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78 Satellites of Jupiter Duration Eclipses
" Stars Algol Type
~~81 Eclipses Jupiter's Satellites 1880-1~~
84 Stars near new nebulæ.
86 List of new nebulæ &c
94 Remarks for new nebulæ.
98 " " " "
101 Stars marked xx in U.A.
103 Short S.
105 Sidereal time of 7h.
107 Suspected Var in Cass.
~108 standard stars for Letter Boys
117 Stars following Nebulæ
~~119 Remarks Comet~~
120 Planetary Nebulæ
122 Nebulæ observed 1876-70
124 Colored Stars in U.A.
132 Miscellaneous Objects to be examined.
134 Variable of Class II
138 Constellations U.A.
140 Red Stars in U.A. Corrected
141 Nebulæ in Orion
145 Clusters in Ursa Major
148 Nebulæ " "
149 Red Stars " " & H
J 151 Planetary Nebulæ " " " Will be observed
J 152 Planetary Nebulæ to be observed
154 Objects detected by Barnard
159 Stars suspected with Comet Seekers
162 Comet 1881
170 Red Stars in U.A.

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## Stars having Right-Ascensions

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8.5 | | 20 | 5 | 45 | +35 | 49 | DM. +35° 4001 | |
| 8.0 | 1 | 20 | 7 | 23 | +35 | 51 | DM. +35° 4013 | |
| 8.0 | 2 | 20 | 10 | 3 | +36 | 18 | DM. +36° 3956 | 5.4 g' mute |
| | 3 | 18 | 1 | 17 | −21 | 16 | Oe. 17681 | 1880 Aug. 28. R92, 116. |
| | 4 | 6 | 49 | 13 | −23 | 46 | Lal. 13412 | 1881 Mar. 28. R96, 185 |
| 8.1 | 5 | 20 | 12 | 33 | +37 | 3 | DM. +36° 3987. | 1881 Nov. 4. R99, 194. |

## Planetary Nebulae

| | | | | | | | Found |
|---|---|---|---|---|---|---|---|
| | 1 | 18h | 25m | 10s | −25° | 13′ | 1880 July 13 R92,43 |
| | 2 | 18 | 4 | 19 | −28 | 12 | 1880 July 14 R92,48 |
| | 3 | 18 | 14 | 23 | −26 | 53 | 1880 Sept. 3 R92,139 |
| | | 20 | 6 | 27 | +37 | 3 | 1881 Nov. 25 R99,195 |
| | | 17 | 58 | 6 | −19 | 51 | 1882 July 15 R102,48 |
| 9.4 | | 19 | 16 | 50 | +1 | 17 | DM. +1° 3979. 1882 July 16 R102,49 |
| | | 18 | 7 | 44 | −20 | 19 | 1882 Aug. 18 R102,115 |
| | | 17 | 41 | 22 | −16 | 26 | 1882 Aug. 18 R102,116 |
| | | 18 | 5 | 13 | −19 | 7 | 1882 Aug. 18 R102,116 |
| | | 18 | 56 | 27 | −0 | 37 | 1882 Aug. 19 R102,121 |
| | | 19 | 28 | 40 | +5 | 26 | 1882 Sept. 4 R103,17 |
| | | 21 | 1 | 42 | +41 | 45 | DM. +41° 4004 (Webb) |
| | | 21 | 2 | 12 | +47 | 22 | Burnham & Copeland. |
| | | 20 | 4 | 54 | +18 | 33 | 1883 R |

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46.
85
41.

72,43
2,48
,139
1,195
.48
,49
115
116
,116
,121
17

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## Long Period Variables.

| Nam. | R.A. | Dec. | Transit. |
|---|---|---|---|
| R. Androm. | $0^h\ 16^m.4$ | $+37°\ 46'$ | R. 104. 91. / 105. 9. |
| S. Cassiop. | 1 9.1 | +71 ∨1 | |
| S. Piscium. | 1 10.0 | + 8 10 | |
| R. " | 1 23.2 | + 2 8 | |
| S. Arietis. | 1 ∨6.8 | +11 ∨0 | R. 104. 106. |
| R. " | 2 7.9 | +24 23 | |
| R. Ceti | 2 18.6 | − 0 ∨0 | |
| R Persei. | 3 20.8 | +3∨ 10 | |
| S Tauri. | 4 13.6 | +19 11 | |
| R " | 4 20.4 | + 9 ∨0 | |
| S " | 4 21.4 | + 9 37 | |
| V " | 4 43.6 | +17 17 | |
| R Orionis. | 4 ∨1.1 | + 7 ∨4 | |
| R Aurigae. | ∨ ∨.6 | +∨3 2∨ | |
| S " | ∨ 17.6 | +34 2 | |
| S Orionis. | ∨ 21.8 | − 4 49 | R. 104. 129. |
| R Lyncis. | 6 49.3 | +∨∨ 32 | |
| R Gem. | 6 ∨8.6 | +22 ∨∨ | |
| S Cam. Min. | 7 24.8 | + 8 37 | |
| T Cam. Min. | 7 2∨.9 | +12 3 | |
| S Gem. | 7 34.3 | +23 47 | R. 104. 145 |
| T " | 7 40.6 | +24 6 | R. 104. 144. X |
| U " | 7 46.∨ | +22 28 | |
| R Canum. | 8 8.6 | +12 10 | |
| V Canum | 8 13.4 | +17 44 | |
| U " | 8 2∨.∨ | +19 24 | |
| S Hydrae | 8 46.0 | + 3 37 | |
| R Leonis Min. | 9 36.9 | +3∨ 11 | |
| V " | 8 48.6 | − 8 3∨ | |
| U Leonis. | 10 16.3 | +14 44 | R 106. 113. |
| R Ursæ Maj. | 10 34.3 | +69 32 | |
| S Leonis | 11 3.4 | + 6 1∨ | |
| T " | 11 31.0 | + 4 10 | |

(Con. on p. 10.)

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# Long Period Variables.

Date & Obs.

1882. Dec. 8. P. W. / 1883. Jan. 22. W. S. /

1882. Dec. 12. W. P. S.

1883. Apr. 2. /

1883. Feb. 23. W.

1882. Mar. 9. W.
1882. Dec. 18. W.

1883. Jan. 14. S. / Feb. 1. S. / Mar. 6. S. / Mar. 11. S. / Mar. 30. S. /

1882. Dec. 29. W. S. / 1883. Jan. 7. S. / Jan. 12. S. W. / Jan. 14. S. / Feb. 7. S. P. / Feb. 12. S. / Mar. 8. S. / Mar. 30. S. / Apr. 3. S.
1883. Jan. 7. S. / Jan. 12. S. W. / Jan. 14. S. / Feb. 12. S. / Apr. 3. S. /
1883. Jan. 14. / 1883. Mar. 16. W. / Mar. 29. W. / Apr. 3. S. C. /

1883. Apr. 3. S. /

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## Long Period Variables (con.)

| Name. | R.A. | Dec. | Transit. |
|---|---|---|---|
| R Coronae. | 11h 56.6 | +19° 35′ | R. 106. 110. |
| S Virginis. | 12 7.2 | −5 14 | |
| R Corvi | 12 12.1 | −18 29 | |
| S Mus. Aug. | 12 29.5 | +60 17 | |
| U Virginis. | 12 43.5 | + 6 21 | |
| V " | 13 20.3 | − 2 25 | |
| S " | 13 25.4 | − 6 27 | |
| T Boötis | 14 7.3 | +19 45 | R. 106. 106. 106, 161 |
| S " | 14 15.0 | +54 25 | |
| R Camelop. | 14 20.9 | +54 29 | |
| R Boötis | 14 30.5 | +27 22 | R 107,1 |
| U " | 14 47.6 | +16 17 | |
| S Librae. | 15 13.1 | −19 52 | R 106, 148 |
| S Serpentis. | 15 14.9 | +14 50 | R 106 141 |
| S Coronae | 15 15.5 | +31 54 | R 106. 134. |
| R Serpentis. | 15 42.6 | +25 36 | R106, 157, |
| R Librae | 15 44.0 | +15 35 | R 106. 149 |
| R Herculis. | 15 47.4 | −15 45 | R106, 155 |
| R Scorpii. | 15 59.7 | +15 46 | R 106. 151. |
| S " | 16 9.1 | −22 35 | R 106, 198 |
| V (?) Ophiuchi. | 16 9.0 | −22 32 | |
| U " | 16 13.6 | − 7 21 | R. 106. 187. |
| T Ophiuchi. | 16 14.1 | −17 32 | R106, 162 |
| S " | 16 25.4 | −15 49 | R 106. 165 |
| S Herculis. | 16 25.9 | −16 51 | R 106. 176. |
| − Ophiuchi. | 16 45.3 | +15 11 | R. 106. 144 |
| R " | 16 51.4 | −12 40 | |
| S Herculis | 16 59.4 | −15 54 | R 106, 159 |
| S Serpentis | 18 3.6 | +31 0 | R 107. 12. |
| R Cor. Aust. | 18 21.7 | + 6 12 | R 106, 167 |
| S Sagittarii. | 18 52.1 | −37 9 | |
| R Sagittarii. | 19 1.9 | −17 13 | |
| | 19 4.2 | −19 34 | R 107, 22 |

(Con. on p. 18.)

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# Long Period Variables.

Dates & Obs.

| 1879 | d | h | m |
|---|---|---|---|
| | | 8 | 11.2 |
| Jan | 1 | 11 | 8.2 |
| | 4 | 5 | 0.3 |
| | 18 | 13 | 6.4 |
| | 21 | 9 | 55.7 |
| | 21 | 9 | 54.4 |
| | 24 | 6 | 45.0 |
| | 24 | 3 | 34.2 |
| Feb | 4 | 14 | 51.3 |
| | 10 | 11 | 40.6 |
| | 13 | 8 | 29.9 |
| | 16 | 5 | 19.1 |
| March | 2 | 13 | 25.5 |
| | 5 | 10 | 15 |
| | 8 | 7 | 4 |
| | 8 | 6 | 54 |
| | 11 | 3 | 53.7 |
| | 25 | 11 | 59 |
| | 28 | 8 | 49 |
| | 31 | 5 | 38 |
| April | 14 | 13 | 43 |
| | 14 | 10 | 32 |
| | 20 | 7 | 21 |
| | 23 | 4 | 11 |

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1879

| | | | |
|---|---|---|---|
| July | 9 | 14 | 8 |
| | 12 | 10 | 54 |
| | 15 | 4 | 45 |
| | 18 | 4 | 34 |
| August | 1 | 12 | 34 |
| | 4 | 9 | 25 |
| | 7 | 6 | 14 |
| | 21 | 14 | 14 |
| | 24 | 11 | 5 |
| | 27 | 7 | 54 |
| | 30 | 4 | 42 |
| Sept. | 13 | 12 | 45 |
| | 16 | 9 | 33 |
| | 19 | 6 | 22 |
| | 22 | 3 | 11 |
| Oct. | 3 | 14 | 25 |
| | 6 | 11 | 14 |
| | 9 | 8 | 2 |
| | 12 | 4 | 51 |
| | 26 | 12 | 53 |
| | 29 | 9 | 44 |
| Nov | 1 | 6 | 32 |
| | 4 | 3 | 21 |
| | 15 | 14 | 34 ~~58~~ |
| | 18 | 11 | 25 |
| | 24 | 8 | 14 |
| | 27 | 5 | 3 |
| Dec. | 8 | 13 | 8 |
| | 11 | 9 | 54 |
| | 14 | 6 | 44 |
| | 17 ~~20~~ 28 31 | 3 ~~8~~ 14 11 | 36 ~~25~~ 52 41 |

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## S Cancri

| 1879 | | | |
|---|---|---|---|
| Jan | 5 | 3 | 8 |
| | 14 | 14 | 46 |
| | 24 | 2 | 23 |
| Feb. | 2 | 14 | 1 |
| | 12 | 1 | 39 |
| | 21 | 13 | 17 |
| March | 3 | 0 | 56 |
| | 12 | 12 | 34 |
| | 22 | 0 | 13 |
| | 31 | 11 | 52 |
| April | 9 | 23 | 31 |
| | 19 | 11 | 10 |
| | 28 | 22 | 49 |
| May | 8 | 10 | 28 |
| | 17 | 22 | 4 |
| | 27 | 9 | 46 |
| June | 5 | 21 | 25 |
| | 15 | 9 | 4 |
| | 24 | 20 | 42 |
| Sept. | 8 | 17 | 44 |
| | 18 | 5 | 21 |
| | 27 | 16 | 57 |
| Oct. | 7 | 4 | 34 |
| | 16 | 16 | 10 |
| | 26 | 3 | 44 |
| Nov. | 4 | 15 | 23 |
| | 14 | 3 | 0 |
| | 23 | 14 | 36 |
| Dec. | 3 | 2 | 13 |
| | 12 | 13 | 49 |
| | 22 | 1 | 26 |
| | 31 | 13 | 3 |

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(Cow. from p. 10.)

## Long Period Variables.

| | Name. | R.A. | Dec. | Transit. | |
|---|---|---|---|---|---|
| | S. Sagittarii. | 19ᵘ 11.0ᵐ | −19° 17′ | | |
| | R Cygni. | 19 32.9 | +49 52 | | |
| | X " | 19 45.0 | +32 33 | | |
| | S " | 20 2.5 | +37 34 | | |
| | R Capricorni | 20 3.2 | −14 42 | | |
| | R Delphini | 20 7.9 | +8 39 | | |
| | T " | 20 38.6 | +15 52 | | |
| | U Capricorni. | 20 40.1 | −15 19 | | |
| | T Aquarii. | 20 42.3 | −7 41 | | |
| | R Vulpeculae. | 20 57.9 | +23 15 | | |
| | T Capricorni | 21 14.0 | −15 46 | | |
| | S Pegasi | 22 1.8 | +11 50 | | |
| | S Aquarii. | 22 49.3 | −21 7 | | |
| | R " | 22 59.4 | +9 46 | | |
| | S " | 23 13.2 | +8 8 | | |
| | R Cassiop. | 23 51.1 | +50 35 | | |
| 137(a) | R Lacertae | 22 36.8 | +41 37 | R. 106. 193. | |

Posted to Apr. 2, 1863.

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# Long Period Variables.

Date & Obs.

1882. Dec. 6. P.

1883 Aug 9 & 10 S. R 106; 214, 216.

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1879

~~March 7 21 36 I. D~~

~~9 16 5 " "~~

~~21 18 II "~~

~~14 23 31 I "~~

| 1879 | d | Time h | m | s | No. of Sat. | Dir. or Refr. | Solenoid above below horizon. |
|---|---|---|---|---|---|---|---|
| March | 7 | 22 | 0 | 28.9 | I. | D | ⊙ |
| | 9 | 16 | 29 | 0.5 | " | " | J |
| | | 21 | 41 | 53.8 | II. | " | ⊙ |
| | 14 | 23 | 54 | 33.6 | I. | " | ⊙ |
| | 15 | 16 | 53 | 35.8 | III. | " | J |
| | 16 | 18 | 23 | 5.4 | I. | " | ⊙ |
| | | 24 | 18 | 53.1 | II. | " | ⊙ |
| | 22 | 1 | 48 | 34.8 | I. | " | ⊙ |
| | | 20 | 53 | 34.8 | III. | " | ⊙ |
| | 23 | 20 | 14 | 5.1 | I. | " | ⊙ |
| | 24 | 2 | 55 | 41.3 | II. | " | ⊙ |
| | 29 | 3 | 42 | 33.4 | I. | " | ⊙ |
| | 30 | 0 | 53 | 29.4 | III. | " | ⊙ |
| | | 22 | 11 | 3.2 | I. | " | ⊙ |
| April | 1 | 16 | 39 | 30.5 | " | " | |
| | 3 | 18 | 50 | 52.6 | II. | " | ⊙ |
| | 6 | 24 | 4 | 58.9 | I. | " | ⊙ |
| | 7 | 2 | 15 | 9.4 | IV. | " | ⊙ |
| | 8 | 18 | 33 | 25.5 | I. | " | ⊙ |
| | 10 | 21 | 27 | 11.8 | II. | " | ⊙ |
| | 14 | 1 | 58 | 52.8 | " | " | ⊙ |
| | 15 | 20 | 24 | 18.8 | " | " | ⊙ |
| | 17 | 24 | 3 | 15.4 | II. | " | ⊙ |
| * | 20 | 16 | 25 | 35.0 | III. | R. | |
| | 22 | 22 | 21 | 10.8 | I. | D. | ⊙ |

38 obs. 1 S h.

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1879

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| April | 23 | 20 | 24 | 52.4 | IV. | D. | ⊙ | |
| | 24 | 1 | 3 | 44.6 | " | R. | ⊙ | |
| * | | 16 | 49 | 41.9 | I. | D. | | Cl. |
| | 25 | 2 | 39 | 9.4 | II. | " | ⊙ | |
| * | 27 | 16 | 53 | 39.4 | III. | " | | Cl |
| | | 20 | 25 | 28.9 | " | R. | ⊙ | |
| * | 28 | 15 | 56 | 49.2 | II. | D. | | Cl |
| | 29 | 24 | 15 | 2.4 | I. | " | ⊙ | |
| May | 1 | 18 | 43 | 33.5 | " | " | ⊙ | |
| | 4 | 20 | 54 | 12.5 | III. | " | | |
| | 5 | 0 | 25 | 46.4 | " | R. | | |
| | | 18 | 32 | 28.4 | II. | D. | | |
| | 8 | 20 | 34 | 25.0 | I. | " | | |
| | 10 | 14 | 34 | 40.2 | IV. | " | 39 | 17 49 |
| * | | 15 | 5 | 50.9 | I. | " | 40 | 18 20 S.T. |
| | | 19 | 11 | 24.6 | IV. | R. | | |
| | 12 | 0 | 54 | 4.9 | III. | D. | | |
| | | 21 | 4 | 54.0 | II. | " | | |
| | 15 | 22 | 31 | 14.0 | I. | " | | |
| | 14 | 16 | 59 | 43.1 | " | " | | |
| | 19 | 23 | 43 | 15.3 | II. | " | | |
| | 23 | 0 | 25 | 10.0 | I. | " | | |
| | 24 | 18 | 53 | 36.3 | " | " | | |
| * | 30 | 15 | 35 | 59.8 | II. | " | | |
| | 31 | 20 | 44 | 31.0 | I. | " | | |
| June | 2 | 12 | 53 | 40.0 | III. | " | | |
| * | | 15 | 16 | 2.0 | I. | " | | |
| | | 16 | 24 | 2.2 | III. | R. | | |
| | 6 | 18 | 10 | 54.6 | II. | D. | | |

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1879

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| June | 7 | 22 | 41 | 24.5 | I. | D. | |
| | 9 | 16 | 54 | 14.9 | III. | " | |
| | 14 | 9 | 59 | 59.1 | I. | " | |
| | 20 | 24 | 15.9 | | III. | R. | |
| | 11 | 11 | 38 | 25.2 | I. | D. | |
| | 13 | 20 | 45 | 42.4 | II. | D. | |
| * | 18 | 13 | 32 | 26.1 | I. | " | ? |
| * | 24 | 12 | 34 | 43.3 | II. | " | |
| * | 25 | 15 | 26 | 30.8 | I. | " | ? |
| July * | 1 | 15 | 12 | 19.4 | II. | " | |
| | 4 | 11 | 49 | 15.4 | I. | " | |
| * | 8 | 12 | 24 | 6.3 | III. | R. | |
| * | 11 | 13 | 43 | 30.0 | I. | D. | |
| | 12 | 4 | 4 | 9.0 | II. | " | ⊙? |
| - * | 15 | 12 | 56 | 0.1 | III. | " | |
| - * | | 16 | 23 | 54.5 | " | R. | |
| - * | 16 | 15 | 19 | 2.0 | II. | D. | |
| * | 18 | 15 | 34 | 49.9 | I. | " | |
| *? | 19 | 9 | 38 | 41.4 | II. | " | J.? |
| * | 20 | 10 | 6 | 23.5 | I. | " | ? |
| | 22 | 16 | 56 | 30.4 | III. | " | ⊙? |
| | 25 | 14 | 32 | 15.5 | I. | " | ⊙? |
| * * | 26 | 12 | 13 | 15.6 | II. | " | U |
| * | 24 | 12 | 0 | 51.0 | I. | " | |
| August * | 2 | 9 | 31 | 30.4 | II. | " | |
| * | | 13 | 51 | 36.8 | " | R. | |
| * | 3 | 13 | 55 | 24.4 | II<br>I. | D<br>D. | |
| | 5 | 8 | 24 | 4.4 | " | " | ♃? |
| | 9 | 14 | 22 | 33.2 | II. | " | ⊙? |

d.
SS
PW SW
PW SP
SW
PP

* Vis. at Washington

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1879

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | August | 10 | 15 | 50 | 5.5 | I. | D. | |
| * | | 12 | 10 | 18 | 50.2 | " | " | |
| | | 13 | 6 | 39 | 56.6 | II. | " | ?? |
| | | 14 | 14 | 44 | 54.2 | I. | " | ⊙? |
| * | | 19 | 12 | 13 | 40.4 | " | " | |
| * | | 20 | 9 | 1 | 14.1 | III. | " | |
| * | | | 9 | 14 | 46.3 | II. | " | |
| | | 21 | 6 | 42 | 20.2 | I. | " | ⊙? ♃? |
| * | | 26 | 14 | 8 | 38.4 | " | " | |
| * | | 27 | 11 | 49 | 44.3 | II. | " | |
| * | | | 13 | 2 | 20.3 | III. | " | |
| * | | 28 | 8 | 34 | 19.4 | I. | " | |
| | Sept. | 3 | 14 | 11 | 8.6 | II. | R. | |
| * | | 4 | 12 | 44 | 24.8 | I. | " | |
| | | 6 | 9 | 16 | 14.6 | " | " | |
| | | 9 | 6 | 28 | 42.8 | II. | " | ⊙? |
| * | | 11 | 14 | 42 | 34.3 | I. | " | |
| * | | 13 | 9 | 11 | 25.4 | " | " | |
| * | | 14 | 9 | 3 | 54.4 | II. | " | |
| ? | * | 18 | 16 | 34 | 50.3 | I. | " | 16 8 |
| * | | 20 | 8 | 19 | | " | D. | |
| * | | 21 | 11 | 39 | 24.2 | II. | R. | |
| ? | * | 21 | 16 | 15 | 36.9 | IV. | D. | Nov vis |
| ? | * | 25 | 8 | 31 | 14.3 | III. | R. | |
| * | | 27 | 13 | 2 | 6.1 | I. | " | |
| * | | 28 | 14 | 15 | 2.4 | II. | " | 15 23 |
| * | | 29 | 9 | 30 | 55.6 | I. | " | |
| ? | Oct. | 2 | 12 | 33 54 | 0.5 44 | III. | " | |
| | | 9 | 13 | 57 | 34.3 | I. | " | 15 0 |

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II

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1879

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Oct. | * | 6 | 9 | 26 | 24.7 | I. | R. | | |
| | * | ~~4~~ 8 | ~~22~~ 10 | 45 | 15.9 | IV. | D. | | |
| | * | 8 | 14 | 31 | 26.5 | II. | R. | J? | 14 41 |
| | * | 9 | 6 | ~~4~~ | 51.9 | II. | " | | |
| | * | " | 13 | 13 | 36.4 | III. | D. | ~~J~~ vis. | |
| | * | 13 | 11 | 21 | 58.2 | I. | R. | | |
| | * | 15 | 5 | 50 | 55.8 | I. | " | J.? | |
| | * | 16 | 8 | 45 | 12 | II. | " | | |
| | | 20 | 13 | 17 | 34.4 | I. | " | | 13 50 |
| | * | 22 | 7 | 46 | 33.6 | " | " | | |
| | * | 23 | 11 | 61 | 22.8 | II. | " | | |
| | | 25 | 4 | 50 | 21.7 | IV. | D. | | |
| | * | | 5 | 43 | 6.9 | " | R. | | |
| | * | 29 | 9 | ~~42~~ | 13.1 | I. | " | | |
| | | 31 | 4 | 11 | 4.8 | " | " | ⊙ | |
| | | | 4 | 38 | 4.3 | III. | " | ⊙? | |
| Nov. | * | 5 | 11 | 37 | 54.5 | I. | " | | 12 47 |
| | * | 7 | 5 | 22 | 39.1 | III. | D. | ⊙? | |
| | * | | 6 | 6 | 46.4 | I. | R. | | |
| | * | | 6 | ~~34~~ 40 | 9.5 | III. | " | | |
| | * | 10 | 5 | 53 | 3.1 | II. | " | | |
| | * | 14 | 8 | 2 | 26.4 | I. | " | | |
| | * | | 9 | 25 | 10.1 | III. | D. | | |
| | * | 17 | 8 | 30 | 3.1 | II. | R. | | |
| | * | 21 | 9 | 58 | 9.6 | I. | " | | |
| | | 23 | 4 | 27 | 6.4 | " | " | ⊙? | |
| | * | 24 | 11 | 7 | 12.8 | II. | " | | 11 40 |
| | * | 30 | 6 | 22 | 43.4 | I. | " | | |
| Dec. | * | 7 | 8 | 18 | 22.4 | " | " | | 10 53 |

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1879

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Dec. | 12 | 5 | 41 | 1.8 | II. | R. | | | |
| | 13 | 4 | 47 | 48.4 | III. | " | | | |
| S | 14 | 10 | 13 | 56.7 | I. | " | 4? | 10 | 30 |
| | 16 | 4 | 42 | 47.9 | " | " | | | |
| * | 19 | 8 | 18 | 44.9 | II. | " | | | |
| | 20 | 5 | 36 | 55.3 | III. | " | | | |
| * | | 6 | 49 | 11.5 | " | " | | | |
| * | 23 | 6 | 38 | 17.6 | I. | " | | | |
| * | 27 | 9 | 39 | 49.3 | III. | D. | 4? | 9 | 50 |
| * | 30 | 6 | 33 | 43.4 | I. | R. | | | |
| * | 31 | 6 | 7 | 6.6 | III. | D. | | | |
| | | 9 | 28 | 39.2 | " | R. | 4? | 9 | 38 |

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# Comparison Stars for Variables.

| | | Nos Obs. | A.S. | Class. |
|---|---|---|---|---|
| R Andromedae | PU, U | - 7, 7 | - 90 | 5 |
| o Ceti | | 10, 10 | — — | |
| R Cancri | | 11 - 11 | 400 — | 3 |
| S Cancri | P, PSU, PU | 6, 5, 7 | 700 220 | 1 |
| R Leonis | U, SU, S, | 0 13 - 13 | 840 | 1 |
| R Ursae Maj. | | - ~~13~~ 12 12 | — 240 | 5 |
| R Virginis | | 0 12 ~~13~~ 12 | 1000 | 1 |
| R Hydrae | | 8 4 9 | 480 28 | 3 |
| S Virginis | | — 8 8 | — 160 | 5 |
| R Bootis | | .. 6 11 11 | 200 170 | 4 |
| S Serpentis | | 0 4 4 | 840 | 1 |
| R Coronae | | 6 12 13 | 700 280 | 2 |
| R Serpentis | | 12 6 13 | 700 100 | 2 |
| R Scuti | | 0 10 5 10 | 1800 47 | 1 |
| R Aquilae | | 9 12 14 | 300 260 | 3 |
| R Cygni | | 0 4 6 6 | 1260 180 | 1 |
| S Aquarii | | — 6 6 | 43 | 5 |
| R Vulpeculae | | — 4 4 | 180 | 5 |
| R Aquarii | | .. 8 8 | 320 | 4 |

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March 1879.

20
1
2
S. 3
4
5 Algol. 11 59
6
7
8 Algol 8 49
9
S. 30
1 Algol 5 38 S. Camelo 11 52

Sept 1879

1 Jupiter 16 39
2
3
4
5
6
7
8
9
10
1
2
3 Algol 13 43
4
5
6

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Jupiter.

| | Dec | Mer. Trans | 0° | 5° | 10° |
|---|---|---|---|---|---|
| June 1 | -8.3 | 18 11 | 5 30 | 5 1 | 4 33 |
| July | -7.9 | 16 18 | 31 | 3 | 37 |
| Aug. | -8.6 | 14 12 | 28 | 0 | 31 |
| Sept. | -10.0 | 11 56 | 23 | 4 55 | 25 |
| Oct. | -11.3 | 9 45 | 18 | 49 | 20 |
| Nov. | -11.7 | 7 38 | 16 | 47 | 17 |
| Dec. | -10.9 | 5 47 | 20 | 51 | 22 |
| Jan. | -9.2 | 4 2 | 26 | 58 | 29 |

| | 0° | 10° |
|---|---|---|
| June 1 | 12 41 | 13 38 |
| July | 10 47 | 11 41 |
| Aug | 8 44 | 9 41 |
| 8 > Sept | 6 33 | 7 31 |
| Oct. | 15 3 | 14 5 |
| Nov. | 12 54 | 11 55 |
| Dec. | 11 7 | 10 9 |
| Jan | 9 28 | 8 31 |

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August, 1879.

| | | |
|---|---|---|
| | 1 | Algol 12 37 |
| | 2 | J. IV 9 31, 13 51 |
| S | 3 | J. I 13 55 |
| | 4 | Algol 9 25 |
| | 5 | |
| | 6 | |
| | 7 | Algol 6 14 |
| | 8 | |
| | 9 | |
| S | 10 | J. I 15 50 |
| | 11 | |
| | 2 | J. I 10 19 |
| | 3 | |
| | 4 | |
| | 5 | |
| | 6 | |
| S | 7 | |
| | 8 | |
| | 9 | J. I 12 14 |
| | 20 | J. III 9 14, II 9 15 |
| | 1 | Algol 14 27 |
| | 2 | |
| | 3 | |
| S | 4 | Algol 11 5 |
| | 5 | |
| | 6 | J. I 14 9 |
| | 7 | J. II 11 50. III 13 · 2 Algol 7 54 |
| | 8 | |
| | 9 | |
| | 30 | Algol 4 42 |
| S | 1 | |

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September 1879.

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | Jupiter | I | R. | 12h | 47m | 24.8 |
| 11 | " | I | R. | 14 | 42 | 34.3 |
| 13 | " | I | R. | 9 | 11 | 25.7 |
| 14 | " | II | R. | 9 | 3 | 57.7 |
| (?) 18 | " | I | R. | 16 | 37 | 50.3 |
| 20 | " | I | D. | 8 | 19 | |
| 21 | " | II | R. | 11 | 39 | 24.2 |
| (?) 21 | " | IV | D. | 16 | 15 | 35.9 |
| 25 | " | III | R. | 8 | 31 | 17.3 |
| 27 | " | I | R. | 13 | 2 | 6.1 |
| 28 | " | II | R. | 14 | 15 | 2.4 |
| 29 | " | I | R. | 7 | 30 | 55.6 |

50 | 230

Deimos I NW NW; S SW, W | P, NW.; S W S;
~~Phobos~~ J P; S W S; | S W P;

50° | 230°

Deimos I S W, S W ; S, S, W ; W, S | S, N W ; S, W, S ; S, S, W,
~~Phobos~~ J S ; S, W, S, S ; S, W, S W. | S, W, S ; W, P ; P, W, S

P 5
W 3
S 1

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# September.

1
2
3
4
5
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19
20. Jup. I. D. $8^h$ $19^m$
21. " II. R. 11 39 24.2 — IV D. $16^h$ N $35'.9$ (?)
22.
23. Uranus n.f. $10^h.0$
24. " n.f. 8.6
25. " III R. 8 31 17.3 " n.f. 7.2 ⊙ = II.
26. " n.f. 5.8
" n.p. 12.0
27. " I. R. 13 2 6.1 " n.p. 10.6
28. " II. R. 14 15 24 " n.p. 9.2
29. " I. R. 7 30 55.6
30.

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October, 1879.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | | | | | | | | | | | | |
| 2. | Jupiter | III. | R. | 12 | 32 ~~33~~ | 41.6 ~~0.5~~ | | | | | | |
| 3. | | | | | | | | | | | | |
| 4. | " | I. | R. | 14 | 57 | 15.4 ~~34.3~~ | | | | | | |
| S 5. | | | | | | | | | | | | |
| 6. | 9 | 26 | 24.7 | 0 5.8 | I. | R. | | | | | | |
| 7. | | | | | | | | | | | | |
| 8. | Jupiter | IV. | D. | 10 | ~~32~~ | 31 54.0 ~~15.9~~ | IV. | R. | 14 | 31 | 09.6 ~~28.5~~ | |
| 9. | " | II. | R. | 6 | 8 | 32.0 ~~51.9~~ | III. | D. | 13 | 13 | ~~36.4~~ | |
| 10. | | | | | | | | | | | | |
| 11. | | | | | | | | | | | | |
| S 12. | | | | | | | | | | | | |
| 13. | " | I. | R. | 11 | ~~21~~ | 21 39.3 ~~58.2~~ | | | | | | |
| 14. | | | | | | | | | | | | |
| 15. | " | I. | R. | 5 | ~~50~~ | 36.9 ~~55.8~~ | | | | | | |
| 16. | " | II. | R. | 8 | ~~45~~ | 44 42.3 ~~1.2~~ | | | | | | |
| 17. | | | | | | | | | | | | |
| 18. | | | | | | | | | | | | |
| S 19. | | | | | | | | | | | | |
| 20. | " | I. | R. | 13 | 17 | 16.5 ~~36.4~~ | | | | | | |
| 21. | | | | | | | | | | | | |
| 22. | " | I. | R. | 7 | 46 | 14.7 ~~33.6~~ | | | | | | |
| 23. | " | II. | R. | 11 | 21 | 03.4 ~~22.8~~ | | | | | | |
| 24. | | | | | | | | | | | | |
| 25. | " | IV. | D. | 4 | 50 | 02.8 ~~21.7~~ | IV. | R. | 8 | 42 ~~43~~ | 50.0 ~~8.9~~ | |
| S 26. | | | | | | | | | | | | |
| 27. | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | |
| 29. | " | I. | R. | 9 | ~~42~~ | 41 54.2 ~~13.1~~ | | | | | | |
| 30 | | | | | | | | | | | | |
| 31. | " | I | R | 4 | ~~11~~ | 10 45.9 ~~4.8~~ | III. | R. | 4 | 37 ~~38~~ | 45.4 ~~4.3~~ | |

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# October. 1879.

1.
2.
3.
4.
5.
6. β Persei $11^h\ 05^m$
7. δ Cancri $3^h\ 33^m$
8.
9. " " $7^h\ 53^m$
10.
11.
12.
13.
14.
15.
16. δ Cancri $15^h\ 09^m$
17.
18.
19.
20.
21.
22.
23.
24.
25.
26. " " $12^h\ 46^m$ δ Cancri $2^h\ 46^m$ Mean 6.6 ± 2.6
27. ~~" " $9^h\ 34^m$~~
28.
29. 9 34
30.
31.

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# November 1879

1.
S 2.
3.
4.
5. J.I 11 37 44.5 R*
6.
☾ 7. J.III 5 22 39.1 D* I 6 6 46.4 R* III 8 40 9.5 R*
8.
S 9.
10. J.II 5 53 3,1 R* (82.8)
11.
12.
● 13.
14. J.I 8 2 28.4 R* III 9 25 10,1 D* cl.
15.
S 16.
17. J.II 8 30 31.1 R* cl.
18.
19.
☽ 20.
21. J.I. 9 58 9.6 R* : O I : :
22.
S 23. J.I. 4 27 6.4 R : : O : :
24. J.II. 11 7 12.8 R* : ! O : :
25.
26.
27. Thanksgiving
○ 28.
29.
S 30 J.I. 6 22 45.4 R* : O : : :

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# December 1879

1.
2.
3.
4.
5.
6.
S 7. J.I 8 18 22.4 R* λ=.84, S.lo : : O. :
8.
9.
10.
11.
12. J.II 5 41 1.8 R P : : : O.
13. J.III 4 47 48.4 R (dS) : O ! :
S 14. J.I. 10 13 56.7 R (dS) : O .
15.
16. J.I. 4 42 47.9 R S O : : :
17.
18.
19. J.II. 8 18 44.9 R* : ! O. :
20. J.III. 5 36 55.3 R J.III 8 49 11.5 R* O ! : :
S 21.
22.
23. J.I. 6 38 17.6 R* : O. :
24.
25.
26.
27. J.III. 9 39 49.3 D* : O. ! :
S 28.
29.
30. J.I. 8 33 43.4 R* : O . .
31. J.IV 6 17 6.6 D* J.IV 9 28 39.2 R . O . .

