

S.I.B.

(Photometry)

Variable Stars

R. P. Sequences to

m 3

to

(Paper print

Provisional work
rejected)

NGC

6656

(M22)

A. I. B

Observations.

Some preliminary experimental settings
for practice with Runford Chalouche
in 1902.

Cambridge Jan'y 20 - 1902

1

Star X

H. a.
4.30

20.2 - 1.3

20.6 - 0.7

20.4 - 1.1

20.9 - 0.6

33.5

21.0 - 0.5

20.7 - 0.8

21.0 - 0.5

21.4 - 0.1

22.5 + 1.0

36.1

22.9 + 1.4

22.0 + 0.5

20.6 - 0.9

22.6 + 1.1

20.0 - 1.5

38.6

21.9 + 0.4

21.9 + 0.4

20.8 - 0.7

22.7 + 1.2

22.8 + 1.3

41.6

22.2 + 0.7

29.3

21.46

± 0.8

H. a.

17

W.

*-7.5

Low in S.W.

Rumford Photometer

night very hazy.
moon nearly full.

Star *y*Cambridge
Jan'y 20 - 19024^h a.
46.0

6.8 + 3.0

6.3 + 2.5

7.1 + 3.3

6.0 + 2.2

2.4 - 1.4

3.9 + 0.1

0.8 - 3.0

6.0 + 2.2

10.2 + 6.5

3.2 - 0.6

0.0 - 3.8

1.3 - 2.5

0.0 - 3.8

0.0 - 3.8

4.3 + 0.5

4.2 + 0.4

5.6 + 1.8

1.1 - 2.7

7.4 + 3.6

0.0 - 3.8

76.7	51.5
3.84	± 2.58

4^h a.
2: 7 w. - 11.5°Star about as bright
as artificial star
when at brightest.star probably too bright
for accurate comp.

48.8

51.7

55.2

Star Z.

Cambridge
Jan'y 20. 1902Star
faint in moonlight
haze.5^h 00.00

5.0

6.4

11.6

32.7	+ 3.5
31.4	+ 2.2
30.5	+ 1.3
27.8	- 1.4
29.0	- 0.2
30.5	+ 1.3
28.6	- 0.6
28.5	- 0.7
27.0	- 2.2
28.0	- 1.2
27.2	- 2.0
27.4	- 1.8
27.4	- 1.8
31.1	+ 1.9
27.8	- 1.4
31.0	+ 1.8
26.1	- 3.1
29.0	- 0.2
30.1	+ 0.9
32.1	+ 2.9
583.2	32.4
29.16	± 1.62

Monday Jan 27 1902

U. Cephei

The comparison star
used was the one marked
c on chart.

7^h 37

60

22.4

20.2

21.0

21.1

168.3

20.8

21.0

21.2

20.4

21.2

2^a 39.5

7 42.5

60

15.7

16.1

16.1

16.0

129.7

16.8

16.2

44.8

16.0

16.8

45.6

16.2

7^a 48.7

60

19.8

21.0

21.0

163.2

50.4

20.7

20.4

20.4

20.1

20.2

20.0

Monday Jan 27 1902

Al.

7^h 56.9

17.6

17.7

16.9

17.8

143.2

58.9

17.9

17.9

18.8

18.3

8^h 00.5

18.2

B.

8^h 03.7

23.8

22.2

22.1

21.9

176.6

06.4

21.4

22.1

20.8

22.2

08.0

22.2

Al.

09.5

18.3

20.2

20.0

19.7

157.8

11.0

18.7

19.7

20.4

19.7

20.8

Monday Jan 27 1902

6.

8^h. 27.8

22.0

22.0

22.8

22.8

178.4

30.4

22.8

22.3

21.7

22.0

31.6

22.3

It.

33.0

22.8

24.0

22.0

183.2

22.0

22.9

35.2

22.2

23.8

23.0

36.6

23.4

6

38.3

22.0

22.3

21.8

175.9

22.7

22.0

40.6

22.2

21.1

21.0

41.8

22.8

Monday Jan 27 1902

8h. 44.0

Al.

24.1

22.7

24.0

25.9

194.5

46.5

23.4

24.3

24.4

25.8

48.5

24.2

B.

50.2

24.2

23.2

25.0

26.1

198.4

52.4

24.7

24.8

24.0

24.8

53.7

26.4

Al.

56.6

27.0

27.0

26.0

25.0

207.7

58.8

27.4

26.0

25.8

25.0

9h. 00.4

25.0

Variable Stars
Sequences etc.

D.I.B.

W.L.C. 7078. (m 15).
 Estimate of grades of sequence stars -
Cambridge. April 12, 1910.

X 8869.

$a_2 b_3 c_0 d_2 e_0 f_0 g_2 h_2 k_2 l_4 m_2 n_3 o_3$
 $p_3 q.$

X 8781

$a_4 b_3 c_1 d_{\frac{1}{2}} e_1 f_{\frac{1}{2}} g_2 h_2 k_1 l_2 m_1 n_3 o_3 p_3 q.$

N.S.C. 6656. (m. 22).
 Estimate of grade of frequency stars.
April 13, 1910.

(1) Σ 8919.
 $a_0 b_3 c_4 d_1 e_2 f_3 g_3 h_2 k_3 l_3 m_2 n_2 o_2 p_1 q_2$
 $r_3 s (3 t_3 u)$ $t \text{ \& } u \text{ are added at this time.}$

(2) Σ 10869.
 $a_0 b_3 c_3 d_2 e_2 f_3 g_3 h_2 k_2 l_3 m_2 n_1 o_2$
 $p_0 q_2 r_2 s (2 t_3 u)$.

(3) Copy of obs. by miss Ireland.
 Σ 8919

$a_4 b_6 c_4 d_2 e_5 f_4 g_5 h_3 k_2 l_3 m_4 n_2 o_3 p_1$
 $q_3 r_1 s_3 t_2 u$.

(4) Σ 10869
 $a_3 b_4 c_5 d_1 e_3 f_4 g_3 h_3 k_3 l_2 m_3 n_1 o_3 p_2$
 $q_2 r_2 s_1 t_2 u$.

	(1)	(2)	(3)	(4)	Mean	Residual		(1)	(2)	(3)	(4)	Mean	
a	0	0	0	0	0.0	-	o	2	1	2	1	1.5	0 1 0 1
b	0	0	4	3	1.8	2 2 2 1	p	2	2	3	3	2.5	0 0 1 1
c	3	3	6	4	4.0	1 1 2 0	q	1	0	1	2	1.0	0 1 0 1
d	4	3	4	5	4.0	0 1 0 1	r	2	2	3	2	2.2	0 0 1 0
e	1	2	2	1	1.5	1 0 0 1	s	3	2	1	2	2.0	1 0 1 0
f	2	2	5	3	3.0	1 1 2 0	t	3	2	3	1	2.2	1 0 1 1
g	3	3	4	4	3.5	1 1 0 0	u	3	3	2	2	2.5	1 1 0 0
h	3	3	5	3	3.5	1 1 1 1							
k	2	2	3	3	2.5	0 0 1 1							
l	3	2	2	3	2.5	1 0 0 1							
m	3	3	3	2	2.8	0 0 0 1							
n	2	2	4	3	2.8	1 1 1 0							

(over)

WGL 6656 -

var. pr. frequency

means grades - sums. grades

a	0.0	0.0
b	1.8	1.8
c	4.0	5.8
d	4.0	9.8
e	1.5-	11.3
f	3.0	14.3
g	3.5-	17.8
h	3.5-	21.3
k	2.5-	23.8
l	2.5-	26.3 ³
m	2.8	29.1
n	2.8	31.9
o	1.5-	33.4
p	2.5-	35.9
q	1.0	36.9
r	2.2	39.1
s	2.0	41.1
t	2.2	43.3
u	2.5-	45.8

next page
 1. D. was cont.
 from S-T. ul. was
 frequency of 6656.
 Combed by 1/2 & 1/4.

west 6656 -

Fifty (50) X plates for regular study.

X	Date.	S.T.	J.D.	Exp.	Qual.	X	Date.	S.T.	J.D.	Exp.	Qual.
6793	95 6 27 15 40	3372	620	585	100	4	10584	02 7 2	16 45	5933	60
6800	95 6 28 15 39	3373	613	582	90	4	10823	04 6 6	15 28	6638	60
6855	95 7 9 16 00	3384	97	566	90	5	10828	" "	7 15	06 6639	60
6891	" " 17 16 4	3392	80	548	91	4	10838	" "	9 14	26 6641	60
6975	" 8 5 19 20	3411	48	631	50	4	10839	" "	" 15	40 " 6035	60
7026	" " 14 16 55	3420	30	506	70	4	10858	" "	13 14	35 6645	60
7141	" 9 16 19 32	3453	46	525	60	4	10859	" "	" 16	00 " 58	60
7161	" " 19 19 49	3456	64	528	103	5	10864	" "	14 15	00 6646	60
7662	96 7 7 16 50	3748	34	605	85	4	10865	" "	" 16	45 " 87	60
7791	" 8 3 19 15	3775	54	631	60	5	10867	" "	" 21	32 " 87	63
7995	" 9 18 19 55	3821	77	533	60	5	10870	" "	15 16	00 6647	60
8644	97 6 7 16 05	4083	59	636	60	4	10878	" "	16 14	31 6648	60
8663	" " 10 15 46	4086	51	634	71	4	10888	" "	10 6	20 206760	60
8904	" 10 11 20 32	4209	19	497	63	4	10891	" "	7 20	09 6761	60
8919	" " 14 20 30	4212	50	487	60	5	10892	" "	" 21	15 " 56	60
9611	99 6 10 14 50	4816	68	597	61	3	10894	" "	11 21	04 6765	60
9612	" " " 16 50	"	70	680	60	4	10895	" "	" 12	20 206766	60
9613	" " " 18 29	"	70	749	60	4	10896	" "	" 21	24 " 53	60
9614	" " " 20 00	"	33	812	60	4	10935	05 4 1	16 05	6937	60
9621	" " 12 14 50	4818	63	591	61	3	10984	" "	6 28	16 357025	60
9623	" " " 16 48	"	61	744	60	5	11357	06 8 20	19 47	7443	60
9983	" 9 14 18 50	4912	22	501	60	5	11795	07 8 27	20 25	7815	60
10047	" 10 16 20 55	4944	20	499	60	5	12129	08 8 4	19 33	8158	60
10575	02 6 30 17 00	5931	56	634	63	5	12159	" "	" 6	19 27 8181	60
10579	" 7 11 16 47	5932	45	623	65	5	12168	" "	" 31	20 53 8185	60

(4914 93 7 11 16 43 26 56. 593 60 3

not corrected for Exp. 4 light

Net 6656.
Var. no. 14.

X 8919 Var. 27
 4914 " < 37
 8904 " 26
 10878 " 46
 10870 " 48 =
 10867⁵ < 43
 10864 < 46
 10859 < 45
 12168 18
 12159 18
 12129 17
 11795 32
 11357 < 43
 8663 < 46
 8644 < 41
 7995 33 +
 7791 18
 7662 26
 7161 < 39
 7141 < 28
 7026 33
 6975 26
 6891 21
 6855 19
 6800 17

X 6793. Var. 17
 9623 36 =
 9621 < 33
 9614 < 32
 9613 < 39
 9612 37 +
 9611 < 33
 10984 < 35
 10935 < 33
 10896 18
 10895 19
 10894 19
 10892 21
 10891 19
 (10889 18)
 10888 19
 10858 < 40
 10839 < 40
 10838 < 41
 10828 < 39
 10823 < 40
 10584 < 40
 10579 < 41
 10575 < 36
 10047 27³
 9983 39 =

Wise 6656. Jar No-14.
Add. Meas. of Jar. above maximum.

X12139	Jan. 17	1908	~~1895~~	8	6	19	24	60	8160.	53
9343	21	1898		10	15	21	15	60	~~7429~~	632
6789	19	1895		6	26	19	45	100	4578.5	37
10889	20	1904		10	6	21	30	65	3371.7	92
10882	20	1904		10	5	~~19~~ 20	54	60	6760.	74
									6759.5	51

WRC 6656, var. 3 -

April 22, 1910.

X 9983 Jan. 40 ±

10047 " 39 ±

10575 " 40

10579 " 41

10584 " 40

10823 " 28

10828 " 40 ±

10838 " 41 ±

10839 " 41

10858 " 41 ±

10888 " <40

10891 " 41

10892 " <33

10894 " 33

10895 " 31

10896 " 34

10935 " <34

10984 " <34

9611 " <32

9612 " <39

9613 " 32

9614 " 33

9621 " <33

9623 " <36

96793 " 42 ±

6800 " 40 ±

~~42~~

X 6855 var. 26.

6891 " <40

6975 " 40 ±

7026 " <40

7141 " <32

7161 " <39

7662 " 32 ±

7791 " <37

7995 " 39 ±

8644 " 40 ±

8663 " 40

11357 " 41 ±

11795 " 37 ±

12129 " 41

12159 " 26⁷

12168 " 41 ±

10859 " 41 ±

10864 " 41

10865 " 41

10870 " 41¹ ±

10878 " 39

8904 " 25-

4914 " <35-

8919 " 41

near 6656 - var. 3 -
Additional meas - at or near Maximum -

X9914 var 27 =

The plates which are examined & measured, if the variable is at or near maximum, are the following. Several of which are, however, poor, & show so few stars, that when the var. is not pretty bright at max, it might not be visible even if at maximum! —

X 5317	1893	10	5	21	⁵⁴ 4	100	2742.5 ⁷⁰ ~~33~~
5332	1893	10	7	²¹ 19	¹³ 55	155	2744.536
5349	1893	10	14	²² 20	²⁸ 58	90	2751.538
6764	1895	6	21	¹⁷ 15	²⁰ 16	100	3366.636
6789	1895	6	26	²⁰ 19	³⁵ 45	100	3371.7 ⁹² ~~57~~
8717	1897	6	21	¹⁷ 16	³⁸ 29	60	4097.682
8756	1897	7	29	²⁰ 19	³⁰ 26	60	4135.551
8758	1897	7	29	²⁰ 19	³⁰ 26	60	" . 682
8839	1897	8	19	²⁰ 19	⁴⁰ 45	90	4156.640
8876	1897	10	5	²⁰ 19	⁴⁰ 55	90	4203.518
9308	1898	8	17	19	³³ 3	61	4519.600
9343	1898	10	15	21	⁴ 45	60	4578.57 ³⁷ ~~6~~
9578	1899	6	8	¹⁶ 15	⁴ 20	70	4811.662
9604	1899	6	9	15	⁵⁴ 21	66	4815.644
9622	1899	6	12	¹⁷ 16	¹⁸ 48	60	4818.694
9914	1899	8	8	17	⁵⁰ 30	40	4875.561
10863	1904	6	14	¹⁴ 13	⁰ 30	60	6646.552
10866	1904	6	14	19	⁴² 12	60	" . 789
10867	1904	6	14	²² 21	³⁴ 32	63	" . 888
10869	1904	6	14	²¹ 20	³⁴ 54	60	6759.5 ⁵¹ ~~30~~
10882	1904	10	5	²¹ 20	³⁰ 54	65	6760.5 ⁷⁴ ~~52~~
10889	1904	10	6	²¹ 20	³⁰ 54	65	6760.5 ⁵³ ~~52~~
12139	1908	8	6	19	⁵⁴ 24	60	8160.632

I have given labels
from sheets in
X plate book
wh. is beginning of Feb.
Side stars -
corrected to mean.
line of ref.

Net 6656 - var. No. 7. May 9.

