THE OBSERVER'S HANDBOOK FOR 1935

PUBLISHED BY

The Royal Astronomical Society of Canada

EDITED BY C. A. CHANT

TWENTY-SEVENTH YEAR OF PUBLICATION

TORONTO
198 COLLEGE STREET
PRINTED FOR THE SOCIETY
1935

1935 CALENDAR 1935

JANUARY						
Sun.		6	13	20	27	
Mon.		7	14	21	28	
Tues.	1	8	15	22	29	
Wed	2	9	16	23	30	
Thur.	3	10	17	24	31	
Fri.	4	11	18	25	..	
Sat	5	12	19	26	..	

FEBRUARY						
Sun.	.	3	10	17	24	
Mon.	.	4	11	18	25	
Tues.	.	5	12	19	26	
Wed.	.	6	13	20	27	
Thur.	.	7	14	21	28	
Fri.	1	8	15	22	....	
Sat.	2	9	16	23	...	

MARCH						
Sun.	3	10	17	24	31	
Mon.	4	11	18	25	....	
Tues.	5	12	19	26	....	
Wed.	6	13	20	27	....	
Thur.	7	14	21	28	....	
Fri.	1	8	15	22	29	....
Sat	2	9	16	23	30	....

APRIL						
Sun.	.	7	14	21	28	
Mon.	1	8	15	22	29	
Tues	2	9	16	23	30	
Wed.	3	10	17	24	....	
Thur.	4	11	18	25	....	
Fri.	5	12	19	26	....	
Sat	6	13	20	27	...	

MAY						
Sun		5	12	19	26	
Mon.		6	13	20	27	
Tues		7	14	21	28	
Wed.	1	8	15	22	29	
Thur	2	9	16	23	30	
Fri	3	10	17	24	31	
Sat	4	11	18	25		

JUNE						
Sun.	2	9	16	23	30	
Mon.	3	10	17	24	....	
Tues.	4	11	18	25	....	
Wed.	5	12	19	26	....	
Thur.	6	13	20	27	....	
Fri.	.	7	14	21	28	....
Sat	1	8	15	22	29	...

JULY						
Sun		7	14	21	28	
Mon.	1	8	15	22	29	
Tues.	2	9	16	23	30	
Wed	3	10	17	24	31	
Thur	4	11	18	25	...	
Fri.	5	12	19	26	....	
Sat	6	13	20	27	..	

AUGUST						
Sun.	.	4	11	18	25	
Mon.	.	5	12	19	26	
Tues.	.	6	13	20	27	
Wed.		7	14	21	28	
Thur	1	8	15	22	29	
Fri	2	9	16	23	30	
Sat	3	10	17	24	31	

SEPTEMBER						
Sun.	1	8	15	22	29	
Mon.	2	9	16	23	30	
Tues.	3	10	17	24	..	
Wed.	4	11	18	25	....	
Thur	5	12	19	26	....	
Fri.	6	13	20	27	....	
Sat	7	14	21	28	..	

OCTOBER						
Sun.	.	6	13	20	27	
Mon.		7	14	21	28	
Tues.	1	8	15	22	29	
Wed.	2	9	16	23	30	
Thur.	3	10	17	24	31	
Fri.	4	11	18	25	....	
Sat	5	12	19	26	....	

NOVEMBER						
Sun.	.	3	10	17	24	
Mon.	.	4	11	18	25	
Tues.	.	5	12	19	26	
Wed.	.	6	13	20	27	
Thur.	.	7	14	21	28	
Fri.	1	8	15	22	29	
Sat	2	9	16	23	30	

DECEMBER						
Sun.	1	8	15	22	29	
Mon.	2	9	16	23	30	
Tues.	3	10	17	24	31	
Wed.	4	11	18	25	..	
Thur	5	12	19	26	.	
Fri.	6	13	20	27	....	
Sat.	7	14	21	28	....	

JULIAN DAY CALENDAR, 1935

J. D. 2,420,000 plus the following

Jan. 1	7804	May 1	7924	Sept. 1	8047
Feb. 1	7835	June 1	7955	Oct. 1	8077
Mar. 1	7863	July 1	7985	Nov. 1	8108
Apr. 1	7894	Aug. 1	8016	Dec. 1	8133

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CONTENTS

PREFACE

In the present issue of the HANDBOOK the list of stars occulted by the mo has been omitted, but any person who is able and willing to observe occultations will be supplied with the necessary information.

No star maps are included in the HANDBOOK, but the following are recommended: Four circular maps, 9 inches in diameter, roughly for the four seasons, obtainable from the Director of University Extension, University of Toronto, for one cent each. A set of 12 circular maps, 5 inches, in diameter with brief explanation, is supplied by *Polular Astronomy*, Northfield, Minn., for 15 cents. Young's *Uranography*, contains four maps with good descriptions of the constellations, suitable for small telescopes (Ginn and Co., 72 cents). Norton's *Star Atlas and Telescopic Handbook* is larger and excellent. (Gall and Inglis, price 12*s.* 6*d.*; supplied also by Eastern Science Supply Co., Boston).

In the preparation of this HANDBOOK the Editor has been assisted by Mr. H. Boyd Brydon, Victoria, who supplied much of the "copy" and read the proofs; Mr. W. E. Harper, M.A., of the Dominion Astrophysical Observatory, Victoria, B.C.; Dr. R. J. McDiarmid, of the Dominion Observatory, Ottawa; Mr. W. S. Armstrong, M.A.; and his colleague Dr. R. K. Young, of the University of Toronto.

The minima of Algol have been computed from an observation by Stebbins (*Ap. J.*, vol. 53, 1921), J. D. 2422619.7866 with the period 2.86731077, given by Hellerick (*A. N.*, vol. 209, p. 227, 1919).

TORONTO, December, 1933. THE EDITOR.

ANNIVERSARIES AND FESTIVALS 1935

New Year's Day	Jan. 1
Epiphany	Jan. 6
Septuagesima Sunday	Feb. 17
Quinquagesima (Shrove) Sunday	Mar. 3
Ash Wednesday	Mar. 6
St. David	Mar. 1
St. Patrick	Mar. 17
Palm Sunday	Apr. 14
Annunciation (Lady Day)	Mar. 25
Good Friday	Apr. 19
Passover, First Day	Apr. 18
Easter Sunday	Apr. 21
Mohammedan New Year (1354)	Apr. 4
St. George	Apr. 23
Rogation Sunday	May 26
Accession of King George V (1910)	May 6
Ascension Day	May 30
Pentecost (Whit Sunday)	June 9
Empire (Victoria) Day	May 24
Birthday of Queen Mary 1867)	May 26
Trinity Sunday	June 16
Corpus Christi	June 20
Birthday of King George V (1865)	June 3
Birthday of Prince of Wales (1894)	June 23
St. John Baptist (Midsummer Day)	June 24
Dominion Day	July 1
Labour Day	Sept. 2
Jewish New Year (5696) (Rosh Hashanah)	Sept. 28
Day of Atonement (Jewish)	Oct. 7
Tabernacles (Jewish)	Oct. 12
St. Michael (Michaelmas Day	Sept. 29
All Saint's Day	Nov. 1
Armistice Day	Nov. 11
St. Andrew	Nov. 30
First Sunday in Advent	Dec. 1
Christmas Day	Dec. 25

Thanksgiving Day, date set by Proclamation

SYMBOLS AND ABBREVIATIONS

SIGNS OF THE ZODIAC

♈ Aries..... 0°	♌ Leo.....120°	♐ Sagittarius...240°
♉ Taurus .....30°	♍ Virgo.....150°	♑ Capricornus..270°
♊ Gemini .....60°	♎ Libra.....180°	♒ Aquarius....300°
♋ Cancer.....90°	♏ Scorpio ....210°	♓ Pisces.....330°

SUN, MOON AND PLANETS

☉ The Sun.	☾ The Moon generally.	♃ Jupiter.
● New Moon.	☿ Mercury.	♄ Saturn.
○ Full Moon.	♀ Venus.	♅ or ♅ Uranus
☽ First Quarter	⊕ Earth.	♆ Neptune.
☾ Last Quarter.	♂ Mars.	

ASPECTS AND ABBREVIATIONS

☌ Conjunction, or having the same Longitude or Right Ascension
☍ Opposition, or differing 180° in Longitude or Right Ascension
□ Quadrature, or differing 90° in Longitude or Right Ascension
☊ Ascending Node; ☋ Descending Node.
α or A.R., Right Ascension; δ Declination.
h, m, s, Hours, Minutes, Seconds of Time.
°, ′, ″, Degrees, Minutes, Seconds of Arc.

THE GREEK ALPHABET

A, α,	Alpha.	I, ι,	Iota.	P, ρ,	Rho.
B, β,	Beta.	K, κ,	Kappa.	Σ, σ, ς,	Sigma.
Γ, γ,	Gamma.	Λ, λ,	Lambda.	T, τ,	Tau.
Δ, δ,	Delta.	M, μ,	Mu.	Υ, υ,	Upsilon
E, ε,	Epsilon.	N, ν,	Nu.	Φ, ϕ,	Phi.
Z, ζ,	Zeta.	Ξ, ξ,	Xi.	X, χ,	Chi.
H, η,	Eta.	O, o,	Omicron.	Ψ, ψ,	Psi.
Θ, θ, ϑ,	Theta.	Π, π,	Pi.	Ω, ω,	Omega.

In the Configurations of Jupiter's Satellites (pages 29, 31, etc.), O represents the disc of the planet, d signifies that the satellite is on the disc, * signifies that the satellite is behind the disc or in the shadow. Configurations are for an inverting telescope.

SOLAR AND SIDEREAL TIME

In practical astronomy three different kinds of time are used, while in ordinary life we use a fourth.

1. *Apparent Time*—By apparent noon is meant the moment when the sun is on the meridian, and apparent time is measured by the distance in degrees that the sun is east or west of the meridian. Apparent time is given by the sun-dial.

2. *Mean Time*—The interval between apparent noon on two successive days is not constant, and a clock cannot be constructed to keep apparent time. For this reason *mean time* is used. The length of a mean day is the average of all the apparent days throughout the year. The *real sun* moves about the ecliptic in one year; an imaginary *mean sun* is considered as moving uniformly around the celestial equator in one year. The difference between the times that the real sun and the mean sun cross the meridian (*i. e.* between apparent noon and mean noon) is the *equation of time.* (See next page).

3. *Sidereal Time*—This is time as determined from the stars. It is sidereal noon when the Vernal Equinox or First of Aries is on the meridian. In accurate time-keeping the moment when a star is on the meridian is observed and the corresponding mean time is then computed with the assistance of the Nautical Almanac. When a telescope is mounted equatorially the position of a body in the sky is located by means of the sidereal time.

4. *Standard Time*—In everyday life we use still another kind of time. A moment's thought will show that in general two places will not have the same mean time; indeed, difference in longitude between two places is determined from their difference in time. But in travelling it is very inconvenient to have the time varying from station to station. For the purpose of facilitating transportation the system of *Standard Time* was introduced in 1883. Within a certain belt approximately 15° wide, all the clocks show the same time, and in passing from one belt to the next the hands of the clock are moved forward or backward one hour.

In Canada we have six standard time belts, as follows;—60th meridian or Atlantic Time, 4h. slower than Greenwich; 75th meridian or Eastern Time, 5h.; 90th meridian or Central Time, 6h.; 105th meridian or Mountain Time, 7h.; 120th meridian or Pacific Time, 8h.; and 135th meridian or Yukon Time, 9h. slower than Greenwich.

Date	Apparent R.A.	Equation of Time	Apparent Dec.
	h m s	m s	° ′ ″
Jan. 1	18 41 59	+ 3 06.4	−23 05 54
" 4	18 55 13	+ 4 31.3	−22 50 32
" 7	19 08 24	+ 5 52.9	−22 31 04
" 10	19 21 31	+ 7 10.2	−22 07 36
" 13	19 34 33	+ 8 22.4	−21 40 14
" 16	19 47 30	+ 9 29.0	−21 09 07
" 19	20 00 20	+10 29.4	−20 34 22
" 22	20 13 03	+11 23.3	−19 56 07
" 25	20 25 40	+12 10.4	−19 14 30
" 28	20 38 10	+12 50.6	−18 29 43
" 31	20 50 33	+13 23.6	−17 41 53
Feb. 3	21 02 48	+13 49.5	−16 51 13
" 6	21 14 56	+14 07.9	−15 57 54
" 9	21 26 57	+14 19.0	−15 02 07
" 12	21 38 50	+14 22.8	−14 04 04
" 15	21 50 37	+14 19.5	−13 03 57
" 18	22 02 16	+14 09.5	−12 01 56
" 21	22 13 50	+13 53.2	−10 58 11
" 24	22 25 17	+13 30.9	− 9 52 55
" 27	22 36 39	+13 03.3	− 8 46 16
Mar. 1	22 44 11	+12 42.2	− 8 01 10
" 4	22 55 25	+12 06.6	− 6 52 38
" 7	23 06 35	+11 26.8	− 5 43 14
" 10	23 17 41	+10 43.2	− 4 33 09
" 13	23 28 44	+ 9 56.2	− 3 22 34
" 16	23 39 44	+ 9 06.5	− 2 11 39
" 19	23 50 41	+ 8 14.4	− 1 00 34
" 22	0 01 37	+ 7 20.8	+ 0 10 33
" 25	0 12 32	+ 6 26.1	+ 1 21 32
" 28	0 23 27	+ 5 31.2	+ 2 32 13
" 31	0 34 22	+ 4 36.4	+ 3 42 27
Apr. 3	0 45 18	+ 3 42.4	+ 4 52 05
" 6	0 56 14	+ 2 49.5	+ 6 00 56
" 9	1 07 13	+ 1 58.1	+ 7 08 50
" 12	1 18 13	+ 1 08.7	+ 8 15 37
" 15	1 29 16	+ 0 21.8	+ 9 21 09
" 18	1 40 21	− 0 22.3	+10 25 17
" 21	1 51 30	− 1 02.9	+11 27 52
" 24	2 02 43	− 1 39.7	+12 28 46
" 27	2 14 00	− 2 12.3	+13 27 50
" 30	2 25 22	− 2 40.2	+14 24 56
May 3	2 36 49	− 3 03.3	+15 19 54
" 6	2 48 20	− 3 21.6	+16 12 34
" 9	2 59 56	− 3 34.8	+17 02 49
" 12	3 11 38	− 3 43.2	+17 50 30
" 15	3 23 24	− 3 46.5	+18 35 29
" 18	3 35 16	− 3 44.7	+19 17 39
" 21	3 47 12	− 3 38.0	+19 56 53
" 24	3 59 13	− 3 26.3	+20 33 04
" 27	4 11 20	− 3 09.7	+21 06 05
" 30	4 23 30	− 2 48.5	+21 35 50
June 2	4 35 45	− 2 23.3	+22 02 13
" 5	4 48 04	− 1 54.4	+22 25 08
" 8	5 00 25	− 1 22.5	+22 44 31
" 11	5 12 50	− 0 48.1	+23 00 20
" 14	5 25 16	− 0 11.8	+23 12 29
" 17	5 37 43	+ 0 25.9	+23 20 59
" 20	5 50 11	+ 1 04.5	+23 25 46
" 23	6 02 40	+ 1 43.4	+23 26 50
" 26	6 15 08	+ 2 22.1	+23 24 11
" 29	6 27 36	+ 3 00.0	+23 17 49

