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Plan of Observations.

The following Observations with the Zollner Astrophotometer are undertaken with the following objects in view:—

1. To determine the brightness of a number of standard stars for comparison with other objects.

2. To determine the variation in brightness with the altitude and thus determine the law and coefficients of atmospheric absorption.

3. To determine the relative brightness of the stars taken as standards by Argelander and Schonfeld in their determinations of variable stars and thus reduce their values to absolute measure.

4. To determine the variation of Algol and other variable stars by direct measurement.

The observations which will be found on page 51 et seq. should be conducted as follows:- Early evening after mounting the instrument lighting the lamp and taking care that everything is in proper condition, the telescope should be directed to the pole star and the time observed. Four observations of the equality of the images should then be taken. This should be repeated one to four times and the time again noted. Then one of the standard stars should be observed and repeated and the pole star then remeasured. The time at the beginning and end of the series of measurements of each star must be noted that their mean may be used for the altitude of the star. The time need only be taken to the nearest minute.
The form of record should be made with copying pencil as follows. Errors in observing should not be erased but lines drawn through them.

α Ursae Minoris (Polaris) begin. 9h 15m. end 9h 20m

48.3	47.8
131.9	132.2
132.5	131.6
48.7	48.5

β Ursae Majoris begin 9h 24m end. 9h 28m.

61.4
118.1
117.6
62.0

The following observations are desired. First, a series of readings of some distant artificial star as a street-lamp. Then a similar reading of the Pole-star. twenty readings of each. These readings repeated at the end of the evening to estimate the change in the light.

Secondly, a series of readings of the following stars distant about 30° from the pole. From their altitude and ~~[illegible]~~ real brightness may be deduced the atmospheric absorption.

	Mag.	R.A.	Dec. N.
β Cassiopeae	2.5	0h 1	58° 20'
α Persei	2.5	3h 14	49 20
δ Aurigae.	3.5	5 47	54 16
o Ursae Majoris.	4.	8 18	61 13
β " "	2	10 53	57 11
ζ " "	3	13 18	55 43
β Draconis.	2.5	17 37	52 25
α Cephei	3	21 15	61 57

Also the following bright stars to be observed as near the horizon as possible:–

		R.A.	Dec N.
α Geminorum (Castor)	2.1	7h 26m	32 9
α Leonis. (Regulus)	1:	10 1	12 34
α Bootis (Arcturus)	1:	14 10	19 49
α Lyrae (Vega)	1	18 32	38 40
α Andromedae	2	0 2	28 25
α Aurigae (Capella)	1	5 7	45 52

Not improbably this last set may prove too bright when high and too irregular when low for satisfactory measurement. In this case omit them.

For comparison with β Persei the following stars have been used as standards.

			N.P.D.	
ρ Persei	2	56	55	45
γ "	2	54	37	5
δ "	3	32	42	42
ε "	3	48	50	26
ζ "	3	45	58	34
ν "	3	35	47	54
α Trianguli	1	44	61	9
β "	2	1	55	43
γ Andromedae	1	55	48	24
ι Aurigae	4	47	57	5
β Arietis	1	46	69	56
β Persei (Algol)	2	58	49	38

As these stars culminate earlier early ~~every~~ afternoon it is desirable that their magnitudes should be determined soon, and before the complete determination of the standard stars. If Algol is not within 4 hours of its minimum it should be used as a standard for them with occasional comparison with the others the frequency dependent on the constancy of the light. In ~~compa~~ measuring, those stars that ~~are~~ nearest the horizon should be measured first as later in the evening they would be too low.

The following scheme is proposed as ~~an~~ two hours observation. The first and last portions of the time, not exceeding half an hour each ~~[illegible] each~~ should be devoted to the standard stars to determine the corrections for atmospheric absorption.

distant gas light	2
α Ursae Minoris	2
β Draconis	2
α Ursae Minoris	1
α Cephei	2
α Ursae Minoris	1
δ Aurigae	2
o Ursae Majoris	2
α Ursae Minoris	2
dist light	2
α Ursae Minoris	2
β Persei	4
α Ursae Minoris	2
~~β Ae~~ ε Aurigae	2
γ Persei	2
β Persei	2
ε "	2
ζ "	2
α Ursae minoris	2
β Persei	2
ρ "	2
β "	2
α Trianguli	2
β "	2
β Persei	4

Tr

α Ursae Minoris	2
dist light	2
α Ursae Minoris	2

standard stars in reverse order.

Probably this list would be too long as the eye should not be used when fatigued, as it loses its sensitiveness. Observations should not be made when the images of the stars are unsteady which is most likely to occur after a sudden change in weather or temperature, a high wind or other causes of rapid alteration in the density of the air. A exception may be made in the case of Algol which should be observed during its minimum whatever the condition of the air provided there are no clouds. The epochs of these minima are given below for April ~~and~~ and the comparison may be made thus.

β Persei
ρ Persei
β Persei
α Ursae Minoris.
Standard Star (low.)
~~α Ursae~~ β Persei
α Ursae Minoris
β Persei.
Standard Star (high)
α Ursae Minoris.
β Persei
ρ Persei
β Persei
γ " 2
β "
ρ "
β "
γ " 2
&c

Ephemeris for Algol.

	Minima Boston mean time		
April	2	22	30
	5	19	19
	7	16	8
	10	12	57
	13	9	25
	22	0	14
	25	21	3
	27	17	52
	30	14	42

Although it is very desirable to measure accurately all the comparison stars to reduce the earlier phot. observations of the variation of Algol, yet in measuring its brightness with the photometer it is better to confine the comparison to two or three stars. ρ Persei might alone be used, were it not variable, but it still ~~from~~ from its position affords a good standard. It should be used with one of the ~~compa~~ other comparison stars having nearly the same altitude. Probably γ Persei would be best. The comparison might be made thus:— γ, β, ρ, β, γ, γ, β, ρ, β, γ, &c. The time of each set of readings of β should be recorded to the nearest minute and the watch compared with a standard before and after unless it can be depended on within a few seconds. When near the minimum κ (between β & γ) might also be used if time permits. E.C.P. March 24 '77

For various reasons Mr Hersh was unable to carry out this plan which has therefore been abandoned for the present.

The following observations were made with a photometer attached to the great equatorial. The eyepiece used was that constructed for use on the Eclipse of 1870 and consisted of a negative eyepiece containing a Nicol prism free to turn around its axis. The angular motion was measured by an index. In front of this eyepiece a double image prism was placed. The effect of this prism was to form two images whose relative brilliancy could be altered at will by turning the eyepiece and Nicol. This plan was devised Saturday August 4th and tried the ~~Monday August 6th~~ same evening.

Nebula Photometer.

The photometer attached to the East Equatorial gave the following results

May 4th 1877 Amon Leonis out of focus compared with artificial star (R 2,141). Reading angle = 40°.0 ± 2.6 or prob. error 1 obs. = 6.5 per cent.

May 29th 1877. Zero point = 0.24 and 180.6 6.03 Reading of Dome. 74°.1 and 73°.7 each result of five settings. Repeated setting five times in each quadrant.

17.02 ± .53) 74.03
165.08 ± .34)

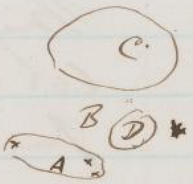
197.08 ± .43) 74.18
345.44 ± .34)

June 14th 1877 10 P.M.

Obs.	~~Ang~~ Angl	Object	No
E.C.P.	6.47	* 1	4
E.C.P.	6.36	"	4
W.A.R.	10.00	"	10
?(E.C.P.)	6.62	"	4
E.C.P.	7.55	* 2	4
E.C.P.	8.30	"	4
J.R.E.	983	"	11

June 17th 9.20 Zero 2d, 0°.28 181°.0 (R. 2 144)
Satell. 4 Jupiter Rdg. 4 53°.5 4 more, discordant.
Nebula 10 5°.44

July 7th 1877.
Nebula in Sagittarius (M 8)



	Rdgs.	
A	11	3°.3
C	10	2°.1
A	8	6.2.5
C	5	4.15
A		
C		

Introd. smoked glass
" " "
F. W. obs.

Friday Aug 3d 1877. Zero. 1.16 and 180.78

Obj.	
Sky at 8.28	3.79
(M 8) Centre A	5.5
" " D	4.8
" " B	3.9
Neb. Andromeda	17.62
" "	17.83

	Log ξ^2_α		
1	9.4714	2.12	
2	9.5298	1.88	
3	9.3094	2.76	
4	9.63~~50~~82	1.43	
5	9.6400	1.44	
6	9.6514	1.39	
7	7.804	8.78	
8	7.7664	8.93	65.97
9	7.9902	8.04	
10	9.1590	3.36	
1	8.9542	4.18	
2	8.8622	4.52	
3	8.8800	4.48	
4	8.8860	4.46	
5	8.848	4.60	62.07
6	8.754	4.98	
7	9.0286	3.88	
8	8.9814	4.08	
9	9.8692	.52	
20	9.9636	.04	
1	8.8190	4.72	65.17
2	8.7608	4.96	65.33
3	9.8198	.72	
4	9.0028	3.99	64.13 ~~[illegible]~~ (?)
5	8.9652	4.18	64.24
6	9.0360	3.86	64.04 ~~[illegible]~~
7	9.1222	3.55	64.65

Photometric Observations

	Time.	Object		No.	Avg.	Bright	
Aug. 6th		Jupiter	br. 3-4	8	28.55	.29.6	R.2.16 Too near sunset.
"	"	"	3-1	6	30.2	33.9	dim cov. [illegible]
"	"	"	"	8	24.3	20.4	
"	"	"	3-2	8	33.4 ~~24.3~~	43.5	
"	6th 8	"	3-2	4	33.35	43.7	R19.11
		"	"	4	33.8	44.8	
		α Ursæ Maj.		4	4.57	0.64	
	8	"		10	4.37	0.58	
8.3	8.15	"		6	5.65	0.98	cl.
8.6	8.32	β Scorpionis ~~Capricorni~~		4	18.7	14.4 ~~[illegible]~~	
		"		5	16.7	9.0	
		ν Scorpionis		5	15.1	7.3	
		"		6	15.4	7.6	cl.
		β Capricorni		4	15.5	7.7	
		"		10	14.87	7.1	
		"		2	13.4	5.7	
7	8	ζ Ursæ Majoris		6	18.1 ~~36.2~~	10.7 ~~53.4~~	
		"		4	17.2 ~~[illegible]~~	9.58 ~~16.9~~	R19.13 Hazy. Cloudy
8.	8.05	Jupiter	br. 3-1	8	40.7	74.0	troubled by Clouds
		"	br. 1-2	8	43.8	92.0	
		β Scorp.		10	14.4 ~~14.35~~	8.6 ~~[illegible]~~	
		"		10	13.5 ~~13.7~~	5.8 ~~5.7~~	S?
		α Capric.		8	39.1	66.0	
:		β Capric.		10	17.6	10.0	
		"		10	16.9	9.2	
	9.30	ζ Ursæ Maj.		10	18.24	10.9	
		"		10	20.0	13.2	

			Object	N. 188.	Ang.	Log. Ang.	Weight
28	Aug 8	9.45	α Ursae Maj	10	7.31	8.216 ~~9.108~~	
9			" "	10	6.06	8.052 ~~9.052~~	
30	Aug. 10	8 5	β Cygni	10	16.11		
1		11	Jupiter 3-1	8	35.24		
2			" 3-4	8	27.82		
3			δ Delphini S. br.	8	38.82		
4			α Ursae Maj	10	6.37		
5		8 30	ν Scorpii.	10	17.07		
6		10 20	Jupiter 3-4	8	23.9		
7			α Aquilae	10	1.51		
8			β Capricorni	10	17.61 ~~8.37~~		
9			" "	10	19.25		u
40			α Capricorni	12	37.3		
1		11 22	" "	12	41.75		u
2			α Ursae Maj.	10	7.53		
3		11 50	" " "	10	12.14		u
4			ζ Lyrae	11	21.71		
5		12 15	ε Lyrae N br.	10	42.49		
6	12	7 40	Jupiter 2-4	11	32.04		
7		8 01	β Scorpii	11	13.04		
8		8 48	α Ursa Maj	10	7.81		
9			β Capricorni.	10	16.64		
50		9 37	α Ursa Maj.	7	7.13		
1	625	9 55	" "	11	7.86		
2	15		β Capricorni	137 10	22.08		
3		8 30	α Ursae Majoris	10	8.39		
			~~α Aquilae~~				
4			α Aquilae	10	1.90		
5			"	10	1.98		
6			"	10	1.63		
7			"	10 1.85	1.62		

May.		Remarks.
7.14 ~~3.57~~ ~~3.66~~	65.42	
7.79 ~~3.97~~	65.45	
	64.83	Clouds.
		Clear.
	64.82	observed (78)
	65.61	
	64.77	
	65.61	
	63.85	
	65.49	
	69.55	
	64.89	
	63.16	
	154.04	clouds.
	155.35	
	154.06	
	333.31	
	334.32	W. A. R. obs.
	300.04	New Photom. B W. Equat.
	205.35	E. C. P. ~~N. Photo. W. Equat.~~
	31.28	N. Photo. E. Equat. E. C. P.
	110.04	"
	30.95	E. S. H
	109.72	"