X	var.
8919	19
4914	23
8904	21
10878	22
10870	17
10865	24
10864	23
10859	15
12168	14
12159	24
12129	23
11795	21
11357	22
8663	17
8644	24
7995	14
7791	22
7662	23
7161	15
7141	23
7026	24
6975	17
6891	22
6855	19
6800	22
6793	23
9623	21
9621	14

X	var.
9614	21
9612	17
9613	20
9611	14
10984	14
10935	23
10896	17
10895	14
10894	23
10892	22
10891	22
10888	25
10858	19
10839	24
10838	23
10828	24
10823	19
10584	25
10579	19
10575	24
10047	17
9983	23
9622	18
8876	15
8717	17
10889	20
8839	20
10869	14

U.S. 6656. Var. No. 13.

X	Var.	X	Var.
9983	25	6975	26
10047	~~21~~ 21	7026	15
10575	17	7141	18
10579	23	7161	24
10584	21	7662	20
10823	21	7791	17
10828	24	7995	21
10838	24	8644	18
10839	24	8663	24
10858	24	811357	20
10888	23	11795	23
10891	20	12129	22
10892	15	12159	23
10894	21	12168	22
10895	23	10859	24
10896	23	10864	18
10935	18	10865	20
10984	24	10870	24
9611	16	10878	19
9613	19	8904	21
9612	17	4914	18
9614	21	8919	24
9621	~~3~~ 18	10882	15
9623	18	10863	16
6793	24	8717	17
6800	21	9343	18
6855	23	9622	16
6891	23		

Smith. pl.?

neg 6656, var. No. 2.

May 20. 1910

X	Var.	X	Var.
7026	24	9621	22
7141	15-	9614	23
7161	25-	9612	22
7662	15-	9613	25-
7791	18	9611	22
7995	25-	10984	24
8644	18	10935	-
8663	25-	10896	25-
11357	25-	10895	24
11795	24	10894	21
12129	21	10892	-
12159	25-	10891	21
12168	18	10888	24
10859	24	10858	24 ?
10864	21	10839	19
10865	17	10838	18
10870	25-	10828	-
10878	20	10823	24
8904	24	10584	21
4914	18	10579	24
8919	25-	10575	24
10882	-	10047	-
6975	24	9983	24
6891	18	9914	18
6855	24	12139	16
6800	24	8758	18
6793	20	5349	17
9623	25-	5317	17

abn. mth. best: rather difficult-

Star is one comp. of dbl.

This star is the Component nearer Centre of cluster.

Possible other comp. varies slightly also.

Wfc 6656 - Var - 5-
May 26 - 1910

Examination of all the available plates fails to confirm the variability of this star. Its light changes somewhat compared with the adjacent star var-No. 9, but this appears to be due chiefly if not altogether to the var. of No. 9. No. 5 may vary through a very small range. 2 or 3 tenths of a magnitude - but even this may be due to change in plate, mag. + when due to the star itself.

No measurements made -

WHL-6656 - var. 46 - 9.
 May 26 - 1910.

X	Var.	X	Var.
7026	10	9614	15
7141	14	9612	15
7161	13	9613	14
7662	10	9611	15
7791	14	10984	9
7995	14	10935	9
8644	15	10896	11
8663	15	10895	10
11357	15	10894	10
11795	10	10892	9
12129	8	10891	11
12159	14	10888	10
12168	13	10858	14
10859	13	10839	13
10864	14	10838	13
10865	14	10828	14
10870	13	10823	14
10878	12	10584	11
8904	10	10579	11
4914	14	10575	12
8919	11	10047	10
6975	11	9983	9
6891	14	<u>12139</u>	8
6855	15	10889	10
6800	15	10882	10
6793	15		
9623	14		
9621	14		

N.H.L. 6656 - Dec. 1.

May 31. 1910.

Σ pl.	grades - var -	X. pl.	var
10584	31	6975	31
10579	24	8919	29
10575	32	4914	22
10047	32	8904	30
9983	33	10878	29 =
10823	22	10870	30
10828	32	10865	25
10838	32	10864	22
10839	22	10859	31
10858	30	12168	28
10888	22	12159	30
10891	30	12129	29
10892	- 51	11795	25
10894	26	11357	30
10895	29	8663	24
10896	32	8644	29
10935	25	7995	29
10984	31	7791	29
9611	21	7662	21
9613	28	7161	30
9612	24	7141	31
9614	29	<u>7026</u>	21
9621	28		
9623	30	10889	24
6793	25	5349	24
6800	30	8717	22
6855	31	8876	21
6891	29	9578	22

Var.
Upl. 6656. Mo. 16.
June 3. '10.

X	Var
7026	20
7141	26
7161	21
7662	25
7791	24
7995	23 ~~18~~
8644	25
8663	26
11357	20
11795	24
12129	22
12159	23
12168	24
10859	22
10864	23
10865	25
10870	24
10878	24
8904	24
4914	20
8919	25
6975	23
6891	21
6855	26
6800	20
6793	22
9623	20
9621	25

X	Var.
9614	20
9612	25
9613	21
9611	23
10984	21
10935	22
10896	22
10895	25
10894	24
10892	24
10891	23
10888	24
10858	20
10839	20
10838	21
10828	23
10823	23
9983	22
10047	26
10575	24
10579	24
10584	23
12139	21
9578	21
8756	20
5317	20
10863	21
10867	20

Camb. October 7, 1910.

M 3. Var. No 33.

Remeasure of A 1840 - J.D. 3724.664.

Record was d₃, 12. a reexamination of the plate makes it sure that wrong star was taken. The var. is extremely faint, and as A 1840 is one of the stars used only for mapping. The obs. is therefore rejected & crossed out.

Camb. Oct. 20, 1910

M 3. Var. No. 46.

Remeasure of ~~A 15~~ X 8612. Var. 0 K. ±

This confirms my measure.

Camb. Dec. 6, 1910.

M 3 var No. 50 -

Remeas. of J.D. 4073.555. X 8597.

gives f1, 12. Prae. = W old measure.

Camb. Dec. 16, 1910

M 3. var. No. 52.

Remeas. of J.D. 4071. X 8584

var 0 hr. for Camb. before.

m 3. Mo - 95-
 Remeasures. (not using b. wh. is poss. bar.)

Contd - Dec. 31. 1910

X 8624 ✓ 13.50
 7488 ✓ 13.50 ±
 6854 ✓ 13.50 ±
 6820 ✓ 13.40
 6792 ✓ 13.35-
 6828 ✓ 13.45-
 6837 ✓ 13.40
 6844 ✓ 13.35-
 6872 ✓ 13.45-
 6875 ✓ 13.40
 6876 ✓ 13.45-
 6909 ✓ 13.50
 6916 ✓ 13.50
 6918 ✓ 13.50
 6923 ✓ 13.55-
 6925 ✓ 13.55-
 6980 ✓ 13.55 ±
 6990 ✓ 13.70 ±
 7482 ✓ 13.40
 7483 ✓ 13.40
 7489 ✓ 13.45-
 7654 ✓ 13.80
 8444 ✓ 14.10
 8563 ✓ 13.45-
 8584 ✓ 13.35-
 8597 13.40 ±

from def

(over)

M 3 Mo. 95 cont.

X

8605	✓	13.35
8611	✓	13.35
8612	✓	13.40
8618	✓	13.35
8619	✓	13.35
8625	✓	13.35
8631	✓	13.35
8632	✓	13.35
8650	✓	13.30
8655	✓	13.30
8656	✓	13.30
8779	✓	14.00
9158	✓	14.00
9166	✓	14.00
9204	✓	13.90
9205	✓	14.10
9558	✓	13.40

white back plate of 95 ft.

A

1783	✓	13.50	±
3672	✓	13.40	±
3673	✓	13.4	
3674	✓	13.35	
1751	✓	13.4	
1774	✓	13.35	
1775	✓	13.4	
1776	✓	13.4	
1777	✓	13.4	
1780	✓	13.35	
3675	✓	13.35	
3677	✓	13.5	

m3 - # 95. cont.

A

3678	✓	13.4
3679		13.35
3680		13.35
3681		13.35
3682		13.3
3684		13.4

C

1	-	For long exp.
3	13.4	It is rather diff. to get measuring on C plate.
4	13.4	which shall be process comp. with those on
2	13.5	X + A plates. On X + A plates the
10	13.5	star 95 is never always a little
8	13.4	longer than a + much shorter than c,
5	13.4	and about equal or a little fainter than
7	13.6	the star A (c star bet. C + b)
6	13.4	but of the seq. is repeated as it is suff.
12	13.5	of var. on C plate the cluster is
9	13.4	at one side of the plate so that
17	13.5	the definition of a is probably some
18	13.5	what affected more it often appears
19	13.5	what is large. 95 is smaller than
21	13.5	a but about equal to A. +
23	13.5	much larger than c. i.e. "A" which
22	13.5	on X + A plate is larger than a, is
24	13.5	eq. for this on C plate - prob due to a being
25	13.5	nearer the top of plate. Under these
11	13.5	circumstances I have noted as a com-

moning they were 13.4 when about equal to A, but rather longer than A, + 13.5 when = to A. +

a also being still kept in mind on many of these C pl. A, a, + 95 are proc. =

(over)

m3. NO. 95-

13 13.5-
 14 13.5-
 15 13.5-
 16 13.4

No evidence of change in
 bgrnd on the C plates.
 Called 13.5 when = to A + a
 on the average.

July 1, 1911. m3 no 95-

Plate not used

Seven C plates examined. suffic. good
 to show faint neb. star 95 separate from
 companion. These plates were taken
 on March 10, 1898. when 95 is apparently
 rather faint est. ^{13.8} 14.1 (C 11082.) No other plate used this date
 on March 21, Mar 30, Mar 31 (2 plates)
 Apr. 1. + May 8, 1899, always bgt.

4805.	X 9537	May 30, 99	13.5
S.D. 5899.	10453	May 29. 02	13.5
5903.	10462	June 2 02	13.6
"	10463	" " "	13.6
5904.	10469	" 3 "	13.6
5905.	10475	" 4 "	— neb. plate out of focus
5907.	10487	" 6 "	13.6
6635.	10812	June 3 04	14.3
"	10813	" " "	14.3
6636.	10817	" 4 "	14.4
"	10818	" " "	14.3
6916.	10906	March 11 05	13.35
6918.	10911	" 13 "	13.35

M 3 -
August 15 - 1911.

Discard
all meas. of
Magnitude of Messier
3 on paper print, see
this book, as the photograph
sent from Mt. Wilson
was shaded -
when enlarged -
see work
on paper prints

Selection of features 4 ft. Star
Estimate made on enlargement of a 4 in.
plate made with the 60-inch telescope (refr.)
on Mt. Wilson. by

Paper print of D - Scale 2" 0mm.
bright star has no real companion to make standard
copy. Faint star from p down lower fork
ref. for study -

(n₂₀₃) p₄ q₃ r₃ s₄ t₃ u₃ v₃ w₂ x₂ y₂ z₂ +₃ β.

Aug. 16 - paper print same as above.

p₄ q₂ r₃ s₂ t₄ u₃ v₄ w₃ x₂ y₂ z₂ +₃ β

Scale from another print of same photograph
this is the scale made up for comparison.

p₃ q₂ r₃ s₂ t₂ u₄ v₃ w₂ x₃ y₂ z₃ +₂ β

Means -

p_{3.7} q_{2.3} r_{3.3} s_{2.3} t_{3.0} u_{3.3} v_{3.3} w_{2.3} x_{2.3} y_{2.0} z_{2.3}
+_{2.7} β

Means.

p	0	37.3	u	14.6	46.9	z	27.8	62.1
q	3.7	38.0	v	17.9	52.7		30.1	64.4
r	6.0	40.3	w	21.2	55.8		32.8	67.1
s	9.3	43.6	x	23.5	57.8			
t	11.6	45.9	y	25.8	60.1			

Adding sums from
pre. work - means -
where p = 34.3

see curve

Position & brightness of stars in Messier 3 -
 measured on paper enlargement of G 17. with Nelson 60-inch
 rep. 4^h. Apr. 9. 1910 -

Aug. 17, 1911

Time	Pos. R.A.	Dec.	magn. paper scale.	Signe
2.30	4.7	0.1	21.0	σ5
	3.9	1.5	21.7	"
	12.7	5.4	21.7	"
	0.1	8.0	20.3	"
	0.7	14.4	19.3	σ5
	0.6	1.2	20.5	σ2
	10.0	3.3	20.6	"
	12.1	4.3	19.5	"
	12.0	6.8	20.6	"
	2.6	5.7	20.7	"
	1.0	9.4	19.4	"
	7.2	10.4	19.8	"
	6.0	12.2	21.2	"
	1.9	4.0	20.5	σ5
	6.5	1.9	16.2	"
	10.0	0.4	20.4	"
	6.3	8.5	19.7	"
	3.8	12.0	19.4	"
	4.1	5.3	20.5	σ6
	8.6	5.8	19.0	"
	5.7	10.6	20.9	"
	1.5	12.5	21.4	"
	0.7	13.4	19.5	"
	6.0	13.5	20.0	"
Time	13.6	11.0	21.7	"
2.45				

42

Aug. 17, 1911

Time	P.A.	Pos. 2 sec.	Magn. Paper for Scale	Square
2.50	3.7	0.6	21.2	p 6 ✓
	10.1	2.7	21.7	"
	14.4	2.2	21.3	"
	12.3	4.3	21.7	"
	4.7	6.4	19.0	"
	1.7	8.4	21.5	"
	3.4	14.3	20.6	"
	7.0	13.0	19.8	"
	7.5	13.8	19.0	"
	13.5	12.7	21.0	"
	0.2	7.8	20.4	q 6 ✓
	1.1	6.0	21.2	"
	13.3	4.7	19.3	"
	4.3	10.6	20.4	"
	6.0	10.9	19.0	"
	4.6	14.0	20.1	"
	14.5	10.4	21.4	"
	11.4	12.5	21.3	"
	6.3	3.5	15.8	o 7 ✓
	3.5	5.0	21.3	"
	0.2	8.6	21.4	"
	13.0	8.3	20.0	"
	12.0	10.2	20.9	"
	13.0	10.1	21.2	"
	11.0	11.8	21.2	"
	8.5	10.7	20.8	"
	4.8	13.9	18.7	"
	11.0	1.3	19.4	p 7 ✓
	14.7	10.0	19.5	"
Time 3.06	9.6	14.3	21.3	"

3.07		Pos.		Magn for Paper, Scale	Aug 17, 1911	43
Time	R.A.	Dec.			Square	
	9.5	14.0		21.4	p7 ✓	repetition accidental
	13.0	13.5		21.1	"	
	6.8	0.1		21.2	q7 ✓	
	14.9	0.9		21.1	"	
	3.9	5.4		20.8	"	
	12.8	6.9		20.6	"	
	11.7	8.8		17.0	"	
	8.6	9.6		19.7	"	
	14.7	9.9		20.3	"	
	1.3	2.3		21.2	p8 ✓	
	4.0	2.3		21.8	"	
	4.5	4.4		21.3	"	
	12.0	4.7		20.8	"	
	10.0	6.4		20.1	"	
	7.2	9.3		21.2	"	
	3.8	11.5		20.2	"	
	14.0	13.0		21.7	"	
	8.8	3.2		20.6	p8 ✓	
	7.8	5.6		21.2	"	
	3.8	9.2		20.7	"	
	3.6	12.1		19.4	"	
	10.5	13.6		20.7	"	
	11.5	13.6		19.8	"	
	1.2	1.6		21.6	qf8 ✓	
	3.4	0.3		21.4	"	
	5.0	2.0		19.3	~~qf8~~	
	6.4	4.6		21.1	"	
	11.0	4.7		21.3	"	
	14.6	12.5		21.7	"	
Time	2.1	8.0		20.7	"	
3.25						