Date	Apparent R.A.	Equation of Time	Apparent Dec.
	h m s	m s	° ′ ″
July 2	6 40 02	+ 3 36.3	+23 07 47
" 5	6 52 25	+ 4 10.3	+22 54 05
" 8	7 04 46	+ 4 41.3	+22 36 49
" 11	7 17 03	+ 5 08.8	+22 16 01
" 14	7 29 16	+ 5 32.4	+21 51 47
" 17	7 41 25	+ 5 51.7	+21 24 12
" 20	7 53 30	+ 6 06.3	+20 53 20
" 23	8 05 29	+ 6 16.3	+20 19 17
" 26	8 17 24	+ 6 21.3	+19 42 10
" 29	8 29 14	+ 6 21.0	+19 02 05
Aug. 1	8 40 58	+ 6 15.5	+18 19 10
" 4	8 52 36	+ 6 04.5	+17 33 34
" 7	9 04 09	+ 5 47.9	+16 45 24
" 10	9 15 37	+ 5 25.8	+15 54 49
" 13	9 26 59	+ 4 58.3	+15 01 56
" 16	9 38 16	+ 4 25.8	+14 06 55
" 19	9 49 29	+ 3 48.5	+13 09 52
" 22	10 00 37	+ 3 06.9	+12 10 55
" 25	10 11 41	+ 2 21.2	+11 10 12
" 28	10 22 41	+ 1 31.8	+10 07 54
" 31	10 33 38	+ 0 39.1	+ 9 04 08
Sept. 3	10 44 32	− 0 16.8	+ 7 59 05
" 6	10 55 23	− 1 15.3	+ 6 52 53
" 9	11 06 12	− 2 16.0	+ 5 45 41
" 12	11 16 59	− 3 18.4	+ 4 37 38
" 15	11 27 45	− 4 21.9	+ 3 28 52
" 18	11 38 31	− 5 25.9	+ 2 19 31
" 21	11 49 17	− 6 29.7	+ 1 09 44
" 24	12 00 03	− 7 32.8	− 0 00 21
" 27	12 10 51	− 8 34.8	− 1 10 33
" 30	12 21 40	− 9 35.1	− 2 20 43
Oct. 3	12 32 32	−10 33.2	− 3 30 41
" 6	12 43 26	−11 28.7	− 4 40 16
" 9	12 54 23	−12 21.0	− 5 49 20
" 12	13 05 24	−13 09.7	− 6 57 42
" 15	13 16 30	−13 54.0	− 8 05 14
" 18	13 27 40	−14 33.4	− 9 11 46
" 21	13 38 56	−15 07.3	−10 17 07
" 24	13 50 17	−15 35.3	−11 21 08
" 27	14 01 45	−15 57.0	−12 23 36
" 30	14 13 20	−16 12.1	−13 24 21
Nov. 2	14 25 01	−16 20.4	−14 23 11
" 5	14 36 50	−16 21.7	−15 19 56
" 8	14 48 45	−16 15.8	−16 14 24
" 11	15 00 48	−16 02.4	−17 06 24
" 14	15 12 59	−15 41.4	−17 55 48
" 17	15 25 17	−15 12.6	−18 42 23
" 20	15 37 43	−14 36.2	−19 26 00
" 23	15 50 17	−13 52.1	−20 06 28
" 26	16 02 58	−13 00.8	−20 43 37
" 29	16 15 46	−12 02.8	−21 17 17
Dec. 2	16 28 40	−10 58.4	−21 47 19
" 5	16 41 40	− 9 48.4	−22 13 36
" 8	16 54 44	− 8 33.4	−22 36 01
" 11	17 07 53	− 7 14.0	−22 54 27
" 14	17 21 06	− 5 50.8	−23 08 49
" 17	17 34 22	− 4 24.6	−23 19 03
" 20	17 47 40	− 2 56.1	−23 25 04
" 23	18 01 00	− 1 26.3	−23 26 53
" 26	18 14 19	+ 0 03.8	−23 24 26
" 29	18 27 39	+ 1 33.1	−23 17 45

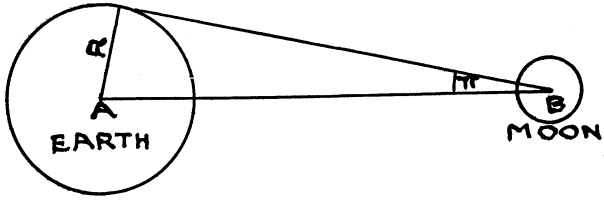
To obtain the R.A. of Mean Sun, subtract the Equation of Time from the Right Ascension; adding 12h to this gives the Sidereal Time at 0h G.C.T.

In the equation of Time the Sign + means the watch is faster than the Sun, − that it is slower. To obtain the Local Mean Time, in the former case add the Equation of Time to and in the latter case subtract it from, apparent or sun-dial time.

THE MOON'S PHASES AND DISTANCE

The times of the moon's phases and of its least distance (perigee) and greatest distance (apogee) from the earth are given in the astronomical phenomena for each month.

The moon's distance at any time can be found to the nearest 50 miles from the moon's horizontal parallax π, which is given for every 12 hours in the *Nautical Almanac* and the *American Ephemeris*, by means of a simple formula.



In the figure it will be seen that $\sin \pi$ is equal to R, the earth's radius (3963.34 miles), divided by the distance AB between the centres of the earth and moon; whence

$$\text{Distance } AB = R/\sin \pi$$

At apogee and perigee the change of π in 12 hours does not exceed 2″.5 and a change of 1″ is equivalent to about 50 miles. For more accurate distances interpolation formulae are necessary.

(75th Meridian Time)

Perigee			Apogee		
Date		Distance	Date		Distance
d	h	miles	d	h	miles
Jan. 6	06.6	223,450	Jan. 20	17.0	252,400
Feb. 3	18.4	226,950	Feb. 17	18.2	252,500
Mar. 4	06.9	222,300	Mar. 16	23.6	252,250
Apr. 1	15.2	224,400	Apr. 13	14.8	251,700
Apr. 29	11.0	227,550	May 11	09.3	251,200
May 25	11.5	229,650	Jun. 8	04.2	251,150
Jun. 20	05.1	227,950	July 5	22.0	251,650
July 17	21.7	224,850	Aug. 2	13.1	252,250
Aug. 15	03.1	223,100	Aug. 29	21.3	252,750
Sept. 12	13.1	221,750	Sept. 25	23.6	252,600
Oct. 10	23.6	222,800	Oct. 23	08.4	252,100
Nov. 8	05.8	225,500	Nov. 20	01.0	251,550
Dec. 5	17.1	228,950	Dec. 17	21.7	251,300
Dec. 30	10.4	229,500			

ABBREVIATIONS FOR THE CONSTELLATIONS

Andromeda	And	Andr
Antlia	Ant	Antl
Apus	Aps	Apus
Aquarius	Aqr	Aqar
Aquila	Aql	Aqil
Ara	Ara	Arae
Aries	Ari	Arie
Auriga	Aur	Auri
Bootes	Boo	Boot
Caelum	Cae	Cael
Camelopardalis	Cam	Caml
Cancer	Cnc	Canc
Canes Venatici	CVn	CVen
Canis Major	CMa	CMaj
Canis Minor	CMi	CMin
Capricornus	Cap	Capr
Carina	Car	Cari
Cassiopeia	Cas	Cass
Centaurus	Cen	Cent
Cepheus	Cep	Ceph
Cetus	Cet	Ceti
Chamaeleon	Cha	Cham
Circinus	Cir	Circ
Columba	Col	Colm
Coma Berenices	Com	Coma
Corona Austrina	CrA	CorA
Corona Borealis	CrB	CorB
Corvus	Crv	Corv
Crater	Crt	Crat
Crux	Cru	Cruc
Cygnus	Cyg	Cygn
Delphinus	Del	Dlph
Dorado	Dor	Dora
Draco	Dra	Drac
Equuleus	Equ	Equl
Eridanus	Eri	Erid
Fornax	For	Forn
Gemini	Gem	Gemi
Grus	Gru	Grus
Hercules	Her	Herc
Horologium	Hor	Horo
Hydra	Hya	Hyda
Hydrus	Hyi	Hydi
Indus	Ind	Indi
Lacerta	Lac	Lacr
Leo	Leo	Leon
Leo Minor	LMi	LMin
Lepus	Lep	Leps
Libra	Lib	Libr
Lupus	Lup	Lupi
Lynx	Lyn	Lync
Lyra	Lyr	Lyra
Mensa	Men	Mens
Microscopium	Mic	Micr
Monoceros	Mon	Mono
Musca	Mus	Musc
Norma	Nor	Norm
Octans	Oct	Octn
Ophiuchus	Oph	Ophi
Orion	Ori	Orio
Pavo	Pav	Pavo
Pegasus	Peg	Pegs
Perseus	Per	Pers
Phoenix	Phe	Phoe
Pictor	Pic	Pict
Pisces	Psc	Pisc
Piscis Australis	PsA	PscA
Puppis	Pup	Pupp
Pyxis	Pyx	Pyxi
Reticulum	Ret	Reti
Sagitta	Sge	Sgte
Sagittarius	Sgr	Sgtr
Scorpius	Scr	Scor
Sculptor	Scl	Scul
Scutum	Sct	Scut
Serpens	Ser	Serp
Sextans	Sex	Sext
Taurus	Tau	Taur
Telescopium	Tel	Tele
Triangulum	Tri	Tria
Triangulum Australe	TrA	TrAu
Tucana	Tuc	Tucn
Ursa Major	UMa	UMaj
Ursa Minor	UMi	UMin
Vela	Vel	Velr
Virgo	Vir	Virg
Volans	Vol	Voln
Vulpecula	Vul	Vulp

The 4-letter abbreviations are intended to be used in cases where a maximum saving of space is not necessary.

From *Transactions of the I.A.U.*, Vol. IV., 1932.

TIMES OF SUNRISE AND SUNSET

In the tables on pages 10 to 21 are given the times of sunrise and sunset for places in latitudes 44°, 46°, 48°, 50° and 52°, which cover pretty well the populated parts of Canada. The times are given in Mean Solar Time, and in the table on the page following this, are given corrections to change these times to the Standard or Railroad times of the cities and towns named, or for places near them.

How the Tables are Constructed

The time of sunrise and sunset at a given place, in mean solar time, varies from day to day, and depends principally upon the declination of the sun. Variations in the equation of time, the apparent diameter of the sun and atmospheric refraction at the points of sunrise and sunset also affect the final result. These quantities, as well as the solar declination, do not have precisely the same values of corresponding days from year to year, and so it is impossible to give in any general table the exact time of sunrise and sunset day by day.

With this explanation the following general table has been computed, giving the rising and setting of the upper limb of the sun, corrected for refraction, using the values of the solar declination and equation of time given in the Nautical Almanac for 1899; these are very close average values and may be accepted as approximately correct for years. It must also be remembered that these times are computed for the sea horizon, which is only approximately realised on land surfaces, and is generally widely departed from in hilly and mountainous localities. The greater or less elevation of the point of view above the ground must also be considered, to get exact results.

The Times for Any Station

In order to find the time of sunrise and sunset for any place on any day, first from the list below find the approximate latitude of the place and the correction, in minutes, which follows the name. Then find in the monthly table the time of sunrise and sunset for the proper latitude, on the desired day, and apply the correction.

44°		46°		48°		50°		52°	
	mins.		mins.		mins.		mins.		mins.
Barrie	+ 17	Charlotte-		Port Arthur	+ 57	Brandon	+ 40	Calgary	+ 36
Brantford	+ 21	town	+ 13	Victoria	+ 13	Indian		Edmon-	
Chatham	+ 29	Fredericton	+ 26			Head	- 5	ton	+ 34
Goderich	+ 27	Montreal	- 6			Kamloops	+ 2	Prince	
Guelph	+ 21	Ottawa	+ 3			Kenora	+ 18	Albert	+ 4
Halifax	+ 14	Parry Sound	+ 20			Medicine		Saska-	
Hamilton	+ 20	Quebec	- 15			Hat	+ 22	toon	+ 6
Kingston	+ 6	Sherbrooke	- 12			Moosejaw	+ 2		
London	+ 25	St. John,				Moosomin	+ 40		
Orillia	+ 18	N.B.	+ 24			Nelson	- 11		
Owen Sound	+ 24	Sydney	+ 1			Portage La			
Peterboro	+ 13	Three Rivers	- 10			Prairie	+ 33		
Port Hope	+ 14					Regina	- 2		
Stratford	+ 24					Vancouver	+ 12		
Toronto	+ 18					Winnipeg	+ 28		
Windsor	+ 32								
Woodstock	+ 23								
Yarmouth	+ 24								

Example.—Find the time of sunrise at Owen Sound, also at Regina, on February 11.

In the above list Owen Sound is under "44°", and the correction is + 24 min. On page 11 the time of sunrise on February 11 for latitude 44° is 7.05; add 24 min. and we get 7.29 (Eastern Standard Time). Regina is under "50°", and the correction is −2 min. From the table the time is 7.18 and subtracting 2 min. we get the time of sunrise 7.16 (Central Standard Time).

JANUARY

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	7 35	4 33	7 42	4 26	7 50	4 18	7 59	4 9	8 9	3 59
2	7 35	4 34	7 42	4 26	7 50	4 19	7 59	4 10	8 8	4 0
3	7 35	4 35	7 42	4 27	7 50	4 20	7 59	4 11	8 8	4 2
4	7 35	4 36	7 42	4 28	7 50	4 21	7 58	4 12	8 7	4 3
5	7 35	4 37	7 42	4 29	7 50	4 22	7 58	4 13	8 7	4 4
6	7 35	4 38	7 42	4 30	7 49	4 23	7 58	4 14	8 6	4 6
7	7 35	4 39	7 42	4 32	7 49	4 24	7 58	4 16	8 6	4 7
8	7 34	4 40	7 41	4 33	7 49	4 25	7 57	4 17	8 5	4 8
9	7 34	4 41	7 41	4 34	7 49	4 26	7 57	4 18	8 5	4 9
10	7 34	4 42	7 41	4 35	7 48	4 27	7 56	4 19	8 4	4 11
11	7 34	4 43	7 40	4 36	7 48	4 29	7 56	4 21	8 4	4 12
12	7 33	4 44	7 40	4 38	7 47	4 30	7 55	4 22	8 3	4 14
13	7 33	4 45	7 39	4 39	7 47	4 31	7 55	4 23	8 2	4 15
14	7 32	4 46	7 39	4 40	7 46	4 33	7 54	4 25	8 1	4 17
15	7 32	4 48	7 38	4 41	7 45	4 34	7 53	4 26	8 0	4 19
16	7 31	4 49	7 38	4 42	7 45	4 36	7 52	4 28	8 0	4 21
17	7 30	4 50	7 37	4 44	7 44	4 37	7 52	4 29	7 59	4 22
18	7 30	4 52	7 36	4 45	7 43	4 38	7 51	4 31	7 58	4 24
19	7 29	4 53	7 35	4 47	7 42	4 40	7 50	4 32	7 57	4 26
20	7 28	4 54	7 34	4 48	7 41	4 41	7 49	4 34	7 56	4 27
21	7 28	4 55	7 34	4 49	7 40	4 43	7 48	4 36	7 55	4 29
22	7 27	4 57	7 33	4 51	7 40	4 44	7 46	4 37	7 54	4 31
23	7 26	4 58	7 32	4 52	7 39	4 46	7 45	4 39	7 52	4 32
24	7 25	4 59	7 31	4 54	7 38	4 47	7 44	4 41	7 51	4 34
25	7 25	5 1	7 30	4 55	7 36	4 49	7 43	4 42	7 50	4 36
26	7 24	5 2	7 29	4 56	7 35	4 50	7 42	4 44	7 49	4 38
27	7 23	5 3	7 28	4 58	7 34	4 52	7 40	4 46	7 47	4 39
28	7 22	5 5	7 27	4 59	7 33	4 54	7 39	4 47	7 46	4 41
29	7 21	5 6	7 26	5 1	7 32	4 55	7 38	4 49	7 45	4 43
30	7 20	5 8	7 25	5 3	7 30	4 57	7 36	4 51	7 43	4 44
31	7 18	5 9	7 23	5 4	7 29	4 58	7 35	4 52	7 42	4 46

For an explanation of this table and its use at various places, see pages 8 and 9.