			No. Ex. 485		Obr.	Zero.	Phot.	Ill.		
58	16	α Aquilae	10	1.91	E.C.P.	109.45	B	E		
9		"	8	2.01	Q.S	109.31	"	"		
60		"	10	2.15	"	199.19	"	"		
1		"	10	2.08	"	30.12	"	"		
2	17	Jupiter 4-3	8	33.8	E.C.P.		"	"		
3		β Capricorni	10	18.23	E.C.P.	211.33	"	"		
4		α Aquilae	10	1.66	E.C.P.	30.88	"	"		
5		" "	10	2.13	Q.S.	209.07	"	"	< Phot. fell	
6		ζ Ursae Maj.	8	17.65	E.C.P.		"	"		
7		" " "	10	19.38	E.C.P.	2215.2	"	"		
8		α Aquilae	10	2.32	P	29.32	"	"		
9		" "	10	2.45	S	29.43	"	"		
70		" "	10	2.95	U	29.13	"	"		
1	18A	Jupiter 3-2	8	43.3	P	~~43.3~~	"	W. prov.		
2		β Capric.	10	11.66	P	268.82	"	"	"	
3		"	10	18.07	P	222.31	A	"		
4		Mars. Saturn.	10	13.04	P	179.56	B	lines		.2316
5		" "	10	12.65	P	359.73	"	"		.2245
6		" "	10	13.13	U	181.96	"	"		.2332
7		" "	10	13.04	P	179.78	"	"		.2316
8	19th	β Scorpii	10	19.35	P	232.05	B.	I.	pulse A & B	
9		ν "	10	20.71	"	231.77	"			
80		σ "	10	33.14	"	136.76	"			
		Jupiter 2-4	10	40.19	"	140.98	"			
		β Capricorni	10	17.12	"	321.60	"			
		α' Capricorni	10	5.34	"	322.08	"			
		α² "	10	5.42	~~Q.S.~~ C dk	50.74	"			
		" "	10	4.66	P	140.14	"		Center field	
		" "	10	7.96	"	136.38	"		right	
		" "	10	5.95	"	145.21	"		left	
			777							

α Ursae Maj.	β Capric.	β Scorp.	ν Scorp.	Mars. Saturn.
4.57	15.4 (4)	18.7	15.1	2290
4.37	14.87	16.7	15.4	2126
7.31	13.4 (2)	14.4	17.07	2080
6.06	17.6	13.5	20.71	2016
6.37	16.9	13.04	13.43	1835
7.53	17.6	19.35		2057
12.14	19.25			2436
7.81	16.64			2339
7.13	22.08			2284
7.86	18.23			
8.39	11.66 ~~17.12~~			
6.16	18.07			
5.00	17.12			
4.67	14.09			
	10.55			

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Aug.	Time	Object.	No. Obs.	Ang.	Zero.	Obs.	Tel.	Mult.	
22.	7.52	α Capricorni	777 10	40.99	49.91	P.	W.	B	
		β Capricorni	10	14.09	50.09	"	"		
	8 22	α Ursa Maj.	10	6.16	229.80		"		
		α Librae	10	19.57	228.73 ~~19.51~~				
	8 41	" "	10	21.12	52.20				
		γ Scorpii	10	13.43	141.43				
		β Capricorni	10	10.55	140.41				
	9 20	α Ursae Maj.	2	4.85	318.4				
	9 30	" "	10	5.00	316.92				
		" "	10 872	4.67	137.81				
27th		Jupiter Sat. 2	4.	47.2	165.3				1.0799
		"	4.	46.0	161.8				1.0355
		"	4.	42.7	164.8				.9228
		"	4.	46.2	162.4				1.0428
	9 36	Saturn. 3; Tethys?	4	16.5	169.9				.2962
		" 3 Tethys	4.	16.1	165.5				.2886
	9 45	" 1 Titan	2	54.0					
	10	" 2 or Dione Rhea?	9	13.67	253.75				.2432
		Mars Satellite	2	12.9	131.5		one	C	.2290
		Mars. Satellite	5	4.5	162.9	P	:		.0787
		" "	10	3.90	161.98	a.S.			.0682
		" "	10	3.44	251.52	P.			.0601
		" "	10	4.67	71.97	W.W.			.0816
28th	9 10	Mars Satell.	10	11.20	94.28	P			.2126
		" "	10	11.75	271.39	"			.2080
		" Satell.	10	2.51	202.51	W.a.R.			.0439
		" "	10	2.49	22.63	W.a.R.			.0435
		" "	9	2.61	49.86	P			.0456
		" "	9	2.47	327.02	L.W.			.0432
		" "	2 1014	3.0	328.6	P.			.0524

		Diam"	
right eye Vert. diam A	$\overset{(60)}{=}.0282^{mm.}$ = ".851	.928	62
left "		.888	"
right "		.785	"
left " E $7^h.5$		.887	"
		.252	63
		.245	"
		~~.207~~	"
W 26d16.9		.207	"
			64
Resolved star to at least		.0670	.66
~~Bes~~ as bright as satellite		.0580	"
as recollected.		.0511	"
		.0694	67
			70
			"
Resolved star = to satell as recollected recollected.	B .03725	.0493 9 on one side 1 on other	71
"	= 1".124	.0489	"
Satel. seen three times		.0513	72
Artif. star reduced to smallest point		.0486	"
Satel. believed to be seen.		.0591	"

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Time		Object	No. Obs.	Ang.	Zero	Obs.	Phot.	tang B.C. alt D
30 Oct.		Mars Saturn	1014. ~~10~~ 10	11.40	178.88	P	C	.2016
		" "	10	10.40	90.72	P	C	.1835
		Mars Satellites	16	1.04	120.14	R	B	.0182
12	1 20	" Satellite	10	11.59	89.06	P	C	.2051
	5	" "	10	13.69	272.01	P	C	.2436
31st	Am 0.15	Holes ~~D~~ C 3-4	4	12.50	208.75	P	B	.2217
		" 2 3	10	6.63	209.37	P	"	.1162
		" 2 4	10	2.13	119.71	P	"	.0373 ~~.0273~~
		" 3 4	10	13.00	120.30	P	"	.2309
31st	23 30	Holes carried chart of	10	2.32	90.02	P	"	.0405
		"	10	2.18	270.85	P	"	.0381
		"	10	1.66	89.82	P	"	.0290
		"	10	1.85	270.57	P	"	.0322
Sept		Total in Aug.	1144					
2d.		Saturn. Titan, Rhea.	10	29.09	0.49	P	"	.5563
3d	9 50	Mars Satellite	10	13.17	227.21	P	C	.2339 ~~.0554~~
	10	" "	10	12.87	357.77	P	C	in plane .2284 ~~.0501~~
"		" "	10	13.05	269.15	P	C	.2318
4th.		Satellite Mars. Ref*	10	9.39	254.73	P	D	.1631
"	9 30	" " "	10	7.70	72.80	P	D	.1340
"	10 40	Ref* with J.S.	c 10	13.62	5.70	P	D	.2354
	50	" "	c 10	13.05	182.55	P	D	.2258
	11 0	Satellite & Ref*	10	9.29	254.91	P	D	.1614
	10	" "	10	9.18	72.60	P	D	.1596
	33	" "	10	8.40	78.74	S	D	.1461
	55	" M.Q.	c 10	4.17	90.97	P	B	.0729
	23	Ref.* and Disc image	c 12	33.2		P	D	.5476
		" "	c 10	60.44		S	D	.8699
5	6 30	" "	c 12	46.2		P	D	.7218
			1298					

Dia "

1.808
C4 . 05992 .0329

Assum two planed = .02676 from meas. and foll. .02683
the agree would be exact if [illegible] [illegible] was ~~2.09~~ 1.57

} another part of
} shade glass.

R. E. 11.4 92

replaced.
read
Vernier 0

104

105

"

1.5 = .760
1.1 = 2.636

.0347
Sat [illegible] 8 times . M = .012 mm = ~~.0214~~

2.444 Comp [illegible] * with [illegible] aperture .05269 in = 1.338 mm

1.538

1.554

Time		Obj	No. Obs	Ang.	Zero	Obs.	Phot.	
Sept 6	4 45	Ref.* & Dic. Image	1298 c 4	31.8		P	D	.5270
		"	c 10	33.74	180.48	P	D	.5554
		" "	c 10	32.16	1.38	P	D	.5323
		" "	c 10	21.19	0.87	P	C	.3877
		" "	c 10	24.61	87.49	P	C	.4580
		" "	c 10	40.06	257.50	P	C	.8409
		" "	c 10	30.22	265.42	P	C	.5825
8	7.	Jupiter through A.1 and ref.*	c 10	30.81	5.61	P	D	.5122
		" " "	c 10	23.93	183.05	P	D	.4056
		Mars " "	c 10	36.26 ~~30.74~~		P	D	.5914 ~~.7959~~
		" " "	c 6	30.55		P	D	.5082
		" " "	c 11	39.69		P	D	.6387
	9 11	~~Satl. ref *~~ Mars II; Mars	10	8.55	182.73	P	D	.1486
	20	" "	10	9.92	3.02	"	"	.1722
	~~47~~ 45	" "	10	8.52	2.44	S	"	.1481
	55	" "	10	9.91	181.67	P	"	.1721
	10 20	" "	10	9.38	182.29	P	"	.1630
	30	" "	10	10.72	2.75	S	"	.1860
	11	Mars ~~through~~ ~~and ref.*~~ A1; Mars	c 10	42.89	182.59	P	"	.6805
		" " "	stars nearly equal ref. if anything brighter a S.					
	11 15	" "	c 4	31.65	262.20	P	"	.5247
	11 30	Satl. (1) ref *	10	13.33	6.55	P	"	.2306 ~~.1140~~
	11 40	" (6) "	10	7.95	2.57	P	"	.1383
	12 0	" (1)	10	9.40	182.86	S	"	.1633
	12 10	" (6)	10	9.91	181.23	S	"	.1721
10	10 15	Mars through A1 and ref.*	c 10	25.99	183.85	P	"	.4382
		" " "	c 10	39.65	3.09	P	"	.6381
		Zero of whole	12		182.00	P		
			1555					

2.539

2.410

2.51.5

Compared images
by phot. c

" Apert. 9.4 mm.

(reject)

5" Cap on tube. dia. 0.129 = .389"

" " " "

"

"

"

Cap off

r. eye.

Apert. 5"

"

"

Cap off. One nearly 332.0 rejected probably erroneous really for 352.0 would give 34°.35

Cap 3"

At dilute ~~as if this~~ light through Nicol.

	Time	Obj.		No. Obs.	Ang.	Zero.	Obs.	Illum.	
				1555					
11	7 45	Jup. through Q.1 with ref. *	c	10	19.90	2.30	P	D	.3404
	8 0	" " "		10	18.15	179.35	P	D	.3115
		Sat(2) with Ref. * ~~Other~~		10	33.50	4.02	P	D	.5519
	8 20	Mars. thng Q1 " "	c	10	19.90	3.80	P	D	.3404
		" " "	c	10	21.45	181.02	P	D	.3657
	8 32	" " "	c	10	26.62	178.65	S	D	.4481
	9 45	Sat. (1) " "		10	10.52	2.80	P	D	.1826
	10 15	" " "		2	15.1	4.4	P	D	.2605
	~~30~~ 25	Sat–Satur " " [illegible]	√	10	62.05	2.43	P	D	.8833
		" "		2	60.25	172.65	P	D	.8682
				1639					
12		Mars through R3. ref. image	c	10	20.08	2.24	P	D	.3433
	8 25	" " "	c	10	15.78	181.26	P		.2720
	9 0	" " "	c	10	50.29	179.25	S		.7693
	9 30	Satel. Mars (1.)		10	6.52	1.88	P		.1135
	9 40	" " (6)		10	5.83	2.05	P		.1016
	10 30	" " (6.)		12	5.65	2.76	P		.0984
	10 45	" " 6		10	8.68	1.92	S		.1509
	11 10	" " 6		10	8.86	1.82	P		.1540
	11 25	Mars. R.3. ref. image	c	8	27.19	0.33	P		.4570
				1729					
13	7 20	Jupiter R1 ref. i.	c	10	21.75	182.59	P		.3705
	7 25	" "	c	10	21.73	1.77	P		.3702
	7 40	Mars "	c	10	28.17	1.29	P		.4721
	7 50	" "	c	10	26.26	182.54	P		.4425
		Saturn inner Satel. Encel		10	34.87	4.33	P		.5717
	8 25	Saturn inner Satel. "		10	33.14	356.90	S		.5467
	8 55	Mars Satel (6)		10	7.33	2.23	P		.1276
	9 0	" " (6)		10	8.61	2.69	S		.1497
	10 15	" " (6)		10	5.54	261.02	P	C	.0970
				1819					

Cap 3" Star faint.

"

" E. 12.1

"

Cap Off.

E. 9.9

" "

Aper 3 in. .01372 = ".3932

" "

" 5

field br.

" "

" "

" "

field dark

Apert 5 ins.

