	p Puppis Q5 D4 Comp a 7rv x 8142	stronger than comp
3933	20	+5
36-8	8	+
3944	8	+
61	8	+
3970	18	+3
3997	8w	+2
4003	4	+
4005	8w	0
12-14	4	+2
18-22	5w	+
24	5	+2
28	5	+1
30	5	+1
31	4	+
41	6	-1
46	3	+
48	3	+
50	5	+
54	5	0
59	5	0
63	5	0
67	6	+1
72	4	-1
75	3	0
77	7	+2
? 83	5	+
87	6w	-1
93	3	-1
4101	11	0

p Pup in  
rather poor  
focus  
until  
4101

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]173[[/preprinted]]  
 | rho Pup |  
 4110 | 3 | +  
 11? | 3 | 0  
 4118 | 5 | +3  
 22 | 4  
 28 | 3 | 1  
 31 | 3 | 1  
 32 ~~[[strikethrough]]28[[/strikethrough]]~~  
 34 ~~[[strikethrough]]32[[/strikethrough]]~~  
~~[[strikethrough]]37[[/strikethrough]]~~ ?  
 4144 | 5 | -1  
 46 | 3  
 47 | 3 | 1  
 49 | 4 | 1  
 50 | 3 | 1  
 52 | 4 | 1  
 54 | 4 | 1  
 56 | 3 | 1  
 59 | 4 | 1  
 61 | 3  
 63 | 2  
 4167 | 4  
 4172 | 8 omega | +2  
 77 | 5 | +  
 79 | .5 | +  
 82 ~~[[strikethrough]][[?]]~~ | 5  
 85 ~~[[strikethrough]][[?]]~~ | 5  
 87 ~~[[strikethrough]][[?]]~~ | 5  
 91 ~~[[strikethrough]][[?]]~~ | 5  
 96 ~~[[strikethrough]][[?]]~~ | 5  
 98 ~~[[strikethrough]][[?]]~~ | 6

173

	$P_{\text{Pup}}$	
4110	3	+
11?	3	0
4118	5	+3
22	4	
28	3	1
31	3	1
32	28	
34	32	
37	37	
4144	5	-1
46	3	
47	3	1
49	4	1
50	3	1
52	4	1
54	4	1
56	3	1
59	4	1
61	3	
63	2	
4167	4	
4172	8 omega	+2
77	5	+
79	.5	+
82	82	
85	85	
87	87	
91	91	
96	96	
98	98	

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]174[[/preprinted]]

| rho Pup |  
4202 | 4 |  
05|4||  
07|3||  
08|3||  
10|3|-1  
12|2||  
?|2||  
15|5|+3  
17|3||  
19|4||  
22|3||  
24|3||  
27|6|-2  
||3||  
33|6|+2  
36|6|+2  
40|4||  
42|4||  
[[strikethrough]]47|5[[/strikethrough]]||  
47|7|omega||  
51|6||  
53|3||  
54|5||  
58|5||  
4261|6|-2  
71|5|-1  
75|4|0  
?80|4|0  
90|8|+2  
94|4|+  
[[preprinted]]John G. Wolbach Library, Harvard-Smithsonian Center for  
Astrophysics [[large dot]] Provided by the NASA Astrophysics Data  
System[[/preprinted]]

174		
	p Pup	
4202	4	
05	4	
07	3	
08	3	
10	3	-1
12	2	
?	2	
15	5	+3
17	3	
19	4	
22	3	
24	3	
27	6	-2
	3	
33	6	+2
36	6	+2
40	4	
42	4	
<del>47</del>	<del>5</del>	
47	7 <sub>W</sub>	
51	6	
53	3	
54	5	
58	5	
4761	6	-2
71	5	-1
75	4	0
? 80	4	0
90	8	+2
94	4	+

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]175[[/preprinted]]

rho Pup |  
 97 | 4 | +  
 4300 | 9 | +1  
 02 | 9 | +1  
 4305 | 4 |  
 4305 | 4 | -2  
 4208 | 4 |  
 4[[3]]15 | 7 | +  
 17.0 | 3 |  
 17.6 | 3 |  
 21 | 6 |  
 26 | 7 | -1  
 31 | 6 | +  
 33 | 5 | +  
 4337 | 6 |  
 4340 | 10 | +1  
 44 | 6 | +  
 [[3]] | 3 |  
 52 | 8 | +2  
 55 | 4 | +  
 59 | 5 | +  
 67 | 3 | +  
 68 | 4 | +  
 70 | 4 | +  
 71 | 3 | +  
 75 | 8 | +2  
 85 | 5 | + ^[[79=4  
           83=9]]  
 90 | 6 | +  
 95 | 6 | +  
 4398 | 3 | +2  
 4400 | 6 | +2

rho Pup			175
97	4	+	
4300	9	+1	
02	9	+1	
4305	4		
4305	4	-2	
4208	4		
4[[3]]15	7	+	
17.0	3		
17.6	3		
21	6		
26	7	-1	
31	6	+	
33	5	+	
4337	6		
4340	10	+1	
44	6	+	
	3		
52	8	+2	
55	4	+	
59	5	+	
67	3	+	
68	4	+	
70	4	+	
71	3	+	
75	8	+2	
85	5	+	
90	6	+	
95	6	+	
4398	3	+2	
4400	6	+2	

79.4  
 83.9

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[pPup?]] |

4405 | 5 | +

08 | 5 | +

11 | 4 | +

4415 | 5 | 0

17 | 5 | +1

22 | 4 | +

-? | 3 | +

27 | 4 | +

30 | 4 | +

35 | 5 | 0

44 | 10 | +2

[[~~strikethrough~~]]47-50 | 7[[?]]

? | 3

? | 3

55 | 5 | 0 [[margin note]]wrong section[[/margin note]]

60 | 4 | +

| 3 | +

| 3 | +

| 3 | +

| 3 | +

| 3 | +

| 6w | +2[[~~strikethrough~~]]

4[[~~strikethrough~~]]7[[~~strikethrough~~]]4 | 4 | +

47[[~~strikethrough~~]]50[[~~strikethrough~~]] | 4 | +

50 | 6 | +1

55 | 5 | +1

62 | 6 | +

?64 | 2 |

| 2 |

60 | 6w |

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]177[[/preprinted]]

| [[pPup?]] |  
4473 | 3  
[[strikethrough]]8[[/strikethrough]]76 | 4  
81 | 7 | 0  
? | 3  
89 | [[symbol - reverse comma?]] 5 |  
91 | 5  
94 | [[symbol - reverse comma?]] 4 |  
97 | 4  
[[4?]]501 | 5 | 0  
08 | 4 | +  
15 | 3 | +  
20 | 3 | +  
22 | 3 | +  
25 | 3 | +  
28 | 3 | +  
^[[31 | 3 | +]]  
34 | 6w | +2  
41 | 3 | +  
44 | 3 | +  
49 | 5 | +1  
54 | 5[[?]] | +  
58 | 3 | +1  
64 | 4 | +1  
72 | 4 | +1  
46[[strikethrough]]34[[/strikethrough]]19 | 5w  
29 | 3 |  
34 | 4 |  
57 | 6 | +2  
63 | 6 | +2  
68-70 | 6 | 0

177

4473	3	
76	4	
81	7	0
89	5	
91	5	
94	4	
97	4	
501	5	0
08	4	+
15	3	+
20	3	+
22	3	+
25	3	+
28	3	+
31	3	+
34	6w	+2
41	3	+
44	3	+
49	5	+1
54	5	+
58	3	+1
64	4	+
72	4	+1
46	34	5w
29	3	
34	4	
57	6	+2
63	6	+2
68-70	6	0

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]178[[/preprinted]]

| [[pPup?]] |

4698 | 3 | +

4703 | 4 | +

09 | 4 | +

14 | 3 | +

?4754 | 4w | 0

4765 | 5w | 0

4824 | 4 |

48 | 2 |

55 | 3 |

4861 | 11 | 0

[[vertical line/table column border continues to bottom of page]]

[[margin note]]good a little to r.

(ord pl)[[/margin note]]

178		
	p Pup	
4698	3	+
4703	4	+
09	4	+
14	3	+
?4754	4w	0
4765	5w	0
4824	4	
48	2	
55	3	
4861	11	0
Good a little to r. (ord pl)		

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]179[[/preprinted]]

X 8660 [[?]] Q3 D3 lines very hazy  
[[best guess: Coup alpha For]] X 8142 [[margin note]] This is (partly at  
least) plate quality only salient lines measured[[/margin note]]

4065	8	-1
4068	7	-1
4072	8	-1
4077	10	+2
83	8w	0
4101	11	+1
4144	8	0
4172	9	+1
4215	6	+2
4227	9	+1
4290	7	+1
4300	9w	+2
4308	5	-2
4315	6	+3
26	10	0
31	4	+
52	6	0
60	5	+2
68	4	+2
75	5	+1
83	7	0
4444	8w	+1
4469	6w	+1
81	8w	+1
89	7	+2
4657	5	+1
63	5	+1
4668	7	+1
4765	5w	+2
4861	9	0

			179
X 8660	X 8142	Q3 D3	lines very hazy
Coup alpha For X 8142			this is (partly at
4065	8	-1	least) plate
4068	7	-1	quality
4072	8	-1	only salient
4077	10	+2	lines measured
83	8w	0	
4101	11	+1	
4144	8	0	
4172	9	+1	
4215	6	+2	
4227	9	+1	
4290	7	+1	
4300	9w	+2	
4308	5	-2	
4315	6	+3	
26	10	0	
31	4	+	
52	6	0	
60	5	+2	
68	4	+2	
75	5	+1	
83	7	0	
4444	8w	+1	
4469	6w	+1	
81	8w	+1	
89	7	+2	
4657	5	+1	
63	5	+1	
4668	7	+1	
4765	5w	+2	
4861	9	0	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

X 8219 Sigma Canis Majoris Q5 D4 excellent spectrum  
[[best guess: Coup]] Alpha Aurigae, [[?]] D, [[?]] Q, [[?]]  
disp. X 8219  
[[margin note in ink]]Subsequent identifications\*[[/margin note in ink]]  
Wave lengths from  
[[?]] [[?]] [[?]] list  
[[?]] | [[?]] | [[?]] | [[?]] |  
[[ink]]Ca+[[/ink]] | 39[[~~[[?]]~~]]9[[~~[[?]]~~]]33 | 30 | +10 | |  
[[ink]][[?]][[/ink]] | 44 | 7 | +1 | |  
[[?]]+ Fe,fe | 50-51 | 8d | +2 | [[symbol- open French brace spans these  
four lines included in this table cell]]  
Y 12,12,50,35  
Fe4,- 49.95  
Ca4,-48.91  
La 12,20 49.10 |  
[[ink]]Ti[[/ink]] | 56 | 5 + | |  
[[ink]]Ti[[/ink]] | [[~~[[?]]~~]]61[[~~[[?]]~~]]58 | 4 | + | |  
[[ink]][[?]][[/ink]] | 61 | 5 | + | |  
[[ink]]Ca+,H[[/ink]] | 70 | 25 | +5 | |  
Fe,Cr | 76 | 3 | - | | [[symbol- open French brace spans these two lines  
included in this table cell]]  
Cd -,6 76. [[~~[[?]]~~]]6  
Cr 9,7 76.68 |  
Fe | 77 | 4 | - | | [[symbol- open French brace spans these two lines  
included in this table cell]]  
Cd -,6 77.8  
Fe 5,2 77.746 |  
Cr Co Fe | 79 | 3 | - | - |  
[[ink]]Ti[[/ink]] | 3981 | 8 | - | |  
Cr Fe | 84 | 3 | - | [[symbol- open French brace spans these two lines  
included in this table cell]]  
Hg6,10 84.11  
Fe 4,- 83.98 |  
?Mn | 87 | 2 | - | | [[symbol- open French brace spans these two lines  
included in this table cell]]  
Mo -,6 86.25  
Fe 4,- 86.18 |  
[[ink]]La +[[/ink]] | 88 | 3 | - | La 10,15 88.52 |  
[[ink]]Ti[[/ink]] | 89 | 3 | - | |  
Co | 9[[~~[[?]]~~]]1[[~~[[?]]~~]]5 | 4 | - | Co 10,10 95.31 |  
Fe | 97 | 6 | +2 | Sc 10,- 96.61 |  
[[ink]]Ti[[/ink]] | 98 | 6 | - | |  
-Fe | 4000.1 | 3 | - | | [[symbol- open French brace spans these two lines  
included in this table cell]]  
2y 8,12  
98.96  
[[symbol- open French brace spans these two lines included in this table  
cell]]  
Ti10,6 98.85  
V10,4 98.75 |  
- | 4003 | 5w | 0 | - |  
[[ink]]Fe[[/ink]] | 4005 | 6 | +2 | |  
Fe | 09 | 4w | - | [[symbol- open French brace spans these two lines  
included in this table cell]]  
Ti4,- 09.71  
Ti 7,4 09.14 |  
[[ink]]Ti+[[/ink]] | 12 | 6 | - | |  
Fe | 14 | 5 | - | | [[symbol- open French brace spans these two lines  
included in this table cell]]

X 8274		E. Lavis Majoris Q5 D4 excellent spectrum	
Comp. & Arranged, same 3, same Q, same T		dispo X 8219	
Identifications	Wave Length	From	Lockyer's & G. list
Ca + 8933	80	+10	
Al	7	+1	
Li + Fe	50.51	+2	50.51 50.51 50.51 50.51 50.51 50.51
Ti	56	5	
Ti	56	4	
U	61	5	
Ca + H	70	85	+5
Ti, Fe	76	3	
Fe	77	4	
Ca Fe	79	3	
Ti 3a	81	8	
Ca Fe	84	3	
2 Mn	87	2	
La *	88	3	
Ti	89	3	
Ca	95	4	
Fe	97	6	+2
Ti	98	6	
- Fe	4001	3	
-	4003	5	0
Fe	4005	6	+2
Fe	409	4	
Ti +	12	6	
Fe	14	5	
U + Fe	17	3	
Mn	18	3	
Fe	22	4	

\* List in Mem. RAS 50, 32. Known 58 in list.