FEBRUARY

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	7 17	5 10	7 22	5 5	7 28	5 0	7 33	4 54	7 40	4 48
2	7 16	5 12	7 21	5 7	7 26	5 1	7 32	4 56	7 38	4 50
3	7 15	5 13	7 20	5 8	7 25	5 3	7 30	4 58	7 36	4 52
4	7 14	5 14	7 19	5 10	7 24	5 5	7 29	4 59	7 34	4 54
5	7 13	5 15	7 18	5 11	7 22	5 6	7 27	5 1	7 33	4 56
6	7 12	5 17	7 17	5 12	7 21	5 8	7 26	5 3	7 31	4 57
7	7 10	5 18	7 15	5 14	7 19	5 9	7 24	5 5	7 29	4 59
8	7 9	5 20	7 13	5 15	7 18	5 11	7 23	5 6	7 27	5 1
9	7 8	5 21	7 12	5 17	7 16	5 13	7 21	5 8	7 25	5 3
10	7 6	5 23	7 11	5 18	7 15	5 14	7 19	5 10	7 23	5 5
11	7 5	5 24	7 10	5 19	7 13	5 16	7 18	5 11	7 21	5 7
12	7 3	5 25	7 8	5 21	7 12	5 17	7 16	5 13	7 19	5 9
13	7 2	5 27	7 6	5 23	7 10	5 19	7 14	5 15	7 18	5 10
14	7 1	5 28	7 4	5 24	7 8	5 21	7 12	5 17	7 16	5 12
15	6 59	5 29	7 3	5 26	7 6	5 22	7 10	5 18	7 14	5 14
16	6 58	5 31	7 1	5 27	7 5	5 24	7 9	5 20	7 12	5 16
17	6 56	5 32	7 0	5 29	7 3	5 26	7 7	5 22	7 10	5 18
18	6 55	5 34	6 58	5 30	7 1	5 27	7 5	5 23	7 9	5 19
19	6 53	5 35	6 56	5 32	6 59	5 29	7 3	5 25	7 7	5 21
20	6 52	5 36	6 54	5 33	6 58	5 30	7 1	5 27	7 5	5 23
21	6 50	5 38	6 53	5 35	6 56	5 32	6 59	5 29	7 3	5 25
22	6 48	5 39	6 51	5 36	6 54	5 33	6 57	5 30	7 0	5 27
23	6 47	5 40	6 49	5 38	6 52	5 35	6 55	5 32	6 58	5 29
24	6 45	5 42	6 47	5 39	6 50	5 36	6 53	5 34	6 56	5 31
25	6 44	5 43	6 46	5 41	6 49	5 38	6 51	5 35	6 54	5 33
26	6 42	5 44	6 44	5 42	6 47	5 39	6 49	5 37	6 51	5 34
27	6 40	5 45	6 42	5 43	6 45	5 41	6 48	5 38	6 49	5 36
28	6 38	5 47	6 41	5 45	6 43	5 42	6 45	5 40	6 47	5 38

For an explanation of this table and its use at various places, see pages 8 and 9.

MARCH

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	6 37	5 48	6 39	5 46	6 41	5 44	6 43	5 42	6 43	5 41
2	6 35	5 49	6 37	5 47	6 39	5 45	6 41	5 44	6 42	5 42
3	6 34	5 50	6 35	5 49	6 37	5 47	6 39	5 45	6 40	5 44
4	6 32	5 52	6 33	5 50	6 35	5 48	6 37	5 47	6 38	5 45
5	6 30	5 53	6 31	5 52	6 33	5 50	6 35	5 48	6 36	5 47
6	6 28	5 55	6 30	5 53	6 31	5 51	6 33	5 50	6 34	5 49
7	6 26	5 56	6 28	5 54	6 29	5 53	6 31	5 52	6 32	5 51
8	6 25	5 57	6 26	5 56	6 27	5 54	6 28	5 53	6 29	5 52
9	6 23	5 58	6 24	5 57	6 25	5 56	6 26	5 55	6 27	5 54
10	6 21	6 0	6 22	5 59	6 23	5 57	6 24	5 56	6 25	5 56
11	6 19	6 1	6 20	6 0	6 21	5 59	6 22	5 58	6 23	5 57
12	6 18	6 2	6 18	6 1	6 19	6 0	6 20	6 0	6 21	5 59
13	6 16	6 4	6 16	6 3	6 17	6 2	6 18	6 2	6 19	6 1
14	6 14	6 5	6 15	6 4	6 15	6 3	6 15	6 3	6 16	6 3
15	6 12	6 6	6 13	6 5	6 13	6 5	6 13	6 5	6 14	6 4
16	6 10	6 7	6 11	6 7	6 11	6 6	6 11	6 6	6 11	6 6
17	6 8	6 8	6 9	6 8	6 9	6 8	6 9	6 8	6 9	6 8
18	6 7	6 10	6 7	6 9	6 7	6 9	6 7	6 9	6 7	6 10
19	6 5	6 11	6 5	6 11	6 5	6 11	6 5	6 11	6 4	6 12
20	6 3	6 12	6 3	6 12	6 3	6 12	6 3	6 13	6 2	6 13
21	6 1	6 13	6 1	6 14	6 1	6 14	6 0	6 14	5 59	6 15
22	5 59	6 14	5 59	6 15	5 59	6 15	5 58	6 16	5 57	6 17
23	5 58	6 16	5 57	6 16	5 56	6 17	5 56	6 17	5 55	6 19
24	5 56	6 17	5 55	6 17	5 54	6 18	5 54	6 19	5 52	6 20
25	5 54	6 18	5 53	6 19	5 52	6 20	5 52	6 20	5 50	6 22
26	5 52	6 19	5 51	6 20	5 50	6 21	5 50	6 22	5 48	6 24
27	5 50	6 21	5 49	6 22	5 48	6 23	5 47	6 24	5 46	6 26
28	5 48	6 22	5 47	6 23	5 46	6 24	5 45	6 25	5 43	6 27
29	5 47	6 23	5 46	6 24	5 44	6 26	5 43	6 27	5 41	6 29
30	5 45	6 24	5 44	6 25	5 42	6 27	5 41	6 28	5 39	6 31
31	5 43	6 25	5 42	6 27	5 40	6 28	5 38	6 30	5 36	6 32

For an explanation of this table and its use at various places, see pages 8 and 9.

APRIL

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 41	6 27	5 40	6 28	5 38	6 30	5 36	6 31	5 34	6 34
2	5 39	6 28	5 38	6 30	5 36	6 31	5 34	6 33	5 32	6 36
3	5 38	6 29	5 36	6 31	5 34	6 33	5 32	6 35	5 30	6 37
4	5 36	6 30	5 34	6 32	5 32	6 34	5 30	6 36	5 27	6 39
5	5 34	6 32	5 32	6 33	5 30	6 36	5 28	6 38	5 25	6 41
6	5 32	6 33	5 30	6 34	5 28	6 37	5 26	6 39	5 23	6 43
7	5 30	6 34	5 28	6 36	5 26	6 38	5 24	6 41	5 21	6 44
8	5 29	6 35	5 26	6 37	5 24	6 40	5 21	6 42	5 19	6 46
9	5 27	6 36	5 24	6 39	5 22	6 41	5 19	6 44	5 16	6 48
10	5 25	6 37	5 23	6 40	5 20	6 43	5 17	6 46	5 14	6 49
11	5 24	6 38	5 21	6 41	5 18	6 44	5 15	6 47	5 11	6 51
12	5 22	6 40	5 19	6 43	5 16	6 45	5 13	6 49	5 9	6 53
13	5 20	6 41	5 17	6 44	5 14	6 47	5 11	6 50	5 7	6 54
14	5 18	6 42	5 15	6 45	5 12	6 48	5 9	6 52	5 5	6 56
15	5 17	6 43	5 14	6 46	5 10	6 50	5 7	6 53	5 3	6 58
16	5 15	6 45	5 12	6 48	5 8	6 51	5 5	6 55	5 1	7 0
17	5 13	6 46	5 10	6 49	5 6	6 53	5 2	6 56	4 58	7 1
18	5 11	6 47	5 8	6 50	5 5	6 54	5 1	6 58	4 56	7 3
19	5 10	6 48	5 6	6 52	5 3	6 55	4 59	6 59	4 54	7 5
20	5 8	6 49	5 5	6 53	5 1	6 57	4 57	7 1	4 52	7 6
21	5 7	6 50	5 3	6 54	4 59	6 58	4 55	7 2	4 50	7 8
22	5 5	6 52	5 1	6 56	4 57	7 0	4 53	7 4	4 48	7 10
23	5 3	6 53	4 59	6 57	4 55	7 1	4 50	7 6	4 46	7 11
24	5 2	6 54	4 58	6 58	4 54	7 3	4 49	7 7	4 44	7 13
25	5 0	6 56	4 56	7 0	4 52	7 4	4 47	7 9	4 42	7 14
26	4 59	6 57	4 54	7 1	4 50	7 5	4 45	7 10	4 40	7 16
27	4 57	6 58	4 53	7 2	4 48	7 7	4 43	7 12	4 38	7 18
28	4 56	6 59	4 51	7 3	4 47	7 8	4 41	7 13	4 36	7 19
29	4 54	7 0	4 50	7 5	4 45	7 10	4 39	7 15	4 34	7 21
30	4 53	7 1	4 48	7 6	4 43	7 12	4 38	7 16	4 32	7 22

For an explanation of this table and its use at various places, see pages 8 and 9.

MAY

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	4 51	7 3	4 47	7 7	4 42	7 12	4 36	7 18	4 30	7 24
2	4 50	7 4	4 45	7 9	4 40	7 14	4 34	7 20	4 28	7 26
3	4 48	7 5	4 43	7 10	4 38	7 15	4 32	7 21	4 26	7 27
4	4 47	7 6	4 42	7 11	4 37	7 17	4 31	7 23	4 24	7 29
5	4 46	7 8	4 41	7 13	4 35	7 18	4 29	7 24	4 22	7 31
6	4 44	7 9	4 39	7 14	4 34	7 19	4 27	7 26	4 21	7 33
7	4 43	7 10	4 38	7 15	4 32	7 21	4 26	7 27	4 19	7 34
8	4 42	7 11	4 36	7 16	4 31	7 22	4 24	7 29	4 17	7 36
9	4 40	7 12	4 35	7 17	4 29	7 23	4 22	7 30	4 15	7 38
10	4 39	7 13	4 34	7 19	4 28	7 25	4 21	7 32	4 13	7 39
11	4 38	7 14	4 32	7 20	4 26	7 26	4 20	7 33	4 11	7 41
12	4 37	7 16	4 31	7 21	4 25	7 28	4 18	7 34	4 10	7 42
13	4 36	7 17	4 30	7 23	4 24	7 29	4 16	7 36	4 8	7 44
14	4 35	7 18	4 49	7 24	4 22	7 30	4 15	7 37	4 7	7 45
15	4 34	7 19	4 28	7 25	4 21	7 31	4 14	7 39	4 5	7 47
16	4 32	7 20	4 26	7 26	4 20	7 33	4 12	7 40	4 4	7 48
17	4 31	7 21	4 25	7 27	4 18	7 34	4 11	7 42	4 3	7 50
18	4 30	7 22	4 24	7 28	4 17	7 35	4 10	7 43	4 1	7 51
19	4 30	7 23	4 23	7 30	4 16	7 36	4 8	7 44	4 0	7 52
20	4 29	7 24	4 22	7 31	4 15	7 38	4 7	7 46	3 58	7 54
21	4 28	7 25	4 21	7 32	4 14	7 39	4 6	7 47	3 57	7 55
22	4 27	7 26	4 20	7 33	4 13	7 40	4 5	7 48	3 56	7 56
23	4 26	7 27	4 19	7 34	4 12	7 41	4 4	7 49	3 55	7 58
24	4 25	7 28	4 18	7 35	4 11	7 43	4 3	7 51	3 53	7 59
25	4 24	7 29	4 17	7 36	4 10	7 44	4 2	7 52	3 52	8 1
26	4 24	7 30	4 16	7 37	4 9	7 45	4 0	7 53	3 51	8 2
27	4 23	7 31	4 16	7 38	4 8	7 46	3 59	7 54	3 50	8 3
28	4 22	7 32	4 15	7 39	4 7	7 47	3 58	7 56	3 49	8 5
29	4 22	7 33	4 14	7 40	4 6	7 48	3 58	7 57	3 47	8 6
30	4 21	7 34	4 14	7 41	4 5	7 49	3 57	7 58	3 46	8 8
31	4 21	7 34	4 13	7 42	4 5	7 50	3 56	7 59	3 45	8 9

For an explanation of this table and its use at various places, see pages 8 and 9.

JUNE

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	4 20	7 35	4 12	7 43	4 4	7 51	3 56	8 0	3 45	8 10
2	4 19	7 36	4 12	7 44	4 4	7 52	3 55	8 1	3 44	8 11
3	4 19	7 37	4 11	7 44	4 3	7 52	3 54	8 2	3 44	8 11
4	4 18	7 38	4 11	7 45	4 3	7 53	3 54	8 3	3 43	8 12
5	4 18	7 39	4 10	7 46	4 2	7 54	3 53	8 4	3 43	8 13
6	4 17	7 39	4 10	7 47	4 2	7 55	3 52	8 4	3 43	8 14
7	4 17	7 40	4 10	7 48	4 1	7 56	3 52	8 5	3 42	8 15
8	4 17	7 41	4 9	7 48	4 1	7 57	3 52	8 6	3 42	8 15
9	4 17	7 41	4 9	7 49	4 1	7 57	3 51	8 7	3 41	8 16
10	4 16	7 42	4 9	7 49	4 0	7 58	3 51	8 8	3 41	8 17
11	4 16	7 42	4 9	7 50	4 0	7 59	3 50	8 8	3 41	8 18
12	4 16	7 43	4 9	7 51	4 0	7 59	3 50	8 9	3 41	8 18
13	4 16	7 43	4 8	7 51	4 0	8 0	3 50	8 10	3 40	8 19
14	4 16	7 44	4 8	7 52	4 0	8 0	3 50	8 10	3 40	8 19
15	4 16	7 44	4 8	7 52	4 0	8 1	3 50	8 11	3 40	8 20
16	4 16	7 45	4 8	7 53	4 0	8 1	3 50	8 11	3 40	8 21
17	4 17	7 45	4 8	7 53	4 0	8 2	3 50	8 12	3 40	8 21
18	4 17	7 45	4 8	7 54	4 0	8 2	3 50	8 12	3 39	8 22
19	4 17	7 46	4 8	7 54	4 0	8 2	3 50	8 12	3 39	8 23
20	4 17	7 46	4 8	7 54	4 0	8 3	3 50	8 13	3 39	8 23
21	4 17	7 46	4 8	7 54	4 0	8 3	3 50	8 13	3 39	8 23
22	4 18	7 46	4 9	7 55	4 0	8 3	3 50	8 13	3 39	8 23
23	4 18	7 46	4 9	7 55	4 1	8 3	3 51	8 13	3 40	8 23
24	4 18	7 47	4 10	7 55	4 1	8 3	3 51	8 13	3 40	8 23
25	4 18	7 47	4 10	7 55	4 1	8 3	3 51	8 13	3 40	8 23
26	4 19	7 47	4 10	7 55	4 2	8 3	3 52	8 13	3 41	8 23
27	4 19	7 47	4 11	7 55	4 2	8 3	3 52	8 13	3 41	8 23
28	4 19	7 47	4 11	7 55	4 3	8 3	3 53	8 13	3 42	8 23
29	4 20	7 47	4 12	7 55	4 3	8 3	3 53	8 13	3 42	8 23
30	4 20	7 47	4 12	7 54	4 4	8 3	3 54	8 13	3 43	8 23

For an explanation of this table and its use at various places, see pages 8 and 9.