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Mars
Meridian
10 5

Mechain (100)

| | RA | | Dec. | |
|---|---|---|---|---|
| 21719 | 21 | 45 35 | 17 | 27 |
| | | 47 4 | 17 | 35 |

9 20

8 40

8 6

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## Clymene (104)

| | RA h m s | Dec ° ′ | mag. | RA 80 h m s | Dec '80 ° ′ |
|---|---|---|---|---|---|
| W. XXIII. 7 | 23 0 12 | −10 8 | 9 | 23 3 4 | −9 50 |
| W XXIII. 42. | 23 2 6 | −10 9 | 9 | 46 58 | −9 51 |
| W XXIII 76 | 23 3 52 | −10 31 | 7 | 6 44 | −10 13 |
| W XXIII 85 | 23 4 22 | −10 53 | 9 | 7 14 | −10 35 |
| " 109 | 23 5 5 | −9 53 | 9 | 7 57 | −9 35 |
| " 124 | 23 5 36 | −10 38 | 8 | 8 28 | −10 20 |
| " 144 | 23 6 41 | −10 2 | 9 | 9 33 | −9 44 |
| " 147 | 23 6 43 | −10 2 | 5 | 9 35 | −9 44 |
| W XXII 1241 | 22 57 8 | −10 32 | 7 | 0 0 | −10 14 |
| " 1240 | 22 57 2 | −10 20 | 9 | 22 59 54 | −10 2 |
| " 1214 | 22 55 54 | −10 51 | 9 | 58 46 | −10 33 |
| " 1120 | 22 51 59 | −10 29 | 8 | 54 51 | −10 11 |
| ~~1044~~ | | | | | |

~~(3994) 3 Ceti 23 58.4 −11 11~~

~~(3962) Aquarii~~

| | | | |
|---|---|---|---|
| 3857 | 23 9.6 | −9 44 | 4.6 |
| 3829 | 22 58.9 | −8 20 | 8.6 |

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Diam. (106)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| WXXIII 9 | 23 | 0 | 17 | −13 | 34 | 9 | $23^h\ 3^m\ 2^s$ | | $-13^\circ 16'$ | |
| " 12 | | 0 | 30 | −12 | 59 | 9 | 3 | 15 | −12 | 41 |
| " 57 | | 2 | 50 | −12 | 53 | 8 | 5 | 35 | −12 | 35 |
| " 72 | | 5 | 39 | −13 | 46 | 9 | 8 | 24 | −13 | 28 |
| " 73 | | 5 | 40 | −13 | 33 | 9 | 8 | 25 | −13 | 15 |
| " 138 | | 6 | 28 | −12 | 55 | 8.9 | 9 | 13 | −12 | 37 |
| " 160 | | 7 | 35 | −12 | 55 | 9 | 10 | 20 | −12 | 37 |
| " 185 | | 8 | 32 | −12 | 40 | 7 | 11 | 17 | −12 | 22 |
| " 193 | | 8 | 45 | −12 | 13 | 9 | 11 | 30 | −11 | 55 |
| " 224 | | 9 | 47 | −12 | 45 | 9 | 12 | 32 | −12 | 27 |
| " 228 | | 9 | 54 | −13 | 7 | 8 | 12 | 39 | −12 | 49 |
| " 365 | | 16 | 42 | −12 | 7 | 8.9 | 19 | 27 | −11 | 49 |
| " 381 | | 17 | 40 | −12 | 0 | 8.9 | 20 | 25 | −11 | 42 |
| " 402 | | 18 | 59 | −12 | 25 | 7 | 21 | 44 | −12 | 7 |
| " 403 | | 19 | 2 | −13 | 10 | 8 | 21 | 47 | −12 | 52 |
| " 448 | | 20 | 57 | −12 | 52 | 9 | 23 | 42 | −12 | 34 |
| " 485 | | 22 | 46 | −12 | 55 | 8 | 25 | 31 | −12 | 37 |
| | | | | | | (3865) | 23 | 11.4 | −12 | 22 |
| | | | | | | (3872) | | 12.7 | −10 | 15 |

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# Planetary Nebulae.

| +10 −40 | | +40 +10 | | +40 −90 |
|---|---|---|---|---|
| 400 vF | | 12 | | 20 |
| 544 vB | | 810 | | 639 F |
| 664 | | 1999 ε F | | 801 pB |
| 705 F | | 2099 vF | | 1629 m |
| 826 ⊕ | | 2400 cB F | | 1728 pB |
| 932 cB | | | | 1888 cF |
| 1170 F | | | | 1950 vB |
| 1202 B | | | | 2158 cB |
| 1225 pB | | | | 2231 B |
| 1226 | | | | 2613 pF |
| 1270 | | | | 2620 B |
| 1359 | | | | 2635 cB |
| 1362 | | | | 2680 B |
| 1373 | pB | | | |
| 1375 | | | | |
| 1425 | | | | |
| 1437 | | | | |
| 1487 | | | | |
| 1500 | | | | |
| 1532 B | | | | |
| 1565 pB | | | | |
| 1567 cB | | | | |
| 1589 pB | | | | |
| 1672 ~~f~~ | | | | |
| 2102 vB | | | | |
| 2209 F | | | | |
| 2255 ε F | | | | |
| 2670 pB | | | | |

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+10° − 40°

3066 cB
3307
3366 pB
3801 pB
3806 II pB
3808 c ?
4302 pB s
4353 diffuse
4378 m
4477 v ? W S
4570 B W, SP
4628 v B
4802 ?

+10° + 40°

3108 v ?
3109 v ?
3340 v ?
4053
4447 B ◎ PSW, PW.
4561 ?
4565 ?
4572 B w

+40° + 90°

2748 cB
3270 pB
2536 cB
3575 pB
4244 v B SPW, SPW, PW, PW.
4274 ?
4373 v B w, sw
4514 B
4594 v ? m
4634 s ?
4702 e ?
4947 v ?
4964 v B

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| No. | Remark. | Spectr. (others, see page) | light. | diam. | |
|---|---|---|---|---|---|
| | | **Planetary Nebulae.** | | | |
| | | +10 — 40. | | | |
| 400 | vF | (91.54) | | | |
| 544 | vB | 179 PS. 103 star(s) (not seen) | | | Not Plan Center |
| 664 | Not * | 91, 4P Not vis 91.38 | Star — | No dif. limit | |
| 705 | F | (1.37) W | | | |
| 706 | | | | | |
| 826 | ⊕ | ⊕ | | | |
| 932 | cB. | (1,36) W | | | |
| 1170 | F | (1,37) PW | Very Cond. Cent. No dif. limit | | Not Planet |
| 1202 | B. | (1,38) PW | | | Not Star. |
| 1225 | pB. O | (1,38) PW. | (1.38) PS. | (1.38) PS | Plan |
| 1226 | | | | | |
| 1270 | | | | | |
| 1359 | | | | | |
| 1362 | pB. | | | | |
| 1373 | | | | | |
| 1375 | | | | | |
| 1425 | | | | | |
| 1437 | | | | | |
| 1487 | | | | | |
| 1500 | | | | | |
| 1532 | B | | | | |
| 1564 | | | | | |
| 1565 | pB O | | | | |
| 1567 | cB. | | | | |
| 1574 | | | | | |
| 1589 | pB | | | | |
| 1672 | F | | | | |
| 1783 | | | | | |
| 2102 | vB. ⊙ | 60 P | | | |
| ~~2155~~ | | | | | |
| ? 2209 | 4 | | | | |
| 2255 | εF. | | | | |
| 2670 | pB | | | | |
| 3066 | cB | | | | |
| 3258 | | 60 PS | | | |
| 3305 | | 60 PS | | | |

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— means Record book 52.

(1.27) man P91.37



# Planetary Nebulae.

+10 – 40.

| | | Spect. | Phot-P | Diam | | |
|---|---|---|---|---|---|---|
| 3307 | | | | | | |
| 3366 | pB. | | | | | |
| 3801 | pB. | 94 S.P. 159, P. 213, S. | 213, S. | | | |
| 3806 | II pB | 94 S. 159, P. | | | | |
| 3808 | c F. | 94 S. 159, P. | | | | |
| 4302 | pB. | 213, P.S. 154, S.P. 155, P(?) | 213-4 S. 1, S. | | | ◎ |
| 4355 | trifid. | 155 P | | | | |
| ~~4378~~ 4407 | | | | | | rr nebl |
| 4479 | v F. | 57 PSW. 129P | 57 PWS. 129P | v faint | | C |
| 4510 | B | 52 W. 129P | 52 W. 58 SP 129P | 125 PW. 129P | | C |
| 4628 | vB | 72 PS. 175PS | 72-3 SPW. 175S | 79 P. 80 W. 81 S. 127 PPWW. | | Elliptic. C |
| 4802 | F. | 144 PS ~~175PS~~ | 144 PS 175, 6PS | v faint | | C |

+40 +10.

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | | 141P | v v middle | hazy. bordr. not Plan. | | |
| 810 | | | | | | |
| 1999 | ◎ F. | | | | | |
| 2099 | v F | | | | | |
| 2400 | c B F. | | | | | |
| 3108 | v F | | | | | Double |
| 3109 | v F | | | | | |
| 3340 | v F | | | | | v v Cm |
| 4053 | | 154 Nebulous S. fpt. extsp. | | | | |
| 4447 | B ◎ | 58 PS? | 55, 180. 34 PSW. 48 PW. | ? | | Ring Nebula |
| 4561 | F | 133 S | | 133 S | | |
| 4565 | F1 | 132 S 36' PW. 91' PS | 36' PW (91') PS | 132 S v faint | | C |
| 4572 | B | 53 W. 92 PS. 142 PS | 53 W. 142 PS | 92 PS. 143 SP | | C |

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# Planetary Nebulae.

| | | +40 | +90 | Spect. | Mult. a | Diam. | |
|---|---|---|---|---|---|---|---|
| | 20 | | | R 91, 54 | | | |
| | 639 | | | | | | |
| | 801 | pB. | O | 180 SP | 180 | | |
| | 1629 | m | | | | | |
| | 1728 | pB. | | | | | |
| | 1888 | c | | | | | |
| | 1950 | vB. | | | | | |
| | 2158 | cB. | O | | | | |
| Dec +1° | 2231 | B. | | | | | |
| | 2613 | p | | | | | |
| | 2620 | B | | | | | |
| | 2635 | cB | | | | | |
| | 2680 | B | | | | | |
| | 2748 | cB. | | | | | |
| | 3270 | pB. | | | | | |
| | 3536 | cB | O | 94s PWS. | | 9s PWS. | |
| | 3575 | pB | | | | | |
| | 4244 | vB | | 182, P.S. | 3R5 PW. 46 PW. 47 PW. 181, P.S. 182 P.S. 3H5 PW. | | |
| | 4274 | | | | | | |
| | 4373 | vB. | | 50 P. 58 W. 59 SW. (PS 1,41) | 51 W. 59 SW. (1,40 PS) | (1,41 PS W. (1,52 PS 1,41 PS W. (1,52 PS | Planetary ? |
| | 4514 | B. | | 1,48 P (1,50 PS) | 1,48 P (1,50) PS | (1,48 PS) (1,48 PS 1,50 | Planetary ? |
| | 4594 | v | | (291,52) | | | |
| | 4634 | c | | (R 91, 53) | | | Pub. Stars - Nat. 4 Stars. " Stars? |
| | 4702 | c | | (R 91, 53) | | | |
| | 4947 | v | | (R 91, 53 | | | |
| | 4964 | vB. | | 91SP 102-3 SWP. 141 PS. 1775 | 148 PS (1,44 PS) | 91.5 102- SWP. 141 PS. 1475P | Planetary |

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# Ephemeris of Deimos.

| Date (1879) | Washington M.T. | Pos. Ang. | Dist. | C.M.T. |
|---|---|---|---|---|
| Oct. 10 | 10h 46m | 232° | | 11h 10m |
| 12 | 8 13 | 52,1 | 60."8 | 8 37 |
| 13 | 14 31 | 52 | | 14 55 |
| 15 | 12 58 | 232 | | 13 22 |
| 17 | 9 25 | 52 | 62.2 | 9 49 |
| 18 | 15 43 | 52 | | 16 07 |
| 20 | 13 10 | 231 | | 13 34 |
| 22 | 10 37 | 51.3 | 63.7 | 11 01 |
| 23 | 16 55 | 51 | | 17 19 |
| 25 | 14 22 | 231 | | 14 46 |
| 27 | 11 49 | 51 | 64.5 | 12 13 |
| 29 | 9 16 | 231 | | 9 40 |
| 30 | 15 34 | 231 | | 15 58 |
| Nov. 1 | 12 0 | 52.7 | 66.9 | 12 24 |
| 3 | 9 27 | 232 | | 9 51 |
| 4 | 15 45 | 232 | | 16 09 |
| 5 | 6 54 | 52 | | 7 18 |
| 6 | 13 12 | 52 | | 13 36 |
| 8 | 10 38 | 231 | 66.7 | 11 02 |
| 9 | 16 56 | 231 | | 17 20 |
| 10 | 8 5 | 51 | | 8 29 |
| 11 | 14 23 | 51 | | 14 47 |
| 13 | 11 50 | 231 | | 12 14 |
| 15 | 9 17 | 50,8 | 64.9 | 9 41 |

| | | | | α | | | |
|---|---|---|---|---|---|---|---|
| 10 | 8 | 29 | 50° | 14 | 3 | 23 | 50° |
| " | 23 | 38 | | " | 18 | 32 | |
| 11 | 14 | 47 | 50° | 15 | 9 | 41 | 50° |
| 12 | 5 | 56 | | " | 0 | 50 | |
| " | 20 | 5 | 50° | 16 | 15 | 57 | 50° |
| 13 | 12 | 14 | | 17 | 3 | 8 | 50° |

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# Ephemeris of Phobos.

| Date. 1879 | Wash. M.T. | Pos. Ang. | Dist. |
|---|---|---|---|
| Oct. 10 | 8h 2m | 55° | 24".4 |
| | 11 52 | 235 | |
| | 15 41 | 55 | |
| 11 | 7 0 | 55 | |
| | 10 50 | 235 | |
| | 14 39 | 55 | |
| 12 | 9 47 | 235 | |
| | 13 37 | 55 | |
| 13 | 8 45 | 235 | |
| | 12 35 | 55 | |
| | 16 24 | 235 | |
| 14 | 7 43 | 235 | |
| | 11 32 | 55 | |
| | 15 22 | 235 | |
| 15 | 6 41 | 235 | |
| | 10 30 | 55 | |
| | 14 20 | 235 | |
| 16 | 9 28 | 55 | |
| | 13 18 | 235 | |
| 17 | 8 26 | 55 | |
| | 12 15 | 235 | |
| 18 | 7 23 | 55 | |
| | 11 13 | 235 | |
| | 15 3 | 55 | |
| 19 | 6 21 | 55 | |
| | 10 11 | 235 | |
| | 14 0 | 55 | |

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# Ephemeris of Phobos. — Continued.

| Date. 1879 | Wash. M.T. | Pos. Ang | Dif. | C. M.T. |
|---|---|---|---|---|
| Oct. 20 | 9h 9m | 235° | | |
| | 12 58 | 55 | | |
| 21 | 8 6 | 235 | | |
| | 12 16 | 55 | | |
| | 15 46 | 235 | 26.″0 | |
| 22 | 7 4 | 235 | | |
| | 10 54 | 55 | | |
| | 14 43 | 235 | | |
| 23 | 9 51 | 54 | | |
| | 13 41 | 234 | | |
| 24 | 8 49 | 54 | | 8 29 |
| | 12 39 | 234 | | 12 19 |
| 25 | 7 47 | 54 | | 7 27 |
| | 11 37 | 234 | 26.″5 | 11 17 |
| | 15 26 | 54 | | 15 06 |
| 26 | 6 45 | 54 | | 6 25 |
| | 10 34 | 234 | | 10 14 |
| | 14 24 | 54 | | 14 04 |
| 27 | 9 32 | 234 | | 9 12 |
| | 13 22 | 54 | | 13 02 |
| 28 | 8 30 | 234 | | 8 10 |
| | 12 19 | 54 | | 11 59 |
| | 16 9 | 234 | | 15 49 |
| 29 | 7 28 | 234 | | 7 08 |
| | 11 17 | 54 | | 10 57 |
| | 15 7 | 234 | | 14 47 |
| 30 | 10 15 | 54 | | 9 55 |
| | 14 5 | 234 | | 13 45 |

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# Ephemeris of Phobos. — continued

| Date 1879 | Wash. M.T. | Pos. Aug. | Dist. | G.M.T. |
|---|---|---|---|---|
| Oct. 31. | 9h 13m | 54 | | 8h 53m |
| | 13 2 | 234 | | 12 42 |
| Nov. 1. | 8 10 | 54 | | 7 50 |
| | 12 0 | 234 | 26".8 | 11 40 |
| | 15 50 | 54 | | 15 30 |
| 2. | 7 8 | 54 | | 6 48 |
| | 10 58 | 234 | | 10 38 |
| | 14 47 | 54 | | 14 27 |
| 3. | 6 6 | 54 | | 5 46 |
| | 9 55 | 234 | | 9 35 |
| | 13 45 | 54 | | 13 25 |
| 4 | 8 53 | 234 | | 8 33 |
| | 12 43 | 54 | | 12 23 |
| | 16 32 | 234 | | 16 12 |
| 5 | 7 51 | 233 | | 7 31 |
| | 11 41 | 53 | | 11 21 |
| | 15 30 | 233 | | 15 10 |
| 6 | 6 49 | 233 | | 6 19 |
| | 10 38 | 53 | | 10 18 |
| | 14 28 | 233 | | 14 08 |
| 7 | 9 36 | 53 | | 9 16 |
| | 13 26 | 233 | | 13 06 |
| 8 | 8 34 | 53 | | 8 14 |
| | 12 24 | 233 | | 12 04 |
| | 16 13 | 53 | | 15 53 |
| 9 | 7 32 | 53 | | 7 12 |
| | 11 21 | 233 | | 11 01 |
| | 15 11 | 53 | | 14 51 |

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# Ephemeris of Phobos.

| Date. 1879. | Wash. M.T. | | Pos. Ang. | Dif | C.M.T. | | |
|---|---|---|---|---|---|---|---|
| Nov. 10 | $10^h$ | $19^m$ | $233^\circ$ | | $9^h$ | $59^m$ | |
| | 14 | 9 | 53 | | 13 | 49 | |
| 11 | 9 | 17 | 232 | | 8 | 57 | |
| | 13 | 6 | 52 | | 12 | 46 | |
| | 16 | 56 | 232 | $16^h\ 36^m$ | | | |
| 12 | 8 | 15 | 232 | 7 55 | | | |
| | 12 | 4 | 52 | 11 44 | | | |
| | 15 | 54 | 232 | 15 34 | | | |
| 13 | 7 | 12 | 232 | | | | |
| | 11 | 2 | 52 | | 13 | 10 42 | 50 |
| | 14 | 52 | 232 | | | 14 32 | |
| 14 | 10 | 0 | 52 | | 14 | 9 40 | 50 |
| | 13 | 49 | 232 | 26".2 | | 13 29 | |
| | | | | | 15 | 8 38 | 50 |
| | | | | | | 12 27 | |
| | | | | | 16 | 7 36 | 50 |
| | | | | | | 11 25 | 230 |
| | | | | | | 15 14 | 50 |

No account is taken of the Correction for Aberration which would change the Comp. times about 4 m

6 52

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# Ephemeris for Deimos Continued.

Date 1879. ~~Wash.~~ C. M. T. Pos. Aug. Dist. ~~C. M. T.~~

| | | | | | | |
|---|---|---|---|---|---|---|
| Nov. | 18 | 13 | 26 | 230 | 13 | 50 |
| | 19 | 12 | 35 | | | |
| | 20 | 10 | 53 | 50 | 11 | 17 |
| | 21 | 17 | 11 | 50 | 17 | 35 |
| | 23 | 14 | 38 | 230 | 15 | 02 |
| | 25 | 12 | 5 | 50 | 12 | 29 |
| | 27 | 9 | 32 | 230 | 9 | 56 |
| | 28 | 15 | 50 | 230 | 16 | 14 |
| | 30 | 12 | 16 | 50 | 12 | 40 |
| Dec. | 2 | 9 | 43 | 230 | 9 | 07 |
| | 3 | 16 | 01 | 230 | 16 | 25 |
| | 4 | 8 | 10 | 50 | 7 | 34 |

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# Ephemeris for Phobos. Continued.

| Date 1879. Nov. | ~~Washington~~ M. T. | Pos. Aug. | dist. | ~~Washington~~ M. T. |
|---|---|---|---|---|
| | A small cross is made whereever | | | |
| 17 | 6 32 | √0 | 6 | 12 |
| | 10 22 | ≷30 | 10 | 2 |
| | 14 11 | √0 | 13 | √1 |
| 18 | 9 20 | ≷30 | 9 | 0 |
| | 13 09 × | √0 | 12 | 49 |
| 19 | 8 17 | ≷30 | 7 | √7 |
| | 12 27 | √0 | 12 | 7 |
| | 15 √7 | ≷30 | 15 | 37 |
| 20 | 7 15 | ≷30 | 6 | √5 |
| | 11 0√ | √0 | 10 | 4√ |
| | 14 √4 | ≷30 | 14 | 34 |
| 21 | 10 02 | √0 | 9 | 42 |
| | 13 √2 × | ≷30 | 13 | 32 |
| 22 | 9 0 | √0 | 8 | 40 |
| | 12 √0 | ≷30 | 12 | 30 |
| | 16 39 | √0 | 16 | 19 |
| 23 | 7 √8 | √0 | 7 | 38 |
| | 11 48 | ≷30 | 11 | 28 |
| | 15 37 | √0 | 15 | 17 |
| 24 | 6 √6 | √0 | 6 | 36 |
| | 10 4√ | ≷30 | 10 | 2√ |
| | 14 3√ | √0 | 14 | 15 |

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# Ephemeris for Phobos Continued.

| Date 1879 | Wash. M. T. | Par. Aug. | Dist. | G. M. T. |
|---|---|---|---|---|
| Nov. 25 | 9 43 | 230 | 9 | 23 |
| | 13 33 | 0 | 13 | 13 |
| 26 | 8 41 | 230 | 8 | 21 |
| | 12 30 | 0 | 12 | 10 |
| | 16 20 | 230 | 16 | 00 |
| 27 | 7 39 | 230 | 7 | 19 |
| | 11 28 | 0 | 11 | 8 |
| | 15 18 | 230 | 14 | 58 |
| 28 | 6 36 | | | |
| | 10 26 | 0 | 10 | 6 |
| | 14 16 | 230 | 13 | 56 |
| 29 | 9 24 | 0 | 9 | 4 |
| | 13 13 | 230 | 12 | 53 |
| 30 | 8 21 | 0 | 8 | 1 |
| | 12 11 | 230 | 11 | 51 |
| | 16 1 | 0 | 15 | 41 |
| Dec. 1 | 7 19 | 0 | 6 | 59 |
| | 11 9 | 230 | 10 | 49 |
| | 14 58 | 0 | 14 | 38 |
| 2 | 6 17 | 0 | 5 | 57 |
| | 10 7 | 230 | 9 | 47 |
| | 13 56 | 0 | 13 | 36 |
| 3 | 9 4 | 230 | 8 | 44 |
| | 12 54 | 0 | 12 | 34 |
| | 16 43 | 230 | 16 | 23 |
| 4 | 8 2 | 230 | 7 | 42 |
| | 11 52 | 0 | 11 | 32 |
| | 15 41 | 230 | 15 | 21 |

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5 7 0
10 50
14 30

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# Ephemeris for Deimos. 1879.

| | Date. 1879. | C. M. T. | Pos. Angle. | Dist. | |
|---|---|---|---|---|---|
| D | Nov. 20 | 10 √3 | 50° | | |
| | 21 | 2 2 | 230 | | |
| | | 17 11 | √0 | | |
| | 22 | 8 20 | 230 | | |
| | | 23 29 | √0 | | |
| S | 23 | 14 38 | 230 | 5 | |
| | 24 | 5 47 | √0 | 6 | |
| | | 20 56 | 230 | | |
| | 25 | 12 15 | √0 | 7 | |
| | 26 | 3 14 | 230 | | |
| | | 18 23 | √0 | | |
| | 27 | 9 32 | 230 | | |
| O | 28 | 0 41 | √0 | | |
| | | 15 50 | 230 | | |
| | 29 | 6 59 | √0 | | |
| | | 22 8 | 230 | | |
| S | 30 | 13 16 | √0 | | |
| Dec. | 1 | 3 25 | 230 | | |
| | | 18 34 | √0 | | |
| | 2 | 9 43 | 230 | | |
| | 3 | 0 52 | √0 | | |
| | | 11 01 | 230 | | |
| | 4 | 8 10 | √0 | | |
| | | 22 19 | 230 | | |
| | 5 | 14 27 | 50 | | |

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| | Decimal | | | Thebes. | | |
|---|---|---|---|---|---|---|
| | | | | 4 | 55 | 230 |
| S7 | 11 | 55 | 230° | 8 | 45 | 50° |
| | | | | 12 | 35 | 230 |
| | | | | 16 | 24 | 50 |
| 8 | 3 | 4 | 50° | 7 | 43 | 50 |
| | 18 | 13 | 230° | 11 | 33 | 230 |
| | | | | 15 | 22 | 50 |
| 9 | 9 | 22 | 50° | 6 | 41 | 50 |
| | | | | 10 | 30 | 230 |
| | | | | 14 | 20 | 50 |
| 10 | 0 | 31 | 230° | 5 | 38 | 50 |
| | 15 | 40 | 50° | 9 | 28 | 230 |
| | | | | 13 | 18 | 50 |
| 11 | 6 | 49 | 230° | 4 | 36 | 50° |
| | | | | 8 | 26 | 230° |
| | | | | 12 | 16 | 50° |
| 12 | 13 | 7 | 230° | ~~2~~ | ~~34~~ | ~~50°~~ |
| | | | | 7 | 24 | 230° |
| | | | | 11 | 14 | 50° |
| 13 | 4 | 16 | 50 | ~~2~~ | ~~22~~ | ~~50°~~ |
| | 19 | 25 | 230 | 6 | 22 | 230° |
| | | | | 10 | 12 | 50° |
| | | | | 14 | 2 | 230° |

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Look at companion of $\mu$ Cassiopeiae; angle given 187° distance 2′ in catalogue; see if this is correct,

Position angle and distance wanted for companion of $\kappa$ Pegasi.

Written of Lear Sound by Prof. Hall.

| | RA | | | Dec | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3 | 22 | 0 | +18° | 13′ | 20″ | | |
| B.C.C. | 3 | 21 | 15 | −76° | 14′ | 33″ | 1850 | 54.171 W.H.S |
| DM. | 3 | 21 | 31.7 (24) | 18 | 13.6 (5.3) | | 1855 | 54.183 S.D.H. |
| > DM.86 | 3 | 22 | 54.7 | 18 | 18.9 | | 1880 | |
| B.C.1064 DM.65 | 3 | 18 | 47.2 | 18 | 14.9 | | 1855 | |
| > DM.65 | 3 | 20 | 11 | 18 | 20.2 | | 1880 | |

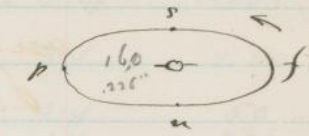
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## Hyperion.

| | | | |
|---|---|---|---|
| Dec | 7 | 14 | Sup conj. S |
| | 12 | 22 | preceding |
| | 18 | 5 | Inf conj N |
| | 23 | 13 | Following |
| | 28 | 20 | Sup conj S |
| Jan | 3 | 4 | |
| Jan | 8 | 11 | Inf. conj N |




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| | | Deimos. | | | Phobos. | | |
|---|---|---|---|---|---|---|---|
| Dec. | 14. | 10h | 34m | 50° | 5h | 20m | 230° |
| | | | | | 9 | 10 | 50° |
| | | | | | 13 | 0 | 230° |
| " | 15 | 1h | 43 | 230° | 4h | 18 | 230° |
| | | 16 | 52 | 50° | 8 | 8 | 50° |
| | | | | | 11 | 58 | 230° |
| | | 6 | 14 | | | | |
| " | 16 | 8 | 1 | 230 | 7 | 6 | |
| | | 6 | | | | | |
| " | 17 | 14 | 19 | 230° | 6 | 4 | |
| " | 18. | 4 | 36± | 50° | 4 | 54 | 50° |
| | | | | | 8 | 44 | 230 |
| | | | | | 12 | 34 | 50 |
| " | 19 | 10 | 48± | 50° | 3 | 52 | 50° |
| | | | | | 7 | 42 | 230° |
| | | | | | 11 | 32 | 50° |
| " | 20 | 2 | 0± | 230° | 2 | 50 | 50° |
| | | | | | 6 | 40 | 230° |
| | | | | | 10 | 30 | 50° |
| " | 21. | 8 | 18± | 230° | 1 | 48 | 50° |
| | | | | | 5 | 38 | 230 |
| | | | | | 9 | 28 | 50 |
| " | 22. | 14 | 36± | 230° | 0 | 46 | 50° |
| | | | | | 4 | 36 | 230 |
| | | | | | 8 | 26 | 50 |

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1070phot.proj..476p



| | | Deimos. | | Phobos. | | |
|---|---|---|---|---|---|---|
| Dec. | 23. | $5^h$ | $45^m \pm$ 50° | 23 | 44 | 50° |
| | | | | 3 | 34 | 230 |
| | | | | 7 | 24 | 50 |
| | | | | 11 | 14 | 230 |
| " | 24. | 12 | 3 ± 50° | 22 | 42 | 50° |
| | | | | 2 | 32 | 230 |
| | | | | 6 | 22 | 50 |
| | | | | 10 | 12 | 230 |
| | | | | 14 | 2 | 50 |
| " | 25. | 3 | 12 ± 230° | 21 | 41 | 50° |
| | | | | 1 | 30 | 230 |
| | | | | 5 | 20 | 50 |
| | | | | 9 | 10 | 230 |
| | | | | 13 | 0 | 50 |
| " | 26. | 9 | 30 ± 230° | 20 | 38 | 50° |
| | | | | 0 | 28 | 230 |
| | | | | 4 | 18 | 50 |
| | | | | 8 | 8 | 230 |
| | | | | 11 | 58 | 50 |
| " | 27 | 15 | 48 ± 230° | 19 | 36 | 50° |
| | | | | 23 | 26 | 230 |
| | | | | 3 | 16 | 50 |
| | | | | 7 | 6 | 230 |
| | | | | 10 | 56 | 50 |
| " | 28 | 6 | 57 ± 50° | 18 | 34 | 50° |
| | | | | 22 | 24 | 230 |
| | | | | 2 | 14 | 50 |
| | | | | 6 | 4 | 230 |
| | | | | 9 | 54 | 50 |
| " | 29 | 13 | 15 ± 50° | 17 | 32 | 50° |
| | | | | 21 | 22 | 230 |
| | | | | 1 | 12 | 50 |
| | | | | 5 | 2 | 230 |
| | | | | 8 | 52 | 50 |
| | | | | 12 | 42 | 230 |

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| | | Deimos. | | | Phobos. | | |
|---|---|---|---|---|---|---|---|
| Dec. | 30. | $4^h$ | $24^m \pm$ | 230° | $4^h$ | 0 | 230° |
| | | | | | 7 | 50 | 50 |
| | | | | | 11 | 40 | 230 |
| " | 31. | 10 | 42 ± | 230° | 2 | 58 | 230° |
| | | | | | 6 | 48 | 50° |
| | | | | | 10 | 38 | 230° |
| 1880. Jan. | 1. | 17 | 0 ± | 230° | 1 | 56 | 230° |
| | | | | | 5 | 46 | 50° |
| | | | | | 9 | 36 | 230° |
| | | | | | 13 | 26 | 50° |
| Jan. | 2. | 8 | 9 ± | 50° | 0 | 54 | 230° |
| | | | | | 4 | 44 | 50 |
| | | | | | 8 | 34 | 230 |
| | | | | | 12 | 24 | 50 |
| " | 3. | 14 | 27 | 50° | 23 | 52 | 230° |
| | | | | | 3 | 42 | 50 |
| | | | | | 7 | 32 | 230 |
| | | | | | 11 | 22 | 50 |
| | | | | | 15 | 12 | 230 |
| " | 4. | 5 | 36 | 230° | 22 | 50 | 230° |
| | | | | | 2 | 40 | 50 |
| | | | | | 6 | 30 | 230 |
| | | | | | 10 | 20 | 50 |
| | | | | | 14 | 10 | 230 |
| " | 5 | 11 | 54 ± | 230° | 21 | 48 | 230° |
| | | | | | 1 | 38 | 50 |
| | | | | | 5 | 28 | 230 |
| | | | | | 9 | 18 | 50 |
| | | | | | 13 | 8 | 230 |

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| | Deimos. | | | Phobos. | | |
|---|---|---|---|---|---|---|
| Jan. 6. | $3^h$ | $3^m \pm$ | 50° | $20^h$ | 46m | 230° |
| | | | | 0 | 36 | ↓0 |
| | | | | 4 | 26 | 230 |
| | | | | 8 | 16 | ↓0 |
| | | | | 12 | 6 | 230 |
| " 7. | 9 | 21 ± | 50° | 19 | 44 | 230 |
| | | | | 23 | 34 | ↓0 |
| | | | | 3 | 24 | 230 |
| | | | | 7 | 14 | ↓0 |
| | | | | 11 | 4 | 230 |
| " 8 | 15 | 39 ± | 50° | 2 | 22 | 230 |
| | | | | 6 | 12 | ↓0 |
| | | | | 10 | 2 | 230 |
| | | | | 13 | ↓2 | ↓0 |
| " 9 | 21 | ↓7 | ↓0° | | | |
| " 10. | 13 | 6 | 230° | | | |
| " 11 | 4 | 15 | ↓0° | | | |
| " 12 | 10 | 33 | ↓0° | | | |
| " 13 | 16 | ↓1 | ↓0° | | | |
| " 14 | 8 | 0 | 230° | | | |
| " 15 | 14 | 18 | 230° | | | |
| " 16 | ↓ | 27 | ↓0° | | | |
| " 17 | 11 | 45 | ↓0° | | | |

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Deimos.

| | | | | |
|---|---|---|---|---|
| Jan. | 18. | 2h | 54 ± | 230° |
| " | 19. | 9 | 12 ± | 230° |
| " | 20. | 15 | 30 ± | 230° |
| " | 21. | 6 | 39 ± | 50° |
| " | 22. | 12 | 57 ± | 50° |
| " | 23 | 4 | 6 ± | 230° |

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Jan. 1880.

19

20 β Persei 13h 1m — Vicinity of Algol

21

22

23

24 9.0 9.2

25

26

27

28 2.0 8.8 8.5

29 8.0 9.5

30 9.5

31

9.2 7.5

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# Planetary Nebulae

| | | No. | RA. | Dec. | |
|---|---|---|---|---|---|
| c · c | m | 705 706 | 3 19 | -36.9 | O? pS; vlumbMh |
| c · c | m | 801 | 3 57 | +60.6 | O pB 1'dia |
| c · c | m | 826 | 4 9 | -13.1 | ⊕ vB; r |
| — · — | | 1045 | 5 7 | -69.4 | O B |
| c · c | m | 1225 | 5 36 | +9.0 | O pB |
| c · | m | 1565 | 7 36 | -24.4 | O pB |
| c · c | m | 1567 | 7 37 | -17.9 | O cB nbv vell def. |
| · | m? | 1574 | 7 43 | -27.0 | O ?. |
| — · — | | 1703 | 8 42 | -41.5 | Cl 8t 12...13 |
| c · c | m | 1801 | 9 11 | -36.0 | O pB |
| — · — | | 1843 | 9 18 | -57.9 | O !! |
| c · c | m | 2017 | 10 2 | -39.8 | O vB !! |
| — · — | | 2063 | 10 12 | -80.2 | O pB ! |
| — · — | | 2076 | 10 14 | -62.0 | O |
| c · c | m | 2102 | 10 19 | -18.0 | O vB. ! |
| c · c | | 2158 | 10 31 | +54.1 | O? cB |
| c · c | m | 2343 | 11 7 | +55.7 | O !! vB 19s dia. |
| — · — | | 2581 | 11 44 | -56.5 | O ! |
| c · c | | 3536 | 13 18 | +71.1 | O? cB. |
| · | | 3614 | 13 31 | -17.3 | |
| — · — | | 3661 | 13 43 | -50.6 | O !! |
| · | ✓ | 3976 | 14 34 | +2.7 | O? vF. |
| — · — | | 4066 | 15 8 | -45.2 | O |
| — · — | | 4125 | 15 35 | -60.9 | O !. pF. |
| c · c | m | 4234 | 16 39 | +24.0 | O. vB diff l border |
| c · c | | 4244 | 16 44 | +47.8 | vB |
| — · — | | 4284 | 17 10 | -51.6 | O pB !!! |
| · | ✓ | 4290 | 17 13 | -38.3 | ◎. eF. !!! |
| c · c | m | 4302 | 17 22 | -23.6 | ◉ pB !! |
| c · c | m | 4373 | 17 58 | +66.8 | O, vB |
| · | ✓ | 4378 | 18 1 | -25.9 | ⊕. F. |

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Structure  Mag. 2.  Diameter.

1.88 P.W  1,1795P  1,175 PS

CC  1805P 1,1107W. 1,175WS  180  175 WS  α Camelop.

C C  1,61 PW. 1,69  1,62 PW. 1,68  1,87P  α Tauri  ζ Orionis

Too S

C C  1.38 PW 1.89 PW  1,38 PS 1.90 PW  1.39 PS  ζ Orionis

C C  1.94 1,128W 1,168W  1.94 PW  1,128W  ζ Geminis

C  1.65 W.S. 1.91 WP  1,128 WP 1,165W 1,173W  δ Can. Maj.

ο Cluster diss. 91, 174

Too S

C C  1,164 W.P 1,170 WPS  1,164 PS 1,170 PS  H Dennis Saint

Too S

C C  1,165 PS W. 1,170 P.  1,165 PS W. 1,170 PS  α Geminis

Too L.