" "

"

"

"

15 ins. E. 5.7 143

" " " 143

but seen almost every time
by v. faint. .0382

Sept.	Time		Obj		No. Obs.	Ang.	Zero.	Obs.	Sin an G.
					1819				
13	10	45	Mars. lat (6)		10	6.57	1.65	P	.1144
	11	3	" " (6)		10	7.41	1.75	S	.1290
			" " (J)		10	9.22	1.76	S	.1602
			" " ~~6~~ (J)		10	8.87	1.33	P	.1542
			" " (6)		10	8.34	2.08	P	.1451
15	9	10	* (90) - Mars.		10	8.81	1.40	P	.1532
			" "		10	7.24	~~7.24~~ 181.58	P	.1261
	9	25	" "		10	14.56	181.72	S	.2515
	9	35	" "		8	9.50	357.25	S	.1950
					19.07.				
16	10	10	(90) Mars.		10	13.28	2.16	P	.2297
	10	15	"		10	17.66	3.60	S	.3035
	10	25	"		10	10.67	181.27	P	.1857
			"		12	15.56	181.38	S	.2683
	11	30	(6) Sat. Mar. Saturn		10	35.67	0.11	P	.5831
	11	35	" "		10	29.60	4.92	S	.4939
1	11	45	(J) " " Mars		10	11.97	1.61	P	.2074
	11	50	(6) " " "		10	8.96	1.52	P	.1557
	11	55	(6) " " "		10	8.85	181.75	P	.1538
					1999				
18	9	25	(90) " Saturn		10	30.74	1.96	P	.5111
		30	" " "		3	4.21	0.14	R	.6704
		35	" " "		v10	38.05	0.40	R	.6167
		55	" "		10	35.64	0.50	S	.5827
	10	20	" Mars		10	10.04	182.42	P	.1743
		25	" "		10	7.61	1.37	S	.1325
					2052				
18	23	35	Length clouds	c	10	34.15	359.77	P	.5613
			as reflected	c	10	36.29	2.61	S	.5919
				c	10	32.03	182.47	P	.5304
				c	10	35.92	181.64	S	.5867
					2092				

2

2

one object not easy

2 55'

1

1330

2.37 {vill. apert. 1.332 mm

2.25 {R. 19.174

2.57

2.27

	Time		Objects		No. Obs	Ang.	Zero	Obs.		
19	7	35	Jupiter R3 Ref.*		2092 10	31.48	359.94	P		
22	6	20	Jupiter the R3. Ref.*	c	10	17.19	181.95	P		.1251
	6	30	" " "	c	10	15.60	± 1.62	P		.0976
	7	45	Mars " "	c	10	16.50	180.54	P		.1132
	8	10	" " "	c	10	24.95	1.63	S		.4218
	8	30	" " "	c	10	21.82	359.50	P		.3717
	8	36	" " "	c	10	25.11	181.71	S		.4244
			Zero of Mic'd }		5	—	181.64	S		—
			" " " } Dist.		5	—	1.16	S		—
			" " " } Mon.		5	—	181.76	P		—
			" " " }		5	—	1.52	P		—
			80		2182					
23	6	20	Jupiter. Sats. 3-4		10	24.02	177.02	P	B	.4070
	6	25	1-2		10	45.48	89.18	P	B	.7130
	8	10	Saturn Sats 1-2 T Titan (R/D)		10	24.36	358.18	P	B	.4125
	8	20	" " "		10	24.36	177.74	S	B	.3643
	8	50	" R3 Sat. 2 R/D		2	34.4	182.80	P	B	.5650
			" " "		10	30.10	359.10	P	B	.5015
	9	5	" " "		10	44.93	3.13	S	B	.7063
	9	30	Mars ref. and " double R/D		10	19.22	181.26	P	D	.3292
		35	" " "		10	19.89	180.99	S	D	.3402
		55	" " Sat. 4 Te		10	17.96	1.78	P	"	.3084
	10	0	" " "		10	15.67	0.85	S	"	.2701
		30	Mars " outer satellite		10	10.16	181.56	P	"	.1764
		40	" " "		10	14.25	183.11	S	"	.2461
			122		2394					
24	6		Jupiter 2 and R.3		12	24.16	356.90	P	B	
			" 1 " "		10	25.64	177.16	P	B	
	6	34	1 " 4		10	50.25	91.37	P	B	
	7	15	Mars Ref. " Jupiter		10	15.53	0.93	P	D	
	7	25	" " Titan		10	40.72	359.24	P	D	
					2356					

7h 5m
Cep 3"

Registry two: 25°75
" on 18° Jub. U. hole
1 brightest

Time			Object.			Ang.	Zero	Obs.	Phot.	
24			Mars ref. ~~Encel~~ Tethys (5)		2356 10	13.99	2.61	P	D	
	7	50	" " Enceladus (6)		10	7.43	1.47	P	:	
	8	0	" " Rhea (3)		10	22.74	2.22	P		
		7	" " Dione (4)		10	17.34	3.32	P		
	8	40	" " Tethys (5)		10	15.17	181.85	P		
			" " " (5)		10	13.66	183.08	S		
	9	0	" " Titan (1)		10	33.97	181.83	P		
			" " " "		10	35.08	185.88	S		
	9	15	" " Japetus.		10	15.46	1.28	P		
		25	" " "		10	16.57	0.99	S		
	9	55	" " a Star		10	9.30	1.14	P		
	10	0	" " "		10	9.48	1.50	P		
	10	5	" "	182	10 2486	7.23	180.19	S		
25			Jupiter 3.1		10	40.17	179.57	P	B	
	6	20	4.2		5	29.18	178.51	P		
			"		10	40.86	177.56	P		
	7	10	Jupiter 3 Star		10	18.70	86.98	P		
	7	15	1 and 3		10	51.61	358.87	P		
	8	40	Mars ref. ~~Dione~~ Tethys		10	16.36	0.88	P		
		50	" "		10	16.42	0.74	S		
		58	" Rhea		10	20.94	1.66	P		
	9	5	" "	85	10 2571	25.20	1.42	S		
26			Saturn, Titan		10	43.03	232.57	P	C	
	9	30	" "		10	28.59	228.27	S	"	
	10	35	Saturn Mars		10	14.88	221.86	P	C	
		40	" "		10	13.51	41.93	P	"	
27	22	55	Clouds		10	41.44	94.48	P	D'	.6618
			"		10	39.65	94.59	P	D'	.6381
					2631					

E 14.9

E 4.5

E 25 d 1.1

E 14.6

2 rej.

2 rej.

2 rej.

Supposed at time to be satellite

RA 22h 50m 56s Dec S 12° 45' 57"

moved telescope

R.A. 27h 41m 53.5 Dec S 23° 19' 48"

W. 13.6

" "

E. 1.1

" "

Removed 2 plates from D and took images

5" apert. 1330

2.012 Replaced plates, deter. [illegible] on clouds

2.100

				2631	Ang.	Tele.	Obs.	Phd.	Scaly
27	23		Clouds	10	24.06	95.46	P	D'	.4077
			"	11	24.95	94.95	P	D'	.4218
29	7		Japetus 1-2	10	49.20	245.98	P	B	1.1585
	7	20	" 2-4	10	36.47	141.55	P	"	.7390
	6	5	" 4.3	10	30.96	67.88	P	"	.6000
	7	50	Titan Rhea	10	26.86	23238	P	"	.5064
Aug 4 omitted Oct. 1	7	30	*	5	Reading 17.828	15.76.	P	I.	2.07
	7	50	~~Dione~~? (Saturn Tethys)	5	19.826		P	"	4.07
			" "	5	19.690		P	"	3.93
	8	0	" "	5	20.790		U	"	5.03
			" "	5	20.636		"	"	4.88
			" "	5	19.522		S	"	3.76
			" "	5	19.712		"	"	3.95
	8	35	Hyperion? "	5	17.122		P		1.36
		54	" "	5	18.254		S		2.49
	9	5	" "	5	16.856		U		1.09
	9	20	Dione & Tethys	5	20.212		P		4.45
			Tethys & Dione	5	19.268		"		3.51
			Rhea "	5	21.578		"		5.76
			Hyperion	1	17.28		"		1.52
	9	25	Dione Tethys Saturn	5	20.226		S		4.47
			Tethys Dione "	5	19.316		"		3.56
			Rhea "	5	20.744		"		4.98
	9	45	~~D~~ ~~Hyperion~~ Dione Tethys "	5	20.986		U		5.22
			~~Tethys~~ Saturn Dione "	5	20.120		"		4.36
			Rhea "	5	21.420		"		5.66
			" Hyperion "	1	17.95		"		2.19
			" Hyp.	6	17.037		P		1.28
	10	15	" Hyp.	2	17.83		S		2.07
				2797					

with aper.
1.965 3" aper. .8014
1.900 " "

double in finder
visible

37

Rh.^{E} 13.4 38

Cardboard aperture. 43

W 10.7
W 5.4
W 19.6

1st		Zero.	(1)		15.768			
Oct 3d		Zero.	$\binom{5}{1}$	—	14.735	P		
			2797	— —	14.734			
Oct 5th		Saturn Hyperion	~~3~~ 5	16.354	$14.7\overset{4}{3}$	P	E	$1.6\overset{1}{2}4$
		" Japetus	5	20.080	"	P	E	$5.3\overset{4}{5}0$
	7 40	" Hyperion	5	15.748	"	U	"	$1.0\overset{0}{7}8$
	8 25	Mars Satellite	10	14.51	172.15	P ~~E~~	C ~~E~~	
	36	" "	10	42.86	173.92	U	"	
	40	" "	10	13.42	174.28	S	"	
	45	" "	10	16.68	171.94	U	"	
	40	Saturn Dione?	4	17.578	$14.7\overset{4}{3}$	P	E	$2{:}8\overset{3}{4}8$
	9 0	"	5	18.032	"	P	"	3.292 ~~3.302~~
	5	"	5	18.248	"	S	"	3.508
	10	"	5	18.094	"	U	"	$3.3\overset{5}{6}4$
	25	Hyperion	5	16.268	"	P	"	1.528
	30	"	5	16.106	"	S	"	1.396
		Titan Dione	10	25.85	318.71	P	C	
10	5	" "	10	28.49	138.13	U	"	
	10 20	" "	6	27.43	319.20	S	"	
A omitted for + 4s			2907					
Sept 30.	7 55	Jupiter 1-2 (1hr)	10	43.09	165.95	P	B	
	9 50	Mars Saturn	10	13.09 ~~26.18~~	259.45	P	"	
	9 55	" "	10	16.46	357.24	S	"	
	10 5	" "	10	13.74	353.80	P	"	
	10 10	" "	10	16.45	261.25	S	"	
6	6 55	Jupiter 3. – 2	10	37.02	264.12	P	"	
	7 5	" 3. – 2	10	33.21	84.91	P	"	
7	8 55	Vesta Saturn	5	21.246	$14.7\overset{4}{3}$	P	E	$6.5\overset{0}{7}6$
	9 0	" "	5	22.092		S		7.362
	10		5	21.628		P		6.898
	15		5	20.200		S		5470
			2997					

I. 9.2

r centre of field   near-border
l " " " 3 " "

Oct 7	9	45	~~Mimas~~ Enceladus		2997 / 5	17.628	14.74	P	I	2.888
		50	"		5	18.086		S	"	3.346
	10	0	Titan		5	25.486		P	"	10.746
		5	"		5	22.864		S	"	8.124
		15	Japetus.		5	18.648		P	"	3.908
	"	20	"		5	18.876		S	"	4.146
Octob. 2	"		Zero Cl.	c	5 (5)	32.442	14.74 14.729	P		17.702 17.762
			"	c	5	20.502	14.74	"		5.762
			"	c	5	20.136		"		5.396
Oct 8	20	50	Saturn (jottings eyepiece No 9)	c	5	26.774		P		12.034
	23	55	"	c	5	25.888		S		11.148
			"	c	5	27.476		"		12.736
9th	0	20	"	c	5	27.724		"		12.984
			"	c	5	28.590		"		13.850
	0	35	"	c	5	27.760		P		13.020
				c	5	27.626		"		12.886
	0	55		c	5	24.594		S		9.854
				c	5	25.828		"		11.088
	1	25		c	5	18.492		P		3.752
				c	5	18.542		"		3.802
	1	30		c	5	19.058		S		4.318
				c	5	19.050		"		4.310
9th				c	3107 / 5	18.418		P		3.678
				c	5	18.518		"		3.778
	22	40		c	5	18.508		S		3.768
	"	"		c	5	18.454		"		3.714
	"	55		c	5	18.640		"		3.900
	"	"		c	5	18.742		"		4.002
					3137					

~~Observations by Mr. J. B. Hewett Jr.~~

15" apert. dist Cert.

5" apert.

"

1.47

1.37 indirectly reading) alternately [illegible]

1.56 directly ") mean. apert. 8.173 mml.

26.682 483

1.59 inc.

1.70 dec.

1.59 dec

1.58 inc

1.21 inc 82

1.36 dec "

1.53 inc. apert. 2.467 mml. [illegible] 32 "

1.54 dec. " "

1.75 inc. " 83

1.75 dec. " "

1.49 inc " " 84

1.53 dec. " " "

1.53 inc " "

1.51 dec. " " "

1.59 inc 1870 " " "

1.62 dec " 1966 " "

1877phae.proj.171S.

Oct 10	0.0	Lantern dim. eyepiece	c	3137 5	29.572	147~~3~~ 4	S	I	..	14.842
	0 40		c	5	29.916		"		...	15.086
	0 10		c	5	27.750		P		...	13.020
	" "		c	6	27325		"		..	12.695
	0 35		c	5	19.702		"			~~1~~4.972
	. .		c	5	19.646		"			4.916
			c	5	19.738		S			5.008
			c	5	19.968		"			5.238
	0 55		c	5	20.198		U			5.468
			c	5	20.262		"			5.532
		Mars. Saturn		10	16.15~~6~~	264.07	P	C		
11	~~25~~	" "		10 3208	14.93	82.47	"	"		
13	1 0	⊙ α Leonis		5	15.822	14.73	P	I		1.092
		" "		5	15.782		P			1.051
		" "		5	20.962		P			6.232
	1 20	" "		5	20.468		P			5.738
		" "		6	19.962		P			5.232
	6 11	Jupiter Sat 2		5	24.870		P			10.140
		" 3		5	31.616		P			16.886
		" 4		5	26.963		P			12.232
		" 2		5	21.498		PU			6.768
		" 2		5	25.726		P			10.996
		" 3		5	32.726		P			17.996
		" 4		5	24.450		P			9.720
		Saturn Titan		5	25.646		P			10.916
		" Japetus		5	19.094		P			4.364
		" "		5	19.472		U			4.742
		" Titan		5	22.622		"			7.892
		" R.3	c	5 3294	22.404		P			7.674

6.01 in large. Glass plate Ap.'''' 2467 mm.
6.15 dec
5.27 in
5.25 dec.
3.69 in Ap.'''' 1.350
3.64 dec.
3.71 in 86
3.88 dec
4.05 in
4.10 dec

Double curve but distinct image.

" " " image^b doubled refl. plate gl.