Sc 6,8 14.52  
 Fe<sub>4,0</sub> 14.53 |  
 Un, Fe | 17 | 3 | - | - | |  
 [[ink]]Mn[[/ink]] | 18 | 3 | - | |  
 Fe | 22 | 4 | - | | [[symbol- open French brace spans these two lines  
 included in this table cell]]  
 Fe 4,2 21.872  
 Cu 15,10 22.70 |  
 \*List in Mem RAS 54,212. Known SR in ink

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]181[[/preprinted]]  
 Sigma CMa Excess  
 - | 4023 | 4 | - | |  
 [[ink]]Ti, Ti+[[/ink]] | 4025 | 8 | +4 | |  
 [[ink]]Ti+[[/ink]] | 28 | 4 | - | |  
 [[ink]]Mn[[/ink]] | 4030 | 9 | +1 | |  
 [[ink]]Mn[[/ink]] | 33 | 5 | - | |  
 [[ink]]Mn[[/ink]] | 34 | 4 | - | |  
 [[ink]]Mn[[/ink]] | 35 | 3 | - | |  
 [[ink]]Mn[[/ink]] | 41 | 7 | +2 | |  
 La? | 43 | 4 | - | La 8,15 42.92 |  
 Fe, Fe | 44 | 3 | - K 10,10 44.15 |  
 [[ink]]Fe[[/ink]] | 46 | 8 | -1 | |  
 [[ink]]Mn[[/ink]] | 48 | 5 | - | |  
 - | 50 | 4 | - | La 6,10 50.09 |  
 [[ink]]Fe[[/ink]] | 52 | 4 | - | |  
 [[ink]]Ti+[[/ink]] | 54 | 6 | - | |  
 [[ink]]Ti[[/ink]] | 55 | 3 | - | |  
 [[ink]]Mn[[/ink]] | 56 | 3 | - | |  
 [[ink]]Mg[[/ink]] | 57 | 3 | - | |  
 [[ink]]Co, Mn[[/ink]] | 58 | 3 | - | |  
 [[ink]](Ti) [[/ink]] | 61 | 3 | - | |  
 [[ink]]Fe[[/ink]] | 63 | 9 | +2 | |  
 Fe Fe pNi Fe | 67 | 7 | +2 | Fe 4,0 17.28 [[line break within table cell]]La  
 6,8 67.37 [[line break within table cell]] Fe 4,0 66.99 |  
 [[ink]]Fe[[/ink]] | 71 | 7 | -1 | |  
 ?Fe | 73 | 6 | - | [[?]] 8,4 72.70 |  
 - | 75 | 3 | | Fe 4,0 74.80 |  
 [[ink]]Sr+[[/ink]] | 4077 | 10 | +3 | |  
 [[ink]]Mn, Mn[[/ink]] | 79 | 4w | - | |  
 Fe | 80 | 3 | - | R[[?]] 12,10 80.62 |  
 [[ink]]Ti, Mn[[/ink]] | 82 | 3 | - | |  
 [[ink]]Mn[[/ink]] | 83 | 5 | +2 | |  
 Fe | 85 | 5 | | Fe 4,0 85.01 |  
 La? | 86 | 5 | | [[symbol -an open French brace links the following two  
 lines together in this table cell]]  
 La 10,15 86.70  
 Co 9.8 86.32 |

		SCMa	Gamma	
-	4023	4	-	
Ti, Ti+ 4025	8	+4		
Ti+ 28	4	-		
Mn 4030	9	+1		
Mn 33	5	-		
Mn 34	4	-		
Mn 35	3	-		
Mn 41	7	+2		
La? 43	4	-	La 8,15 42.92	
Fe, Fe 44	3	-	K 10,10 44.15	
Fe 46	8	-1		
Mn 48	5	-		
- 50	4	-	La 6,10 50.09	
Fe 52	4	-		
Ti+ 54	6	-		
Ti 55	3	-		
Mn 56	3	-		
Mg 57	3	-		
Co, Mn 58	3	-		
(Ti) 61	3	-		
Fe 63	9	+2		
Fe Fe pNi Fe 67	7	+2	Fe 4,0 17.28 La 6,8 67.37	
Fe 71	7	-1		
?Fe 73	6	-	[[?]] 8,4 72.70	
- 75	3	-	Fe 4,0 74.80	
Sr+ 4077	10	+3		
Mn, Mn 79	4w	-		
Fe 80	3	-	R[[?]] 12,10 80.62	
Ti, Mn 82	3	-		
Mn 83	5	+2		
Fe 85	5	-		
La? 86	5	-	La 10,15 86.70	
Co 9.8	86.32	-		

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]182[[/preprinted]]  
 | Sigma CMa | Excess | [[?]] |  
 Fe | 4089 | 3 | - | [[?]] 6,4 90.51 |  
 - | 90 | 4 | - | [[best guess: symbol - down arrow]] |  
 [[ink]]Fe, V[[/ink]] | 92 | 4 | - V10,10 90.59 [[line break within table cell]]  
 Co 8,10 92.40 |  
 - | 94 | 2 | - | Cd -,7 94.8 |  
 Fe, Fe | 96 | 4 | - | V 9,5 95.49 |  
 [[ink]]VFe[[/ink]] | 98 | 4 | - | Fe 5,0 98.19 |  
 [[ink]]V, Fe[[/ink]] | 4100 | 2 | - | Ca 5,0 98.50 [[line break within table cell]]  
 La 5,10 99.53 |  
 [[ink]]H[[/ink]] | 02 | 10 | 0 | |  
 [[ink]]V[[/ink]] | 04-5 | 4w | - | Rg 0,8 03.34 |  
 Fe, Fe | 06 | 3 | - | [[symbol - open French brace links these two lines within one table cell]]  
 V ^[[10.4]]05.2  
 Sr 5,0,05.86 |  
 Fe | 07 | 4 | - | [[symbol - open French brace links these two lines within one table cell]]  
 Fe 5,0 07.50  
 Mo 6,0 07.49 |  
 [[ink]]V[[/ink]], Fe | 09 | 5 | - | [[symbol - open French brace links these two lines within one table cell]]  
 V 15,10 09.78  
 Co 10,10 10.54 |  
 [[ink]]V[[/ink]] | 11 | 5 | - | [[symbol - open French brace links these two lines within one table cell]]  
 Mn 6,0 V 20,0,11.80  
 10.92 |  
 - | 13 | 4 | - | - |  
 [[ink]]V[[/ink]] | 15 | 4 | - | V 6,0,15.17 |  
 - | 17 | 2 | - | V 15,5,16.50 |  
 Fe | 18 | 4 | - | Co 8,10 18.78 |  
 Fe | 20 | 4 | - | Fe 6,8 18.552 [[line break within table cell]] Fe 4,10 20.22 |  
 -, Fe | 23 | 4 | - | La 2[[strikethrough]]1[[/strikethrough]]0,15 23.24 |  
 Fe, Fe, V | 28 | 6 | +3 | Fe 4,0 22.56 [[line break within table cell]] (Cd 0,6,26.9) |  
 [[ink]]Fe+[[/ink]] | 29 | 4 | - | [[symbol - open French brace links these three lines within one table cell]]  
 Fe 4,0, 27.62  
 V 10,10, 28.10  
 Y 15,8, 28.32 |  
 [[ink]]Ba+[[/ink]] | 30 | 4 | - | |  
 [[ink]]Fe[[/ink]], Fe | 32-34 | 6w | +1 | |  
 Fe(3) | 36-7 | 2[[best guess: lambda symbol]] | - |  
 [[ink]]Fe, La+[[/ink]] | 40-2 | 2 | - | La+ 6,10 41.72 |  
 [[ink]]Fe[[/ink]] | 4144 | 8 | +2 | |  
 [[ink]](Fe[[/ink]]) | 46 | 4 | - | no S.R. |  
 [[ink]]Fe[[/ink]] | 47 | 4 | - | |  
 Fe | 49 | 6 | - | [[symbol - open French brace links these two lines within one table cell]]  
 Fe 4,0 49.38  
 [[?]] 10,15 49.20 |  
 - | 50 | 3 | - | Ce 10,10 49.95 |  
 [[ink]]Fe[[/ink]] | 52 | 4 | - | La 10,10 51.95 |

182					SCMa	Excess	Unpaired	
Fe	4089	3	-					
-	90	4	-					
Fe, V	92	4	-					
-	94	2	-					
Fe, Fe	96	4	-					
[[ink]]VFe[[/ink]]	98	4	-					
[[ink]]V, Fe[[/ink]]	4100	2	-					
La	5,10	99.53						
[[ink]]H[[/ink]]	02	10	0					
[[ink]]V[[/ink]]	04-5	4w	-					
Fe, Fe	06	3	-					
V ^[[10.4]]	05.2							
Sr	5,0,05.86							
Fe	07	4	-					
Fe	5,0 07.50							
Mo	6,0 07.49							
[[ink]]V[[/ink]], Fe	09	5	-					
V	15,10 09.78							
Co	10,10 10.54							
[[ink]]V[[/ink]]	11	5	-					
Mn	6,0 V 20,0,11.80							
10.92								
-	13	4	-					
[[ink]]V[[/ink]]	15	4	-					
-	17	2	-					
Fe	18	4	-					
Fe	20	4	-					
-	23	4	-					
Fe, Fe, V	28	6	+3					
Fe	29	4	-					
Fe	32-34	6w	+1					
Fe	36-7	2	-					
Fe	40-2	2	-					
Fe	4144	8	+2					
Fe	46	4	-					
Fe	47	4	-					
Fe	49	6	-					
Fe	50	3	-					
Fe	52	4	-					

[[preprinted]]183[[/preprinted]]  
 || Sigma CMa | Excess ||  
 Fe | 4154 | 5 ||  
 - | 56 | 5 || [[symbol - open French brace links these three lines in one table cell]]  
 Fe4,0 53.92  
 Gr 5,0 53.81  
 Fe 4,0 54.41 |  
 Fe,Un | 59 | 3 || [[symbol - open French brace links these two lines in one table cell]]  
 [[?]] 6,10 56.23  
 Fe 5,0 56.81 |  
 [[ink]]Sr+[[/ink]] | 4161 | 6 || [[symbol - open French brace links these two lines in one table cell. The first of these lines appears in the cell above.]]  
 Fe 4,0 58.80  
 Co 8,0 60.70? |  
 Ti | 63 | 6 || Ti 4,10 63.65 |  
 Fe | 63 | 4 || [[symbol - open French brace links these two lines in one table cell. The 2nd of these lines appears in the cell below.]]  
 Sc 6,0 65.22  
 Ce 5,10 65.60 |  
 [[ink]]Mg[[/ink]] | 67 | 4 ||  
 Ti | 72 | 4 || [[symbol - open French brace links these three lines in one table cell. The third of these lines appears in the cell below.]]  
 Fe 5,0 72.13  
 Ti0,10 71.91  
 Ga 15,30 92.05 |  
 [[ink]]Fe+[[/ink]] | 73 | 8 || Fe 4,0 74.92 |  
 - | 75 | 3 || Fe 4,0 74.92 |  
 [[ink]]Fe[[/ink]] | 77 | 4 || [[strikethrough]][[?]][[/strikethrough]] |  
 [[ink]]Fe+[[/ink]] | 79 | 8 || +4 |  
 Fe | 81 | 7 || +1 | Fe4,0 81.76 |  
 Ti | 84 | 8 || +1 || [[symbol - open French brace links these two lines in one table cell.]]  
 Fe 5,0 84.59  
 V 0,10 83.44 |  
 Fe,Fe | 87 | 8 | 0 || [[symbol - open French brace links these two lines in one table cell. The 2nd of the lines appears in the cell below.]]  
 Fe 6,4 87.05  
 Fe 6,4 87.81  
 Fe | 91 | 7 | - | Fe 6,3 91.442 |  
 - | 93 | 3 | - | La 7,8 92.34 |  
 Fe | 95 | 7 | - | Fe 4,0 95.34 |  
 Fe | 96 | 8 | - | Fe 4,0 96.21 |  
 [[ink]]Fe[[/ink]] | 98 | 7 || La 10,10 96.55 |  
 [[ink]]Fe[[/ink]] | 4202 | 7 ||  
 Y,V | 05 | 5 || V 0,10 05.09 |  
 ?[[?]] | 0[[strikethrough]]6[[/strikethrough]]9. [[?]] | 4 || Y 5,5 05.09 [[line break within table cell]] [[?]] 6,12 08.96 |  
 [[ink]]Fe[[/ink]] | 1[[strikethrough]]9[[/strikethrough]]9[[/strikethrough]]0 | 4 || V 8,8 09.84 |  
 ?[[?]] 1[[strikethrough]]0[[/strikethrough]]2 | 4 || [[?]] 5,5 11.85 |  
 Fe | 13 | 3 || Ag 10,10 12.02 [[line break within table cell]] - |  
 [[ink]]Sr+[[/ink]] | 15 | 8 | -1 ||  
 - | 17 | 4 ||  
 Fe | 19-20 | 4w || [[symbol - open French brace links these three lines in one table cell. The first of the lines appears in the cell above. There is also what appears to be an up arrow and a down arrow pointing the cell to the left.]]  
 Cd 0,6 16.9  
 La 6 10 17.56

183

	S C Ma	Tecum	
Fe	4154	5	
-	56	5	
Fe,Un	59	3	
Sr+	4161	6	
Ti	63	6	
Fe	65	4	
Mg	67	4	
Ti	72	4	
Fe	73	8	+3
-	75	3	
Fe	77	4	
Fe+	79	8	+4
Fe	81	7	+1
Ti	84	8	+1
Fe	87	4	0
Fe	91	7	-
-	93	3	-
Fe	95	7	-
Fe	96	8	-
Fe	98	7	
Fe	4202	7	
Y,V	05	5	
Fe	09	4	
Fe	13	3	
Fe	17	4	
Fe	19-20	4w	
Fe	20-5	4w	

Fe 4,0 17.56 |  
[[ink]]Fe[[/ink]] | 22 | 5 | | Fe 5,0 4219,36 |  
Fe,Fe | 24-5 | 4w | | Fe 4,0 24,17 [[line break within table cell]] 4,0 25.46  
|

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



184  
 Sigma Cma Ex  
 Ca 4227 10 0  
 Fe, Fe 29 3 1  
 Fe, Fe+ 33 9 1  
 Fe 36 8 1  
 Fe 39 5 1  
 6, 10 39.30  
 La 10, 10 38.40  
 Fe 5, 0 38.81  
 Fe 40 5 1  
 Cr 42 7 1  
 Fe 45 3 1  
 Sc 47 10 1  
 Fe, Fe+ 50 8 1  
 Co 52 5 1  
 Cr 54 5 1  
 56 3 1  
 Fe+ 58 5 1  
 Fe 60 6 1  
 Cr 62 4 1  
 62 4 1  
 69 2 1  
 La 10, 10 69.50  
 Fe, Fe+ 71-2 8 0  
 V 8, 10 68.63  
 Fe 73 5 0  
 Cr 75 7 0  
 77-8 4 1  
 80-81 4 1  
 Fe, Ca 82 5 1  
 V 8, 10 84.04  
 84 3 1  
 V 8, 10 84.04  
 Ti 88 4 1  
 Ca, C+, Ti 4290 10 0  
 Ti+, Fe, Sc 94 9 1  
 Fe+ 96 9 1  
 Fe, Ti, Ti+, Ca 99-00 10 1  
 Ca, Fe+ 430 0 10

184			
	S.C.M.	Ex	
Ca	4227	10	0
Fe, Fe	29	3	-
Fe, Fe+	33	9	1
Fe	36	8	1
Fe	39	5	1
Fe	40	5	1
Cr	42	7	1
Fe	45	3	1
Sc	47	10	1
Fe, Fe	50	8	1
Co	52	5	1
Cr	54	5	1
-	56	3	1
Fe+	58	5	1
Fe	60	6	1
Cr	62	4	1
-	69	2	1
Fe, Fe	71-2	8	0
Sc	73	5	0
Cr	75	7	0
-	77-8	4	1
-	80-81	4	1
Fe, Ca	82	5	1
-	84	3	1
-	88	4	1
Ca, C+, Ti	4290	10	0
Ti+, Fe, Sc	94	9	1
Fe+	96	9	1
Fe, Ti, Ti+, Ca	99-00	10	1
Ca, Fe+	430	0	10