44

Time
3.26

Pos.	Magn	Aug 17, 1911
RA	Dec	Paper Scale Square
6.2	- 10.0	18.5 gr 8 ✓
8.6	9.0	20.7 "
13.7	13.0	21.3 "
0.6	13.4	18.8 "
5.0	12.4	20.7 "
6.0	13.7	18.0 "
11.8	1.1	19.7 59 ✓
11.1	1.4	20.2 "
6.0	6.6	20.1 "
6.1	7.6	21.4 "
11.5	6.0	20.6 "
11.0	7.7	20.5 "
14.9	8.2	19.7 "
13.8	10.0	21.3 "
12.0	11.3	20.0 "
4.8	12.0	21.3 "
6.3	13.1	20.9 "
3.2	1.0	21.0 p 9 ✓
1.6	1.6	21.5 "
4.2	3.1	20.3 "
11.8	1.4	20.1 "
7.4	3.1	21.5 "
11.7	4.4	21.0 "
11.3	7.0	15.3 "
12.0	10.5	18.2 "
7.8	11.0	21.2 "
9.9	11.3	19.4 "
12.2	12.5	20.4 "
1.0	2.3	19.3 9/9
0.5	3.8	18.2 "

Time
3.40

Time 3.42	Pos.		Magn from Paper Scale		Square
	R.A	Dec			
	6.5	2.1	20.6		99 ✓
	6.7	6.4	21.2		"
	6.2	8.2	20.7		"
	1.4	10.3	21.5		"
	10.7	7.6	21.5		"
	14.9	9.8	21.4		"
	4.5	11.0	20.4		"
	4.5	10.6	20.6		"
	10.4	11.6	20.7		"
	0.5	1.4	20.3		10 ✓
	3.2	1.7	20.6		"
	0.8	3.6	20.2		"
	4.5	4.0	20.5		"
	6.0	4.2	20.6		"
	7.0	3.4	20.3		"
	14.7	0.0	19.6		"
	12.0	3.7	20.4		"
	8.0	7.0	15.6		"
	6.3	8.6	20.6		"
	10.7	8.7	20.2		"
	14.0	9.0	20.7		"
	14.5	10.0	20.9		"
	14.3	13.5	21.1		"
	4.0	14.5	21.5		"
	13.8	2.8	21.1		10 ✓
	5.5	5.5	21.7		"
	2.6	6.7	20.1		"
	5.2	8.3	21.6		"
	1.3	9.7	21.2		"
	1.0	11.5	21.7		"

Time
3.55

46

Time
3.56

Pos.	Magn	Aug 17, 1911
Ra Dec.	Paper Scale	Square
1.5 14.3	20.1	p 10 ✓
5.7 11.8	20.5	"
10.0 11.4	18.2	"
11.7 7.3	21.2	"
14.4 9.6	21.0	"
11.4 12.0	20.6	"
13.0 11.7	20.8	"
14.0 12.8	21.5	"
2.4 0.1	20.5	q 10 ✓
4.7 1.6	18.6	"
5.3 2.4	18.6	"
14.3 0.4	21.5	"
10.3 2.7	21.7	"
12.4 3.5	21.6	"
14.5 4.0	21.6	"
1.4 3.4	21.5	"
0.7 4.5	20.9	"
5.0 5.0	21.4	"
2.0 7.0	20.8	"
1.0 9.0	21.2	"
1.6 11.0	21.2	"
9.8 9.5	21.5	"
11.7 9.8	19.3	"
8.4 11.7	20.6	"
11.8 12.0	20.3	"
13.8 13.0	21.7	"
0.1 1.0	21.4	o 11 ✓
2.2 0.2	21.4	"
6.0 1.0	19.0	"
11.3 0.2	19.0	"

Time
4.08

Aug 17, 1911

47

Time	Poz.	Magn.	Scale	Square
4.09	Pa, 21.6	1.5	20.4	5.11 ✓
	2.6	2.8	19.4	"
	5.5	2.3	19.8	"
	2.4	4.8	20.5	"
	0.1	7.5	20.4	"
	14.8	2.8	20.1	"
	8.5	4.1	18.6	"
	11.6	4.9	19.6	"
	11.4	6.8	20.8	"
	7.5	7.5	19.5	"
	3.4	8.0	21.0	"
	3.2	10.5	19.7	"
	0.6	12.4	19.1	"
	1.6	14.0	19.3	"
	5.0	12.8	20.1	"
	10.4	10.7	19.0	"
	7.8	14.5	19.6	"
	14.7	14.6	20.6	"
	2.0	1.7	21.3	5.11 ✓
	2.1	1.6	21.1	
	3.7	2.0	21.5	"
	10.7	0.7	20.6	"
	10.3	2.2	20.5	"
	12.9	3.0	19.3	"
	12.5	4.0	19.5?	"
	13.0	4.0	19.3	"
	12.6	4.6	18.5	"
	1.2	6.7	18.9	"
	4.7	7.0	21.3	"
Time	4.8	4.8	20.1	"
4.26				

48

Time

4.27

Pos.

RA

Dec.

Magn
Paper ScaleAug 17. 1911
Square

p 11 ✓

6.6

4.0

21.3

6.0

5.2

19.7

"

7.0

6.0

20.6

"

0.1

10.7

21.5

"

3.0

9.2

20.4

b

7.0

9.6

20.5

"

10.6

8.8

20.1

"

12.2

8.4

19.5

"

14.2

9.8

20.6

"

1.7

12.4

20.7

"

4.7

11.7

20.1

"

6.9

12.8

20.1

"

10.0

14.0

19.5

"

12.0

14.0

19.3

"

2.8

1.0

18.9

p 11 ✓

14.9

4.3

18.2

"

14.5

5.0

19.3

"

9.6

4.2

21.3

"

10.7

5.0

21.4

"

11.7

6.0

21.5

"

13.7

7.3

20.9

"

1.0

7.2

20.4

"

7.6

10.1

20.0

"

2.4

13.0

18.8

"

14.3

14.0

20.5

"

8.5

11.0

21.7

"

10.4

11.2

21.6

"

11.0

12.8

21.6

"

6.1

1.0

17.6

p 12 ✓

11.0

0.4

19.3

"

Time

4.42

Aug 17, 1911

49

Time	Pa.	Magn.	Square
4.43	RA Dec.	Paper Scale	
	1.8 2.8	21.1	0/12 ✓
	0.6 5.0	20.9	"
	2.0 5.0	21.2	"
	9.2 2.6	20.9	"
	12.0 2.6	21.5	"
	13.2 4.0	21.0	"
	11.1 4.0	20.2	"
	8.3 4.8	20.0	"
	5.0 5.6	19.3	"
	1.4 8.0	20.8	"
	1.0 9.4	18.8	"
	3.4 9.8	20.7	"
	14.3 7.1	19.7	"
	12.4 7.4	21.3	"
	13.8 9.8	21.7	"
	10.0 7.3	16.5	"
	8.0 9.3	19.3	"
	10.4 10.0	20.1	"
	10.7 11.2	20.5	"
	11.7 13.2	19.2	"
	6.6 12.5	19.7	"
	11.9 14.0	19.4	"
	6.0 14.0	19.5	"
	2.4 14.3	17.0	"
	9.0 0.1	18.4	1/12 ✓
	13.3 1.4	19.7	"
	11.0 2.3	20.0	"
	12.0 3.0	20.4	"
	10.4 4.0	20.3	"
Line	9.2 2.3	21.6	"
4.54			

50

Time

4.55

Time	For Pa	elec.	Magn Laper Scale	Square
4.55	9.0	4.0	21.6	p12 ✓
	2.6	2.7	20.3	"
	1.3	4.4	20.6	"
	2.6	4.8	20.9	"
	4.0	6.3	18.6	"
	0.2	9.5	19.3	"
	1.3	9.6	19.8	"
	14.7	4.8	19.3	"
	9.5	7.1	19.3	"
	7.7	8.0	20.8	"
	6.0	9.3	18.6	"
	13.0	10.2	14.0	"
	10.0	11.1	20.3	"
	6.0	9.5	18.7	"
	3.1	10.5	19.4	"
	13.4	12.7	20.5	"
	7.0	11.7	19.4	"
	4.6	12.3	20.8	"
	2.6	13.0	20.7	"
	6.0	14.0	18.8	"
	3.5	0.4	21.2	p12 ✓
	0.6	0.6	21.7	"
	8.5	2.0	21.7	"
	13.6	0.1	20.0	"
	10.0	1.0	20.5	"
	13.4	3.0	19.3	"
	13.3	4.0	21.1	"
	11.3	4.3	20.6	"
	12.8	5.6	21.3	"
	10.0	5.4	21.5	"

Time

5.07

Aug. 17, 1911

51

Time	Por.	Pa elec.	Magn	Paper Scale	Square
5.08	8.0	3.0	20.3		912 ✓
	2.6	4.3	19.2		"
	6.3	6.6	20.4		"
	6.0	7.6	19.5		"
	4.5	7.0	19.4		"
	12.7	9.0	15.5		"
	14.0	10.7	20.6		"
	12.5	10.7	20.5		"
	11.0	10.7	20.8		"
	9.8	9.8	19.7		"
	7.0	10.0	20.8		"
	4.2	10.2	20.6		"
	5.2	12.0	20.8		"
	5.5	12.7	20.9		"
	12.0	14.0	18.2		"
	9.7	12.0	18.5		"
	8.0	14.4	19.4		"
	0.0	0.5	20.5		513 ✓
	1.4	2.8	21.3		"
	0.3	4.2	19.7		"
	2.2	1.7	20.8		"
	4.0	1.5	19.7		"
	10.7	0.5	20.1		"
	13.0	0.3	20.1		"
	13.0	1.0	20.5		"
	14.6	1.0	21.1		"
	13.3	2.9	21.3		"
	11.0	3.0	17.8		"
	8.7	2.2	20.7		"
Time	9.0	2.5	20.7		"
5.22					

52

Aug 17, 1911

Time

5.23

Pos.	Magn		
R.A	Dec.	Paper Scale	Square
7.6	4.0	20.0	13 ✓
5.0	4.2	19.3	"
14.4	4.7	19.8	"
13.7	5.6	20.0	"
12.7	5.0	20.9	"
21.0	6.3	20.9	"
10.0	5.0	20.7	"
7.2	6.0	20.5	"
0.1	9.0	20.5	"
1.0	9.2	20.0	"
7.4	8.1	20.0	"
~~8.4~~	~~8.8~~	21.1	"
10.2	9.6	20.9	"
11.5	8.7	19.6	"
12.5	12.0	19.4	"
14.3	14.0	19.7	"
12.0	14.5	20.7	"
10.4	11.6	20.5	"
10.0	13.0	20.9	"
10.6	13.8	20.5	"
8.8	12.2	21.2	"
6.8	10.2	21.2	"
4.8	11.0	21.5	"
4.3	12.7	18.8	"
2.0	11.0	21.2	"
0.6	12.6	21.4	"
2.7	0.7	21.5	13
1.5	1.6	21.7	"
1.5	4.0	21.7	"
12.5	0.8	16.8	"

Time

5.35

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Messier 3 continuation of prec. Magn only

Line	Square	Line	Line	Line	Line	Line
12,10	9,13 ✓	12,15	9,13 ✓	12,14 ✓	12,14 ✓	12,14 ✓
21.7	20.3	21.0 (12,20)	20.4 (12,30)	20.0 (12,37)	20.3	20.3
21.4	20.6	19.6	20.5	21.2	19.6	19.6
20.3	21.2	20.7	21.2	21.3	21.5	21.5
19.2	21.5	20.7	21.3	21.3	21.5	21.5
18.9	21.6	19.0	19.3	18.0	21.3	21.3
18.9	20.1	21.0	19.3	18.5	18.8	18.8
20.7	19.3	21.4	19.6	18.4	20.0	20.0
21.2	17.7	18.0	20.7	19.3	21.0	21.0
20.6	20.9	19.0	20.7	18.8	19.0	19.0
21.7	19.7	20.0	21.2	19.8	19.2	19.2
16.2	20.1	20.4	21.3	20.0	17.2	17.2
20.6	20.3	19.4	20.4	20.7	18.0	18.0
18.2	20.5	19.7	21.1	20.6	20.1	20.1
dbl. 18.2	20.1	19.3	20.5	21.4	20.1	20.1
21.0	21.2	21.0	20.4	21.2	20.9	20.9
20.5	20.4	20.9	21.2	21.0	21.2	21.2
20.1	20.4	20.8	20.6	18.2	20.9	20.9
21.3	18.1	18.2	20.7	19.0	21.5	21.5
21.2	19.3	19.3	20.4	21.2 ✓	20.2	20.2
21.5	20.1	19.5	20.2	21.2	20.9	20.9
21.2	18.9	21.0	20.5	20.0	20.4	20.4
19.3	21.0	19.14 ✓	19.5	20.6	20.7	20.7
20.7	19.6	20.4	21.5	20.3	20.0	20.0
20.4	20.0	20.6	21.2	18.0	15.5	15.5
19.4	21.2	17.8	20.8	20.4	18.0	18.0
19.2	21.3	18.0	20.5	19.0	18.6	18.6
Line 12,15	Line 12,20	Line 12,25	Line 12,30	Line 12,37	Line 12,42	

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Line Square		Messier 3 continuation of spec. Magns only					
12.43	Line 12.43	Line 12.45	Line 12.50	Line 12.54	Line 12.57	Line 1.00	Line 1.05
19.7	18.0	20.9	20.1	20.6	18.2		
20.9	20.7	20.3	20.5	20.8	19.8		
21.4	19.7	21.3	20.8	20.4	18.6		
19.2	19.7	20.4	21.4	20.7	20.4		
20.0	19.7	19.7	19.2	20.0	20.1		
20.0	20.7	19.4	20.6	21.0	19.3		
19.8	21.5	19.4	20.5	19.7	20.0		
19.7	19.3	19.3	21.2	20.4	21.3		
20.9	19.2	19.2	21.4	19.7	21.5		
20.4	20.2	20.0	19.3	19.3	21.5		
18.9	19.3	21.5	19.7	20.1	18.2		
20.5	19.2	20.7	18.2	20.7	19.7		
20.4	20.9	20.2	19.4	21.3	20.3		
19.2	20.9	20.7	21.4	21.2	20.4		
19.7	19.2	19.3	20.4	20.6	16.6		
20.3	19.7	16.2	19.7	21.4	19.4		
21.5	19.3	16.2	19.7	19.4	19.4		
21.4	20.4	21.5	19.6	14.2 dbl.	14.2		
21.0	20.4	21.5	20.0	20.7	20.2		
18.6	20.3	20.0	21.3	20.7	18.9		
16.5	18.8	19.0	20.0	20.6	20.6		
18.0	19.0	19.7	20.7	19.3	19.3		
20.0	19.7	20.1	20.6	20.6	21.5		
19.3	20.6	20.6	21.2	20.7	21.3		
18.2	19.6	21.5	21.4	19.2			
Line 12.45	Line 12.50	Line 12.54	Line 12.57	Line 1.00			