13	9	00	Saturn Rhea.	3294	5	19.616	1473	P	4.886
	9	08	Tethys?		5	18.536		P	3.806
		20	Tethys?		5	19.026		u	4.296
		30	Rhea		5	20.610		"	5.880
			Satur R.3	c	5	22.672		"	7.942
		55	Dione?		5	18.692		"	3.962
	10	0	Enceladus		5	16.876		"	2.146
	10	20	["		5	16.874		P	2.144
			Dione?		5	19.132		"	4.402
			Meas. Saturn.		10	16.03	76.69	"	
	10	30	" "		10	13.96	83.64	"	
14			Satellite Meas. Saturn	3359	5	16.44	1473	"	1.71
	8	45	" "		5	16.212		"	1.482
15	5	45	Jupiter 3 - 1		10	47.16?	129.60	P B	
			" 1 and E₂		10				
17	6	35	" 2		5	19.104	14.73	E	4.374
			" 1		5	18.482			3.752
			" 1		5	18.384			3.654
			" (4)		5	17.348			2.618
			" (3)		5	21.264			6.514
			Saturn Titan		5	18.962		4 E	4.232
			Rhea		5	17.242		"	2.512
	7	20	Tethys		5	16.558		"	1.828
	9	50	[Rhea		5	20.184		P	5.454
			Tethys		5	18.798			4.068
		50	Iapetus		5	17.368			2.638
	8	55	Enceladus		5	17.310			2.580
			Dione		5	17.292			2.562
	9	7	Titan		5	25.966			11.236
				3455					

106

doubtful omit 106

Aperture 5"

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" 15"

					3455					
17	9	20	Saturn; Rhea		5	19.386	14.73	u	E!	4.656
		25	Tethys		5	18.098		"		3.368
	9	30	Encel.		5	16.654		"		1.924
	9	40	Dione		5	17.732		"		3.002
		45	Japetus		5	17.378		"		2.648
		57	Titan		5	26.570		"		11.840
			R.3	c	5	22.564		P		7.834
	10	20	"	c	5	22.366		u		7.636
					3495					
17	8	20	Mars Saturn		10	17.50	302.74	M	B w. tels.	
			Mars Saturn		9	16.82	300.92	"	"	
	9	25	Moon "		10	4.44	32.92	P	"	
	"	30	" Mars.		10	13.15	34.05	"	"	
	9	40	Saturn "		10	17.65	31.89	"	"	
					3544					
18			Jupiter (1) - (4)		10	33.66	374.58	"	"	
	6	~~50~~	" (1) - (4)		10	34.38	121.70	u	"	
		50	" 2 - (4)		2	46.65	387.85	u	"	
			Mars. R.3.	c	5	23.312	14.73 ~~23.312~~	P		8.382
	8	35	" "	c	5	22.414		u		7.684
			Saturn	c!	5	23.004				8.274
	9	30	Mimas as read.		1	17.30		P		2.57
			Japetus		1	18.54		P		3.81
			Rhea !		1	21.02		P		6.29
			Japetus		5	17.462		P		2.732
			Rhea		5	19.544		P		4.814
	9	40	Mars Saturn		10	15.92	274.78	u	B	
	9	26,	" Moon		10	12.27	45.77	u	"	
	10	7	Saturn "		10	3.27	45.07	u	"	
	10	15	" Mars.		10	15.20	226.86	P	"	
					3634					

R 26. 17
" "
" "
" 18
" "
24

clouds

] focus shorter
I, 17d 148

W S
"
"
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"
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"
"
129

			3634				
Oct. 22d. 6.24	Saturn Titan.		5	22.698	14.73	P I.	7.968
7.30	Japetus.		5	18.000		P	3.270
35 [	Dione		7	18.604 ~~20.330~~		P	3.874
	Rhea		5	20330		P	6.600
40	Enceladus		3	17.34		P	2.61
9 20	Mars Satellite		10	18.10 ~~28.00~~	217.06	P C	
23	"	"	10	18.98 ~~37.76~~	218.54	u	
10 10	Neptune Satellite. No		5	15.192	14.73	P	.46
13	" "	"	5	15.220		u	.49
16	" "	"	5	15.298		P	.568
38	" "	O.	5	16.562		P	1.832
10 41	" "	"	5	16.712		P.	1.982
			3705				
23d 5 10	Zero pt.		5		14.769	P	
	Centr lat.		5	20.730	1473	"	6.000
	Jupiter	(3)	5	19.326		"	4.696
	"	(1)	5	18.466		"	3.736
	"	(2)	5	18.176		"	3.446
5 45	"	(4)	5	17.650		"	2.920
	"	(2)	5	18.484		u	3.754
6 5	"	(1)	5	18.660		"	3.930
6 15	"	(3)	5	18.922		"	4.192
6 23	"	(4)	5	17.458		"	2.728
	"	(4)	6	17.435		P	2.705
6 35	"	(1)	5	18.500		"	3.770
	"	(3)	5	19.062		"	4.332
6 45	"	(2)	5	18.790		"	4.060
	* Jove. 4		5	16.068		"	1.338
7 35	Vesta ~~Mars~~. Saturn		5	21.514		P	6.784
	"	"	5	22.378		u	7.648
			3791				

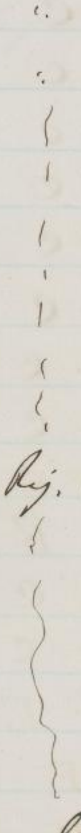
N.1 = .226 mm. = 6″.81

with clear dist .35 = 1″.18

Of = .105 mm but is badly closed 3″.2

Mean moved each time

Ap. 5″



Rej. 17.18 point gives 17.486

Sl a little out of focus

Oct. 23d	7 50	Mars Vesta ④		3791 5	17.560	14.73	u	E.	2.830
	8 0	" "	"	5	17.926		P		3.196
	8 12	" Saturn.		10	17.09	306.76	P	C	
	9 30	" "		10	19.63	36.79	u	"	
	9 45	" "		10 3833	19.52	36.08	P	"	
Oct. 24th	7 40	α Lyrae last		5	.15	110.06	P	B	
	22	Zero point		5		14.7434	P	E	
	5	Contact.	c	5	20.360	14.73	P	"	5.630
	35	"	c	5	21.668		u	"	6.938
	50	"	c	5	20.470		P	"	5.740
25th	2	"	c	5	20.518		P	"	5.788
	2 10	"	c	5	21.864		U	"	7.134
		"	c	5	18.514		P	"	3.784
	2 25	"	c	5	18.816		U	"	4.086
27th	5 55	Jupiter Venus.		3848 10	25.03	307.27	P	C	
		Mars Saturn.		10	19.52	36.32	P	C	
	9 42	" "		7	19.04	128.21	S	C	
	10 20	" "		10	17.86	306.88	P	C	
28th	5 45	Jupiter Venus		10	24.07	35.13	P	C	
	50	" "		10	27.61	35.79	S	C	
	9 45	Mars Saturn.		10	18.29	215.39	P	C	
	10 5	" "		10	20.65	308.17	S	C	
29th	7 15	" "		10	20.62	35.36	U	C	
		π Andr.		10 3985	6.52	212.06	P	B	
30th	5 50	Mars Saturn.		10	18.49	36.41	P	C	
	6 10	" "		10	17.26	35.88	U	C	
		Antiope Saturn.		5	16.864	14.73	P	E.	2.134
		" Mars.		5	15.604		"	"	.873
	7 27	" ~~Saturn~~ Mars		5	15.654		U	"	.924
	35	" ~~Mars~~ Saturn		5 4025	16.890		"	"	2.160

Ap. 5.

"

5" apert.

3" apert.

Objects distant Venus lens.

			4025					
Oct 30th 7 45	Saturn Hyperion.		5	16.866	14.73	P	I.	2.136
51	"		5	16.914		u	I.	2.184
8	Mars Saturn.		10	21.62	214.92	S	C	
Nov 1st 5 25	Venus Jupiter		10	23.87	35.19	P	C	
	Zero Phot I.		5		14.7392	P	I.	
2d. 5 35	Jupiter Venus.		10	20.96	126.38	S	C	
	Mars Saturn		10	13.60	218.94	S	C	
	Zero C. by gas		5		217.10	S	C	
	Zero of C by Venus		10	~~4.88~~	215.60	S	"	
4th 5 45	Venus Jupiter.		10	24.00	35.32	S	"	
5 55	Mars Saturn.		10	14.49	127.91	S	"	
	Zero		10		124.38	S	"	
			4125					
6th. 5 35	Venus Jupiter		10.	19.22	124.12	S	"	
5 45	Mars Saturn		10	17.59	214.87	S		
	Zero Phot. Eq		10	1	125.98	S		
6 15	Venus Jupiter		10	24.36	218.88	u		
8 53	Mars Saturn.		10	19.48	127.52	P		
9	" "		10	19.93	35.77	"		
			4185					
7th 2 40	Centr.	c	5	20.788	14.73	P		6.058
5 25	Venus Jupiter		10	19.72	126.90	P		
5 33	" "		10	22.37	36.05	"		
5 42	" "		10	21.51	36.31	S		
5 51	" "		10	19.09	125.97	"		
6 10	" "		10	21.13	126.03	u		
	" "		10	23.54	215.38	"		
	Mars thr. R.3 centr.	c	5	22.428	14.73	P		7.698
6 45	" " R? "	c	5	17.120		S		2.390
7 05	" " R 3 "	c	5	23.288		u		8.558
15	" " R 3	c	5	23.282		P		8.552
			4270					

through glass
"   "

Ap 5th
Attached tube to C

					Rdg.	Zero	Obs	Dist.
Nov. 7th		Saturn	Japetus.	4270 5	17.242	1473	P	2.572
		"	Hyperion.	5	15.928		"	1.198
		"	Dione	5	19.000		"	4.270
		"	Japetus	5	17.636		U	2.906
	8 20	"	Dione	5	18.764		"	4.034
	8 30	"	Hyperion.	5	16.080		"	1.350
	" "	Saturn	Mars	10	19.63	215.51	P	
	" 41	"	Japetus.	5	18.892		S	4.162
		"	Hyperion.	5	16.228		"	1.498
	9 03	"	Dione	5	18.076		"	3.346
	9 08	Mars	Saturn.	10	21.99	36.77	U	
	10 12	Brunhilde (123)	β Arietis	5	19.138		S	4.408
	10 17	"	"	5	19.770		P	5.040
	10 22	"	"	5 4350	22.662		U	7.932
Nov 9th	5 46	Jupiter	Venus	10	20.71	127.45	P	
	51	"	"	10	20.89	36.21	"	
	6 10	Mars	Saturn	10	20.30	35.90	"	
	15	Jupiter	Venus	10	20.65	36.43	"	
	21	"	"	10	22.12	306.53	"	
	36	"	"	10	22.41	306.83	S	
		"	"	10	25.25	220.39	"	
		"	"	10	24.90	216.30	U	
	50	"	"	10 4440	22.67	125.53	"	
Nov 13th	4 45	Constant.	c	5	20.594	1473	P	5.864
			c	5	32.066	"	"	17.336
		Venus red to ocl.		16			P.S.	
		Venus	Jupiter	10	19.45	123.75	S	
	6 03	"	"	10	20.59	213.71	"	
	6 10	"	"	10	20.21	214.35	U	
	6 15	"	"	10 4506	18.40	122.70	"	

5th aperture.
15th "

			4506					
Nov. 13	6 10	β₃ Cephei. β' Ceph.	5	18.724	147.4	P	I.	~~4.00~~ 3.98 ~~3.994~~
"	6 20	Venus Jupiter.	10	19.90	123.20	"	C	
"	6 26	" "	10	20.69	206.38	"	"	
"	6 25	β₃ Ceph. β' Ceph.	5	18.640	147.4	S	I.	3.9~~10~~
"	6 37	" "	5	17.710		u	"	2.9~~80~~
"	7 15	α Lyrae and Ceph.	5	18.868		P	"	
	21	" "	5	18.352		u		
	30	" a ε Lyrae.	5	18.810		P		
	33	" b "	5	15.932		"		
		" c "	5	16.338		"		
	53	" a "	5	18.792		u		
	58	" b "	5	15.658		"		
	8 01	" c "	5	16.154		"		
	8 12	" a "	5	19.846		S		
	16	" b "	5	17.026		"		
	20	" c "	5	16.424		"		
	50	β Delphini b β Delphini	5	20.982		"		
	59	" a "	5	27.166		"		
	10	a "	5	30.354		u		
	9 19	" b "	5	20.484		"		
	9 37	" b "	5	20.618		P		
	9 40	" a "	5	29.376		"		
	9 57	κ? Pegasi. b κ Pegasi	5	22.616		P		
	10 ~~8~~		5	22.618		"		
	9 5	Mars Moon	10	19.01	197.17	P		
	10	" "	10	13.98	329.94	"		
	19	" "	10	14.17	254.47	S		
	35	" "	10	29.81	163.37	"		
	55	" "	10	21.51	334.55	u		
	10 0	" "	10	18.96	57.54	"		
			4696					

Mer Mark	22h.		Zero Point.		4696 5		14.745	P	F.
	22	10	Constant F. w Obj.	c	5	20.802	14.74	"	$6.0\overset{6}{7}2$
	22	20	"	c	5	20.492	"	"	$5.7\overset{5}{6}2$
		20	"	c	5	21.786	"	u	$7.0\overset{4}{8}6$
		30	"	c	5	21.574	"	P	$6.8\overset{3}{4}4$
	23	5	"	c	5	21.072	"	S	$6.3\overset{3}{4}2$
	23	8	"	c	5	20.706	"	P	$5.9\overset{6}{7}6$
15d	0	10	Artif. Star.	c	5	26.524	"	P	11.784
"	0	15		c	3	28.42	"	S	13.68
"	0	50		c	5	27.096	"	P	12.356
"	0	55		c	5	27.614	"	S	12.874
	1	10		c	5	27.080	"	u	12.340
	2	30		c	5	24.800	"	P	10.060
	2	33		c	5	24.070	"	S	10.330
	2	43		c	5	18.910	"	P	4.170
	2	50		c	5	18.888	"	S	4.148
	2	55		c	5	18.980	"	P	4.240
	3	0		c	5 4784	19.088	"	S	4.348
16d	9	05	Mars Satel.		10	26.44	236.60	S	
		8	" "		10	25.23	326.94	"	
		15	" "		10	27.30	146.50	P	
		20	" "		10	24.09	241.53	"	
			Satur Japetus		5	16.768	14.67	P	
		05	" Dione.		5	19.180		P	
		08	" Dione		5	19.490		u	
		15	Japetus		5	17.472		u	
	9	30±	Cml. : Orionis		10	4.71	263.89	P	F
	9	45	" "		4 4858	6.22	264.42	S	F

R 30.11

r. eye Ap. 5" .

l. " " .

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without circ. diaph. .

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Sky through pin hole. Apert. 7.24 mms.
Brightness altered with rotation of Nicol.
Sky thro' circular [illegible] ,

" ,

" ,

Scantier thing through greatly [illegible].