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



[[preprinted]]185[[/preprinted]]  
 | Sigma Cma | Ex | |  
 Sr[[line break within cell]]Ti[[line break within cell]]Sc+[[symbol - close French brace links the last two lines]]4305 | 7 | | |  
 [[ink]]Ca,Fe,[[line break]]Ti+[[symbol - close French brace links the last two lines]]08 | 5 | | |  
 [[ink]]Y+[[ink]] | 09 | 6 | | |  
 [[ink]]Ti+[[ink]] | 1[[strikethrough]]4[[/strikethrough]]3 | 5 | | |  
 [[ink]]Ti,Ti+[[line break within cell]]Sc+,Fe[[ink]] | 4315 | 9 | | |  
 Ti+? | 17 | 5 | - | | |  
 [[ink]]Ca[[ink]] | 18 | 5 | | |  
 [[ink]]Sc+[[link break within cell]]Fe[[symbol - close French brace links the last two lines]]4321 | 8 | [[symbol - Curved line from above the L, under the whole entry, ending in the next row and column]]La 6,5 22.5 | | |  
 [[ink]]Sc+[[link break within cell]]Ti+[[symbol - close French brace links the last two lines]]4326 | 9 | | |  
 [[ink]]Ti+[[ink]] | 4331 | 8 | | |  
 ?la | 4333 | 7 | [[symbol - Curved line from above the L, extends into the next row to link the entry that appears in the cell below]]La 12,12 33.77 | |  
 |  
 [[underline]][[ink]]Cr,Fe,[[link break within cell]]Ti+[[ink]][[/underline]] | 4337 | 8 | +3 | | |  
 (Nov25)  
 [[ink]]H[[ink]] | 4340 | 11 | +4 | | |  
 [[ink]]Ti+,Cr[[ink]] | 44 | 8 | +4 | | |  
 [[ink]]Fe+[[line break within cell]]Cr,Ca[[symbol - close French brace links the last two lines]] | Fe[[line break within cell]]Mg[[symbol - close French brace links the last two lines]]51 | 11w | +2 | | ^[[NB [[?]] 4347 not seen]] |  
 [[ink]]Ca[[ink]] | 55 | 7 | - | La 8,10 54.29 | |  
 [[ink]]Y+,Cr[[ink]] | 58-9 | 10w | +3 | [[?]] 9,10 59.74 | |  
 Ni | 62 | 3 | - | [[?]] 10,0 61.71 | |  
 - | 64 | 2 | - | Mo 0,8 63.65 | |  
 [[ink]]Fe,Ti+[[ink]] | [[strikethrough]]7[[/strikethrough]]67 | 5 | +2 | | |  
 [[ink]]Fe+[[ink]] | 69 | 5 | +2 | | |  
 [[ink]]Cr[[ink]] | 71 | 4 | - | | |  
 [[ink]]Sc+,Y+[[ink]] | 74 | 11 | +3 | Y 15,20 74.94 | |  
 [[ink]]V[[ink]] | 79 | 4 | +2 | [[?]] 10,12 79.77 | |  
 [[ink]]Fe,Mg+[[line break within cell]]Fe+[[symbol - close French brace links the last two lines]]84-5 | 11 | 0 | V 20,30 84.73^[[Sc,Cr,La]] | |  
 |  
 [[ink]]Ti+[[ink]] | 87-8 | 5w | - | | |  
 [[ink]]Mg+[[ink]] | 91 | 7 | +2 | | |  
 [[ink]]Ti+[[line break within cell]]V[[symbol - close French brace links the last two lines]]95 | 10 | +3 | | |  
 [[ink]]Y+[[ink]] | 98 | 5 | - | | |  
 [[ink]]Sc+,Ti+[[ink]] | 4400 | 10 | +3 | | |  
 [[ink]]Fe[[ink]] | [[?]] | 6 | +1 | Ni15,15 01.54 | |

185

	Sigma	Ex	
03 05	7		
08	5		
09	6		
14	5		
4315	9		
17	5		
18	5		
4321	8		
4326	9		
4331	8		
4333	7		
4337	8		
(Nov25)			
4340	11	+4	
44	8	+4	
51	11w	+2	
55	7	-	
58-9	10w	+3	
62	3	-	
64	2	-	
67	5	+2	
69	5	+2	
71	4	-	
74	11	+3	
79	4	+2	
84-5	11	0	
87-8	5w	-	
91	7	+2	
95	10	+3	
98	5	-	
4400	10	+3	

[[preprinted]]186[[/preprinted]]  
 | Sigma Cma | Ex |  
 [[ink]]Fe[[/ink]] | 4408-9 | 6 omega | 0 | V 15,30 08.50 |  
 Ti | [[strikethrough]]09[[/strikethrough]]11 | 5 | - | - |  
 [[ink]]Fe,Sc+[[/ink]] | 1[[strikethrough]]1[[/strikethrough]]5 | 6 | +2 | |  
 [[ink]]Fe+[[/ink]] | 17[[strikethrough]]15[[/strikethrough]] | 8 | +3  
 [[ink]]gamma + [[/ink]] 22 | 5 | - | [[bracket]] nu 8, 15 21.57 gamma 10,  
 10 22.60  
 [[ink]]Ca [[/ink]] 25 | 3 | -  
 [[ink]]Fe, Mg+ [[/ink]] 27 | 5 | - | [[La]] 7, 8 27.57  
 [[ink]]Fe [[/ink]] 30 | 5 | - | [[La]] 10, 10 29.90  
 [[ink]]Ca [[/ink]] 35 | 5 | -1  
 [[ink]]Fe [[/ink]] 42 | 5 | [[strikethrough]]+2 [[/strikethrough]]  
 [[ink]]Ti+ [[/ink]] 44 | 9 | +2  
 [[ink]]Fe [[/ink]] 47 | 4 | -  
 [[ink]]Ti+ [[/ink]] 50 | 8 | -  
 [[ink]]Ca [[/ink]] 55 | 6 | 0  
 [[ink]]Fe [[/ink]] 59 | 3 | -  
 [[ink]]Fe [[/ink]] 62 | 5 | -  
 Ti 64 | 5 | -1 | Mn 6, 4 64.68  
 Fe 66 | 3 | - | [[bracket]] Ti 4, 0, 65.80 Fe 5, 0 66.556  
 [[ink]]Ti+ [[/ink]] 68 | 6 | -  
 NiZn 70 | 5 | \ | [[bracket]] Mn 6,4 70.14  
 Ni 10,4 70.48  
 Zn 4,4 70.55  
 [[ink]]Fe+ [[/ink]] 73 | 5  
 Fe 76 | 4 | 0 | Fe 6,4 76.03  
 Fe 80 | 3 | | Cu 9,0 80.42  
 [[ink]]Mg+, Fe, Fe. [[/ink]] 81, 2 | 7 omega | 0  
 [[ink]]- [[/ink]] 85 | 2 | | Fe 4,0, 84.23 ?  
 Ti [[ink]]Fe+ [[/ink]] 88.9 | 7 | +3  
 [[ink]]Fe+ [[/ink]] 91 [[strikethrough]] 89 [[/strikethrough]] | 6 | -  
 [[ink]]Fe [[/ink]] 94 [[strikethrough]] 91 [[/strikethrough]] | 6 | -  
 [[ink]]- [[/ink]] 97 [[strikethrough]] 94 [[/strikethrough]] | 6 | +3 | Zn 5,10  
 96.96 [[Cn 8,10 96.85]]  
 [[ink]]Ti+ [[/ink]] 4501 97 | 7 | +4

186					
	S. Cma	St. Cma			
Fe	4408-9	6w	0	V 15.30 08.50	Fe
Ti	0911	5	-	-	Fe
Fe, Sc	15	6	+2		Ti
Fe	1715	8	+3		Fe
Ti	22	5	-	V 15.30 08.50	Fe
Ca	25	3	-	V 15.30 08.50	Fe
Fe, Mg+	27	5	-	Ca 7.8 27.57	Fe
Fe	30	5	-	Ca 10.0 29.90	Fe
Ca	35	5	-1		Fe
R	42	5	-		Ti
Ti+	44	9	+2		Fe
Fe	47	4	-		Ti
Ti+	50	8	-		Ti
Ca	55	6	0		Fe
Fe	59	3	-		Ti
Fe	62	5	-		Fe
Ti	64	5	-1	Mn 6.4 64.68	Fe
Fe	66	3	-	Fe 5.0 66.556	Fe
Ti+	68	6	-		Ti
NiZn	70	5	-	Mn 6.4 70.14	Fe
Fe	73	5	-		Fe
Fe	76	4	0	Fe 6.4 76.03	Fe
Ti+	80	3	-	Cu 9.0 80.42	Ti
Fe	81	2	7 omega		Fe
Fe	85	2	-	Fe 4.0 84.23 ?	Fe
Ti	88.9	7	+3		Fe
Fe	91	6	-		Fe
Fe	94	6	-		Fe
Fe	97	6	+3	Zn 5.10 96.96	Fe
Ti+	4501 97	7	+4		Fe

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 187 [[/preprinted]]  
 | sigma Cma | [[excess]] |  
 [[ink]] Fe+ [[/ink]] 4508 | 6 | - | [[Zn]] 5,8 07.11  
 [[ink]] Fe+ [[/ink]] 4515 | 6 | - |  
 [[ink]] Ti [[/ink]] 18 | 5 | - |  
 [[ink]] Fe+ [[/ink]] 20 | 6 | - |  
 [[ink]] Fe+, Ti [[/ink]] 22 | 6 | - | [[La]] 10,12 22.37  
 [[ink]] Ba+ [[/ink]] 25 | 5 | - | [[Sw]] 40,20 24.74 | \*?  
 | - | [[La]] 7-8 25.30  
 [[ink]] Fe, Ti+ [[/ink]] 28-9 | 6 | - |  
 [[ink]] Fe [[/ink]] 31 | 3 | - |  
 [[ink]] Ti, Ti+ [[/ink]] 34 | [[strikethrough]] 1 [[/strikethrough]] | 7 | - | Cr 7,7  
 40.87  
 [[ink]] Fe+ [[/ink]] 40 | 3 | - |  
 [[arrow from above row]] 41 | 6 | - |  
 [[ink]] Ti [[/ink]] 44 | 7 | [[strikethrough]] +2 [[/strikethrough]] |  
 [[ink]] Ti+, Fe+ [[/ink]] [[bracket]] 49 | 8 | +2 |  
 [[ink]] Ti [[/ink]] 52 | 3 | - |  
 [[ink]] Ba+ [[/ink]] 54 | 7 | - | [[Zr]] 0,6 53.97  
 [[ink]] Ti, Fe+ [[/ink]] 56 | 8 | - |  
 [[Cr]] 58 | 5 | - | [[bracket]] [[La]] 8,5 58.47  
 [[Cr]] 0,10 58.64  
 [[ink]] Ti+ [[/ink]] 63 | 6 | +1 |  
 [[Cr]] 65 | 4 | - |  
 Fe 68 | 4 | - | - |  
 [[ink]] (Mg) Ti+ [[/ink]] 72 | 7 | +2 |  
 Fe 74 | 2 | - |  
 [[ink]] Fe+ [[/ink]] 76 | 4 | - | [[Zr]] 5,6 75.52  
 V Fe Ni 80 | 4 | - | - | [[v]] 8,10 80.39  
 [[ink]] Fe+ [[/ink]] 84 | 8 | - |  
 [[Cr]] 88 | 3 | - | Cr 0,10, 88.20  
 [[ink]] Ti+ [[/ink]] 90 | 3 | - |  
 Fe, Cr 92 | 4 | - |  
 V, Fe 94-5 | 1 | - | [[v10, v20 94.59]]  
 [[Co 8, -94.64]]

187

	S. C. Ma.	Excess	
K+ 4508	6	-	2-1-1 07.11
Fe+ 4515	6	-	
Ti 18	5	-	
Fe+ 20	6	-	
Fe+ Ti 22	6	-	La 10,12 22.37
Ba+ 25	5	-	Sw 40,20 24.74 + ?
			La 7-8 25.30
Fe, Ti+ 28-9	6	-	
Fe 31	3	-	
Ti+ 34	7	-	
Fe 40	3	-	La 7,7 40.87
Ti 41	6	-	
Ti 44	7	-	
Ti+ Fe+ 49	8	+2	
Ti 52	3	-	
Ba+ 54	7	-	2-1-1 07.11
Ti, Fe+ 56	8	-	
Cr 58	5	-	La 8,5 58.47
Ti+ 63	6	-	
Fe 65	4	-	
Fe 68	4	-	
(Mg) Ti+ 72	7	+2	
Fe 74	2	-	
Fe+ 76	4	-	La 5,6 75.52
V Fe Ni 80	4	-	La 8,10 80.39
Fe+ 84	8	-	
Cr 88	3	-	Cr 0,10, 88.20
Ti+ 90	3	-	
Fe, Cr 92	4	-	
V, Fe 94-5	1	-	La 7,7 40.87
			Co 8, -94.64

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]188[[/preprinted]]  
 | Sigma CMa | Excess |  
 [[ink]]Cr[[/ink]] | 4600 | 3 | |  
 [[ink]]Fe[[/ink]] | 03 | 3 | |  
 Ni | 05 | 2 | Ni 10,0 04.99 |  
 Sr | (4607?) | 0 | -4 | Mn 5,0 05.38 |  
 | ? | 3 | - | |  
 [[ink]]Cr[[/ink]] | 13 | 4 | - | |  
 [[ink]]Cr[[/ink]] | 16 | 5 | - | |  
 FeCrFe | 19 | [[symbol - open French brace links this cell to the one below]]5 | - | Cr 0,10 18.85 |  
 [[ink]]Fe+[[/ink]] | 20 | 5 | - | V 8,10 19.71 [[line break within cell]] La 6,6 19.87 |  
 - | 32 | 5 | - | - |  
 Cr | 34 | 4 | - | | [[symbol - open French brace links this cell to the one below]][[?]] 6,8 33.99 |  
 - | 42 | 3 | - | Cr 0,7 34.12 |  
 - | ? | 3 | - | - |  
 [[ink]]Cr[[/ink]] | 46 | 5 | 0 | |  
 Ni | 49 | 5 | 0 | Ni 15,- 48.66 |  
 [[ink]]Cr,Cr[[/ink]] | 52 | 4 | - | |  
 - | 55 | 5 | - | La 7,10 55.50 |  
 [[ink]]Fe+[[/ink]] | 57 | 6 | +2 | |  
 -,- | 60-3 | 6w | La 5,4 62.51 |  
 [[ink]]Fe+[[/ink]], [[ink]]Ti[[/ink]]? | 67 | 7 | 0 | La 5,8 63.77 |  
 Sc | 70 | 7 | | [[symbol - less than]]La 5,8 68.91 NN there? [[line break within cell]] [[symbol - open French brace connects this line with the first line of the cell below]]Sc 8,0 70.42 |  
 Cd? | 78 | 4 | 0? | V 8,3 70.48 [[line break within cell]]Cd 8,8 78.152 |  
 [[ink]]Ti[[/ink]] | 82 | 4 | 0 | Y+ 4,10 82.32 |  
 Ti,Fe | 91 | 4 | 0 | Ti 5,0 91.34 ^[[[symbol - less than]][[?]] 5,10 88.45 Not there? 7,12 87.80 [[margin note circled with arrow pointing to text insert; note extends to last line of notebook]] [[?]] too diff; there is a wide band [[?]] [[/margin note]]  
 - | 99 | 6 | | Fe 4,0 91.417 [[symbol - less than]]La 6,5 92.50 [[line break within cell]]Ti 6,0 98.79 |  
 [[ink]]Mg[[/ink]] | 4703 | 6 | | |  
 [[ink]]Ti+[[/ink]] | 08 | 7w | | |  
 | | | ? [[?]] 8,10 4710.08 |