Too L

C C  1,157W  60 P 1,129W  1,129 W PS 1,157 PW  α Dennis Long br.

1,204 W  1,204 P.  1,204 P.

C C  1,175 S 1,191 PS  1,175 S 1,191 PS  ζ Ursa Maj. B Ursa Min.

C C  1,201 PW  1,201 P.  1,202 PW

1.179 P.W. 1,198 PS  1,176 P.W. 1,198 PS  α Ursa Maj. B Ursa Maj.

Too L.

C C  1,208 WP 1,207 SP  1,207 SW  1,206 W P 1,207 W  ι Draconis

94-5 PWS  1,201 P.W.  95 P.W.S.

Too L.

Not seen Apr. 20

Too L

Too L

C C  1,195. W.P 1,208 WS  1,196 W.P 1,208 WS  α Cor. Borealis

1,206 P.W. 1,207 W.  1,206 P.W. 1,207 W.

C  182 PS 2,105  151 PS 182 PSL

Too L

CCC  C  C  1,41 PSW 1,52 PS  1,41 PSW 1,25 PS

2,42 SP  2,41 WPS

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| | No. | RA | Dec. | |
|---|---|---|---|---|
| m ✓ | 4386 | 18 3 | −33.9 | O, F |
| C m | 4390 | 18 6 | +6.8 | O, vB, |
| m ✓ | 4407 | 18 18 | −23.3 | O — ⊕ pB, εεS, R |
| C C | 4447 | 18 49 | +22.9 | ◎ !!! B Lyra |
| m | 4479 | | | |
| ✓ | 4487 | 19 12 | +6.3 | O, F |
| C m | 4510 | 19 37 | −14.4 | O, B |
| C C m | 4514 | 19 42 | +50.2 | O B |
| C C m | 4565 | 20 11 | +30.2 | ◎ !! F. |
| C C m | 4572 | 20 17 | +19.7 | O !! B |
| C C m | 4628 | 20 57 | −11.9 | O !!! vB |
| ✓ | 4754 | 22 0 | −29.6 | vF. clusters O |
| C C m | 4964 | 23 20 | +41.9 | O !!! vB |
| m? ✓ | 5240 | 2 20 | −0.9 | O vE., εS ? |
| ✓ | 5617 | 11 59 | +11.4 | O pL, S, E. #10.11 sf |
| | 6000 | 21 25 | +0.1 | O (Lyr D'A adj. O.M. +0°,4741 #9 |
| | | 0 36 | 40.5 | Androm. |
| | | 5 28 | −5.5 | Orion |
| | | | | Variable Neb. |
| | | 4 15 | +19.2 | Taurus Hind Lacepide Pogson |
| | 4415 | 18 24 | +74.5 | Draco Tuttle |
| | | 3 39 | +23.4 | Camelop Temple |
| | 1191 | 5 30 | +21.1 | " Schmidt Klein nebs. |
| C C m | | 21 2 31 | +41 45.3 | DM 41,4004 Wilb. |
| | | 21 37 | +42 17 | Nova Cygni Nature xvi, 403 |

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Spectrum Nebul: 2 Diameter.

C C P.S. 92,77

W 2,102 W,102

C 58 PS 59 150, 34 PSW, 42R ( ) Rémy Mot. Lagrula

CCC 52 W 129 P ~~52 W, 58 SP 129 P~~ ~~57 W 58, 129 P~~ 125 PW. 129 P

CCC 1,48 P 1,50 PS 1,48 P 1,50 PS 1,48 PS 1,50 PS 1,50 PS

CCC 1325, 36 PW 1,35 PS 36 PW 1,35 PS 1325 Co faint

CCC 53 W, 92 PS. 142 PS 53 W, 142 PS 92 PS, 143 SP

CCC 72 PS, 175 PS 72 SPW. 175 S 79 P 50 W 815 127 PW

CCC 102 SWP, 141 PS, 177 PS 148 PS 144 PS 102 SWP 141 PS 147 SP

P W

CCC 1,59 PS 171 PS 1,64 S 1,59 PS 1,64 S 171 PS 159 PS, 163 172 S α Cygni

DM 42, 4184 9.1 fold 250 ~~Rect~~ 1.3

DM 42 4185 9.4 " 350 ~~rect~~ 1.2

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Sept.

| | | | | | | |
|---|---|---|---|---|---|---|
| 23 | δ Leitzen | 16.6 | α Coronae | 16.3 | β Ursae | 3.3 |
| 24 | ~~β Ursae~~ | 15.9 | | | | 6.8 I Jet. |
| 25 | Dm 81.25 | 20.7 | | | | |
| S 26 | δ Leitzen | 0.5 | β Ursae | 0.1 | | |
| 27 | ~~Dm 81°25~~ | 8.4 | α Coronae | 3.7 | | |
| 28 | ~~β Ursae~~ | 14.7 | δ Leitzen | 9.2 | β Ursae | 20.9 14.2 II Jet. |
| 29 | ~~β Ursae~~ | | | | | 14.2 I Jet. |
| 30 | δ Leitzen | 16.2 | α Coronae | 14.0 | | |

Minima of Dm. +81° 25'

| | | | | | |
|---|---|---|---|---|---|
| Sept. | 20 | 21.1 | Sept. | 25 | 20.7 |
| " | 25 | 20.7 | Sept. | 28 | 8.4 |
| " | 30 | 20.3 | Sept. | 30 | 20.3 |
| Oct. | 5 | 19.7 | Oct. | 2 | 8.8 |
| | | | Oct. | 5 | 19.9 |

| | | | |
|---|---|---|---|
| Sept. | 23 | 8.9 | If period = 25 Min dia |
| | 28 | 8.4 | |

| | | | |
|---|---|---|---|
| Sept. | 24 | 4.9 | If period = 1.7 ± .87 at-6 dimin |
| " | 27 | 12.5 | |
| | 29 | 4.5 | |
| | 24 | 14.9 | If period = 1.25 no dimin |

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# Ephemeris Satellitis of Mars.

## 1882.

Diams.

| | | | | |
|---|---|---|---|---|
| Jan. | 11 | 6 | 39 | E. |
| | | 21 | 48 | W. |
| | 12 | 12 | 56 | E. |
| | 13 | 4 | 5 | W. |
| | | 19 | 13 | E. |
| | 14 | 10 | 21 | W. |
| | 15 | 1 | 29 | E. |
| | | 16 | 37 | W. |
| | 16 | 7 | 46 | E. |
| | | 22 | 54 | W. |
| | 17 | 14 | 2 | E. |
| | 18 | 5 | 11 | W. |
| | | 20 | 18 | E. |
| | 19 | 11 | 27 | W. |
| | 20 | 2 | 35 | E. |
| | | 17 | 43 | W. |
| | 24 | 12 | 32 | W. |
| | 25 | 3 | 41 | E. |
| | 25 | 18 | 49 | W. |
| | 26 | 9 | 58 | E |
| | 27 | 16 | 17 | W. |
| | 30 | 4 | 13 | E. |
| | 30 | 20 | 2 | W. |
| Feb. | 2 | 23 | 47 | W. |
| | 2 | 8 | 39 | E. |
| | 8 | 0 | 50 | E. |
| " | 8 | 15 | 59 | W. |
| " | 14. | 8 | 11 | W. |

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## Satellites of Jupiter  R 63.84

| | Diam. Sat. | Diam. Sum | Sat + Sum | |
|---|---|---|---|---|
| | ″ | ″ | ″ | m |
| I | 235 | 44 | 279 | 4.6 |
| II | 250 | 88 | 338 | 5.6 |
| III | 534 | 177 | 711 | 11.8 |
| IV | 592 | 413 | 1005 | 16.8 |

## Stars Algol-Type.

| Name. | R.A. | Dec. | Mag. Max. | Mag. Min. | Period d h m s | Diff |
|---|---|---|---|---|---|---|
| β Persei | 2 58 45 | +40 23.6 | 2.2 | 3.7 | 2 20 49 | 1.5 |
| λ Tauri | 3 52 39 | +12 4.6 | 3.4 | 4.2 | 3 22 52 | 0.8 |
| δ Cancri | 8 35 39 | +19 33.2 | 8.2 | 9.8 | 9 11 38 | 1.6 |
| U Coronæ | 15 12 17 | +32 10.8 | 7.6 | 8.8 | 3 10 51 | 1.2 |
| δ Librae | 14 53 14 | −7 56.4 | 4.9 | 6.1 | 2 7 51 | 1.2 |
| +81°25 | 0 49 39 | +81° 5. 14 | | | 2 11 48 | 2.0 |

129 2 9
124

0 51 7 81 44

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# Nautical Almanac 1880.
## Eclipses Jupiter's Satellites.

| | | | | | | |
|---|---|---|---|---|---|---|
| May | 5 | 16h | 45m | 31.4s | I | Dis. Cloudy. |
| " | 23. | 15 | 29 | 17.5 | II | Dis. 90 Sats. Mist in. |
| June | 13. | 15 | 12 | 17.7 | I | Dis. Cloudy. |
| " | 23. | 14 | 19 | 13.4 | III | Dis. |
| " | 24. | 15 | 13 | 35.2 | II | Dis. 91 Sats |
| " | 29. | 13 | 28 | 34.7 | I | Dis. 92 Sats. |
| July | 19. | 12 | 19 | 25.3 | II | Dis. 93 Sats. Cloudy |
| " | 23. | 13 | 39 | 2.6 | I | Dis. |
| " | 26. | 14 | 54 | 57.5 | II | Dis. 94 Sats. |
| " | 29. | 13 | 2 | 2.4 | III | Re. 95 |
| " | 29. | 15 | 32 | 7.4 | I | Dis. 95 Sats |
| August | 5. | 14 | 26 | 33.6 | III | Dis. 96 Sats. |
| " | 7. | 11 | 55 | 45.6 | I | Dis. 98 Sats. |
| " | 14. | 13 | 50 | 0.1 | I | Dis. 98 Sats. |
| " | Fri 20. | 11 | 58 | 28.5 | II | Dis. Cloudy |
| " | Sat 21. | 15 | 44 | 20.3 | I | Dis. 99 Sats. |
| " | M 23. | 10 | 12 | 59.8 | I | Dis. 100 Sats. |
| " | 27. | 14 | 33 | 38.0 | II | Dis. 101 Sats. |
| " | 30. | 12 | 7 | 27.7 | I | Dis. 102 Sats. |
| Sept. | 3. | 17 | 8 | 45.3 | II | Dis. 103 Sats. |
| " | 6. | 14 | 2 | 2.1 | I | Dis. cloudy |
| | 10. | 10 | 34 | 23.4 | III | Dis. cloudy |
| | 10. | 13 | 2 | 42.4 | III | Re. 104 Sats. |
| | 13. | 15 | 56 | 44.2 | I | Dis. cloudy. |
| | 14. | 9 | 1 | 24.9 | II | Dis. cloudy. |
| | 15. | 10 | 25 | 23.5 | I | Dis. 106. Sats |
| | 17. | 14 | 36 | 26.1 | III | Dis. 107 Sats. |
| | 21. | 11 | 36 | 32.4 | II | Dis. 108 Sats |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sept. | 22. | 12h 24 6 | 20m 49 | 15.4s | I I | Dis. | | |
| " | 28. | 14 | 11 | 42.9 | II | Dis. | P. obs. | 109 |
| " | 29. | 14 | 15 | 15.5 | I | Dis. | P obs. | 110 |
| Oct. | 1. | 8 | 44 | 4.9 | I | Dis. | P obs. | 111 |
| " | 5. | 16 | 46 | 57.1 | II | Dis. | Cloudy? Obs. am. J. | |
| " | 8. | 12 | 49 | 18.2 | I | Re. | S obs. | 112 |
| " | 9. | 8 | 40 | 13.2 | II | Re. | P obs. | 113 |
| " S | 10. | 7 | 18 | 1.6 | I | Re. | P. obs. | 114 |
| " | 15. ✓ | 14 | 44 | 32.3 | I | Re. | S obs. | 115 |
| " | 16. { | 9 | 5 | 58.1 | III | Re. | Cloudy | |
| " | 16. { | 11 | 15 | 23.6 | II | Re. | Cloudy | |
| " S | 17. | 9 | 13 | 17.5 | I | Re. | Cloudy | |
| " | 22. ✓ | 16 | 39 | 53.9 | I | Re. | Clear | |
| " | 23. { | 13 | 7 | 44.3 | III | Re. | P obs. | 116 |
| " | 23. { | 13 | 50 | 40.9 | II | Re. | P obs. | 117 |
| " S | 24. | 11 | 8 | 40.9 | I | Re. | S obs. Cloudy | 118 |
| " | 30. ✓ | 14 5 | 38 50 | 25.7 | I III | Re. Dis. | Cloudy | |
| " S | 31. | 13 | 4 | 11.1 | I | Re. | P obs | 119 |
| Nov. | 2. | 7 | 33 | 8.1 | I | Re. | | |
| " S | 7. ✓ | 14 | 59 | 47.9 | I | Re. | S obs. S. rec. | 120 |
| " | 9. | 9 | 28 | 46.1 | I | Re. | P. S. W. C | 121 |
| " | 10. | 8 | 19 | 29.2 | II | Re. | Cloudy Obs W at mch | |
| " | 16. | 11 | 24 | 29.1 | I | Re. | S obs | 122 |
| " | 17. | 10 5 | 55 | 15.2 | II | Re. | S obs | 123 |
| " | 18 h 21 23. | 13 5 | 13 5 20 | 16.7 | I I III | Re. | P obs. | 124 125 |
| " | 24. 25 | 13 | 31 | 10.8 | II I | Re. | Cl. | |
| " S | 28. | 7 | 49 24 1 | 29.2 | III | Dis. | P obs. Cl | 126 |
| " | 28. | 9 | 14 | 37.0 | III | Re. | Cl | |
| Dec. | 2. | 9 | 45 | 3.5 | I | Re. | Cl | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dec. 5 | | 5 | 25 | 20.7 | II | Re. | Cl | |
| Dec. S | 5, | 11h | 4m | 39.8s | III | Dis. | Cl. | |
| " S | 5, | 13 | 16 | 17.8 | III | Re. | Cl. | |
| " | 9, | 11 | 40 | 57.2 | I | Re. | Cl | |
| " | 11, | 6 | 9 | 59.5 | I | Re. | Cl | |
| " S | 12, | 8. | 1 | 38.2 | II | Re. | Cl | |
| " | 18, | 8 | 5 | 44.5 | I | Re. | S | 127 |
| " S | 19, | 10 | 38 | 4.7 | II | Re. | P | 128 |
| " | 25, | 10 | 1 | 49.1 | I II | Dis Re. | Cl. | |
| " | 26 27 | 10 | 4 | 38,3-40,5 30 | 44.3 | I | Re | |

## Nautical Almanac 1881.
## Eclipses Jupiter's Satellites.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jan. | 1 | 11 | 57 | 41 | I | Re. (near horizon) | | |
| Jan. | 3, | 6h | 26m | 36.6s | I | Re. | Sd. | 130 |
| " | 10, | 7 5 | 20 9 | 45 1.2 | II III | Re. Dis. | P | 131 |
| " | 10, | 8 | 22 | 27.5 | I | Re. | S | 132 |
| " | 10, | 9 5 | 25 126 | 0.6 | III II | Dis. | P | 133 |
| " | 13, | 7 5 | 46 | 40.4 | II | Re. | Oc. Jellett 04 | |
| " | 17, | 10 | 18 | 16.0 | I | Re. | | |
| " | 19 20, | 4 10 | 4 23 | 23 2 43.2 | III I II | Dip Re Re. | (prob. two near hor) (prob. two near mer.) | |
| | | | | | | | S | 134 |
| " | 26, | 6 | 42 | 57.4 | I | Re. | | |
| Feb. | 2, | 8 | 38 | 38.9 | I | Re. | P | 135 |
| " | 14, 15 | 7 5 | 34 33 | 30.4 33 | II III | Re Re. | S | 136 137 |
| " | 18, | 6 | 58 | 31.2 | I | Re. | P | 137 |
| " | 22, | 7 9 | 37 34 | 18.3 36 | III III | Dis. Re. (near horizon) | S | 138 clouds |
| " | 25, | 8 | 53 | 53.6 | I | Re. | | Rejected |
| March | 13, | 7 | 13 | 9.1 | I | Re. | | |
| " | 18, | 7 | 23 | 58.1 | II | Re. | | |

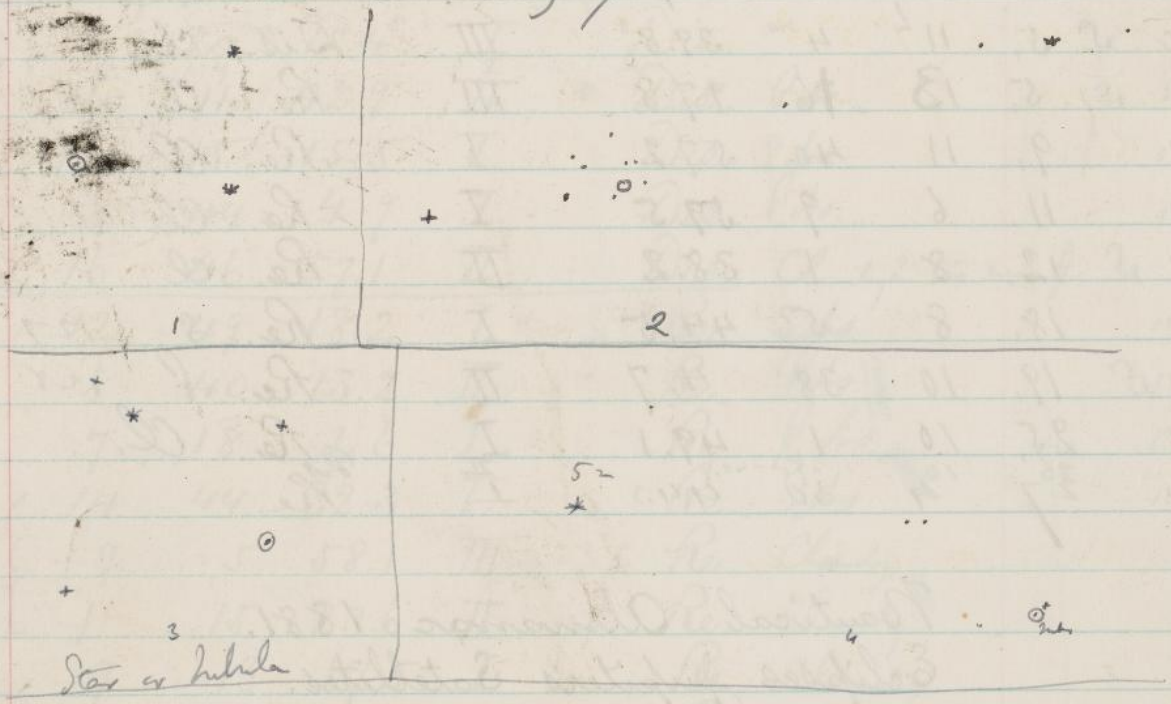
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Vicinity of Nebulae




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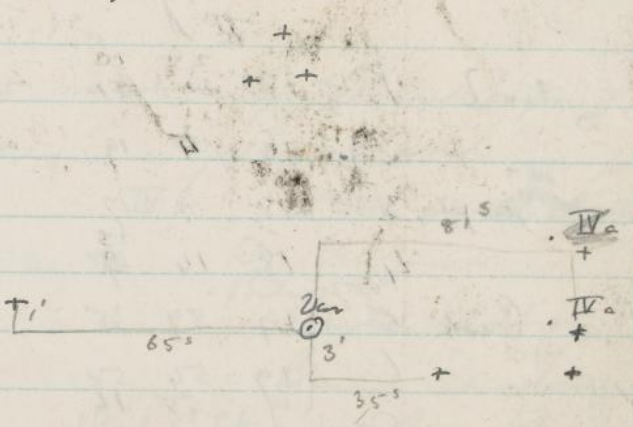


Var. in Sagittis. See page

(1850) RA $7^h 55^m 14^s$ Dec $-12° 31'$

6.0 Lal. 262 1875 8 4 53 −13 26

5.7 263 8 5 24 −12 33




Dec. 5 100.34 Harvard

Variable found by Prof. Pickering.

R.A. $16^h 32^m 0^s$ $+72° 36'$

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# New Planetary Nebulae. Red Stars &c.

| | | R.A. | | | Dec. | | | Date Disc | |
|---|---|---|---|---|---|---|---|---|---|
| | 1. | 18 | 24 25 10 | 51 | −25° | 13′ | (1850) (1875) | July 13 | D. |
| | 2. | 18 | 4 | 19 | −28° | 12 | (1850) | " 14 | D. |
| | 3 | 18 | 1 | 17 | −21° | 16.0 | (1850) | Aug 25 | D |
| | 4 | 18 | 14 | 23 | −26 | 53 | (1850) | Sept 3 | D |
| | 5 | 19 | 59 | 35 | −27 | 34 | (1850) | Sept 24 | D |
| | 6 | 19 | 54 | 58 | −28 | 3.3 | (1875) | Oct 7 | D |
| | | 19 | 55 | 16 | −28 | 2.7 | (1850) | Dec 22. | D |
| | | 3 | 0.3 | | 57′ | 20″ | (1855) | | D |
| | 7 | 23 | 37 | 37 | −15 | 57. | | | D |
| | 9 | 20 | 4 | 32 | +35° | 38′ | 1850 | Dec 30 | D |
| | 10 | 20 | 6 | 34 | +35 | 44 | " | " " | D |
| ✓ | 11 | 20 | 4 | 37± | +35 | 33 | " | " " | D |
| | 12 | 4 | 55 | 20 | + 6 | 28.4 | " | Jan 2 | D. |
| | 13 | 1 | 21 | 13 | −33 | 11.5 | 1875 | " 7 | D |
| | 14 | 1 | 49 | 44 | +30 | 26 | 1855 | " | D |
| | 15 | 6 | 36 | 59 | + 3 | 28 | 1855 | " 25 | D |
| ✓ | 16 | 23 | 52 | 57 | +62 | 13′ | 1850 | Jan 31. | |
| | 17 | ~~1 51 55 37 6~~ | | | ~~+ 54 + 54~~ | ~~14.4~~ | ~~1850~~ | Feb 5 | W |
| | 18 | ~~1 55 58 37~~ | | | ~~+ 55~~ +54 | 39.0 | " | " | W |
| | 19 | 7 | 55 | 14 | −12 | 31 | | Feb 23 | D |
| | 20 | 7 | 56 | 34 | −12 | 42 | | " | |

2nd Chapt.

λ = 18ʰ 20ᵐ,6 ± − 25° 29′ 1 ± 5ᵐ/₁ 16′ m of λ

μ = 18 6.6 − 21° 5′ 3 5²ₖ 11ᵐₛ of μ

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near Cel. 34071 Cel.
near Cel. 17736, 748, 7[illegible]
= Cel 17681
near Lal 33578 W.Z. 1848 176, 50, 51
33580, 33789, 34007
Cel. 20234
= U.A. 472
= Dm 57°702

Dm 6°810, 9.2
U.A. 173 Sandy.
Dm. 30° 310 7.0

Dm 62° 2343
Dm 52° 431

R92. 47. 55 IIr pwp
R92, 48, 55

R92

R9 164

R94, 21 . IVa C.Sks. Gas bands (Fine)
R Aquarii Bands

R95, 4 IVa Red (only) Gas bands.
" .4 Red " "
" 5 Red. Spect not precisely
Red Str.

R95, 54, IVc
IVa Gas bands. R Scorpionis.
" 95, 107
" .118

95, 157 near red class ft doubt red. IVa bands
" 171 Bands
" 171 Red. Spect not precisely
[illegible]
96 94, 121 Bands
" " " IVa

O Brilliant bright O
O
17764 not found.
IIIb Star colors obscure
O Very minute
Bitty Sp.
Banded Spectrum.
Band Spectrum

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D.h. 35°3993 R 95,4 not Rem

Collegium

| | | | | | |
|---|---|---|---|---|---|
| 6 | 49 | -23,1 | Lalande Cygnus Lyster. | 194. | 96, 185 |
| 7 | 13 | -44,5 | L. Bottlick | | 96, 185 192 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sept-13 | 1881/59 | 16h | 32m | +72° 36' | Bruhns. | ver. 98 | 190 | B. |
| " 17 | 66 | 19 | 27 | -31 0 | Sagitt. III | 7m 10'2 | " 195-268 | B. |
| " 17 | 69 | | | | Sagitt 265 III | | " 197 | B |
| " 17 | 70 | | | | 268 bruhns? | | " 197 | B |
| ? " 17 | 71 | | | | 283 bruhns? | | " 197 | B |
| " 18 | 74 | | | | Capric. 56 III. | | " 202 | B |
| " 18 | 76 | | | | " 81 III. | | " 203 | B |
| " 18 | | | | | " 89 bruhns? | | " 203 | B |
| " 19 | | | | | Sagittarii 2 bruhns test. | | " 204 | B |
| " 19 | 67 | | | | " IV fine | | " 205 | B |
| " 19 | | | | | Sagittarii 17 Bruhns test. | | " 209 | B |
| " 19 | | | | | R 25 Bruhns III 2 orb. | | " 209 | B |
| " 20 | 77 | | | | Aquarii 9 Bruhns III 2 orb. | | " 215 | B |
| " 25 | 63 | | | | Sagittarii 46 2 III | | 99 9 | B |
| " 26 | | | | | ~~Aquarii 87 III~~ | | 14 | S |
| " 30 | 19 | | | | τ Aquarii 183 III | | 20 | S |
| | 80 | | | | Aquarii 216 Bruhns test. | | 21 | S omit |
| | 81 | | | | " 251 " | | 22 | B omit |
| | 72 | | | | Pharos. 17 prob. Bruhns | | 23 | B |
| | 75 | | | | " 35 Bruhns test. | | 23 | B omit |

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see page 92

# Planetary Nebulae.

| No. | R. A. | Dec. | |
|---|---|---|---|
| ~~andr.~~ | ~~0 36~~ | ~~40.5~~ | ~~Androm Neb.~~ |
| 5240 | 2 20 | −0.9 | O of e5 |
| | 3 39 | + 23.4 | Trapez Pleiades |
| | 4 15 | + 19.2 | Hind Taurus |
| Orion | 5 28 | − 5.5 | Orion |
| | 5 30 | + 21.1 | Crescent Nebula |
| 1565 | 7 36 | + 9.0 | O & B |
| 1574 | 7 43 | − 27.0 | O. A Cluster |
| 56 17 | 11 59 | + 111.4 | |
| 3976 | 14 34 | + 2.7 | not seen |
| 4290 | 17 13 | − 38.3 | ◎ of !!! |
| 4378 | 18 1 | − 25.9 | |
| 4386 | 18 3 | − 33.9 | O7 |
| 4390 | 18 6 | + 6.8 | O & B |
| 4407 | 18 18 | − 23.3 | O or ⊕, ∈ S, R |
| 4415 | 18 24 | + 74.5 | Draco Cluster |
| 4487 | 19 12 | + 6.3 | A |
| 4510 | 19 37 | − 14.4 | B |
| ~~6000~~ | ~~21 25~~ | ~~+ 0.1~~ | — |
| 6990 | 21 25 | + 0.1 | — |
| | 21 37 | + 42 17 | Nova Cygni |
| 4754 | 22 00 | − 29.6 | v F almost = O |

| | | 1855 | | | |
|---|---|---|---|---|---|
| 3976 | 14h | 35m | 38° | + 2° 49′ | O? v F S diffuse +15 ~95″ |
| 69 | | 30 | 10 | 2 54 | |
| 81 | | 35 | 12 | 2 54 | |
| 91 | | 33 | 17 | 2 36 | |
| 93 | | | 54 | 2 37 | |

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Spect. Phot Q. Diameter.

P W

C 1.94 W P 1.127 W

Both S.

C 2.42 SP 2.109 WP 2.41 WPS. 2.109 WP

2.76 W S {2.76 WS

2.7 W. 77. P
C 2.46 WS P 2.58 W 2.65 WS {C. 2.77 PS

2.108 PW.
C 2.64 W 2.67 WS. 2.101 W. 2.102 W {2.108 WP. 2.67 S W. 2.102 W.

9 2 Sa

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# Planetary Nebulae.

| | No. | R.A. | Dec. | |
|---|---|---|---|---|
| ✓ | Andr. | 0 36 | 40.√ | Androm. Neb. |
| ✓ | √740 | 2 20 | −0.9 | O v F eS |
| | | 3 39 | +23.4 | Temple Pleiades |
| | | 4 1√ | +19.2 | Hind Taurus |
| ✓ | Orion | √ 28 | −√.√ | Orion |
| | | √ 30 | +21.1 | Chac. Taurus |
| ✓ | ~~1√65~~ | 7 36 | +9.0 | O p B |
| ✓ | 1√74 | 7 43 | −2°7.0 | O F cluster |
| ✓ | √617 | 11 ~~5~~9 | +11.4 | ~~not seen.~~ |
| ✓ | 3976 | 14 34 | +2.7 | not seen vF |
| | ~~4290~~ | 17 13 | −38.3 | ◎ eF 1.1 |
| | ~~4378~~ | 18 1 | −2√.9 | |
| | ~~4386~~ | 18 3 | −33.9 | O F |
| | ~~4390~~ | 18 6 | +6.8 | O vB |
| | ~~4407~~ | 18 18 | −23.3 | O w ⊕ ε ε SR |
| | 441√ | 18 24 | +74.√ | Dracs Little |
| | ~~4487~~ | 19 12 | +6.3 | O 7 |
| | ~~4√10~~ | 19 37 | −14.4 | O B |
| | ~~bxxx~~ | 21 2√ | +0.1 | Star |
| ✓ | Nor. Cyg. | 21 37 | +42 17 | Nova |
| | ~~47√4~~ | 22 00 | −29.6 | |
| | Kepler's Star | 17 22 or 23 | −21°.3 | Kepler Nova |
| | 11 Vulpec. | 19 42 | +27.0 | Anthelm " |
| | ~~7 Coronae~~ | 15 53 | +26.3 | " |
| ✓ | Vulpecula | 19 54 | +22.3 | Dumbbell |
| | Sagittarius B.C. 4355 | 17 54 | −23.0 | Irregd |
| | | | | Neb Stars & Nebulae Nature xv 244, 397 |
| | Singular Spectrum | 7 | +8 | D.Mo. 8. 1848 A.J. 96 Bauendell |

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Spectr. Phot. Q. Drawn.

Coo joint R92 491

C

C

P W

C

C 1.94 m P 1.127 m

C —

C — C 2.42 SP C 2H W P S 18 2 2 -30 44.8 S.g double

C — 3.64 P. W. 3.64 P. W. 18 2 39 -33 49.2 6.5

C .. 2.76 W S 2.76 W S. not seen Oct 1

C — C C 18 3 47 -33° 53'.5 Neb.

C — C 2.102 m C

3,190 3,199

4. 12 m.. S.W W. wP94 S.W.P. wP74

2.207 3,22 2.207.21. 3.23

C — W P S W. P. S. P W S W.P.S, S.P Long

2.200 W. S. P.

C — V2 m 1.29 P C

C — 9m star.

Sept 30 C PS, WP 3,35

not seen Sept 30, 1880

C .. WP 3,19 P W W WP 3,19, P W 3,30 P W

P 3.37 V m 3.73

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# Sweeps for Planetary Nebulae

| No. | Date | Inst. | Obs. | Limits R.A. | Limits Dec. | Rev. |
|---|---|---|---|---|---|---|
| 1 | July 7 | E.Eg. | B | 18h 30m - 19h 0 | -20° | -30° 92,82 |
| 2 | Aug. 8 | " | " | 17 40 - 18 0± | -5° | 0° 81 |
| 3 | " " | " | " | 20 0 - 20 30 | -5° | 0° 87 |
| 4 | " 9 | " | " | 15 30 - 18 00 | +30° | +35° 89 |
| 5 | " 12 | C.Sk. | " | 19 56 - 20 20? | — | — 91 |
| 6 | " 13 | E.Eg. | " | ~~19 30~~ 20 0 - 20 30 | 0° | +5° 94 |
| ~~8~~ | " 14 | C Sk | " | 22 8 - 22 26 | — | — ~~97~~ ~~95~~ |
| 7 | " 14 | E.Eg | " | 18 30 - 19 0 | +30° | +35° 96 |
| ~~9~~ | " 28 | " | " | ~~19~~ 18 0 - 18 20 | -20° | - 25 116 |
| 10 | Sept. 2 | C.Sk. | " | 20 0 - 20 30 | -10° | -+90° 136 |
| 11 | " 3 | E.Eg | " | 18 0 - 18 30 | -25 | -30 139 |
| 12 | " 5 | C.Sk | " | 21 15 - 22 0 | — | — 147 |
| 13 | " 11 | E.Eg. | " | 21 55 22 30 | -20 | -25 154 |
| 14 | " " | " | W. | 22 30 23 5 | -20 | -25 156 |
| 15 | " 24 | " | P | 19 55 20 40 | -25 | -30 200 |
| 16 | Oct. 2 | " | " | 18 55 19 40 | -25 | -30 93,41 |
| 17 | " 5 | " | " | 20 30 21 0 | -20 | -25 " 67 |
| 18 | " 6 | " | " | 18 20 18 38 | -20 | -25 " 68 |
| 19 | " 7 | " | " | 19 53 20 7 | -25 | -30 " 79 |
| 20 | " 9 | C.Sk. | " | 0 0 1 0 | -30 | -90° " 123 |
| 21 | " 24 | E.Eg. | " | 19 50 20 35 | 20 | -25° " 179 |
| 22 | " 27 | C Sk. | " | 20 20 20 50 | — | — " 194 |
| 23 | " 29 | " | " | ~~21 54~~ ~~20 59~~ 22 47 | — | — " 197 |
| 24 | " 31 | E.Eg | " | 19 58 20 55 | -20 | -25 " 200 |
| 25 | " " | C.Sk. | " | 1 00 1 40 | — | — " 201 |
| 26 | Nov 3 | C.Sk | " | 20 34 21 15 | — | — 94,16 |
| 27 | " 25 | E.Eg. | " | 2 45 3 27 | 0 | -5 " 116 |
| ? 28 | " " | " | " | 3 34 3 48 | 22.5 | 25. 1 |
| 29 | " 27 | C.Sk. | | 1 30 - 46 1 54 2 22 | | " 124 |

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Star catalogue Hunter discovered H.C. 3

H.C. 4

H.C. 5

22 Quad after this date looked carefully for Stars of 4th Type.

~~H.C. 5~~

H.C. 6

G.C. 4543, Catalogue Brit. Sys 6th Type.

H.C. 7

1.8

G.C. 4628 com

Rhienda

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| No | Date | Inst. | Obs | Limits R.A. | Limits Decl. | Remarks |
|---|---|---|---|---|---|---|
| 30 | Dec. 19 | C.Sk. | P. | 23 33 – 0 03 | | 94,192 |
| 31 | " 22 | C.Sk. | P | 2 55 – 3 55 | | 94,204 |
| 32 | Jan. 2 | C.Sk. | P. | 3 55 – 4 30 | | 95.42 |
| 33 | " 17 | C Sk. | P. | 14 5 – 52 20 | | 95.107 |
| 34 | " " | C Sk. | P. | 2 25 – 3 8 | | 95,109 |
| 35 | " 24 | C Sk. | P. | 6 6 – 6 45 | | 95,131 |
| 36 | Feb. 2 | C.Sk. | P. | 3 56 – 4 45 | | 95,157 |
| 37 | " 19 | C.Sk. | P. | 7 9 – 7 52 | | 96,66 |
| 38 | " 22 | C.Sk. | P. | 4 32 – 5 10 | | 96.70 |
| 39 | " 23 | E.Eg. | P. | 7 22 – 7 56 | -13.5 – -18.5 | 96.92 |
| 40 | " 25 | C Sk. | P. | 5 11 – 6 9 | | 96,108 |
| 41 | March 25 | C.Sk. | P. | 9 20 – 10 5 | | 96,178 |
| 42 | " 26 | C Sk. | P. | 7 50 – 8 20 | | 96,180 |
| 43 | " 28 | C Sk. | P. | 6 45 – 7 15 | | 96,185 |
| 44 | April 2 | C.Sk. | P. | 8 30 – 9 20 | | 96,195 |
| 45 | " 18 | C Sk. | P | 10 10 – 11 12 | | 97,71 |
| 46 | " 29 | C Sk. | P. | 10 55 – 12 05 | | 97,114 |
| 47 | June 15 | C Sk. | P. | 12 50 – 13 30 | | 97,189 |
| 48 | " 16 | C Sk. | P. | 13 ~~48~~ – 14 15 | | 97,193 |
| 49 | " 21 | C Sk. | P. | 14 20 – 15 07 | | 97,200 |
| | | C Sk. | | | | 98,60 |
| 50 | July 27 | C Sk. | P | 15 46 – 16 08 | | 98,114 |
| 51 | Aug 3 | E.Eg. | P | 18 42 – 18 58 | -10 – -5 | 98,125 |
| 52 | Sept 18 | E.Eg. | P | 17 53 – 18 6 | -25 – -30 | 98,200 |
| 54 | Feb 11. '77 | E.Eg | P | 6 45 – 7 15 | -15° – -20° | 100,194 |
| 55 | March 17. | E Eg | P | 7 0 – 7 14 | 0 – +5° | 101 39 |
| 56 | March 19 | E Eg | P | 4 42 – 5 20 | +12.5 – +17.5 | 101 41 |
| 57 | April 8. | E Eg | P | 10 36 – 11 20 | +12.5 – +17.5 | 101.112 |

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H.C. 8

HC 16

~~HC 14~~

Twilight streaks.