JULY

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	4 21	7 47	4 13	7 54	4 4	8 3	3 55	8 12	3 44	8 23
2	4 21	7 46	4 14	7 54	4 5	8 2	3 56	8 12	3 45	8 22
3	4 22	7 46	4 14	7 54	4 6	8 2	3 56	8 12	3 46	8 22
4	4 22	7 46	4 15	7 54	4 6	8 2	3 57	8 11	3 47	8 21
5	4 23	7 46	4 15	7 53	4 7	8 2	3 58	8 11	3 48	8 21
6	4 24	7 45	4 16	7 53	4 8	8 1	3 59	8 10	3 48	8 20
7	4 24	7 45	4 17	7 53	4 9	8 1	4 0	8 10	3 49	8 20
8	4 25	7 45	4 18	7 52	4 10	8 0	4 0	8 9	3 50	8 19
9	4 26	7 44	4 18	7 52	4 10	8 0	4 1	8 9	3 51	8 19
10	4 27	7 43	4 19	7 51	4 11	7 59	4 2	8 8	3 52	8 18
11	4 28	7 43	4 20	7 50	4 12	7 59	4 3	8 7	3 53	8 17
12	4 29	7 42	4 21	7 50	4 13	7 58	4 4	8 7	3 54	8 16
13	4 29	7 42	4 22	7 49	4 14	7 57	4 5	8 6	3 56	8 15
14	4 30	7 41	4 23	7 48	4 15	7 56	4 6	8 5	3 57	8 14
15	4 31	7 40	4 24	7 48	4 16	7 56	4 7	8 4	3 58	8 13
16	4 32	7 40	4 25	7 47	4 17	7 55	4 8	8 3	3 59	8 12
17	4 33	7 39	4 26	7 46	4 18	7 54	4 10	8 2	4 0	8 11
18	4 34	7 38	4 27	7 45	4 19	7 53	4 11	8 1	4 2	8 10
19	4 34	7 38	4 28	7 44	4 20	7 52	4 12	8 0	4 3	8 9
20	4 36	7 37	4 29	7 43	4 21	7 51	4 13	7 59	4 4	8 8
21	4 37	7 36	4 30	7 42	4 23	7 50	4 15	7 58	4 5	8 7
22	4 38	7 35	4 31	7 41	4 24	7 49	4 16	7 57	4 7	8 5
23	4 39	7 34	4 32	7 40	4 25	7 48	4 17	7 56	4 8	8 4
24	4 40	7 33	4 33	7 39	4 26	7 47	4 18	7 54	4 10	8 2
25	4 40	7 32	4 34	7 38	4 27	7 46	4 20	7 53	4 11	8 1
26	4 41	7 31	4 35	7 37	4 28	7 44	4 21	7 52	4 12	8 0
27	4 42	7 30	4 36	7 36	4 30	7 43	4 22	7 50	4 14	7 58
28	4 44	7 29	4 38	7 35	4 31	7 42	4 24	7 49	4 15	7 57
29	4 45	7 28	4 39	7 34	4 32	7 40	4 25	7 47	4 17	7 55
30	4 46	7 27	4 40	7 33	4 33	7 39	4 26	7 46	4 18	7 54
31	4 47	7 26	4 41	7 32	4 35	7 38	4 28	7 44	4 20	7 52

For an explanation of this table and its use at various places, see pages 8 and 9.

AUGUST

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	4 48	7 24	4 42	7 30	4 36	7 36	4 29	7 43	4 21	7 50
2	4 49	7 23	4 44	7 29	4 37	7 35	4 31	7 41	4 23	7 49
3	4 50	7 22	4 45	7 27	4 39	7 33	4 32	7 40	4 24	7 47
4	4 51	7 21	4 46	7 26	4 40	7 32	4 33	7 38	4 26	7 45
5	4 52	7 19	4 47	7 24	4 41	7 30	4 35	7 37	4 28	7 43
6	4 53	7 18	4 48	7 23	4 43	7 29	4 36	7 35	4 29	7 41
7	4 54	7 17	4 49	7 22	4 44	7 27	4 38	7 33	4 31	7 40
8	4 56	7 15	4 51	7 20	4 45	7 26	4 39	7 32	4 32	7 38
9	4 57	7 14	4 52	7 19	4 46	7 24	4 40	7 30	4 34	7 36
10	4 58	7 12	4 53	7 17	4 48	7 22	4 42	7 28	4 36	7 34
11	4 59	7 11	4 54	7 16	4 49	7 21	4 44	7 26	4 37	7 32
12	5 0	7 9	4 56	7 14	4 51	7 19	4 45	7 25	4 39	7 30
13	5 2	7 8	4 57	7 12	4 52	7 17	4 47	7 23	4 40	7 28
14	5 3	7 6	4 58	7 11	4 53	7 16	4 48	7 21	4 42	7 26
15	5 4	7 5	4 59	7 9	4 55	7 14	4 50	7 19	4 44	7 24
16	5 5	7 3	5 1	7 8	4 56	7 12	4 51	7 17	4 45	7 22
17	5 6	7 2	5 2	7 6	4 57	7 10	4 53	7 15	4 47	7 20
18	5 7	7 0	5 3	7 4	4 59	7 9	4 54	7 13	4 48	7 18
19	5 8	6 59	5 4	7 3	5 0	7 7	4 55	7 12	4 50	7 16
20	5 10	6 57	5 6	7 1	5 2	7 5	4 57	7 9	4 52	7 14
21	5 11	6 55	5 7	6 59	5 3	7 3	4 59	7 7	4 53	7 12
22	5 12	6 54	5 8	6 57	5 4	7 1	5 0	7 5	4 55	7 10
23	5 13	6 52	5 9	6 56	5 6	6 59	5 2	7 3	4 56	7 8
24	5 14	6 50	5 11	6 54	5 7	6 57	5 3	7 1	4 58	7 6
25	5 15	6 49	5 12	6 52	5 8	6 56	5 4	7 0	5 0	7 4
26	5 16	6 47	5 13	6 50	5 10	6 54	5 6	6 57	5 1	7 2
27	5 18	6 45	5 14	6 48	5 11	6 52	5 8	6 55	5 3	7 0
28	5 19	6 44	5 16	6 46	5 12	6 50	5 9	6 53	5 4	6 58
29	5 20	6 42	5 17	6 45	5 14	6 48	5 10	6 51	5 6	6 56
30	5 21	6 40	5 18	6 43	5 15	6 46	5 12	6 49	5 8	6 54
31	5 22	6 38	5 19	6 41	5 17	6 44	5 14	6 47	5 10	6 51

For an explanation of this table and its use at various places, see pages 8 and 9.

SEPTEMBER

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 23	6 36	5 20	6 39	5 18	6 42	5 15	6 45	5 11	6 49
2	5 24	6 35	5 22	6 37	5 19	6 40	5 16	6 43	5 13	6 46
3	5 25	6 33	5 23	6 35	5 21	6 38	5 18	6 40	5 15	6 44
4	5 27	6 31	5 24	6 33	5 22	6 36	5 20	6 38	5 17	6 42
5	5 28	6 29	5 26	6 31	5 23	6 34	5 21	6 36	5 19	6 39
6	5 29	6 28	5 27	6 29	5 25	6 32	5 23	6 34	5 20	6 37
7	5 30	6 26	5 28	6 27	5 26	6 30	5 24	6 32	5 22	6 34
8	5 31	6 24	5 30	6 26	5 27	6 28	5 25	6 30	5 24	6 32
9	5 32	6 22	5 31	6 24	5 29	6 26	5 27	6 28	5 26	6 30
10	5 33	6 20	5 32	6 22	5 30	6 24	5 28	6 25	5 27	6 27
11	5 34	6 19	5 33	6 20	5 31	6 22	5 30	6 23	5 29	6 25
12	5 36	6 17	5 34	6 18	5 33	6 20	5 31	6 21	5 30	6 23
13	5 37	6 15	5 36	6 16	5 34	6 17	5 33	6 19	5 32	6 21
14	5 38	6 13	5 37	6 14	5 36	6 15	5 34	6 17	5 33	6 18
15	5 39	6 11	5 38	6 12	5 37	6 13	5 36	6 14	5 35	6 16
16	5 40	6 9	5 39	6 10	5 38	6 11	5 38	6 12	5 36	6 14
17	5 41	6 8	5 41	6 8	5 40	6 9	5 39	6 10	5 38	6 11
18	5 42	6 6	5 42	6 6	5 41	6 7	5 41	6 8	5 39	6 9
19	5 44	6 4	5 44	6 4	5 42	6 5	5 42	6 5	5 41	6 7
20	5 45	6 2	5 45	6 2	5 44	6 3	5 43	6 3	5 42	6 4
21	5 46	6 0	5 46	6 0	5 45	6 1	5 45	6 1	5 44	6 2
22	5 47	5 58	5 47	5 58	5 47	5 59	5 46	5 59	5 46	6 0
23	5 48	5 56	5 48	5 56	5 48	5 56	5 48	5 56	5 48	5 58
24	5 49	5 55	5 50	5 54	5 50	5 54	5 50	5 54	5 49	5 55
25	5 50	5 53	5 51	5 52	5 51	5 52	5 51	5 52	5 51	5 53
26	5 52	5 51	5 52	5 50	5 52	5 50	5 52	5 50	5 53	5 51
27	5 53	5 49	5 54	5 48	5 54	5 48	5 54	5 48	5 54	5 48
28	5 54	5 47	5 55	5 46	5 55	5 46	5 55	5 46	5 56	5 46
29	5 55	5 45	5 56	5 44	5 57	5 44	5 57	5 44	5 58	5 44
30	5 56	5 43	5 57	5 43	5 58	5 42	5 58	5 41	5 59	5 41

For an explanation of this table and its use at various places, see pages 8 and 9.

OCTOBER

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	5 58	5 41	5 58	5 41	5 59	5 40	6 0	5 39	6 1	5 39
2	5 59	5 40	6 0	5 39	6 1	5 38	6 2	5 37	6 3	5 37
3	6 0	5 38	6 1	5 37	6 2	5 36	6 3	5 35	6 5	5 35
4	6 1	5 36	6 2	5 35	6 4	5 34	6 5	5 33	6 6	5 32
5	6 2	5 34	6 4	5 33	6 5	5 32	6 6	5 31	6 8	5 30
6	6 4	5 32	6 5	5 31	6 7	5 30	6 8	5 28	6 10	5 28
7	6 5	5 31	6 6	5 30	6 8	5 28	6 10	5 26	6 11	5 25
8	6 6	5 29	6 8	5 28	6 9	5 26	6 11	5 24	6 13	5 23
9	6 8	5 27	6 9	5 26	6 11	5 24	6 12	5 22	6 15	5 21
10	6 9	5 25	6 10	5 24	6 12	5 22	6 14	5 20	6 16	5 19
11	6 10	5 24	6 12	5 22	6 14	5 20	6 16	5 18	6 18	5 17
12	6 11	5 22	6 13	5 20	6 15	5 18	6 17	5 16	6 19	5 15
13	6 12	5 20	6 14	5 18	6 17	5 16	6 19	5 14	6 21	5 13
14	6 13	5 19	6 16	5 16	6 18	5 14	6 21	5 12	6 23	5 10
15	6 15	5 17	6 17	5 14	6 20	5 12	6 22	5 10	6 24	5 8
16	6 16	5 15	6 18	5 13	6 21	5 10	6 24	5 7	6 26	5 6
17	6 17	5 13	6 20	5 11	6 22	5 8	6 26	5 5	6 27	5 4
18	6 19	5 12	6 21	5 9	6 24	5 6	6 27	5 3	6 29	5 1
19	6 20	5 10	6 22	5 8	6 25	5 5	6 28	5 2	6 31	4 59
20	6 21	5 9	6 24	5 6	6 27	5 3	6 30	5 0	6 33	4 57
21	6 22	5 7	6 25	5 4	6 28	5 1	6 32	4 57	6 35	4 55
22	6 24	5 6	6 27	5 2	6 30	4 59	6 34	4 56	6 37	4 53
23	6 25	5 4	6 28	5 1	6 31	4 58	6 35	4 54	6 39	4 51
24	6 26	5 2	6 30	4 59	6 33	4 56	6 37	4 52	6 40	4 48
25	6 28	5 1	6 31	4 57	6 34	4 54	6 38	4 50	6 42	4 46
26	6 29	4 59	6 32	4 56	6 36	4 52	6 40	4 48	6 44	4 44
27	6 30	4 57	6 34	4 54	6 38	4 50	6 42	4 46	6 46	4 42
28	6 32	4 56	6 35	4 52	6 39	4 48	6 43	4 44	6 48	4 40
29	6 33	4 55	6 37	4 51	6 41	4 47	6 45	4 42	6 50	4 38
30	6 34	4 54	6 38	4 49	6 42	4 45	6 47	4 41	6 52	4 36
31	6 35	4 52	6 40	4 48	6 44	4 44	6 48	4 39	6 53	4 35

For an explanation of this table and its use at various places, see pages 8 and 9.

NOVEMBER

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	6 37	4 51	6 41	4 46	6 45	4 42	6 50	4 37	6 55	4 33
2	6 38	4 49	6 42	4 45	6 47	4 41	6 52	4 36	6 57	4 31
3	6 40	4 48	6 44	4 44	6 48	4 39	6 53	4 34	6 59	4 29
4	6 41	4 47	6 45	4 42	6 50	4 38	6 55	4 32	7 1	4 27
5	6 42	4 45	6 47	4 41	6 51	4 36	6 57	4 31	7 2	4 26
6	6 43	4 44	6 48	4 39	6 53	4 35	6 58	4 29	7 4	4 24
7	6 44	4 43	6 49	4 38	6 54	4 33	7 0	4 28	7 6	4 22
8	6 46	4 42	6 51	4 37	6 56	4 32	7 2	4 26	7 8	4 21
9	6 47	4 41	6 52	4 36	6 58	4 30	7 3	4 25	7 9	4 19
10	6 49	4 40	6 54	4 35	6 59	4 29	7 5	4 23	7 11	4 18
11	6 50	4 38	6 55	4 33	7 1	4 28	7 7	4 22	7 13	4 16
12	6 51	4 37	6 56	4 32	7 2	4 26	7 8	4 20	7 15	4 15
13	6 53	4 36	6 58	4 31	7 4	4 25	7 10	4 19	7 16	4 13
14	6 54	4 35	6 59	4 30	7 5	4 24	7 11	4 18	7 18	4 12
15	6 55	4 34	7 1	4 29	7 7	4 23	7 13	4 16	7 20	4 10
16	6 57	4 33	7 2	4 28	7 8	4 21	7 15	4 15	7 21	4 9
17	6 58	4 32	7 4	4 27	7 10	4 20	7 16	4 14	7 23	4 7
18	6 59	4 32	7 5	4 26	7 12	4 19	7 18	4 13	7 25	4 6
19	7 0	4 31	7 6	4 25	7 13	4 18	7 20	4 11	7 26	4 5
20	7 2	4 30	7 8	4 24	7 14	4 17	7 21	4 10	7 28	4 4
21	7 3	4 29	7 9	4 23	7 15	4 17	7 23	4 9	7 30	4 3
22	7 4	4 28	7 10	4 22	7 17	4 16	7 24	4 8	7 32	4 2
23	7 6	4 28	7 12	4 22	7 19	4 15	7 26	4 7	7 33	4 0
24	7 7	4 27	7 13	4 21	7 20	4 14	7 28	4 6	7 35	3 59
25	7 8	4 26	7 14	4 20	7 21	4 13	7 29	4 5	7 37	3 58
26	7 9	4 26	7 16	4 19	7 23	4 12	7 31	4 4	7 38	3 57
27	7 10	4 25	7 17	4 19	7 24	4 12	7 32	4 4	7 40	3 56
28	7 12	4 25	7 18	4 18	7 25	4 11	7 33	4 3	7 41	3 55
29	7 13	4 24	7 19	4 18	7 27	4 10	7 35	4 2	7 43	3 55
30	7 14	4 24	7 21	4 17	7 28	4 10	7 36	4 2	7 44	3 54

For an explanation of this table and its use at various places, see pages 8 and 9.