Messier 3 continuation of prev. Mags only

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Time	Square	Time	Square	Time	Square	Time	Square	Time	Square	Time	Square
4.05	0 29 ✓	4.10	~~1 29~~ ✓	4.15	9 29	4.20	0 30 ✓	4.25	9 30 ✓	4.28	0 31 ✓
	20.7		19.7		18.9		20.1		20.6		21.4
	19.3		20.5		21.3		20.7		18.6		18.9
	20.6		20.4		18.0		21.5		20.4		20.6
	21.0		21.0		20.4		20.4		19.6		19.7
	18.8		20.5		21.2		20.4		19.6		20.9
	20.9		20.7		21.5		20.5		20.5		20.9
	20.0		20.9		20.1		20.8		20.4		~~1 31~~ ✓
	19.2		20.7		20.7		17.6		21.2		20.7
	20.4		19.7		19.6		20.6		20.9		20.6
	20.7		20.3		17.6		20.1		20.5		20.0
	21.4		20.2		20.6		20.1		19.3		19.3
	19.3		20.9		20.9		20.8		19.4		19.8
	18.9		20.0		20.3		~~1 30~~ ✓		19.6		19.2
	20.7		19.3		19.3		21.3		20.7		20.0
	20.9		20.4		20.5		20.9		20.9		20.1
	20.6		20.2		20.0		20.7		20.9		20.2
	19.2		21.0		20.9		20.4		21.5		20.0
	21.2		21.2		21.2		21.0		21.5		21.5
	19.3		20.0		21.3		17.6		~~0 31~~ ✓		20.6
	18.2		19.3		20.6		16.2		20.9		20.5
	20.9		19.2		20.9		19.2		20.6		20.9
	21.2		~~20.9~~ 19.7		~~0 30~~ ✓		19.0		21.0		20.7
	20.9		20.2		20.6		20.1		20.3		17.6
	21.2		20.7		21.5		20.7		21.5		21.4
	~~1 29~~ ✓		~~9 29~~ ✓		18.0		19.7		19.2		~~9 31~~ ✓
	18.1		20.7		20.9		18.9		20.8		20.9
	20.9		20.7		20.7		18.1		20.9		20.1
	20.6		20.6		21.0		~~9 30~~ ✓		21.2		20.4
Time	19.03	Time	20.5	Time	20.4	Time	21.2	Time	21.4	Time	20.7
4.10		4.15		4.20		4.25		4.28		4.31	

Messier 3 continuation of prev. Mays only 57

Line	Square	Time	Line	Square	Time	Line	Square	Time	Line	Square	Time
4.31	20.9	(4.33)	21.3	(4.36)	20.5	(4.45)	21.0	(5.50)	21.34	(5.54)	21.35
	21.5		21.2		21.1		20.7		21.0		21.7
	19.7		21.32 ✓		20.9		19.7		20.8		21.2
	20.1		20.7		20.6		20.0		21.3		21.3
	20.0		20.6		20.8		21.1		21.5		19.3
	20.1		19.7		20.2		18.7		21.0		20.9
	19.2		20.5		21.33 ✓		20.4		20.3		18.6
	18.6		20.7		21.7		19.2		21.35 ✓		21.6
	20.7		17.7		21.6		21.4		20.9		21.36 ✓
	20.0		18.9		21.6		21.34 ✓		19.7		21.7
	21.2		18.8		19.5		20.6		20.4		21.6
	20.3		19.3		20.4		21.5		21.3		19.0
	20.8		20.8		21.4		21.4		20.7		20.4
	20.5		20.3		19.7		20.6		20.7		15.5
	21.0		20.7		20.9		21.5		21.4		21.5
	20.4		21.5		21.5		21.2		21.35 ✓		21.5
	20.5		21.3		20.0		20.1		21.3		19.6
	21.2		21.4		20.0		20.6		21.2		19.3
	21.3		21.6		21.33 ✓		20.6		20.4		20.5
	21.32 ✓		20.5		18.8		21.4		19.6		21.36 ✓
	20.7		21.2		20.2		21.34 ✓		19.7		20.8
	21.0		21.6		21.2		20.9		20.7		19.6
	20.9		21.32 ✓		19.8		21.3		19.6		21.0
	21.5		20.5		18.6		21.6		21.35 ✓		21.5
	20.4		20.0		20.4		21.7		19.7		18.5
	21.6		19.6		18.6		20.8		20.0		19.7
	21.6		21.5		21.3		21.3		20.2		20.7
	19.7		21.5		21.6		21.34 ✓		21.5		19.3
	21.7		20.4		21.6		21.5		21.6		21.5
Time	20.5	Time	20.4	Time	4.45	Time	5.50	Time	5.54	Time	5.56
4.33		4.36									

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Time	Square	Time	Square	Time	Square	Time	Square	Time	Square	Time	Square
5.57	<u>136</u> ✓	(5.10)	<u>222</u> ✓	(5.12)	<u>21</u> ✓	5.15	<u>20</u> ✓	(5.20)	<u>20</u> ✓	(5.23)	<u>19</u> ✓
	21.5		19.2		20.1		19.7		20.10		20.5
	<u>136</u> ✓		17.5		20.5		21.2		19.3		20.7
	21.5		18.1		18.3		19.7		20.4		20.4
	21.4		20.7		19.6		19.3		20.7		20.0
	<u>222</u> ✓		19.4		19.2		20.2		20.1		20.2
	20.7		19.4		18.2		20.2		20.6		20.3
	21.4		20.7		18.9		20.5		<u>19</u> ✓		19.5
	21.6		20.1		20.7		20.5		16.8		18.3
	20.5		18.9		20.2		20.6		20.1		18.9
	20.4		20.3		21.4		15.0		20.7		18.6
	20.8		20.4		17.6		20.4		20.1		19.4
	20.9		18.5		18.9		20.1		20.9		18.0
	20.6		<u>221</u> ✓		20.9		20.5		21.4		19.3
	20.6		19.7		19.3		21.3		21.5		18.6
	20.7		20.5		18.6		19.4		20.6		21.2
	21.0		19.3		18.6		18.3		20.6		<u>222</u> ✓
	20.1		20.4		20.1		16.8		20.5		20.7
	20.1		21.1		19.7		20.4		19.6		20.7
	17.6		19.7		19.4		20.4		19.3		21.1
	19.6		18.6		19.7		20.5		18.0		19.3
	20.8		21.5		19.3		19.3		20.1		19.6
	21.2		21.4		20.4		20.6		19.8		19.4
	19.3		21.3		<u>220</u> ✓		19.8		20.1		18.8
	20.9		20.6		18.9		19.7		20.3		19.2
	21.1		20.7		20.1		20.1		20.2		20.7
	19.3		20.4		18.9		20.1		18.9		20.9
	21.0		21.2		20.1		19.0		18.9		21.4
	19.3		16.8		20.5		17.6		16.2		21.3
Time	18.9	Time	18.9	Time	19.3	Time	19.7	Time	16.5	Time	20.6
5.10		5.12		5.15		5.20		5.23		5.26	

August 18, 1911
Messier 3 continuation of pres. mag. only.

Time	Source	Time	Source	Time	Source	Time	Source	Time	Source	Time	Source
5.26	<u>n 22</u> ✓ (5.45)	<u>n 21</u> ✓ 18.6	(5.50)	<u>n 21</u> ✓ 18.2	(5.53)	<u>n 20</u> ✓ 20.8	(5.55)	<u>n 19</u> ✓ 20.6	(6.00)	<u>n 22</u> ✓ 20.7	
20.1		20.0		21.0		20.1		20.1		20.1	
19.5		19.3		19.7		19.6		20.4		20.5	
16.5		20.6		19.7		18.2		19.5		19.8	
18.6		19.7		17.5		17.2		18.5		20.9	
17.2		20.7		19.3		18.6		20.4		20.4	
19.3		20.8		<u>n 20</u> ✓		20.4		20.8		21.1	
20.7		20.7		20.1		20.4		20.7		20.2	
20.8		21.5		20.7		21.5		19.7		19.5	
20.7		21.5		19.3		21.4		20.9		20.9	
20.3		20.9		20.9		21.5		19.3		21.5	
19.3		20.4		20.9		<u>n 19</u> ✓		19.3		<u>n 21</u> ✓	
19.3		20.2		20.5		20.1		19.8		17.6	
5.30	19.2	19.7		20.4		20.5		20.3		20.1	
5.40	19.7	21.2		21.1		19.6		20.4		20.0	
20.7		20.9		19.7		21.0		<u>n 22</u> ✓		21.3	
20.4		20.4		~~15.8~~ ~~16.0~~		19.7		18.5		21.1	
20.0		19.3		19.5		20.0		19.3		19.7	
21.0		19.7		18.8		20.6		20.4		19.7	
21.3		19.3		19.0		18.0		21.2		19.6	
21.3		18.0		19.1		19.3		20.6		19.6	
21.2		16.8		19.4		20.7		21.3		20.6	
21.7		20.7		20.4		21.5		20.6		21.2	
20.5		20.6		18.2		21.5		20.6		20.5	
19.7		20.1		21.5		21.5		21.5		20.6	
<u>n 21</u> ✓		20.7		20.1		20.6		20.7		21.3	
19.3		20.6		19.9		20.5		20.6		20.9	
18.5		20.7		20.5		20.1		19.2		19.3	
20.7		18.6		20.9		21.5		20.8		19.3	
Line	19.6	Line	19.3	Line	20.7	Line	21.3	Line	20.1	Line	20.9
5.45		5.50		5.53		(5.55)		6.00		6.02	

Measures 3 continuations August 18, 1911
of previous May 20 only

Square		Time		Square		Time		Square		Time		Square		Time	
✓ 21		(6.05)		20.6		(6.10)		19.8		(6.12)		20.4		(6.15)	
19.7		19.6		20.8		20.5		19.0		20.3		19.3		16.7	
20.9		19.5		20.9		19.7		20.8		19.3		19.3		16.7	
20.9		18.6		20.4		19.7		19.5		16.7		19.3		19.3	
19.3		21.3		19.8		20.5		19.5		19.3		19.7		19.7	
19.7		18.6		19.3		18.6		19.7		19.7		19.7		19.7	
19.9		19.3		21.1		15.5		19.3		(6.20) 21.2		21.2		21.2	
19.3		21.3		✓ 22		14.5		20.1		20.1		20.1		20.1	
20.4		19.4		16.2		16.5		20.8		20.8		20.8		20.8	
21.5		20.6		19.9		20.1		19.5		19.5		19.5		19.5	
21.4		19.3		19.3		20.4		19.3		19.3		19.3		19.3	
✓ 20		20.1		20.8		20.4		19.4		19.4		19.4		19.4	
18.6		20.1		21.4		20.1		20.4		20.4		20.4		20.4	
18.0		✓ 19		20.9		19.8		20.6		20.6		20.6		20.6	
20.6		14.5 dbl		19.7		19.9		21.3		21.3		21.3		21.3	
20.4		19.6		19.3		19.8		✓ 19		19.7		19.7		19.7	
21.2		19.7		18.9		19.9		20.1		20.1		20.1		20.1	
19.7		20.9		19.3		21.3		20.4		20.4		20.4		20.4	
19.3		21.2		20.6		20.9		19.7		19.7		19.7		19.7	
20.1		19.3		20.8		19.3		20.7		20.7		20.7		20.7	
20.4		20.4		20.1		✓ 20		20.7		20.7		20.7		20.7	
20.4		20.6		19.7		18.9		20.8		20.8		20.8		20.8	
20.9		20.6		20.8		19.2		21.2		21.2		21.2		21.2	
20.8		21.5		20.7		18.9		20.9		20.9		20.9		20.9	
20.7		21.0		20.6		18.5		21.0		21.0		21.0		21.0	
20.6		19.3		20.8		18.5		20.8		20.8		20.8		20.8	
20.8		20.9		19.4		20.8		19.5		19.5		19.5		19.5	
19.3		20.9		20.4		21.2		20.4		20.4		20.4		20.4	
19.3		20.4		21.2		19.0		21.5		21.5		21.5		21.5	
5 18.2		Time 6.10		19.7		Time 6.12		✓ 21		Time 6.15		Time 6.18		Time 6.18	

August 19, 1911

Messier 3 cut off pec. Magns. only

Time	Square	Time	Square	Time	Square	Time	Square	Time	Square	Time	Square
10.50	<u>219</u> ✓	(10.55)	<u>220</u> ✓	Time	<u>222</u> ✓	Time	<u>219</u> ✓	Time	<u>221</u> ✓	Time	<u>220</u> ✓
	21.4		17.2	(11.00)	20.6	(11.05)	20.8	(11.10)	19.7	(11.15)	20.0
	21.5		20.1		18.9		18.9		20.3		19.4
	21.3		19.7		20.9		19.3		<u>222</u> ✓		20.9
	20.7		19.2		21.4		19.3		20.7		20.1
	21.3		21.1		21.4		17.2		20.9		20.9
	21.2		<u>221</u> ✓		21.2		<u>220</u> ✓		21.4		20.7
	21.3		19.7		20.9		19.3		21.3		19.3
	20.5		20.1		19.3		20.7		19.3		20.4
	21.3		20.4		21.0		20.8		20.1		18.9
	20.8		21.2		20.8		21.2		20.9		19.6
	20.6		20.0		21.4		21.4		20.7		21.0
	20.4		17.3		<u>219</u> ✓		19.8		20.4		19.2
	21.2		18.6		18.9		20.9		20.4		18.2
	20.9		17.8		20.6		20.8		19.6		15.5
	20.4		19.4		21.4		19.0		19.3		<u>221</u> ✓
	21.5		21.2		20.1		20.1		20.8		19.7
	21.2		19.7		18.8		20.3		21.2		20.4
	20.8		21.2		19.8		<u>221</u> ✓		21.2		20.6
	<u>220</u> ✓		21.2		21.3		20.4		20.7		20.1
	19.2		19.5		20.9		20.7		<u>219</u> ✓		20.9
	20.5		20.4		21.2		19.6		20.9		19.7
	20.6		20.7		21.2		20.4		20.2		20.1
	19.3		20.4		18.8		20.4		21.6		20.1
	21.5		20.9		20.6		19.5		20.4		20.9
	20.1		<u>222</u> ✓		21.2		21.2		20.6		19.3
	21.5		20.1		19.3		21.5		20.1		21.2
	20.6		20.7		19.7		20.6		20.8		19.7
	20.7		20.6		20.1		20.1		20.0		20.4
Time	18.9	Time	19.6	Time	20.5	Time	18.6	Time	20.6	Time	21.2
10.55		11.00		11.05		11.10		11.15		11.18	

August 19, 1911

Messier 3, continuation of previous pages only

Time	Square	Time	Square	Time	Square	Time	Square
11.18	<u>B21</u> ✓	(11.20)	<u>21.4</u> ✓	(11.23)	<u>21.4</u> ✓	(11.30)	<u>19.9</u> ✓
	20.7		20.8		20.6		19.3
	15.5		21.3		19.7		20.2
	16.0		21.5		17.3		17.6
	17.3		21.4		21.6		20.3
	<u>B22</u> ✓		20.6		<u>19</u> ✓		18.2
	14.5		20.1		21.5		<u>22.2</u> ✓
	19.0		19.7		21.2		21.2
	19.8		19.3		20.7		18.9
	20.6		<u>21</u> ✓		21.5		19.7
	21.4		21.2		21.5		19.3
	20.6		21.1		21.4		18.9
	20.3		20.9		18.9		19.7
	19.7		21.2		17.6		21.5
	19.2		20.9		<u>20</u> ✓		21.5
	<u>19</u> ✓		21.3		21.2		<u>19</u> ✓
	20.1		20.8		20.9		20.7
	18.6		21.2		20.4		20.4
	19.5		21.0		21.2		20.9
	18.6		20.8		21.6		20.1
	20.1		20.9		<u>21</u> ✓		21.5
	21.5		21.0		20.9		<u>20</u> ✓
	21.5		20.9		21.5		20.5
	21.4		20.2		21.3		20.5
	<u>20</u> ✓		19.6		20.8		20.7
	20.1		19.4		20.5		20.1
	21.3		<u>22</u>		21.5		18.5
	20.7		18.2		20.9		16.2
	21.3		19.2		20.8		<u>21</u> ✓
Time	21.3	Time	20.7	Time	20.4	Time	18.9
11.20		11.23		11.30		11.35	
							11.40

August 19, 1911

Messier 3 continuation of spec. Wagne. only.