188				S.C.Ma Secs	
Ca	4600	3			
Fe	03	3			
Ni	05	2			Ni 15,- 48.66
Sr	(4607?)	0	-4		Mn 5,0 05.38
	?	3	-		
Cr	13	4	-		
Cr	16	5	-		
FeCrFe	19	5	-		Cr 0,10 18.85
Fe+	20	5	-		La 6,6 19.87
Ca	26	4w	-		
Fe+	29	8	-		
	32	5	-		
	34	4	-		Sc 8,0 70.42
	42	3	-		La 5,8 62.51
	?	3	-		
Ca	46	5	0		
Ni	49	5	0		Ni 15,- 48.66
Cr,Cr	52	4	-		
	55	5	-		La 7,10 55.50
Fe+	57	6	+2		
	60-3	6w	-		La 5,4 62.51
Fe+,Ti	67	7	0		La 5,8 63.77
Sc	70	7			Sc 8,0 70.42
Cd?	78	4	0?		V 8,3 70.48
Ti	82	4	0		Y+ 4,10 82.32
Ti,Fe	91	4	0		Ti 5,0 91.34
	99	6			Fe 4,0 91.417
Mg	4703	6			La 6,5 92.50
Ti+	08	7w			Ti 6,0 98.79

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]189[[/preprinted]]

[[greek delta]] CMa Excess

Ti 4715 5 0

- 19 4 - 2h5,5 19.11

- 28 3 Mn 7.4 27.48 Sa 7.0 28.39 [[preceeding in brackets]]

Te+ 31 6 0

Te 34 3

- 37 5 Fe 6.0 36.768

- 40 3 {2 [[gamma]] 8,10 39.47 Sa 8,4 40.25}

- 52 2 - <43.08 sa 10,10 48.72 sa 6,50 May be there sf too diff

Mn 55 3

Ti Ni 64 12 +4 -

Fe 71 3 Co 7,5 71.10

Ti+ 80 6 Zr 6,10 72.31

Mn 83 [[two lines]] 4 4 Zr 4.5 84-94

Y+ 86 [[two lines]] 3 3

Fe 98 5w

Te+ 4805 6

?Zn? 11 5

Y+ Mn 24 9

? 3

? 4

Ti 40 4

Cr 48 8 Cr 0,6 48.24

Y+ 55 8

H 4861 11 0 good to w

{Sn too diff [?] de [?] there

189

		$\delta$ CMa	Excess	
Ti	4715	5	0	
-	19	4	-	2h 5,5 19.11
-	28	3		28 3 Mn 7.4 27.48
Te+	31	6	0	31 6 0
Te	34	3		34 3
-	37	5		37 5 Fe 6.0 36.768
-	40	3		40 3 {2 [[gamma]] 8,10 39.47
-	52	2		52 2 - <43.08 sa 10,10 48.72
Mn	55	3		55 3
Ti Ni	64	12	+	64 12 +4 -
Fe	71	3		71 3 Co 7,5 71.10
Ti+	80	6		80 6 Zr 6,10 72.31
Mn	83	4		83 4 4 Zr 4.5 84-94
Y+	86	3		86 3 3
Fe	98	5w		98 5w
Te+	4805	6		4805 6
?Zn?	11	5		?Zn? 11 5
Y+, Mn	24	9		24 9
-	3	3		3 3
-	4	4		4 4
Ti	40	4		40 4
Cr	48	8		48 8 Cr 0,6 48.24
Y+	55	8		55 8
H	4861	11	0	4861 11 0

May be there sf too diff

good to w

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]190[[/preprinted]]

[[Greek delta]] CMa beyond H [[greek letter delta]] X 8948 [underlined]  
Measures for 1st image (from H [[delta]] 2nd image approximate  
[[lambda]])

4 52170 - 00482 (H [[beta]] off)

4 410 -00242

H[[beta]] 8 52652

4 970 00318

4 53385 00733

5 826 01174

3 58897 06245

3 59880 07228

4 60491 07839

2 61462 08810

5 62287 09635

[[nu omega]] 12 62701 10049

[[omega]] 8 63094 10442

4 63700 11048

5 64083 11431 [[faint] 00249 [[strikethrough]]

8 64332 11680

8 64518 111866 [[faint] 00186

edge of gd [open bracket] 65327 12675 00809 [strikethrough]

65596 12944 1078

7 65668 13016 [[faint] 00201 00238

7 65869 13217 b

7 66813 14161

7 67062 14410 [[faint] 00944 00800

7 67321 14669

Edge [[bracket]] 67979 15327

68220 15568

7 68496 15844

6 69052

8 69887 17235

190			
8 CMa beyond H $\beta$ X 8948 Measures for			
1st image (from H $\beta$ )		2nd image (approximate)	
	52170	-00482 (H $\beta$ off)	
	410	-00242	
H $\beta$	8 52652		
4	970	00318	
4	53385	00733	
5	826	01174	
3	58897	06245	
3	59880	07228	
4	60491	07839	
2	61462	08810	
5	62287	09635	
nu omega	12 62701	10049	
omega	8 63094	10442	
4	63700	11048	
5	64083	11431	
8	64332	11680	
8	64518	111866	
edge of gd	65327	12675	
	65596	12944	
7	65668	13016	
7	65869	13217	
7	66813	14161	
7	67062	14410	
7	67321	14669	
7	67979	15327	
	68220	15568	
7	68496	15844	
6	69052		
8	69887	17235	

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]191[[/preprinted]]

2nd image			Difference
4	70398	17746	
8	70849	18197	71327
4	71541	72059	00518
7	72072	19420	72528
	[Scribbled out number]	72720	00456
72236	3	72896	
72412	4	73602	
73118	2	73874	
73390	8	74242	
73758	6	74483	
73999	6	74771	
74287	5	75058	
74574	5	75462	
74978	8	75611	
75127	6	76009	
75525	8		

		2nd image		191	
					Difference
4	70398	17746			
8	70849	18197	71327		00478
4	71541		72059		00518
7	72072	19420	72528		00456
	<del>72720</del>	3	72720		
	72236	4	72896		
	72412	2	73602		
	73118	8	74242		
	73758	6	74483		
	73999	6	74771		
	74287	5	75058		
	74574	5	75462		
	74978	8	75611		
	75127	6	76009		
	75525	8			

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 192 [[/preprinted]].

	delta CMa x10156 Measures for approximation	
8	31151	lambda
7	31588	
(ink mark)7	31792	
5	31890	
8	32318	
3	33106	
6	33233	
10	34489	
7	35145	
7	35835	
7	36120	
4	36346	
8	36802	
7	37715	
7	37963	
H/3 8	38204 x	
ink 7	49739	
7	49977	
7	50777 x	
6	50949	
6	51104	
8	51326	
(5227)ink 8	52224 x	
8	52481	
9	52729	
9	53451	
9	53457	
10	53923	
ink-9	54325	
-	54515	54300

192

	delta CMa	x10156	Measures for approximation
8	31151		lambda
7	31588		
(ink mark)7	31792		
5	31890		
8	32318		
3	33106		
6	33233		
10	34489		
7	35145		
7	35835		
7	36120		
4	36346		
8	36802		
7	37715		
7	37963		
H/3 8	38204	x	
ink 7	49739		
7	49977		
7	50777	x	
6	50949		
6	51104		
8	51326		
(5227)ink 8	52224	x	
8	52481		
9	52729		
9	53451		
9	53457		
10	53923		
ink-9	54325		
-	54515		54300

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



[[preprinted]]193[[/preprinted]]

change of scale zero      Difference  
9 54575 54300      00215

4    54442  
5    54564  
4    54703  
6    54836  
4    54936  
9    55069  
10   55377  
10   55588  
8    55778  
10   56103  
(2 faint lines)  
4    56711  
6w   56886

[[line with an arrow from the words 'Plate moved' pointing to the number '57293' on the next line]]

12   57319   57293   00026  
10   57491   57479   00012  
8    57711   57699   00012  
wk, 10   58708   58686   00012

Plate moved      59038

[[line down left side margin from the words 'plate move' encompassing the remainder of the entries]]

59384  
59523  
59859  
10   60224  
5    60363  
8    60448  
8    60778  
7    61307  
wk?   6170-

[[preprinted]] John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics - Provided by the NASA Astrophysics Data System[[/preprinted]]

		193
change of scale zero		Difference
9	54575	54300
4		54442
5		54564
4		54703
6		54836
4		54936
9		55069
10		55377
10		55588
8		55778
10		56103
(2 faint lines)		
4		56711
6w		56886
12		57319
10		57491
8		57711
10		58708
Plate moved		57293
		57479
		57699
		58686
		59038
		59384
		59523
		59859
		60224
		60363
		60448
		60778
		61307
		6170-

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]194[[/preprinted]]

See page 208 for current procedure.

Deviation of approximate for measured lines in the spectrum of CMa, x 10156

Selected lines

Element	Wavelength	Distance from zero
Hg	4861.33	0.0
Mg	5183.67	12573
Fe	5227.19	16121

Deviation of constants in the formula

= + c/n-n

$$4861.33 = + c/38204 - n \quad (1)$$

$$5183.67 = + c/50777 - n \quad (2)$$

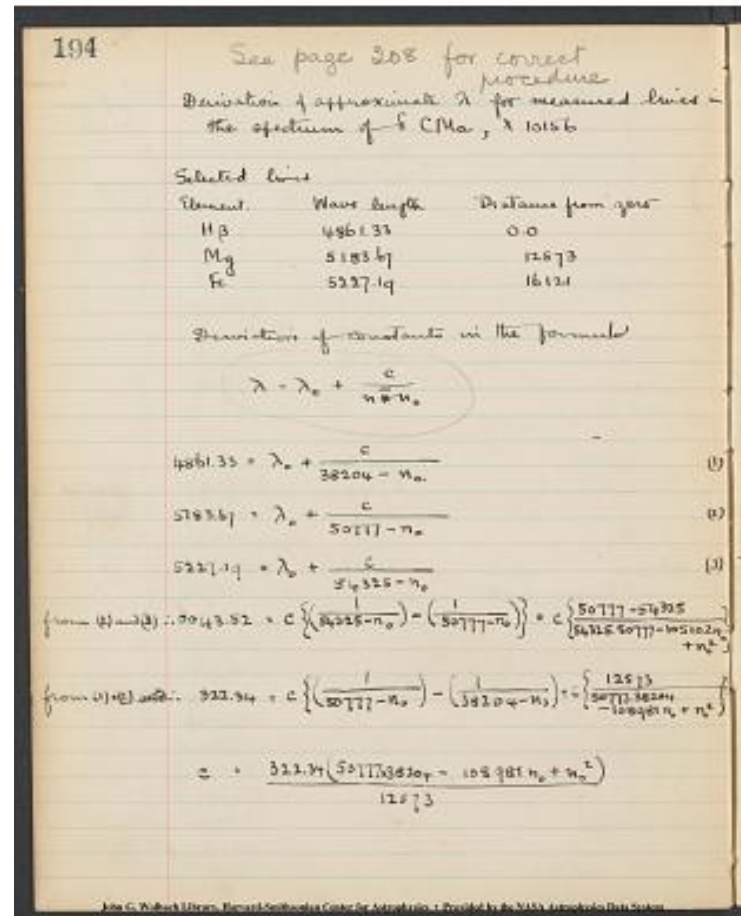
$$5227.19 = + c/54325 - n \quad (3)$$

$$\text{from (2) and (3)} 0043.52 = c\left\{\left(\frac{1}{54325} - n\right) - \left(\frac{1}{50777}\right)\right\} = C\{50777 - 54325/54325 \cdot 50777 - 105102n + n^2\}$$

$$\text{from (1) and (2)} 322.34 = c\left\{\left(\frac{1}{50777} - n\right) - \left(\frac{1}{38204}\right) - n\right\} = c\{12573/50777 \cdot 38204 - 108989n + n^2\}$$

$$c = 322.34(50777 \cdot 38204 - 108989n + n^2)/12573$$

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



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

195

~~entire page - diagonal line from upper RH to lower LH~~

therefore sign 43.52 =

$$322.34(50177 \times 38204 - 108981n^{[0]} + n^{[0]}n^{[2]^2})^{[0]}$$

division (underline)

$$(54325.50777 - 105102n^{[0]} + n^{[2]^2})^{[0]}$$

therefore sign  $n^{[2]^2}[0](4352 - 322.34) + n^{[0]}((105102 \times 43.52) + (108981 \times 322.34))$

$$+ (43.52 \times 54325 \times 50777) - (322.34 \times 50777 \times 38204) = 0$$

or  $278.82n^{[2]^2}[0] - 3.9704 \times 10^{17}n^{[0]} + 5.5053 \times 10^{15} = 0$

therefore sign  $n^{[0]} = 3.9704 \times 10^{17}n^{[0]}$  [symbol - plus or minus] [symbol - square root of]  $(3.9704)^{[2]^2} \cdot 10^{14}$  -  $4(278.82 \times 5.5053 \times 10^{15})$

division (underline)  $278.82 \times 2$

$= 3.970 \times 10^{17}$  [symbol - plus or minus] [symbol - square root of]  $1.576 \times 10^{15}$  -  $0.564 \times 10^{15}$

division (underline) 557.64

$= 3.970 \times 10^{17}$  [symbol - plus or minus]  $5.93 \times 10^{14}$  [symbol - square root of]  $1.012 \times 10^{15}$

division (underline) 557.64

vertical line accross entire page

~~43660~~ adopting the positive root.

$$4861.33 = \lambda^{[0]} + C \frac{38204 - 108981}{57090}$$

$$\frac{43660}{57090} - \lambda^{[0]} - C \frac{5456}{6313} = 18886$$

$5183.67 = \lambda^{[0]} + C \frac{50777 - 43660}{57090}$

division (underline)  $7117$   $6313$

$322.34 = C \frac{5456}{6313} - \lambda^{[0]}$

division (underline)  $5456$   $6313$

division (underline)  $12573$   $5456$   $12573$   $6313$

$C = \frac{322.34 \times 7117 \times 5456}{2573} = 1.0005 \times 10^{[6]}$

$\frac{322.34 \times 6313 \times 18886}{12513} \log c = 6.4853$

~~entire page - diagonal line from upper RH to lower LH~~

195

$$143.52 = \frac{322.34(50177 \times 38204 - 108981n_0 + n_0^2)}{(54325.50777 - 105102n_0 + n_0^2)}$$

$$n_0^2(143.52 - 322.34) + n_0\{105102 \times 43.52 + (108981 \times 322.34) + (43.52 \times 54325 \times 50777) - (322.34 \times 50777 \times 38204)\} = 0$$

$$278.82n_0^2 - 3.9704 \times 10^{17}n_0 + 5.5053 \times 10^{15} = 0$$

$$n_0 = \frac{3.9704 \times 10^{17} \pm \sqrt{(3.9704 \times 10^{17})^2 - 4(278.82 \times 5.5053 \times 10^{15})}}{278.82 \times 2}$$

$$= \frac{3.970 \times 10^{17} \pm \sqrt{1.576 \times 10^{35} - 6.164 \times 10^{15}}}{557.64}$$

$$= \frac{3.970 \times 10^{17} \pm 1.012 \times 10^{15}}{557.64}$$

adopting the positive root.