DECEMBER

Day of Month	Latitude 44°		Latitude 46°		Latitude 48°		Latitude 50°		Latitude 52°	
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
1	7 15	4 23	7 22	4 16	7 29	4 9	7 37	4 1	7 46	3 54
2	7 16	4 23	7 23	4 16	7 31	4 9	7 39	4 1	7 47	3 53
3	7 17	4 23	7 24	4 16	7 32	4 8	7 40	4 0	7 48	3 52
4	7 18	4 23	7 25	4 16	7 33	4 8	7 41	4 0	7 50	3 52
5	7 19	4 22	7 26	4 15	7 34	4 8	7 42	3 59	7 51	3 51
6	7 20	4 22	7 27	4 15	7 35	4 8	7 43	3 59	7 53	3 51
7	7 21	4 22	7 29	4 15	7 36	4 7	7 45	3 59	7 54	3 50
8	7 22	4 22	7 30	4 15	7 37	4 7	7 46	3 59	7 55	3 50
9	7 23	4 22	7 30	4 15	7 37	4 7	7 47	3 58	7 56	3 50
10	7 24	4 22	7 31	4 15	7 38	4 7	7 48	3 58	7 57	3 50
11	7 25	4 22	7 32	4 15	7 40	4 7	7 49	3 58	7 58	3 50
12	7 26	4 22	7 33	4 15	7 41	4 7	7 50	3 58	7 59	3 50
13	7 26	4 22	7 34	4 15	7 42	4 7	7 51	3 58	7 59	3 49
14	7 27	4 22	7 35	4 15	7 43	4 7	7 52	3 58	8 0	3 49
15	7 28	4 23	7 36	4 15	7 44	4 7	7 53	3 58	8 1	3 49
16	7 29	4 23	7 36	4 15	7 44	4 7	7 53	3 58	8 2	3 49
17	7 30	4 23	7 37	4 16	7 45	4 8	7 54	3 59	8 3	3 49
18	7 30	4 24	7 38	4 16	7 46	4 8	7 55	3 59	8 4	3 50
19	7 31	4 24	7 38	4 16	7 46	4 8	7 55	3 59	8 4	3 50
20	7 31	4 24	7 39	4 17	7 47	4 9	7 56	4 0	8 5	3 51
21	7 32	4 25	7 39	4 17	7 47	4 9	7 56	4 0	8 5	3 51
22	7 32	4 25	7 40	4 18	7 48	4 10	7 57	4 1	8 6	3 52
23	7 33	4 26	7 40	4 18	7 48	4 10	7 57	4 1	8 6	3 52
24	7 33	4 27	7 41	4 19	7 49	4 11	7 58	4 2	8 7	3 53
25	7 34	4 27	7 41	4 20	7 49	4 12	7 58	4 3	8 7	3 53
26	7 34	4 28	7 42	4 20	7 50	4 12	7 58	4 3	8 8	3 54
27	7 34	4 28	7 42	4 21	7 50	4 13	7 59	4 4	8 8	3 54
28	7 34	4 29	7 42	4 22	7 50	4 14	7 59	4 5	8 8	3 55
29	7 35	4 30	7 42	4 22	7 50	4 15	7 59	4 6	8 8	3 56
30	7 35	4 31	7 42	4 23	7 50	4 16	7 59	4 7	8 8	3 57
31	7 35	4 32	7 42	4 24	7 50	4 17	7 59	4 8	8 8	3 58

For an explanation of this table and its use at various places, see pages 8 and 9.

THE PLANETS, 1935

By R. J. McDiarmid

MERCURY

Mercury is the smallest, least massive, and swiftest in its orbital motion of the nine major planets. It also has the most eccentric orbit, with the greatest inclination to the ecliptic. Since it is the planet whose orbit is closest to the sun it never appears in the sky very far removed from that body. For this reason Mercury is the least seen of any of the planets visible to the naked eye, though its observation, if attempted at the right time, is not nearly as difficult as many people suppose.

Its apparent separation from the sun is never great, the maximum value ranging from 18° to 28°. During 1935, Mercury reaches a maximum apparent separation from the sun six times. When Mercury is at eastern elongation it may be seen as a ruddy first magnitude star, low in the west shortly after sunset, its light almost eclipsed by the evening twilight. At western elongation it is visible in the eastern morning sky just before sunrise.

The maximum eastern elongations of Mercury for 1935 are on February 1, 18° 20′; May 26, 22° 51′, and September 23, 26° 18′.

During the spring the ecliptic runs most nearly vertical at sunset, and hence the elongation on February 1 is the most favourable at which to look for Mercury in the evening sky.

The maximum western elongations of Mercury during 1935 are on March 15, 27° 37′; July 14, 20° 46′, and November 2, 18° 44′. Since the ecliptic is most nearly vertical at sunrise in September, the elongations on July 14 and November 22 will be equally suitable for observing Mercury in the morning sky.

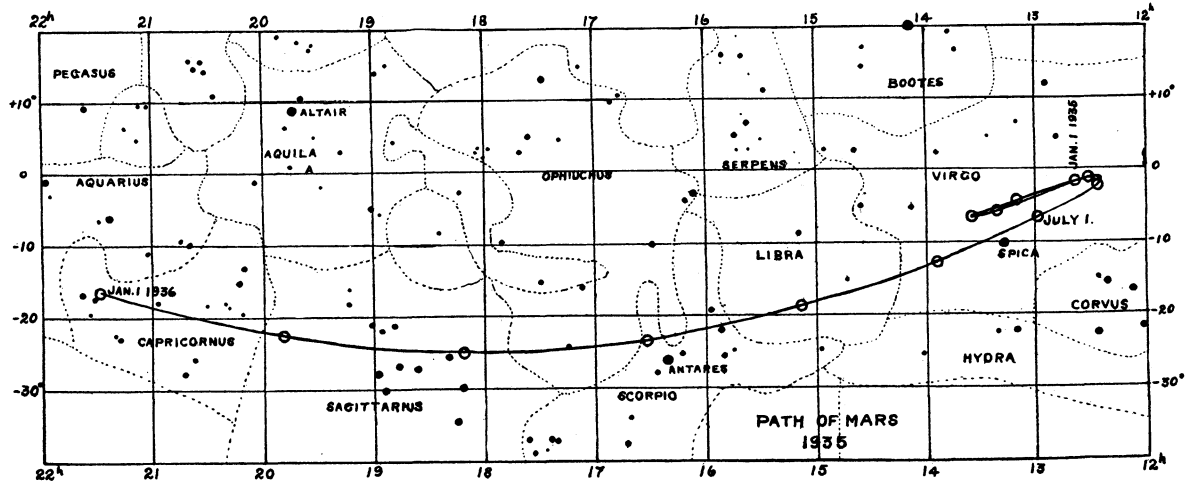
The six elongations of Mercury which occur in 1935 are none of them extremely favourable for the observation of this planet.

VENUS

Venus is the planet whose orbit lies next outside that of Mercury. It is by far the brightest and most conspicuous of all in our skies. It is nearly the earth's twin in respect to magnitude, density, and general constitution, if not in other physical conditions.

The orbit of Venus lies just inside that of the earth and hence it comes closer to us than any other body with the exception of the moon, one or two of the minor planets, and an occasional comet. Its mean distance from the sun is 67 million miles, and its distance from the earth ranges from 26 million to 160 million miles.

It is so brilliant that it is easily seen with the naked eye in the daytime for several weeks when near its greatest elongation. At the beginning of 1935, Venus is about five times brighter than Sirius, setting an hour after the sun, and as it is moving eastward among the stars with respect to the sun, it continues as an



PATH OF MARS AMONG THE STARS DURING 1935

The positions of the planet (shown by a little circle) are marked on the first of each month. The planet is visible during the entire year. It has its maximum brightness in early April when it is about five degrees north of Spica.

evening star all summer, passing eastern elongation 45° 26′ east of sun, June 30; attains greatest brilliancy August 3, about 15 times brighter than Sirius. September 8 it is in inferior conjunction with the sun and becomes a morning star. By October 15 it has again attained its greatest brilliancy, magnitude −4.3. Its apparent separation from the sun gradually increases westward and on November 18 Venus has its greatest elongation west of the sun, 46° 41′. It continues as a morning star the remaining part of 1935.

For a map showing the path of Venus among the stars, see p. 3 of cover.

MARS

Mars, whose orbit lies just outside that of the earth, is the second smallest of the major planets, with a diameter of only 4200 miles. It does not approach quite as close as Venus, but when it is nearest to us, its daylight hemisphere is towards the earth, while the reverse is true for Venus, so that we know more about the surface features of Mars than we do of any other planet.

At the beginning of 1935, Mars is a red star of first magnitude, rising about midnight. It appears a little later each week; by April 6 it is in opposition (*i.e.*, 180° from the sun) and is visible all night. April 12, Mars is nearest the earth and is in good position for observation, magnitude −1.2, nearly as bright as Sirius. The apparent angular separation between Mars and the sun gradually decreases and by July 16 the planet is in quadrature (90° from the sun) and is visible as an evening star, and continues to be till the end of the year. It gradually decreases in brightness and its distance from the earth increases; by early fall it is a first magnitude star again. Mars has two satellites, Phobos and Deimos.

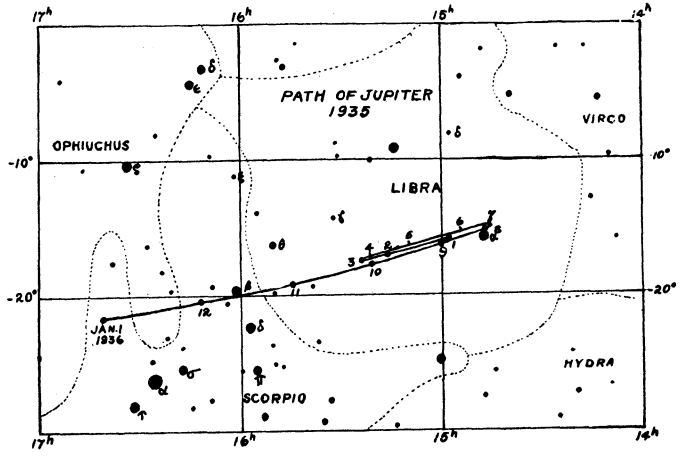
JUPITER

Jupiter is the largest and most massive planet of the solar system and though it does not approach the earth as closely as do Venus and Mars, it is by far the easiest planetary object for observers with small telescopes because of its relatively large disk. An indication of this disk may be seen with a power of ten, and with good seeing, a power of twenty on a two-inch telescope will reveal several dark bands lying on either side of the planet's equator. These are known as cloud belts and change slightly in form from month to month.

Jupiter is known to possess nine moons. The four brightest may be seen with a good pair of prism binoculars (two of them larger than Mercury), but the others are extremely faint bodies and require the most powerful instruments to detect them.

During the greater part of 1935, Jupiter is in the constellation Libra. It is visible as a morning star, magnitude −1.4, at the beginning of the year. February 11 its apparent angular separation from the sun is 90°, and it is a conspicuous object rising shortly after midnight. By May 9, it is in opposition (180° from the sun) and is visible all night. August 7, Jupiter is again in quadrature (90° from the sun) and is visible as an evening star for a short time, gradually approaching the sun, passing conjunction November 27.

Jupiter is not visible during December.



PATH OF JUPITER AMONG THE STARS DURING 1935

The position of the planet on the first of each month are numbered from 1 to 12. From March to July the planet is regreding.

SATURN

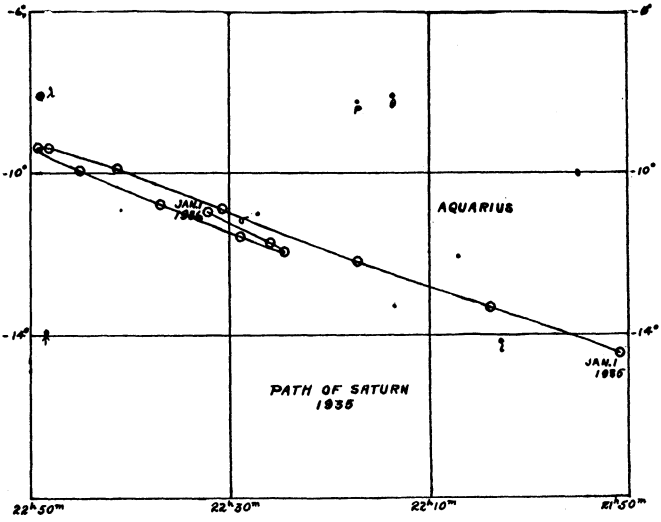
Saturn has a system of rings which makes it a unique object for telescopic observation. These rings may be seen with a good two-inch glass. It has ten satellites, the brightest of these being conspicuous in a small telescope.

At the beginning of the year it is just visible low in the southwest in the early part of the evening. Saturn rapidly approaches the sun and is in conjunction with it on February 20, and enters the morning sky, but is too near the sun to be well seen for a month or two. It starts to retrograde June 22, and is in opposition to the sun August 31. Saturn is in the constellation of Aquarius all year and is a bright yellow star shining with a steady light in the southern sky all summer and autumn. The ring system is well placed for observation.

URANUS

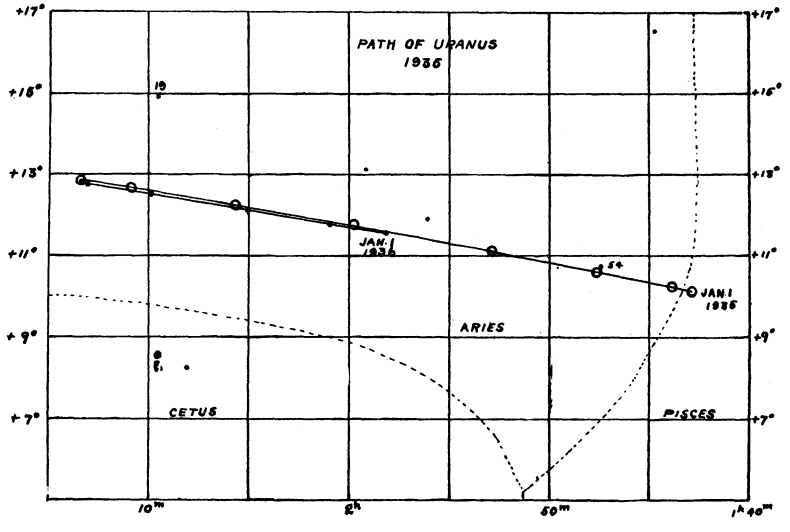
Uranus was discovered by Sir William Herschel in 1781. Before that time Saturn's path was considered the outermost boundary of the solar system, and when the planet was first seen by Herschel he thought it must be a comet. A year later its true nature was recognized. The planet has four satellites, two discovered by Herschel a few years after his discovery of Uranus. In 1851, Lassell rediscovered and observed these two satellites, Oberon and Titania, and independently discovered and observed the two fainter satellites, Ariel and Umbriel. The satellites are very faint, about magnitude 14.

The period of Uranus about the sun is 84 years, and consequently its motion in the heavens is slow. Its period of rotation is 10-3/4 hours. It is of the sixth magnitude, a difficult object to recognize with the naked eye and better observed



PATH OF SATURN AMONG THE STARS DURING 1935

The position of the planet is indicated on the first of each month.



PATH OF URANUS AMONG THE STARS DURING 1935

The position of the planet are shown on the first of each month by open circles when the motion is forward and by filled circles when the planet is regreding.

with a field glass. A large telescope is necessary to show an appreciable disk.

Uranus is in the constellation Aries during 1935. It is in conjunction with the sun on April 22, and a few months later may be observed in the morning sky. Opposition to the sun occurs October 27, at which time the planet is visible all night.

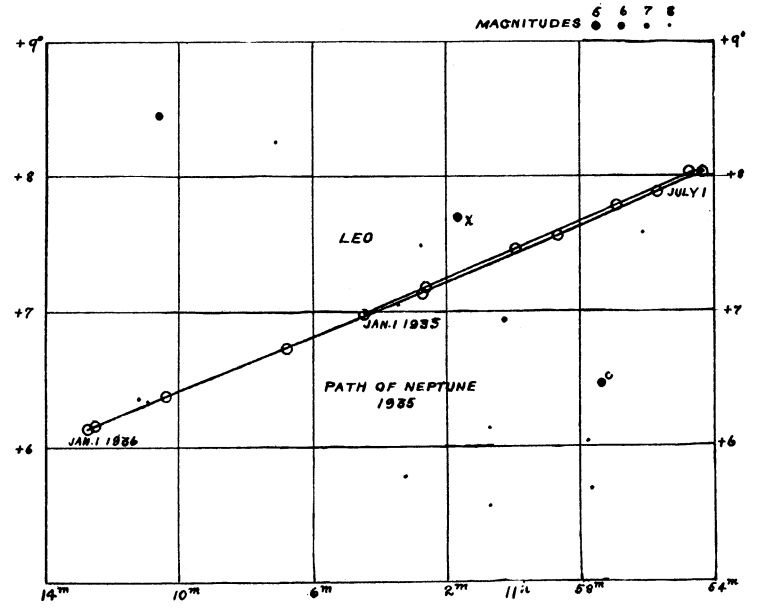
NEPTUNE

Neptune was discovered in 1846 as the result of the mathematical discussion of the planet Uranus, which, for some unknown reason, was not following the path predicted for it. The discovery is one of the most interesting romances in the history of astronomy.