Jesse's Continuation of Spec. Wagon on													
Time	Square	Time	Square	Time	Square	Time	Square	Time	Square	Time	Square	Time	Square
(11.40)	<u>21.9</u> ✓	(12.01)	<u>22.0</u> ✓	20.9	(12.05)	<u>22.0</u> ✓	20.7	(12.10)	<u>22.1</u> ✓	(12.12)	<u>22.2</u>	(12.15)	<u>21.9</u> ✓
18.2		21.5		<u>22.1</u>		20.7		18.9		18.9		18.9	
19.3		21.2		18.6		20.4		18.9		20.1		20.1	
20.5		21.6		20.1		20.1		20.4		21.2		21.2	
19.3		21.5		19.3		20.4		19.3		21.2		21.2	
19.3		19.7		19.7		20.7		19.2		19.0		19.0	
20.4		19.3		20.6		20.2		19.7		20.1		20.1	
19.4		18.3		19.6		19.8		19.7		18.6		18.6	
19.4		18.6		20.2		20.7		19.7		20.5		20.5	
20.2		21.2		20.9		18.6		19.9		19.7		19.7	
16.2		18.8		20.8		19.7		19.8		19.7		19.7	
16.6		18.2		20.9		20.4		21.1		19.7		19.7	
18.0		19.8		21.4		19.6		20.8		19.3		19.3	
18.0		20.7		20.4		19.8		21.1		19.5		19.5	
19.7		20.0		20.1		20.5		21.4		18.5		18.5	
20.1		20.8		17.5		20.9		21.5		20.3		20.3	
19.3		20.7		16.8		<u>22.2</u> ✓		15.2		20.8		20.8	
17.2		14.5		18.6		20.4		20.4		20.4		20.4	
19.3		19.5		20.1		18.6		20.1		20.1		20.1	
19.2		21.2		20.4		19.7		19.5		19.3		19.3	
19.7		20.3		20.7		19.3		<u>21.9</u> ✓		19.3		19.3	
19.9		19.6		18.0		20.4		20.7		20.6		20.6	
21.2		17.8		18.9		20.7		20.9		20.9		20.9	
20.7		18.2		19.0		20.7		17.5		19.7		19.7	
20.7		18.9		18.9		20.9		20.4		<u>22.0</u> ✓		22.0	
20.7		19.7		19.7		21.0		20.9		20.5		20.5	
Time	<u>22.0</u> ✓	17.6		19.2		20.7		19.3		20.1		20.1	
11.45		19.3		19.3		21.0		19.3		19.5		19.5	
12.00		19.7		18.0		21.2		19.7		21.5		21.5	
21.5													
Time	20.4	Time	19.7	Time	19.7	Time	20.8	Time	19.7	Time	20.4	Time	20.4
12.01		12.05		12.10		12.12		12.15		12.20		12.20	

August 19, 1911.

Messier 3 continuation of prec. Magn.

Time Square Time Square Time Square Time Square Time Square Time Square Time Square

i 20 ✓ (12.25) i 21 ✓ (12.30) i 22 ✓ (12.35) i 22 ✓ (12.37) h 19 ✓ (12.40) h 20 ✓

20.7	20.5	20.7	19.5	21.2	20.4
20.1	20.7	20.9	20.1	20.9	20.9
19.7	21.0	21.2	21.2	21.0	20.7
20.1	19.7	21.5	18.2	21.2	20.3
21.2	19.3	20.4	15.5	21.2	19.7
20.9	18.9	20.8	18.5	20.4	20.7
20.6	20.4	20.0	<u>h 19</u> ✓	20.8	19.3
20.6	20.5	20.1	19.6	19.0	21.2
21.1	20.4	20.3	20.4	20.2	21.2
21.2	19.6	19.3	20.7	18.5	19.9
20.4	20.5	16.5	19.5	20.9	<u>h 21</u> ✓
19.5	20.6	17.6	20.8	21.1	19.9
21.0	18.9	20.7	21.0	21.5	21.4
21.2	19.2	20.5	21.2	21.5	21.5
21.2	19.1	20.9	21.5	<u>h 20</u> ✓	21.5
20.7	19.7	21.2	21.5	17.5	21.2
20.6	19.3	20.0	21.3	20.4	21.2
20.6	19.3	19.3	19.5	20.2	20.9
18.6	18.2	19.3	20.4	20.0	20.4
19.3	19.5	19.7	20.6	19.4	21.2
19.5	19.5	19.2	18.2, dbl.	20.0	21.5
19.5	20.5	20.7	20.7	19.6	19.7
20.5	21.1	20.2	20.1	19.6	20.0
17.5	21.3	20.8	19.7	19.7	20.9
19.6	16.6	20.1	19.7	18.9	21.5
<u>i 21</u> ✓	20.7	20.2	21.4	18.8	21.4
18.6	21.0	19.3	20.2	19.7	20.4
17.9	<u>i 22</u> ✓	19.7	20.9	20.7	19.7
19.2	19.3	19.5	21.2	20.0	19.4

August 19, 1911

Messier 3 continuation of prev. Magna only

Time	Square	Time	Square	Time	Square	Time	Square	Time	Square	Time	Square
12.43	<u>h 22</u> ✓	(12.45)	<u>h 22</u> ✓	(12.50)	<u>g 21</u> ✓	(12.55)	<u>g 21</u> ✓	(1.00)	<u>g 22</u> ✓	1.05	<u>g 22</u> ✓
19.3		20.9		21.2		20.7		20.0		20.6	
20.9		21.2		21.3		20.9		19.5		21.0	
20.9		21.3		<u>g 20</u> ✓		18.6		19.7		21.0	
19.7		21.2		19.4		18.9		20.8		21.1	
19.2		21.4		18.9		20.7		20.8		21.3	
20.7		19.7		19.4		20.1		21.4		20.0	
<u>h 22</u> ✓		16.0		19.6		21.2		20.6		20.9	
18.6		<u>g 19</u> ✓		20.0		20.9		19.3		20.3	
18.6		19.0		20.8		18.6		20.1		20.4	
18.9		18.8		20.8		20.1		13.5		18.6	
20.8		20.2		20.9		19.7		<u>g 19</u> ✓		17.3	
19.7		20.8		20.9		19.9		20.9		<u>g 21</u> ✓	
21.2		21.4		20.9		19.4		21.2		18.9	
21.2		21.0		21.2		19.7		20.1		21.2	
21.2		21.5		19.5		19.6		19.7		20.9	
20.8		20.6		21.0		20.1		19.3		19.3	
20.4		20.4		21.2		20.9		19.1		19.5	
20.2		21.2		21.3		21.5		19.7		20.9	
19.3		21.4		21.5		20.7		20.2		20.3	
20.7		20.6		20.8		<u>g 22</u> ✓		18.5		19.2	
21.2		20.7		19.5		18.6		18.0		19.7	
20.9		19.7		19.5		18.1		20.5		19.3	
19.7		19.3		19.6		21.2		19.8		18.9	
19.3		20.1		19.3		20.9		19.6		20.1	
19.2		19.5		19.7		21.2		21.5		20.5	
20.5		20.5		17.2		20.9		20.9		20.4	
19.7		20.8		<u>g 21</u> ✓		20.5		<u>g 20</u> ✓		<u>g 22</u> ✓	
19.5		21.5		18.9		18.6		18.9		20.1	
Time	20.1	Time	21.2	Time	20.7	Time	20.1	Time	19.3	Time	19.6
12.45		12.50		12.55		1.00		1.05		1.07	

August 19 1911
Messier 3 continuation of prev. Magna only

Square

1.07	<u>f 22</u> ✓	3 20	<u>e 19</u> ✓	3 28	<u>e 20</u> ✓	14 35	<u>e 22</u> ✓	3 43	<u>d 20</u> ✓
	20.4		15.8		20.9		16.0		21.2
	20.9		16.5		20.7		19.7		14.5
	20.0		18.2		19.4		19.3		<u>d 21</u> ✓
	20.1		20.9		19.6		20.7		18.5
	19.6		21.6		19.7		19.2		19.7
	20.5		20.4		20.0		19.4		20.6
	18.9		20.8		20.9		20.7		20.1
	19.5		19.7		21.4		19.3		19.3
	19.7		21.2		21.5		21.1		21.1
	20.1		19.2		<u>e 21</u> ✓		21.5		19.6
	21.0		21.0		20.5		20.9		20.4
	21.2		21.5		20.4		19.5		20.8
	20.6		20.7		20.2		18.1		20.4
	20.3		20.7		19.3		19.3		<u>d 22</u> ✓
	20.4		21.2		20.4		<u>d 19</u> ✓		20.5
	20.7		20.9		19.0		20.9		20.9
	20.7		21.5		20.1		21.4		21.6
	21.1		<u>e 20</u> ✓		20.7		20.7		21.5
	20.8		18.9		21.2		21.2		20.9
	18.0		19.7		20.2		20.6		20.8
			19.3		20.4		18.9		20.7
			19.3		20.0		20.6		19.3
			19.3		18.9		<u>d 20</u> ✓		15.5
			19.3		19.5		20.6		15.5
			20.7		20.9		19.1		19.9
			21.2		20.8		20.9		<u>c 19</u> ✓
			21.5		21.0		20.8		20.1
			21.5		20.9		20.7		20.2
			21.5		21.6		20.4		21.3
			21.5		21.3		20.8		21.2
1.07		3 27	21.5	3 34					20.6

3 51	<u>C 19</u> ✓	3 58	<u>C 22</u> ✓	4 6	<u>b 21</u> ✓	4 14	<u>a 21</u> ✓
	19.7		20.8		21.0		20.6
	19.3		20.1		19.6		14.5-
	21.5-		16.2		20.4		<u>a 22</u> ✓
	21.7		<u>b 19</u> ✓		21.7		19.2
	19.8		20.1		21.8		20.9
	20.1		20.7		20.9		21.6
	<u>C 20</u> ✓		21.5-		21.2		21.7
	19.7		20.5-		<u>b 22</u> ✓		21.7
	20.1		19.3		20.7		21.7
	19.7		20.4		19.7	4 16	20.5-
	21.0		20.1		20.8		21.5-
	21.4		19.3		21.2		19.7
	20.5-		20.1		20.6		
	20.7		19.3		21.2		
	20.7		21.5-		21.2		
	<u>C 21</u> ✓		<u>b 20</u> ✓		<u>a 19</u> ✓		
	19.3		20.1		19.5-		
	20.8		21.7		19.5-		
	20.8		20.1		19.3		
	21.3		19.3		21.4		
	19.3		21.5-		21.2		
	20.4		20.9		21.2		
	20.4		20.7		20.9		
	20.5-		21.0		20.9		
	21.2		19.6		<u>a 20</u> ✓		
	<u>C 22</u> ✓		21.4		19.7		
	20.4		20.2		20.6		
	19.7		<u>b 21</u> ✓		21.5-		
	21.5-		19.3		17.5-		
	20.4		21.3		<u>a 21</u> ✓		
					20.7		

Remeasures of 05.15 g 5, for checks +
 R.A. ^{diff} Dec. ^{diff} mag. ^{diff} Δ g.

4 40

4.7 0 0.3 +2 21.0 0 0.5-

4.3 +4 1.3 -2 21.7 0 -

12.5 -2 5.4 0 21.7 10 -

0.4 +3 8.0 0 20.5 +2 -

0.7 0 14.4 0 18.9 -4 -

0.5 -1 1.3 +1 20.5 0 1.5-

2.5 -1 5.7 0 20.7 0 -

10.0 0 3.0 -3 20.5 -1 -

12.0 -1 4.5 +2 19.3 -2 -

11.9 -1 7.0 +2 20.6 0 -

1.3 +3 9.6 +2 19.3 -1 -

7.3 +1 10.2 -2 19.5 -3 -

6.0 0 12.2 0 20.9 -3 -

6.5 0 1.8 -1 15.5 -7 5-

9.8 -2 0.6 +2 20.2 -2 -

2.0 +1 4.0 0 20.5 0 -

6.0 -3 8.7 +2 19.7 0 -

3.8 0 12.2 +2 18.9 -5 -

18) ± 2.5 ± 4.5 ± 3.0

mean diff.

bet. 2 meas.

$\begin{matrix} \text{mm} \\ 0.13 \\ \text{mm} \\ 0.13 \end{matrix}$ $\begin{matrix} \text{mm} \\ 0.13 \\ \text{mm} \\ 0.13 \end{matrix}$ $\begin{matrix} \text{mm} \\ 0.13 \\ \text{mm} \\ 0.13 \end{matrix}$

mid from mean 0.13
 map $\begin{matrix} \text{mm} \\ 0.4 \\ \text{mm} \\ 0.8 \end{matrix}$

0.085

See page 40
 Remark
 in 12d.

Brooks Comet.Tues. Sept 12, 1911.

8 P.M.	a_0 Comet	3.79 +1
	Comet 3 e	3.60 -18
	Comet-3 d	3.91 +13
	f 6 comet	3.82 +4
		<u>3.12</u>
	mean	3.78

$a = i$	Here. 3.79
$b = \beta$	Drac. 2.99
$c = \gamma$	2.42
$d = \delta$	$\{ \begin{smallmatrix} 4.98 \\ 4.95 \end{smallmatrix} \}$ 4.21
$e = \epsilon$	3.90
$f = \zeta$	3.22
$g = \eta$	2.89
$h = \theta$	4.11
$k = \iota$	3.47
l	1.9
m	2.1
n	1.7

Wed. Sept 13.

8 P.M.	a_0 Comet	3.79 +6
	Comet 3 e	3.60 -13
	comet 4 d	3.81 +8
	f 5-comet	3.72 -41
		<u>292</u>
		3.73

o	3.0
p	3.6
q	5.0
r	3.5
s	4.3
t	4.7
u	4.2
v	4.3

See also Monwell record book. (End of Cooke book)
(See page 71.)

Tues. Sept. 26, 1911.

Comet, k (3.4)

7:55 P.M. - Stasty obs.

cloudy a little later before careful
observations were made. but tail
was seen as per drawing.
app. 4° to 5° in length - v. faint
- naked eye -

Brocken Comet

Thursday. Sept 28. 8 P.M.

Comet 4	h	3.2	+ 3
Comet 1	o	2.9	0
h	8 comet	2.7	- 2
		<u>2.93</u>	

Sun Oct 8. 6:30 P.

W₄ Comet 4

3.0
<u>2.4</u>
2.70

hgt clds about

Mon. Oct. 9.

7 P.M.

Comet 3 X 2.5

Normal Observations, Coby.

Dec. Sept. 17.	8 P.M.	{ g_2 Comet Comet 0 f	~~3.1~~ ~~3.2~~	~~3.15~~
Jan. " 19,	8 "	{ g_3 Comet f, "	~~3.2~~ 3.3	3.25-
Wed. " 20,	7 "	{ g_4 Comet f, " .	3.3 3.3	3.30
Fri. " 22.,	8 "	Comet 0 K.	3.5-	3.5-
Sat " 30,	8 "	h_9 Comet Comet 0 Comet 4 f.	2.8 3.0 3.2	3.00

m 5 - var. 62.

Special Sequence. $a' - a'$. See 14x17 chart
March 10 - 1914. S. I. B. Obs.