$$4861.33 = \lambda_0 + \frac{C}{38204 - 108981} = \lambda_0 - \frac{C}{57090}$$

$$5183.67 = \lambda_0 + \frac{C}{50777 - 43660} = \lambda_0 + \frac{C}{57090}$$

$$322.34 = \frac{C}{5456} - \lambda_0 = \frac{12573}{6313} - \lambda_0$$

$$C = \frac{322.34 \times 7117 \times 5456}{2573} = 1.0005 \times 10^6$$

$$\frac{322.34 \times 6313 \times 18886}{12513} \log c = 6.4853$$

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]]196[[/preprinted]]

$$4861.33 = \lambda_{\alpha} + C/38204 - n^{\alpha}[[0]] \quad (1)$$

$$5183.67 = \lambda_{\alpha} + C/50777 - n^{\alpha}[[0]] \quad (2)$$

$$5227.19 = \lambda_{\alpha} + C/54325 - n^{\alpha}[[0]] \quad (3)$$

$$\text{from (1) } | 1/C(4861.33 - \lambda_{\alpha}) = 1/38204 - n^{\alpha}[[0]]$$

$$C/4861.33 - \lambda_{\alpha} = 38204 - n^{\alpha}[[0]] \quad (4)$$

$$\text{from (2) } | C/5183.67 - \lambda_{\alpha} = 50777 - n^{\alpha}[[0]] \quad (5)$$

$$\text{from (3) } | C/5227.19 - \lambda_{\alpha} = 54325 - n^{\alpha}[[0]] \quad (6)$$

$$\text{from (4) } | \text{from (5) } | n^{\alpha}[[0]] = 38204 - C/4861.33 - \lambda_{\alpha} \quad (7)$$

[[/line from (7) above to lower LH corner of page]]

$$\text{from (5) } | \text{from (6) } | n^{\alpha}[[0]] = 50777 - C/5183.67 - \lambda_{\alpha} \quad (8)$$

$$\text{from (7) and (8) } | \text{from (9) } | 12573 C(1/4861.33 - \lambda_{\alpha} - 1/5183.67 - \lambda_{\alpha}) = 38204 - 1/5183.67 - \lambda_{\alpha} \quad (9)$$

from two

$$\text{similar } | 3548 = C(1/5183.67 - \lambda_{\alpha} - 1/5227.19 - \lambda_{\alpha}) \quad (10)$$

$$\text{from (9) } | \text{and (10) } |$$

$$| 16121 C = 1/3548 (1/5183.67 - \lambda_{\alpha} - 1/5227.19 - \lambda_{\alpha}) \quad (11)$$

$$\text{From (11) and (7) } | n^{\alpha}[[0]] = 38204 - 1/3548 (1/4861.33 - \lambda_{\alpha} - 1/5183.67 - \lambda_{\alpha}) \quad (12)$$

$$| -1/(4861.33 \times 5227.19 - \lambda_{\alpha} \times 10088.52 + \lambda_{\alpha}^2)$$

[[/line from (7) above to lower LH corner of page]]

196

$$4861.33 = \lambda_{\alpha} + \frac{C}{38204 - n_{\alpha}} \quad (1)$$

$$5183.67 = \lambda_{\alpha} + \frac{C}{50777 - n_{\alpha}} \quad (2)$$

$$5227.19 = \lambda_{\alpha} + \frac{C}{54325 - n_{\alpha}} \quad (3)$$

from (1)  $\frac{1}{C} (4861.33 - \lambda_{\alpha}) = \frac{1}{38204 - n_{\alpha}}$

$$\frac{C}{4861.33 - \lambda_{\alpha}} = 38204 - n_{\alpha} \quad (4)$$

from (2)  $\frac{C}{5183.67 - \lambda_{\alpha}} = 50777 - n_{\alpha} \quad (5)$

from (3)  $\frac{C}{5227.19 - \lambda_{\alpha}} = 54325 - n_{\alpha} \quad (6)$

from (4) and (5)  $n_{\alpha} = 38204 - \frac{C}{4861.33 - \lambda_{\alpha}} \quad (7)$

from (5) and (6)  $n_{\alpha} = 50777 - \frac{C}{5183.67 - \lambda_{\alpha}} \quad (8)$

from (7) and (8)  $3548 = C \left( \frac{1}{4861.33 - \lambda_{\alpha}} - \frac{1}{5183.67 - \lambda_{\alpha}} \right) \quad (9)$

from (9) and (7)  $3548 = C \left( \frac{1}{5183.67 - \lambda_{\alpha}} - \frac{1}{5227.19 - \lambda_{\alpha}} \right) \quad (10)$

from (9) and (10)  $16121 C = \frac{1}{3548} \left( \frac{1}{5183.67 - \lambda_{\alpha}} - \frac{1}{5227.19 - \lambda_{\alpha}} \right) \quad (11)$

from (11) and (7)  $n_{\alpha} = 38204 - \frac{1}{3548} \left\{ \frac{1}{\left( \frac{1}{4861.33 \times 5227.19} - \lambda_{\alpha} \times 10045.00 + \lambda_{\alpha}^2 \right)} \right\}$

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

131.66  
468

2.1195  
2.6702

-----  
1.4493

1.4493  
1.5114

-----  
1.9379

23962  
738

2.3795  
2.8681

-----  
1.5114

1.0000  
86604

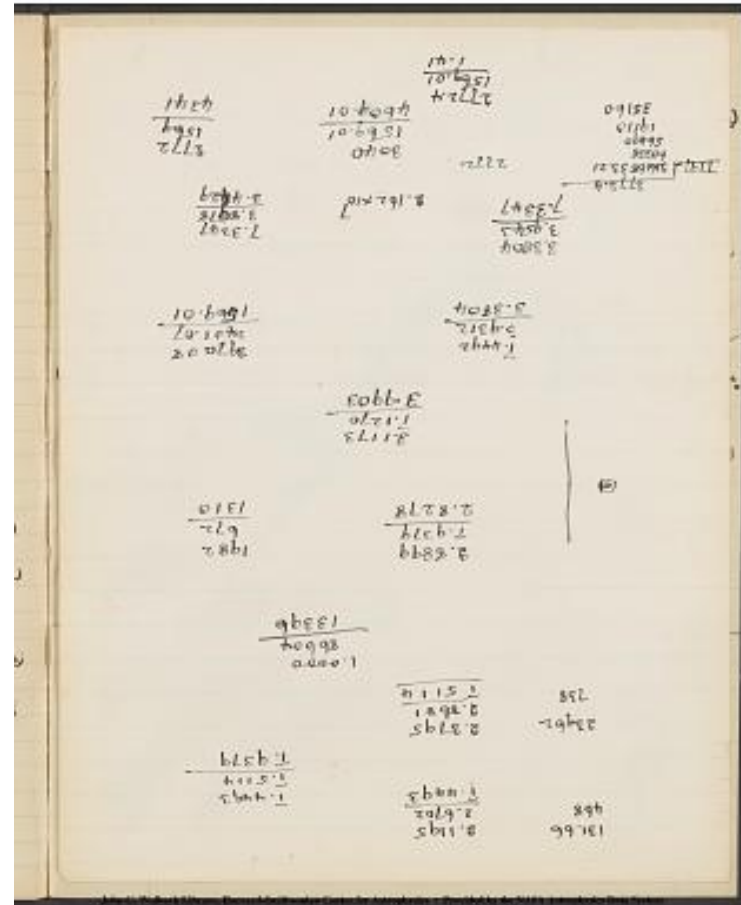
-----  
13396

2.8899  
1.9379

-----  
2.8278

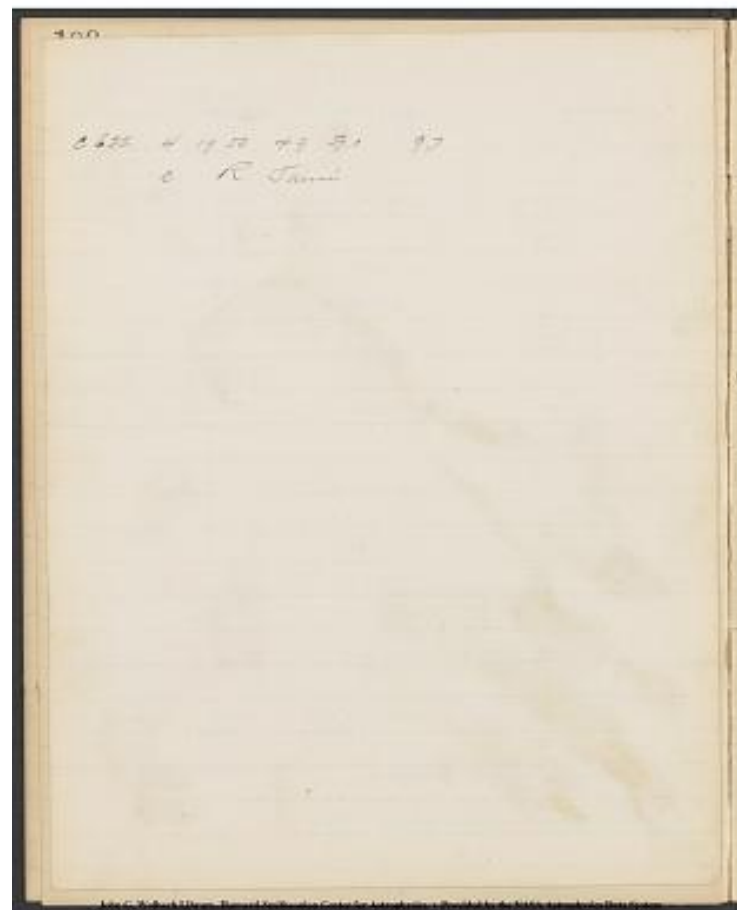
1982  
672

-----  
1310



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

C622 | 4 | 19 53 | +9 | 57.00 | 9.7  
e R Jaissi



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]197[[/preprinted]]

| from (4)

|  $c = (38204 - n^{[0]})(4861.33 - \lambda^{[0]})$  (12)

[[strikethrough - long line extends from (12) above to lower LH through entire page]]

from (12) and (5) |  $(38204 - n^{[0]})(4861.33 - \lambda^{[0]})/5183.67 - \lambda^{[0]} = 50777 - n^{[0]}$  (13)

from (12) and (6) |  $(38204 - n^{[0]})(4861.33 - \lambda^{[0]})/5227.19 - \lambda^{[0]} = 54325 - n^{[0]}$  (14)

from (13) |  $(38204 - n^{[0]})(4861.33 - \lambda^{[0]}) = (50777 - n^{[0]})(5183.67 - \lambda^{[0]})$  (15) [[symbol - check mark]]

from (14) |  $(38204 - n^{[0]})(4861.33 - \lambda^{[0]}) = (5227.19 - \lambda^{[0]})(54325 - n^{[0]})$  (16) [[symbol - check mark]]

(15) [[?]] |  $1^{[0]}[[[symbol - check mark]]].8572^{[2]} \times 10^{[8]} - 38204\lambda^{[0]} -$

$4861.33n^{[0]} + \lambda^{[0]}n^{[0]} = 2.632[[[strikethrough]]]3[[[strikethrough]]]^{[0]} \times 10^{[8]} -$

$5183.67n^{[0]} + 322.34 n^{[0]} = 50777\lambda^{[0]} + 5183.67n^{[0]} + \lambda^{[0]}n^{[0]}$

or |  $-0.7751 \times 10^{[8]} + [0.77489 \times 10^{[8]}] + 12573^{[0]} = 0$

or |  $n^{[0]} = 7.751[[[strikethrough]]]7.751[[[strikethrough]]] \times 10^{[7]} - 12573\lambda^{[0]}/322.34$  (17)

[[symbol - horizontal line across entire page]]

|  $\log 38204 = 4.5821088$   $\log 50777 = 4.7056670$  [[symbol - check mark]]

|  $\log 4861.33 = 3.6867551/8.2688639$  [[symbol - check mark]]

$\log 5183.67 = 3.7146374$  [[symbol - check mark]]  $8.4203044$  [[symbol - check mark]]

[[/strikethrough - long line extends from (12) above to lower LH through entire page]]

197

from (4)  
 $c = (38204 - n_0)(4861.33 - \lambda_0)$  (12)

from (12) and (5) |  $(38204 - n_0)(4861.33 - \lambda_0) = 50777 - n_0$  (13)

from (12) and (6) |  $(38204 - n_0)(4861.33 - \lambda_0) = 5227.19 - \lambda_0$  (14)

from (13) |  $(38204 - n_0)(4861.33 - \lambda_0) = (50777 - n_0)(5183.67 - \lambda_0)$  (15) [[symbol - check mark]]

from (14) |  $(38204 - n_0)(4861.33 - \lambda_0) = (5227.19 - \lambda_0)(54325 - n_0)$  (16) [[symbol - check mark]]

(15) [[?]] |  $1^{[0]}[[[symbol - check mark]]].8572^{[2]} \times 10^{[8]} - 38204\lambda^{[0]} - 4861.33n^{[0]} + \lambda^{[0]}n^{[0]} = 2.632[[[strikethrough]]]3[[[strikethrough]]]^{[0]} \times 10^{[8]} - 5183.67n^{[0]} + 322.34 n^{[0]} = 50777\lambda^{[0]} + 5183.67n^{[0]} + \lambda^{[0]}n^{[0]}$

or |  $-0.7751 \times 10^{[8]} + [0.77489 \times 10^{[8]}] + 12573^{[0]} = 0$

or |  $n^{[0]} = 7.751[[[strikethrough]]]7.751[[[strikethrough]]] \times 10^{[7]} - 12573\lambda^{[0]}/322.34$  (17)

[[symbol - horizontal line across entire page]]

|  $\log 38204 = 4.5821088$   $\log 50777 = 4.7056670$  [[symbol - check mark]]

|  $\log 4861.33 = 3.6867551/8.2688639$  [[symbol - check mark]]

$\log 5183.67 = 3.7146374$  [[symbol - check mark]]  $8.4203044$  [[symbol - check mark]]

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]198[[/preprinted]]  
 [[/strickethrough - diagonal line across entire page from upper RH to lower LH]]  
 substituting in (17)  

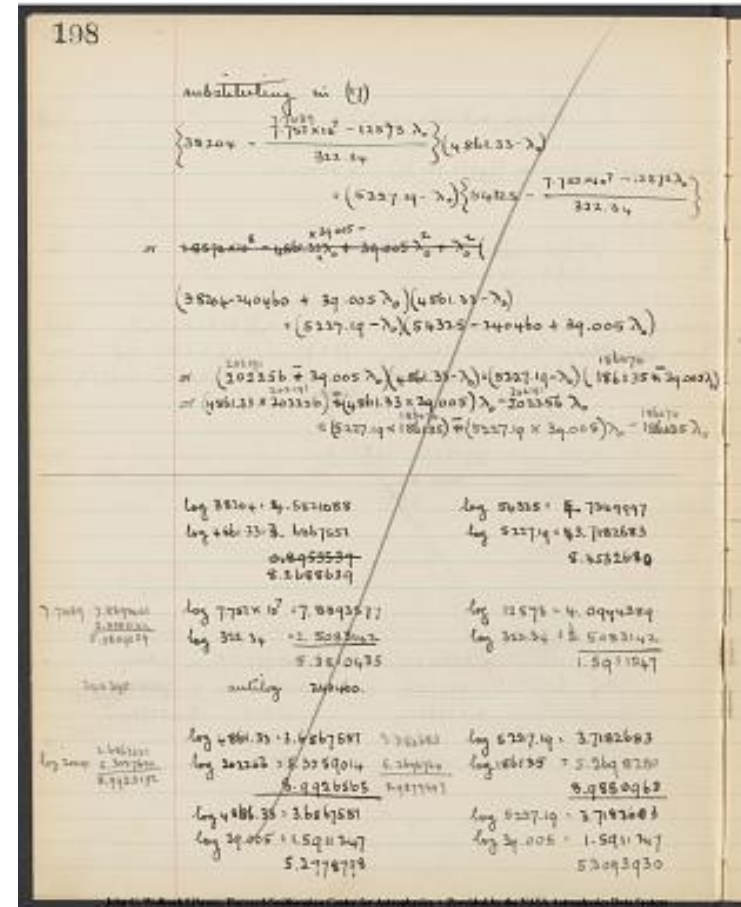
$$\{38204 - 7.751^{[7]} \times 10^{[7]} - 12573 \lambda^{[0]} / 322.43\} (4861.33 - \lambda^{[0]})$$

$$= (5227.19 - \lambda^{[0]}) \{54325 - 7.751 \times 10^{[7]} - 12573 \lambda^{[0]} / 322.34\}$$
 [[margin note]]or[[/margin note]] [[/strickethrough]]  $1.8572 \times 10^{[8]} - 4861.33 \lambda^{[0]} + 39.005 \lambda^{[2]} + 39.005 \lambda^{[0]}$   

$$= (38204 - 240460 + 39.005 \lambda^{[0]}) (4861.33 - \lambda^{[0]})$$

$$= (5227.19 - \lambda^{[0]}) (54325 - 240460 + 39.005 \lambda^{[0]})$$
 or  $(202256^{[202191]} \pm 39.005 \lambda^{[0]}) (4861.33 - \lambda^{[0]}) = (5227.19 - \lambda^{[0]}) (54325 - 240460 + 39.005 \lambda^{[0]})$   