Neptune appears as an eighth magnitude star and hence can be seen only with a telescope. It has a single satellite, with a magnitude of about 13. The satellite was discovered by Lassell a few months following the discovery of the planet.

Neptune, until two years ago, was considered the most distant planet of the solar system, being 2,800 millions of miles from the sun, and requiring 165 years to complete a revolution. The discovery of a new member of the solar system, Pluto, at Flagstaff observatory, Arizona, in 1930, has robbed Neptune of this distinction.

Neptune is in the constellation Leo and in opposition to the sun on March 4, being visible most of the night during the first part of the year. Conjunction



PATH OF NEPTUNE AMONG THE STARS DURING 1935

The position of the planet are shown on the first of each month.

with the sun takes place September 7, and the planet will be too near the sun for observation several months before and after that date.

PLUTO

Pluto was discovered about the beginning of the year 1930 by the staff of the Lowell Observatory, at Flagstaff, Arizona. It was found to be within five degrees of the position predicted for it by Percival Lowell through his mathematical treatment of slight irregularities in the motion of Uranus. In the discovery of this planet history seems to have repeated itself though recently some doubt has been raised as to the possibility of Pluto causing large enough perturbations in the motion of Uranus to allow of its position being calculated. Even should this be so, however, it in no way detracts from the tribute due the late Percival Lowell without whose pioneer work the planet would not have been found. He it was who instituted the search for this planet and it was discovered by the observatory which he founded.

The image of Pluto has been found on plates dating back as far as 1914 and these have greatly facilitated the refinement of its computed orbit. It revolves about the sun once in 248 years at a mean distance of 3700 million miles from that body, and hence its motion among the stars is very slow. Just at present it is in the constellation Gemini, a few degrees south of Castor and Pollux, and visible all winter in the evening sky. Its visual magnitude is 15, however, so that it can be seen only in the largest telescopes. Latest results seem to indicate that its mass is between one- and two-tenths that of the earth.

The approximate position of Pluto at the beginning of 1935, is $\alpha = 7\text{h } 51\text{m}$, $\delta + 22° 38'$. Some idea of the remoteness of this planet may be had from the fact that the light from it requires approximately a quarter of a day to reach the earth.

ECLIPSES, 1935

In the year 1935 there will be seven eclipses, five of the Sun and two of the Moon.

I. A Partial Eclipse of the Sun January 5, visible only in extreme southern latitudes. Greatest eclipse will be 0.001 of the Sun's diameter.

II. A Total Eclipse of the Moon January 19, invisible at Toronto. The beginning visible generally in eastern Europe, Asia, Australia, the eastern part of the Indian Ocean, the Pacific Ocean, and Western North America; the ending visible generally in Europe, Africa, except the extreme western part, the Indian Ocean, Australia, the western part of the Pacific Ocean and the extreme northe western part of North America.

Circumstances of the Eclipse 75th Meridian Civil Time

	m	d	h	m
Moon enters penumbra	January	19	7	39
Moon enters umbra	"	19	8	53
Total Eclipse begins	"	19	10	03
Middle of the Eclipse	"	19	10	47
Total Eclipse ends	"	19	11	31
Moon leaves umbra	"	19	12	41
Moon leaves penumbra	"	19	13	55

Magnitude of the eclipse 1.355 (Moon's diam. = 1.0)

III. A Partial Eclipse of the Sun February 3, visible in North America except the extreme north western part.

Circumstances of the Eclipse 75th Meridian Civil Time

	m	d	h	m	Long. ° ′	Lat. ° ′
Eclipse begins	February	3	9	30	116 05 W.	24 48 N.
Greatest Eclipse	"	3	11	16	115 19 W.	62 33 N.
Eclipse ends	"	3	13	01	35 53 W.	64 37 N.

Magnitude of greatest eclipse 0.739 (Sun's diam. = 1.0)

IV. A Partial Eclipse of the Sun June 30, invisible in North America.

Circumstances of the Eclipse 75th Meridian Civil Time

	m	d	h	m	Long. ° ′	Lat. ° ′
Eclipse begins	June	30	13	34	124 35 E.	59 56 N.
Greatest Eclipse	"	30	14	59	39 18 E.	65 14 N.
Eclipse ends	"	30	16	25	23 19 W.	46 43 N.

Magnitude of greatest eclipse 0.338 (Sun's diam. = 1.0)

V. A Total Eclipse of the Moon July 15-16. The beginning visible generally in Africa except the extreme northwestern part, southwestern Europe, the Atlantic Ocean, North America except the northwestern part, South America and the eastern part of the Pacific Ocean; the ending visible generally in the Atlantic Ocean, North America except the extreme northern part, South America and the eastern part of the Pacific Ocean.

Circumstances of the Eclipse 75th Meridian Civil Time

	m	d	h	m
Moon enters penumbra	July	15	21	15
Moon enters umbra	"	15	22	12
Total Eclipse begins	"	15	23	09
Middle of the Eclipse	"	16	00	00
Total Eclipse ends	"	16	00	50
Moon leaves umbra	"	16	01	47
Moon leaves penumbra	"	16	02	43

Magnitude of the eclipse 1.761 (Moon's diam. = 1.0)

VI. A Partial Eclipse of the Sun July 30, invisible in North America.

Circumstances of the Eclipse 75th Meridian Civil Time

	m	d	h	m	Long. ° ′	Lat. ° ′
Eclipse begins	July	30	3	02	10 20 W.	43 10 S.
Greatest eclipse	"	30	4	16	5 49 W.	62 58 S.
Eclipse ends	"	30	5	30	35 58 E.	70 55 S.

Magnitude of greatest eclipse 0.231 (Sun's diam. = 1.0)

VII. An Annular Eclipse of the Sun December 25, invisible in North America.

Circumstances of the Eclipse 75th Meridian Civil Time

	m	d	h	m	Long. ° ′	Lat. ° ′
Eclipse begins	December	25	10	42	165 11 W.	39 12 S.
Central eclipse begins	"	25	12	18	134 59 E.	62 18 S.
Central Eclipse ends	"	25	13	41	25 06 E.	53 14 S.
Eclipse ends	"	25	15	17	21 31 W.	26 55 S.

THE SKY FOR JANUARY, 1935

Prepared by W. S. ARMSTRONG

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During January the sun's R.A. increases from 18h 42m to 20h 55m, and its Decl. changes from 23° 06′ S. to 17° 25′ S. The equation of time (see p. 6) increases from 3m 6s to 13m 33s. Owing to this rapid rise in value the time of mean noon appears, for the first ten days of the month, to remain at the same distance from sunrise, that is, the forenoons as indicated by our clocks are of the same length. On the 20th of the month the sun enters Aquarius, the second winter zodiacal sign. On the 2nd the earth is in perihelion. There is a partial eclipse of the sun on January 5, invisible in North America (see p. 28).

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page. There is a total eclipse of the moon on the 19th (see p. 28).

Mercury on the 15th is in R.A. 20h 24m, Decl. 21° 26′ S. and transits at 12.53. During this month Mercury continually separates from the sun until February 1, when it has its greatest eastern elongation. Hence it should be visible for a few days at the end of the month, setting a little over an hour after the sun. Read about Mercury on p. 22.

Venus on the 15th is in R.A. 20h 42m, Decl. 19° 45′ S. and transits at 13.08. It is an evening star all month, setting about one hour after the sun. At sunset on the 15th it will be seen in the southwest at an altitude of 10°. Its stellar magnitude is −3.4.

Mars on the 15th is in R.A. 13h 0m, Decl. 3° 51′ S. and transits at 5.25. It is a morning star, rising about midnight at the first of the month. It is a red star, of magnitude 0.8, in the constallation Virgo not far from Spica. See statement on page 24.

Jupiter on the 15th is in R.A. 15h 8m, Decl. 16° 28′ S. and transits at 7.32. From the map on p. 25 it is seen that Jupiter is in Libra most of the year. During this month it is a brilliant morning star, rising 4-1/2 hours before the sun. For the configuration of its satellites see next page, and for their eclipses, etc., see p. 54.

Saturn on the 15th is in R.A. 21h 57m, Decl. 13° 59′ S. and transits at 14.20. From the map on p. 26 it is seen that this planet is in Capricornus at the beginning of the year, but on January 22 passes into Aquarius where it remains for the remainder of the year. It is low in the southwest at sunset and is not suitably placed for observation.

Uranus on the 15th is in R.A. 1h 43m, Decl. 10° 06′ N. and transits at 18.05.

Neptune on the 15th is in R.A. 11h 4m, Decl. 7° 02′ N. and transits at 3.28.

Pluto—For information regarding this planet, see p. 28.

JANUARY

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		h	m	Minima of Algol
Tues.	1	3	40	☌	♃	☾	..... ♃	6	19	N.	4	10	31204
Wed.	2	3	..		⊕		In Perihelion.....						32014
Thur.	3	23	..		♂		In Aphelion.....						3024*
Fri.	4	16	..		♀		In Aphelion.....				1	00	10234
Sat.	5	0	20		●		New Moon.....						20134
		..	..		☉		Partial Eclipse.....						
		6	03	☌	☿	☾	..... ☿	0	46	S.			
		20	31	☌	♀	☾	..... ♀	0	49	S.			
Sun.	6	6	40		☾		In Perigee				21	50	1034*
		9	..		♋		Stationary in R.A.						
Mon.	7	21	29	☌	♄	☾	..... ♄	3	55	S.			d0124
Tues.	8				.....								31204
Wed.	9				.....						18	40	32401
Thur.	10				.....								43102
Fri.	11	15	55		☽		First Quarter.....						d4032
Sat.	12	4	..		☿		Greatest Hel. Lat. S...				15	30	42013
		7	58	☌	♋	☾	..... ♋	6	14	S.			
Sun.	13				.....								41203
Mon.	14				.....								40312
Tues.	15				.....						12	20	d4310
Wed.	16				.....								34201
Thur.	17				.....								34102
Fri.	18	9	..	□	♋	☉	.....				9	10	01342
Sat.	19	..	..		☾		Total Eclipse.....						2034*
		10	44		♌		Full Moon.						
Sun.	20	17	..		☾		In Apogee.....						21034
Mon.	21				.....						6	00	03124
Tues.	22				.....								31024
Wed.	23	11	11	☌	♆	☾	..... ♆	5	07	N.			32014
Thur.	24				.....						2	50	31024
Fri.	25				.....								03142
Sat.	26	11	22	☌	♂	☾	..... ♂	8	24	N.	23	30	2403*
		12	..	☌	☿	♀	..... ☿	0	38	N.			
Sun.	27	5	..		♀		Greatest Hel. Lat. S...						42103
		14	59		☾		Last Quarter.						
Mon.	28	19	45	☌	♃	☾	..... ♃	6	15	N.			40132
Tues.	29				.....						20	20	43102
Wed.	30				.....								43201
Thur.	31	4	..	☌	☿	♄	..... ☿	1	27	N.			4310*
		5	..		☿		In ♌.						
		7	..	☌	♀	♄	..... ♀	0	10	S.			
		19	..	☌	☿	♀	..... ☿	1	46	N.			

Configurations of Jupiter's Satellites at 6h 30m
31204
32014
3024*
10234
20134
1034*
d0124
31204
32401
43102
d4032
42013
41203
40312
d4310
34201
34102
01342
2034*
21034
03124
31024
32014
31024
03142
2403*
42103
40132
43102
43201
4310*

Explanation of symbols and abbreviations on page 4

THE SKY FOR FEBRUARY, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During February the sun's R.A. increases from 20h 55m to 22h 44m, and its Decl. changes from 17° 25′ S. to 8° 01′ S. The equation of time reaches a maximum value of 14m 23s on the 12th (see p. 6). For changes in the length of the day see p. 11. On the 19th the sun enters Pisces, the third winter sign of the zodiac. There is a partial eclipse of the sun on February 3, visible throughout North America except in Alaska and other northerly portions (see p. 29).

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 22h 4m, Decl. 8° 07′ S. and transits at 12.22. On the 1st it has its greatest eastern elongation, after which it approaches the sun and comes to inferior conjunction on the 17th. For the remainder of the month it is a morning star, but is too near the sun for observation.

Venus on the 15th is in R.A. 23h 12m, Decl. 6° 40′ S. and transits at 13.36. It is an evening star of magnitude −3.3, visible about 20° above the horizon at sunset.

Mars on the 15th is in R.A. 13h 32m, Decl. 6° 37′ S. and transits at 3.54. As it rises about 10 p.m., it can be observed for the greater part of the night.

Jupiter on the 15th is in R.A. 15h 21m, Decl. 17° 18′ S. and transits at 5.44. On the 11th it is in quadrature with the sun and rises at midnight. For the configuration of its satellites, see next page, and for their eclipses, etc., see p. 54.

Saturn on the 15th is in R.A. 22h 11m, Decl. 12° 45′ S. and transits at 12.32. The planet is in conjunction with the sun on the 20th and hence is too near the sun for observation during this month.

Uranus on the 15th is in R.A. 1h 45m, Decl. 10° 21′ N. and transits at 16.03.

Neptune on the 15th is in R.A. 11h 1m, Decl. 7° 19′ N. and transits at 1.24.

Pluto—For information regarding this planet, see p. 28.

FEBRUARY

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m				°	′		Minima of Algol h	m	Configurations of Jupiter's Satellites at 5h 15m
Fri.	1	15	..		☿	Greatest elong. E	18	20		17	10	43O12
Sat.	2											412O3
Sun.	3	..	..		☉	Partial Eclipse						24O13
		11	27		🌑	New Moon.						
		18	24		☾	In Perigee.						
Mon.	4	13	14	☌	♄ ☾	♄	4	13	S.	14	00	O1243
		18	22	☌	☿ ☾	☿	1	47	S.			
		19	..		☿	In Perihelion.						
		21	57	☌	♀ ☾	♀	4	51	S.			
Tues.	5											13O24
Wed.	6											32O14
Thur.	7	12	..		☿	Stationary in R.A.				10	50	312O4
Fri.	8	15	43	☌	♁ ☾	♁	6	12	S.			3O124
Sat.	9											d1O34
Sun.	10	4	25		☽	First Quarter				7	40	2O143
Mon.	11	16	..	□	♃ ☉							O234*
Tues.	12											413O2
Wed.	13	5	..	☌	☿ ♄	☿	4	59	N.	4	30	432O1
Thur.	14											4312O
Fri.	15	2	..		☿	Greatest Hel. Lat. N.						43O12
Sat.	16									1	20	41O23
Sun.	17	1	..	☌	☿ ☉	Inferior						42O13
		18	12		☾	In Apogee.						
Mon.	18	6	17		♍	Full Moon				22	10	41O23
Tues.	19	15	56	☌	♆ ☾	♆	5	02	N.			d4O32
Wed.	20	1	..	☌	♄ ☉							32O41
Thur.	21									18	50	321O4
Fri.	22											3O124
Sat.	23	3	34	☌	♂ ☾	♂	8	40	N.			1O234
Sun.	24									15	40	2O134
Mon.	25	6	40	☌	♃ ☾	♃	6	06	N.			1O234
Tues.	26	5	14		☾	Last Quarter						O1324
Wed.	27	13	..		♂	Stationary in R.A.				12	30	32O14
Thur.	28											321O4

Explanation of symbols and abbreviations on page 4

THE SKY FOR MARCH, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During March the sun's R.A. increases from 22h 44m to 0h 38m, and its Decl. changes from 8° 01′ S. to 4° 06′ N. The equation of time decreases from 12m 42s to 4m 18s (see p. 6). For changes in the length of the day, see p. 12. On the 21st at 13h 18m (G.C.T.) the sun enters Aries, the first spring sign of the zodiac, and spring begins. On that day the sun crosses the equator going north.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 21h 54m, Decl. 13° 36′ S. and transits at 10.27. During the entire month Mercury is a morning star, reaching its greatest western elongation of over 27° (see opp. page), but the spring is not a good time to observe Mercury as a morning star for the reason given on p. 22.