X 10806	$a', v_3 b'$
X 7000	$b'_2 v, c'$
X 8657	$a'_3 v, b'$
X 8790	$a', v_3 b'$
X 9159	$a'_2 v_3 b'$
X 9501	$a'_0 v, b'$
X 9790	$a'_2 v, b'$
X 9859	$a'_0 v$
X 9940	$a'_3 v, b'$
X 10249	c', v, d'
X 10253	$d'_0 v$
X 10256	$d'_0 v$
X 10257	$a'_2 v_2 b'$
(A 1781	$c'_0 v \pm$)
A 1782	$c'_0 v$
A 1784	$b'_2 v, c'$
A 1785	$a', v_3 b'$
A 1788	$b'_2 v_2 c'$
A 1786	$a'_0 v$
A 1787	$a'_3 v_2 b'$
A 1789	$a', v_2 b'$
A 1790	~~$a'_3 v$~~ $a', v_3 b'$
A 1791	$a'_3 v, b'$
X 8599	$a'_2 v_2 b'$
X 8596	$a'_3 v, b'$
X 8604	$c'_0 v$

X 8594 $b'_0 v$
 X 8578 $b'_0 v \pm$ defect on image
 X 8583 $a'_0 v$
 X 8576 $b'_2 v_2 c'$
 X 8571 $a'_0 v$
 X 8564 $a'_1 v_2 b'$
 X 8591 $c'_1 v_1 d'$
 X 8586 $b'_2 v_1 c'$
 X 8556 $d'_0 v$

March 11, 1914:

X 8544 $a'_1 v_3 b'$
 X 8542 $c'_0 v$
 X 8540 $a'_2 v_1 b'$
 X 8538 $b'_0 v$
 X 8515 $c'_0 v$
 X 7789 $a'_1 v_3 b'$
 X 7661 $a'_2 v_3 b'$
 X 7603 $b'_2 v_1 c'$
 X 7601 $a'_2 v_2 b'$
 X 7038 $a'_3 v_1 b'$
 X 7469 $a'_0 v$
 X 7499 Too faint, ... all sl. light
 X 7043 $a'_2 v_2 b'$
 X 7036 $d'_1 v_0 e'$
 X 7018 $a'_0 v$
 X 7008 $b'_3 v_1 c'$
 X 7010 $a'_1 v_3 b'$

MS. No-62
March 11.

X 6991 $b'_1 v_2 c'$
 X 6981 $b'_0 v$
 " $g_0 a'; g_3 b'; h; l, c', m; m_0 d'; m_2 e', n$
 X 6974 $a'_3 v, b'$
 X 6815 $c'_0 v$
 X 6960 $b'_0 v$
 X 6958 $d'_0 v$
 X 6814 $a'_2 v_2 b'$
 " $g_2 a'_2 h; \{b_0 b'\}; l, c', m; m_0 d'; m_0 e';$
 " $\{h_2 b', l\} a'_4 b'_2 c'_2 d'_2 e'$

March 13-

X 6806 Too faint, i.e. all slown (w) ft
 X 6805 $a'_1 v_3 b'$
 X 6786 $b'_2 v, c'$
 X 6877 $a'_4 v, b'$
 X 6838 $d'_1 v, e'$
 X 6956 $a'_0 v$
 X 6836 $b'_1 v, c'$
 X 6829 $d'_0 v$
 X 6821 $a'_1 v_3 b'$
 X 6817 $c'_0 v; d'_0 v$ how late
 X 6785 $a'_3 v_2 b'$
 X 6742 $a'_2 v_2 b'$? diff.
 X 6637 $e'_0 v \pm$
 C 10149 $a'_2 v_2 b'$
 X 12123 $a'_2 v_3 b'$
 X 8754 $d'_0 v$

ms. No 62. - 9
Mar. 13 - 1894.

X 10974 $d'_0 v$
X 10973 $d'_0 v$
X 10967 $c'_1 v_1 d'$
X 8467 $a'_3 v_2 b'$
X 10804 $b'_0 v$
X 10460 $c'_0 v$
X 10805 $a'_3 v_1 b'$
X 10808 $b'_3 v_0 c'$
X 10452 $a'_3 v_2 b'$
X 8453 $b'_0 v$
X 8358 $c'_0 v$
X 10458 $b'_0 v$
X 8452 $c'_0 v$

$a'_4 b'_3 c'_1 d'_2 e'$

$a'_4 b'_3 c'_1 d'_3 e'$

M.W. 85- $a'_2 v_2 b'$
" 146 $a'_1 v_2 b'$
" 112 $b'_0 v$
" 105- $d'_0 v$
" 107 $b'_1 v_2 c'$
" 111 $a'_3 v_1 b'$
" 106 $d'_0 v$
" 84 $a'_2 v_1 b'$
" 110 $a'_2 v_2 b'$
" 86 $a'_1 v_3 b'$
" 82 $d'_0 v$
" 108 $a'_2 v_2 b'$

Int iso.

" iso

" "

" -

" "

" -

Par iso

Int "

" "

ms - Nob 2 -
 Special Sequence - Mar. 27.

a 1756 $a'_4 v_1 b'$

a 1812 $b'_0 v_2 c'$

a 1809 $b'_1 v_1 c'$

a 1825 $a'_3 v_2 b'$

a 1829 $a'_1 v_3 b'$

a 1828 $d'_0 r$

X 8453 Repeat $b'_1 v_2 c'$ - always faint though.
 but do not see any special
 defect.

ms. no 62.
April. 2 - 1910.

X9916 var o d'

var. No. 4.

A 1756 10 var !! 10 ft + diffie. blurred with other stars
 A 1781 10 var ± very poor + diffie ..
 A 1782 10 var.
 A 1825 10 var ± v. diffie. too poor. more v. bad,
 A 1828 9/2h
 A 1829 dblet more elongated. very bad. not possible to make out magnitude.

Did not
have been
measured
on
1756.
1781.

On A 1829. Miss L agrees.

" 1781 " " Says faint

" 1756 " " " " perhaps 0 h v. diffie

MS. No. 35-
 Remeasures. April 8, 1914

✓ X 8515 h o var. ^{14.25-}
 ✓ X 7499 ? $\mu_{avg} =$ poor ft + defective prob. var. is ft. pl. poor
 ✓ X 7469 h, var 1 m ^{14.39} $\neq$ diffie. μ_{avg} of diff. form on both sides & el.
 ✓ X 7043 h o var ^{14.25-}
 ✓ X 6806 m o var ^{14.53} $\neq$ short sep. ? 5 cm ft. diff.
 ✓ X 6805 m o var ^{14.53}
 ✓ X 6821 h o var ^{14.25-}
 ✓ X 6829 h o var ^{13.97}
 ✓ X 9501 h o var ^{13.97} $\neq$ μ_{avg} poor
 ✓ X 10973 h 2 12 ^{14.16}
 X 10974 g 1 2 h ^{14.76}

X 6805 h - h or m ^{much} nearer m than h
 X 6806 g - h or m from plate but nearer m than h.
 X 9501 h or l - m appears as left as h - less poor images.

ms. No. 40
April 15, 1914

X 8358	h ₁ 3l	14.01	
X 10806	~~h~~ m 1 2n	14.61	
X 10808	Var 0 h	13.97	
X 7469	g 2 2 h	13.81	
X 7499	Var 0 h	??	13.97? ft + diff. not reliable

April 21, 1914

ms. No. 40.

X 9916	Var 0 m	14.79 ±	4876.513
X 8538	h 0 var	13.97	4058.548
8540	h 1.1 l ±	14.11	" 662
8542	m 1.1 m	14.66	- 780
8544	h 1.2 l	14.26	- 854

A 1825	h 1.2 l	14.06	3717.517
1828	m 1.1 m	14.66	- 692
1829	h 0 Var	13.97	- 817

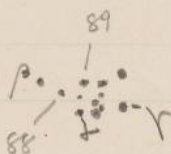
± very poor plate.

ms. No 85.
May 12, 1914

Rumens

ms 109	var = n ±	9537.874	14.79	I have small confidence in these measures - very diff. - 15 pass from var. & comb. star. Quays are of different form & intensity. var is close to other stars on some plates. comb. st. m = or is bet. than l. fear l is slightly variable.
- 112	h ₂ 1 l	" 950	14.16	
" 105	var = l ±	" 761	14.25	
" 107	" = l ±	" 412	14.25	
- 111	h ₃ 1 l	" 924	14.21	
" 106	var = l ±	" 786	14.25	
- 84	m, 2 m	9533.888	14.61	
" 110	var = l ±	9537.899	14.25	
" 86	" = m ±	9533.947	14.53	
" 104 ⁸	l - m ±	9537.836	14.39	
- 82	var = m ±	9533.816	14.53	
A 1791	var = m ±	diff. 3699.584	14.73	Try unsatisfactory on A plates
" 1790	too diff.	" .542	"	
" 1789	unpos.	" .499	"	
" 1787	"	3695.644	"	
- 1786	too diff.	" .602	"	
- 1788	unpos.	3698.504	"	
- 1785	l - m ±	3695.561	14.39	
" 1784	too diff.	" .519	"	
X 10257	more defective	5581.558	"	
10256	var = l ±	5579.551	14.25	
10253	l - m	5562.605	14.39	small bet. than on other plates & hence seem variable
10249	var = l ±	5560.608	14.25	
9940	n = 0 ?	4486.535	14.89	
8599	g 3, 1 l	4073.758	13.91	
8596	var = m	4073.553	14.53	
8604	var = m	4074.561	14.53	
8594	g 3, 1 l	4072.745	13.91	

X 8578	h ₂ lm	4070.655-	14.44
8583	var ₀ h	4071.538	13.97
8576	g ₂ zh	4069.795-	13.81
8571	h ₂ 1h	" 560	14.16
8564	var ₀ m	4067.636	14.53
8591	var ₀ l ± -	4072.538	14.25
8586	g ₂ zh	4071.747	13.81
8556	var ₀ m	4066.635-	14.53



Combine 88 with + and beta.

M.M.82	+3 beta	+ = m	beta = m	±	r ₂ +	r = l ±
x 8586	+2 beta	+ = l	beta = m	=	r ₄ r	r = g ±
x 8591	+3 beta	r = l	beta = m	±	r ₅ r	r: g = r ₂ h

$$t = \frac{14.53}{14.25} = \frac{14.25}{14.20} = 1.03$$

$$14.34$$

$$14.53$$

$$14.25$$

$$14.79$$

$$1.85$$

$$14.62$$

$$t = \frac{14.25}{13.65} = \frac{13.81}{2.71} = 13.90$$

$$V_{3.7} \pm 2.7 \beta$$

$$0 \quad 3.7 \quad 6.4$$

for
comb.
+

direct
Est.

Calc. $\frac{14.3}{14.4}$

$$r = 13.90$$

$$+ 14.33$$

$$\beta = 14.63$$

$$13.90$$

$$14.00$$

$$10$$

$$20$$

$$30$$

$$40$$

$$50$$

$$60$$

$$70$$

X 10808 14.0

16806 14.6

(over)

M 5. No 80.
 Special Sequence. Good plates only.
May 13, 1914.

A 1791	β_2 var
" 1790	β_2 var.
" 1789	Too poor.
" 1787	β_3 var.
" 1786	Too poor
" 1788	" "
" 1785	Var 0 +
" 1784	Poor.
X 10257	Image defective
10256	Var 0 +
10253	γ_2 2 +
~~10249~~	γ_1 3 +
~~9940~~	Poor
9859	var 0 β +
8599	Var 0 γ
8596	var 0 β <i>W. W. L. L.</i>
8604	β_1 var
8594	Var 0 γ
8578	Var 0 β
8583	+ 1. β + more slightly defec.
8576	var 0 γ
8571	var 0 +
8564	Var 0 β
8591	Var 0 +
8586	Var 0 γ
8556	β_1 var
12123	var 0 β
9916	γ_2 3 +

X 8754	var α β	
10967	γ 2 3 +	
8467	γ 3 1 +	
10804	var α β	
10460	β 3 var	
10805	γ 3 1 +	
10452	var α γ	
10458	γ 3 2 +	
8452	var α γ	
A 1756	Too poor	
1782	poor	
1781	Too poor	
X 10806	var α β ''	✓
10808	γ 1 3 +	✓
8358	var α γ	
10974	α 1 1 β	
7469	β , var	
7499	β , var	
10973	α 1 1 (3)	✓
6829	γ 3 1 +	
6821	var α + = mixed defec.	
7043	var α γ	
8515	var α β	
9501	Poor	
6805	γ 4 1 +	
6806	Too short base.	
8453	γ 1 4 +	
6817	Too poor	
7789	γ 1 4 +	
7661	var α γ	

X 7603 var o γ
 7601 β 1 var
 7038 var o + $\pm$
 7036 var o γ
 7018 γ 3 2 +
 7008 γ 4.1 +
 7010 γ 1 2 +
 8538 $\pm$ 1 1 β
 8540 γ 1 4 +
 8542 var o β
 8544 var o β'' +
 6991 γ 1.3 +
 6981 $\pm$ 1 1 β
 6974 γ 3.1 + $\pm$
 6815 var o γ
 6960 γ 3.1 + $\pm$
 6958 var o β
 6814 γ 2.2 +
 6786 var o +
 6877 var o +
 6838 var o β
 6956 β 1 var
 6836 γ 1 4 +
 6785 $\pm$ 2.1 β
 6784 γ 2 2 +
 6637 var o β +
 7000 poor
 8702 broken
 9790 β 1 var

X 9159	$\gamma 14 +$
8790	$\gamma 13 +$
A 1809	too poor
1812	" "
1829	" "
1825	" "
1828	" "
C 10149	" "
mm 85	+2 1β
82	+1 2β
108	+2 1β
86	+2 1β
110	+1 1β
84	var 0 β
106	var 0 +
111	$\gamma 2, 1 +$
107	$\gamma 2, 1\beta$
105	$\gamma 2, 2 +$
112	$\gamma 1, 3 +$
109	$\gamma 2, 1\beta$

Probably from
too long exp.
These plates
are diffie.
differences bet
 $\gamma + + \beta$ seem
small in general.

Those with " reexamined indefig. + found correct.

May 26-1914.

Messier 5.

Comparison of 2 plates of Mitchell

of Cramer 330. One taken Apr. 10-1914 2^h exp. No. 22.
B. Moore, " " " May 2 - 4^h exp. B 32.

Centric search for variables. Region in general too dense on
plates. Only a few of the brighter ^{known} variables seen on
either plate. Definition of B 32 much better than that of 22.
Near center 25 or 30 stars can be compared. No case
of pure variation seen.

Stars seen to about μ , which is not far from maximum
of the fainter variables.

Messier 3.

Examined for stars. center of cl. on plates made on
Apr. 12, 13, 17, + 26. Plates in general show μ well, & faintly.
One var. found, which at max. is brightest star within $7.5 \pm$
of center of cluster.

This star on Apr. 5 is at max. & is brighter than (a or b).

" " " " 12 is faint, + about = d

" " " " 13 " " " brighter than d

" " " " 17 " at max & is bright " " "

" " " " 26 " near min + a little brighter than d.

This is the brightest var. found in the cluster.

Among the brighter stars ($14 \text{ magn} \pm$) few if any others
seen to vary. These plates show the brighter stars
well at center of cl. of which there are perhaps 20-
30 μ all. ($14-15 \text{ magn.}$). The vars. found are nearly
all among the fainter stars of the cluster & these are
not sufficient well shown to examine for variables.

The Mitchell plates with screens show some stars which are of very different magnitude than when seen on the X plates for example. A striking case is that of star 127. Some of the adjacent stars show similar effects. No 27 will be a good plate for an enlargement. $1^m = 2'' \pm$ to compare with our other enlargements.

July 21, 1914,

P.M.

10" Polar Telescope. West Wing -

98

30

Set on M13. Well resolved. One wd estimate
a few 100 stars, resolved to the centre -

M.C. 6171. rather faint. not well resolved
wd not be sure whether nebula with a few stars in it.
or a cluster. glob in form not v. bright at centre.
confus. of 6171

M.C. 6218. !! pB. glob - p Cat M.
fairly well resolved.

M.C. 6229. Not resolved. pB. appears like
a neb. v m b M. altho a stellar nucleus, but I
do not resolve the apparent nebula into stars.

July 27, 1914

Counts of stars near globular clusters -

A vehicle is used giving an area on ϕ plate of 50 sq. mm. area is 20 sqs. 10 mm on a side = 424, sq. card = " " at a dist. of 30' from center of cluster to center of square.

X 8064, 47 Lucasae. Vch ~ 60m

Four regions, each 50 sq', at distance 30', comb'd N.E.
S. + W.

N, 6; E, 6; S, 13; W, 7. Sum, 32; mean 8.0; freq.^1 , 0.16

X 8065 - Wt 362. Crd. 120m.