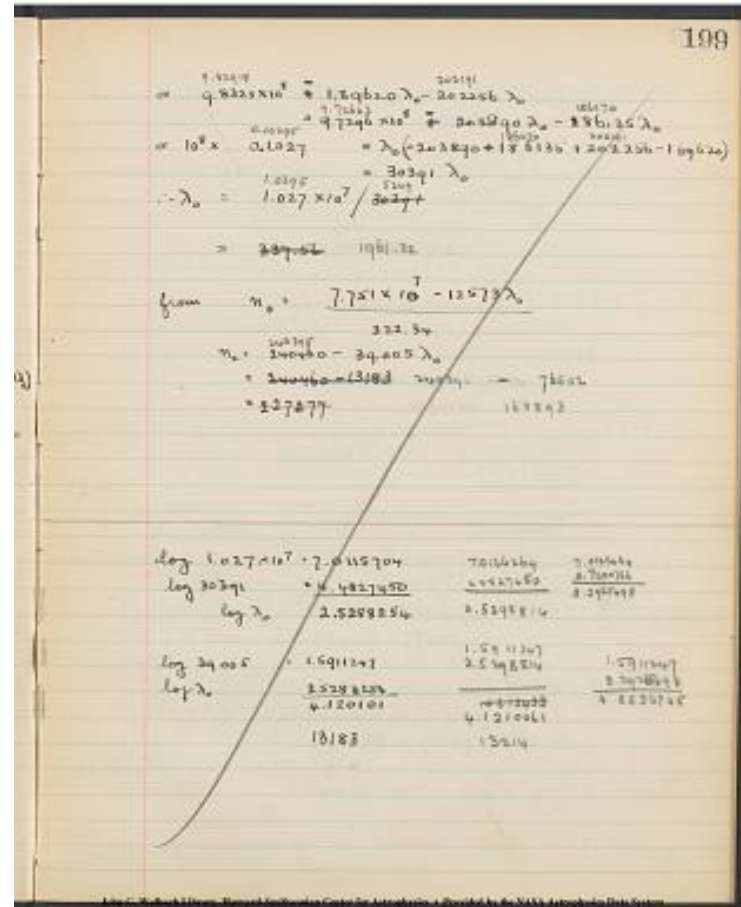
$$= (5227.19 \times 186135^{[186070]}) \pm 39.005 \lambda^{[0]} - (5227.19 \times 39.005) \lambda^{[0]} - 186135 \lambda^{[0]}$$
 [[symbol - horizontal line across entire page]]  
 $\log 38204 = 4.5821088 \quad \log 54325 = 4.7349997$   
 $\log 4861.33 = 6.6867551 \quad \log 5227.19 = 3.7182683$   
 [[/strickethrough]]4[[/strickethrough]] 8.4532680  
 8.2688639  
 [[margin note in pencil]]7.7489 7.8893401  
 $2.5083142 / 5.3809259$  [[margin note in pencil]]  $\log 7.751 \times 10^{[7]} + 7.8893577 \log 12573 = 4.0994390$   
 $\log 332.34 = 2.5083142 / 5.3810435 \quad \log 322.34 = 2.5083142 / 1.5911427$   
 [[margin note in pencil]]240395[[/margin note in pencil]] [[best guess: autilog]] 240460.  
 $\log 4861.33 = 3.6867551 \quad 3.7182683 \log 5227.19 = 3.7182683$   
 [[margin note in pencil]] $\log 202191^{[3.6867551]}$   
 $5.3057621 / 8.9925172$  [[margin note in pencil]]  
 $\log 202256 = 5.3059014 \quad 5.2696764 / 8.9879447 \quad \log 186135 = 5.2698280$   
 $[[\underline{8.9926565}]] [[\underline{8.9880963}]]$   
 $\log 48[?]6.33 = 3.6867551 \quad \log 5227.19 = 3.7182683$   
 $\log 39.005 = 1.5911247 \quad \log 39.005 = 1.5911247$   
 5.2778798 5.3093930



[[/strickethrough - diagonal line across entire page from upper RH to lower LH]]

or  $9.8323 \times 10^{18} \times 10^{[8]} - 1.89620 \lambda^{[0]} - 202256 \lambda^{[202191]} \lambda^{[0]}$   
~~diagonal line through entire page from upper RH to lower LH~~  
 $= 9.7296 \times 10^{[8]} \times 10^{[8]} - 203890 \lambda^{[0]} - 2 \times 10^{[8]} \times 0.1027 \times 10^{[0.10295 = \lambda^{[0]}(-203890 + 186135 \times 10^{[0]} + 202256 \times 10^{[202191]} - 189620)]}$   
 $= 30391 \lambda^{[0]}$   
 or  $10^{[8]} \times 0.1027 \times 10^{[0.10295 = \lambda^{[0]}(-203890 + 186135 \times 10^{[0]} + 202256 \times 10^{[202191]} - 189620)]}$   
 $= 30391 \lambda^{[0]}$   
 [symbol - therefore sign]  $\lambda^{[0]} = 1.027 \times 10^{[7]} / 30391$   
 $= 337.56$   
 from  $n^{[0]} = 7.751 \times 10^{[7]} - 12573 \lambda^{[0]}$   
 $322.34$   
 $n^{[0]} = 240460 - 39.005 \lambda^{[0]}$   
 $= 240460 - 13183 \lambda^{[0]} - 240395 - 76502$   
 $= 227277 - 163893$   
 [symbol - horizontal line across entire page]  
 $\log 1.027 \times 10^{[7]} = 7.0115704$   
 $\log 30391 = 4.4827450$   
 $\log 39.005 = 1.5911247$   
 $\log 240460 = 5.381247$   
 $\log 240395 = 5.381247$   
 $\log 76502 = 4.8836745$   
 $13183$   
 $13214$

~~diagonal line through entire page from upper RH to lower LH~~



Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]]200[[/preprinted]]

$$185722251.32 - 38204 \lambda^{[[0]]} - 4861.33 n^{[[0]]} +$$
$$\lambda^{\overline{0}} n^{\overline{0}}$$
$$= 263211211.59 - 5183.67n^{[[0]]} - 50777\lambda^{[[0]]} +$$
$$\lambda^{\cancel{n}} \lambda^{\cancel{n}}$$

-77.488.  
 $\Delta H_{\text{f}}^\circ =$

$$n^{\wedge}[[0]] =$$
$$\lambda^0 \approx 12533$$

322 34

[[symbol - horizontal line across entire page]]

$$c/4861.33 - \lambda^{[0]} = 38204 - n^{[0]}$$
$$c/5183.67\text{-}\lambda^{[0]} = 50777 - n^{[0]}$$
$$c/5227.19 - \lambda^{[0]} = 54325 - n^{[0]}$$

[[symbol - horizontal line across entire page]]

$$n^{[[0]]} = 240395.1 - 39.005 \lambda^{[[0]]}$$
$$(38204 - 240395.1 + 39.005 \lambda^{[[0]]})(4861.33 - \lambda^{[[0]])}$$
~~350777~~~~3~~240395.1 + 39.005
$$\lambda^{[0]}(5183.67 - \lambda^{[0]})$$

[-202191.1 +  $\sqrt{20005}$ ]

extends into upper row and ends at following minus sign]]39.005  
lambda^([f01])\1861.23 lambda^([f01])

$$= (180618.1 + 30.005 \lambda^{[0]}) / 5183.67 - \lambda^{[0]}$$
$$= (-189618.1 \pm 39.005 \text{ lam})$$
$$= \lambda^{[0]}(-189616.17 + 202189.04)$$
$$\lambda^{[0]} = -\frac{[\text{strickethrough}]^{[?]}}{[\text{symbol - division}]^4}$$

sign]] - (12572.348)

[[/strikethrough - diagonal line through entire page from upper RH to

lower LH]]

200

$$18572257,22 - 38204 \lambda_0 - 4801,22 \pi_0 + 2\lambda_0$$

$$+ 2632112,15 \eta - 9183,67 \pi_0 - 50777 \lambda_0 + 2\pi_0$$

$$-77488960 + \lambda_0 \times 12573 + \mu_0 \times 322.34 = 0$$

$$n_p = \frac{77488960 - \lambda_p \times 12572}{322.34}$$

$$\frac{e}{4861.33 - 20} = 38204 - n$$

$$\frac{c}{5183.67 - \lambda} = 50777 \text{ nm}$$

$\frac{c}{5227.19} \rightarrow 0$  - 54875-no

$$n_0 = 2403957 - 30.005 \lambda$$

$$(38204 - 240095.1 + 89.005 \lambda_0)(4861.93 - \lambda_0) \\ = (10777 - 3403051 + 30.005 \lambda_0)(2783.57 - \lambda_0)$$

$$\begin{pmatrix} -2021941 + 39.005\lambda_0 & (4861.33 - \lambda_0) \\ 51891.81 + 32.005\lambda_0 & (5183.17 - \lambda_1) \end{pmatrix}$$

$$= 962917660 + 982917656$$

$$\lambda = \frac{1}{-4} = \frac{1}{(12571348)}$$

Project PHaEDRA - Cecilia H. Payne #4

Transcribed and Reviewed by Digital Volunteers

Extracted Dec-02-2022 11:28:51

[[preprinted]]201[[/preprinted]]  
 [[/strickethrough - diagonal line through entire page from upper RH to lower LH]]  
 $(38204 - 240395.1 + 39.005\lambda)(4861.33 - \lambda)$   
 $= (5227.19 - \lambda)(54325 - 240395.1 + 39.001\lambda)$   
 $= (-212191.1 + 39.005\lambda)(4861.33 - \lambda)$   
 $= (-186070.1 + 39.005\lambda)(5227.19 - \lambda)$   
 $[[symbol - therefore sign]] - 982917660.163 + 972623.76.019$   
 $= 1427.03693\lambda +$   
 $-10293900. = 1427.03693\lambda$   
 $[[/strickethrough]] + [[/strickethrough]] -$   
 $16121.0[[/strickethrough]] \cdot 0\lambda$   
 $- \lambda \times 17548. = 14694 = -$   
 $10293900.$   
 $\lambda =$   
 $[[/strickethrough]] [[/strickethrough]] 70.054[[/strickethrough]] 14693[[/strickethrough]] +$   
 $-2732.4$   
 $n^{\lambda} = 240395.1 * [[/strickethrough]] 2288.08[[/strickethrough]]$   
 $=$   
 $[[/strickethrough]] 2738104.0[[/strickethrough]] [[/strickethrough]] 243683.2[[/strickethrough]]$   
 $[[/strickethrough]] 238107[[/strickethrough]] [[/strickethrough]] 238107[[/strickethrough]]$   
 $[[/strickethrough]] 2436832[[/strickethrough]] [[/strickethrough]] 4919.99[[/strickethrough]]$   
 $C = (38204 - 240395.1) - 243683(4861.33 + 58.66) =$   
 $1010954625$   
 $C = 186886. \times 511[[/strickethrough]] 3.62 + 955663$   
 $= 183338. \times 5157.14$   
 [[/strickethrough - diagonal line through entire page from upper RH to lower LH]]

201

$$(38204 - 240395.1 + 39.005\lambda)(4861.33 - \lambda)$$

$$= (5227.19 - \lambda)(54325 - 240395.1 + 39.001\lambda)$$

$$= (-212191.1 + 39.005\lambda)(4861.33 - \lambda)$$

$$= (-186070.1 + 39.005\lambda)(5227.19 - \lambda)$$

$$- 982917660.163 + 972623.76.019$$

$$= 1427.03693\lambda +$$

$$-10293900. = 1427.03693\lambda$$

$$- \lambda \times 17548. = 14694 = -$$

$$10293900.$$

$$\lambda =$$

$$[[/strickethrough]] [[/strickethrough]] 70.054[[/strickethrough]] 14693[[/strickethrough]] +$$

$$-2732.4$$

$$n_0 = 240395.1 * 2288.08 = 237668$$

$$= 2738104.0$$

$$= 243683.2$$

$$= 238107$$

$$= 238107$$

$$= 2436832$$

$$= 4919.99$$

$$C = (38204 - 240395.1) - 243683(4861.33 + 58.66) = 1010954625$$

$$= (50777 - 243683)(5227.19 + 58.66) = 10112769$$

$$= (54325 - 240395.1)(5227.19 - 58.66) = 10009179$$

$$C = 199459 \times 4791.27 = 955661$$

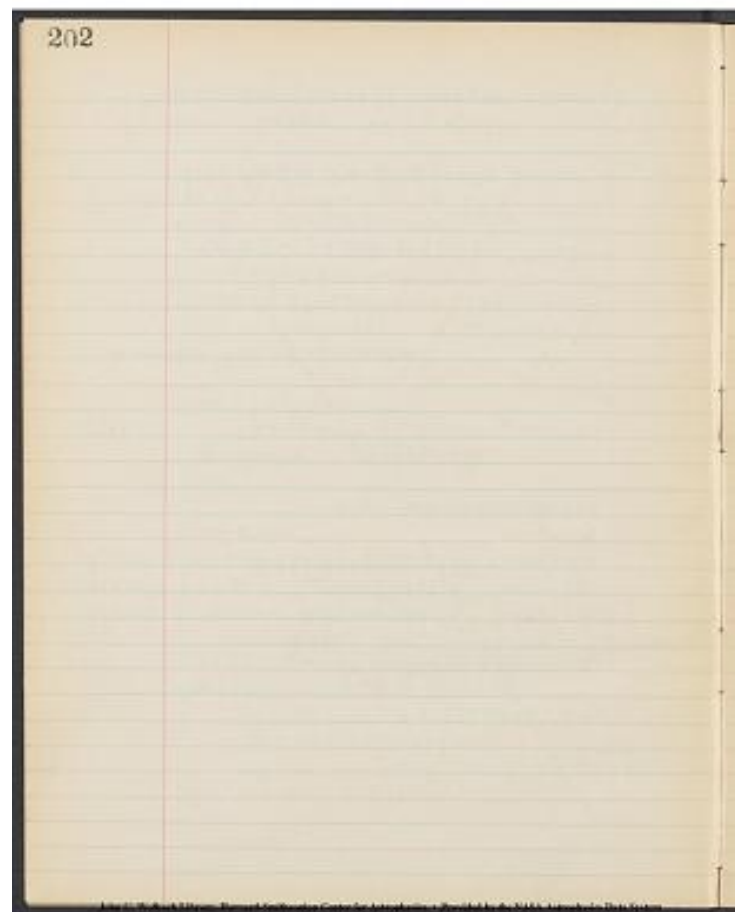
$$= 186886 \times 5157.14 = 955663$$

$$= 183338 \times 5157.14$$

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51

[[preprinted]] 202 [[/preprinted]]