Sky clear & cool but 1h 10m H.C. disc

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# Sums for Planetary Nebulae

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | $-17.^{\circ}5$ & $-12.^{\circ}5$ | 0 | 40 | & 1 | 20 | 86 | | 104,14 |
| 2 | | 2 | 40 | 3 | 20 | 85 | | 104,12 |
| 3 | | 4 | 40 | 5 | 20 | 91 ~~86~~ | | 105,53 ~~104,47~~ |
| 4 | | 6 | 40 | 7 | 20 | 90 | | 105.45 |
| 5 | | 8 | 40 | 9 | 20 | 58 | | 101,114 |
| 6 | | 10 | 40 | 11 | 20 | 57 | | 101,112 |
| 7 | | 12 | 40 | 13 | 20 | 98 ~~62~~ missed | | 106,43 ~~101,200~~ |
| 8 | | 14 | 40 | 15 | 20 | 62 | | 101,200 |
| 9 | | 16 | 40 | 17 | 20 | 65 | | 102,43 |
| 10 | ~~$+12.^{\circ}5$ & $+17.^{\circ}5$~~ | 18 | 40 | 19 | 20 | 64 | | 102,36 |
| 11 | | 20 | 40 | 21 | 20 | 70 | | 102,106 |
| 12 | | 22 | 40 | 23 | 20 | 84 | | 104.5 |
| 13 | $+12.^{\circ}5$ & $+17.^{\circ}5$ | 0 | 40 | 1 | 20 | 80 | | 103,110 |
| 14 | | 2 | 40 | 3 | 20 | 79 | | 103,107 |
| 15 | | 4 | 40 | 5 | 20 | 56 | | 101,41 |
| 16 | | 6 | 40 | 7 | 20 | 59 | | 101,119 |
| 17 | | 8 | 40 | 9 | 20 | 60 | | 101,168 |
| 18 | | 10 | 40 | 11 | 20 | 61 | | 101,174 |
| 19 | ~~$+42^{\circ}$ & $+47^{\circ}$~~ | 12 | 40 | 13 | 20 | 63 | | 101,210 |
| 20 | | 14 | 40 | 15 | 20 | 71 ~~62~~ | | 102, ~~101,200~~ |
| 21 | | 16 | 40 | 17 | 20 | 69 | | 102,90 |
| 22 | | 18 | 40 | 19 | 20 | 64 | | 102,39 |
| 23 | | 20 | 40 | 21 | 20 | 81 | | 103,110 |
| 24 | | 22 | 40 | 23 | 20 | 76 | | 103,74 |
| 25 | $+42^{\circ}$ & $+49^{\circ}$ | 1 | 0 | 1 | 40 | 92 | | 105,57 |
| 26 | | 3 | 40 | 4 | 20 | 96 | | 105,213 |
| 27 | | 6 | 20 | 7 | 00 | 95 | | 105,212 |
| 28 | | 9 | 0 | 9 | 40 | 97 | | 106, |
| 29 | | 11 | 40 | 12 | 20 | | | |
| 30 | | 14 | 20 | 15 | 0 | | | |
| 31 | | 17 | 0 | 17 | 40 | 97 | | 105,217 |
| 32 | | 19 | 40 | 20 | 20 | 100 | | 106, |
| 33 | | 22 | 20 | 23 | 0 | 59 | | 105,24 |

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| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 58 | April | 12 | E Eg | β | 8 | 41 | 4 | 9 | 22 | −12.5 | −17.5 Rio1,114 |
| | 59 | April | 16 | " | β | 6 | 40 | " | 7 | 20 | +12.5 | +17.5 101,119 |
| | 60 | May | 5 | " | β | 8 | 40 | " | 9 | 20 | +12.5 | +17.5 101.163 |
| | 61 | " | 16 | " | β | 10 | 40 | 4 | 11 | 20 | +12.5 | +17.5 101,174 |
| | 62 | June | 5 | " | " | 14 | 40 | " | 15 | 20 | −12.5 | −17.5 101.200 |
| | 63 | " | 9 | " | " | 12 | 40 | " | 13 | 20 | +12.5 | +17.5 101,210 |
| | 64 | July | 11 | " | " | 18 | 40 | " | 19 | 20 | −12.5 | −17.5 102,36 |
| | 65 | July | 13 | " | " | 16 | 40 | " | 17 | 20 | −12.5 | −17.5 102,62 |
| | 66 | " | 15 | " | " | | | | | | | 102.48 |
| | 67 | " | 16 | " | " | 18 | 40 | " | 19 | 20 | +12.5 | +17.5 102.49 |
| | 68 | Aug | 6 | " | " | 17 | 20 | | 18 00 19 00 | | −20 | −25 102.86 |
| | 69 | " | 9 | " | " | 16 | 40 | | 17 20 | | +12.5 | +17.5 102.90 |
| | 70 | " | 11 | " | " | 20 | 40 | | 21 20 | | −12.5 | −17.5 102.98 |
| | 71 | " | 17 | " | " | 14 | 40 | | 15 20 | | +12.5 | +17.5 102. |
| | 72 | " | " | " | " | 19 | 40 | | 19 50 | | −25 | −30 102 |
| | 73 | " | 18 | " | " | 17 | 40 | | 18 20 | | −15 | −20 116 |
| | 74 | " | 19 | " | " | 19 | 0 | | 19 40 | | 0 | −5 121 |
| | 75 | Sept. | 4 | " | " | 18 | 25 | | 18 40 | | −5 | −10 103,17 |
| | 76 | " | 17 | " | " | 22 | 40 | | 23 20 | | +12.5 | +17.5 103.74 |
| | 77 | " | " | " | " | 19 | 12 | | 19 33 | | +5° | +10° 103.76 |
| | 78 | " | 18 | " | " | 19 | 20 | | 20 00 | | +10° | +15° 103.83 |
| | 79 | Oct. | 3 | " | " | 2 | 40 | | 3 20 | | +12.5 | +17.5 103.107 |
| | 80 | " | 4 | " | " | 0 | 40 | | 1 20 | | +12.5 | +17.5 103.110 |
| | 81 | " | 8 | " | " | 20 | 40 | | 21 20 | | +12.5 | +17.5 103.139 |
| | 82 | " | 9 | " | " | 19 | 0 | | 19 40 | | 0 | +5° 103,138 |
| | 83 | " | 10 | " | " | 18 | 10 | | 18 40 | | +5 | +10 103.147 |
| | 84 | Nov | 4 | " | | 22 | 40 | | 23 20 | | +12.5 | +17.5 104.5 |
| | 85 | " | 5 | " | " | 2 | 40 | | 3 20 | | +12.5 | +17.5 104.12 |
| | 86 | " | 8 | " | " | 0 | 40 | | 1 20 | | +12.5 | +17.5 104.14 |
| | 87 | Dec | 8 | " | " | 21 | 30 | | 22 10 | | +47 | +55 104.91 |
| | 88 | Dec | 12 | " | " | 20 | 52 | | 21 35 | | +45 | +55 104.101 |

Le nuage 109

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1880

January.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | | Ohm. Jun | Orion | 5 | 18 | −1° | 1 | |
| 2 | | Ohm. | " | 5 | 36 | +1 | 24 | |
| 3 | | Ohm. | Columbae | 5 | 55 | −42 | 49 | |
| 4 | S | III v, ml. | Can. Maj. | 6 | 57 | −27 | 45 | 3.6 |
| 5 | | nfm | " " | 7 | 10 | −26 | 49 | 6.5 |
| 6 | | III S | Hydrae | 13 | 42 | −27 | 44 | 7.0 |
| 7 | | bad? | Virg. S. | 13 | 26 | −6 | 33 | 6-12 |
| 8 | J. I. 4 57 40 | | Librae | 15 | 14 | −35 | 48 | |
| 9 | | | | 15 | 21 | −46 | | |
| 10 | | | | | | | | |
| 11 | S | | | | | | | |
| 12 | | | | | | | | |
| 13 | J. II. 5 30 58 | | S | | | | | |
| 14 | | | | | | | | |
| 15 | J. I. 6 52 55 | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | S | | | | | | | |
| 19 | | | S. Cancri 12h 18m | | | | | |
| 20 | J. II. 8 9 4 | | β Persei 13h 15m | | | | | Cloudy |
| 21 | | | | | | | | |
| 22 | J. I. 8 48 4 | | ? | | | | | |
| 23 | | | β Persei 10h 4m | | | | | |
| 24 | | | | | | | | |
| 25 | S J III 4 55 47 | | | | | | | |
| 26 | | | β Persei 6h 53m | | | | | |
| 27 | | | | | | | | |
| 28 | | | S Cancri 2 3h 54m | | | | | |
| 29 | | | β Persei 3h 42m | | | | | |
| 30 | | | | | | | | |
| 31 | J I 5 11 53 | | | | | | | |

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# Stars marked rr in U.A.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Pavo | | 17h | 3m2 | 32 | -57° | 39.4 | 7.0 |
| | Muscae | μ | 11 | 42 | 15 | -66 | 7.1 | 5.3 |
| | " | ξ | 12 | 15 | 14 | -67 | 36.7 | 6.5 |
| | Dorado | | 4 | 35 | 19 | -62 | 19.4 | 5.5-6.5 |
| | Herd. | | 2 | 49 | 38 | -63 | 25.3 | 6.4 var? |
| | Centaurus | ω | 12 | 35 | 41 | -48 | 7.6 | 5.4 |
| | Crux | ε | 12 | 14 | 38 | -59 | 42.6 | 4.0 |
| | Norma | κ | 16 | 3 | 38 | -54 | 18.2 | 5.5 |
| | Lyncis | 11. | 22 | 15 | 5 | -46 | 34.6 | 6.7 rr dbl |
| 13 | Lupus | φ1 | 15 | 13 | 53 | -35 | 48.4 | 3.6 |
| | " | | 15 | 20 | 43 | -46 | 17.8 | 5.9 |
| 14 | " | | 15 | 27 | 39 | -43 | 58.5 | 6.2 |
| 15 | " | | 15 | 29 | 38 | -42 | 9.3 | 4.7 |
| 16 | " | | 15 | 31 | 50 | -30 | 0.1 | 5.1 |
| 17 | Scorpius | | 17 | 34 | 22 | -36 | 52.8 | 6.2 |
| 18 | " | | 17 | 42 | 45 | -40 | 43.9 | 6.5 |
| 19 | Sagittarius | | 18 | 17 | 54 | -20 | 36.3 | 5.1 Not 4th type |
| 6 | Columba | η | 5 | 55 | 19 | -42 | 49.4 | 4.0 |
| HC. 13 | Scorpius | R | 1 | 21 | 13 | -33 | 11.5 | 5.8-7.8 IV 2a? 95.50 |
| HC. IVa 9 | Antlia | | 10 | 29 | 40 | -38 | 55.0 | 5.9 var? |
| 10 | Hydra | | 10 | 31 | 22 | -12 | 44.1 | 5.4 vr |
| 11 | " | | 13 | 41 | 59 | -27 | 44.5 | 7.0 vr |
| 7 | Can Maj. | | 6 | 56 | 44 | -27 | 45.4 | 3.6 var? |
| 8 | " " | | 7 | 9 | 48 | -26 | 49.2 | 6.5 |
| 2 | Scorpius | R | 4 | 54 | 55 | -14 | 59.8 | 6-8.5 |
| HC.7 4th type 22 | Aquarii | R | 23 | 37 | 21 | -15 | 58.6 | 6-11 |
| 12 | Virg | S | 13 | 26 | 28 | -6 | 33.1 | 6-12 |
| 20 | Scorpius | | 18 | 25 | 35 | -14 | 57.2 | 5.9 bds dif. bandid |
| 21 | Aquila | R | 19 | 18 | 7 | +8 | 2.5 | 6.5-11 |
| 3 | Orion | | 5 | 23 | 23 | -1 | 11.5 | 4.7-6 |
| 4 | " | | 5 | 36 | 1 | +1 | 24.7 | 5.3 |

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# 1880.

## February.

| | | |
|---|---|---|
| S. | 1 | |
| | 2 | |
| | 3 | |
| | 4 | |
| | 5 | |
| | 6 | |
| | 7 | |
| S. | 8 | |
| | 9 | |
| | 10 | |
| | 11 | |
| | 12 | β Persei $11^h\ 47.^m5$ |
| | 13 | |
| | 14 | |
| S. | 15 | β Persei $8^h\ 34.^m4$ — S. Cancri $23^h\ 11^m$ |
| | 16 | |
| | 17 | |
| | 18 | β Persei $5^h\ 23.^m3$ |
| | 19 | |
| | 20 | |
| | 21 | β Persei $2^h\ 12.^m2$ |
| S. | 22 | |
| | 23 | β Persei $23^h\ 1.^m1$ |
| | 24 | |
| | 25 | S. Cancri $10^h\ 49^m$ |
| | 26 | β Persei $19^h\ 50.^m0$ |
| | 27 | |
| | 28 | |
| | 29 | β Persei $16^h\ 38.^m8$ |

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Phot. S.

| | | |
|---|---|---|
| Nov 7 | Mean of α Capric | 94 22 |
| Nov 12 | α Capric | 94 ,43 |

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# 1880.
## March.

1
2
3 β Persei. $13^h\ 27^m\ 45^s$
4
5 S Cancri. $22^h\ 27^m$
6 β Persei. $10^h\ 17^m$ cl.
S 7
8
9 β Persei. $7^h\ 6^m$ cl
10
11
12 β Persei. $3^h\ 54^m$
13
S 14
15 S. Cancri. $10^h\ 5^m$ β Persei. $0^h\ 43^m$
16
17 β Persei. $21^h\ 32^m$ Occult. Mars.
18
19
20 β Persei. $18^h\ 21^m$
S 21
22
23 β Persei. $15^h\ 10^m$
24 S. Cancri. $21^h\ 43^m$
25
26 β Persei. $11^h\ 59^m$
27
S 28
29 β Persei $8^h\ 48^m$
30
31

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# Sidereal Time at 7 P.M.

| Sid Time | | | Sid Time | | |
|---|---|---|---|---|---|
| 0h | Dec. | 5 | 12 | Jan. | 6 |
| 1 | " | 21 | 13 | " | 21 |
| 2 | Jan. | 6 | 14 | July | 6 |
| 3 | " | 21 | 15 | " | 21 |
| 4 | Feb. | 5 | 16 | Aug. | 6 |
| 5 | " | 20 | 17 | " | 21 |
| 6 | Mar. | 6 | 18 | Sept. | 5 |
| 7 | " | 22 | 19 | " | 20 |
| 8 | Apr. | 6 | 20 | Oct. | 5 |
| 9 | " | 21 | 21 | " | 20 |
| 10 | May | 6 | 22 | Nov. | 5 |
| 11 | " | 22 | 23 | " | 20 |

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1880.

April.

| | | | |
|---|---|---|---|
| | 1 | β Persei $5^h\ 37^m$ | |
| | 2 | | |
| | 3 | | S. Cancri. $9^h\ 21^m$ |
| S | 4 | β Persei $2^h\ 26^m$ | |
| | 5 | | |
| | 6 | β Persei $23^h\ 15^m$ | |
| | 7 | | |
| | 8 | | |
| | 9 | β Persei $20^h\ 3^m$ | |
| | 10 | | |
| S | 11 | | |
| | 12 | β Persei $16^h\ 52^m$ | S. Cancri $20^h\ 59^m$ |
| | 13 | | |
| | 14 | | |
| | 15 | β Persei $13^h\ 41^m$ | |
| | 16 | | |
| | 17 | | |
| S | 18 | β Persei $10^h\ 30^m$ | |
| | 19 | | |
| | 20 | | |
| | 21 | β Persei $7^h\ 19^m$ | |
| | 22 | | S. Cancri $8^h\ 37^m$ |
| | 23 | | |
| | 24 | β Persei $4^h\ 8^m$ | |
| S | 25 | | |
| | 26 | | |
| | 27 | β Persei $0^h\ 57^m$ | |
| | 28 | | |
| | 29 | β Persei $21^h\ 46^m$ | |
| | 30 | | |

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Suspected Variable in Cassiopeia

| | | | | | R | |
|---|---|---|---|---|---|---|
| Nov. 23 | 6 | 10 | Comet Seeker. | | 94, 104 | P. |
| | 7 | 25 | " | " | " | " |
| 25 | 7 | 30 | " | " | 4 | 114 | " |
| | 8 | 09 | " | " | " | 116 | " |
| 26 | 8 | ? | " | " | | 120 | " |
| 27 | 7 | 30 | " | " | " | 122 | " |

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## Standard Stars.

| | Dm | Zones. | Schultz. |
|---|---|---|---|
| γ Pegasi | R 75. 43 | | 100, 67 |
| δ Ceti | S | | 100, 76 |
| α Piscium | | | 100, 134 |
| α Arietis | | | |
| α Ceti | | | 100, 141 / 104. 102 |
| γ Eridani | S | | 100, 152 |
| α Tauri | | | 99 213; 100, 143 |
| ε Orionis | | | 99, 212; 100, 144 |
| γ Geminorum | | | 100, 153 / -101. 33 |
| α Canis Min. | | | 100, 202, -100. 203. 213. |
| ε Hydrae | | | 101. 18 / 105. 194 |
| α Hydrae var | | | |
| α Leonis | 53 | Ch Dr. P. | 101. 22, 26. / 105. 196 |
| θ Leonis | | | 101, 31. |
| η Virginis | | Ch Dr. P. | 101, 25, 27, 32 |
| α Virginis | S | | |
| α Bootis | 57 | | 101. 114 |
| β Leporis | S | | 106, 207 |
| δ Ophiuchi | S | | 106. 180. / 106, 204. |
| η Ophiuchi | S | | 106, 210 |
| η Serpentis | S | | 103. 58 / 103. 136 |
| δ Aquilae | 62, | 99. 31 | 112 [100. 37. 47 / 103. 60 |
| θ Aquilae | 63. | 99. 30 ~~31~~ | 155 [100. 39 ~~101. 14~~ |
| β Aquarii | 65' | 99, 118, 119 | 159 [100, 57 [107, 175 |
| α Aquarii | 65 | 99 120, 123 | 162 [100, 58 |
| α Pegasi | 66 | | [100, 64 |

Posted up to Apr. 2. 1883.

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Summary of Limits continued from +99

| No. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No. +99 | | 1883 | | | | | | |
| 89 | Jan | 26 | 22 18 | 23 02 | +42° | +49° | 105, 24 | |
| 90 | Feb | 5 | 6 40 | 7 20 | -12.5 | -17.5 | 105, 45 | |
| 91 | Feb | 8 | 4 40 | 5 20 | -12.5 | -17.5 | 105, 53 | |
| 92 | " | 9 | 1 00 | 1 40 | +42° | +49° | 105, 57 | |
| 93 | Mar | 4 | 6 36 | 7 20 | 0 | +5° | 105, 129 | |
| 94 | April | 8 | 6 40 | 7 20 | +25 | +35 | 105, 210 | |
| 95 | " | 9 | 6 20 | 7 02 | +42 | +49 | 105, 212 | |
| 96 | " | 10 | 3 40 | 4 20 | +42 | +49 | 105, 213 | |
| 97 | " | " | 17 0 | 17 40 | +42 | +49 | 105, 247 | |
| 98 | " | 29 | 12 40 | 13 20 | -12.5 | -17.5 | 106, 43 | |
| 99 | May | 2 | 9 00 | 9 40 | +42 | +49 | 106, | |
| 100 | " | 8 | 19 40 | 20 20 | +42 | +49 | 106, | |
| 101 | Oct | 26 | 18 20 | 18 40 | -10 | -15 | 107, 166 | |
| 102 | Oct | 30 | 18 30 | 19 0 | 0 | -5 | 107, 170 | |
| 103 | Nov | 4 | 19 20 | 20 0 | +15 | +20 | 107, 189 | |
| 104 | " | 17 | 19 00 | 19 30 | +25 | +30 | 108, 20 | |
| 105 | " | 18 | 20 02 | 20 30 | +20 | +25 | 108, 26 | |
| 106 | " | 25 | 19 15 | 19 40 | +30 | +35 | 108, 40 | |
| 107 | | | | | | | | |

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October. 1880.

1. 8 44 49. I dis. S Cancri 14h 28m. β Persei 17h 46m
2. ~~β Persei 3h 34m. λ Tauri 13h 37m. S Cancri 0h 16m~~
S 3. Mean V. 8.0
4. U Coronae 0h 54m. β Persei 14h 34m
5. 16 46 ν7.1 II dis. Mean V. 19.9
6. λ Tauri 12h 29m
600 hs 7. β Persei 11h 23m. U Coronae 11h 4ν ~~Mean V. 7.6~~
8. 12 49 18.2 I Reap. Mean V 7.6
9. 8 40 13.2 II Reap.
200 hs S 10. 7 18 1.6 I Reap. β Persei 8h 12m. λ Tauri 11h 21m
11. S Cancri 2h 04m.
12. ~~Mean V 7.2~~
13. β Persei 5h 00m. Mean V. 7.2
14. U Coronae 9h 28m. λ Tauri 10h 13m.
15. 14 44 32.3 I Reap. Mean V. 19.1
16. 9 5 ν8.1 III Reap. 11 15 23.6 II Reap. β Persei 1h 49m
S 17. 9 13 17.ν I Reap. U Coronae 20h 19m hm.
18. λ Tauri 9h 0ν m. β Persei 22h 38. Mean V 6.4
19.
20. S Cancri 13h 41m Mean V 18.6
21 U Coronae 7h 10m. β Persei 19h 26m
22 16 39 53.9 I Reap. S Cancri 7h ν7m?
23 13 7 44.3 III Reap. 13 ν0 40.9 II Reap.
S 24 11 8 40.9 I Reap. β Persei 16h 15m. U Coronae 18h 01m
25. Mean V 18.1
26. ν 38 I Reap. λ Tauri 6h 49m.
27. β Persei 13h 04m.
28. U Coronae 4h ν3m. h
29.
30. 14 ν0 2ν.7 III disap. S Cancri 1h 17m.
S 31. 13h 4 11.1 I Reap. U Coronae 15h 44m

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ρ
1 Cam. P. W. 4386 WP. .4754 Jup. I Phot R +81°.25 Simples Spectrum Stars, Nature xv, 166
RA 1877, 20 43m 24s, +72° 32'
Wien xx 1396

λ Tauri 13.6 ~~Neptune b. 8.0~~
Nr. V 8.0
B Pers. 14.6 β
J II 16.7
λ Tauri 12.5 λ
β Persei 11.4 β
J I 12.8 Nr. 7.6 Nr
J II 8.7 β λ
J I 7.2 10 ~~22~~ U Coronae 22h 36m Nr. V 19.5

β Nr
λ

β?

Nr λ

5h 41
S 6 20
7 5
7 55
Nr 6.4 8 50
9 47

λ
β
Nr 6.0

β 30. λ Tauri 5h 4m . β Persei 9h 3m Nr. V. 17.6

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# November. 1880

| | | | | |
|---|---|---|---|---|
| | 1. | | | |
| | 2. | $7^h 33^m 8^s.1$ I. Reap. | $\beta$ Persei $6^h 42^m$ | |
| | 3. | | $\lambda$ Tauri $4^h 33^m$ | |
| | 4. | | ~~$\nu$ Coronae $2^h 35^m$~~ | |
| | 5. | | $\beta$ Persei $3^h 30^m$ | D 7.24 |
| | 6. | | | D 8.35 |
| S | 7. | 14 59 47.9 I. Reap. | $\lambda$ Tauri $3^h 25^m$. $\nu$ Coronae $13^h 26^m$ | |
| | 8. | J.C. | $\beta$ Persei $0^h 19^m$. S Cancri $12^h 54^m$ | |
| | 9. | 9 28 46.1 I. Reap. | | |
| | 10. | 8 19 29.2 II. Reap. | $\beta$ Persei $21^h 08^m$ | |
| | 11. | J.C. | ~~$\beta$ Persei $21^h 08^m$~~ $\lambda$ Tauri $2^h 17^m$. $\nu$ Coronae $0^h 17^m$ | |
| | 12. | | | |
| | 13. | | $\beta$ Persei $17^h 57^m$ | |
| S | 14. | | $\nu$ Coronae $11^h 09^m$ | |
| | 15. | ~~5 43 23.3 I Reap.~~ | $\lambda$ Tauri $1^h 09^m$ | |
| | 16. | 11 24 29.1 I. Reap. | $\beta$ Persei $14^h 36^m$ | |
| | 17. | 10 55 15.2 II. Reap. | $\nu$ Coronae $22^h 00^m$ | |
| | 18. | 5 53 I.R. | S Cancri $0^h 30^m$. | |
| | 19. | | $\beta$ Persei $11^h 35^m$ $\lambda$ Tauri $0^h 02^m$ | ( 641 |
| | 20. | | | 7 38 |
| S | 21. | 5 13 00.2 III Reap. | $\nu$ Coronae $8^h 51^m$ | 8 37 |
| | 22. | | $\beta$ Persei $8^h 24^m$. $\lambda$ Tauri $22^h 54^m$ | 9 38 |
| | 23. | 13 20 16.7 I. Reap. | | |
| | 24. | 13 31 10.8 II. Reap. | $\nu$ Coronae $19^h 42^m$ | |
| | 25. | 7 ~~59~~ 49 11.9 I Reap. | $\beta$ Persei $5^h 13^m$ ~~$\nu$ Coronae~~ | |
| | 26 | | $\lambda$ Tauri $21^h 46^m$ | |
| | 27 | | S Cancri $12^h 07^m$ | |
| S | 28 | 7 1 29.2 III Reap. | 9 14 37.0 III Reap. $\beta$ Persei $2^h 2^m$. $\nu$ Coronae $6^h 33^m$ | |
| | 29 | | | |
| | 30 | | | |
| | 31 | | | |

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Clear

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# December. 1880.

1. ~~9h 4m 3.5s I.~~
2. 9 4 3.5 I.
3. D 6 15 β Persei 19h 40m
4. ~~β Persei 19h 40m~~. λ Tauri 19h 31m.
5. S 5 25 20.7 II. 11h 4m 39s.8 III D. 13h 16m 17s.8 III.
6. 10 1 β Persei 16h 29m. S Cancri 23h 43m.
7. 11 12 ☿
8. λ Tauri 18h 24m.
9. 11 40 57.2 I. β Persei 13h 18m.
10.
11. 6 11. 59.5 I.
12. S 8 1 38.2 II. β Persei 10h 07m. λ Tauri 17h 16m.
13. β Persei 20h 31m.
14.
15. β Persei 6h 56m
16. λ Tauri 16h 09m. S Cancri 11h 20m. β Persei 17h 20m.
17. ☌ 5 30
18. 8 5 44.5 I. β Persei 3h 45m
19. S 10 38 4.7 II. β Persei 14h 09m 1 Capri 12.5
20. 8 30 λ Tauri 15h 01m.
21. 9 31 β Persei 0h 34m.
22. W β Persei 10h 58m
23. β Persei 21h 23m.
24. ☌ λ Tauri 13h 54m 1 Capri 12.0
25. 10 1 49.1 I. S Cancri 22h 57m. β Persei 7h 47m
26. S β Persei 18h 12m
27. 4 30 44.3 I.
28. λ Tauri 12h 47m. β Persei 4h 36m
29. W β Persei 15h 01m 1 Capri 4.7
30.
31. β Persei 1h 25m Eclipse of Sun

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Visit Committee

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# List of Double Stars discovered at the H. C. O. Obs. to be obs. for position.

| | No. | R. A. | Dec. | Mags. | Pos. | Dist. | Rem. |
|---|---|---|---|---|---|---|---|
| x | 201. | 19h 25m | −27° 4′ | 7½. 10. | S. f. | 7″ | |
| | 202. | 19 30 | −10 11 | 9½. 9½. | | 2″ | |
| x | 203. | 19 32 | −10 24 | 6½. 8. | | 4″ | |
| | 204. | 19 34 | −15 | 10. 10. | 146.5 | 3.″7 | |
| − x | 205. | 19 51 | −9 23 | | | | |
| − x | ~~206.~~ | 19 57 | +40 0 | | 32.7 | 13 | |
| | 207. | 20 0 | −9 20 | | | | |
| | 208. | 20 30 | −13 39 | | | | |
| | 209. | 20 33 | +10 49 | | | | |
| | 210. | 20 33 | −18 1½ | | 355.4 | 14″ | |
| | 211. | 20 35 | −9 2 | | S. p. | 5″ | |
| | 212. | 20 40 | −24 5 | | | 15″ + 36″ | Triple. |

See more complete list on page. 126.

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Stars pilling  Pisces. HC VI 2 180
R70, 138  DM +0°.5037

| | | RA | Dec. | |
|---|---|---|---|---|
| 143 | 6 4.6 | 0 | 0 | 10'.3 |
| | 12 | | 9 | 3 |
| | 12 | | 57 | 3 |
| 146 | 12.5- | 1 | 12 | 9 |
| | 12. | 2 | 28 | 4 |
| | " | | 37 | — |
| | 12.5- | 3 | 16 | 7 |
| | 9.5 8.6 | | 43 | 3 |
| 151 | 10 | 9.5 | 50 | 7 |
| | 12 | 4 | 57 | 7 |
| | 11 | 9.5- | 0 | 8 |
| | " | 9.5 | 39 | 10. |
| | " | 6 | 49 | 1. |
| 156 | 13 | 7 | 20 | 2. |
| | 11.5 | 9.5 | 22 | 3. |
| | 11.5 | 9.1 | 29 | 6. |
| | 14 | 9 | 27 | 7. |
| | 12.5 | 10 | 58 | 4. |
| 161 | 10 | 8.6 | 11 27 | 5. |
| | 14 | 12 | 5 | 3 |
| | 12.5 | | 12 | 10. |
| | " | | 59 | 3. |
| | 12.5 | 13 | 23 | 3. |
| 166 | 12 | 16 | 17 | 9. |
| | 12.5 | | 23 | 10. |
| | 11.5 | 9.5 | 35 | 9. |
| | 12.5 | 17 | 44 | 10 ? |
| | 10 | 18 | 7 | 9 |

no stars above 14m.

no stars above 14m.

no stars above 14m

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| | Magn. | m | ° | ′ |
|---|---|---|---|---|
| 171 | 12.5 | 19 | 2 | 2 |
| | 12.5 | | 18 | 5 |
| | 11.5 | | 38 | 10 |
| | 12.5 | 20 | 3 | 5 |
| | 12.5 | | 14 | 5 |

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Peninsula Comt.

| | | | | | |
|---|---|---|---|---|---|
| Dec 19.6 | R.A | 19 | 4 | +12 | 33 |
| | | | + 4 45 | + | 37 |
| | | | 8 49 | | 70 |
| | | | 14 1 | | |
| 22 | | 19 | 18 | +14 | 24 |

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# Planetary Nebulae.

| No. | R. A. | Dec. | Andromeda. |
|---|---|---|---|
| Andr. | $0^h\ 36^m$ | $+40°.5$ | Androm. Neb. |
| 5240 | 2 20 | $-0.9$ | o ℞. ℘S |
| Orion | 5 28 | $-5.5$ | Orion |
| 1565 | 7 36 | $+9.0$ | O ℘ B. |
| 1574 | 7 43 | $-27.0$ | O ℞ cluster. |
| 3617 | 11 59 | $+11.4$ | not seen. |
| 3976 | 14 34 | $+2.17$ | not seen V.F. |
| Nov. Cygni. | 21 37 | $+42°17'$ | |
| Vulpecula | 19 54 | $+22°.3$ | dumbbell |

0 43 $+2°\ 42'$ Hazy 3″ ℘

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1.94 m P, 1.127 m.

P 339 . W.

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# List of nebulae observed at H.C.O. 1866 – 1870, in equal to or exceeding 5s,

| G.C. No. | α 1860, G.C. | Corr. | δ, 1860, G.C. | Corr. |
|---|---|---|---|---|
| *101 | 0h 32m 14s | +45s | + 2° 33′ | −45s [?] |
| 1005 | 4 59 56 | −4.s3 | − 3 33′ | +101″ |
| 1696 | 8 38 44 | −26s | + 13 5 | +2′25″. |
| 1792 | 9 9 5 | −1s | +20 38 | −1′.5 |
| 2170 | 10 32 35 | +32s.2 | +10 1 | −5′50″. |
| 2355 | 11 9 8 | +9s | + 5 17 | +4′. |
| 2829 | 12 10 18 | −0s.2 | + 7 27 | +61″. |
| 4055 | 15 1 37 | −23s | −10 47 | +7′. |
| 4572 | 20 16 8 | | + 19 40 | |
| 4795 | 22 22 6 | −10s | − 21 33 | −22″ |

*101 Observed in December, 1880; see books R 94, p.p. 211, 212, and R 95, p. 12. The nebulae of this region have been studied by D'Arrest, who considers the G.C. wrong in its identifications. The place given for G.C. 101 requires corrections in R.A. & N.P.D of −7s, −50″, approximately.

Stars W. 0h 507 δ° 530 observed at the same time seem to have some relative proper motion; places for 1881,

0h 31m 23s +2° 29′.0, 0h 32m 57s +2° 27′.9, magnitudes 7 and 7.5 approximately. Observe them with DM. +2° 67, 73; 77, 88, 95, 97 also be taken. DM. places of all as follows:

| | Magn. | α | δ |
|---|---|---|---|
| DM. +2° 67 (W. 0h 443) | 7.8 | 0h 26m 27s.9 | +2° 31′.3 |
| 73 (observed at Bonn) | 8.9 | 28 10.9 | 31.4 |
| 77 | 9.5 | 29 21.5 | 21.3 |
| 80 (W. 0h 507) | 6.8 | 30 3.8 | 20.2 |
| 84 (W. 0h 530) | 7.5 | 31 39.5 | 19.0 |
| 85 | 9.5 | 32 0.6 | 30.6 |
| 97 (observed at Bonn) | 7.7 | 37 27.7 | 24.3 |

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the places of which there seemed to be errors in the General Catalogue, or 1'.

Remarks.

G.C. 98 § 103 found same night; (places $0^h 32^m 6^s$, $+2° 17'$; $0^h 32^m 22^s$, $+2° 23'$).

W. IV 1333 s f neb; $\Delta\alpha \cos\delta$ 350".4, $\Delta\delta$ 184".7; also a 10 mg. n f neb. 68".84, 174".62.

W. VIII 1057 s f neb; $\Delta\alpha$ $2^m 45^s$, $\Delta\delta$ 1' 3"; also a 10 mg. f neb $5^s$, n 10".

Nearly between DM. +20° Nos 2298 and 2299.

W. X 547 n f neb; $\Delta\alpha$ $2^m 12^s.9$, $\Delta\delta$ 47".4; no other neb near; see Dreyer, p. 392.

DM. +5° 2472 n f a somewhat nebulous star; no other neb. found.

W. XII 144 s f neb; $\Delta\alpha \cos\delta$ 12".98, $\Delta\delta$ 314".5.

W. XV 12 s f neb; $\Delta\alpha$ $68^s$, $\Delta\delta$ 4'. Corr. in $\delta$ will vanish if neb is s of star.

Is DM. +19° 4387 the neb itself, or near it?

Compared approximately with $\nu$ Aquarii; neb large; differences not surprising.

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Cloud Stars in M. C.