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" " aperture ·3.09 mms

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					4558				
Nov 17th	6.10	Venus Jup.		10	14.61	236.55	P	C	
		" "		10	15.38	327.66	"	"	
	6 45	β Aquarii		5	22.092	14.67	P	E	
	" 50	" "		5	21.952	"	S	"	
	7 3	α Aquarii		5	19.480	"	P	"	
	" 10	" "		5	20.422	"	S	"	
18th	6 31	Mars Saturn		4898 8	24.69 ~~49.38~~	238.99	S	C	
				8	28.45	145.60	S	"	
	6 55	Moon Neptune		5	15.094	14.67	P	E	
	7 01	" "		5	15.138	"	S		
	7 12	" "		5	15.136		P		
	9 5	Vesta Mars		5	17.964		P		
	9 12	" "		5	17.952		S		
	9 17	" "		5	17.756		P		
	9 23	" Sat.		5	21.408		P		
	27	" "		5	21.204		S		
	9 53	Mars "		8	25.83	236.58	P		
		" "		8	27.67	145.69	P		
19th	4 47	Cent.	c	4970 5	20.480	14.67	P		810 ~~5.750~~
	4 51	"	c	5	31.696		P		17.026 ~~16.966~~
	7 45	K. χ Cygni		5	22.686		P		
		l		5	20.054		"		
		n		5	18.686		"		
		m		5	18.710		"		
		e		5	19.882		"		
		g		5	18.352		"		
	8 45	Enif.		5	17.410		"		
	50	Jup.		5	17.634		"		
	55	Kapt.		5	16.386		"		
	9 00	Fomal.		5	17.644		"		
				5030					

5^{m} ah.

15^{m} af.

5^{m} ah

			5030				
Nov. 19th 9 13	Japetus		5	16.184	~~14.66~~ 14.67	u	
25	Tethys		5	17.736		"	
32	Japetus		5	16.598		S	
42	Tethys		5	16.764		"	
50	Titan		5	17.810		u	
55	"		5	18.294		S	
10 0	"		5	17.860		P	
			5065				
2nd h 47	Cent.	c	5	32764		P	18.034
	Japetus		5	16.446		S	
6 10	Tethys		5	16.146		S	
6 23	~~Jap~~ Tethys		5	18.432		P	
30	Japetus		5	16.806		P	
	k Cygni e α Cygni		4	16.65	7	P	
	" .		4	16.27	"	"	
	k		4	32.97	"	"	
	l		4	48.40	"	"	
	n		4	28.72	"	"	
	m		4	29.95	"	"	
7 50	i		4	57.23	"	"	
	g		4	43.20	"	"	
	c		4	21.50	"	"	
	h		4	11.65	"	"	
	d		4	21.77	"	"	
	η		4	8.40	"	"	
	α Cygni		10	2.18	83.28	$\overset{1.6}{\Sigma}$	"
			5148				
2nd 23 3, Titan			5		14.6638	"	"
22 d 50 "			5		14.6706	"	"
3.8 "			5		14.6656	"	"
3.9 "			5		14.7260	"	
			5168				

ap 5th

"

"

prov. dilendet

Turned for bolty screw

									Diff.
				5768					
Nov 29th	9.7	α Piscium		4	31.12	157.95	P	C	~~✻~~ .219 ~~.784~~
	9.8	"		4	32.37	161.87	S		.199
	9.9	"		4	30.80	162.70	[illegible]		.225
				5180					
30th	4.5	Zero. Mot G		5		.14	P	G	
	4.9	Cond.	c	5	2.143		P	"	
	5.0	"	c	5	2.176		P		
	6.6	Iapetus		5	1.271		S		
	6.7	"		5	1.030		u		
	6.8	Rhea		5	1.168		S		
	6.9	Titan		5	1.522		S		
	7.2	Rhea		5	1.015		u		
	7.8	α Delphini	a	5	2.402		P		
	7.9	" "	b	2	1.73		P		
	7.9	" "	c	5	2.662		P		
	8.0	" "	d	2	1.28		P		
	8.3	" "	a	4	2.290		u		
				5238					
Dec. 1st		ε Aquilae		4	15.95	4.45	P	Z	
		"		4	16.57	2.37	"		
		pr. st. mic.		4	3.77	7.27			
		γ Aquilae		4	30.87	5.42			
		β "		4	19.97	6.27			
		η "		4	25.6 ?				
		ι "		3	18.3				
		ν "		4	14.20	5.80			
		δ "		4	21.72	5.67			
		μ "		4	15.17	6.97			
		ε "		4	18.77	6.52			
		γ "		4	31.10	6.25			
		β "		4	20.67	3.82			
		α "		3	9.0				
				539[illegible]					

Imperfect rates of S and U rejected.

5th april.

nj. 252 eyes tired

Σ 41°

34°.8

30.2

29.0

30.6

34.3

33.3

37.4

35.5

35°

				5292				
Dec 14	3.9	Zeta		5	99.9		G.	P
	4.0	Centt.		5	1.745		"	"
	6.8	Japetus		5	1.058		"	S
	6.9	Titan		5	2.412		"	S
	7.0	Tethys?		5	1.696			S
	7.5	Japetus		5	1.130			u
	7.8	Rhea		5	1.352			u
	7.9	Japetus		5	1.158			P
	8.0	Rhea		5	1.850			P
	8.4	β. Delphini 15²		5	2.426			P
	8.7	γ Equulei		5	2.700			P
	8.9	γ "		5	5.016			S
	9.4	ε Pegasi		5	1.250			S
	9.5	" "		5	1.352			P
	9.7	α Aquarii		5	2.006			P
	10.0	" "		5	2.280			S
				5372				
Dec 20.	5.6	β Aquilae	40.4	4	25.62	8.87	Z	P
	5.6	ι	30.7	4	18.12	7.82		
	5.7	ν	30.2	4	15.07	7.32		
	5.7	δ	31.8	4	28.80	6.45		
	5.8	μ	35.8	4	13.87	8.32		
	5.8	ε	35.4	4	19.40	6.35		
	5.9	ε	34.7	4	21.13	9.97		
	5.9	μ	34.8	4	15.90	8.05		
	5.9	δ	29.6	4	23.35	9.25		
	6.0	ν	27.4	4	13.47	6.27		
	6.0	ι	27.3	4	16.05	8.10		
	6.0	β	35.8	4	23.98	7.02		
	6.1	η	30.8	4	21.63.	7.72		
	6.2	β		4	24.00	5.85		S
	6.3	β	33.1	4	21.18	6.27		S
				5432				

Apr 5"

			5432			Ins.	Obs.
Dec 2d	6.6	ε Lyrae	4	31.82		H	P
	6.7	"	4	33.50		"	"
	6.8	"	4	32.02		"	S
	6.8	"	4	34.10		"	"
	7.0	5 "	4	37.25		"	"
	8.3	α Cygni	5	.834		G	P
		limit visib.	1	.30		"	"
	8.5	α Cygni	5	.838		"	S
		limit visib.	1	.37		"	S
	9.4	ε Pegasi	5	.986		"	S
	9.5	" "	5	1.046		"	P
	9.6	" " b fainter	5	.652		"	"
	9.8	ξ "	1	2.42		"	"
	10.1	β "	5	1.040		"	"
	10.2	" "	5	1.052		"	S
			z Merid 5490 1.14 5376				
3d	4.8	Capella	5	1.905		"	P
	4.9	"	5	2.138		"	S
	5.2	ζ Lyrae	4	29.82	149.42	H	P
	5.3	" "	4	29.10	149.00	"	"
	5.5	" "	4	29.20	148.35	"	S
	5.8	39 Draconis	4	14.17	~~[illegible]~~ 238.87	"	P
	5.8	" "	4	16.67	238.82	"	S
	6.1	o "	4	12.82	238.77	"	P
	6.2	o "	4	15.50	239.75	"	~~[illegible]~~ S
	6.2	o "	4	11.40	239.75	"	U
	6.7	α Aquilae	5	1.953		G	U
	7.2	γ "	5	1.5~~[illegible]~~ 1.0		"	P
	7.5	" "	5	1.554		"	U
			5433				

Log tan² α (H.)	Log cot² α (H.)	
9.585	0.415	1.04
9.642	0.358	.89
9.592	0.408	1.02
9.661	0.339	.85
9.761	0.239	.60

Ap 5"

9.516	0.484	1.21
9.491	0.509	1.27
9.495	0.505	1.26
8.806	1.194	2.98
8.954	1.046	2.61
8.713	1.287	3.22
8.886	1.114	2.78
8.609	1.391	3.43
~~9.098~~		
~~8.862~~		
~~8.886~~		

				5433				
Dec 3d	8.0	o Cygni α Cygni.		5	.416		G	~~R~~
	8.1	" "		5	.578		"	U
	8.7	ζ Pegasi α Pegasi		5	.887		"	U
	8.9	" "		5	.744		"	S
	9.2	ξ " "		5	.732		"	S
	9.5	" "		5	1.175		"	U
				5463				
	23.6	Coll:	c	5	3.266		"	P
	23.7	"	c	5	3.998		"	S
		δ Orionis		4	6.63	257.07	H	P W. Equal.
		" "		4	6.87	250.57	"	" " "
	23.9	Coll: dec.	c	5	3.894	3	G	S
		" inc.	c	5	3.736		"	"
4th	0.2	" inc		5	3.548		"	P
	"	" dec.		5	3.612		"	P
	1.1	" inc.		5	3.244		"	S
	"	" dec		5	3.484		"	"
	1.5	" inc		5	3.256		"	"
		" dec.		5	3.556		"	"
	1.8	" inc.		5	3.206		"	"
		dec.		5	3.578		"	"
	2.3	inc		5	3.294		"	"
		dec.		5	3.376		"	"
	2.6	inc		5	3.378		"	U
		dec		5	3.608		"	"
	3.1	inc		5	3.804		"	P
		dec.		5	3.702		"	"
	3.2	dec.		3	3.40		"	"
		inc		3	3.42		"	"
				5567				

discordant probably a bright ring in penumbra of [illegible]
reflect. Center in quantity. Apert: Cab. Mic. Eyepiece No 1 = 8.173m

8.127 1.873 4.68
8.166 1.834 4.58

alternately incl. dia. Apert. 7.251 mm.

Aperture 7.251 mms R 30.69

r. eye

l. eye

r. eye

l eye

other pairs

			5569				
Dec 6th	21.9	Contact	5	3.424		G	P
	2		5	3.526			"
	22.1		5	3.480			S
			5	3.730			"
	22.4		5	3.674			P
			5	3.648			"
			5599				
7th	5.8	I Pegasi	4	6.17	162.22	H	S
	5.8	"	4	4.75	161.55		P
	5.9	"	4	6.25	162.60		"
	5.9	"	4	5.25	161.05		S
	6.4	η Lyrae	4	11.22	251.12		S
	6.5	"	4	10.12	251.32		"
	6.6	"	4	10.97	251.47		"
	6.7	"	4	11.90	252.05		S
	7.1	52 Cygni	4	7.85	161.05		S
	7.2	"	4	6.30	161.30		"
	7.3	"	2	6.85	249.65		"
	8.2	f' Cygni	4	6.30	161.25		"
	8.3	"	2	6.6	72.6		"
	9.8	"	4	6.42	161.47		S
	9.9	"	4	7.12	161.62		P
	10.0	"	4	7.10	161.35		S
	10.1	"	4	7.10	161.15		P
			5663				
8th	6.2	β Cygni	4	20.75	161.80		S
	6.3	" "	4	22.70	161.15		P
	6.4	"	4	21.80	164.00		S
	6.5	"	4	18.50	164.80		"
	6.5	"	4	20.35	164.130		"
	6.6	"	4	23.72	162.77		P.
			5687				

8.072	1.928	
7.830	2.170	
8.072	1.928	
7.918	2.082	
8.593	1.407	
8.501	1.499	
8.577	1.423	
8.647	1.353	
8.273	1.727	
8.086	1.914	
8.153	1.847 clouds	
8.086	1.914	angle not over 300° Σ 352°
8.127	1.873 clouds	
8.100	1.900	
8.191	1.809	
8.191	1.809	
8.191	1.809	
9.155	0.845	
9.243	0.757	
9.204	0.796	
9.049	0.951	
9.136	0.864	
9.285	0.715	

				An	Ze	Ph.	Ob
Dec 8th 77			5687				
	6.7	γ Delphini	4	~~20.75~~ ~~161.80~~ 34.42	163.82 ~~161.80~~	H	P
	6.7	"	4	30.33	163.87		S
	6.8	"	4	31.30	163.80		P
	6.9	"	4	29.80	164.55		S
	7.0	β "	4	2.70	164.30		S
	7.8	ζ Aquarii	4	57.17	162.87		P
	7.9	"	4	49.38	161.85		P
	8.0	"	4	44.60	161.75		U
	8.1	"	4	45.77	160.17		U
	8.2	μ Cygni	4	28.20	162.20		P
	8.2	"	4	25.57	161.29		U
	8.3	"	4	25.90	161.40		U
	8.4	"	4	28.30	160.65		P
	8.5	"	4	26.45	161.75		S ?
	8.7	φ Cygni	4	21.37	161.33		P
	8.8	"	4	18.10	160.22		S
	8.9	"	4	16.27	161.59		U
	9.0	"	4	16.95	161.25		U
	9.1	"	4	15.90	161.05		S
	9.2	"	4	19.90	160.65		P
			5767				
Dec 9th	6.7	β ~~γ~~ Aquilae α Aquilae	5	.774		₵	P
	7.5	2 Lyrae (a) α Lyrae	5	1.112			"
	7.5	" (c) "	5	.264			"
	7.6	" (b) "	5	.306			"
	7.7	(a)	6	.790			"
	7.8	(a)	5	.956			"
	7.9	α Lyrae cont. " "	5	1.012			"
	8.1	ζ Lyrae	4	21.83	163.62	H	"
			5804				