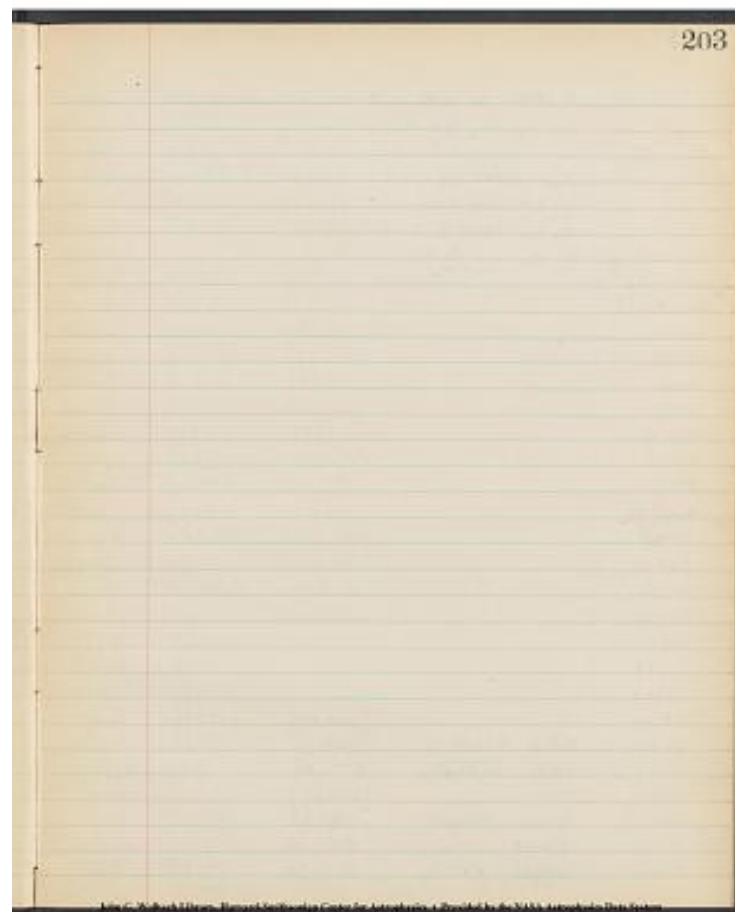
[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 203 [[/preprinted]]

[[no entries]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[preprinted]]204[[/preprinted]]

Sigma CMa x 1015. Third line misidentified  
 $\lambda = \lambda_0 + C/n - n^{[0]}$

$\lambda^{[0]} = 5562.49$

$C = -1.036 \times 10^{[7]}$

$n^{[0]} = 23415.8$

$n$  (reading of measuring machine) |  $n - n^{[0]}$  |  $C/n - n^{[0]}$  |  $\lambda$

31151

31588

31792

31890

32318

33106

33233

34489

35145

35835

36120

36346

36802

37715

37963

38204 [4861.33]

49739 26323 -393<sup>^</sup>[.]5.72 5168.92

49977 26561 ~~[[strikethrough]]~~-480.49~~[[/strikethrough]]~~-390.04 5172.45

50777 [5183.67]

50949 27535 -376.27 5186.82

51104 27688 -374.17 5188.33

51326 27910 -371.19 5191.30

204			
Sigma CMa x 1015. Third line misidentified			
$\lambda = \lambda_0 + \frac{C}{n - n_0}$			
$\lambda_0 = 5562.49$			
$C = -1.036 \times 10^7$			
$n_0 = 23415.8$			
$n$ (reading of measuring machine)	$n - n_0$	$\frac{C}{n - n_0}$	$\lambda$
31151			
31588			
31792			
31890			
32318			
33106			
33233			
34489			
35145			
35835			
36120			
36346			
36802			
37715			
37963			
38204			
49739			
49977			
50777			
50949			
51104			
51326			
49739	26323	-393.572	5168.92
49977	26561	<del>-480.49</del>	5172.45
50777			[5183.67]
50949	27535	-376.27	5186.82
51104	27688	-374.17	5188.33
51326	27910	-371.19	5191.30

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[preprinted]] 205 [[/preprinted]]

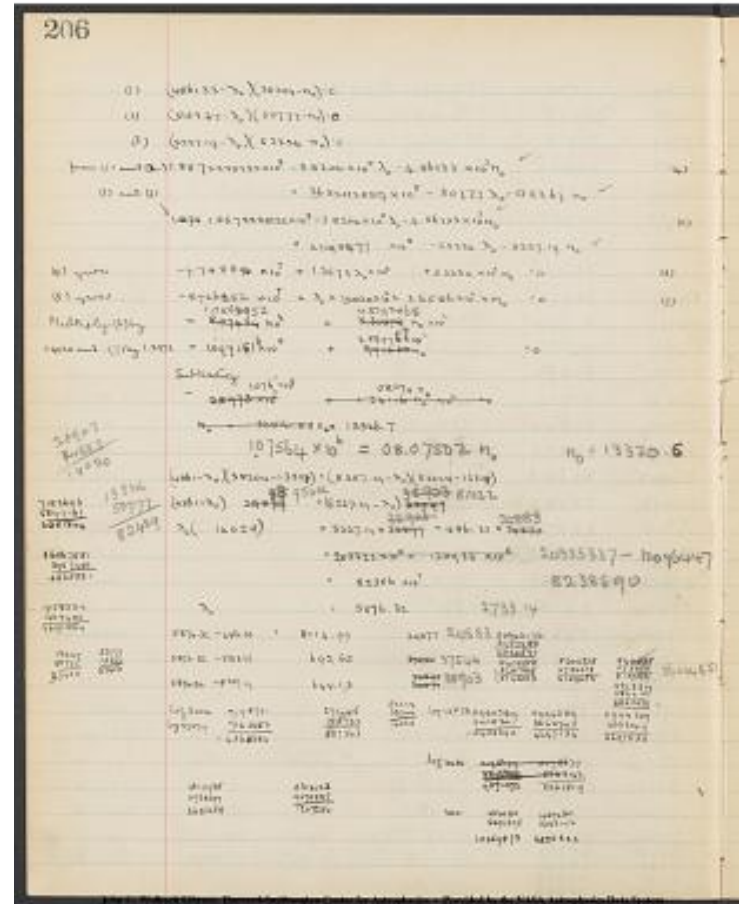
52224	28808	-359.62	5202.87
52481	29065	-356.44	5206.05
52729	29313	-353.42	5209.07
53451	30035	-344.93	5217.56
53649	30234	-342.66	5219.83
53923	30507	-339.59	5222.90
54235		[5227.19]	
54515	31100	-332.47	5230.02
54657	31242	-331.65	
54779	31364	-330.31	
54918	31503	-328.85	
55051	31636	-327.47	
55151	31736	-326.44	
55284	31869	-325.08	
55592	32177	-321.96	
55803	32388	-319.87	
55993	32588	-318.69	
56318	32903	-314.86	
56926	33511	-309.15	
57001	33586	-308.46	
57534	34119	-303.64	
57706	34291		
57926	34511		
58923	35508		
59241	35826		
59587	36172		
59726	36311		
60062	36647		
60427	37012		
60566	37151		
60651	37236		
60981	37566		
61510	38085		
?	61903	38488	-269.19 [? - possibly .17]   5293.32

205			
52224	28808	-359.62	5202.87
52481	29065	-356.44	5206.05
52729	29313	-353.42	5209.07
53451	30035	-344.93	5217.56
53649	30234	-342.66	5219.83
53923	30507	-339.59	5222.90
54235		[5227.19]	
54515	31100	-332.47	5230.02
54657	31242	-331.65	
54779	31364	-330.31	
54918	31503	-328.85	
55051	31636	-327.47	
55151	31736	-326.44	
55284	31869	-325.08	
55592	32177	-321.96	
55803	32388	-319.87	
55993	32588	-318.69	
56318	32903	-314.86	
56926	33511	-309.15	
57001	33586	-308.46	
57534	34119	-303.64	
57706	34291		
57926	34511		
58923	35508		
59241	35826		
59587	36172		
59726	36311		
60062	36647		
60427	37012		
60566	37151		
60651	37236		
60981	37566		
61510	38085		
?	61903	38488	-269.19 [? - possibly .17]   5293.32

Project PHaEDRA - Cecilia H. Payne #4  
 Transcribed and Reviewed by Digital Volunteers  
 Extracted Dec-02-2022 11:28:51



[[preprinted]] 206 [[/preprinted]]  
 (1) |  $(4861.33 - \lambda^{[0]})(38204 - n^{[0]}) = C$   
 (2) |  $(5183.67 - \lambda^{[0]})(50777 - n^{[0]}) = [?]$   
 (3) |  $(5227.19 - \lambda^{[0]})(52224 - n^{[0]}) = C$   
 from (1) and (2) |  $1.8572225132 \times 10^{[8]} - 3.8204 \times 10^{[4]} \lambda^{[0]}$   
 $- 4.86133 \times 10^{[3]} n^{[0]} \quad [symbol - check mark]$  (4)  
 from (1) and (3)  $[symbol - arrow pointing to the left and to the next row]$   
 $= 2.6321121159 \times 10^{[8]} - 50777 \lambda^{[0]} - 5783.67 n^{[0]}$   
 $[symbol - check mark]$   
 $[symbol - check mark]$   $1.875 [symbol - check mark]$   $1.8572225132 \times 10^{[8]} - 3.8204$   
 $\times 10^{[4]} \lambda^{[0]} - 4.86133 \times 10^{[3]} n^{[0]} \quad [symbol - check mark]$   
 (5)  
 $= 2.7298 [symbol - check mark]$   $5 [symbol - check mark]$   $477 \times 10^{[8]} - 52224$   
 $\lambda^{[0]} - 5227.19 n^{[0]} \quad [symbol - check mark]$   
 (4)  $[?]$  |  $-7.748896 \times 10^{[7]} + 1.2573 \lambda^{[0]} \times 10^{[4]} + 3.2234$   
 $\times 10^{[2]} n^{[0]} = 0$  (6)  
 (5) gives |  $-8.726252 \times 10^{[7]} + [?] \times 1.4020 \times 10^{[4]} + 3.6586 \times 10^{[2]}$   
 $\times n^{[0]} = 0$  (7)  
 Multiplu (6) by |  $[symbol - check mark]$   $8.07434 [symbol - check mark]$   $10863952 \times$   
 $10 [symbol - check mark]$   $[symbol - check mark]$   $[symbol - check mark]$   $3.35878$   
 $[symbol - check mark]$   $3.35878 [symbol - check mark]$   $4.5192068 [symbol]$   $\times 10^{[2]}$   
 $1.4020$  and (7) by  $1.2573$  |  $-1.0971516 \times 10^{[8]} + [symbol - check mark]$   
 $2.91550 [symbol - check mark]$   $4.599957 \times 10^{[2]} = 0$   
 Subtracting  
 $- [symbol - check mark]$   $2.8973 \times 10^{[7]} [symbol - check mark]$   $1.076 \times 10^{[6]}$   
 $[symbol - check mark]$   $+ 1.24116 [symbol]$   $\times 10^{[2]} = 0 [symbol - check mark]$   
 $08.074 [symbol]$   
 $[symbol - check mark]$   $[symbol] = 36816.58 [symbol - check mark]$   $[symbol] =$   
 $13326.7$   
 $[left margin]$   
 $38903$   
 $24883$   
 $[line]$   
 $14020$   
 $[/left margin]$   
 $107564 \times 10^{[6]} = 08.07502 [symbol]$   $[symbol] = 13320.6$   
 $(4861 - [symbol]) (38204 - 13321) = (5227.19 - [symbol]) (52224 -$   
 $13321)$   
 $[left margin]$   
 $7282683 \quad 133206$   
 $5899161 \quad 50777$   
 $[line]$   $[line]$   
 $3081844 \quad 82429$   
 $[/left margin]$   
 $(4861 - [symbol]) [symbol - check mark]$   $24877 \quad 83 [symbol - check mark]$   $95002 =$   
 $(5227.19 - [symbol]) [symbol - check mark]$   $38897 \quad 38903 [symbol - check mark]$   
 $81022$   
 $[symbol] (14020) = 5227.19 \times [symbol - check mark]$   $38897 \quad 38903$   
 $[symbol - check mark]$   $- 4861.33 \times [symbol - check mark]$   $24877 \quad 24883$   
 $[symbol - check mark]$   
 $[left margin]$   
 $3.6867551$   
 $3957980$   
 $[line]$   
 $.0825531$   
 $[/left margin]$   
 $= [symbol - check mark]$   $203322 \times 10^{[8]} - 120936 \times 10^{[8]} \quad 20335337 -$   
 $12096447$   
 $= 8.2386 \times 10^{[7]} \quad 8238890$   
 $[symbol] = 5876.32 [underlined]$   $2733.14 [underlined]$



[[left margin]]  
 9158534  
 1467480  
 [[line]]  
 7691054  
 [[/left margin]]  
 5876.32 - 4861.33 = 1014.99 24877 24883  
 00646176  
 3957980  
 [[line]]  
 4022597  
 [[line]]  
 [[left margin]]  
 13327 50777  
 50777 13327  
 [[line]] [[line]]  
 37450 37450  
 [[/left margin]]  
 5876.32 - 5183.67 692.65 ~~37450~~ ~~37450~~  
 37544  
~~8405138~~  
 8405138  
 3741065  
 [[line]]  
 2146203  
~~4139656~~  
  
 840838  
 5734518  
 [[line]]  
 4139656  
  
 8405138  
 5734518  
 [[line]] 26004851  
 4139656  
  
 5876.32 - 5227.19 649.13 ~~38897~~ 24877  
~~38903~~  
 log 52224 1718701 272~~85~~ 52224 log 12573 = 0994389 0994389  
 0994389  
 log 522719 7182683 185722 38204 9408301 3652745 5633149  
 [[line]] [[line]] [[line]] [[line]] [[line]] [[line]]  
 1.4361384 087263 14020 1.0402690 4647134 6627538  
 log 10420 ~~0178677~~ 0178677 0178677  
 888892395 5083143 ~~0178677~~  
 9071072 5261819  
 4619935 0318123  
 0938277 9070887  
 [[line]]  
 3681658 1247236  
 1402 1467480 1467480  
 8892395 5083142  
 1.0359875 6530622  
  
 [[preprinted]]  
 John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics  
 - Provided by the NASA Astrophysics Data system  
 [[/preprinted]]

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

207

133206	133206
38204	52224
-----	-----
95002	81022

$4.5 \times 10^8$   $4.2 \times 10^8$

$4.618360 \times 10^8$   
 $4.2357738 \times 10^8$

~~4861.33 383187~~

4861.33 | 5783.67 | 5227.19  
2733.14 | 2733.14 | 2733.14  
2128.19 | 2450.53 | 2494.05  
95002 | 82429 | 81022  
20218 | 20199 | 202072  
| 20211 for .5 angstrom difference  
 $n_0 = 133206$   
 $\lambda_0 = 2733.14$   
 $c = -2.02 \times 10^8$

207

133206	133206
38204	52224
-----	-----
95002	81022

$4.5 \times 10^8$   $4.2 \times 10^8$

$4.618360 \times 10^8$   
 $4.2357738 \times 10^8$   
-----  
 $383187$

~~4861.33 383187~~

4861.33	5783.67	5227.19
<u>2733.14</u>	<u>2733.14</u>	<u>2733.14</u>
2128.19	2450.53	2494.05
95002	82429	81022