Venus on the 15th is in R.A. 1h 18m, Decl. 7° 44′ N. and transits at 13.52 It continues as an evening star, being about 25° above the horizon at sunset.

Mars on the 15th is in R.A. 13h 30m, Decl. 6° 13′ S. and transits at 2.02. The planet continues to improve its position for observation and, at the end of the month, is visible nearly all night. It is increasing in brightness, being of magnitude −0.7 and will be found just north of Spica.

Jupiter on the 15th is in R.A. 15h 25m, Decl. 17° 26′ S. and transits at 3.57. The planet rises about 9 p.m. in the evening and is a prominent object in the constellation Libra from that time until dawn. For the configuration of its satellites see next page, and for their eclipses, etc., see p. 54.

Saturn on the 15th is in R.A. 22h 23m, Decl. 11° 34′ S. and transits at 10.54. The planet is now a morning star, but is not well placed for observation.

Uranus on the 15th is in R.A. 1h 50m, Decl. 10° 46′ N. and transits at 14.18.

Neptune on the 15th is in R.A. 10h 59m, Decl. 7° 37′ N. and transits at 23.27.

Pluto—For information regarding this planet, see p. 28.

MARCH

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		h	m	
Fri.	1	5	..		☿		Stationary in R.A.....						34012
Sat.	2				.....						9	20	41032
Sun.	3	6	41	☌	☿	☾	.....☿	0	06	S.			42013
Mon.	4	6	13	☌	♄	☾	.....♄	4	32	S.			4103*
		6	54		☾		In Perigee.						
		12	..	☌	♆	☉							
		21	40		🌑		New Moon.						
Tues.	5				.....						6	10	40132
Wed.	6	21	41	☌	♀	☾	.....♀	6	13	S.			4320*
Thur.	7				.....								d4320
Fri.	8	2	40	☌	♁	☾	.....♁	6	03	S.	3	00	34012
Sat.	9				.....								1042*
Sun.	10	3	..		♃		Stationary in R.A.....				23	50	20134
		13	..		☿		In ♈.						
Mon.	11	19	30		🌓		First Quarter.....						12034
Tues.	12				.....								01324
Wed.	13				.....						20	40	d3104
Thur.	14				.....								d3204
Fri.	15	14	..		☿		Greatest elong. W.....	27	37				30124
Sat.	16	23	36		☾		In Apogee.....				17	30	1024*
Sun.	17				.....								24013
Mon.	18	20	37	☌	♆	☾	.....♆	4	58	N.			41203
Tues.	19				.....						14	10	40123
Wed.	20	0	31		🌕		Full Moon.....						41302
		19	..		☿		In Aphelion.						
Thur.	21	8	18		☉		Enters ♈, Spring com..						43201
Fri.	22	2	..	☌	♀	♁	.....♀	0	24	N.	11	00	4302*
		3	09	☌	♂	☾	.....♂	8	35	N.			
		4	..	☌	☿	♄	.....☿	0	19	S.			
Sat.	23				.....								43102
Sun.	24	12	06	☌	♃	☾	.....♃	5	59	N.			42013
		14	..		♀		In ♌.						
Mon.	25				.....						7	50	21403
Tues.	26				.....								01423
Wed.	27	15	51		☾		Last Quarter.....						13024
Thur.	28				.....						4	40	32014
Fri.	29				.....								3024*
Sat.	30				.....								31024
Sun.	31	21	49	☌	♄	☾	.....♄	4	57	S.	1	30	20134

Minima of Algol

Configurations of Jupiter's Satellites at 4h 0m

Explanation of symbols and abbreviations on page 4

THE SKY FOR APRIL, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During April the sun's R.A. increases from 0h 38m to 2h 29m, and its Decl. changes from 4° 06′ N. to 14° 43′ N. The equation of time changes from +4m 18s to −2m 48s (see p. 6). For changes in the length of the day, see p. 13. On the 21st the sun enters Taurus, the second spring sign of the zodiac.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 0h 44m, Decl. 2° 33′ N. and transits at 11.17. It is a morning star at the beginning of the month, but too close to the sun for observation. On the 27th it is in superior conjunction with the sun, after which it becomes an evening star.

Venus on the 15th is in R.A. 3h 44m, Decl. 20° 52′ N. and transits at 14.16. It is about 30° above the western horizon at sunset and sets about 3 hrs. after the sun.

Mars on the 15th is in R.A. 12h 51m, Decl. 2° 54′ S. and transits at 23.16. On the 6th it is in opposition to the sun and rises as the sun sets. This month is a good one to observe Mars as it reaches its maximum brilliancy (Mag. −1.2) on the 9th and is nearest the earth on the 12th (see p. 24).

Jupiter on the 15th is in R.A. 15h 17m, Decl. 16° 54′ S. and transits at 1.47. The planet is still improving its position for observation, and at the end of the month is visible nearly all night. For the configuration of its satellites see next page, and for their eclipses, etc., see p. 54.

Saturn on the 15th is in R.A. 22h 36m, Decl. 10° 25′ S. and transits at 9.05. The planet is a morning star, rising about 1-1/4 hours before the sun, but on account of its southerly declination, is not well placed for observation.

Uranus on the 15th is in R.A. 1h 56m, Decl. 11° 22′ N. and transits at 12.24.

Neptune on the 15th is in R.A. 10h 56m, Decl. 7° 54′ N. and transits at 21.22.

Pluto—For information regarding this planet, see p. 28.

APRIL

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		h	m	Configurations of Jupiter's Satellites at 2h 15m
Mon.	1	15	12		☾		In Perigee						21O34
		21	34	☌	☿	☾	☿	7	02	S.			
Tues.	2										22	20	O1243
Wed.	3	7	11		●		New Moon						14O32
Thur.	4	15	25	☌	♁	☾	♁	5	52	S.			432O1
Fri.	5	19	06	☌	♀	☾	♀	4	14	S.	19	10	431O*
Sat.	6	13	..	☍	☌	☉							43O12
Sun.	7												42O3*
Mon.	8										16	00	421O3
Tues.	9												4O123
Wed.	10	4	..		☿		Greatest Hel. Lat. S.						41O32
		12	42		☽		First Quarter.						
Thu.	11										12	50	32O41
Fri.	12	0	..		☌		Nearest ⊕						312O4
Sat.	13												3O124
Sun.	14										9	40	dO34*
Mon.	15	2	19	☌	♆	☾	♆	5	02	N.			21O34
Tues.	16												O1234
Wed.	17	15	04	☌	☌	☾	☌	7	45	N.	6	20	1O324
Thur.	18	16	10		☍		Full Moon						32O14
Fri.	19	14	48		☾		In Apogee						312O4
Sat.	20	14	00	☌	♃	☾	♃	5	58	N.	3	10	34O12
Sun.	21												41O32
Mon.	22	7	..	☌	♁	☉							d42O3
Tues.	23										0	00	4O123
Wed.	24												41O32
Thur.	25	1	..	☌	☿	♁	☿	0	14	S.	20	50	432O1
		23	20		☾		Last Quarter.						
Fri.	26												4321O
Sat.	27	2	..		♀		In Perihelion						34O12
		7	..	☌	☿	☉	Superior.						
Sun.	28	10	18	☌	♄	☾	♄	5	27	S.	17	40	13O24
Mon.	29	4	..		☿		In ♌						2O134
		11	..		☾		In Perigee.						
Tues.	30												O234*

Explanation of symbols and abbreviations on page 4

THE SKY FOR MAY, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During May the sun's R.A. increases from 2h 29m to 4h 32m, and its Decl. changes from 14° 43′ N. to 21° 54′ N. The equation of time decreases from −2m 48s to a minimum of −3m 46s on the 15th and then increases to −2m 32s at the end of the month (see p. 6). For changes in the times of sunrise and sunset see p. 14. On May 22nd the sun enters Gemini, the third spring sign of the zodiac.

The Moon—For its phases, perigee and apogee times and distances and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 4h 39m, Decl. 24° 22′ N. and transits at 13.14. On the 26th it reaches its greatest eastern elongation and at sunset should be seen about 20° above the western horizon.

Venus on the 15th is in R.A. 6h 16m, Decl. 25° 40′ N. and transits at 14.49. It is an evening star about 30° above the western horizon on the 15th at sunset, and setting three hours after the sun.

Mars on the 15th is in R.A. 12h 24m, Decl. 1° 27′ S. and transits at 20.53. It continues to be suitable for observation, being visible most of the night, but its magnitude is decreasing (−0.6 on the 15th). It will be found about 40° above the southeastern horizon at sunset.

Jupiter on the 15th is in R.A. 15h 3m, Decl. 15° 57′ S. and transits at 23.30. On the 9th it is in opposition to the sun and rises as the sun sets. As it is at its maximum brilliancy (mag. −2.0) throughout the month, this is a good time for its observation. For the configuration of its satellites, see next page, and for their eclipses, etc., see p. 54.

Saturn on the 15th is in R.A. 22h 45m, Decl. 9° 37′ S. and transits at 7.16. It is a morning star of magnitude 1.3 about 25° above the southeastern horizon at sunrise, rising about three hours before the sun.

Uranus on the 15th is in R.A. 2h 3m, Decl. 11° 57′ N. and transits at 10.33.

Neptune on the 15th is in R.A. 10h 54m, Decl. 8° 02′ N. and transits at 19.23.

Pluto—For information regarding this planet, see p. 28.

MAY

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		Minima of Algol h m	Configurations of Jupiter's Satellites at 0h 45m
Wed.	1										14 30	10324
Thur.	2	3	52	☌	♁	☾	..... ♁	5	49	S.		23014
		16	36		●		New Moon.					
Fri.	3	7	39	☌	☿	☾	..... ☿	3	58	S.		32104
		19			☿		In Perihelion.					
Sat.	4										11 20	30124
Sun.	5	18	05	☌	♀	☾	..... ♀	0	38	S.		13024
Mon.	6											24013
Tues.	7										8 10	41203
Wed.	8											d4023
Thur.	9	20	..	☌	♃	☉						42301
Fri.	10	6	54		☽		First Quarter				5 00	43210
Sat.	11	9	15		☾		In Apogee					43021
Sun.	12	9	26	☌	Ψ	☾	..... Ψ	5	14	N.		41302
Mon.	13										1 40	42013
Tues.	14	1	..		☿		Greatest Hel. Lat. N.					12403
		10	56	☌	♂	☾	..... ♂	6	30	N.		
Wed.	15										22 30	01423
Thur.	16											dd014
Fri.	17	15	29	☌	♃	☾	..... ♃	6	04	N.		32104
Sat.	18	4	57		♍		Full Moon				19 20	30214
Sun.	19	1	..		♂		Stationary in R.A.					31024
		2	..		♀		Greatest Hel. Lat. N.					
Mon.	20											20314
Tues.	21										16 10	21034
Wed.	22											01423
Thur.	23											4023*
Fri.	24	3	..		Ψ		Stationary in R.A.				13 00	43210
Sat.	25	4	44		☾		Last Quarter					43021
		11	30		☾		In Perigee.					
		19	20	☌	♄	☾	..... ♄	5	55	S.		
Sun.	26	17	..		☿		Greatest elong. E	22	51			43102
Mon.	27										9 50	42031
Tues.	28											42103
Wed.	29	12	22	☌	♁	☾	..... ♁	5	51	S.		40123
Thur.	30										6 40	41023
Fri.	31											d2304

Explanation of symbols and abbreviations on page 4

THE SKY FOR JUNE, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During June the sun's R.A. increases from 4h 32m to 6h 36m, and its Decl. from 21° 54′ N. to its maximum value of 23° 27′ N. on the 22nd and then drops to 23° 12′ N. at the end of the month. On the 22nd the sun reaches summer solstice and enters Cancer, the first summer zodiacal sign, and summer commences. The duration of daylight is now at its longest and does not change appreciably for some days, see p. 15. For changes in the equation of time, see p. 6. The increase in this quantity at the end of the month taken with the shortening of daylight causes the local mean time of sunset to appear almost constant at the end of June and the beginning of July. There is a partial eclipse of the sun on June 30, visible in the region of the North Pole.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 6h 12m, Decl. 21° 09′ N. and transits at 12.39. On the 21st it is in inferior conjunction with the sun.

Venus on the 15th is in R.A. 8h 43m, Decl. 20° 27′ N. and transits at 15.13. It continues to separate from the sun until the 30th when it reaches its greatest elongation east. It will be easily found in the western sky immediately after sunset at an altitude of about 30°.

Mars on the 15th is in R.A. 12h 39m, Decl. 4° 11′ S. and transits at 19.06. It is approaching quadrature with the sun and will be found just west of the meridian shortly after sunset. It sets about 4-1/2 hours after the sun.

Jupiter on the 15th is in R.A. 14h 49m, Decl. 15° 05′ S. and transits at 21.15. On the 15th its magnitude is −1.9 and it is about 25° above the southeastern horizon at sunset. For the configurations of its satellites see next page, and for their eclipses, etc., see p. 55.

Saturn on the 15th is in R.A. 22h 49m, Decl. 9° 19′ S. and transits at 5.18. It is in quadrature with the sun on the 1st, when it rises about midnight.

Uranus on the 15th is in R.A. 2h 9m, Decl. 12° 28′ N. and transits at 8.37.

Neptune on the 15th is in R.A. 10h 55m, Decl. 7° 58′ N. and transits at 17.22.

Pluto—For information regarding this planet, see p. 28.

JUNE

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		h	m	Configurations of Jupiter's Satellites at 23h 30m
Sat.	1	2	..	☌	♄	☉	.....						31O24
		2	52		●		New Moon.						
Sun.	2	20	37	☌	☿	☾	.....☿	0	55	S.	3	30	2O14*
Mon.	3	3	..	☌	♆	☉	.....						21O34
Tues.	4	20	39	☌	♀	☾	.....♀	2	55	N.			O1234
Wed.	5				.....						0	20	1O234
Thur.	6	12	..		☿		In ♉						23O14
Fri.	7				.....						21	00	32O4*
Sat.	8	4	12		☾		In Apogee.....						34102
		17	41	☌	♆	☾	.....♆	5	26	N.			
		21	..		☿		Stationary in R.A.						
Sun.	9	0	49		☽		First Quarter.....						42301
Mon.	10				.....						17	50	42103
Tues.	11	1	13	☌	♂	☾	.....♂	5	40	N.			40213
Wed.	12				.....								41023
Thur.	13	19	13	☌	♃	☾	.....♃	6	12	N.	14	40	42301
Fri.	14	12	..		♂		In ♉						43210
Sat.	15				.....								34102
Sun.	16	15	20		☺		Full Moon				11	30	32O14
		19	..		☿		In Aphelion.						
Mon.	17				.....								21O34
Tues.	18				.....								O2134
Wed.	19				.....						8	20	1O234
Thur.	20	5	06		☾		In Perigee.....						23O14
Fri.	21	13	..	☌	☿	☉	Inferior.....						32104
Sat.	22	2	00	☌	♄	☾	.....♄	6	14	S.	5	10	d3024
		3	38		☉		Enters ♋, Summer com.						
		9	..		♄		Stationary in R.A.						
Sun.	23	9	21		☾		Last Quarter.....						d3O14
Mon.	24				.....								21403
Tues.	25	22	32	☌	♁	☾	.....♁	5	56	S.	2	00	40213
Wed.	26				.....								41023
Thur.	27				.....						22	50	42301
Fri.	28				.....								43210
Sat.	29	15	44	☌	☿	☾	.....☿	6	59	S.			43012
Sun.	30	..	..		☉		Partial Eclipse.....				19	40	43102
		6	..		♀		Greatest elong. E.....	46	25				
		14	44		●		New Moon.						

Explanation of symbols and abbreviations on page 4

THE SKY FOR JULY, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During July the sun's R.A. increases from 6h 36m to 8h 41m, and its Decl. decreases from 23° 12′ N. to 18° 19′ N. The equation of time increases from 3m 24s on the 1st to 6m 22s on the 27th, and then drops to 6m 16s at the end of the month. On the 23rd the sun enters Leo, the second summer sign of the zodiac. For changes in the length of day, see p. 16. On the 4th the earth is in Aphelion at a distance of 94,450,000 miles from the sun. There is a partial eclipse of the sun on July 30th, invisible in North America.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page. A total eclipse of the moon, visible at Toronto, occurs on July 15-16, for the circumstances of which see p. 29.