See R 70, 168.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 35 | 36 | Lemkster | c | n | R | 2 | R 95. 50 |
| | 38 | | | n | R | 2 | " |
| | 50 | | | n | R | 1 | " |
| | 52 | | | n | | | " |
| ✓ | 113 | | rr. R var. | IV a | 2 diff. | 4 | " |
| | 115 | | | n | | | " |
| 47 | 10 | Celis | | n | R | 2 | R 95 13 |
| | 12 | | | ~~III~~ | w | 0 | " |
| ✓ | 13 | | | III | 2 | 2 | " |
| | 18 | | | n | n | 2 | " |
| ✓ | 22 | | | III | y | 1 | " |
| ✓ | 25 | | | III | s | 2 | " |
| | 70 | | c β | n | w | 0 | " |
| | 77 | | | n | w | 0 | " |
| | 89 | | | n | y | 1 | " |
| | 94 | | $\varphi_3$ | n | y | 1 | " |
| | 141 | | | n | y? | 0 | " |
| | 183 | | | n | w | 0 | " |
| | 190 | | | n | w | 0 | " |
| ✓ | 196 | | | ~~III~~ | 2. | 2 | " |
| ✓ | 233 | | o | IIk. | 2. | 4 | |
| | 310 | | c α | III | | 3 | 95 135 |
| 57 | 28 | Pikris | | n | v S k. | 1 | 95. 126 |
| ✓ | 42 | | | B 648 | IV o? | v. k. 4 | 127 |
| | 49 | | | n | v. S. k. | 1 | 127 |
| ✓ | 59 | | | Cands ~ gall. III? | | p. S. n. 1 | |
| | 63 | | | n | w | 0 | |
| ✓ | 80 | | | IV a? | | 3 or? | |
| | 81 | | | n | w | 0 | |
| | 96 | | | n | w | 0 | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Spectr. | Calcium | | | |
| ✓ | 36 | 83 | Fornax | prob. bands | sl v. 1 | | | RG5-125 |
| | | 109 | | c | n. | v.sl.v. 1 | | " " |
| | 23 | 55 | Eridanus | $\rho_2$ | n | 1 | | RG5.135 |
| | | 91 | | | n | 1 or 0 | | |
| | | 124 | | $\lambda$ | n | 2 | | RG5-142 |
| | | 127 | | $\pi$ | ~~III~~ | ~~III~~ 2.0 | | " " |
| | | 138 | | $\beta$ | | | | |
| | | 158 | | $\gamma$ | III | 2.0 | | " 142 |
| | | * | 93 Sym 154, 6'S | | III or IV c | 2.0 | | " 142 |
| | | 183 | | | n | 1.0 | | " 143 |
| | | 184 | | | n | 0.5 | | 143 |
| | | 211 | | | n | 1.5 | | 143 |
| | | 216 | | | n | 2 | S | 149 |
| | | 219 | | $\alpha$ | | | | |
| | | 231 | | | n | 1.5 | | 143 |
| | | | | | n | | | 144 |
| | | 241 | | | n | | | 144 |
| | | 242 | | | n | | | 144 |
| | | 259 | | | Lines of Sym. W n | 1 | | 145 |
| | | 263 | | | n | 0.5 | S.P. | 149 |
| | | 271 | | | n | 0 | | 145 |
| | | 273 | | $\alpha_1$ | n | | | |
| | | 274 | | | n | 0 | | 145 |
| | | 277 | | | n | 0 | | 145 |
| | | 278 | | | n | 1.5<br>0 | | 145<br>145 |
| | | 279 | | $\rho R$ | n | 1.5 | S.S. | 149 |
| | | 284 | | | n | 1.5 | | 146 |
| | | 285 | | $\phi$ | n | 0 | | 146 |
| | 39 | 3 | Ceti | o | n | 1 | P | 152 |
| | | 22 | | var. | | | | |
| | | 26 | | | n | 0 | P | 153 |
| | | 42 | | | n | 1 | P | 153 |
| | | 43 | | | n | 0 | P | 153 |
| | 29 | 12 | Cetus | | III pec. | 2.5 | S.N. | 96.116 |

See page 140

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# List of doubles discovered at the H. C. Obsy, to be looked after.

| No. | R.A. | Dec. | Mags. | Pos. | Dist. | Rem. |
|---|---|---|---|---|---|---|
| 1 | 0h 1m 47s | +4° 4′ | 9 16 | p | 20″ | D.m. 3° 4 |
| 3 | 0 4 36 | +7 13 | 7.5 14 | s.f. | 6 | D.m. 7° 13 = W.D. 57 |
| 4 | 0 5 5 | +3 29 | 9.5 14 | 17 5 | 20 | D.m. 3° 18′ = W. D. 68. |
| 5 | | | | | | v.p. D.m. 4° 19 |
| 6 | 0 6 10 | +4 40 | 12 | v | 15 | D.m. 4° 17 |
| 11 | 0 9 | | 12 15 | | | (? v.p. D.m. 2° 32 |
| 13 | 0 10 5 | +3 33 | 9 v v F | 45 | 30 | D.m. 3° 28 |
| 15 | 0 11 | | 10 11 | 5 5 | 25 | s.p. D.m. 2° 28 |
| 16 | 0 14 41 | +7 19 | 9½ v F. | s.f. | 30 | D.m. 7° 37 |
| 21 | 0 18 1 | −0 31 | 8½ 12 | s.p. | 10 | D.m. −0° 5 90 = W.D. 290 |
| 22 | 0 18 41 | +7 42 | 9½ v F. v v F. | v.p. s.p. | 20″ 15″ | D.m. 7° 47 |
| 23 | 0 20.4 | +6 28 | 12 | s.f. | 8 | N. of D.m. 7° 5 0 |
| 24 | 0 19.8 or 20.6 | +3 7 | | | | |
| 25 | 0 20 | | | v.p. | | s.f. No. 23. |
| 26 | 0 21 | | 14 | v.p. | | s.p. D.m. −0° 64 |
| 29 | 0 27 14 | +2° 36′ | 8 | p. | close. | D.m. 2° 67 = W.D. 443 single |
| 30 | 0 27 57 | +3 9 | 9 13 | 120 | 30 | D.m. 3° 66. |
| 31 | 0 28 | +3 7 | | | | Perhaps 0° 18.2 |
| 33 | 28 | | V. F. | | | v. f. D.m. 2° 73 |
| 34 | 29 | | | | 12 | v.p. D.m. 2° 73. |
| 35 | 28 57 | +2 36 | 9 | | | D.m. 2° 73. |
| 39 | 39 37 | −0 46 | 9.3 | | v. wide. | D.m. −0° 112 |
| 41 | 43 | +2 42 | 11 11½ | p | 3. | Happy Star. |
| 44 | 48 | −1 5 | | | | s.p. D.m. −1° 116 field, enum. |
| 45 | 49 27 | −1 6 | 9 v F. | v | 15 | D.m. −1° 119. |
| 47 | 55 | −1 2 | F. | v.p. | 5 | s.D.m. −1° 134 |
| 49 | 53 | +4 23 | 9.5 10.5 | | | |
| 50 | 1 1 30 | +1 9 | 9½ | | | triple. |
| 52 | 9 41 | −15 10 | | | 5 | |
| 53 | 10 | +1 20 | 8 10 | s.f. | 20 | |
| 54 | 11 | +1 11 | 8 10.5 | s. | 25 | |
| 57 | 12 26 | −23 27 | | | | |
| 59 | 18 21 | +2 22 | 8½ 12 | v.p. | 25 | D.m. 2° 205 |
| 62 | 1 44 | −1 16 | | 26.9 | 11 | |
| 63 | 42 28 | −11 30 | | | | |
| 67 | 1 44 | −1 16 | 10 11 | 6 | | (? |
| 66 | 46 | −2 42 | | | | |

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# List of doubles &c.

| No. | R.A. | Dec. | Mags. | Pos. | Dist. | Rem. |
|---|---|---|---|---|---|---|
| 70 | 2h 9m 35s | +29° 50′ | 9 9 | | 7 | |
| 81 | 3 55 25 | −15 58 | | | | |
| 82 | 4 1 | −16 10 | 9 9 | 80.5 | 18.2 | |
| 83 | 4 14 54 | +15 19 | | | v Close. | 71 Tauri. near 66 Ceti. |
| 86 | 7 2 | − 2 17 | | | | |
| 87 | 5 10 | | | v. f. | < 1″ | v Corvi. pos. comp. |
| 88 | 10 | | | | | susp. " " pos. comp. ∧ |
| 89 | 23 27 | −22 40 | 8½ 12 | m. f. | 10 | |
| 90 | 25 15 | −22 42 | 9 15 | m. f. | 10. | |
| 93 | 31 35 | −1 49 | | 350 | 5″ | D. m. −1°985 |
| 94 | 30 52 | −1 7 | Equal. | 200. | 40 | D. m. −1°981 |
| 97 | | | | | | |
| 98 | 5 33 | −20 26 | 9 5 | 280 | 7 | |
| 100 | 6 0 | + 5 1 | 10 + 11 or less. | 305 | 15.7 | |
| 105 | 6 5 19 | − 4 34 | | | v. Close. | W. VI. 109 susp. ∧ |
| 106 | 6 13 53 | −20 0 | 9. 11. 11. | S. vp. | 12″ 20″ | |
| 109. | 36 57 | −21 35 | | 329.7 | 2″ | |
| 110. | 36 56 | −20 29½ (?) | 9 11 | 225 | 5 | |
| 111 | 38 | −20 30 | 9 10 | 233 | 4 | |
| 114 | 39 31 | −20 36½ | | p. | 10. | |
| 115 | 40 | −20 40 | | 260 | v. Close susp. ∧ | |
| 116 | 40 31 | −20 35 | 9 10 | p. | 6 | |
| 118 | 46 3 | −19 1 | 9 10 | m. f. | 8 | |
| 119 | 47 47 | −5 39 | 7½ 7½ | v. f. | 1½ | |
| 121 | 51 30 | −19 36 | 9 9 | m. | 8. | |
| 122 | 54 40 | −20 24 | | | | |
| 123 (?) | 55 40 | −21 21 | 9 9½ | 320 | 7 | "Perhaps = No. 22" |
| "10.6" | 8h 6.2± | −23 50± | 8.5 10 | 32 | 5 | |
| H.C. 197 | 17 16 | −30 56 | 11 13½ | 140 | 5 | |
| 199. | 17 47 | −17 22 | 10 10 | 206 | | |
| A.C.'s New Double | 17 59 | −25 25 | 11 11 | 15 | 5 | |
| H.C. 224. | 20 35 | +40 6 | | 20 | 0.9 | |
| near 299 | 21 59 | − 2 42 | | 211 | 3 | |
| | | (See next page.) | | 153 | | |
| | | | | 191 | | 9 (binde. Very bright |

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# List of doubles &c. con.

Pos. of Σ 2995 = 23h 9.9m −2° 17′

Pos. Ang. " = 27° − Dist. 4.5″ − Mags. 7.7 + 8.0

| No. | R. A. | Dec. | Mags. | Pos. | Dist. | Rem. |
|---|---|---|---|---|---|---|
| 126 | 7h 1m | −19 16 | 9 | v.F. | n.p. | 5″ | |
| 127 | 7 3 | −19 53 | 9 | — | n.p. | 5″ | |
| 128 | 7 3.5 | −15 48 | | | | | |
| 129 | 7 3.5 | −19 56 | 8½ | 12 | s.p. | 5″ | |
| 130 | 7 4 | −19 56 | 9 | 11 | 120 | 10″ | Pair. slee red. |
| 132 | 7 13 | −19 45 | 9 | 10 | 30 | 11″ | |
| 134 | 7 30 | −24 24 | | | | | Susp. |
| 138 | 7 30½ | −23 30 | 7½ | 10 | s.f. | | |
| 142 | 7 45 | −23 50 | 8 | 10 | s.p. | 2″ | |
| 144 | 7 50½ | −19 17 | 8½ | 8½ | 170 | 8″ | |
| 145 | 7 51 | −18 30 | 9 | 13 | n.f. | 10″ | |
| 152 | 8 10 | −24 24 | 9½ | 9½ | n. | 1½ | |
| 167 | 10 35 | −12 17 | 9 | 11 | s.p. | 3″ | Prob. See B.97 p.130 # 168. |
| 176 | 12 15 | −23 28 | 9 | 9 | s.p. | 5″ | See B.97 p 130 |
| 179 | 13 17 | −20 16 | 7 | 14 | n. | | |
| 195 | Fol. 194. (194 = R.A. 17h 12½ Dec. −26° 37′ Mags. 6½ 6½) | | | | | | |
| New Star. | 16 29 | −31 14 | | | | | |
| 197 | 17 44 | −17 22 | | | 21 | | |
| 198 | 17 16 | −30 56 | 11 | 13½ | | 5″ | |
| 199 | 17 59 | −25 25 | 11 | 11 | 165 | 5.5 | |
| 201 | 19 25 | −27 5 | 7½ | 10 | s.f. | 7″ | |
| 204 | 19 34 | −15 — | 10 | 10 | 146 | 3.7 | |
| 211 | 20 35 | −9 2 | | | s.p. | 5″ | |
| 212 | 20 40 | −24 5 | | | | 15″ & 30″ | Triple. |
| 213 | 20 43½ | −7 14 | 8 | 9 | 145 | 4″ | |
| 215 | 21 26 | −4 58 | | | | | |
| 216 | 21 4 | −5 52 | | | | | |
| 217 | 21 10 | −4 41 | | | | | |
| 218 | 21 19 | −28 53 | 8½ | 11 | 137 | 10″ | |

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# List of doubles &c. con.

| No. | R. A. | Dec. | Mags. | Pos. | Dist. | Rem. |
|---|---|---|---|---|---|---|
| 221 | $21^h\ 38^m.5$ | $-6°\ 49'$ | 8. 10. 14. | 123 | 10".5 | |
| 224 | 21 59 | −2 42 | 9 10 | 29 p | 3.26 | |
| | 22 11 9 | −22 7 | 8½ 9 | 49. | 4" | |
| 226 | 22 36 | −20 16 | | | 14" | |
| 227 | 22 40.5 | −20 0 | 9 10½ | p. | | |
| 231 | 23 20 | −22 7 | 8½ 9 | 140 | 0".3 | |
| 235 | 23 29.6 | −22 10 | 8½ 9 | 40 | 9" | |
| 236 | 23 42 | −15 39 | 9 12 | | 20" | |
| 237 | 23 42 | −22 12 | 8 | | | Susp. |

Sleu obs. by mistake for Schj. #14

R. A. Schj. #14 = $10^h\ 15^m.5$
Dec. " " = $-9°\ 41'$
Mags. of same 8. 9.
Dist. " " 2"

Special list of H. C. O. Doubles to be looked up.

5 N.p. Dec. +4° 19 20

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# January 1881.

S 1. $11^h\ 57^m\ 41^s$ I. J. too low.

S 2.

3. 6 26 36.6 I. S Sha 1 Capricorni 11.2

4. S Cancri ✱ $10^h\ 34^m$

5. 5 9 45 II. Cloudy.

6.

7.

8. 1 Capricorni 10.8

S 9. 2 Tauri 9.5 ~~1 Capricorni 10.8~~

10. 7 20 1.2 III. $8^h\ 22^m\ 27^s.5$ I. $9^h\ 25^m\ 0^s.6$ III

11.

12.

13. 5 12.6 II $7^h\ 46^m\ 40^s.4$ II. 1 Capricorni 13.2 2 Tauri 8.4

14.

15.

S 16.

17. 10 18 16 I. $11^h\ 23^m\ 02^s$ III. 2 Tauri 7.2

18. 1 Capricorni 12.9

19. 4 47 26 I.

20. 10 23 43.2 II.

21. 2 Tauri 6.1

22.

S 23 S Cancri $9^h\ 48^m$ 1 Capricorni 12.6.

24.

25.

26. 6 42 v9.4 I.

27.

28. 1 Capricorni 12.3

29.

S 30.

31

32 S. Cancri $21^h\ 25^m$

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S Cancri $22^h\ 11^m$

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## Miscellaneous Objects to be examined.

| | | R. A. | Dec. | |
|---|---|---|---|---|
| Prob. Var. Star. | (Walker 1880. Dec. 2) | $2^h\ 15^m\ 29^s$ | $+5\ 4^\circ\ 49.2$ | (Est. 6.4 to 8 mag.) |
| Hazy Star. | (H. C. Double # 41) | $0^h\ 43^m$ | $+2^\circ\ 42'$ | (11.11½ p. 3") |

## Special list of H. C. O. Doubles to

Old. No.

5. N.p. Dm. $+4^\circ$ 19 – Dist. 20" – A remark in com-
11 S.f. Dm. $+2^\circ$ 32 – In the north pr. angle of a right
15 S.p. Dm. $+2^\circ$ 26 – Pos. 235. Dist 2½" Mags. 10 + 11.
26 S.p. Dm. $-0^\circ$ 6K – Pos. n.p. – Mag. 15.
33 n.f. Dm. $+2^\circ$ 73 – Mag. v. ft.
66 R.A. $1^h\ 48^m$ Dec. $-2^\circ$ 42'
76 near 66 Cati. Pos. 157.9 Dist 5.39
123 To this # 122. Pos. 320. Dist. 7" Mags. 9 + 9.5
130 Principal component rd. Pos. 120. Dist. 10. Mags. 9 + 11.
132 Pos. 30. Dist. 11. Mags. 9 + 10.
144 Pos. 170. Dist. 8. Mag. 8.5 + 8.5
145 Comp. n.f. Mags. 9 + 13.
204 Comp. f. Pos. 133. Dist. 12. Mags. 10, 10.
235. Pos. 40. Dist. 9. Mags. 8.5 + 9.
G Corvi R.A. = $12^h\ 14^m.4$ Dec. $-21^\circ\ 33'$ Mag. 5.5
+ Ophiuchi.

Mc. Not. XI. 46. $5^h\ 39^m\ 1^s$ $+21^\circ\ 9'$ (Hind notices a change
" " XVIII. 136. 19 33 37 +49 56 (Pogson calls R Cygni

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be looked up.

section with D 24h. +4° 19 says." = 3 stars 9th mag and several small.
angle A s.f. D 24h. +2° 32'. mags ~~12 of forming~~ 12 & 15 – Comp. 7" pr.

Record says "two stars nearly equal mags. – fol. * Elongated. pr. star has a faint comp. 1" distant 2 mag. smaller"

of color from very red to bluish white /
"bluish white" – others call it red, very red, violet and yellow.

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# Variables of Type II.

| Sch. | | | |
|---|---|---|---|
| 1 | T Cas. | Nov. 19 | 1 |
| 2 | R Andr. | | |
| 3 | S Ceti | Dec 31 | |
| 5 ill. | T Piscium | | |
| 7 | S Cas | | |
| 8 | S Piscium | | |
| 9 | R " | | 95, 104 IV |
| 10 | S Arietis | Nov. 7 | 95, 105 to fo 110 |
| 11 | R Arietis | Dec. 6 | 95. 105 |
| 12 | o Ceti | | 95. 105 |
| 13? | S Ruhii | | |
| 14 | R Ceti. | Nov. 23 | |
| 15 | T Arietis | Feb. 24 | |
| 18 | R Ruhii | | |
| 20 ill | T Tauri | | |
| 21 | R " | Jan. 9. | |
| 22 | S " | | |
| 23 | V " | Jan. 31 | |
| 24 | R Aurigæ | | |
| 26 | R Leonis | Dec 14 | |
| 27 | R Antliæ | | |
| 28? | S Orionis | | |
| 31? | | | |
| 32 | | | |
| 33 ill | | | |
| 35 | R Leonis | Dec 28 | |
| 37 | | | |
| 38 | | | |

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Meridian Obs. of May, June, July, August

| | | | | | |
|---|---|---|---|---|---|
| R Androm | | | | | July 18 |
| S Cass | | | | | Sept 21 |
| S Piscium | | | | | July 26 |
| S Arietis | | | | | Aug 23 |
| R " | | | | | June 24 |
| o Ceti | | | | | June 29 |
| U Cancri | | | | | July 19 |
| R Leo Min | | | | | |
| R Ursae Maj | 10 | 36 | +69 | 26 | May 16 |
| S Leonis | | | | | July 22 |
| T Vir. | | | | | Aug 23 |
| S Ursae Maj. | | | | | July 23 |
| W Vir | 13 | 20 | −2 | 45 | May 17 |
| U Vir. | | | | | July 24 |
| R Canes. | 14 | 26 | 84 | 22 | May 9 |
| R Bootis | | | | | Aug 29 |
| R Ophiuchi | | | | | July 15 |
| R Lyncis. | 19 | 9 | −19 | 31 | May 9 |
| R Cygni | | | | | July 29 |
| χ Cygni. | 19 | 46 | +32 | 36 | June 18 |
| S Cygni | 20 | 3 | 57 | 38 | June 8 |
| S Aquarii | 22 | 14 | 8 | 16 | June 25 |
| W Lyncis. | | | | | May 10 |
| U " | | | | | 10 |
| X " | | | | | 10 |
| T Aq. | 20 | 44 | −5 | 35 | |

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39
40
41
42
43 ill
44
45
46 U Cancri Nov. 27
48
49
50
51
52
53
55 ?
56
57 ?
58 ?
59
60
61
62
63
64 S Leonis Maj. Nov 22
65
67
68
69
70 ?

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# Constellations & N.G.

| | | | | | Clust. |
|---|---|---|---|---|---|
| | | Dec. | R.A. | Limits | |
| 35 | Sculptoris | | 23 0 | C | 1 |
| 47 | Ceti | -26 | 23 50 | C | 0 |
| 57 | Piscis | -7 | 22 45 | C 8 | 0 |
| 36 | Fornax | -40 | 1 40 | C | 0 |
| 22 | Eridani | | 1 29 | | 1 |
| 59 | Arietis | -2 | 2 17 | C 4 | 0 |
| 29 | Cetus | | 4 20 | C 1 | 0 |
| 34 | Columba | | 5 0 | C | 0 |
| 45 | Lepus | -27 | 4 50 | C | |
| 54 | Orion | -12 | 4 40 | C 21 | |
| 41 | C. Maj. | -33 | 6 7 | C | |
| 55 | Monoc. | -12 | 5 50 | C 12 | |
| 60 | C. Min. | 0 | 7 0 | C ∞ * * | |
| 28 | Puppis | | 6 0 | C | |
| 26 | Vela | | 8 0 | C | |
| 39 | Hydrae | -36 | 8 20 | C | |
| 40 | Hydra | -35 | 8 5 | C | |
| 65 | Cancri | +7 | 8 9 | C ∞ * * | |
| 37 | Antlia | -39 | 9 22 | C | |
| 56 | Sextans | -12 | 9 39 | C 3 | |
| 58 | Leo | -6 | 9 16 | C 6 | |
| 18 | Centaurus | | 11 0 | | |
| 48 | Crater | -24 | 10 45 | C 3 | |
| 49 | Corvus | -24 | 11 50 | C 2 | |
| 50 | Virgo | -2 | 11 31 | C 16 | |
| 66 | Bootis | +8 | 13 55 | C ∞ * * 1c | |
| 27 | Lupus | | 14 10 | | |
| 43 | Libra | -29 | 14 15 | C | |
| 51 | Serpens | -3 | 15 50 | 6 | |
| | | | 17 10 | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 30 | Scorpius | | 15 | 40 | | |
| 42 | Ophiuchus | −30 | 15 | 55 | | |
| 64 | Herculis | +4 | 16 | 7 | C nn. * * | |
| 31 | Cor. Aus. | | 17 | 57 | 5 | |
| 32 | Sagitt. | | 17 | 30 | | |
| 51 | Scuti Cluster | −16 | 17 | 10 | 5 | |
| 52 | Scutum | −16 | 18 | 15 | 4 | |
| 53 | Aquilae | −12 | 18 | 38 | 16 | |
| 33 | Nubila | | 20 | 20 | | |
| 44 | Capric. | −28 | 20 | 0 | | |
| 46 | Aquarius | −26 | 20 | 30 | | |
| 61 | Delphinus | +2 | 20 | 18 | 2 | |
| 62 | Equuleus | +2 | 20 | 49 | 2 | |
| 63 | Pegasus | +2 | 21 | 21 | 7 | |
| 25 | Pegasus | | 21 | 20 | 4 | 0 |
| 38 | Psc. Aus. | −37 | 29 | 20 | 7 | 0 |

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## Bad Lists — U. A.

Santiago 1.25

| | | | | | Colors | Struct | Obs | Ref. |
|---|---|---|---|---|---|---|---|---|
| * | 34 | 4 | Columba | | 1.5 | n | S.W. | 96. 117. |
| | | 13 | | | 1 | n | W. | 96. 117. |
| | | 25 | | γ var? | 2 | n | W. | 96. 117 |
| | | 28 | | | | | | |
| | | 66 | | η | 3 | n | W. | 96. 117 |
| | | 67 | | | 3 | n | W. | 96. 118 |
| | | 80 | | $\eta_2$ | | | | |
| | | 110 | | | 1 | n | W. | 96. 118 |
| | 45 | 4 | Lepus | R var. | 4.0 | IVa | P.S.W | 95. 149 |
| | | 12 | | Σ var? | 3 | n | W. | 96 118 |
| | | 23 | | μ | 0,2 | n | P.W. | 150 |
| | | 34 | | | 1.5 | n | PW | 150 |
| | | 66 | | ξ | 1.5 | n | PW | 157 |
| | | 74 | | c | 2,5 | n | PW | 157 |
| | | 84 | | | 1, 3 | n | P.W. | 157 |
| | | 91 | | | 1.5 | III | PW | 157 |
| | | 92 | | | 2.0 | III p | PW | 151. |
| | | 96 | | | .5 | n | PW | 152 |
| | | 97 | | | 1.0 | III? n | P W | 15n |
| | | 100 | | var? | 1.0 | n | PW | 150 |
| | 54 | 3 4-5 6 | Orion | | var 1 | n | PS | 146 |
| | | 11 | | $\eta_3$ var | 2.0 | III | P S? | 146 |
| | | 15 | | var? | 1,5 | n | PS | 147 |
| | | 22 | | $\eta_6$ | 1.5 | n | PS | 147 |
| | | 23 | | var | 1,5 | n | W.S. | 96. 118 |
| | | 27 | | c var. | 0,5 | n | PS | 95 147 |
| ✓ | | 32 | | n | 2,0 3 | S.W IV | P | 154 147 |
| | | 40 | | c | 0 | n | P | 147 |
| | | 43 | | var? | var | n | S W | 97 151 |
| | | 46 | | c var | 0 | n | P | 147 |
| | | 51 55 | | | 0 | var III | P | 147 |
| | | 67 | | n | var | n | W.S. | 97 151 |
| | | 68 | | c | 0,2 | n | P W | 147 |
| | | | | | 0 | n | P | 153 |

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# Red Stars in U. A.



| | | | Color | Spectr | | | |
|---|---|---|---|---|---|---|---|
| 72 | var ? | | 1r | n | S W | 97 | 51 |
| 77 Canis | | | 2 | n | | 95 | 153 |
| 81 | rr var | | 2 | III ? | P | | 153 |
| 88 | var ? | | 2.0 | III ? | P W | 95. | 148 |
| 96 | | | 2.5 | n | W. | 97 | 51 |
| | | | | | | | 154 |
| 100 | | | 1.0 | n | S W. | 96, | 119 |
| 101 | var ? | | .5 | n | S W | 97 | 52 (87) |
| 102 ~~110~~ | var ? | | ~~1~~ 0.5 | n | W. S. | 96, | 119 Pp. 52 |
| 103 | var ? | | 1 | n | W S | | |
| 113 | | | 2.0 | n | S. W. | 96, | 119. |
| 109+110 | var ? | | 1 | n | S W | 97 | 52 |
| 114 | | | 1.0 | n | W. S | 96 | 119 |
| 111 | var ? | | 0 | n | W S | 97 | 52 |
| 127 | | | 0.5 | n | S. W. | 96, | 120 |
| 131 | | | 0.5 | n | W. P | 96 | 120 |
| | | | 1.0 2 | n | P | | 154 |
| 132 | rr | | | | | | |
| 141 | var ? | | 0.5 | n | S W | 97 | 53 |
| 144 | | | 1.5 | n | W. P. | 96, | 120 |
| 147 | r var. | | 1.5 | n | P. W. | 96. | 179 |
| 152 | r var. | α = | — | III | W. P. | n | 179 |
| Red Supp 142 161 | c Var? | | 1 | p | S | 97 | 24 (38) |
| " " 185 | var ? | | 1 | n | W S | 97 | 53 |
| | c Var. | | 0 | n | S | 97 | 25 |
| pp. 196 41 4 Cam Maj. | | | 1 | n | S | 96. | 66 |
| 11 | | | 2 | n lines and | S | | 67 |
| 16½ | | | 2 | III prob. | W. P. | | 67 |
| Rec Supp 176 18 | | | | | | | |
| 21 | | | 2 | n | W | | 67 |
| 23 | Canis Maj. | | 1.5 | n | W. P. | | 67 |
| 38 | completed on | | 2 | III prob. | P W. | | 68 |
| 41 | page 176. | | 1 | n | P W | | |
| 52 | | | 0 | n | P W. | | |
| 54 | | | 1.5 | n | P W. | | |
| 57 | | | 1.5 | n | P W | | |
| 59 | | | | | W. | 96 | 140 |
| 61 | | | | | W | " | " |
| 71 | | | | | W | " | " |
| 72 | | | | | W | " | 141 |
| 73 | Cam. prob. | | | | W | " | " |
| 78 | Cam | | | | W. S | " | " |

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# Red Stars in U. A.

| | Stars Conducted. | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|
| | 22, 138 ~~Eridani~~ 138 Eridanus | | | | | | |
| | 219 " 219 | | | | | | |
| | 16 1.54 Orionis | c Var 5.2 | | | | | |
| | ~~55 185~~ | c Var 5.5 | | | | | |
| | 54 | cum | | | | | |
| 55 | 52 Monocerot | r. var.? | | o | n | S | 72 97 |
| + | 53 | | | o | n | S | 72 97 |
| | 63 | | | 2 | n | S | 72 97 |
| + | 68 | | | 1. v | n | nS | 97 77 |
| | 69 | | | 1 | n | S | 73 97 |
| | 84 88 + | cum. | | 0 | n | pS | 73 97 |
| | 92 + | | | 1 | n | p | 97 97 |
| — | 106 | | ☆ III h 1032 | | | | |
| + | 108 | var.? | | 0 | n | S | 97 77 |
| + | 108½ | neb. cum | | | n | S | 97 77 |
| | 112 | | | 2 | n | S | 97 77 |
| | 136 | | | 1 | n | S | 97 74 |
| + | 138 | | | 1 | n | S | 97 74 |
| + | 139 | n. var. | | 1 | n | S | 97 74 |
| + | 156 | var.? | | 0 | n | S | 97 74 |
| + | 60 29 Canis Minor. | var.? | | 0 | n | m | 97 84 |
| S | 28 17 Puppis | | ε | | | | ~~P.M. 193~~ B. 96 |
| | 31 | κ | | | | | P.M. 193 B. 96 |
| | 37 | | | | | | P.M. 194 96 |
| S | 39 | τ | | | | | |
| S | 43 | | | | | | |
| S | 44 | | | | | | |
| S | 47 | | | | | | |
| | 63 | | | | | | P.M. 194 B. 96 |
| S | 68 | | | | | | |
| S | 72 | $L_1$ | var.? | | | | 2 Pw 19 |
| S | 73 | $L_2$ | ? IV. H.C. | | | | |
| S | 81 | | | | | | |
| | 82 | π | | | | | 2.v p P.M. 69 97 |
| | 87 | H | | 1 | | m.P | 69 97 |
| | 95½ | c. | | 1 | n | | 38 97 |

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# Red Stars in H. A.

Cow. on p. 170.

| | | | | Color. | Spek. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|
| S | 99 | | 0 | | | | |
| | 100 | | | | 1 | n | S 38, 97 |
| S 26 | | Vela | Pickering continued. | | | | |
| S | 3 | | 105 | | 1 | n | S W b 44 97 |
| S | 4 | | 107 | | 2 | n | W. b 40, 97 |
| S | 6 | | 122 / 129 | raw? | 0 | n | W. b. 40 97 |
| S | 16 | | 140 / 148 | cum. var. | 1 | n | W S 97 97 |
| S | 46 | b. | 154 | | 0, v | n | S W 97 97 |
| S | 52 | | 155 c var? | | 1 | n | W S 45 97 |
| S | 58 | n. | 157 (l) / 158 | cum. | 1 | n | S W n P W 97 97 |
| S | 87 | | 175 (a) c | | 2 | p. | P W. 69 97 |
| S | 97 | c. | 185 / 174 | cum. | 1 | n. | W. P. 70 97 |
| S | 100 | λ | 188 | | 1.v | n | W S 45 97 |
| S | 114 | | S 189 | Bands suspected by W. Var. 40.6 | 2.3 | n | P. W. S. 70 97 |
| S | 118 | | 190 q. | | 1.v | n | S W. 46 97 |
| S | 121 | | 191 | | 1.v | n | W S 45 97 |
| S | 122 | K. | S 196. (Q) | | | | |
| S | 126 | | 197 | | 1.v | n | W. S. v9 97 |
| S | 144 | N | S 213 ~~C var.~~ | | | | |
| S | 161 | | 215 | | 1 | n | S. W. v9 97 |
| S | 162 | | 225 / S 227 | raw? | 0.v | n | W. S. v9 97 |
| S | 162½ | | S 228 (N) | | | | |
| S | 171 | Φ | S 231. (G) | | | | |
| S | 182 | | 234 | | 0.v | n | S. W. 60 97 |
| S | 193 | | 250 | | 1 | n | W S 60 97 |
| S | 195 | | 251 | | 2 | p | W. S 60 97 |
| | | | + 267 ~~S 268~~ | ~~C~~? | 2.3 | n | P S 60 70? |
| S | 201 | | 282 | | 1 | n | S W 60 97 |
| S | 202 | | 287 | | 1.v | n | W S 60 97 |
| | | | 291 | | 1 | n | W. S. 46 97 |
| S | 204 | n. | ~~A var.~~ | | | | |
| | | | 294 | | 2 | n | S W 61 97 |
| S | 209 | | 300 | | 0 | n | W S 61 97 |
| | | | 302 | | 1.v | n | S W ~~N~~ 46 97 |
| S | 213 | | 308 ~~S var.~~ | | 2.5 | n | W 97 See Page 170 |

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# Nebulæ in Orion.

| Region. | Comp. par. | Obs. | |
|---|---|---|---|
| a | ζ | P. P. W. W. W. W. W. W. W. W. | S. W. |
| b | ζ | P. W. W. W. W. | S. W. |
| c | ζ | P. W. W. W. | S. W. |
| a d | σ | P. W. W. W. | S. W. |
| d | ζ | P. W. W. W. | S. W. |
| b f | σ | P. W. W. | S. W. |
| p | " | P. W. W. W. | S. W. |
| b e | " | P. W. W. W. | S. W. |
| e | ζ | P. W. W. W. | S. W. |
| f | " | P. W. W. W. | S. W. |
| g | σ | P. W. W. W. | S. W. |
| ~~g~~ a | ζ | | S. W. |
| k | σ | P. W. W. | S. W. |
| h | " | P. W. W. W. | W. |
| l | " | P. W. W. W. | W. |
| m | " | P. W. W. | S. W. |
| o | " | P. W. W. | S. W. |
| q | " | P. W. | S. W. |
| o q | " | P. W. | S. W. |
| n | " | P. W. W. | S. W. |
| K n | " | P. W. | S. W. |
| a | ζ | | S.S. W. |

Focus of small telescope. ζ Orionis. S.S. W.