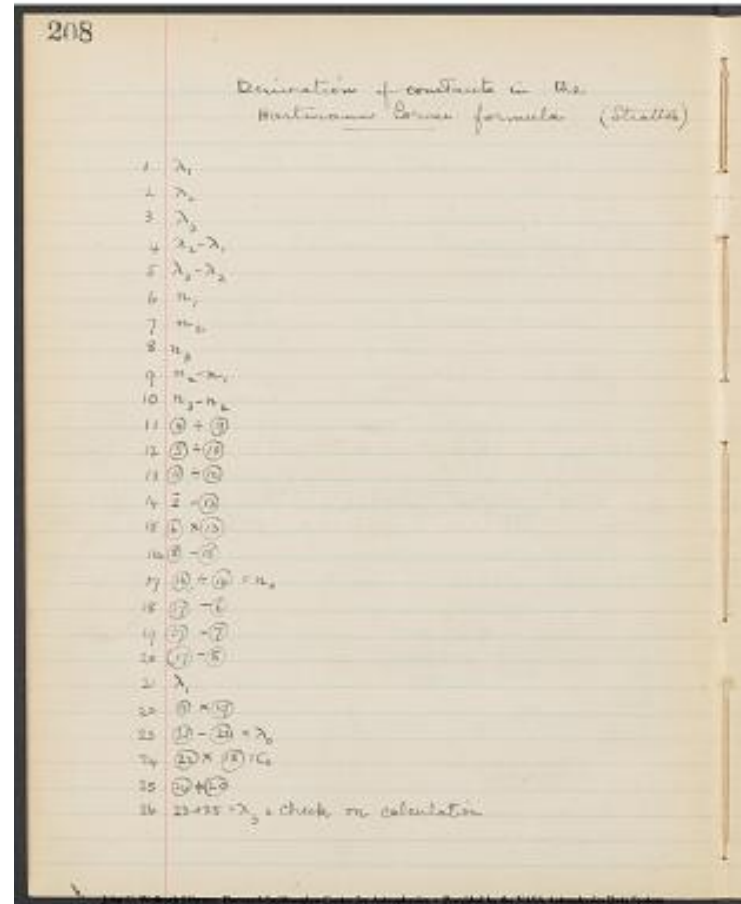
20218 20199 202072  
-----  
20211 for .5 A difference

$n_0 = 133206$   
 $\lambda_0 = 2733.14$   
 $c = -2.02 \times 10^8$

Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

Derivation of constants in the Hartmann Cornu formula (Stratton) [[end of Hartmann and beginning of Cornu seems to have an underline]]

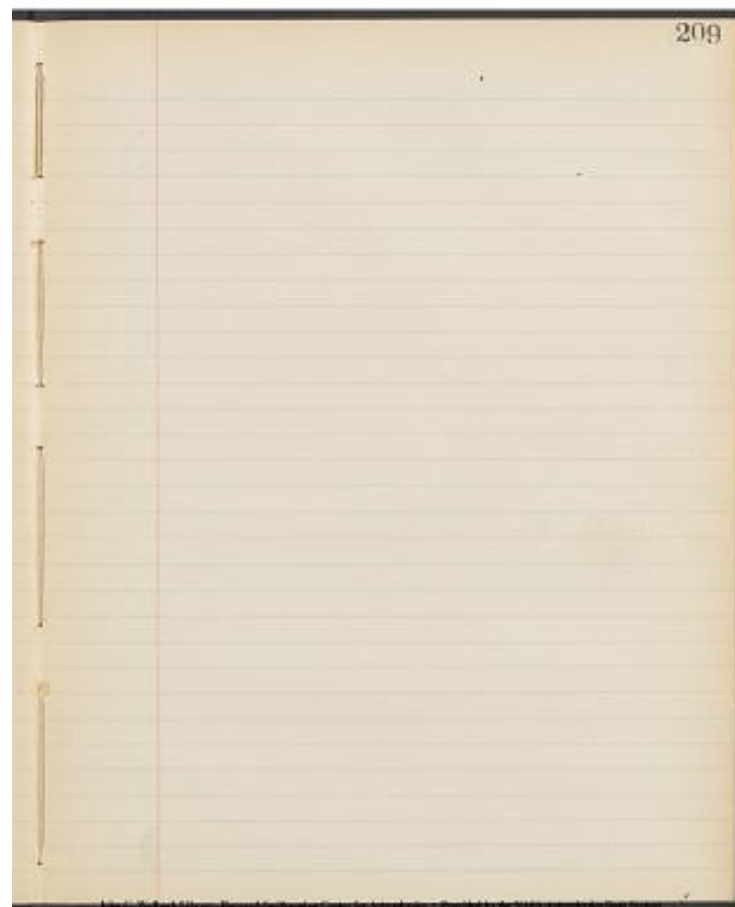
- 1 |  $\lambda$   $[[subscript]] 1 [[/subscript]]$
- 2 |  $\lambda$   $[[subscript]] 2 [[/subscript]]$
- 3 |  $\lambda$   $[[subscript]] 3 [[/subscript]]$
- 4 |  $\lambda$   $[[subscript]] 2 [[/subscript]] - \lambda$   $[[subscript]] 1 [[/subscript]]$
- 5 |  $\lambda$   $[[subscript]] 3 [[/subscript]] - \lambda$   $[[subscript]] 2 [[/subscript]]$
- 6 |  $n$   $[[subscript]] 1 [[/subscript]]$
- 7 |  $n$   $[[subscript]] 2 [[/subscript]]$
- 8 |  $n$   $[[subscript]] 3 [[/subscript]]$
- 9 |  $n$   $[[subscript]] 2 [[/subscript]] - n$   $[[subscript]] 1 [[/subscript]]$
- 10 |  $n$   $[[subscript]] 3 [[/subscript]] - n$   $[[subscript]] 2 [[/subscript]]$
- 11 |  $[[circled]] 4 [[/circled]] [[symbol-division]] [[circled]] 9 [[/circled]]$
- 12 |  $[[circled]] 5 [[/circled]] [[symbol-division]] [[circled]] 10 [[/circled]]$
- 13 |  $[[circled]] 11 [[/circled]] [[symbol-division]] [[circled]] 12 [[/circled]]$
- 14 |  $1 [[symbol-bar]] [[symbol-subtraction]] [[circled]] 13 [[/circled]]$
- 15 |  $[[circled]] 6 [[/circled]] [[symbol-multiplication]] [[circled]] 13 [[/circled]]$
- 16 |  $[[circled]] 8 [[/circled]] [[symbol-subtraction]] [[circled]] 15 [[/circled]]$
- 17 |  $[[circled]] 16 [[/circled]] [[symbol-division]] [[circled]] 14 [[/circled]] =$
- 18 |  $n$   $[[subscript]] 0 [[/subscript]]$
- 19 |  $[[circled]] 17 [[/circled]] [[symbol-subtraction]] [[circled]] 6 [[/circled]]$
- 20 |  $[[circled]] 17 [[/circled]] [[symbol-subtraction]] [[circled]] 7 [[/circled]]$
- 21 |  $\lambda$   $[[subscript]] 1 [[/subscript]]$
- 22 |  $[[circled]] 11 [[/circled]] [[symbol-multiplication]] [[circled]] 19 [[/circled]]$
- 23 |  $[[circled]] 21 [[/circled]] [[symbol-subtraction]] [[circled]] 22 [[/circled]]$
- 24 |  $[[circled]] 22 [[/circled]] [[symbol-multiplication]] [[circled]] 18 [[/circled]]$
- 25 |  $[[circled]] 24 [[/circled]] [[symbol-division]] [[circled]] 20 [[/circled]]$
- 26 |  $23 + 25 = \lambda$   $[[subscript]] 3 [[/subscript]] =$  check on calculation



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

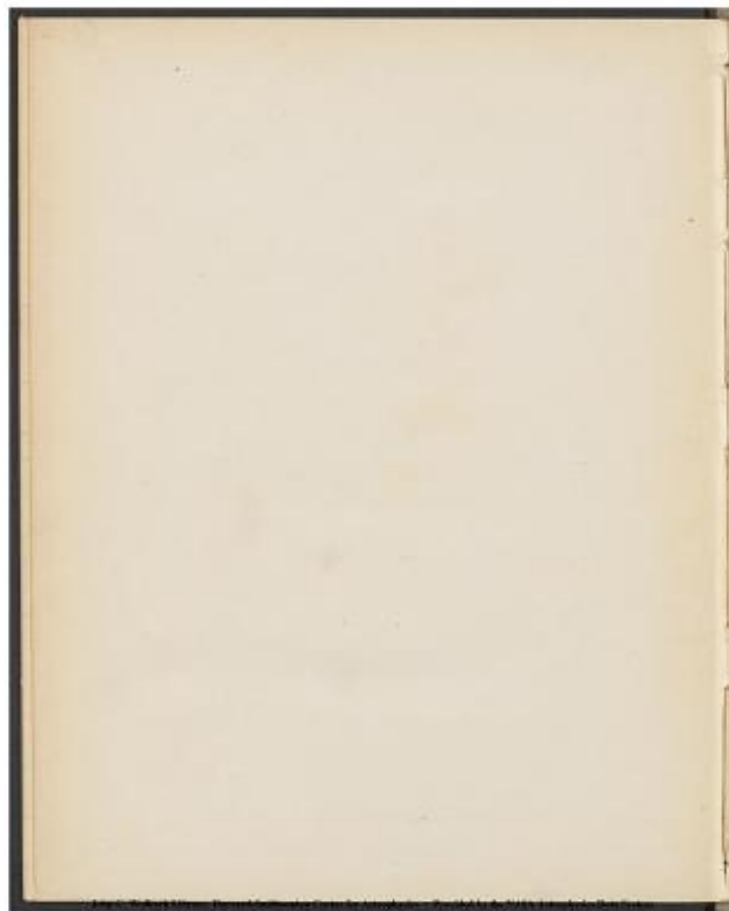
[[preprinted]] 209 [[/preprinted]]

[[no entries]]



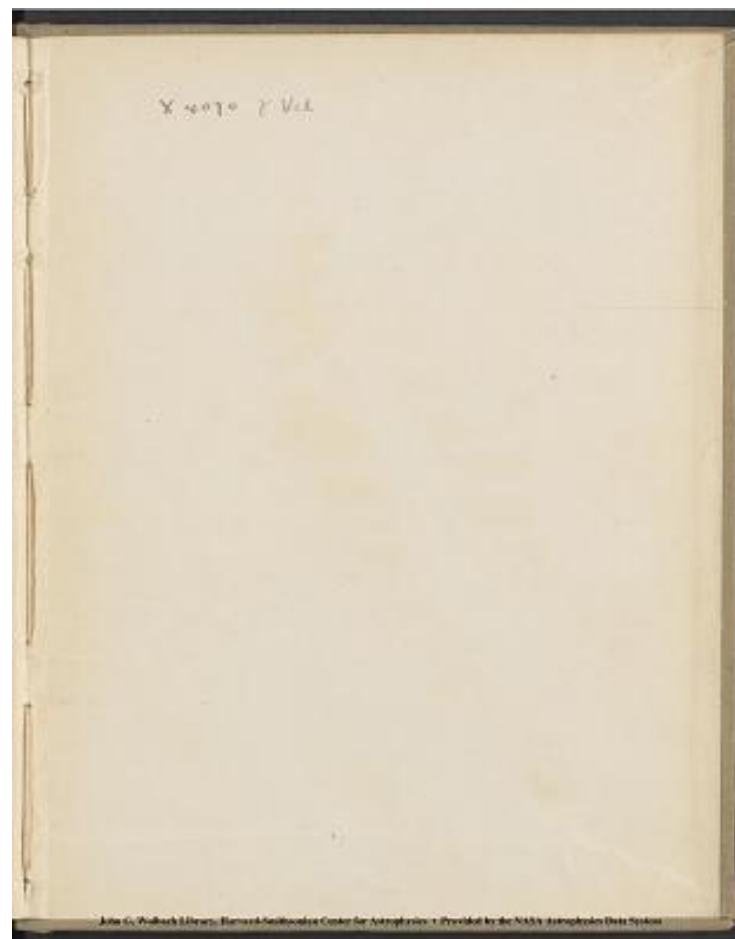
Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

[[blank page]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51

X 4010 gamma Vel

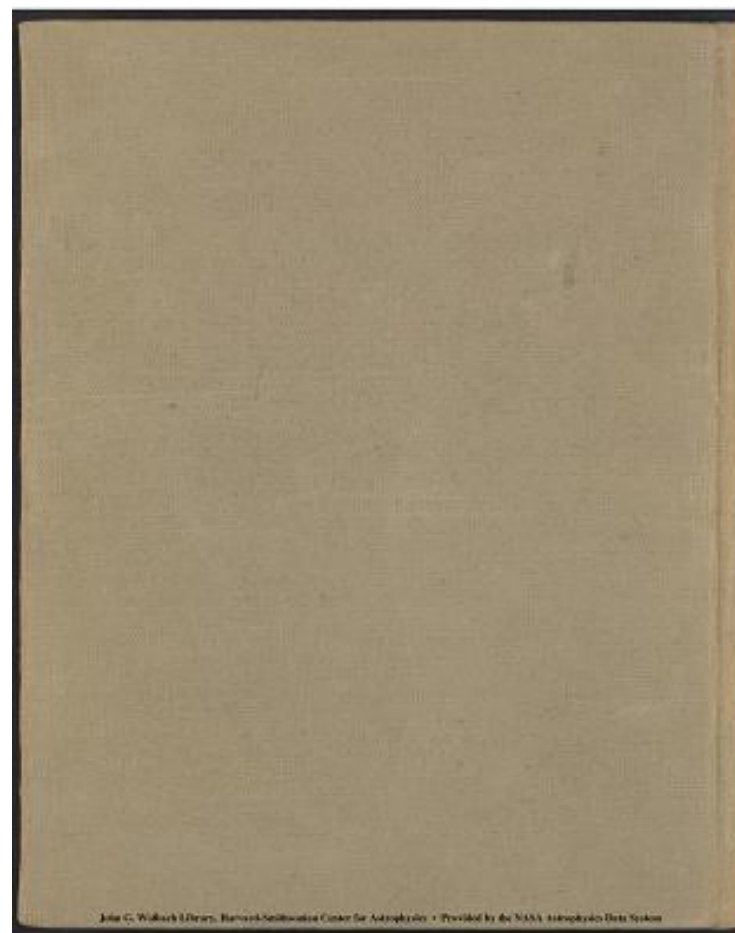


Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



[[back cover]]

[[blank]]



Project PHaEDRA - Cecilia H. Payne #4  
Transcribed and Reviewed by Digital Volunteers  
Extracted Dec-02-2022 11:28:51



## Smithsonian Institution

*Harvard-Smithsonian Center for Astrophysics*

The mission of the Smithsonian is the increase and diffusion of knowledge - shaping the future by preserving our heritage, discovering new knowledge, and sharing our resources with the world. Founded in 1846, the Smithsonian is the world's largest museum and research complex, consisting of 19 museums and galleries, the National Zoological Park, and nine research facilities. Become an active part of our mission through the Transcription Center. Together, we are discovering secrets hidden deep inside our collections that illuminate our history and our world.

Join us!

The Transcription Center: <https://transcription.si.edu>

On Facebook: <https://www.facebook.com/SmithsonianTranscriptionCenter>

On Twitter: [@TranscribeSI](https://twitter.com/TranscribeSI)

Connect with the Smithsonian

Smithsonian Institution: [www.si.edu](http://www.si.edu)

On Facebook: <https://www.facebook.com/Smithsonian>

On Twitter: [@smithsonian](https://twitter.com/smithsonian)