$\bar{N}, 5'; E, 10'; S, 15'; W, 41$, Mean $10.2'$ - $\bar{S}, 20$

X ~~5001~~ ~~7099~~ E WLC 7099 Veh-120m

N 3; S, 6; S, 4; W, 3; June 16; Mean 4.0; $\alpha = 0.08$

X 7929 nose 6809, sub 100m

N 7; E 7, 5, 15; W 11; Dues 40; Mean 10; $\alpha = 0.20$

X 7808 vol. 130. N.Y.C. 5986.

$N 23; E 18; S 16, W 23$ ^{Sum} 80 Mean 20, $n = 0.40$

X 7852. Sub-127m. Ngl 6205'

N. 8; E, 12; S, 5; W 7. Sum 32, Mean 8, $\sigma = 0.16$

X 7846⁵, vol 140, NYU, 7089

N. 9; E, 6; S, 7; W 10; Sum 32 Mean 8: — 0.16

X 7767 Evch, Wtl. 7078

$N, 10; E, 9; S, 7; W, 15; \text{Sum } 41, \text{Mean } 10.2 \approx 0.20$

~~P~~ 1686, Sep. 120, WLL 6266.
 N 57; E 61; S, 50; ^W 65; Jun. ~~58~~²³³; Mean 58.25; per sq. 1.16

X 6792, Sep. , NYC 5272
 N, 3; E, 2; S, 3; W, 3, Jun 11; Mean 2.75; ~ 0.06
 Above cluster (M3) rather near edge of plate so
 that his areas were not in exact distance & direction
 but areas were same -

A 2150, Sep. 270^m 47⁵ Tue.
 N, ~~9~~²¹; E, ~~12~~²¹; S, ~~17~~¹⁷; W, ~~11~~¹¹, Jun ~~54~~⁷⁴ Mean ~~13.5~~^{18.5} Per sq. 0.18
 This plate is 60" = 1^m, i.e. one count. is 100 sq', ~~0.14~~
 first count, crossed out, was made at wrong distance, at 42.5" from center

Sept. 15, 1914.

measures of Barnard's Companion Star "R". See
AM 4409, + letter of Barnard of Sept. 7, 1914.

✓ X 6805 h 3, ~~1~~ l ^{mean} 14.25, 14.15 - 14.20

✓ X 12123 h 3.0 l, 1 m 14.25, 14.25, 14.45 - 14.32

✓ X 8578 h 3.0 l 2 m 14.25, 14.25, 14.35 - 14.28

✓ X 10256 h 4, 1 l 14.35, 14.15 - 14.25

✓ X 10806 h 3.0 l. 2 m 14.25, 14.25, 14.35 - 14.28

AM.W. 86 K 0 l ± 14.25

October 9, 1914

Estimate of steps of frequency of M 5.

X 8583 $a_6 b_8 c_5 d_3 e_6 f_3 g_3 h_2 i_1 m_3 n_3 o_3 p_4 q_5$ Oct 12 - 1914X 8790 $a_7 b_8 c_5 d_3 e_8 f_4 g_3 h_3 i_0 m_4 n_2 o_2 p_4 q_5$ M.V 82 $a_7 b_5 c_5 d_4 e_4 f_3 g_3 h_2 i_0 m_3 n_2 o_2 p_7 q_5$ Oct. 15, 1914X 7603 $a_7 b_8 c_6 d_4 e_6 f_4 g_3 h_3 i_2 m_2 n_2 o_3 p_4 q_5$ X 7601 $a_6 b_6 c_5 d_3 e_7 f_4 g_3 h_3 i_1 m_4 n_3 o_4 p_3 q_5$

Aug 23, 1910

Messier 5 Det. of position of a, b, c, d, e
comp. stars for special study of Var 62.

Scale used in det. of pos. of nebulae

	X	Y	Z	W	V
Var 55-	67.0	104.0	77.7	101.0	
" 32	108.4	100.1	118.8	96.8	
" 62	96.5	122.4	107.3	119.3	
a'	80.8	96.6	91.4	93.6	
b'	125.9	127.8	136.8	124.5	
c'	106.0	118.2	116.7	105.0	
d'	106.5	118.8	116.3	115.8	
e'	127.7	122.7	138.6	119.3	

on Enl. photo
used for Plate

stars are all
in South falling
quadrant of
cluster

mid of scale is
 $\frac{1}{2}$ mm ~~0.5~~ =
2.93"

	X			Y		
a'	13.8	2.76	15.7	13.7	27.4	15.9
	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>
	690	1380	785	685	1370	795
	1242	2484	1413	1233	2466	1431
	<u>276</u>	<u>552</u>	<u>314</u>	<u>274</u>	<u>548</u>	<u>318</u>
	4071	814	463	404	808	46905
(55)	80.3	(32) 202.7	(62) 167.6	(55) 80.3	(32) 202.7	(62) 167.6
	<u>121.0</u>	<u>121.3</u>	<u>121.3</u>	<u>120.7</u>	<u>121.8</u>	<u>120.7</u>

X Z
a' + 121.1 - 141.7

8					
7.4	3.5	25.8	7.4	3.2	25.7
<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>
370	175	1290	370	160	1285
666	315	1290	666	288	1285
<u>148</u>	<u>70</u>	<u>2322</u>	<u>148</u>	<u>64</u>	<u>2313</u>
21.830	10.3	516	21.8	9.4	514
(55) -163.1	(32) 76.1	(62) 217.9	(55) -163.1	(32) 76.1	(62) 217.9
<u>-141.3</u>	<u>-141.4</u>	<u>-141.8</u>	<u>-141.3</u>	<u>-142.3</u>	<u>-142.1</u>

	589	175	29.4	59.1	~~18.0~~	29.5
	295	295	295	295	18.0	29.5
	2945	875	1470	2935	295	29.5
	5301	1575	2646	5319	900	1475
	1178	350	588	1182	1620	2655
	173755	51625	86730	1743	53.1	870
(55)	80.3	(32) 202.7	(62) 167.6	(55) 80.3	(32) 202.7	(62) 167.6
	254.1	254.3	254.3	254.6	255.8	254.6

X Z
b' + 254.6 233.2

	~~238~~	~~277~~	~~5.4~~	~~23.5~~	~~27.7~~	~~5.2~~
	~~295~~	~~295~~	~~295~~	~~295~~	~~295~~	~~295~~
	~~1190~~	~~1385~~	~~270~~	~~1175~~	~~1385~~	~~260~~
	~~2442~~	~~2493~~	~~486~~	~~2415~~	~~2493~~	~~468~~
	~~576~~	~~554~~	~~108~~	~~570~~	~~554~~	~~104~~
	~~70.2~~	~~81.7~~	~~159~~	~~70.2~~	~~81.7~~	~~153~~
(55)	-163.1	(32) 151.7	(62) 217.9	-163.1	(32) 151.7	(62) 217.9
	-233.3	-233.4	-233.8	-232.4	-233.4	-233.2

From page 93 -

c'

39.0	295	9.5	39.0	295	9.4
<u>295</u>	<u>24</u>	<u>295</u>	<u>295</u>	<u>24</u>	<u>295</u>
1950	1180	475	1950	1180	470
3510	590	855	3510	590	846
<u>780</u>	<u>7.1</u>	<u>190</u>	<u>780</u>	<u>6.20</u>	<u>188</u>
115.1	(32) 202.7	(62) 167.6	115.1	(34) 202.7	(62) 27.7
(55) 80.3			(55) 80.3		(62) 167.6
+ 195.4	+ 195.6	195.6	+ 195.4	+ 196.5	195.3

$$c' \quad x + 195''.6$$

$$y - 175''.6$$

4.2	8.1	14.2	295	8.2	14.3
<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>
210	405	710	11.80	410	715
378	2295	1278	(55) 163.1	738	1287
<u>84</u>	<u>162</u>	<u>254</u>	<u>164</u>	<u>286</u>	
12.4	23.9	41.9	(32) 24.2	(62) 42.2	
(55) 163.1	(32) 151.7	(62) 217.9	(55) 174.9	(62) 217.9	
- 175.5	- 175.6	- 176.0	- 175.9	175.7	

d'

385	2.9	295	385	2.5	9.0
<u>295</u>	<u>295</u>	<u>9</u>	<u>295</u>	<u>295</u>	<u>295</u>
1925	145	2655	1930	125	2655
3465	261	2655	3474	325	167.6
<u>770</u>	<u>58</u>	<u>8555</u>	<u>772</u>	<u>7.4</u>	
113575	(32) 202.7	(62) 167.6	113.9	202.7	+ 194.2
(55) 80.3			80.3		195.3
+ 193.9	+ 194.1	+ 194.2	+ 194.2		

$$d' \quad x + 194''.3$$

$$y - 207''.0$$

14.8	18.7	3.6	14.8	19.0	8.5
<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>
740	935	180	740	950	175
1332	1683	324	1332	1710	315
<u>296</u>	<u>374</u>	<u>72</u>	<u>296</u>	<u>380</u>	<u>70</u>
43.7	58.2	10.6	43.7	56.05	10.3
(55) 163.1	(32) 151.7	(62) 217.9	(55) 163.1	(32) 151.7	(62) 217.9
- 206.8	- 206.9	207.3	- 206.8	- 207.7	- 207.6

e'

60.7	19.3	31.2	60.9	19.8	31.3
<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>
3035	965	1560	3045	990	1565
5463	1737	2808	5481	1782	2817
<u>1214</u>	<u>386</u>	<u>624</u>	<u>1218</u>	<u>396</u>	<u>626</u>
179.1	56.955	92.0	179.7	58.4	92.3
(55) 80.3	(32) 202.7	(62) 167.6	+ 80.3	202.7	167.6
+ 259.4	+ 259.6	259.6	+ 260.0	+ 261.1	+ 259.9

$$e' \quad x + 259''.9$$

$$y - 218''.1$$

18.7	22.6	0.3	18.3	22.5	0
<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>	<u>295</u>
935	1150	285	915	1125	295
1683	2034	0.885	1647	2025	0
<u>374</u>	<u>452</u>	<u>0.885</u>	<u>366</u>	<u>450</u>	<u>0</u>
55.2	66.7	(62) 217.9	(55) 54.0	(32) 66.4	
(55) 163.1	(32) 151.7	- 217.9	(55) 163.1	(32) 151.7	
- 218.3	- 218.4	- 218.8	- 217.1	- 218.1	- 217.9

Camb. - Sept. 10. 1915

Messier 5 - Var No. 62 -

Comparison with special sequence on plates not found when previous measures of this var. with spec. sequence were made.

		S.P.	mark	Means
X 9916	62	15.35	c'1,0d'3e' =	15.35 14.35
✓ 6813		14.75	a'2,3b'	14.70 14.72
✓ 10254		14.75	b'1,3c'	14.98 14.86
✓ 6763		15.30	b'3,1c'	15.16 15.23
✓ 7009		14.70	a'1,5b'	14.54 14.62
✓ 8662		15.40	b'3,1c'	15.16 15.28
✓ 8710		14.75	a'1,3b'	14.64 14.70
✓ 7007		15.20	b'4,1c'	15.22 15.21

Mess. Islands obs. copied from Bk 44 in ink done

~~10808~~

Miss R. estimate

x 8919

x 10865

a+b

b+c

c+d

d+e

e+f

f+g

g+h

h+i

k+l

l+m

m+n

n+o

o+p

p+q

q+r

r+s

s+t

t+u

a₃b₄c₅d₁e₃f₄g₃

M.C.

bb56.

g₃h₃k₃l₂m₃n₁o₃p₂q₂r₂s₁t₂u₂v₂

62.

reads .0.20 or gr.

defective. var. sing. st.

is faint, but waves of c'd + e something alike.

is v. hozy + poor

t. measure doubtful. sing. faint.

is not good but fair

v. st. meas. doubtful

v. st. measure doubtful

10808

15.25

more poss. defective

over

~~Sept. 14, 1915~~
 Sept. 14, 1915

Messier 5 - Var. 62.

Re-measures of plates giving results .0.20 or gr.

X 6637	15.60	faint + image has defective var. sing. ft
6838	15.40	diffic. + faint contains faint but image of c'd + e look something alike.
7000	15.25	diffic. image v. hazy + poor
7036	15.50	image v. ft. measure doubtful. var. sing. faint
7603	15.10	image not good but fair
7661	14.80	image v. ft. meas. doubtful
8453	15.00	image v. ft. measure doubtful
10256	14.60 ^{''}	
10458	14.85 ^{''}	
10804	14.90 ^{''}	
10805	14.80 ^{''} 75	
10808	15.25	image poor. defective

over

MMW.84

14.85^u

107

14.85^u

108

14.65

X 6817. ^{3376.677} a rev. by Miss L. shows that her previous $a \approx 2b$, if correctly copied is undoubtedly much as you of some sort as she makes it unmistakably much shorter than b . Hence I have changed her estimate to $\sqrt{a} = d$

Camb. - Nov. 27 1915

M.S. No. 77.

Special Sequence, see large chart.
comb of wogu. with primary sequence, direct

a" 13.85-
b" 14.7
c" 15.1
d" 15.6
e" 16.0

x 8540
a" b" c" d" e"

a" 14.0
b" 14.8
c" 15.63
d" 15.6
e" 16.0

mvr 105-
a" b" c" d" e"

AB a²₂ b²₄ c²₄ d²₂ e
PM a²₅ b²₃ c²₃ d²₂ e
MmW. a²₃ b²₂ c²₃ d²₁ e
" a²₂ b²₃ c²₄ d²₁ e

0.0
4.2
7.2
10.7
12.2

Means a²_{4.2} b²_{3.0} c²_{3.5} d²_{1.5} e²

Nov 30, 1912

MS- Spec. Sequence for No. 77.