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Clusters & Nebb.

| | h | m. | |
|---|---|---|---|
| 120 | 0 | 35 | +61 |
| 341 | 1 | 24 | +60 |
| 352 | | 26 | +30 |
| 392 | | 37 | +60 |
| 512 | 2 | 10 | +56 |
| 521 | | 10 | +56 |
| 538 | | 24 | +56 |
| 584 | | 33 | +42 |
| 654 | 3 | 6 | +46 |
| 775 | | 39 | +52 |
| 820 | 4 | 5 | +50 |
| 1067 | 5 | 11 | +39 |
| 1112 | | 15 | −24 |
| 1119 | | 20 | +35 |
| 1166 | | 27 | +34 |
| 1184 | | 29 | − 4 |
| 1295 | | 43 | +32 |
| 1360 | 6 | 0 | +24 |
| 1361 | | 1 | +13 |
| 1424 | | 24 | +5 |
| 1454 | | 41 | −20 |
| 1465 | | 45 | +0 |
| 1483 | | 56 | −8 |
| 1512 | 7 | 11 | −15 |
| 1551 | | 30 | −14 |
| 1549 | | 30 | +21 |
| 1564 | | 35 | −14 |
| 1571 | | 39 | −23 |
| 1611 | | 53 | −10 |

C. P 95,150

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(Continued on page 12 Bk 74)



Clusters (Stelle)

| | h. | m. | | | | |
|---|---|---|---|---|---|---|
| 1630 | 8 | 4 | −12 | | | |
| 1637 | | 7 | −5 | | | |
| 1681 | | 32 | +20 | | | |
| 1712 | | 44 | +12 | | | |
| 1558 | 13 | 6 | +18 | ? 3558 | Cortie | 97.150 |
| 3636 | | 36 | 8 +29 | | | |
| 3900 | 14 | 22 | 47 −5 | | | |
| 4083 | 15 | 11 | 57 +2 | | Cortie | 97.150 |
| 4173 | 16 | 9 | 15 −22 | | | |
| 4315 | | 30 | 47 −3 | | Cortie | 97.150 |
| 4230 | | 37 | 2 +36 | | | |
| 4238 | | 40 | 29 −1 | | | |
| 4256 | | 50 | 19 −3 | | | |
| 4287 | 17 | 11 | 27 −18 | | | |
| 4294 | | 13 | 9 +43 | | | |
| 4315 | | 31 | 47 −3 | | | |
| 4346 | | 49 | 18 −18 | | | |
| 4367 | | 56 | 50 −22 | | | |
| 4388 | 18 | 4 | 56 −21 | | | |
| 4397 | | 10 | 34 −18 | | | |
| 4400 | | 11 | 26 −13 | | | |
| 4401 | | 12 | 20 −17 | | | |
| 4406 | | 16 | 32 −24 | | | |
| 4410 | | 21 | 12 +6 | | | |
| 4424 | | 28 | 15 −24 | | | |
| 4432 | | 38 | 5 −9 | | | |
| 4437 | | 44 | 9 −6 | | | |
| 4451 | | 49 | 50 +10 | | | |
| 4455 | 19 | 11 | 29 +29 | | | |

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(Continued on Page 18 Book 74

# Peters & Wilkins C.B.

| | | | | | Hy | HC |
|---|---|---|---|---|---|---|
| 116 | 0 | 35 | +40 | Andrew | C | |
| 117 | | 35 | +40 | | C | |
| 218 | 1 | 2 | +35 | | | |
| 385 | | 34 | +50 | | m | |
| 600 | 2 | 36 | - 0 | | | |
| 768 | 3 | 38 | +23 | | | |
| 801 | | 56 | +60 | | | m |
| 826 | 4 | 8 | -13 | | C | m |
| 1157 | 5 | 26 | +21 | | | |
| 1179 | | 28 | -5 | Anon. | m | |
| 1267 | | 40 | 0 | | | |
| 1532 | 7 | 21 | +21 | | | |
| 1567 | | 36 | -17 | | | m |
| 1713 | 8 | 44 | +33 | | | |
| 1823 | 9 | 14 | +51 | | | |
| 1949 | | 44 | +69 | | C | |
| 1950 | | " | " | | C | |
| 2008 | | 58 | - 7 | | | |
| 2041 | 10 | 7 | +4 | | | |
| 2102 | | 18 | -18 | | m | m |
| 2207 | | 41 | +13 | | | |
| 2318 | 11 | 3 | +58 | | | |
| 2343 | | 7 | +55 | | m | m |
| 2377 | | 13 | +13 | | | |
| 2373 | | " | " | | | |
| 2838 | 12 | 12 | +15 | | | |
| 2841 | | 12 | +48 | | C | |
| 2946 | | 18 | +18 | | | |
| 3021 | | 23 | +8 | | | |

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~~13h 42m 15s −27 46.0 Boston~~

# Red Stars. Webb and Herschel.

1870-80

| Short extracts | Bettinghaus | | RA | | Decl. | | Mag. | Auth. | Color | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| – | 1 | 0 | 2 | 37 | +60 | 11 | 8 | H.W | 8.7 | – n | 95.158 |
| n | 4 | | 13 | 2 | +43 | 56 | | W | 8.2 | – n | 95.159 |
| – | 11 | | ~~47~~ 50 | ~~15~~ 22 | ~~+66~~ 67 | ~~13~~ 3 | 9 | H | 8.8 | ?III | 95.170 |
| – | 14 | | ~~58~~ 57 | 18 | +52 | ~~48~~ 49 | 10 | H | 10.0 | 2e 15 near bds | Cl. clear nebs. 95.171 |
| H.C.D. | 24 | 1 | ~~+9~~ 21 | ~~9~~ 27 | −33 | ~~20~~ 23 | 6 | H | 6.0 | R. Sculptoris | 2 Cl. 124 95.171 |
| H.C.G. | 33 | | 54 | 27 | +54 | 23 | 8 | WH | 7.9 | Wds. | 95 |
| – | 36 | 2 | ~~8~~ 7 | ~~37~~ 2 | +0 | ~~32~~ 31 | 7 | H | 8.0 | n pec. n. 5 U a. | 95.166 |
| – Dm. 456 | 39 | 2 | 9 | 52 | +42 | 34 | 9 | WH | 8.3 | 37 near | |
| – | | | ~~14~~ 47 | | ~~−3~~ 45 | | ~~8~~ | H | | var ○ Beta | |
| – n/pec | 46 | | 29 | 0 | +56 | 28 | 9 | WH | 8.3 | n. pec. n | 97 67 |
| B2 | 65 | 3 | 31 | 30 | +62 | 15 | | W | 6.6 | | — |
| – | ~~65~~ 65½ | | ~~32~~ 4 | | ~~+47~~ 47 | ~~19~~ 16 | | W | | 0.5 n | P.W. 97.112. |
| – | 66 | | 34 | 55 | +14 | 21 | 9 | WH | 8.8 | n | 95.169 |
| – | 67 | | 36 | 13 | +53 | 28 | 9 | WH | 8.0 | n | 97.68 |
| – | 82 | 4 | 36 | 50 | +32 | 41 | 8 | WH | 8.7 | bands | 95.168 |
| – | 84 | | ~~37~~ 41 | ~~6~~ 36 | +52 | 1 | 9 | H | 9.5 | n | 97.64 |
| P | 85 | | 43 | 23 | +28 | 18 | 8 | WH | 8.1 | IV | — |
| P.C. | 96 | | 58 | 41 | +0 | 57 | | W | 6.0 | – IVa 32 Orionis | 2e 95 near |
| – | 104 | 5 | 12 | 15 | +34 | ~~8~~ | 8 | WH | 7.9 | n pec | 97.68 |
| n | 135 | 6 | 2 | 49 | +26 | 3 | | W | 7.4 | IV | — |
| P | 138 | | 5 | 24 | +27 | 12 | 8 | WH | 9.0 | IV | — |
| n | 144 | | 18 | 37 | +15 | 47 | 7 | H | 6.5 | – IV | 95.167 |
| – | 145 | | ~~15~~ 18 | 52 | −26 | 59 | 8 | H | 8.1 | – | |
| SP | 148 | | 27 | 36 | +38 | 84 | 6 | WHB | 3 | IV | — |
| – | 174 | 7 | 15 | 47 | −20 | 40 | | W | 9.0 | 1.5 – p. | 2e 176 near P.W. 97.112. |
| – | 175 | | 18 | 3 | −25 | 32 | 7 | H | 7.0 | 1.5 n & p. | P.W. 97.112 |
| – | 176 190 | | 42 | 57 | −31 | 50 | 9 | H | 9.0 | 0.5 n. W.S. 1. – p.n. | 97.113. W. 97.115. |
| – | 206 | 8 | ~~40~~ 44 | ~~27~~ 28 | −27 | 46 | 8 | H | 8.5 | – | |
| n | 211 | * 8 | 45 48 | 3 | −20 +17 | 0 46 | 8 | WH | 6.5 | 1.5 p. IV | P.W. 97.113 |
| P | 235 | 10 | 6 | 39 | −34 | 43 | | H | 7.0 | IV | |

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1879phae.proj..476P



February. 1881.

1. S Cancri $21^h\ 2^m$
2. $8^h\ 38^m\ 38.9^s$ I. R *Cephei $11^h\ 51^m$.
3.
4.
5.
S 6.
7. *Cephei $11^h\ 31^m$
8.
9. a.a.s.
10.
11. S Cancri $9^h\ 02^m$
12. *Cephei $11^h\ 11^m$
S 13.
14. 7 34 30.4 III Re.
15. 5 33 33 III Re. 6 nies $7^h\ 19^m$
16. *Cephei $4^h\ 55^m$ 8 22 S Cancri $2^h\ 50^m$
17. *Cephei $10^h\ 50^m$ 9 27
18. 6 58 31.2 I. R. 10 33
19.
S 20. S Cancri $20^h\ 39^m$
21. *Cephei $4^h\ 35^m$
22. 7 37 18.3 III D. 9 34 36 III. R. *Cephei $10^h\ 30^m$.
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24.
25 8 53 53.6 I R S Cancri $14^h\ 28^m$
26.
S 27. *Cephei $10^h\ 10^m$.
28.

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1879phae.proj..476P



Red Stars in Webb & Herschel.

| | B. | RA | Dec. | Magn. | | |
|---|---|---|---|---|---|---|
| | | h m s | | | 47 nebulae | |
| bands, fine banded | 280 | 12 23 10 | +28° 57.5 | 9.0 | D.M. 29° 2293 | 97, 148 |
| | | 13 42 15 | -27 46.0 | | Bernham. | 97, 165 |
| | 333 | 14 28 10 | -42 50.7 | 9.0 † | | |
| III | 366 | 15 30 54 | +15 30.0 | 6.7 | P.M. 2200 | |
| | 374 | 16 9 23 | -45 30.4 | 8.5 † | | |
| n pec. | 379 | 16 20 4 | -12 8.7 | 8.0 † | | 97, 151 |
| n pec | 385 | 16 32 56 | -32 8.4 | 8.0 † | | 97, 152 |
| | 409 | 17 22 9 | -35 32.5 | 9.0 † | | |
| IVa both | 410 | 17 22 39 | -19 22.5 | 8.5 † | | 97, 153 |
| | 414 | 17 31 54 | -41 33.1 | 8.0 † | | |
| | 418 | 17 37 53 | -18 36.1 | 8.5 | | 97, 166 |
| | 420 | 17 48 8 | +1 47.5 | 9.5 | | 99, 67 |
| | 435 | 18 13 19 | +0 47.7 | 7.9 | | 99, 67 |
| | 460 | 18 39 57 | +8 37.5 | var. | | |
| | 492 | 19 14 25 | +27 2.1 | — | | |
| | 533 | 20 4 34 | -14 37.4 | var. | | |
| | 541 | 20 9 2 | +38 21.9 | 8.2 | | |
| | 559 | 20 20 35 | -28 39.3 | 8.0 † | | |
| | 600 | 21 58 32 | +27 46.2 | 7.7 | | |
| | 649 | 23 43 0 | +44 31.0 | 9.5 | | |

39 just
59
66
148*
174
175
190
206 8 40 27 -27 46 8

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1879phae.proj..476P



# Planetary nebulae. Observations still needed, Feb. 17, 1881, with Photometer Q.

| | | | | |
|---|---|---|---|---|
| G.C. 1565 | 7h 36m | −14° 25′ | Comp. star λ Gem. | 3 observations made. |
| 4386 | 18 3 | −33 53 | " " δ Sagittarii. | 2 " " |
| 4407 | 18 18 | −23 16 | ee S; R. Comp. stars σ and δ Sagittarii. | 3 " " |
| 4413 | 18 23 | +74 30 | pB; pL; E. Comp. star ζ Urs. Min. | 2 " " |
| 4479 | 19 8 | − 2 56 | vF; L; R. | No " " |
| 4532 | 19 54 | +22 23 | Dumb-bell neb; Comp. star ε Cygni | 2 " " |
| Copeland's neb | 21 2 | +47. 22 | | No " " |

# Observations of Spectrum needed

| | | | | | | |
|---|---|---|---|---|---|---|
| G.C. | 705 | 3 | 19 | −21 | 58 | F; mE; conn. | Observed once, W. |
| | 706 | 3 | 19 | −37 | 3 | O?; pS | " twice, P., W. |
| | 932 | 4 | 51 | − 5 | 4 | cB; S; mbM* | " once, W. |
| Con | 1565 | 7 | 36 | −14 | 27 | O; pB; pS. | " 3 times, W., P., W. |
| | 2343 | 11 | 8 | +55 | 40 | O; vB; vL. | " 3 " , P, W., W. |
| | 4045 | 15 | 0 | + 2 | 4 | vB; pL; f of 2. {Of found gases needs photometric observation} | " 3 " , S., S., U. |
| | 5240 | 2 | 21 | − 0 | 47 | vF; eS; too faint perhaps | " once, W. |

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W. P. R. 96, 65.

C P R 99, 70

C.

C P W ~~R~~ 99, 68 & 99, 71

C.

~~E~~ W. P 99, 110 — Wr. S. 99. p. 134.

Wr. 99. 170.

Wr. 99. 169.

C W. P. R 96, 65.

Wr. 99. 169.

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Nebulae &c. detected with Comet Finder

| | No. | R.A. | Dec. | Obj. | | Identif. |
|---|---|---|---|---|---|---|
| 92, 91 | 5 | | | Stell. neb. | O | G.C. 4514 |
| | 5 | 20 46 | +40.0 | " | | |
| | 8 | Nothing suspected. | | | — | ——— |
| | 10 | | | Large Neb. | | |
| | 12 | 21 8 | +42.3 | Neb. | | |
| 93, 123 | 20 | 0 35 | +40.5 | Neb. in Androm. | Cl. | M 31 |
| | 20 | | | Reflection of Jupiter | — | ——— |
| 194 | 22 | 20 38 | +45.3 +~~47.6~~ | | | |
| | " | 20 42 | +70.4 | ? Neb. foll. | | |
| | " | 20 45 | +18.3 | Spectrum peculiar? | | ? N |
| 197 | 23 | 20 18 | +74.7 | 5m obj. Clouds | | — |
| 201 | 25 | 1 35 | +60.6 | | | |
| 94, 16 | 26 | 20 57 | -11.9 | Plan. Neb. | O | GC 4628 |
| | " | | | Plan. Neb. | — | GC. 4628 |
| 124 | 29 | 1 36 | +60.2 | Cluster. | Cl. 892 | |
| | " | 2 15 | +58.1 | Large Cluster | — | Cluster Nucleus. |
| 192 | 30 | 23 46 | +46.6 | ? Bunch | | — D2h 4214 |
| 204 | 31 | 3 2 | +57.4 | | H.S.8 | D2h 57°702 |
| 95, 42 | 32 | 4 9 | +57.0 | Neb. Cap | — | GB. 820 |
| | " | 16 20± | +57.5 | ? IV | | - |
| | " | 16 20± | +80.8 | ? IV | | - |
| 107 | 33 | 1 55 | +30.3 | IV (? 2 39 -21.4) | H.C.14 | D2h 30°310 |
| | " | 2 31 | -21.3 | IV unobserved. | | |
| | " | 2 36 | -3.7 | IV Cloudy. | | |
| | " | 2 37 | -3.1 | IV cloudy. | | |
| 109 | 34 | 2 57 | +38.4 | III | III | ρ Persei |
| | " | 3 2 | +57.8 | IV | Low tem | H.C.8. ——— |
| 131 | 35 | 6 16 | +22.6 | III | | N ρ Geminor |
| | " | 6 28 | +38.8 | IV | B148, IV | ——— |
| | " | 6 40 | -4.3 | IV unobserved | | |

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| | No. | R.A. | Dec. | Obj. | | Identif. |
|---|---|---|---|---|---|---|
| 95,159 | 36 | 4 11 | +16.0 | Sing. nebulous. | | not pos. Rg5,116 |
| ✓ | " | 4 39 | -12.6 | Bands indistinct | | |
| ✓ | " | 4 41 | +53.6 | " " | | |
| P | " | 4 42 | +68.1 | IV | IV 83 | B 83 |
| | " | 4 44 | +10.7 | Cluster. | | |
| 9666 | 37 | 19 25 | +76.0 | L.c. Bands ext. | | 57 Dorm. |
| | " | 7 37 | -18.0 | Plan. Neb. | O | G.C. 1567 |
| | " | 7 48 | -14.6 | Cluster. | | |
| | " | 7 49 | -15.2 | Cluster. | | |
| ✓ | 38 | 4 53 | +46.9 | Bands ext. | | |
| ✓ | " | 5 1 | -1.4 | " " | | |
| n | " | 5 12 | -0.6 | " " | | ? B 102 |
| 96 92 | 39 | 7 29 | -16.0 | Suspected nebs. large. | 2142 GC 1551 | |
| | " | 35 | -18.3 | Cluster. | | |
| | " | 37 | -17.7 | Pr. Plan. Neb. | O 2d view G.C. 1567 | |
| — | " | 49 | -13.0 | Type IV. a | H.C. | |
| -94 | " | | | Red Stars. | H.C. | |
| ✓ 108 | 40 | 5 16 | +37.4 | III ? | | |
| ✓ | " | 20 | +16.0 | ~~III?~~ Bands ext. | | |
| | " | 21 | +35.8 | Large Cluster | — | G.C. 1119 |
| ✓ | " | 21 | +74.9 | ~~III?~~ Bands ext. | | |
| ✓ | " | 25 | +28.7 | Bands ext. | | |
| | " | 27 | -4.5 | Neb. Orion (Trapezium) | — | G.C. 1179 |
| | " | 29 | +34.0 | Large Neb. | — | G.C. 1166 |
| ✓ | " | 35 | +25.5 | IV | | |
| n | " | 37 | +20.6 | IV a nebs. | H.C. | ? B 121 |
| ✓ | " | 43 | -23.8 | IV | | |
| | " | 44 | +32.6 | Cluster | — | G.C. 1245 |
| ✓ | " | 58 | +7.6 | Bands ext. | | |
| | " 6 | 1 | +24.6 | Coarse Cluster | — | G.C. 1360 |

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| Repsn No | R.A. | Dec. | |
|---|---|---|---|
| R 96.178.41 | 9h 49 | -32.8 | IV ? |
| | 9 45 | +69. | Cluster. |
| 96 180,42 | 8 10 | -5 | Cluster. |
| 185,43 | 6 49 | -23.1 | Sing. band. H.C. |
| | 6 58 | -8.2 | Band lines. |
| | 6 58 | +7.1 | " " |
| | 7 13 | -43.7 | Sing. band. H.C. ? I. Puppis |
| 195,44 | 8 33 | +20.4 | Nebulae |
| | 8 44 | +12.3 | R.S. GC 1712 |
| | 8 49 | +13.1 | Band suspected. |
| | 8 49 | +21.3 | " " |
| | 9 17 | -41.6 | " " |
| 97,71,45 | 10 18 | -18.1 | GC 2102 |
| | " " | | " |
| | 10 31 | -39.2 | IV ζ1 Antliae |
| | 32 | -12.7 | IV |
| | 38 | +67.7 | IV |
| | 38 | +67.9 | IV |
| 97,114,46 | 11 20 | +57.4 ?? | IV |
| | 17 | +12° | Bands indist. |

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# Standard Stars.

| Star. | Estimated Intervals. | | Eye & Ear Transits. | Chronograph Transits. |
|---|---|---|---|---|
| γ Pegasi. | 0. 7 | +14.5 | ✓ 1 | |
| θ Ceti. | 1 18 | −8.8 | ✓ 2 | |
| ε Piscium. | 1 55 | +2.1 | ✓ 3 | |
| ε Ceti. | 2 56 | +3.6 | ✓ 4 | |
| γ Eridani. | 3 53 | −13.8 | ✓ 5 | |
| ε Tauri. | 4 29 | +16.3 | ✓ 6 | |
| ε Orionis. | 5 30 | −1.3 | ✓ 6 7 | |
| γ Geminorum. | 6 31 | +16.5 | ✓ 7 8 | |
| α Can. Min. | 7 33 | +5.5 | ✓ 8 9 | |
| ε Hydrae. | 8 41 | +6.8 | ✓ 9 10 | |
| α Leonis. | 10 2 | +12.5 | ✓ 10 11 | |
| θ Leonis. | 11 18 | +16.2 | ✓ 11 12 | |
| γ Virginis. | 12 14 | −0.0 | ✓ 12 13 | |
| α Bootis. | 14 10 | +19.8 | ✓ 13 14 15 | |
| β Libræ. | 15 11 | −9.0 | ✓ 14 15 16 | |
| δ Ophiuchi. | 16 8 | −3.4 | ✓ 16 17 | |
| γ Ophiuchi. | 17 4 | −15.6 | ✓ 17 18 | |
| γ Serpentis. | 18 15 | −2.9 | ✓ 18 19 | |
| θ Aquilæ. | 20 5 | −1.2 | 10.14 ✓ 20 21 | |
| β Aquarii. | 21 25 | −6.1 | 10.15 ✓ 21 22 | |
| α " | 22 0 | −0.9 | 10.15 ✓ 22 23 | |
| ε Pegasi. | 22 59 | +14.6 | ✓ 23 24 | |
| ε Virginis. | 13 19 | −10.6 | ✓ 13 14 | |
| δ Aquilæ. | 19 20 | +2.9 | ✓ 19 20 | |

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Stars suspected of certain bands with Comet Sykes

| | | | | |
|---|---|---|---|---|
| 20h | 45m | +18.3 | Spectr. Type? | |
| 22 | 18 | +74.7 | 5m, very clear spectr. | |
| 23 | 46 | +46.6 | ? Bands | |
| 19 | 25 | +76.0 | Bands cert. | |
| 2 | 31 | −21.3 | IV cert. | |
| 2 | 36 | −3.7 | " " | |
| 2 | 37 | −3.1 | " " | |
| 16 | 20± | +57.5 | " ? | |
| 16 | 20± | +80.8 | " ? | |
| 4 | 39 | −12.6 | Bands cert. | |
| 4 | 41 | +53.6 | " " | not seen R 97.66 |
| 4 | 55 | +46.9 | " " | not seen R 97.66 |
| 5 | 1 | −1.4 | " " | not seen R 97.66 |
| 5 | 16 | +37.4 | IV.? | not seen R97.66 |
| 5 | 20 | +14.0 | Bands cert. | not seen R97.66 |
| 5 | 21 | +74.9 | " " very clear spectr. | |
| 5 | 25 | +26.1 | " " | not seen R96.192 |
| 5 | 35 | +25.5 | IV | seen R96 192 |
| 5 | 43 | −23.8 | IV | |
| 5 | 58 | +7.6 | Bands cert. | not seen R97.66 |
| 6 | 40 | −4.3 | IV cert. | not seen R97.66 |
| 9 | 49 | −22.8 | IV? | |
| 6 | 58 | −8.2 | Bands cert. | not seen R97.66 |
| 6 | 58 | +7.1 | " " | not seen R97.66 |
| 8 | 49 | +13.1 | " " | |
| 8 | 49 | +21.3 | " " | |
| 9 | 17 | −41.6 | " " | |

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March, 1881.

1. λ Tauri 18h 50m
2. S Cancri ≈ 8h 16m
3.
4.
5. λ Tauri 17h 43m
6. * Cephei
7.
8.
9. λ Tauri 15h 3[illegible]m * Cephei 9h 30m
10.
11. S Cancri 19h [illegible]3m
12.
13. 7 13 9.1 I Rε. λ Tauri 1[illegible]h 27m
14. * Cephei ++ 9h 10m
15.
16.
17. λ Tauri 14h 20m
18. 7 23 [illegible]8.1 II Rε.
19. * Cephei 8h [illegible]0m
20.
21. λ Tauri 13h 12m. S Cancri 7h 30m
22.
23
24. ~~* Cephei~~ * Cephei 8h 30m
25. λ Tauri 12h 04
26.
27.
28
29. λ Tauri 10h [illegible]7m * Cephei 8h 10m
30. S Cancri 19h 07m
31 These minima are only approximate.

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# Standard Stars.

| Star. | Place R.A. | Dec. | Estimated Intervals. | Eye + Ear Transits. | Chronograph Transits. |
|---|---|---|---|---|---|
| γ Pegasi. | 0h 7m | +14.5 | | | |
| θ' Ceti. | 1 14 | −8.8 | | | |
| ε Piscium. | 1 55 | +2.1 | | | |
| α Ceti. | 2 56 | +3.6 | | | |
| γ Eridani. | 3 53 | −13.8 | | | |
| α Tauri. | 4 29 | +16.3 | | | |
| ε Orionis. | 5 30 | −1.3 | | | |
| γ Geminorum. | 6 21 | +16.5 | | | |
| α Can. Min. | 7 33 | +5.5 | | | |
| ε Hydrae. | 8 41 | +6.8 | | | |
| α Leonis. | 10 2 | +12.5 | | | |
| θ Leonis. | 11 14 | +16.2 | | | |
| γ Virginis. | 12 14 | −0.0 | | | |
| α Virginis. | 13 19 | −10.6 | | | |
| α Bootis. | 14 10 | +19.8 | | | |
| β Librae. | 15 11 | −9.0 | 106. 207-9 | 106. 207-9 | 106. 207-9 |
| δ Ophiuchi. | 16 8 | −3.4 | 106. 204-6 | 106. 204-6 | 106. 204-6 |
| γ Ophiuchi. | 17 4 | −15.6 | 106. 210-12 | 106. 210-12 | 106. 210-12 |
| γ Serpentis. | 18 15 | −2.9 | | | |
| δ Aquilae. | 19 20 | +2.9 | 107. 197. | 107. 162. | 107. 162. |
| θ Aquilae. | 20 5 | −1.2 | 107. 202. | 108. 14. | 108. 32. |
| β Aquarii. | 21 25 | −6.1 | 107. 195-7 | 107. 195-7 108. 15 | — |
| α Aquarii. | 22 0 | −0.9 | | 107. 184. | 107. 186. |
| α Pegasi. | 22 59 | +14.6 | | | |

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# April 1881.

1.
2. λ Tauri $9^h 50^m$
S 3. * Cephens $7^h 50^m$
4. * Cephens $13^h 45^m$
5.
6. λ Tauri θ ~~$8^h 45^m$~~ $8^h 34^m$
7. δ Librae $5^h 05^m$
8. * Cephens $7^h 30^m$ ~~δ Librae $14^h 06^m$~~ U Coronae $10^h 13^m$
9. S Cancri $6^h ~~34~~ 52^m$ δ Librae $12^h 56^m$ * Cephens $13^h 25^m$
S 10. λ Tauri $7^h ~~36~~ 27^m$
11. ×C.
12. ~~δ Librae $6^h 49^m$~~
13. * Cephens $7^h 10^m$
14. λ Tauri 6 ~~29~~ δ Librae $4^h 39^m$. U Coronae $7^h 55^m$. * Cephens $13^h 05^m$
15. ~~δ Librae $14^h 40^m$~~ ×C
16. δ Librae $12^h 30^m$ ×C
S 17.
18. λ Tauri $5^h ~~22~~ 13^m$ * Cephens $6^h 50^m$. S Cancri $18^h ~~44~~ 30^m$
19. ~~δ Librae $6^h 23^m$~~ * Cephens $12^h 45^m$
20.
21. δ Librae $4^h 13^m$
22. λ Tauri $4^h ~~40~~ 06^m$ ~~δ Librae $14^h 14^m$~~. U Coronae $5^h 38^m$
23. * Cephens $6^h 30^m$ δ Librae $12^h 04^m$
S 24. * Cephens $12^h 25^m$
25. U Coronae $16^h 29^m$
26. λ Tauri ~~$2^h 59^m$~~ $2^h 08^m$ ~~δ Librae $5^h 57^m$~~
27.
28. * Cephens $6^h 10^m$ S Cancri $6^h ~~48~~ 08^m$ δ Librae $3^h 47^m$
29. ~~δ Librae $14^h 48^m$~~ U Coronae $3^h 20^m$ * Cephens $12^h 05^m$
30. λ Tauri ~~$2^h 57^m$~~ δ Librae $11^h 38^m$

These Minima are only approximate.

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May. 1881.

Eclipse of Moon a June 11. 1881

| | | | |
|---|---|---|---|
| Begins | 12 | 26.5 | |
| Total | 13 | 29 | |
| | 14 | 49 | |
| Ends | 15 | 52 | |
| | | | |
| Im. 44 | 13 | 10 | |
| Em | 13 | 29 | |
| Im 50 | 15 | 0 | |
| Em. | 16 | 0 | |
| Im. 51 | 15 | 27 | |
| Em. | 16 | 1.5 | |

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Soddi notices of Eclipses of Jupiter's Sat. II.

II. Eclipse Reap. II. Occultation Dis.

| | | | | |
|---|---|---|---|---|
| 1881. July | 20. | 22h | 8m | 39.s |
| | 24. | 11 | 26 | 34 |
| | 28. | 0 | 45 | 21 |
| | 31. | 14 | 3 | 14 |
| Aug. | 4. | 3 | 21 | 55 |
| | 7. | 16 | 39 | 45 |
| | 11. | 5 | 58 | 19 |
| | 14. | 19 | 16 | 6 |
| | 18. | 8 | 34 | 33 |
| | 21. | 21 | 5 | |
| | 25. | | | |
| | 29. | | | |
| Sept. | 1. | | | |
| | 5. | | | |
| | 8. | | | |

| | | | |
|---|---|---|---|
| July | 24. | 16h | 11m |
| | 28. | 5 | 30 |
| Aug. | 4. | 8 | 6 |
| | 11. | 10 | 43 |
| | 18. | 13 | 19 |
| | 25. | 15 | 55 |
| | 29. | 5 | 13 |
| Sept. | 5. | 7 | 49 |

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# October, 1881

| | | |
|---|---|---|
| | 1 | |
| S | 2 | |
| | 3 | |
| | 4 | |
| | 5 | |
| | 6 | |
| | 7 | 0 |
| | 8 | 5 51 |
| S | 9 | 6 30 |
| | 10 | 7 14 |
| | 11 | 8 2 |
| | 12 | 8 55 |
| | 13 | 9 51 |
| | 14 | 10 50 |
| | 15 | |
| S | 16 | |
| | 17 | |
| | 18 | J. I. Dis. 16 04 |
| | 19 | |
| | 20 | I. Dis. 10 33 |
| | 21 | |
| | 22 | New ◎ |
| S | 23 | |
| | 24 | II. Dis. 13 57 Sets |
| | 25 | I Dis. 17 59 6 42 |
| | 26 | 7 39 |
| | 27 | I Dis 12 27 8 42 |
| | 28 | 9 57 |
| | 29 | 11 2 |
| S | 30 | |
| | 31 | II Dis. 16 32 |

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November, 1881.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | 14 | 22 | I | | | | |
| 4 | | | | | | | |
| 5 | 8 | 51 | I | | | | |
| S 6 | | | | | | | |
| 7 | 8 | 17 | III | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | 16 | 17 | I | | | | |
| 11 | 8 | 25 | II | | | | |
| 12 | | | | | | | |
| S 13 | | | | | | | |
| 14 | 7 | 22 | I Re | 13 | 52 | III | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | 13 | 32 | II | | | | |
| 19 | 14 | 49 | I | | | | |
| S 20 | | | | | | | |
| 21 | 9 | 14 | I | 17 | 53 | III | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | 16 | 7 | II | | | | |
| 26 | 16 | 44 | I | | | | |
| S 27 | | | | | | | |
| 28 | 11 | 13 | I | | | | |
| 29 | | | | | | | |
| 30 | | | | | | | |

| | | |
|---|---|---|
| | 0 | |
| | 5 | 52 |
| | 6 | 44 |
| | 7 | 39 |
| A.G.S. | 8 | 37 |
| Visit. Com. | 9 | 36 |
| | 10 | 36 |

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December, 1881.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| S 4 | | | | | | | | |
| 5 | 13 | 08 | I R | P. | | | ○ | |
| 6 | 8 | 0 | II | | | | | |
| 7 | 3 | 7 | I | | | | 6 25 | |
| 8 | | | | | | | 7 24 | |
| 9 | | | | | | | 8 23 | |
| 10 | | | | | | | 9 23 | |
| S 11 | | | | | | | 10 21 | |
| 12 | 15 | 4 | I | | | | 11 20 | |
| 13 | 5 | 59 | III R | 10 | 35 | II | | |
| 14 | 9 | 34 | I | | | | a.a.s. | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| S 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | 8 | 26 | III D. | 10 | 0 | III R | 13 | II II |
| 21 | 11 | 29 | I | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| S 25 | | | | | | | | |
| 26 | ~~5~~ | ~~57~~ | ~~I~~ | | | | | |
| 27 | 12 | 27 | III D | 14 | 2 | III R. | | |
| ~~28~~ | 13 | 24 | I | | | | | |
| 29 | | | | | | | | |
| 30 | 7 | 53 | I | | | | | |
| 31 | 5 | 4 | II | | | | | |

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# Red Stars in U. A.

| | | | | | Color. | Spect. | Ob. | Ref. |
|---|---|---|---|---|---|---|---|---|
| S | 218 | | | | | | | |
| S | 227 | | c. | | | | | |
| S | 229 | P | N 2 | | | | | |
| S | 244. | | | | | | | |
| 39 | 6 Pyxis | | rav? | | o | n | S | 39, 97 |
| | 7 | | | | 1 | n+p | S | 39, 97 |
| | 8 | | | | | p | m | 97 84 |
| | 10 | | | | o | n | S | 39, 97 |
| | 11 | | | | o | n | mS | 46 97 |
| | 20 | ζ | v. rav? | | 1 | n | Sm | 46 97 |
| | 22 | β | | | 1 | n | m | v-3 97 |
| | 30 | | c | | 1 | p | n mS | v-3 97 |
| | 34 | | | | | p | PmS | 47 +50 97 |
| | 39 | | rav. | | o.s | n | mS | v4 97 |
| | 50 | | | | 1.7 | n | SPm | 47 97 |
| — | 49. | x | c rav? | IV.p | o | n | Sm | v4 97 |
| | 60 | | | | | | | |
| | 68 | | | | 1.0 | n p n | m S P. | 48 97 |
| | 69 | | rav? | | 1.0 | n. | P.S.m. | 48 97 |
| 40 | 20 Hydra | | | | 1 | n | m. | 97 27 |
| | 58 | | | | 2 | p | mP | v4 97 54 |
| | 70 | | rav? | | o | n | Pm | v4 97 54 |
| * | 76 see note | | | | 2 | p | Pm | 97 v4 |
| | 78 | | | | o | n | Pm | v4 97 54 |
| | 95 | ω | | | 1 | p n | m p | 97 84 |
| | 136 | | | | m | | m | 97 85 |
| — | 140 | α | | III? S | | | | |
| | 183 | | | | 1 | n | S | 97 80 |
| | 194 | $\upsilon_2$ | rav? | | 1 | n | m | 97 85 |
| | 195 | | | | 2 | p | S | 97 80 |
| | 201 | λ | | | o | n | m | 97 85 |
| | 221 | P u | | | 1 | n | S | 97 80 |
| | 224 | | | | 1 | n | S | 97 81 |
| — | 240 | | vv. rav? | VI or III. p | | | | |
| | 241 | | | | 1 | n | S | 97 81 |
| | 254 | ν | | | 1 | n | m | 97 85 |

* Stars 76 & 78 (Hydræ) probably reversed in U. A. as spectrum shows.

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# Red Stars in U. A.

| | | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|
| | 257 | $b_3$ | var? | | | | |
| | 258 | | | | | | |
| | 259 | | var? | 1 | n | 97 | 88 |
| | 265 | $\chi_2$ | c. | 1 | n | 97 | 88 |
| | 272 | | var? | 0 | n | 97 | 88 |
| | 286 | | | 1 | p | 97 | 88 |
| | 287 | | | 2 | p | 97 | 88 |
| | 288 | $\xi$ | | 1 | n | 97 | 89 |
| | 291 | | | 1 | n | " | " |
| | 295 | | | 2 | n | " | " |
| | 310 | | | 0 | n | " | " |
| | 311 | | var? | 0 | n | 97 | 88 |
| | 319 | | | 1 | n | " | 89 |
| | 330 | | | 1 | n | " | 90 |
| | 345 | $\gamma$ | | 1 | n | " | " |
| — | 347 | | III! | | | | |
| | 358 | | v.v | 3 | p | " | " |
| | 368 | $\pi$ | | 1 | n | " | " |
| | 37 2 | Antlia | $\varepsilon$ | 1 | n | 97 | 86 |
| | 16 | | | 1 | n | 97 | 1.79 |
| | 17 | | | 0 | n | 97 | 79 |
| | 18 | | | 0 | n | 97 | 86 |
| | 36 | | | 1 | n | 97 | 86 |
| | 53 54 55 | | cum. | 1 | n | 97 | 86 |
| | 67 | | c. var? | 1 | n | 97 | 87 |
| — | 71 | $\alpha$ | vr. var? IV H.C.O. | | | | |
| | 56 21 | Sextans | var? | 0 | n | 97 | 93 |
| | 23 | | | 2 | n | 97 | 93 |
| — | 32 | | c III? | | | | |
| | 47 | | | 1 | n | 97 | 93 |
| | 58 38 | Leo | $P_2$ | III 2.2032 | | | |
| | 44 | | | III " | | | |
| | 55 | | | 0 | n | 97 | 93 |
| | 57 | | | 1 | n | 97 | 93 |

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# Red Stars in U. A.

| | | | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|---|
| | | 62 Leo. | l | | | | | |
| | | 69 | v | | o | m | S | 97 94 |
| | S | 19 11 | Centaurus | | o | n | S | 97 94 |
| | S | 16½ | | ——. | 1 | n | S | 97 94 |
| | | 39 | | | 1 | n | S | 97 95 |
| | S | 58 | | cmn | | | | |
| | S | 58½ | | c. | | | | |
| | S | 85 | | c. | | | | |
| | S | 108 | F | | | | | |
| | S | 110 | | | | | | |
| | S | 133 | | | | | | |
| | S | 136 | w | nn | | | | |
| | S | 148 | | | | | | |
| | S | 149 | e | | | | | |
| | S | 152 | | | | | | |
| | S | 155 | | | | | | |
| | | 159 | | rav? | o | n | S | 97 95 |
| | S | 172 | | rav? | | | | |
| | S | 178 | | rav. | | | | |
| | S | 182 | | | | | | |
| | S | 196 | | | | | | |
| | | 217 | | ——. | 1 | n | S | 97 97 |
| | S | 221 | | | | | | |
| | | 227 | d | | 2 | n | S | 97 97 |
| | | 233 | | rav. | 1 | n | S | 97 97 |
| | S | 242 | | | | | | |
| | S | 246 | | cmn. | | | | |
| | S | 251 | | | | | | |
| ? | S | 264 | | cmn | | | | |
| | | 265 | i | | o | n | S | 97 97 |
| | S | 266 | M. | c. | | | | |
| | S | 269 | | | | | | |

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# Red Stars in U. A.