~~9.671~~	
9.671	0.329
9.533	0.467
9.568	0.432
9.516	0.484
7.347	2.653
0.189	9.811
0.131	9.869
9.988	0.012
0.030	9.970
9.459	0.541
9.361	0.639
9.373	0.627
9.462	0.538
9.392	0.608
9.186	0.814
9.029	0.971
8.932	1.068
8.965	1.035
8.909	1.091
9.117	0.883

Reject .60 mean =.828 but dome cut off [illegible]

.415

~~9.204~~ ~~0.796~~

			5804	Ag.	Zo	Inst.	Obs.
Dec 9th	8.2	ζ Lyrae	4	27.68	162.97	H	P
	8.4	o₂ Cygni .. α Cygni	5	.566		I	"
	8.5	α " (a) "	5	.808		I	"
	8.6	" " (b) "	5	.404		I	"
	9.5	ε Cygni	5	1.500		I	"
	9.8	μ	4	31.97	161.17	H	"
	9.9	"	4	26.20	161.80	H	"
			5836				
13th	7.1	ε Lyrae	4	30.60	143.85	"	P
	7.3	ζ "	4	27.28	184.85	"	"
	7.3	" "	4	29.30	186.25	"	Y
	7.4	" "	4	27.73	186.37	"	"
	7.8	μ Cygni	4	22.05	184.80	"	"
	7.9	" "	4	22.55	183.80	"	"
	8.2	ξ Cephei	4	22.17	185.67	"	"
	8.2	" "	4	23.87	185.27		"
	8.3	" "	4	22.60	183.62		S
	8.4	" "	4	22.37	184.12		"
	8.5	β Cephei	4	7.65	187.05		"
	8.6	" "	4	8.55	185.80		"
	8.6	" "	4	7.27	185.72		U
	8.7	" "	4	6.80	185.45		"
	8.9	δ Cephei	4	19.87	186.22		"
	9.0	"	4	21.50	187.35		"
	9.0	"	4	17.92	186.17		S
	9.1	"	4	17.55	186.60		"
	9.4	κ Cephei	4	12.75	187.60		"
	9.5	"	4	11.70	186.22		"
	9.6	"	4	10.77	185.92		U
	9.6	"	4	10.50	186.30		"
			5924				

9.440 0.560

centre dist 150" ang. 190°

9.592 0.408
9.384 0.616
0.456
Index shifted.
0.574
0.502
0.560
0.787
0.766
0.798
0.707
0.761
0.770
1.750
1.651
1.785
1.847
0.883
0.809
1.000
1.003
1.294
1.368
1.447
1.464

			5924	ay	Zu	Mut	Obs.
Dec 13th	9.8	η Cassiopeae	4	8.35	185.05	H	u
	9.9	" "	4	8.55	185.20		"
	9.9	" "	4	9.25	184.75		S
	10.0	" "	4	9.12	185.22		"
			5940				
14th	5.3	η Lyrae	4	9.30	186.15		P
	5.3	" "	4	9.70	185.50		S
	5.4	" "	4	10.28	185.52		P
	5.4	" "	4	9.08	186.42		S
	5.7	o Draconis	4	15.10	185.05		S
	5.8	" "	4	14.32	185.17		"
	5.8	" "	4	10.75	186.15		P
	5.9	" "	4	9.95	185.95		"
	6.0	" "	4	12.95	181.65		A.G.C.
	6.4	f' Cygni	4	8.30	180.15		P
	6.5	" "	4	8.02	184.77		S
	6.6	" "	4	7.20	182.20		"
	6.6	" "	4	8.52	180.17		V
	6.7	" "	4	9.10	179.20		"
	7.1	51 Piscium	4	12.12	181.87		S
	7.1	" "	4	11.32	181.82		"
	7.2	" "	4	11.75	180.20		V
	7.3	" "	4	10.70	180.35		"
	7.5	" "	4	9.52	184.67		P
	7.6	" "	4	9.75	183.75		"
	7.6	[illegible] "	4	31.87	184.42		P
	7.7	" "	4	32.52	184.67		"
	7.7	" "	4	33.60	183.05		V
	7.8	" "	4	34.57	184.67		"
	7.9	ψ' "	4	41.57	184.37		P
			6040				

Log. cot² or

1.672
1.651
1.581
1.591
1.572
1.534
1.481
1.591
1.138
1.187
1.447
1.516
1.280
1.672
1.704
1.794
1.651
1.591
1.338
1.399
1.368
1.447
1.553
1.534
0.412
0.392
0.355
0.322
0.103

			6040	Angle	Zero	Phot	Obs.
Dec 14.	7.9	ψ¹ Piscium	4	41.25	183.15	H	P
	7.9	" "	4	39.20	182.25		V
?80	8.0	" "	4	40.95	181.90		"
	8.2	55 "	4	12.62	183.32		P
	8.2	" "	4	11.10	183.35		"
	8.2	" "	4	11.15	183.75		S
	8.3	" "	4	11.42	183.57		"
	8.4	" "	4	12.77	183.57		V
	8.4	" ~~φ~~ "	4	12.15	183.35		"
	8.7	φ "	4	5.42	184.17		"
	8.8	" "	4	4.97	184.17		"
	8.8	" "	4	5.20	94.20		S
	9.0	" "	4	4.72	94.22		S
	9.1	" "	4	5.62	183.72		P
	9.1	" "	4	6.00	184.20		"
	9.2	γ Arietis	4	44.93	181.82		"
	9.2	" "	4	47.22	181.92		"
	9.3	" "	4	41.62	183.82		V
	9.4	" "	4	42.07	183.52		"
	9.5	" "	4	43.80	183.80		S
	9.6	" "	4	44.22	185.35		S
	9.7	ι Trianguli	4	26.37	183.62		"
	9.8	" "	4	22.75	184.75		"
	9.8	" "	4	25.90	184.50		V
	9.9	" "	4	23.50	184.50		"
	10.0	ι Trianguli	4	25.00	184.65		P
	10.0	" "	4	26.32	185.22		"
			6148				
Dec.16.	5.1	ζ Lyrae	4	27.22	207.17		"
	5.2	" "	4	28.02	207.42		"
			6156				

0.116
0.177
0.125
1.301
1.415
1.415
1.391
1.294
1.338
2.049
2.116
2.082
2.170
2.017
1.957
0.003
9.933
0.103
0.088
0.036
0.024
0.608
0.757
0.627
0.723
0.663
0.612
0.578 [2 nat. log of× 3.892]
0.549 3.760

× In these nat. logs 10 is substituted for the characteristic the same as in logarithms

Dec. 16.	5.3	ζ Lyrae	4	26.05	207.45	H	S
	5.3	" "	4	25.00	208.50		"
	5.4	η "	4	8.57	116.92		P
	5.5	" "	4	8.87	116.97		"
	5.5	" "	4	9.67	116.22		S
	5.6	" "	4	8.77	116.67		"
	5.7	39 Draconis	4	14.05	206.75		P
	5.7	" "	4	15.80	206.50		"
	5.9	" "	4	17.10	206.30		S
	5.9	" "	4	20.37	207.77		"
	6.1	o "	4	10.85	206.55		P
	6.1	" "	4	10.17	207.12		"
	6.2	" "	4	12.27	205.52		S
	6.3	" "	4	13.32	207.12		"
	6.4	ε Lyrae	4	29.92	206.67		P
	6.4	" "	4	31.40	204.80		"
	6.5	" "	4	33.00	206.85		S
	6.7	" "	4	35.87	206.47		"
	6.7	5 "	4	40.80 ~~49.20~~	207.40		"
	6.9	" "	4	39.15 ~~50.85~~	207.00		P
	7.9	f¹ Cygni	4	7.55	207.20		"
	7.9	" "	4	6.80	207.55		"
	8.1	" "	4	26.32	118.22		P
	8.2	" "	4	28.87	204.72		"
	8.4	μ Cygni & Burnham's faint comp.	5	2.83		I	"
	8.6	" " " "	5	2.91			S
	9.0	Japetus	5	1.35			"
	9.5	ζ Piscium	4	31.47	207.17	H	P
	9.6	" "	4	30.55	208.40		S
			6275				

	cot. 2nt. An. el.
0.624	4.101
0.663	4.289
1.641	3.224
1.616	2.772
1.534	1.706
1.620	2.919
1.206	8.022
1.097	7.068
1.024	6.501
0.859	5.378
1.439	0.484
1.490	1.115
1.323	9.173
1.253	8.461
0.481	3.478
0.429	3.277
0.375	3.086
0.281	2.763
0.128	2.317 ~~1.726~~
0.181	2.461
1.762	5.192
1.847	6.773
0.612	4.047
0.516	3.623
0.425	3.264
0.460	3.395

Dec. 16.	9.6	ζ Piscium	4	33.55	206.45	H	P
	9.7	" "	4	32.27	206.87		S
	9.9	51 "	4	9.37	207.97		P
	9.9	" "	4	10.42	207.92		S
	9.9	" "	4	11.82	207.67		P
	10.0	" "	4	11.92	207.87		S
			62.99				
Dec. 17.	5.7	α Capricorni	4	36.62	216.35		P
	5.8	" "	4	38.05	207.45		"
	5.9	β "	4	12.67	207.92		"
	6.0	" "	4	13.30	206.60		"
	7.7	I Pegasi	4	5.05	250.10		"
	7.8	" "	4	5.42	249.97		"
	7.9	μ Cygni	4	27.77	158.92		"
	8.0	" "	4	28.40	157.65		"
	8.6	α Piscium	4	34.97	155.87		"
	8.6	" "	4	32.40	156.60		"
			6339				
Dec. 18.	5.1	ε Lyrae	4	32.95	158.45		"
	5.2	" "	4	35.27	157.57		"
	5.2	5 "	4	44.70	157.80		"
	5.3	" "	4	40.45	160.10		S
	5.7	39 Draconis	4	16.12	248.02		"
	5.7	" "	4	17.92	247.47		P
	5.8	" "	4	16.55	247.35		S
	5.9	" "	4	15.77	246.52		P
	6.0	β Cygni	4	20.15	158.70		"
	6.0	" "	4	18.77	158.27		S
	6.1	" "	4	17.75	159.40		P
	6.2	" "	4	20.02	158.87		S
	6.3	" "	4	21.65	158.90		P
			6391				

	2wt tm cet 01
0.358	3.022
0.398	3.164
1.562	2.081
1.473	0.897
1.360	9.573
1.353	9.491
	wj. cot 2a
&	0.258
	0.214
	1.294
	1.253
	2.116
	2.049
	0.556
	0.534
	0.310
	0.395
	0.378
	0.300
	0.009
	0.140
	1.079
	0.982
	1.657
	1.097
	0.873
	0.936
	0.992
	0.878
	0.805

Interposed blue glass.

			No.	Angle.	Zero.	Ob't	Obs.
Dec. 18.	6.3	β Cygni	4	23.77	159.82	H	~~P~~ S
	6.4	" "	4	16.72	159.42		P
	6.4	" "	4	17.87	159.57		S
			6403				
20th	5.6	5 Lyrae	4	48.20	162.75		"
	5.7	" "	4	47.87	162.67		P
	5.8	" "	4	47.40	163.70		S
	6.0	" "	4	47.67	162.42		P
	6.5	ψ Cygni	4	16.35	161.65		S
	6.6	" "	4	18.37	162.87		P
	6.6	" "	4	18.37	162.87		S
	6.7	" "	4	16.15	164.25		P
	6.8	26 "	4	11.00	254.50		"
	6.8	" "	4	9.02	252.92		"
	6.9	" "	4	8.72	252.47		S
	7.0	" "	4	11.15	253.55		~~P~~ S
	8.5	ε Draconis	4	11.40	162.50		S
	8.7	" "	4	11.95	162.65		"
	9.7	ν Ceti	4	7.22	252.82		"
	9.7	" "	4	6.90	253.15		S
	10.0	γ "	4	18.55	163.20		"
	10.1	" "	4	15.07	163.37		"
			6475				
22d	6.0	β Cygni	4	20.22	166.72		P
	6.1	" "	4	20.65	165.85		"
	6.2	5 Lyrae	4	47.15	168.05		"
	6.2	" "	4	47.67	166.92		"
	7.1	Tethys	5	1.350		I	"
	7.8	Japetus	5	1.444			"
	7.9	Tethys	5	1.288			"
	7.9	Japetus	5	1.248			"
			6511				

Log. cot $^2\alpha$	
0.711	Interference blue glass
1.046	〃 red 〃
0.982	〃 〃 〃
9.903	
9.912	
9.927	
9.918	
1.068	
0.956	
0.956	
1.079	
1.423	
1.601	
1.630	
1.415	
1.391	
1.353	
1.797	
1.834	
0.951	
1.138	
	Inherent differences in H

			6511				
Dec 22d	8.3 ~~7.9~~	~~Tethys~~ Japetus	5	1.336		I	S
	8.4	~~Japetus~~ Tethys	5	1.076		"	"
	8.5	~~Japetus~~ ψ Aquarii	4	6.32	147.87	H	P
	8.6	~~Tethys~~ "	4	7.42	147.82	"	S
	8.7	" "	4	6.60	147.60	"	P
	8.7	" "	4	5.92	148.67	"	S
	8.9	λ Arietis	4	18.40	237.60		P
	8.9	" "	4	18.15	237.70		S
	9.0	" "	4	17.62	147.27		P
	9.0	" "	4	18.42	147.97		S
	9.1	γ "	4	43.62	146.32		P
	9.1	" "	4	45.70	147.80		S
	9.2	" "	4	43.85	146.15		P
	9.3	" "	4	46.87	146.12		S
	9.5	π Arietis	4	14.62	237.12		P
	9.6	" "	4	14.30	238.20		S
	9.7	" "	4	13.35	148.05		P
	9.8	" "	4	14.67	148.32		S
	9.9	" " (b)	4	4.45	148.40		P
			6589				
23d	5.2	26 Cygni	4	9.32	240.97		P
	5.3	" "	4	8.90	241.15		S
	5.4	" "	4	9.95	241.40		P
	5.5	" "	4	8.65			S
	5.6	ψ "	4	14.30	240.10		P
	5.6	" "	4	18.37	241.32		S
	5.7	" "	4	18.42	240.02		P
	5.8	" "	4	17.77	240.77		S
	6.2	Japetus	5	1.366			P
	6.3	"	5	1.198			S
			6629				

Indistinct catgut circle,

[bright image at
[illegible] field

pt. more dist Cap. 110°; 20"
CA

[Continued R 18.6]

Continued on Page 170.