Var 39	51.9	~~14.8~~	62.6	~~17.5~~
" 77	67.2	37.0	78.1	39.4
" 29	135.7	74.4	147.0	76.3
a"	54.8	22.4	~~63.2~~ ^{5.6}	25.8
b"	103.5	26.5	114.4	28.6
c"	92.8	38.3	103.8	40.4
d"	118.7	83.6	130.3	85.4
e"	78.3	49.8	89.3	52.3

on Encl. plate
used for plate
Share all
South
position
center
gel.
assume
1 dw. =
2.97

a"	2.9 2.97 203 261 58 8.6 126.1 134.7 -5-	12.4 2.97 868 1116 248 36.8 172.7 135.9 +7	80.9 2.97 5663 7281 1618 240.3 376. 135.7 +5-	3.0 2.97 8.91 126.1 135.0 -2	12.5 2.97 87.5 112.5 250 37.1 172.7 135.6 +4	81.4 2.97 5698 7326 1628 241.8 376 134.2 -1.0
----	---	--	---	---	--	---

x
-135.2

z	7.6 2.97 532 684 152 22.6 249.5 -226.9 -4	14.6 2.97 1022 1384 292 43.4 184.3 227.9 +2	52.0 2.97 3640 4680 1040 154.4 75.1 229.5 +18	7.6 2.97 532 584 152 21.6 249.5 227.9 +2	14.3 2.97 1006 1287 290 42.5 184.0 227.0 -7	51.2 2.97 3584 4608 1024 152.6 75.1 227.2 -5-
---	---	---	---	--	---	---

x
-227.7

b"	51.6 2.97 3612 4644 1032 153.3 126.1 279.4 -7	36.3 2.97 2541 3267 726 107.8 172.7 280.5 +4	32.2 2.97 1610 2898 644 95.0 376.0 281.0 +9	51.8 2.97 3626 4662 1036 153.8 126.1 279.9 -2	36.3 2.97 107.8 872.7 280.5 +4	32.6 2.97 2282 2934 652 96.8 376.0 279.2 -9
----	---	--	---	---	---	---

x
-280.1

z	11.7 2.97 819 1053 234 34.7 249.5 214.8 -15-	10.5 2.97 735 945 210 31.2 184.5 215.7 -6	47.9 2.97 3353 4311 958 142.3 75.1 217.4 +11	11.1 2.97 777 999 222 33.0 249.5 216.5 +2	10.8 2.97 756 972 216 32.1 184.5 216.6 +3	47.7 2.97 3339 4293 954 141.7 75.1 216.8 +5-
---	--	---	--	---	---	--

x
-216.3

Cont. from p 101.

c

40.9 29.7 28.63 36.81 8.18 121.5 126.1 -247.6	28.6 29.7 179.2 230.4 51.2 76.0 172.7 -248.7	42.9 29.7 300.3 386.1 85.8 127.4 376.0 -248.6	22.9 41.2 29.7 28.84 370.8 82.4 122.3 126.1 248.4	25.7 29.7 179.9 231.3 51.4 76.3 172.7 249.0	43.2 29.7 302.4 388.8 86.4 128.3 376.0 247.7
-7	+4	+3	+1	+7	-6

X
-248."3

28.5 29.7 164.5 218.5 47.0 69.945 249.5 -185.6 179.07 -15	1.3 29.7 91 117 26 3.8 184.5 188.5 180.7 -5	36.1 29.7 252.7 324.9 72.2 107.217 75.1 182.3 +11	22.9 29.7 204.3 206.1 45.8 68.5 249.5 181.0 -2	1.0 29.7 184.5 181.5 +3	35.9 29.7 251.3 323.1 71.8 106.6 75.1 181.7 +5
--	--	---	--	-------------------------------------	--

X
-181."2

d

66.8 29.7 467.6 601.2 133.6 198.4 126.1 -324.5 -19	51.5 29.7 360.5 463.5 1030 153.0 172.7 -325.7 -5	17.0 29.7 119.0 153.0 340 50.490 376.0 325.5 -7	67.7 29.7 473.9 609.3 135.4 201.1 126.1 327.2 +10	52.2 29.7 365.4 469.8 104.4 155.0 172.7 327.7 +15	16.7 29.7 116.9 150.3 334 49.6 376.0 -326.4 +2
68.8 29.7 481.6 619.2 137.6 204.3 249.5 -45.2 -19	46.6 29.7 326.2 419.4 93.2 138.4 184.5 -46.1 -10	9.2 29.7 64.4 82.8 18.4 27.3 75.1 -47.8 +7	67.9 29.7 475.3 611.1 135.8 201.7 249.5 -47.8 +7	46.0 29.7 322.0 414.0 92.0 136.6 184.5 -47.9 +8	9.1 29.7 63.7 119 18.2 27.0 75.1 -48.1 +10

X
-326."2

X
-47."1

e

26.4 29.7 184.8 237.6 52.8 78.4 249.5 126.1 204.5 -8	11.1 29.7 97.7 99.9 222 33.0 172.7 205.7 +4	57.4 29.7 401.8 516.6 114.8 170.5 376.0 205.5 +2	26.7 29.7 186.9 240.3 53.4 79.3 126.1 305.4 +1	112 29.7 78.4 100.8 22.4 33.3 172.7 206.0 +7	57.7 29.7 403.9 519.3 115.4 171.4 376.0 204.6 -7
---	---	--	--	--	--

X
-205.3

X
-146.5

35.0 29.7 24.5 31.5 70 104.0 249.5 -145.5 -16	12.8 29.7 89.6 115.2 25.6 38.0 184.5 -146.5 +16	24.6 29.7 172.2 221.4 49.2 73.1 75.1 -148.1 +16	34.8 29.7 243.6 313.2 69.6 103.4 249.5 -146.1 -4	12.9 29.7 90.3 116.1 25.8 38.3 184.5 -146.2 -7	24.0 29.7 16.8 21.6 4.8 71.3 75.1 -146.4 -1
---	---	---	--	--	---

ms. MO-77.
~~Dec 6 1915.~~

Special Sequence

A 1790	14.85-	✓
X10806	14.75-	✓
6877	15.30	✓
8538	14.30	✓
7038	15.20	± ✓
7018	14.95-	✓
7010	14.70	✓
8540	14.75-	✓
7601	15.60	✓
7789	14.65-	✓
6806	15.70	± ✓
9159	15.10	✓
9790	15.05-	✓
8359	Ins faint	✓ ?
8515-	14.70	✓
9501	14.75-	✓
7008	14.60	✓
8599	14.30	✓
6981	15.20	✓
6991	15.40	✓
6815	14.40	✓
9916	14.95-	✓
6813	14.75-	✓
10254	14.95-	✓
7009	14.75-	✓
6763	14.65-	✓
8710	15.15	✓

var 77. Cont.

X 8662	14.85 ✓
7007	14.60 ✓
6817	14.95 ✓
A 1788	14.70 ✓
1785	15.25 ✓
1784	15.10 ✓
X 10254	15.10 ✓
10253	15.30 ✓
10249	15.25 ✓
A 1791	14.75 ✓
X 6805	15.25 ✓
8358	15.05 ✓
A 1782	15.10 ✓
A 1756	14.90 ✓
X 8452	14.80 ✓
7499	14.80 ✓
7469	15.45 ✓
A 1787	15.60 ✓
1789	14.75 ✓
1781	15.05 ✓
X 8591	15.20 ✓
8571	14.45 ✓
8576	15.05 ✓
8594	15.50 ✓
8604	14.75 ✓
9859	14.55 ✓
6829	15.20 ✓

Var 77. Cont.

X 10460	14.80 ✓
8586	15.45- ✓
10974	15.35- ✓
12123	15.00 ✓
8544	15.05- ✓
8542	14.80 ✓
9940	15.10 ✓
C10149	14.85- ✓
~~C14286~~	
X8754	15.50 ✓
10452	15.00 ✓
10967	14.75- ✓
10804	14.40 ✓
6838	15.55- ✓
10805	14.50 ✓
10808	14.75- ✓
10458	15.55- ✓
6637	15.20 ✓
7000	14.50 ✓
8453	14.75 ✓
7661	Defective ✓
7603	14.70 ✓
~~6742~~	— M3- ✓
7036	14.95 ✓
10256	15.45 ✓
A 1786	15.15- ✓
MW82	15.45- ✓

ms. no. 77. spec. Sequence

MW 84 ✓ 15.20
 108 ✓ 15.20
 109 ✓ 15.25
 106 ✓ 15.10
 110 ✓ 15.10
 112 ✓ 15.15
 86 ✓ 14.80
 111 ✓ 15.20
 107 ✓ 15.30
 105 ✓ 15.10
 85 ✓ broken

X 8657 ✓ 14.55
 A 1829 ✓ 15.20
 1828 ✓ 15.30
 1825 ✓ 15.20
 1812 ✓ 14.75
 1809 ✓ 15.30
 X 6960 ✓ 14.65
 6974 ✓ 15.35
 6956 ✓ 15.15
 6908 ✓ 14.45
 7043 ✓ 15.20
 6836 ✓ 15.40
 6821 ✓ 14.75
 6814 ✓ 14.45
 6784 ✓ 14.80

ms no 27. sp. seq.

X
6785 ✓ 14.95-
6786 ✓ 14.55-
8467 ✓ 14.60
8556 ✓ 15.25-
8564 ✓ 15.35-
8578 ✓ 14.80
8583 ✓ 14.95-
8596 ✓ 15.50
8702 } Broken UG
8706 }
9790 missing
10973 15.20

check images of

$\begin{pmatrix} - & 3374.502 & \times & 6805 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} - & 538 & \times & 6806 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} - & 4795.632 & \times & 9501 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} - & 7023.629 & \times & 10973 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} - & 678 & \times & 10974 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} \checkmark & 3377.578 & \times & 6821 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} \checkmark & 3378.579 & \times & 6829 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} + & 3423.506 & \times & 7043 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} \checkmark & 7673.687 & \times & 7469 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} \checkmark & 3693.638 & \times & 7499 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$
 $\begin{pmatrix} \checkmark & 4052.600 & \times & 8515 & \checkmark & \text{hpl} & \text{or } m & \text{or } n \end{pmatrix}$

~~6805~~
~~6806~~
~~6821~~
~~6829~~
~~7043~~
~~7469~~
~~7499~~
~~8515~~
~~9501~~
 10973
 10974

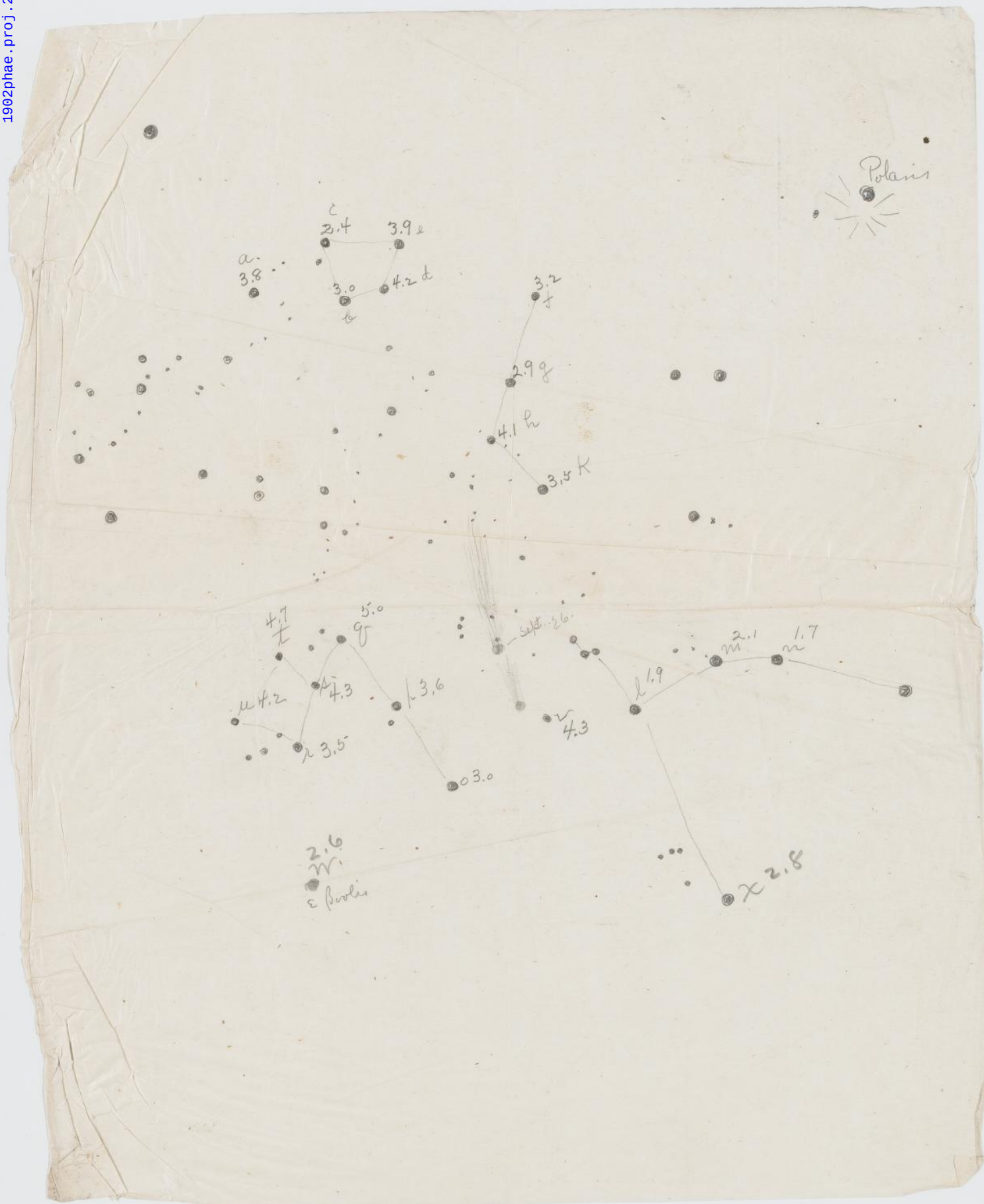
1-2 Nov 96.

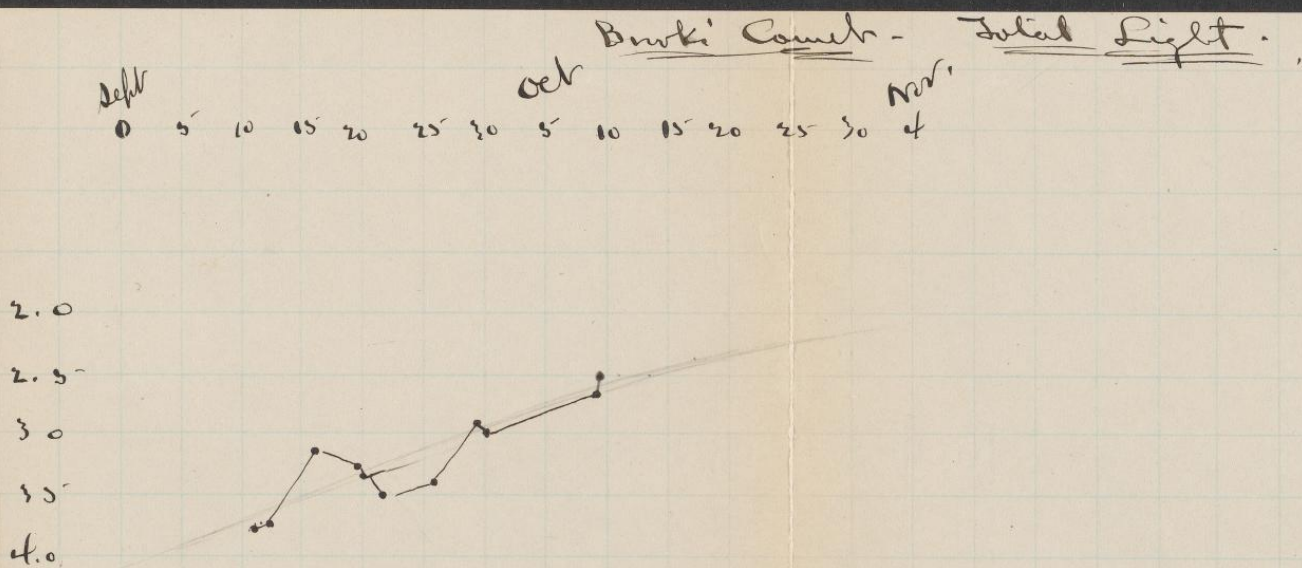
Reverend

3613.681	X7469
3613.638	X7499
3960.869	X8358
6634.566	X10806
582	X10808

40.
X8358

M 5







SULLIVAN BROTHERS TAILOR SHOPS

42 SUMMER STREET

TERMS _____

BOSTON, _____

Dec. 4, 1915.

SOLD TO MR. _____

S. J. Bailey

MDSE.

*1 Suit.
1 Pr. Trousers.*

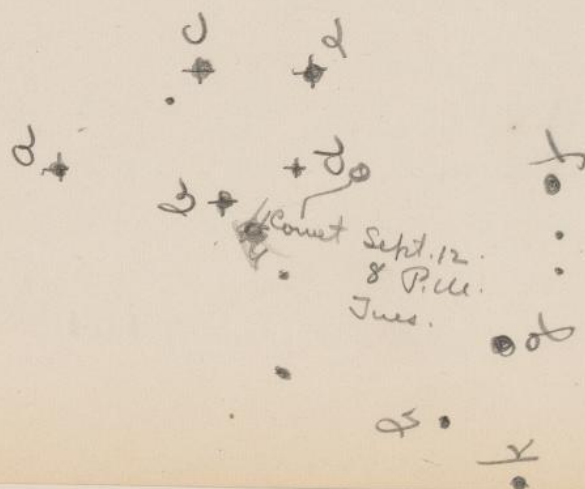
35 00

8 00

43 00

a_0 comet f_6 comet
 comet $3e$
 comet $3d$

4.9x
4.9s.



1902phae.proj.2290B