Preceding

| | | | | | Color. | Spect. | Obs. | Ref. | |
|---|---|---|---|---|---|---|---|---|---|
| | 271½ + | | | | 0 | | S | 97 | 97 |
| | 271½ ++ | | | | ½ | p | S | 97 | 97 |
| | .274 | g. | | | ½ | p | m. | 97 | 115 |
| | S 293 | | | | | | | | |
| | S 321 | | | | | | | | |
| | S 324 | | | | | | | | |
| | S 334 | | c | | | | | | |
| | S 343½ | | | | 1 | n | m | 97 | 115 |
| | .351 | | | | 1 | n | m | 97 | 116 |
| | .358 | | | | 3 | p | m | 97 | 116 |
| | .371 | c | c. | | | | | | |
| | .380 | | | | 1 | n | m | 97 | 116 |
| | .388 | | | | 1 | n | m. | 97 | 116. |
| | .391 | | | | | | | | |
| 484 | Crateris | | | III fp. | | | | | |
| | 5 | α | | | 1 | n | S | 97 | 95 |
| | 8 | | | | 1 | n | S | 97 | 95 |
| 499 | Corvus | α | | | 0 | n | S | 97 | 95 |
| | 12 | ε | var. | | 1 | n | S | 99 | 95 |
| | 18 | γ | var. | | 0 | n | S | 97 | 95 |
| | 28 | δ | var. | ? ring. | 0 | n | S | 97 | 96 |
| | 30 | | var? | | 1 | p | S | 97 | 96 |
| | 36 | β | v. var. | | 1 | n | S | 97 | 96 |
| 502 | Virgo | ω | | III ! | 2 | p | S | 97 | 96 |
| | 69 | | | III a 2044 | | | | | |
| | 70 | | | III fp | | | | | |
| | 83 | | v. var? | | 1 | n | S | 97 | 96 |
| | 89 | | | | 1 | n | S | 97 | 97 |
| | 93 | ψ | | III ! | | | | | |
| | 109 | | | | 1.5 | n | PS | 97 | 99 |
| | 114 | | | | 2 | n | PS | 97 | 99 |
| | 139 | | v. var. | | 1.5 | n | SP | 97 | 99 |
| | 148 | | Var? | | 1 | n | PS | 97 | 100 |
| | 154 | | v. var? | | 0.5 | n | PS | 97 | 100 |
| | 157 | ℓ | | III | 1.5 | III | PS | 97 | 100 |
| | 160 | | vv | | 1 | [illegible] | PS | 97 | 100 |

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# Red Stars in U. A.

97/47 100 n PS 0.5

| | | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|
| | 165 | | | | | | |
| | 175 | | | | | | |
| | 217 | | | 0.7 | n | SPw | 97 104 |
| – | 219 | | III! | | | | |
| | 222 | | var. | 0.3 | n | wSP | 97 104 |
| | 230 | | var? | 0 | nnp | PwS | 97 104 |
| | 238 | υ | var? | 0.7 | n | SPw | 97 105 |
| | 239 | | var? | 0 | n | wSP | 97 105 |
| | 246 | Φ | var. | 1 | n | PwS | 97 105 |
| | 247 | | | 1.3 | n | SPw | 97 105 |
| 66 | 5 Bootis | | c | 1 | n | w | 97 106 |
| | 6 | | var? | 2 | n | w | 97 106 |
| | 7 | | var? | 1 | n | w | " " |
| S 27 | 3 Lupus | | | | | | |
| S | 11 | | | | | | |
| S | 14 | | | | | | |
| S | 17½ | | | | | | |
| S | 30 | b | | | | | |
| S | 35 | o | | | | | |
| S | 49 | | | | | | |
| | 53 | | | 0 | n | w | 97 117 |
| S | 64 | S | | | | | |
| S | 82 | | var? | | | | |
| S | 83 | δ | | | | | |
| S | 86 | $V_1$ | | | | | |
| | 88 | $\Phi_1$ | nn | 3 | n | w | 97 117 |
| | 94 | υ | | 2 | n | Sw | 97 188 |
| S | 102 | | nn | | | | |
| | 110 | | | 2 | p | S.w | 97 188 |
| | ~~115~~ 115 | | ~~nn. -44°~~ | 1.5 | p.n. | wS | 97 188 |
| | 116 | | var? | 0 | n | w | 97 117 |
| | ~~117~~ 117 | ω | ~~nn -44°~~ | 2.5 | n | SP | 97 188 |
| | 119 | $\psi_1$ | nn | 3 | n | w | 97 118 |

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# Red Stars in U. A.

| | | | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|---|
| S | 121 | g. | | | | | | |
| | 128 | | var? | | 1 | n | m | 97 118 |
| S | 144 | | | | | | | |
| 43 | 21 | Libra | | | | p | m | 97 107 |
| | 31 | ξ | | | 1 | n | m | 97 107 |
| | 36 | | | | 1 | m | m | 97 107 |
| | 38 | δ | var? | | 1 | n | m | 97 107 |
| | 45 | σ | | | 2 | p | m | 97 108 |
| | 48 | γ | | | 2 | p | m | 97 108 |
| | 85 | | | | 1 | n | m | 97 108 |
| | 88 | | | | 1 | n | m | 97 108 |
| | 93 | υ | | | 1 | n | m | 97 108 |
| | 105 | | | | 1 | n | m | 97 109 |
| | 106 | χ | | | 2 | p | m | 97 109 |
| | 115 | θ | | | 1 | n | m | 97 109 |
| 51 | 6 | Serpens | | | 2 | n | m | 97 118 |
| | 7 | | neb. | | Cluster | n | M, S. | 97 118, 124 |
| | 9 | | | | 1 | n | S | 97 124 |
| | 11 | | | | 1 | n | S | 97 125 |
| | 15 | A | | | 1 | n | S | 97 125 |
| | 28 | ω | | | 1 | n | S | 97 125 |
| | 89 | | III | | 2 | III | S | 97 125 |
| | 30 31 | | cum | | 0 | n | S | 97 125 |
| | 31 | | neb. | | 1 | n | S | 97 125 |
| 30 | 11 | Scorpius | | | 1 | n | SP | 97 192 |
| | 21 | $\omega_2$ | | | 3 | p | m | 97 192 |
| | 25 | | | | 2 | p | mP | 97 192 |
| | 35 | | | | 2 | pn | ms | 97 195 |
| | 36 | $\chi^1$ | v. var? | | 0.r | n | mS | 97 197 |
| | 44 | | | | 1.r | pn | ms | 97 195 |
| | 48 | | var | | 0.r | n | Sm | 97 195 |
| | 59 | 0 | | | 1 | n | mS | 97 196 |
| | 61 | σ | | | 0.r | n | S.m. | 97 196 |
| | 65 | | neb. | | | | | |
| | 69 | α | | II & III | | | | |
| | 76 | H | c. var? | | 3 | n.p. | Sm | 97 197 |
| | 91 | | | | | | P | 98 156 |

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# Red Stars in U. A.

| | | | | Color. Spect. Obs. Ref. |
|---|---|---|---|---|
| | 95 | ε | ~~cum.~~ | W.P. 98 156 |
| S. | 103 | $\xi_1$ | c | |
| S | 104 | $\xi_2$ | | |
| | 108 | To be looked | r cum at again. | W 98, 163 |
| | 110 | | | S.W. 98, 163 |
| | ~~116~~ 113 | | cum. | Wr.S. 98. 164 |
| | | | | S.W. 98, 163 |
| | 131 | | | r P 98 199 |
| | 134 | | | S.W. 98, 164 |
| | 145 | | | r P 98 199 |
| | 153 | | | W.S. 98. 164. |
| | 159 | Q | | 1 r P 98 199 |
| S | 160 | θ | | |
| | ~~166~~ 155 | | | S.W. 98. 165 |
| | 166 | | rr | Wr.S. 98. 165 |
| | 167 | | ~~rr~~ | S.W. 98, 165 |
| S | 174 | | | |
| | ~~176~~ 177 | | ~~rr-4~~ cum. | |
| S | 183 | | | S 98, 165 |

Canis Major completed.

| | | | | | | |
|---|---|---|---|---|---|---|
| 41 | ~~79~~ 79 | Canis Major. Bothe. | 1 | r | W 2 97 | |
| | 80 var. | | 0 | r | WS 41 97 | |
| | 86 | | 2 | r | S 72 97 | |
| | 89 | | 2 | r. | W 2 97 Wr.S. 96.142. | |
| | 92 | | 3. | r. | Wr.S. 96.141. | |
| | 114 | rr var? | 2 | r | S Wr 97 42 | |
| | 117 | | 0.5 | r | WS 97 42 | |
| | 121 | | 0.5 | r | SW 97 42 | |
| | 125 | | 1 | r. | W 2 97 S.Wr. 96.142. | |
| | 141 | rr | 2. | r. | Wr. 96.145. | |
| | 142 | | 1. | r. | Wr. 96.145. | |
| | 145 | | 2.5 | pr. | Wr.S. 97 42 | |
| | 147 | | 1.5 | p | SWr 97 43 | |

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# Red Stars in H. A.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 41 | 154 | | | 1 | m | W.S. | 97, | 43 |
| | 158 | | | 0 | m | W S | 97 | 43 |
| | 159 | | | 1.5 | p. | S W | 97 | 43 |
| | 162 | | | 1.5 | p | W S | 97 | 43 |
| | 165 | | | 1 | mp | W. | 26 | 97 |
| | 171. | | | 2 | m | S | 72 | 97 |

Also a red star from H. C. O. list, 1870 at approximately
~~2~~ 17h 21m −20° 43'
? 7 15 47 −20 43 174 B a 176

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 42 | 7 | Ophiuchus | δ | | 2 | b. | W. | 98. 157. |
| | 9 | | ε | c | 1 | m | W. | 98. 157. |
| | 15 | | x | var? | 0.5 | m | PW | 98 167 |
| | 17 | | | III | | b | WP | 98 167 |
| | 40 | | | | | | PW | 98 167 |
| | 66 | | | c. | | | WPS | 98 167 |
| | 70 | | | v. var? | | | S P? | 98 168 |
| | 103, 104 | | A | v. dpl. | | | S W | 98 168 |
| | 110 | | | var? | | | P S | 98 168 |
| | 112, 113 | | o | c dpl. | | | P S | 98 168 |
| | 125 | | | | | | S P | 98 168 |
| | 128 | | | | | | S | 98 168 |
| | 135 | | r. | | | | S | 98 169 |
| | 149 | | c. | var? | | | S | 98 169 |
| | 179 | | | | | | S | 98 169 |
| | 193 | | | var.? | | | S | 98 169 |
| | 206 | | | III var | | | S | 98 169 |
| 31 | 7 | Corona Australis | | ~~c.~~ | | | P | 98 199 |
| | ~~18~~ | | | ~~r~~ | | | | |
| | ~~30 32~~ | | | | | | | |
| | 34 | | ε | c. | | | A.N.S. | 96. 166. |
| | 43 | | δ | c. | | | | |

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# Red Stars in N. A.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | — | b | 98 | 204 | | | | | | |
| 14 | — | b | 98 | 204 | | | | | | |
| 8 24 | — | b | 98 | 204 | | | | | | |
| 14 26 | — | b | 98 | 204 | | | | | | |
| 24 27 | — | b | 98 | 204 | | | | | | |
| 24 [illegible] | | | | | | | | | | |
| | | | | | ray. neb.? raw? neb | | | | | |
| 32 28 | Sagittarius | γ | | | N. ray. | | | | S | 98 169 |
| 31 | | | | | | | | | S | 98 169 |
| 37 | | | | | | | | | S | 98 169 |
| 40 | | | | | | | | | S | 98 169 |
| 42 | | | | | | | | | S | 98 169 |
| 43 | | | | | | | | | S | 98 170 |
| 46 | | η | | | | 0 | III | | P | 99 8 |
| 50 | | | | | c. | | | | S | 98 170 |
| 51 | | | | | | | | | S | 98 170 |
| 54 | | δ | | | | | | | S | 98 170 |
| 56 | | | | | c. | bands | | S | WP | 98 170 |
| 65 | | | | | N. N. | | | | PSW | 98 170 |
| 67 | | λ | | | | | | | SP | 98 170 |
| 77 | | | | | | | | | P | 98 177 |
| 78 | | | | | | | | | P | 98 177 |
| 80 | | | | | | 1 | n | | P | 98 195 |
| 81 | | | | | neb. | | | | P | 98 177 |
| 93 | | | | | | ~~1~~ | ~~n~~ | | ~~P~~ | ~~99 8~~ |
| 99 | | | | | | 1 | n | | P | 99 8 |
| 104 | | | | | raw? | | | | S | 98 177 |
| 108 | | | | | | 0 | n. | | P | 98 195 |
| 113 | | $\nu_2$ | | | | | | | S | 98 177 |
| 131 | | | | | | | | | S | 98 178 |
| 139 | | τ | | | | | | | S | 98 178 |
| 140 | | | | | | | | | S | 98 178 |
| 142 | | | | | raw? | | | | S | 98 178 |
| 152 | | | | | | | | | SP | 98 178 |
| 153 | | | | | | 0 | n | | P | 98 205 |
| 154 | | | | | c. | 0 | n | | P | 98 195 |
| 160 | | d. | | | | 0 | n | | P | 98 205 |
| 163 | | | | | | 1 | n | | P | 98 205 |
| 182 | | $\chi_8$ | | | N. raw? | 1 | n | | P | 98 206 |
| 185 | | | | | | 0 | n | | P | 98 206 |
| 202 | | | | | | 0 | n | | P | 98 207 |
| 204 | | | | | raw | 0 | n | | P | 98 207 |

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# Red Stars in H. A.

| | | | | | Colour | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|---|
| | 209 | | | | 1 | n | P | 98 207 |
| | 216 | | neb. | | | c | P | 98 196 |
| | 221 | $e_1$ | | | 0 | n | P | 98 207 |
| | 229 | f | | | 0 | n | P | 98 207 |
| | 250 | b | | | 0.5 | n | P | 98, 207 |
| | 257 | $b_2$ | | | 0 | n | P | 99 9 |
| | 260 | | | | 0 | n | P | 99 9 |
| | 264 | | | | 0 | n | P | 98 207 |
| | 265 | c | | | 1 | III | P | 98 207 |
| | 266 | | c | | 0 | n | P | 98 207 |
| | 268 | | | | | | | |
| | 270 | | | | | | | |
| | 272 | | | | | | | |
| | 279 ~~280~~ | | | | | | | |
| | 283 | | | raw? | | | | |
| | 294 ~~297~~ | | | raw? ~~raw?~~ | | | | |
| 51 | 32 | Serpens Cauda. | | cum | 1.5 | n | P.S. | 98 193 |
| | 42 | | | | | n | SP | " " |
| | 43 | | | | 1.5 | n | SP | " " |
| | 45 | c | | | 0.5 | n | S.P. | " " |
| | 67 | | | | 1.5 | n | P.S. | " 194 |
| | 69 | | | | 0.5 | n | P.S. | " " |
| | 71 | o | | raw? | 0 | n | S.P. | " " |
| | 72 | | | | | | | |
| 52 | 10 | Scutum | | vv | 2 | n | P | 98 207 |
| | 14 | $\alpha$ | | raw? | 0 | n | P | " " |
| | 17 | | | | 1 | bedeau | P | " " |
| | 25 | R. | | raw. | 2 | Brun rouge | P | " " |
| | 27 | | | | 2 | n | P | " " |
| | 30 | | | neb. | 0 | n | P | " 210 |
| | 93 | $\eta$ | | | 1 | n | P | " " |
| 53 | 9 | Aquila | i | | 1 | n | P | 98 211 |
| | 15 | h | | | 0 | n | " | " " |
| | 22 | R. | | vv raw | | | | |

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# Red Stars in H. A.

| | | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|
| | 35 | | | 1 | n | β | 98, 212 |
| | 42 | | | 1 | n | β | " " |
| | 43 | | | 2 | n | β | " " |
| | 53 | | v. var. | 2 | n | β | " " |
| | 54 | θ | | 2 | n | β | " " |
| | 58 | ω | var. | 1 | n | β | " " |
| | 59 | | | 1 | n | β | 98, 213 |
| | 64 | ι | var? | 0 | n | β | " " |
| | 80 | | | 0 | n | β | 98 213 |
| | 85 | | | 1 | n | β | 98 " |
| | 89 | η | var. | 0 | n | β | " " |
| | 101 | | | 1 | n | β | " " |
| | 103 | | | 2 | n | β | " " |
| | 107 | τ | | 1 | n | β | " " |
| | 123 | | | 1 | n | β | 98 214 |
| | 131 | | | 1 | n | β | " " |
| | 135 | | var? | 1 | n | β | " " |
| | 142 | | | 1 | n | β | " " |
| 33 | 13 Monocerotis | | c | | | | |
| | 17 | | | | | | |
| | 28 | | c | | | | |
| | 33 | | | | | | |
| | 35 | | | | | | |
| | 43 | | | | | | |
| | 68 | | | | | | |
| 44 | 5 Capricorni | | v var? | | D n | β | 98, 201 |
| | 11 | σ | | | 1 n | β | 98, 201 |
| | 24 | | | | 1 n | β | 98, 201 |
| | 216 | | var. | | 1 n | β | 98, 201 |
| | 41 | υ | | | 1 n | β | 98, 201 |
| | 43 | | | | 1 n | β | 98, 202 |
| | 52 | | | | 1 n | β | 98, 202 |

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# Red Stars in H. a.

| | | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|
| 56 | ω | | new | 0 | III | P | 98 202 |
| 68 | n | | | 0 | n | P | 98 202 |
| 73 | A | | | 1 | n | P | 98 202 |
| 80 | φ | | | 0 | n | P | 98 202 |
| 81 | | | new | 0 | III | P | 98 203 |
| 86 | ι | | | 0 | n | P | 98 203 |
| 89 | | | | 0 | bad 2 lines III? | P | 98 203 |
| 90 | | | | 0 | n | P | 98 203 |
| 94 | | | | 1 | n | P | 98 217+ |
| 99 | | | | 1 | n | P | 98 217+ |
| 106 | | | | 1 | n | P | 98 217+ |
| 113 | χ | | | 0 | n | P | 98 217+ |
| 469 Aquarius | | k | | 2 | III | P | 98 217 |
| 10 | | T | rav | Superb object! | n | P | " " |
| 13 | | | rav? | 0 | n | P | " " |
| 24 | | | rav? | 1 | n | P | " " |
| 75 | | β | neb. | 0 | n | S | 99 14 |
| 76 | | | | | contin. | S | " 14 |
| 87 | | | | 1 | bds. | S | " 14 |
| 105 | | α | | 1 | n | PS | " 14 |
| 120 | | | rav? | 0 | n | S | " 20 |
| 135 | | | | 1 | n | S | " 20 |
| 145 } 146 } | | f | c dpl. | 0 | n | SP | " 20 |
| 150 } 151 } | | ζ | c dpl. | | | | |
| 181 | | | | | | | |
| 183 | | τ | | | | | |
| 185 | | λ | | | | | |
| 193 | | | | | | | |
| 195 | | | | | | | |

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# Red Stars in H. A.

| | | | | color. | Spect. | obs. | Rep. |
|---|---|---|---|---|---|---|---|
| | 207 | | | | | | |
| | 215 | 9 | | | | | |
| | 216 | | | | | | |
| | 218 | $\psi_1$ | | | | | |
| | ~~219~~ | ~~$\chi$~~ | | | | | |
| | 222 | $\psi_2$ | | | | | |
| | 235 | $b_2$ | | | | | |
| | 256 | $A_1$ | | | | | |
| | ~~260~~ | ~~R.~~ | vv. | | | | |
| 61 | 4 | Delphini | v raw? | 1 | n | P | 98. 215 |
| | 13 | $\chi$ | | 0 | n | P | " " |
| 62 | 8 | Equulei | | 1 | n | P | 98 215 |
| | ~~27~~ 26 | | | 1 | n | P | " " |
| | ~~28~~ 27 | | cum | 0 | 2 | P | " " |
| 63 | 9 | Pegasi | | 2 | III | P | 98 215 |
| | 11 | $\varepsilon$ | v. raw? | 0 | n | P | 98 216 |
| | 18 | | | 2 | n | P | " " |
| | 25 | $\theta$ | raw? | 0 | 2 | P | " " |
| | 33 | | | 1 | n | P | " " |
| | 34 | | | 1 | n | P | " " |
| | 42 | | | 1 | III | P | " " |
| | 43 | | | | III | P | " " |
| | 51 | | raw? | | | | |
| 25 | 12 | Gruis | c | 1 | n | S | 99 27 |
| | 38 | $n_1$ | vv | too low | | | |
| | 41 | $\gamma$ | | 2 | n | S | 99 28 |
| | 57 | $\beta$ | | too low | | | |
| | 60 | | | 1 | n | S | 99 28 |
| | 69 | | | 1 | n | S | 99 28 |
| | 82 | | | 1 | n | S | 99 28 |

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# Red Stars in U. A.

| | | | | Color. | Spect. | Obs. | Ref. |
|---|---|---|---|---|---|---|---|
| 38 | 29 | Piscis Austrinus | v. var? | 2 | m | S | 99 28 |
| | 30 | " | | 2 | m | S | 99 28 |
| | 34 | | | 1 | m | S | 99 29 |
| | 53 | | | 1 | p | SP | 99 29 |
| | 69 | | | | | | |
| | 71 | | | | | | |

## Special Stars to be obs.

40 Hydra * 257 $b_3$ var?

19 Centaurus $\frac{261}{262}$ comm.

" 380

~~181 Scorpius~~

~~745 "~~

~~159 "~~

~~Corona Australis~~

~~28 Equuleus~~

~~46 Sagittarius~~

~~93 "~~

~~99 "~~

~~257, 260 "~~ Col-1

264-291 " 5 5

~~Microscopium~~ ~~7~~ 4

Aquarius 19

Lyra 7 7

Piscis Australis 6 6

44 22

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Pos. of Variable in Ursa Minor.

$16^h\ 32^m\ 0^s \quad +72^\circ\ 36'$

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# Variable Stars whose maxima occur in the latter part (after Sept. 1) of 1881, excluding those which have previously been observed as having banded Spectra.

[Stars whose max are not easily visible are struck out with double line in pencil

Eg 1875 positions are indicated in red ink

| Date of Maximum 1881 | | | Apparent Place 1855 | | | Max. Mag. | |
|---|---|---|---|---|---|---|---|
| | | | h | m | s | ° ′ | |
| Sept 11 | ~~R Scorpii~~ | | | | | | |
| 15 | Σ Heraclis | | 18 | 3 | 37 | +31 0 | 7.8 ± .6 ✓ |
| 17 | U Caneri | | 8 | 27 | 28 | +19 23 | 9.3 ± 1.1 |
| 21 | S Cassiop. | | 1 | 9 | 4 | +71 51 | 7.6 ± 0.9 99, 184 2 bands |
| 24 | S Hydrae | | 8 | 46 | 0 | +3 37 | 8.0 ± 0.5 |
| Oct 10 | R Cephei | h 202 | 20 | 4 3 | 17 10 | −14 39 42 | 9.2 ± 0.4 99, 83 pass binaries +3 5 3 +10" |
| 15 | S Tauri | | 4 | 21 | 16 | +9 37 | 9.9 — |
| 17 | ~~S Virginis~~ | | ~~13~~ | ~~25~~ | ~~26~~ | ~~−6 27~~ | |
| 22 | ~~U Virginis~~ | | ~~12~~ | ~~43~~ | ~~45~~ | ~~+6 21~~ | |
| 23 | V Caneri | | 8 | 13 | 27 | +17 44 | 7.0 ~~7.8~~ ± 0.2 |
| 26 | Σ Can. Min. | | 7 | 25 | 56 | +12 3 | 9.4 ± 0.3 |
| 26 | ~~S Ophiuchi~~ | | ~~16~~ | ~~25~~ | ~~55~~ | ~~−16 51~~ | |
| Nov 1 | S Vulpec. | | 19 | 42 | 27 | +26 56 | 8.4 ± 0.2 99, 186 no spec |
| 2 | V Coronæ | | 15 | 44 | 21 | +40 1 | 8 — 99, 154 bands |
| 7 | S Sagittarii | | 19 | 10 12 | 57 7 | −19 17 15 | 10.0 ± 0.3 — |
| 8 | ~~S Libræ~~ | | ~~15~~ | ~~13~~ | ~~4~~ | ~~−19 52~~ | |
| 11 | R Ceti | | 2 | 18 | 38 | −0 50 | 8.3 ± 0.4 99, 187, bands |
| 15 | Σ Hydrae | | 8 | 48 49 | 37 35 | −8 35 40 | 7.5 ± 0.5 |
| 17 | S Ceti | | 0 | 16 17 | 41 42 | −1.0 1 | 7.5 ± 0.5 99, 185 |
| 20 | R Persei | | 3 | 20 | 50 | +35 10 | 8.6 ± 0.5 99, 185 |
| Dec 1 | ~~Σ Ophiuchi~~ | | ~~16~~ | ~~25~~ | ~~27~~ | ~~−15 49~~ | |
| 2 | Σ Aquarii | | 20 | 42 43 | 17 20 | −5 41 36 | 6.8 ± 0.1 ✓100.4 |
| 2 | S Delphini | | 20 | 36 | 24 | +16 34 | 8.5 ± 0.1 ✓ |

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1881

| | | | | | | |
|---|---|---|---|---|---|---|
| Dec. 5 | ~~S Scorpii~~ | | | | | |
| 6 | R Aurigæ | 5 | 5 | 36 | +53 25 | 7.0 ± 0.5 |
| 8 | Σ Delphini | 20 | 38 | 38 | +15 52 | 8.5 ± 0.5 |
| 11 | S Bootis | 14 | 18 | 1 | +54 28 | 8.3 ± 0.2 |
| 13 | S Gemin. | 7 | 34 | 20 | +23 47 | 8.5 ± 0.3 |
| 22 | R Draco. | 16 | 32 | 19 | +67 3 | 6.7 — |
| 27 | R Arietis | 2 | 7 | 53 | +24 23 | 8.0 ± 0.4 |
| 28 | Σ Serpentis | 18 | 21 | 44 | +6 12 | 9.5 ± 0.5 |
| 29 | R Lyncis | 6 | 49 | 20 | +55 32 | 9 ? |

[Scheiner's var. of 1612 suspected Star] 9 29 21.4 +15 53.5 8.5 mag. [See V.J.S. 1868, 283 also Nature XIX 244]

## Eclipses Jupiter's Satellites.

W.M.T.

| | | | | | |
|---|---|---|---|---|---|
| April. | 8 | 10 | 30 | 37.6 | I Re. |
| | 13 | 6 | 26 | 11.6 | II Re. |
| | 17 | 6 | 54 | 39.6 | I Re. |
| | 20 | 9 | 3 | 8.3 | II Re. |
| | 21 | 6 | 14 | 53.9 | III Re. |
| | 24 | 8 | 49 | 47.5 | I Re. |
| | 28 | 8 | 28 | 0.3 | III D |

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Variable Stars of Long period near maximum May–June 1882, the character of whose Spectra has not yet been observed

| Schonfeld No. | | 1855 α | 1855 δ | Max^t | Max. Mag. |
|---|---|---|---|---|---|
| 48 | S Hydræ | 8 46 0 | +3 37 | June 29 | 7½–8½ |
| 55 | R Crateris | 10 53 26 | −17 32 | May 24 | 7.8 |
| 61 | R Corvi | 12 12 8 | −18 27 | Apr 28 | 7 |
| 65 | W Virginis | 12 43 45 | +6 20 | May 4 | 8 |
| 67 | V " | 13 20 19 | −2 25 | Apr 2 | 8–9 |
| 72 | R Camelop. | 14 28 54 | +84 29 | Mar 27 | 8–8½ |
| 76 | S Libræ | 15 13 4 | −19 52 | May 21 | 8 |
| 79 | R Coronæ | 15 42 36 | +28 36 | Irreg. (now about 6 m) | 5.8 |
| 85 | R Serpentis | 16 9 1 | −22 35 | Apr 22 | 9–10½ |
| 86 | S Serpentis | 16 9 2 | −22 32 | May 31 | 9–10½ |
| 91 | S Ophiuchi | 16 25 55 | −16 51 | June 16 | 8½–9 |
| 94 | R " | 16 59 27 | −15 53.7 | May 14 | 7½ |
| 111 | T Sagittarii | 19 7 52 | −17 13.2 | May 10 | 7½ |
| 113 | S " | 19 10 5 | −19 18.1 | June 25 | 9.7 |
| 116 | S Vulpec. | 19 42 27 | +26 55.7 | May 22 | 8½–9 |
| ~~121~~ | ~~S Aquilæ~~ | | | | |
| 133 | T Cephei | 21 14 0 | −15 46.4 | May 11 | 9 |
| 143 | R Cassiop. | 23 51 4 | +50 34.9 | June 15 | 5 |

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# Points on Encke.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0° | | | Black shadows. | | |
| ~~47~~ | 55 | 1° | a | | Darkest-Interior floor | Grimaldi (W) | 1,85, P,S; 1,94, S; |
| ~~E~~ | 15 | 1½° | b | | Interior | Boeotian | I 0,88, S 0.89 W; 0.97 S; 0.175, P; 1,142 P |
| ~~43~~ | 51 | " | c | | " | Billy (W) | 1,86 PS; 1,91. P.W.; |
| ~~41~~ | 49 | " | d | | " | Lupus (W) | 1,87 PS; 1,92 P, 93 W; |
| ~~F~~ | 1 | 2° | e | | Floor | Endymion. | I 0,156, P, S; 0.182 W.; 1,139 P 1448 |
| ~~9~~ | 9 | " | f | C | " | Lemonnier | I 0.94 P; 0.96 S; 1,140 P 1455, 1,147 P |
| ~~16~~ | 16 | " | g | | " | Caesar | I 0.90, W; 0,175, P; 1,142 P |
| ~~42~~ | 50 | " | h | | " | Cruger | (W) 1,87 PS; 1.93 W.P.; |
| ~~38a~~ | 46 | " | i | | " | Faraday | (W) |
| ~~3~~ | 3 | 2½° | j | | Interior | Azout | I 0,88 S 0.89 W; 0.94 P; 0.95 S; 1,139, P |
| ~~10~~ | 10 | " | k | | " | Vitruvius | I 0.95 P, 0.96 S 1,140 P 1455 |
| ~~21~~ | 22 | " | l | | " | Petavius | I 0.175, P; 1.82. P.W; |
| ~~38~~ | 45 | " | m | | " | Hipparchus | II ~~1.72. W.~~ 1,82, P.W |
| ~~48~~ | 56 | " | n | | " | Manzinus | (W) 1.90, W.P.; 1.94 S; |
| ~~6~~ | 6 | 3° | o | C | " | Taruntius | I 0.179 P; 0.179, W; 1,140, P 1425 1,147 P C |
| | | " | p | | " | Pliny | |
| ~~12~~ | 12 | " | q | | " | Theophilus | I 1.74 ~~W~~ W. S. 1 141 P 1465 |
| ~~46~~ | 54 | " | r | | " | Hamilton | (W) 1,85 S P; 1,90, P.W |
| ~~37~~ | 44 | " | t | | " | Menelaus. | II 0.176, P; 1,82 P.W; |
| ~~2~~ | 2 | 3½° | u | C | Close | Hansen | I 0.178, P; 0.178, W; 1,139 P. 1445, 1,147 P C |
| ~~31a~~ | 35 | " | v | | " | Archimedes | I 0.163, P; |
| ~~39~~ | 47 | " | w | | " | Menelaus | (W) 1,86, S P; 1,93 P, 94 W |
| ~~14~~ | 14 | 4° | x | | Interior | Manilius | I 0.89, W; 0.165, P; 1,141, P |
| ~~23~~ | 24 | " | y | | " | Attalus | I 0.165, P; 1.80. S.W; 1.103. P.W; |
| ~~22~~ | 23 | " | z | | " | Gutenberg | I 1.81. W.; 1,103, P.W; |
| ~~33~~ | 33 | 4½° | A | | Surface | Aristarchus | I 0.90 W; 0.164, P; |
| ~~26~~ | 28 | " | B | | " | Sinus Medii | I 1.78 P.S.; 1.92 W P 1.157 P 1,159 |

I Dentro R's most 1 half from II Dentro R's 1 fifth from

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C 1 PSWPS –
2 PWPSP –
3 SSWPSP –
4 PSPSP –
5 WPPSP –
6 PWPSP –
7 PSPSP –
8 PSSPP –
9 PSWSP –
10 PSPSP –
11 WSPSP –
12 WS PSP –
13 PWPSP –
x 14 WPPPP –
15 SWSPP –
g 16 WPPPP –
17 WPPSP –
18 WSPPP –
19 SWSSPP –
R 20 SWPPP –
21 WPSPP –
22 PPPWPPP –
23 WSPWP –
24 PSWPW –
25 SPPWP –
26 SWWPP –
27 PWWPP –
B 28 PSPPP – media
29 PSPWP –
δ 30 PSPPP –
31 PSPWP –
P 32 WSPP
A 33 WPPP
G 34 PWWP
υ 35 PPPP
I 36 PWPP
II 37 PWP
II 38 PPP
II 39 W. PPP
II 40 PWPP
II 41 PPP
β 42 PWPP
II 43 WPPP
II 44 PPWPP –
II 45 PWPP
W 46
W 47 SP. PP
II 48 PSPPP –
W 49 PS.P.W.P –
W 50 PSW.PS –
W 51 PSSP
W 52 SPP.WS –
W 53 W.PSP
W 54 S.P.P.WP
W 55 W.PS, SS –
W 56 PW.PS

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# Points on Moon.

| | | | | | | |
|---|---|---|---|---|---|---|
| ~~17~~ | 17 | 5° | B | Walls of Arago | I | 0,90 W; 0.165, P; 1,142. P 1468 |
| ~~36~~ | 43 | " | D | " " Landsberg | II | 0.181 W. |
| ~~35~~ | 40 | " | F | Surf. and Kepler. | II | 0.176, P; 0.182 W. |
| ~~34~~ | 34 | " | G | " " Archimedes | I | 0.163, P; 0.181 W. |
| ~~4~~ | 4 | 5½° | H | Walls of Picard | I | 0.94 P; 0.95 S; 0.157, P, S; 1,139. P |
| ~~36~~ | 36 | " | I | " " Timocharis | I | 0.164, P; 0.180 W. |
| ~~8~~ | 8 | 6° | J | " " Rheinhold | I | 0.94 P; 0.96 S; 0,157, S P; 1,140 P |
| ~~20~~ | 21 | " | K | " " Kant | I | 0.180 W; 1.77 P S; 1,142 P |
| ~~13~~ | 13 | " | L C | " " Bullet | I | 0.165, P; 0.180. W. 1 141. P 1465 1,147 P. |
| ~~27~~ | 27 | " | M | " " Riccius | I | 0.163, P; 0,180. W; 79; 1,104, W |
| ~~52~~ | 52 | " | N | " " Flamsteed (W) | | 1,86 S. P; 1.92, P, 93 W; |
| ~~5~~ | 5 | 6½° | O C | " " Lansbergius | I | 0.179, W; 0.179. P; 1,140 P 1,145 S, 1,147 P |
| ~~29~~ | 32 | " | P | " " Mercurius | I | 1.75. W. S. |
| ~~33~~ | 37 | " | Q | " " Gabriel | II | 1,83, P. W. |
| ~~9~~ | 10 | 7° | R | Mersen | I | 1.74. S. W. 1,143 P |
| | | " | | ~~Ariadaeus~~ | | |
| ~~28~~ | 31 | " | T | Bode B | I | 1.76-77. P S.: 1,105, P, W; 1.143, P |
| ~~53~~ | 53 | " | U | Wichmann (W) | | 1,91. W. P; 94; |
| ~~38a~~ | 41 | " | V | Kepler | II | 0.176, P; |
| | | ~~9½°~~ | ~~W~~ | ~~Walls of Godin~~ | | |
| | | " | X | ~~Bode~~ | | |
| | | " | ~~Y~~ | ~~Copernicus~~ | I | |
| ~~18~~ | 19 | 8° | Z | Walls of Godin | I | 0.88 S. 0.89 W; 0,93 S 0.96 S 1,142 P |
| ~~27~~ | 29 | " | α | " " Bode | I | ~~1.76-77. P S.~~ 1,105, P. W 1,143, P |
| ~~36~~ | 42 | " | β | " " Copernicus | I | 0.164, P; 0.181 W. |
| ~~7~~ | 7/30 | 8½° | γ | " " Brosius | I | 0.94 P; 0.95 S; 0 157 P. S.; 1, ~~139~~ 140 P |
| (See p. 192.) | | " | δ | Bode A | I | 1.77 P.S: 1143 P |
| ~~23a~~ | 25 | " | ε | Hipparchus | C | 1.78. S.P; 1,103, P W 1,143, P |

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| | | | | | | |
|---|---|---|---|---|---|---|
| ~~#~~ | 11 | 9° 3 | Centaurus | I | ~~1,70 W.S.~~ 7.7 | 1,141, P 7.5 1458 8.3 |
| ~~17a~~ | 18 | " π | Dionysius | I | 0,90 W; 0,93 S; 0.165, P; | 1,142 P |
| ~~E 4~~ | 26 | " J | Mösting A | I | 1,7 6.7 S.W: 1,104, W P; | |
| ~~40~~ | 48 | " K | Mösting B | II | 0.176, P; 7.2 1,8 S P; | 1,94 W |
| ~~34~~ | 38 | 9½° μ | Inter Centaurus | II | 0.164, P; | |
| ~~34a~~ | 39 | 10° ~~K~~ π | Central peak Cent | II | 1,83, W.P | |
| | | | Mösting C | | 1,98 S P | |
| | | | i ? | | 1,105, W, 106 P; | |

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Notes to Points on Moon.