Comparison Mars & Saturn.

	Ang.	Log.	Obs.	No.
Aug 18th	13.04	.2316	P	10
	12.65	.2245	P	10
	13.13	.2332	U	10
	13.03	.2316	P	10
27th.	12.9	.2290	P	2
28th 9h10m	11.20	.2126	P	10
	11.75	.2080	P	10
30th	11.40	.2016	P	10
	10.40	.1835	P	10
12 12	11.57	.2051	P	10
	13.69	.2436	P	10
3d. 9 50	13.17	.2339	P	10
	12.87	.2284	P	10
	13.05	.2318	P	10
26th 10 35	14.88	.2657	P	10
" 40	13.57	.2405	P	10
Sept 5th 8 25	14.57		P	10
" " 30	13.42		S	10
" " 45	16.68		U	10
Sept ~~Aug~~ 30th 9 50	13.07		P	10
" " 55	16.46		S	10
" 10 5	13.74		P	10
" " 10	16.45		S	10
10th 11 15	16.15		P	10
11 25	14.93		P	10
26th 10 35				
" 40				
~~30th~~				
Oct 5th				

Diameter Holes S.8 and S.9.

Hole drilled Saturday 10 A.M. Jan 26th 1878.

			Age days.	Unit = .05 mms		No 9	No 8.
1	Jan 28th	3 P.M.	2.2	65.69	65.69	17.28	26.72
2	" 29th	9.50 A.M.	3.0	65.89	65.94	17.73	26.744
3	" 30th	9.5	4	66.21	66.20	17.08	26.75
4	" 31st	"	5	65.88	65.79	16.86	26.72
5	Feb. 1st	"	6	65.90	65.92	17.07	26.79
6	" 6th	"	11	65.95	66.10	17.33	26.88
7	" 13th	"	18	65.96	66.02	17.71	26.84
8	" 14	0.5	"	"	"	17.49	27.03

1877phae.proj.171S.

1877phae.proj.171S.

Comparison of Photometric Scales.

A.	Seidl.	Wolff.
1	9.9319	
1.2	9.5318	
2.1	9.4637	
2		
2.3		
3.2	8.8849	
3	8.6732	
3.4	8.5059	
4.3	8.4064	
~~4~~		

H			
1	9.9319	9.87566	−0.0562
1.2	9.5318	9.62660	+0.0948
2.1	9.4637	9.50805	0.0443
2	9.1666	9.26921	0.1026
2.3	8.9402	9.16783	0.2276
3.2	8.8812	9.07433	0.1921
3	8.6591	8.94191	0.2828
3.4	8.5051	8.78327	0.2782
4.3	8.5060	8.74218	0.2362
~~4~~			

		W.				
		.1243	.31	+.69	+19	
		383	.96	+.37	−13	−8
		497	1.23	+44	−6	+4
9.1902	9.3150	731	1.83	+.17	−33	−23
Δ .5084	.3818	833	2.08	+.25	−25	−15
		925	2.31	+46	−4	+6
8.6818	8.9332	1.059	2.65	+.35	−15	−5
		1.117	2.79	+.54	+4	+14
		1.257	3.14	+.53	+3	+13

9 | 380 3

.42

Constants employed

	mm.	″	log.	Author.
Focus of telescope	6828.4	3.834256		
1″	.033150		8.52048 ~~8.52048~~	
Diam A	.02822	.851		60
B	.03725	1.124		
C.4	.05992	1.808		
J.1	.0874	2.636	8.9415	96
M.2	.0158 ±	.476		108
Q.1	.0129		8.1106	(118 123
Abnormal R.3 (	.01372	.4139	8.13735	136-7
correcting glass R.1	.01303	.3932	8.11149	
J 5	.0252	.760		118.
1 div. 1″ obj.	.00722			
" ½″ "	.00423			
" ⅙″ "	.00137			
Aperture 15″ ~~14.94~~	379.5	log. = 2.5792		131 11.43
5″	126.95	= 2.10363		19.187
3″	76.47	= 1.88349		19.187
Focus obj. Phot. D	71.57) 71.66) 71.59	1.85485		19.129
" eyepiece	40.54 40.11 40.17			19.130
" Phot. E	236.55	2.37392		113 24.108
Mag. power large teles.	thickness 9.7 170.0			
" " Phot D	1.788			
" " " E				
mm. Aperture E. Equat. before Nov.	366. mm		2.5635	
~~Av. Aperture about~~	~~370 mm~~			
~~Abnormal~~ Corrected R3	.01267		.1028	
allowing for glass	.01204	0.″3632 log. 9.56015	.0806 ~~.1029~~	102

Thickness at positive lenses D & E — 24.113

8340

Constants.

Apertures.	Diams. of Holes.
37.95 cms.	J1. = ".760
36.6	Q1 = ".390
12.69	R3 = ".363
7.65	
.94	
.1338	

Taken at ~~12.70~~ 12.69
" " 7.65

70.36 1.8473

Observ. Satellites of Saturn.

+ = prec.
- = foll

	Max			.94 Mim 1.68	1.37 Enc. 2.16	1.88 Teth 2.66	2.72 Dion 3.42	4.51 Rhea 4.77	15.9 Tit 11.1	21.3 Hyp. 13.95	79.3 Japetus 32.15	*
1877. Sept.	23 d	8.h	est.		+1.5±	+1.15?	+3.46	+3.46				
	24	8.3	3ta				-3.4	-3.4	+9.65		+28.7	40.3
		9.4	3a.				-2.7	-2.7	+9.6		+28.6	39.4
	25	8.2	3a.					-4.2	+8.4		+29.4	28.2 12.8
		10.2	3a				1.7	-4.2	7.9		+29.0	26.5
		10.8				1.65	+1.15					
		.	est.					-3.65				
	26	10	3a.			6	(3)					
						1.98	2.3	+3.77	+1.98			
						2.08	2.48	+3.42				
	27	8.						+4.47	4.95		+29.4	

Aper. absol. Phot. I. $A = .508(S-15.94)^2$

" $.488(S-14.74)^2$

G.I $5.060\, S^2$

Satellites of Mars.

	page.	Phot.	No.	Obs.		A″	.6 A	Diam. Mars.
27th	32	B	5	P	.0787	.0670	.040	26.″62
	"	"	10	a.s	.0682	.0580	.035	
	"	"	10	P	.0601	.0571	.036	
	"	"	10	U	.0816	.0694	.042	
28th	"	"	10	R		.0493	.029	26.70
	"	"	10	R		.0489	.029	
	"	"	9	P		.0573		
	"	"	~~9~~	~~W~~		~~.0486~~	vanishing point	
	"	"	2	P		.0591		
30th	34	"	16	R		.0329		26.75
4th		D	10	P	.1631			26.80
		"	10	P	.1340			
		"	10	P	.1614			
		"	10	P	.1596			
		"	10	S	.1461			
		B	10	P		.0347		26.68
8th	36	D	10	P	.1486			
			10	P	.1722			
			10	S	.1481			
			10	P	.1721			
			10	P	.1630			
			10	S	.1860			
		I	10	P	.2306			
			10	P	.1583			
		I	10	S	.1633			
			10	S	.1721			
11th	38	I	10	P	.1826			26.52
		I	2	P	.2605			
			263					

	page	Method		No. 263	Obs.	Res.	"	Diam Mars.
12	38	I	D	10	P	.1135		26.374
				10	P	.1016		
				12	P	.0984		
				10	S	.1509		
				10	S	.1540		
13			~~10~~	10	P	.1276		26.26
				10	S	.1497		
			C	10	P	.0970	.0381	
	40			10	P	.1144		
				10	S	1290		
		I	1	10	S	.1602		
		I		10	P	.1542		
				10	P	.1451		
16		Sat.		10	P	.5831		25.82
		Sat.		10	S	.4939		
		I		10	P	.2074		
				10	S	.1557		
				10	S	.1538		
23	42			10	P	.1764		23.82
				10	S	.2461		
				465				

Took nat- sines instead of log sines

log. A×5/15	log. Angle.	A mms. log. diam. of star	B " A+1.4795	Ratio to diam. B − log plate diam	Diam obj. = 1	mm.
	.2354					
	.2258					
7.6350	.5121	8.1229	9.6024	8.0256	.0106	4.02
"	.4056	8.2294	9.7089	8.2321	.0171.	6.49
"	.7719 ~~.7659~~	7.8631	9.3426	7.9164 ~~7.8162~~	.0082	3.12
"	.7061	7.9289	9.4084	7.9822	.0096	3.65
"	.8052	7.8298	9.3093	7.8831 ~~[illegible]~~	.0076	2.89
"	.6806	7.9444	9.4239	7.9977 ~~[illegible]~~	.0100	3.80
"	.0000	7.6350	9.1145	7.6883 ~~[illegible]~~	.0049	1.86 ×
"	.5247	8.1103	9.5898	8.1636 ~~8.0130~~	.0146	5.54
7.4147	.4383 ~~.3404~~	7.9764	9.4559	8.0297 ~~7.8741~~	.0107	4.06
"	.6381	7.7766	9.2561	7.8299 ~~7.6773~~	.0068	2.58
"	.3404	8.0743	9.5538	7.9807	.0096	3.64
"	.3115	8.1032	9.5827	7.9096	.0081	3.07
"	.3404	8.0743	9.5538	8.1319	.0136	5.16
"	.3494	8.0653	9.5448	8.1229	.0133	5.04
"	.4481	7.9666	9.4461	8.0242	.0106	4.02]
7.4416	.3434	8.0982	9.5777	8.1558	.0143	5.43
"	.2720	8.1696 ~~.8897~~	9.6491	8.2272	.0169	6.42
7.6617	.7693	7.8924	9.3719	7.9500	.0089	3.38]
"	.4570	8.2047 of RA	9.6842	8.2623	.0183	3.94
	.3543	8.3074	9.7869	8.2168	.0165	6.27
	.3537	8.3080	9.7875	8.2174	.0165	6.25
	.4721	8.1896	9.6691	8.2497	.0178	6.75
	.4425	8.2192	9.6987	8.27~~45~~93	.0190	7.22]
7.6617 .4416	.7175					

Constant of D by comparison of reflector with tables

	Plate	Planets	Expos.	Ang.	Obs.	Diam Planet	Const.	
20th	J.1	Mars	5"	13.62	P	Eq 1.4281 26.80		
	"	"	5"	13.05	P			
8th	Q 1	Jupiter	5"	30.81	P	1.5768 37.74	.00673	2.55
	"	"	"	23.93	P	~~37.74~~	.00850	3.23
	"	Mars	"	36.26 ~~42.74~~	P	1.4262 26.68	825	3.13
	"	"	"	30.55	P		960	3.65
	"	"	"	39.69	P		764	2.90
	"	"	"	42.89	P		717	2.72
	"	"	"	90.8	S		488	1.85
	"	"	"	31.65	P		739	2.81
10th	"	"	3"	25.99	P		671	2.55
	"	"	"	39.65	P		461	1.75
11th	"	Jupiter	3"	19.90	P	1.5731 37.42	616	2.34
	"	"	"	18.15	P		673	2.56
	"	Mars	"	19.90	P	1.4219 26.42	872	3.31
	"	"	"	21.45	P		812	3.09
	"	"	"	26.62	S		663	2.52
12th	R.3	"	"	20.08	P		873	3.31
	"	"	"	15.78	P		1.102	4.18
	"	"	5	50.29	S		.647	2.45
	"	"	5	27.19	P		1.089	4.13
13th	R.1	Jupiter	"	21.75	P	1.5701 37.16	.955	3.63
	"	"	"	21.73	P		.955	3.63
	"	Mars.	"	28.19	P	1.4194 26.26	1.060	4.03
	"	"	"	26.26	P		1.131	4.28
19th	R3	Jupiter	5	31.48	P	36.50 (.5623)	.690	2.61
22d	"	"	3	17.19	P	36.44 (.5580)	.741	2.86
	"	"	"	15.60	P		.815	3.09
	"	Mars.		16.50	P	24.90 (.3962)	1.120	4.26
	"	"		24.95	S		.754	2.86
	"	"		21.82	P		.856	3.25
	"	"		25.11	S		.767	2.91

Corrected Jan 17th

dist.
Log. Planet:

1.4654

"

1.5798

"

1.4652

1.4639

1.5763

.4654

B = ~~A~~ diaph/15" aper. Equiv. C aperture of plate	A C log lin	C diam. artif. star B − A	C = π C ✱ 1.4775 Log. ~~diam plant~~	Log diam Planet		
	9.3719		14281	1.4281		
	.3537					
7.6350	.7094	.9256	9.4051	1.5768	7.8283	5.6566
	.6084	.0266	9.5061		7.9293	5.8586
	.7719	.8631	9.3426	14262	7.9164	5.8328
	.7061	.9289	9.4084		7.9822	5.9644
	.9052	.8298	9.3093		7.8831	5.7662
	.8329	.8021	9.2816		7.8554	5.7108
	.0000	6350	9.1145		.6883	5.3766
	.7199	.9151	9.3946 ~~.5644~~		.8684	5.7368
7.4149	.6417	.7732	9.2527		.8265	5.6530
	.8049	.6100	9.0895		.6633	5.3266
	.5320	.8829	9.3624 ~~9.5866~~	1.5731	.7893	5.5786
	.4934	.9215	9.4010		.8279	5.6558
	.5320	.8829	9.3624	1.4219	.9405	5.8810
	.5631	.9518	9.4313		.9094	5.8188
	.6573	.7636 ~~.7679~~	9.2431		.8212	5.6424
7.4192 ~~7.4149~~	.5357	7.8835	9.3630		.9411	5.8822
"	.4345	7.9847	9.4642		8.0423	6.0846
7.6393	.8861	7.7532	9.2327		.8108	5.6216
"	.6599	.9794	9.4589		.0370	6.0740
	.5689	.0704	9.5499	1.5701	.9798	5.9596
	.5685	.0708	9.5503		.9802	5.9604
	.6740	.9653	9.4448	1.4194	.0254 ~~.9147~~	6.0508
	.6459	.9934	9.4729		.0535 ~~.9028~~	6.1070
7.6393	.7178	7.9215	9.4010	.5623	.8387 ~~.8309~~	5.6774
7.4192	.4706	7.9486	9.4281	.5580 .8701	~~.8580~~	5.7402
"	.4296	7.9896	9.4691	5 .9111	~~.8990~~	5.8222
"	.4533	7.9659	9.4454	.3962	.0492	6.0982
"	.6251	7.7941	9.2736		.8774	5.7548
"	.5702	7.8490	9.3285		.9323	5.8646
"	.6278	7.7914	9.2789		.8747	5.7494

		mms.	Aper.=1.
Constant from Jupiter alone		90	2.944
" " Mars "		220	
" " all		310	2.985
" on Sept.	8th	80	2.85
	10th	20	2.15
	11th	60	2.30
	12th	40	3.52
	13th	40	3.87
	19th	10	2.61
	22d.	60	3.20
Ratio Outer Satellite to artif. Star	4th	50	.1528
	8th	80	.1625
	12th	40	.1262
	13th	50	.1336
	16th	20	.1547
	23d.	20	.2112
	Mean.	260	.1527
Inner " " " "	8th	20	.1971
	11th	20	.2215
	12th	10	.1135
	13th	20	.1572
	16th	10	.2074
		80	.1838

This gives for diameter of outer satellites 5.4
inner 6.5

log	
.1841	3682
.2109	4218
.1011	2022
.1258	2516
.1892.	.3784
.3247	.6494
.1838	
.2947	5894
.3454	6908
.0550	1100
.1965	3930
.3168	6336

Contents of R 2.