There is a discrepancy in Neison with reference to the location in longitude of Bode A.

The descriptive text on page 296 gives the longitude as $-1^\circ 19' 40''$, whereas the tabular values of coordinates on page 565 makes it $-3^\circ 19' 40''$.

The former is correct.

Additional Nat. Obs.

1137, R101, 44. P.C, 3155, 3171, 0180, R101, 44 P.C

1166 R101, 44 P.C

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"Nebulae" Wolf's whose spectrum is still unknown.

218
307
351
352
768 Cumpl Cost.
801
1112
1157 Athens R 101,41 P.C
1267
1532 ?
1823 101 R 221, P.
1861
1863
1909
2038
2041 ?
2104
2203
2207
2301
2318
2352
2360
2362
2377
2373
2386 ?
2413
2600

2660
2723
2786
2806
2836
2838
2851
2855
2878.?
2946
2961
2972
3021
3042
3043
3049
3075
3101
3106
3165
3182 R 101,44 P.C.
3249
3258
3278
3437
3471
3900
4029
4487

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Points on Moon to be observed May. 1882.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Mersenius C | 2 | | | 1,189 P; 1,191 S; |
| | | i Fontius a flow | 3 | | | 1,190 P; 1.190 S.; |
| | | d ~~Bessis~~ Bode | 3 | | | I 1,189 P; 1,191 S; |
| ✓ | | W Wilkes | 3 | (north of Sinus Med.) | | I 1,181 P; 1,183 P; 1,186 S; 1, 189 |
| ✓ | | X Hortensius | 2 | (f Copernicus) | | II 1,183 P; 1,186 S; 1,189 P; 1, 191 |
| ✓ | | Y Euclides | 2 | {south of X; this Y is struck out but should stand} | | II 1,183 P; 1.186 S; 1.189 P; 1 191 |
| ✓ | C | 11 Z Censorinus | 3 | p Sin. Med. considerably | | 1.181 P; 1,186 S; |
| | C | 23 z Guericke (interior) | | f Ptolemaeus | | 1.181 P; |
| | C | 32 P Thaeetetus (walls) | | towards the north | | 1,181 P; |
| | C | 33 A Aristillus (surf. round) | | near P | | 1.181 P; |
| | C | 34 B Archimedes (surf. round) | | " " | | 1,182 P |
| not P | C | 35 v Archimedes (floor) | 3 | " " | | 1,182 P. 1,186 S; |
| | C | 36 I Timocharis (walls) | | f G | | 1.182 P. |
| | C | 37 2 Lahire (walls) | II | f I | | 1,183 P; |
| ✓ | C | 38 μ Aristarchus Inter. | II 3 | | | 1,183 P; 1.187 S; 1,190 S; |
| ✓ | C | 39 π " C.Pk. | II | | | 1,190 S; |
| | | ~~39~~ | | | | |
| ✓ | C | 40 A Kepler (surf. round) | II | | | 1,187 S; |
| not P. | C | 41 V " | II 3 | | | 1,184 P; 1.187 S; |
| ✓ | C | 42 β Copernicus (walls) | | | | 1,187 S; |
| ✓ | C | 43 D Leandelsig (walls) | II 3 | south of Copern. | | 1,184 P; 1,188 S; |
| | C | 45 n Hipparchus (interior) | | 2d plat. s f | | 1,184 P; |
| ✓ | | 46 i Fontius a (floor) | W 2 | Neison, Map. XV p. 387 | | See top of this page |
| | C | 49 d Lupus (interior) | W | Webb | | 1,184 P; |
| | C | 53 Q Wichmann | | " | | 1,184 P; |
| | C | 56 n Mersenius (interior) | | " | | 1,184 P; |
| | | Mersenius? | 2? | Neison, Map. XV p. 387 | | |
| | | i Fontius a floor | 3 | " " XV p 387 | | |
| | | d Bode | II 3 | I | | |

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Nearly Joints mentioned are:-

Mutchenius C

; 1, 189 P; 1, 191, S; i Tonkin a

4, 191 S; X Hantenius

1 191 S; V Euclides

in Neiphalus

Observations of Subtilis.

| | | | |
|---|---|---|---|
| 1878. | July | 5 | 0.5 |
| | July | 7 | 0.5 |
| | July | 5 | 1.4 |
| 1882 | July | 6 | 8.2 0.4 |
| | " | | 10.0 0.4 |
| | July | 10 | 9.1 0.4 |
| | July | 12 | 8.2 0.5 |
| | " | 15 | 8.0 0.4 |
| | Aug | 11 | 7.8 mm |
| | | 13 | 9.7 " |
| | | 18 | 8.0 " |
| | | 19 | 9.8 " |
| | | 20 | 7.8 " |
| | | 22 | 7.5 " |
| | | 24 | 10.4 " |
| | | 30 | 9.0 " |

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# List of Double Stars, taken from the Catalogue of Suspected Variables.

| Star | α 1855 h m s | δ 1855 ° ′ | Mags | | Dist. | Pos. Angle | | Authority |
|---|---|---|---|---|---|---|---|---|
| | 1 12 50 | −16 4/2 | 3½ 8:A | 7 10:B 10:(C) | 1.5 | 26° | | O Stone & Jacobs |
| | 2 14 15 | +48 40 | | | | | coarse triple: B & C. var. | Σ 256 |
| | 2 22 35 | 57 48 | 8.2 | 8.2 | 1.7 | 42° | | Secchi & OΣ |
| π Arietis | 2 41 13 | 15 51 | 4.9 | 8.4 | 3.3 | 119° | 3.0, 2.9, 2.8. H.C | Σ |
| ε " | 2 50 56 | 20 46 | 5.7 | 6.0 | 0.5 | 189 | | Σ & Engelmann |
| | 2 53 58 | 10 16 | 8.2 | 8.5 | 20" | 200 | | Σ |
| | 3 34 59 | 7 26 | 7 | 10 | 1.9 | 126 | See Details Next page | OΣ |
| ν Tauri | 4 13 22 | 19 28 | 4.2 | 11.3 | 26 | 138 aB | | |
| 7 Camelop. | 4 45 40 | 53 31 | | | 1.2 | 309<0 | Triple | 7-co De |
| | 4 48 38 | 2 57 | 7 | 7.5 | 0.8 | 240 | | OΣ |
| | 5 7 36 | +33 10 | 8.0 | 8.0 | 3.0 | 71° | near | Σ |
| Ll. 10527.9 | 5 27 56 | − 6 6 | 6 | 6 | | | H C | Falb, Schmidt & |
| C Orionis & companion | 5 28 12 30 | − 4 55.6 | 5½ | 5½ | | | | Sould. |
| ο Orionis | 5 31 28 | − 2 41 | Comp. at 236° 11.0 | | | | H C | Dawes. |
| | 5 42 38 | +28 25 | 7.7 | 8.4 | 12.1 | 48° | | Σ & q.v. |
| 35 Camelop. | 5 53 0 | +51 34 | 6.½ | 8.½ | 39.4 | 13° | (A var.) | Dembowski |
| | 6 32 4 | 59 36 | 7.2 | 9.0 | 4.2 | 133° | | Σ & Smyth. |
| 38 Semin. | 6 46 28 | 13 22 | 5.4 | 7.7 | 5.8 | 175° | | Σ & Engel |
| | 7 8 56 | 9 39 | 8.2 | 11.7 | 24" | 283° | | Barnham |
| Star 1° south of 61 Semin. | 7 18 24 | 20 33 | | | | | 60" | Webb &c |
| 8m. star near ζ Can. Min. | 7 32 | 5 36 | | | | | | Smyth & Fletch. |
| 51 Camelop. | 7 32 4 | 65 29 | 7.1 | 7.1 | 15.5 | 5° | | Σ |
| K Semin. | 7 35 43 | 24 46 | 4 | 8.5 | 6" | 230 | 5.8, 5.6, 5.7 H C | OΣ & De. |
| 17 Caneri | 7 56 46 | 27 56 | 6.5 | 7.4 | 3.5 | 355° | | Σ |
| 48 ι Caneri | 8 37 55 | 29 16 | 4.4 | 6.5 | 30" | 307° | 2.6, 2.4 2.6 H C | Σ |
| | 9 20 31 | 67 20 | 7.2 | 7.3 | 10" | 246° | | Σ |
| | 9 22 49 | 11 14 | 7.4 | 7.7 | 14" | 243 B | | Σ |
| 39 Leonis | 10 9 16 | +23 50 | 5.8 | 11.4 | 7" | 300° | | O. Σ. |
| | 10 39 0 | − 4 57 | 8.2 | 8.5 | 1.4" | 6° | | Σ |
| | 10 56 30 | +4 25 | 7.5 | 7.6 | 1.0" | 276° | | OΣ |
| | 4 5 41 | − 7 13 | 8.5 | 10.3 | 7" | | | Σ 514 |

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P — — bot centered — vanishes! Omit —

Mean bot cap.

— —

— E ? Inpl R.B. 104, p39, S; 104, 44, S / 10 v. 73 W. /

— —

— b R 103, 193 P.S., 104, 32+40 S; 104, 45, S;

— — —

May (9 + 9)? D = 4"½ P = 190° 105, 32, W.P.S.; Baxendell's var N Taurus (With Component variable

— —

— —

✓ 10 v. 73. W.S. / 105. 86. S.W. / 106, 30, S, W /

P ✓ 10 v. 74 S. W. / 10 v. 32. P. W. /

— C 104, p154. S.; 104. 212-13 S.; 105, 18, W.S.;

P ? 105, 17, 18, P.W. / 105, 75 W. /

✓ 10 v. 36. W. / 10 v. 76. S. W. /

✓ 1.9, 1.9, 1.9, W.3

✓ 102, 9, W, S;

10 v. 49 W. 105, 50 S. 106.23 S. P.

—

— 106.24 P.S. (est. of grades) low for bar Mich

— low Lichtenberg

— ✓

— C 10 v. 49. 50. W.S. / 106. 24. 25. P / 106. 29. W. / 106. 40. S.

✓ ! 106. 26. W. P. / 106. 31. W.S. / 106. 31+32 W. S. /

✓ ! 106. 27. W. P. v. / 106, 90 S. / 106, 93 S. /

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P 104, p49, S:

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See page 200

{Chandler Σ 1625

| Star | | 1855 α | | | δ | | | mags | | Dist. | Pos. angle | | Authority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 11 | 6 | 5 | +20 | 56 | | 7.3 | 7.3 | 1.0 | 288° | . | O.Σ & Chan. |
| | s | 12 | 9 | 50 | +80 | 56 | | 6½ | 8 | 14.11" | 220 | Sky cloudy. | |
| | | 12 | 23 | 3 | +10 | 31 | | 7.5 | 7.8 | 1.2 | 202° | Clear up. | Σ & Rad. Obs. |
| ζ Virginis | s | 12 | 34 | 20 | − 0 | 40 | | | | | | −0.1, 0.0, 0.0 HC | Σ 20. Σ |
| | | 12 | 49 | 1 | − 0 | 11 | | 7.2 | 7.6 | 0.7 | 240 | | O.Σ |
| Σ 1830. | s | 14 | 11 | 18 | +57 | 22 | | 8.5 | 9.8 | 4.8 | 264° | {Fainter of 2 stars in same field} | O.Σ. |
| | s | 14 | 22 | 54 | | 6 | 56 | 8.7 | 9.3 | 2.7 | 86° | | Σ. |
| ξ Bootis | | 14 | 34 | 14 | | 14 | 22 | 3.5 | 3.9 | 1.2 | 309° | . | Σ & O.Σ |
| | s | 14 | 37 | 51 | | 38 | 22 | 8.7 | 9.2 | 3.1 | 311° | | Dunér |
| 44 Bootis | s | 14 | 59 | 1 | | 48 | 13 | 5.2 | 6.1 | 2.9 | 234° | 1.0; 0.6 0.7 HC | {Several good auth. |
| | | 15 | 12 | 9 | | 27 | 23 | 5.6 | 6.1 | 1.6 | 274° | . | Σ. OΣ. & Dunér |
| W½ Bootis ? | | 15 | 19 | 2 | +37 | 52 | | ~~6.7~~ 4.5 | ~~7.3~~ 6.5 | ~~1.4~~ 10.8" | ~~1.7~~ 1.2 | . 2.5, 2.3, 2.4 HC | Knobel |
| | | 17 | 22 | 56 | | − 0 | 56 | 5.8 | 6.1 | 0.6 | 324 | . | O.Σ. |
| | | 17 | 39 | 18 | | +17 | 46 | 5.9 | 7.9 | 0.7 | 311 | . | Secchi & Dunér |
| 12 Ophiuchi | s | 17 | 41 | | | +27 | 49 | 3.8 | 2.8 | 30" | | | |
| | | 18 | 0 | 28 | | 3 | 33 | 4 | 5 | 0. | + | − | O.Σ |
| | | 18 | 29 | 28 | | 23 | 29 | 6.6 | 6.9 | 0.6 | 350 | . | OΣ |
| | | 18 | 29 | 28 | | 16 | 52 | 6.8 | 7.2 | 1.7 | 201 | . | OΣ |
| | | 18 | 42 | 25 | | 16 | 6 | 8.1 | 10.6 | 1 | 230 | . | OΣ |
| θ Serpentis | s | 18 | 49 | 1 | | 4 | 1 | 4.0 | 4.2 | 21.6" | 104 | 0.5, 0.5, 1.4 HC | {Gould & several others |
| | | 18 | 49 | 36 | | 33 | 47 | {5.7? | -10 ~~triple~~ | 45" | 350 | | |
| | | | | | | | | | | 1.5" | 134 | {10m in the variable | O.Σ. |
| 31 30 | | 18 | 51 | 35 | +44 | 3 | | A=7.4 B=8.5, C=11.1 | | AB=0".5 AC=12.7 | 166 263 | B is the last seen | O.Σ |
| | | 19 | 10 | - | −16 | 7 | | ~~7.3~~ | ~~7.8~~ | ~~0.6~~ | ~~188~~ | | {O. Stone Birmingham |
| | | 19 | 33 | 14 | +21 | 56 | | 7.3 | 7.8 | 0.6" | 188 | . | O.Σ |
| ζ Cygni | | 19 | 40 | 28 | | 44 | 46 | 3.0 | 7.9 | 1.8" | 38 | . | O.Σ. & Knott |
| | s | 19 | 45 | 22 | | 9 | 59 | 7.1 | 10.0 | 13.5" | 309 | | Σ. |
| | s | 20 | 7 | 45 | | 21 | 47 | 7.5 | 7.5 | 6.6" | 28° | | Σ |
| | s | 20 | 35 | 41 | | 12 | 13 | 7.4 | 7.6 | 8.3" | 87° | | Σ |
| | | 21 | 14 | 3 | | 2 | 17 | 7.5 | 8 | 1.6 | 50 | . | O.Σ. |
| | | 22 | 3 | 34 | | 58 | 34 | 8.0 | 8.0 | 0.5" | 334 | . | O.Σ. |
| | s | 23 | 44 | 21 | | 41 | 17 | aB,C | {7.8 7.8} | 9 | 21" | 345 | O.Σ. |
| | s | 23 | 45 | 37 | | 11 | 7 | 6.9 | 7.3 | 18.6 | 282 | | Σ |

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0.8, 1.2, 0.8, 0.5
102, 15, S.W.

0.3, 0.5, 0.5, 0.3
102, 20, S.W.

– 102, 21, S.W.S to clear.

! Var II < 10 27 m. S.

!! – 10 m. P. M. P. / 10 m. 26. P. M.

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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 12 | 9 | 50 | +80 | 56 | 6½ | 8 | 14" | 220° | Chandler. |
| γ Virginis | 12 | 34 | 20 | − 0 | 40 | 4 | 4 | | | -0.1, 0.0, 0.0 |
| | 14 | 11 | 18 | +57 | 22 | 8.5 | 9.8 | 5" | 264° | Estimate of two pairs of field |
| | 14 | 22 | 54 | +6 | 56 | 8.8 | 9.3 | 3" | 86° | |
| | 14 | 37 | 51 | +38 | 22 | 8.7 | 9.2 | 3" | 311° | |
| 44 Boötis | 14 | 59 | 1 | +48 | 13 | 5.2 | 6.1 | 3" | 234° | 1.0, 0.6, 0.7 |
| μ₁ μ₂ Boötis | 15 | 19 | 2 | +37 | 52 | 4.5 | 6.5 | 108" | 172° | 2.5, 2.3, 2.4 two ends ? |
| | 17 | 41 | | +27 | 49 | 3.8 | 9.8 | 30" | | Σ 2220. |
| δ Serpentis | 18 | 49 | 1 | + 4 | 1 | 4.0 | 4.2 | 22" | 104° | 0.5, 0.5, 1.4 |
| | 19 | 45 | 22 | + 9 | 59 | 7.1 | 10.0 | 14" | 309° | Σ 2590 |
| | 20 | 7 | 45 | +21 | 47 | 7.5 | 7.5 | 6" | 3° | |
| | 20 | 35 | 41 | +12 | 13 | 7.4 | 7.6 | 8" | 89° | |
| | 23 | 44 | 21 | +41 | 17 | 7.5 7.8 | 9 | 21" | 345° | |
| | 23 | 45 | 37 | +11 | 7 | 6.9 | 7.3 | 19" | 28° | |
| | 14 | 55 | 16 | +54° | 26' | 7 | 7 | | | |
| | 4 | 5 | 41 | −7° | 13' | | | | | |

δ Serpent. centre 103,192 SP.

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C 0.5, 0.8, 0.6, 0.3 | 0.4 0.4 0.5 0.5 | 0.5, 0.6, 0.7, 0.6. | 0.5, 0.6, 0.5, 0.6 | 0.6, 0.4, 0.6 0.6
102, 42 W | 102.45 PP | 102. 6 5. W. | 102.77. W. P.

C .8, 1.2, .8, .5. | 0.5, 0.4, 0.4, 0.7 | 0.5, 0.6
102. 15. SW. | 102.73 WS | 102.78 W. | 0.8, 0.6, 0.7.

~~W 2, 69~~
fhr 0.3, 0.5, 0.5, 0.3 | fhr. 0.3, 0.4
102.20 SW. | 102, 69 S. W. | 0.4, 0.3

Suspected Aug. 3.

6.2, 6.4, 6.4, 6.5. | 103. 4 5 - 6 W. | 6.4
102, 27 W. S.

C 0.3, 0.3, 0.4, 0.6; | 0.5, 0.4; 0.5, 0.3 | 0.3, 0.4, 0.4, 0.5 | 0.5, 0.5, 0.4, 0.5 | 0.5 0.5 0.5 0.4 | 0.4, 0.4, 0.4, 0.5, 0.4
102, 23 W W | 102, 34, P.W | 102, 37. PP | 102. 44. P.P. | 102.109. W. P.

C 3.7, 3.8, 3.5, 3.6, 3.4. | 3.2, 3.7, 3.7, 3.7, | 3.7, | 2.7, | 4.3 4.5 4.1, 3.9, | (3.7, 3.7, 3.2, 4.2)
102 3 8 S | 102, 56, 57, 5 | 102. 5 9. W. | 102. 68. W. |

C ~~fhr~~ 0.3, 0.2, 0.0, 0.0 ~~fhr~~ 0.3, 0.1, 0.1, 0.2 | ~~fhr~~ 0.1 | 0.1 0.3 | 0.1, 0.2, 0.1
~~102. fhr. S. W.~~ ~ 0. W. S. | ~ 3. W. | 61. W. W.

C fhr 0.1, -0.1, 0.2, 0.3 | fhr. 0.2 | 0.0, 0.5, 0.2 | fhr 0.2 | 0.1, 0.1 | 0.1, 0.2, 0.1,
102. ~~fhr~~ 5 2 W. | 102, 58 S. | 63. W. W.

C 0.5, 0.4, 0.5, 0.5, 0.6, 0.6 | 0.5, 0.4, 0.4, 0.5, 0.6, 0.8 | 0.5, 0.5,
102, 19 5 - 6 W. P. | 102. 200 W. P | 103. 4 4 5 W.

C 0.8, 0.7 | 0.6, 0.5, 0.9, 0.7 | 0.9, 0.7, 0.7, 0.8. | 0.8, 0.7. 0.8
102, 4 P | 102.72 WP | 102.78. W P
104. 69. P. P.

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Stars to be Observed with Obst. H a Finder. Each star 2 evenings, 2 observers. I clt each drum, marking position of image as it would photograph : 16 setting on four cts = all will be taken H.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 717.8 | 4 | 9.0 | + 5 | 54 | | |
| | | | | 9.1 | + 5 | 52 | | |
| | | 1445.6 | 7 | 33.9 | − 26 | 32 | | |
| P 4,3,4,3 | C | 2039,40 | 11 | 48.9 | + 47 | 9 | .4 | 106.7 v. S. W.; 106,81, W. P. |
| | | | | 49.0 | + 47 | 8 | | |
| P 3,3,6,1 | C | 2182.3 | 12 | 46.2 | + 17 | 44 | .3 | P. W. 106.64; 106,71, PS |
| | | | | 46.4 | + 17 | 46 | | |
| S 3,1,1,1,3,1 | C | 2234.5 | 13 | 6.7 | + 19 | 23 | .2 | S. 106.69; 106.70. PW 106,76 W.P. |
| | | | | 7.3 | + 19 | 21 | | |
| P 6,8,1,5, | C | 2251,2 | 13 | 12.8 | + 4 | 19 | .5 | 106,72, P.S. 106.77 S. W. |
| | | | | 13.0 | + 4 | 21 | | |
| S 7,8, | C | 2755.6 | 16 | 18.4 | − 23 | 10 | | 106,81, P.W. 106.84 v. W. S. |
| | | ~~2794.5~~ | | | | | | |
| P 4.4,4.4 | C | 2967.8 | 17 | 38.5 | + 2 | 38 | .4 | 106.73 S. W. 106. #74 S. P. |
| | | | | 38.6 | + 2 | 38 | | |
| T 2,0,4 | C | 3049,50 | 18 | 3.0 | + 26 | 5 | .2 | 106,72 S. P. 106.78 W. S. |
| S 10,13,9,8 | C | 3357,8 | 19 | 23.7 | + 24 | 25 | 1.0 | 106,74 W. S. 106.80 W. P |
| | | | | 23.9 | + 24 | 31 | | |
| T 4,2,0,5 | C | 3768.9 | 21 | 17.3 | + 60 | 11 | .3 | 106.73. P.S. 106.79 S.W. |
| | | | | 17.5 | + 60 | 15 | | |
| P 0,1, | C | 3774.5 | 21 | 18.5 | + 36 | 53 | | 106.80 P.S. 106.85,86. S.W. |
| | | | | 18.9 | + 36 | 50 | | |

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## Small nebulae from G.C.

| G.C.No. | α 1860 | Rec. | δ 1860 | Rec. | Description. |
|---|---|---|---|---|---|
| 4328 | 17h 39m 12s | −1.1s | +72° 11′ | −1.″7 | vF; vS; R; stellar; ×8s. |
| 4462 | 18 55 32 | +1.6 | +48 15 | +4.9 | vF; stellar |
| 4490 | 19 13 23 | +3.1 | −1 21 | +6.4 | eS; stellar. [Seemed like ⁂ to P., 1882, Aug. 19] |
| 4598 | 20 37 14 | +2.9 | +12 0 | +12.8 | vF; S; stellar; ⁂ att. |
| 4729 | 21 53 52 | +3.5 | −32 33 | +17.2 | pB; pL; lE; gbM; 1st of 4. |
| 4730 | 21 53 53 | +3.5 | −32 38 | +17.2 | cB; cS; R; sbM×; 2d of 4. |
| 4731 | 21 53 55 | +3.5 | −32 40 | +17.2 | cF; S; R; p of Dneb; 3d of 4. |
| 4733 | 21 53 59 | +3.5 | −32 40 | +17.2 | B; pL; R; f of Dneb; 4th of 4. |
| 4749 | 21 58 27 | +3.5 | −31 56 | +17.4 | F; R; gbM; 1st of 4. |
| 4750 | 21 58 39 | +3.5 | −31 52 | +17.4 | eF; S; stellar; 2d of 4. |
| 4751 | 21 58 40 | +3.5 | −31 50 | +17.4 | cF; R; stellar; 3d of 4. |
| 4752 | 21 58 48 | +3.5 | −31 42 | +17.4 | pB; L; lE; gbM; 4th of 4. |
| 4754 | 21 59 25 | +3.5 | −29 44 | +17.4 | vF; vS; R; almost O. |
| 4965 | 23 20 1 | +3.1 | −10 11 | +19.8 | eF; S; stellar. |
| 4991 | 23 28 35 | +3.0 | +14 32 | +19.9 | F; S; R; psbM; stellar. |
| 5025 | 23 46 12 | +3.1 | +7 6 | +20.0 | cF; S; R; psbM; stellar; 1st of 4. |
| 5026 | 23 46 19 | +3.1 | +7 6 | +20.0 | pF; S; R; psbM; stellar; 2d of 4. |
| 5027 | 23 46 38 | +3.1 | +7 6 | +20.0 | F; S; R; 3d of 4. |
| 5028 | 23 46 45 | +3.1 | +7 12 | +20.0 | pF; pL; lE; gbM; 4th of 4. |
| 5042 | 23 54 14 | +3.1 | +30 39 | +20.0 | eF; S; R; sbM; stellar; sp of 2. |
| 5043 | 23 54 17 | +3.1 | +30 40 | +20.0 | eF; S; R; stellar; nf of 2. |
| 319 | 1 18 26 | +3.4 | +33 21 | +18.9 | Stellar |
| 322 | 1 18 55 | +3.1 | −2 4 | +18.8 | Stellar; p of Dneb. |
| 323 | 1 18 55 | +3.1 | −2 4 | +18.8 | Stellar; f of Dneb. |
| 325 | 1 19 27 | +3.4 | +33 56 | +18.8 | Stellar. |
| 328 | 1 19 56 | +3.4 | +32 44 | +18.8 | vS; stellar; p of 2. |
| 329 | 1 19 56 | +3.4 | +32 44 | +18.8 | vS; stellar; f of 2. |
| 358 | 1 27 18 | +3.0 | −8 6 | +18.6 | Nebulous star 11 magn. |
| 413 | 1 43 13 | +3.3 | +21 18 | +18.0 | F; S; R; bet 2 st 15. |
| 414 | 1 43 29 | +3.3 | +21 52 | +18.0 | vS; stellar. |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 420 | 1 | 44 | 26 | +3.5 | +35 24 | +18.0 | Stellar; 3d of 4 |
| 421 | 1 | 44 | 26 | +3.5 | +35 24 | +18.0 | Stellar; last of 4 |
| 422 | 1 | 44 | 27 | +3.5 | +35 28 | +18.0 | vF; stellar; 1st of 4 |
| 427 | 1 | 44 | 34 | +3.5 | +35 27 | +18.0 | F; pL; bM; 2d of 4 |
| 428 | 1 | 44 | 56 | +3.6 | +40 2 | +18.0 | Nebulous star, 55 Andr. |
| 434 | 1 | 47 | 5 | +3.3 | +20 1 | +17.9 | vF; vS; R; β Arietis in field. |
| 588 | 2 | 33 | 58 | +2.5 | −34 52 | +15.6 | pB; S; R; stellar. |

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# Nautical Almanac 1882.

| Date. | G. M. T. | Eclipses | Jupiter's Satellites. | |
|---|---|---|---|---|
| July 30 | 14h v2m | 24.s3 | III | Re. |
| " " | 1v 16 | 32.v | I | Dis. |
| August 1v | 14 4 | v6.9 | II | Dis. |
| " 22 | 1v 2v | 27.6 | I | Dis. |
| " " | 16 41 | vv.1 | II | Dis. |
| Sept. 7 | 13 40 | 36.3 | I | Dis. |
| " 11 | 12 40 | v7.8 | III | Dis. |
| " " | 14 v3 | 6.8 | III | Re. |
| " 14 | 1v 33 | v8.2 | I | Dis. |
| " 16 | 13 v1 | v.9 | II | Dis. |
| " 18 | 16 39 | 43.9 | III | Dis. |
| " 21 | 17 27 | 20.2 | I | Dis. Cl, |
| " 23 | 11 vv | 43.0 | I | Dis. Cl |
| " " | 16 27 | 36.8 | II | Dis. Cl, |
| " 30 | 13 49 | 6.3 | I | Dis. Cl |
| Oct. 7 | 1v 42 | 31.4 | I | Dis. |
| " 11 | 10 v7 | v8.1 | II | Dis. |
| " 14 | 17 3v | v9.3 | I | Dis. |
| " 16 | 12 4 | 20.1 | I | Dis. |
| " 17 | 10 v2 | v3.0 | III | Re. |
| " 18 | 13 34 | 6.4 | II | Dis. |
| " 23 | 13 v7 | v2.v | I | Dis. |
| " 24 | 12 32 | 49.8 | III | Dis. D D |
| " " | 14 v2 | 49.2 | III | Re. D S |
| " 2v | 16 10 | 8.v | II | Dis. S S |
| " 30 | 1v v1 | 29.7 | I | Dis. |
| " 31 | 16 32 | 7.v | III | Dis. |
| Nov. 1 | 10 19 | vv.8 | I | Dis. |
| " 6 | 17 4v | 13.1 | I | Dis. |

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| Date | C. M. T. | | | | |
|---|---|---|---|---|---|
| Nov. 8 | 12h | 13m | 41.s0 | I | Dis. |
| " 12 | 10 | 40 | 4.7 | II | Dis. |
| " 15 | 14 | 7 | 32.9 | I | Dis. |
| " 17 | 8 | 35 | 59.5 | I | Dis. |
| " 19 | 13 | 15 | 46.5 | II | Dis. |
| " 22 | 16 | 1 | 32.3 | I | Dis. |
| " 24 | 10 | 30 | 0.9 | I | Dis. |
| " 26 | 15 | 51 | 24.3 | II | Dis. |
| " 29 | 8 | 28 | 24.0 | III | Dis. |
| " " | 17 | 55 | 40.5 | I | Dis. |
| Dec. 1 | 12 | 24 | 11.1 | I | Dis. |
| " 3 | 6 | 52 | 48.6 | I | Dis. |
| " " | 18 | 26 | 58.5 | II | Dis. |
| " 6 | 12 | 27 | 30.0 | III | Dis. |
| " 7 | 7 | 44 | 36.5 | II | Dis. |
| " 8 | 14 | 18 | 30.6 | I | Dis. |
| " 10 | 8 | 47 | 10.3 | I | Dis. |
| " 13 | 16 | 26 | 52.6 | III | Dis. |
| " 14 | 10 | 20 | 8.8 | II | Dis. |
| " 15 | 16 | 12 | 59.2 | I | Dis. |
| " 19 | 7 | 21 | 32.9 | I | Re. |
| " 21 | 15 | 34 | 24.7 | II | Re. |
| " 24 | 14 | 47 | 42.6 | I | Re. |
| " 26 | 9 | 16 | 24.2 | I | Re. |
| " 28 | 18 | 9 | 56.5 | II | Re. |
| " 31 | 16 | 42 | 40.7 | I | Re. |

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# Nautical Almanac. 1883
## Eclipses Jupiter's Satellites.

| Date. | C. | M. | T. | | |
|---|---|---|---|---|---|
| Jan. 1 | 7h | 27m | 45s.9 | II | Re. |
| " 2 | 11 | 10 | 24.3 | I | Re. |
| " 4 | 7 | 0 | 10.1 | III | Re. |
| " 8 | 10 | 3 | 15.1 | II | Re. |
| " 9 | 13 | 6 | 33.6 | I | Re. |
| " 11 | 7 | 35 | 24.6 | I | Re. |
| " " | 11 | 1 | 18.6 | III | Re. |
| " 15 | 12 | 38 | 43.7 | II | Re. |
| " 16 | 15 | 1 | 49.9 | I | Re. |
| " 18 | 9 | 30 | 43.9 | I | Re. |
| " " | 12 | 26 | 50.3 | III | Dis |
| " " | 15 | 2 | 25.5 | III | Re. |
| " 22 | 15 | 14 | 11.4 | II | Re. |
| " 25 | 11 | 26 | 10.2 | I | Re. |
| Feb. 1 | 13 | 21 | 43.2 | I | Re. |
| " 2 | 7 | 1 | 22.4 | II | Re. |
| " 3 | 7 | 50 | 33.1 | I | Re. |
| " 8 | 15 | 17 | 21.1 | I | Re. |
| " 9 | 9 | 42 | 48.4 | II | Re. |
| " 10 | 9 | 46 | 11.8 | I | Re. |
| " 16 | 7 | 9 | 16.1 | III | Re. |
| " " | 12 | 18 | 13.4 | II | Re. |
| " 17 | 11 | 41 | 54.6 | I | Re. |
| " 23 | 8 | 29 | 34.7 | III | Dis. |
| " " | 11 | 11 | 24.3 | III | Re. |
| " 24 | 13 | 37 | 40.4 | I | Re. |
| " 26 | 8 | 6 | 40.6 | I | Re. |
| March 2 | 12 | 29 | 55.9 | III | Dis. |

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| Date. | C. M. T. | | | | |
|---|---|---|---|---|---|
| March | 10h | 2m | 28.5s | I | Re. |
| " 12 | 11 | 8 | 16.8 | I | Re. |
| " 13 | 9 | 22 | 3 | II | Re. |
| " 18 | 10 | 2 | 10.0 | IV | Dis. |
| " " | 11 | 0 | 44 | IV | Re. |
| " 20 | 11 | 7 | 28.3 | II | Re. |
| " 21 | 8 | 22 | 9.3 | I | Re. |
| " 28 | 10 | 18 | 4.6 | I | Re. |
| " 31 | 7 | 19 | 24 | III | Re. |
| April 7 | 8 | 32 | 34.3 | III | Dis. |
| " " | 11 | 21 | 34.9 | III | Re. |
| " 13 | 8 | 39 | 8.7 | I | Re. |
| " 14 | 9 | 1 | 21.9 | II | Re. |
| " 20 | 10 | 34 | 44.7 | I | Re. |
| May 6 | 8 | 4 | 29.0 | I | Re. |
| " 16 | 8 | 41 | 10.6 | II | Re. |
| " 20 | 8 | 33 | 46.8 | III | Dis. |

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δ Librae
α Coronae

Moon. Phot. I 33, 189
Banded Stars. Spect. (Dir Vis.) 33, 176.
" " Higgs.
Nebulae, Clusters 33, 193
Nebulae. Virgo.
Sunspots. 4 per month. 33, 98
Sigmund 2 per month. 33, 108
Drawing Clusters.
Sat: Jupiter 33, 186
Seq. Round Variables 33, 187
Neb. 4029. (Var:) To be examined and watched. Wr.

47.8

22
1.0
12 2
30 8
43.0

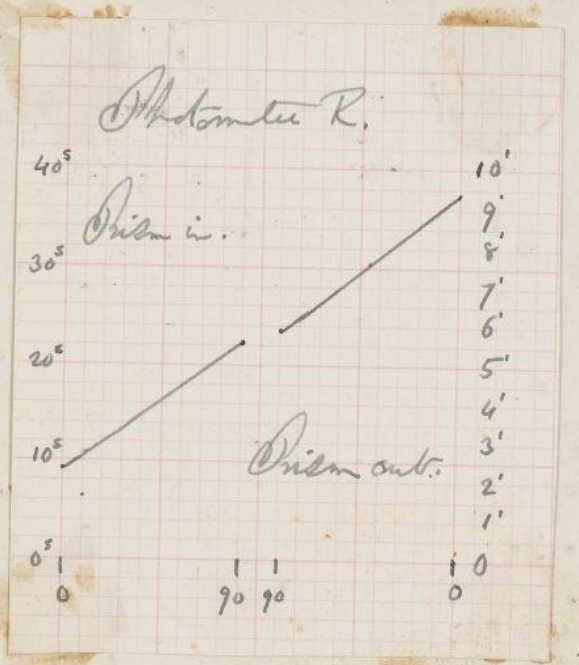
12 2
20 2

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The standard stars to be so selected that they will form twenty-four groups near the equator and at approximately equal intervals in right ascension. Each group to consist of a series of stars decreasing in brightness by differences of about half a magnitude, from the tenth magnitude to the faintest object visible in the largest telescopes. The groups to be located by bringing a star visible to the naked eye into the field of the telescope, waiting for two minutes, and then forming a chart of the zone ten minutes wide passing through the centre of the field of the telescope during the next four minutes. This zone will therefore be defined as the region from five minutes north to five minutes south of the bright star, and from two to six minutes following it. The stars to be selected from this zone, which may in some cases have to be extended. Care to be taken that no star is near enough to another to be sensibly affected in apparent brightness by its proximity. The following stars are proposed as leading stars for these groups: —

*γ Pegasi*, *θ' Ceti*, *α Piscium*, *α Ceti*, *γ Eridani*, *α Tauri*, *ε Orionis*, *γ Geminorum*, *α Canis Minoris*, *ε Hydræ*, *α Leonis*, *θ Leonis*, *η Virginis*, *α Virginis*, *α Bootis*, *β Libræ*, *δ Ophiuchi*, *η Ophiuchi*, *η Serpentis*, *δ Aquilæ*, *θ Aquilæ*, *β Aquarii*, *α Aquarii* and *α Pegasi*.




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