R. 2. 79. Focus Bowditch Comet-Seeker. focus 61.83 cms
81. copy ap. 6.56 cms.
83. Compar. Obser. Mars 1877-1879
85. Photometer for reflector
86 Focus transit circle objective
91 " 23' lens
101 " " " copy
106 Personal equation Old Transit Circle
132. Secular [illegible].
138. Focal length eyepieces.
139. Horiz. refraction.
151. Focal length of eyepiece
152 Optical centre Ep. I, IV, I
154 Accuracy of pointing Compass [illegible].
155. Distance between instruments of Observatory
157. Cell of 15" lens.
178 " " "
180

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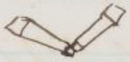
R 19 20 Adjacent stars
26 Plan for photometric work
40 Proposed 

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Comparison of Diameters of Planets.

	Jupiter.		Saturn.	
	P.	E.	P	E
Amer. N.A.	94.12	100.23	78.16	83.60
Brit. " "	92.42	99.704	75.17	81.106
French " "	"	99.703	"	81.105
German	92.6	99.8	73.4	81.1
Spanish	92.44	99.704	75.21	81.106
Newcomb.	92.1	97.9	73.15	81.4
Kaiser.				

Venus.	Mars. Λ	ε
8.546	5.05	
8.305	5.35	
"	"	
8.31	"	
8.305	5.550	
		~~4.71~~
8.55	4.68	4.71
~~4.71~~	4.693	
8.758	~~4.731~~	4.734

	Tot.-Month	Obs.	Nights	Av. in Night	
Aug.		1131	16	71	31
Sept.	1131	1598	22	73	30
Oct.	2729	1304	21	62	31
Nov.	4033	1188	18	66	30
Dec.	5221	2105	22	96	31
Jan	7326	1518	17 116	89	31 184
Feb	8844	1880	17	111	28
Mar.	10724	1508	19	79	31
Apl.	12332	492	11	45	30
May	12824	1119	22	51	31
June	13943				30

	[illegible]	[illegible]	[illegible]	[illegible]	
Aug		1851	76	70	31
Sept	1131	1577	[illegible]	73	30
Oct	2737	1366	[illegible]	[illegible]	31
Nov	4035	1094	[illegible]	48	30
Dec	5781	2102	[illegible]	46	31
Jan	7356	1575	17	49	31
Feb	8845	1551	17	111	28
Mar	10725	1506	69	78	31
Apr	12333	1578	11	45	30
May	13850	1140	22	81	31
June	13983				30

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Journal No | Date | Hour. | Name | No. Comp. | Reading
Contr. D 1 " | No. Journ. | " . | Hole | Diam | Plan | Diam | n Comp | Reading
2 " " " — — — — " "
3 " " " " method — notes " "
Sum. 4 " — " — " "
Cont. E

Sat. Mars. " No. Journ. " " .

" Sat.

Uranus " " " Hour. | No. Comp.

Br. Doubles No. | No. Journ. | Date | Hour | Obs. | Ang. | 2 col. α
Ft. " " " " " " " 2 log.

Telo. | Obscure | Instrument | Remarks |
Aperture | Equiv ap. | Cond: | Obs |
" " " "
" " " "
"

Mag. Diff
"

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Diameter.	Zelo.			
420.88	2011.12	34.33	o	
450.30	2012.22	36.73	-	
410.88	2009.12	33.51	o	~~33.5~~
431.36	2015.68	35.19	-	33.5
4$\overset{6}{\cancel{4}}$7.56	2026.16	38.14		
431.30	2010.38	35.18		33.5
240.98	2012.26	19.66		21.4
225.72	2006.72	16.52		
448.36	2007.20	36.57		
435.26	2011.62	35.50		33.5
420.10+	2008.14	34.27		
216.502	1989.20	17.66		16.0
149.18	1989.62	12.17		13.8
123.79	1989.43	~~10.06~~		
133.18	1989.42	10.70		

Diameters of the Planets

Time Obsd h m		Object		No.	Reading	Obs.	M.E. div.	P.E. " lat.	Ref.
1	17	Cap of Eyepiece		10	737.19	P	.81	".12	24.114
2		"		10	758.78		.52	.07	"
3		"		10	747.40		.74	.11	"
4		"		10	1273.41		1.07	.15	
5	17d 5.20	Jupiter	Equat Ch. 150	5	12[illegible]6.00		2.96	.42	
6		"	" "	5	795.12		1.38	.20	
7		"	" Cent	5	780.96		.72	.10	
8		"	" "	5	1231.26		1.08	.15	
9		"	Polar Ch. 150	5	1210.00		2.73	.39	
10		"	" "	5	799.12		.74	.11	
11		"	" Cent	5	787.16		.72	.10	
12		"	" "	5	1218.52		1.90	.27	
3	18d 5 25	"	Equat	5	779.30		1.20	.17	124
4		"	"	5	1246.86 ?		.56	.08	"
5		"	Polar	5	1220.84		.60	.09	"
6		"	"	$\frac{5}{100}$	789.54		.24	.03	"
7		Mars	Polar	5	1126.62		.40	.06	"
8		"	"	5	885.64		1.72	.25	"
9		"	Equat	5	1116.22		1.42	.20	"
20		"	"	5	890.50		1.12	.16	"
1		Jupiter	Equat	5	779.42		.86	.12	125
2		"	"	5	1227.78		1.34	.19	"
3		"	Polar	5	1223.44		1.60	.23	"
4		"	"	5	788.18		1.08	.15	"
5		"	"	5	794.02	U	1.42	.20	"
6		"	"	5	1214.12	"	3.82+	.55	"
7	Nov. 28th 7.55	Saturn	Eq. 150	8		"			30 40
8		Mars	Pol.	8		"			" "
9		"	Eq.	8		S			" 41
30				8		S			" "

31	155.97	198853	12.72
32	203.04	1985.90	16.56
3	227.55	1992.65	18.56
4	195.98	1985.52	15.99

No.						
31	31	Mars	Polar.	8	. S	30.41
32 2dq	0 Oz Saturn	"		8	"	"
3		"	Eq.	8	"	"
4		"	Polar	8 214	u	32

Mars.		Sat.	
Eq	Pol.	Eq	Pol
16.52 P	19.66 P	17.66	16.56 S
10.06 S	12.17 u	18.56	15.99
10.70 S	~~10.70~~ 12.72 S		

	Obs. Diam.	Log. Diam.	Log. Dist. E.	Log D – Log Dist.				Corr.
Oct. 17th J. E	36.73	1.5647	0.7460	0.820	2.3107	204.2	204.5	
" " " P	35.19	1.5465	"	0.801	2.2925	195.5	196.1	
" 18th " E	38.14+	1.5809	0.7470	0.834	2.3289	213.0	213.3	
" " " P	35.18	1.5465	"	0.799	2.2935	196.3	196.6	
" " M. P	19.66	1.2945	9.7125	1.582	1.0090	10.	10.21	
" " " E	16.52	1.2175	"	1.505	~~0.929~~ ~~.932~~ 0.9320		.932 8.55	9.18
" " J. E	36.57	1.5635	0.7470	0.816	2.3105		204.4	
" " " P	35.50	1.5502	"	0.803	2.2972		198.2	
" " u "	34.27	1.5353	"	0.788	2.2823		191.6	
Nov. 28th S. E	17.66	1.2480	0.9758	0.273	2.2238		167.4	
" M. P	12.17	1.0864	9.9051	0.183	~~0.979~~ .9915		9.807	
" " " E	10.06	1.0043	9.9051	0.101	~~0.907~~ ~~.883~~ 0.9094		.883 8.12 =	9.20
" " s "	10.70	1.0294	9.9051	0.126	0.9345		8.60	9.74
" " " P	12.72	1.1038	9.9051	0.201	1.0089		10.21	
" " S. u	16.56	1.2201	0.9758	0.245	2.1959		157.0 ~~165.8~~	
" " " E	18.56	1.2695	0.9758	0.294	2.2453		175.9	
u "	15.99	1.2041	0.9758	0.229	2.1799		151.4 ~~163.8~~	

Mars	P	E
P	5.10	4.58
u	4.90	4.60
S	4.80	4.87

Jup.	E	P
P	102.2	98.0
"	106.6	98.3
"	102.2	99.1
u		95.8

Sat.	E	P
S	83.7	78.5
u	87.7	75.7

9.64
4.82

9.77
4.96

205
4.685
9.37
4.68

Journal continued from p 99

1877				6629			
Dec. 23d	6.7	* midt. fr Sat. mns.	(b)	5	.562		P
" "	6.8	Oct 2d. & 4th. * near.	(a)	2	.635		"
" "	6.9	"	(b)	5	.516		S
" "	7.0	"	(a)	2	.645		"
" "	8.7	+ Aug 17th	(a)	5	.752		P.
"	8.8	" " "	b	2	1.125		"
"	8.9	" " "	(a)	5	.750		"
"	9.2	ζ Piscium		4	33.62		"
"	9.3	" "		4	34.10		"
"	9.4	51 "		4	10.70		"
"	9.5	" "		4	10.95		"
"	9.8	30 Tauri		4	8.77		"
"	9.9	" "		4	8.55		"
				6679			
24th	5.3	ζ Lyrae		4	41.52		S
	5.9	ζ Delphini		4	1.37	150.27	P
	6.0	β "		4	2.02		"
	6.1	γ "		4	32.02		"
	6.2	" "		4	33.00		"
	6.4	δ Equulei		4	3.85		"
	6.5	" "		4	4.10		"
	7.2	ζ Aquarii		4	43.07		"
	7.3	" "		4	41.42		"
	7.4	ψ' "		4	7.05		"
	7.5	" "		4	6.95		"
	7.9	32 Eridani		4	29.15		"
	8.0	" "		4	25.75		"
	8.5	θ Orionis 1.2		4	28.82		S
	8.6	" " 1.3		4	32.17		"
	8.6	" " 1.4		4	16.17		"
				6743			

Compared with Latitude.

ye, W.

1877 Dec Wed 8.7	θ Orionis		2.3	6743 4	40.42	S
8.9	"	"	2.4	4	23.90	"
9.0	"	"	3.4	4	27.25	"
9.0	"	"	1.2	4	25.62	P
9.0	"	"	1.3	4	26.10	"
9.1	"	"	1.4	4	16.12	"
9.2	"	"	2.3	4	44.75	"
9.2	"	"	2.4	4	33.05	"
9.3	"	"	3.4	4	29.85	"
9.4	"	"	1.3	4	28.62	S
9.5	"	"	·	4	6.97	"
9.6	"	"		4	6.90	P
9.7	"	"		4	7.15	S
9.7	"	"		4	7.12	P
9.9	α Can. Maj.	Sirius		6 6805	.40	P

Aug. 2.

[illegible]

October 1877

November 1877

December 1877

1	~~180~~ 80	
2	58	
3	87	
4	136.	Cudlat
5		
6		
7	64	
8	104	
9	69	
10		
1		
2		
3	104	
4	208	
5		
6	157	
7	40	
8	64	
9		
20	72	
1		
2	114	
3	92	
4	126	
5	130	
6		
7		
8		
9		
30		
31		

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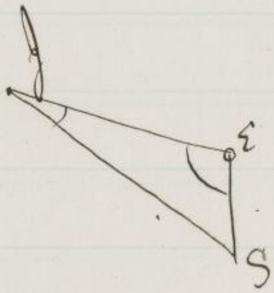
Ellipticity of Jupiter

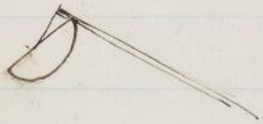
~~19 Hev. Camelopardalis~~

5.05
 505
5.555

5.55
 555



$SJ : ES = JES : EJS$

	Sept. Ult.	Sept. lat.	Oct. lat.	Nov. late
Sept.	.7180	0.7184	0.7175	0.716.5
Oct.		6h54	5h2	3 21.
Nov.		103.5	75.5	50.35
	000	9.9878	9.9857	9.8858
	9.2820	9.2694	9.2682	9.1693
	11.1	10.7	10.7	8.5
	.9813	.9826	9826 ~~.9890~~	.9896
	.0187	.0174	0174 ~~.0110~~	0110
	.0093	.0087	0087 ~~.0055~~	.0055
Mean diam.	.0046	.0043		.0027
		$\frac{1}{250}$		$\frac{1}{400}$