Mercury on the 15th is in R.A. 6h 4m, Decl. 20° 53′ N. and transits at 10.37. It is a morning star throughout the month, reaching its greatest elongation west on the 14th but is not favourably situated for observation.

Venus on the 15th is in R.A. 10h 31m, Decl. 9° 12′ N. and transits at 15.03. It continues as an evening star of magnitude −4.0, readily visible at sunset, but is slowly approaching the sun. It sets about two hours after the sun on the 15th.

Mars on the 15th is in R.A. 13h 22m, Decl. 9° 22′ S. and transits at 17.52. It is in quadrature with the sun on the 16th, when it is seen very close to Spica as a red star of magnitude 0.4. The motion of the planet relative to the fixed star will be interesting to observe at this time.

Jupiter on the 15th is in R.A. 14h 45m, Decl. 14° 54′ S. and transits at 19.14. It is approaching quadrature with the sun and is just east of the meridian at sunset. For the configuration of its satellites see next page, and for their eclipses, etc., see p. 55.

Saturn on the 15th is in R.A. 22h 48m, Decl. 9° 34′ S. and transits at 3.19. It rises about two hours after sunset.

Uranus on the 15th is in R.A. 2h 12m, Decl. 12° 47′ N. and transits at 6.44.

Neptune on the 15th is in R.A. 10h 57m, Decl. 7° 45′ N. and transits at 15.26.

Pluto—For information regarding this planet, see p. 28.

JULY

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		h	m	Minima of Algol	Configurations of Jupiter's Satellites at 22h 30m
Mon.	1													42103
Tues.	2													4013*
Wed.	3	2	..		☿		Stationary in R.A.				16	20		10423
		21	..		⊕		In Aphelion.							
Thur.	4	18	58	☌	♀	☾	♀	4	24	N.				20314
Fri.	5	22	00		☾		In Apogee							32104
Sat.	6	2	22	☌	♆	☾	♆	5	34	N.	13	10		30124
Sun.	7	3	..		☿		Greatest Hel. Lat. S.							31024
Mon.	8	17	28		☽		First Quarter							d2034
Tues.	9	5	13	☌	♂	☾	♂	5	05	N.	10	00		20134
Wed.	10													10423
Thur.	11	2	20	☌	♃	☾	♃	6	11	N.				42031
		21	..		♃		Stationary in R.A.							
Fri.	12										6	50		43210
Sat.	13													43012
Sun.	14	3	..		☿		Greatest elong. W.	20	46					43102
		3	..		♀		In ♍.							
Mon.	15										3	40		4201*
Tues.	16	0	00		♍		Full Moon							4203*
		..	..		☾		Total Eclipse.							
		15	..	□	♂	☉								
Wed.	17	21	42		☾		In Perigee							41023
Thur.	18										0	30		42013
Fri.	19	7	59	☌	♄	☾	♄	6	21	S.				23104
Sat.	20										21	20		30214
Sun.	21													31024
Mon.	22	14	42		☾		Last Quarter							2014*
Tues.	23	5	09	☌	♁	☾	♁	5	57	S.	18	10		2034*
Wed.	24													10234
Thur.	25	1	..	☌	♀	♆	♀	2	36	S.				d0134
Fri.	26	3	..		☿		In ♌				15	00		23104
Sat.	27													30421
Sun.	28													34102
Mon.	29	1	16	☌	☿	☾	☿	0	36	N.	11	50		42301
Tues.	30	7	..	□	♁	☉								42103
		..			☉		Partial Eclipse							
		4	32		●		New Moon.							
		19	..		☿		In Perihelion.							
Wed.	31													40123

Explanation of symbols and abbreviations on page 4

THE SKY FOR AUGUST, 1935

The times of transit are in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During August the sun's R.A. increases from 8h 41m to 10h 37m, and its Decl. decreases from 18° 19′ N. to 8° 43′ N. The equation of time decreases from 6m 16s to 0m 21s, see p. 6. The sun enters Virgo, the third summer zodiacal sign, on the 24th. For changes in the length of day, see p. 17.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 9h 57m, Decl. 14° 20′ N. and transits at 12.30. On the 9th it is in superior conjunction with the sun.

Venus on the 15th is in R.A. 11h 25m, Decl. 1° 50′ S. and transits at 13.52. On the 2nd it attains its maximum brilliancy of −4.2 and during the month it continues to approach the sun. Being so bright it is easily seen in the west immediately after sunset, but it is not very high above the horizon. It sets a little over an hour after the sun on the 15th. During the latter part of the month it is too near the sun for observation.

Mars on the 15th is in R.A. 14h 26m, Decl. 15° 40′ S. and transits at 16.55. It is an evening star and is 20° above the southwestern horizon at sunset. On the 27th it is in conjunction with Jupiter (see opp. page), being 2° south of the latter and much fainter, Jupiter being over eight times as bright as Mars.

Jupiter on the 15th is in R.A. 14h 52m, Decl. 15° 31′ S. and transits at 17.19. It is in quadrature with the sun on the 7th, of magnitude −1.7. On the 27th it is in conjunction with Mars (see above). For the configurations of its satellites, see next page, and for their eclipses, etc., see p. 55.

Saturn on the 15th is in R.A. 22h 42m, Decl. 10° 19′ S. and transits at 1.11. On the 30th it is in opposition with the sun and rises just at sunset. It is in the constellation Aquarius and well placed for observation throughout the month. Its magnitude at this time is 0.7.

Uranus on the 15th is in R.A. 2h 14m, Decl. 12° 53′ N. and transits at 4.42.

Neptune on the 15th is in R.A. 11h 0m, Decl. 7° 23′ N. and transits at 13.31.

Pluto—For information regarding this planet, see p. 28.

AUGUST

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		Minima of Algol h	m	Configurations of Jupiter's Satellites at 21h 00m
Thur.	1										8	30	4O23*
Fri.	2	10	53	☌	♆	☾		♆	5	35 N.			42130
		13	06		☾		In Apogee.						
		19	41	☌	♀	☾		♀	1	41 N.			
		23	..		♀		Greatest Brilliancy.						
Sat.	3												43O1*
Sun.	4										5	20	3142O
Mon.	5												32041
Tues.	6	16	43	☌	♂	☾		♂	4	19 N.			21034
Wed.	7	8	23		☽		First Quarter				2	10	O1234
		12	31	☌	♃	☾		♃	5	59 N.			
		19	..	□	♃	☉							
Thur.	8												O234*
Fri.	9	20	..	☌	☿	☉	Superior				23	00	d21O4
Sat.	10	1	..		☿		Greatest Hel. Lat. N.						32O14
Sun.	11	13	..		♁		Stationary in R.A.						31O24
Mon.	12										19	50	32O14
Tues.	13												21O43
Wed.	14	7	44		☍		Full Moon						4O123
Thur.	15	3	06		☾		In Perigee				16	40	41O23
		13	..		♀		Stationary in R.A.						
		14	38	☌	♄	☾		♄	6	16 S.			
Fri.	16												d42O3
Sat.	17	12	..		♀		In Aphelion						432O1
Sun.	18										13	30	431O2
Mon.	19	11	46	☌	♁	☾		♁	5	51 S.			d43O1
Tues.	20	22	17		☾		Last Quarter						421O3
Wed.	21										10	20	4O213
Thur.	22												1O423
Fri.	23												2O134
Sat.	24	4	..	☌	☿	♆		☿	0	09 N.	7	10	32O4*
Sun.	25												31O24
Mon.	26	13	..	☌	☿	♀		☿	9	01 N.			3O214
Tues.	27	18	..	☌	♂	♃		♂	2	12 S.	4	00	21O34
Wed.	28	20	00		●		New Moon						O134*
Thur.	29	21	18		☾		In Apogee						1O423
		23	33	☌	♀	☾		♀	4	00 S.			
Fri.	30	16	30	☌	☿	☾		☿	5	28 N.	0	40	24O13
		23	..	☍	♄	☉							
Sat.	31												241O3

Explanation of symbols and abbreviations on page 4

THE SKY FOR SEPTEMBER, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During September the sun's R.A. increases from 10h 37m to 12h 25m, and its Decl. decreases from 8° 43′ N. to 2° 44′ S. The equation of time decreases from +0m 21s to −9m 55s. For changes in the length of the day, see p. 18. On the 23rd the sun crosses the equator going south and enters Libra, the first autumnal sign of the zodiac.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 12h 57m, Decl. 7° 54′ S. and transits at 13.25. It is an evening star throughout the month and reaches its greatest elongation east, being 26° 18′ from the sun; but is not in a favourable position for observation (see p. 22).

Venus on the 15th is in R.A. 10h 37m, Decl. 0° 18′ S. and transits at 11.01. On the 8th it is in inferior conjunction with the sun and after this date becomes a morning star. It is too close to the sun for observation throughout the month.

Mars on the 15th is in R.A. 15h 46m, Decl. 21° 17′ S. and transits at 16.13. It is an evening star, about 20° above the southwestern horizon at sunset, setting almost three hours after the sun.

Jupiter on the 15th is in R.A. 15h 8m, Decl. 16° 46′ S. and transits at 15.33. It is an evening star and is 15° above the southwestern horizon at sunset, and sets 2-1/2 hours after the sun. For the configuration of its satellites see next page, and for their eclipses, etc., see p. 55.

Saturn on the 15th is in R.A. 22h 33m, Decl. 11° 12′ S. and transits at 22.56. During the month it can be seen for the greater part of the night. At sunset on the 15th it has an altitude of about 10° above the eastern horizon.

Uranus on the 15th is in R.A. 2h 12m, Decl. 12° 43′ N. and transits at 2.38.

Neptune on the 15th is in R.A. 11h 5m, Decl. 6° 57′ N. and transits at 11.30.

Pluto—For information regarding this planet, see p. 28.

SEPTEMBER

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m				°	′		Minima of Algol h	m	Configurations of Jupiter's Satellites at 19h 45m
Sun.	1									21	30	d4302
Mon.	2	12	..		☿	In ♍						43012
		15	..	☌ ♀ Ψ			♀	10	09 S.			
Tues.	3											42130
Wed.	4	0	54	☌ ♃ ☾			♃	5	33 N.	18	20	42013
		8	10	☌ ♂ ☾			♂	3	07 N.			
Thur.	5	21	26		☽	First Quarter						41023
Fri.	6											42013
Sat.	7	17	..	☌ Ψ ☉						15	10	23410
Sun.	8	3	..	☌ ♀ ☉		Inferior						30124
Mon.	9	0	00		♀	Greatest Hel. Lat. S.						3024*
Tues.	10									12	00	23104
Wed.	11	22	11	☌ ♄ ☾			♄	6	08 S.			20134
Thur.	12	13	06		☾	In Perigee						10234
		15	18		♋	Full Moon.						
		18	..		☿	In Aphelion.						
Fri.	13									8	50	20134
Sat.	14											21304
Sun.	15	19	33	☌ ♁ ☾			♁	5	42 S.			30124
Mon.	16									5	40	3402*
Tues.	17											42310
Wed.	18											42013
Thur.	19	9	23		☾	Last Quarter				2	30	41023
Fri.	20											d4013
Sat.	21									23	20	42103
Sun.	22											43021
Mon.	23	6	..		☿	Greatest elong. E		26	18			34102
		18	39		☉	Enters ♎, Autumn com.						
Tues.	24									20	00	d3240
Wed.	25	3	50	☌ ♀ ☾			♀	3	32 S.			20134
		23	36		☾	In Apogee.						
Thur.	26	3	11	☌ Ψ ☾			Ψ	5	39 N.			10234
Fri.	27	12	29		●	New Moon				16	50	02134
		15	..		♀	Stationary in R.A.						
Sat.	28											21034
Sun.	29	19	58	☌ ☿ ☾			☿	1	37 N.			3014*
Mon.	30									13	40	31024

Explanation of symbols and abbreviations on page 4

THE SKY FOR OCTOBER, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During October the sun's R.A. increases from 12h 25m to 14h 21m, and its Decl. changes from 2° 44′ S. to 14° 04′ S. On the 24th the sun enters Scorpio, the second autumnal sign of the zodiac. The equation of time decreases from −9m 55s to −16m 18s. For changes in the length of the day, see p. 19.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 13h 40m, Decl. 12° 54′ S. and transits at 12.04. On the 18th it is in inferior conjunction with the sun, after which it is a morning star. It continually separates from the sun until November 2 and hence should be visible during the last days of the month.

Venus on the 15th is in R.A. 10h 44m, Decl. 4° 41′ N. and transits at 9.13. On this date it attains greatest brilliancy and during the month it continues to separate from the sun. Because of its brilliancy (mag. −4.3) it can be seen in the southeast just before sunrise. It rises about 3-1/2 hours before the sun.

Mars on the 15th is in R.A. 17h 16m, Decl. 24° 33′ S. and transits at 15.45. It sets about three hours after the sun but is not easy to observe because of its southerly declination.

Jupiter on the 15th is in R.A. 15h 30m, Decl. 18° 15′ S. and transits at 13.57. On the first of the month it may be seen as an evening star of magnitude −1.3 about 15° above the horizon in the southwest at sunset.. It is approaching the sun and toward the end of the month is not favourably placed for observation.

Saturn on the 15th is in R.A. 22h 26m, Decl. 11° 49′ S. and transits at 20.52. It is an evening star visible for most of the night. At sunset it will be seen in the southeast about 15° above the horizon. It has a stellar magnitude of 0.9 and is in the constellation Aquarius.

Uranus on the 15th is in R.A. 2h 8m, Decl. 12° 22′ N. and transits at 0.36.

Neptune on the 15th is in R.A. 11h 9m, Decl. 6° 33′ N. and transits at 9.36.

Pluto—For information regarding this planet, see p. 28.

OCTOBER

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		h	m	Configurations of Jupiter's Satellites at 18h 30m
Tues.	1	14	59	☌	♃	☾	..... ♃	5	01	N.			32O14
Wed.	2				.....								2O4**
Thur.	3	2	..		☿		Greatest Hel. Lat. S....				10	30	41O23
		2	06	☌	♂	☾	..... ♂	1	32	N.			
Fri.	4				.....								4O123
Sat.	5	8	40		☽		First Quarter.....						421O3
Sun.	6	1	..		☿		Stationary in R.A.....				7	20	432O1
Mon.	7				.....								431O2
Tues.	8				.....								432O1
Wed.	9	5	54	☌	♄	☾	..... ♄	6	06	S.	4	10	4213O
Thur.	10	23	36		☾		In Perigee.....						d4O23
Fri.	11	23	39		☍		Full Moon.....						4O123
Sat.	12				.....						1	00	21O34
Sun.	13	4	32	☌	♁	☾	..... ♁	5	36	S.			32O14
Mon.	14				.....						21	50	31O24
Tues.	15	7	..		♀		Greatest Brilliancy....						d3O14
Wed.	16				.....								213O4
Thur.	17				.....						18	40	
Fri.	18	0	..	☌	☿	☉	Inferior.						
Sat.	19	0	36		☾		Last Quarter.						
Sun.	20				.....						15	20	
Mon.	21				.....								
Tues.	22	3	..		☿		In ♌.						
Wed.	23	8	24		☾		In Apogee.....				12	10	
		9	22	☌	♀	☾	..... ♀	2	58	N.			
		11	36	☌	♆	☾	..... ♆	5	50	N.			
Thur.	24	20	..	☌	♀	♆	..... ♀	2	35	S.			
Fri.	25				.....								
Sat.	26	3	11	☌	☿	☾	..... ☿	6	39	N.	9	00	
		11	..		☿		Stationary in R.A.						
		18	..		☿		In Perihelion.						
Sun.	27	5	15		☍		New Moon.						
		16	..	☍	♁	☉							
Mon.	28				.....								
Tues.	29	6	49	☌	♃	☾	..... ♃	4	28	N.	5	50	
Wed.	30				.....								
Thur.	31	22	08	☌	♂	☾	..... ♂	0	23	S.			

Jupiter being near the Sun, phenomena of the Satellites are not given from October 17 to December 17

Explanation of symbols and abbreviations on page 4

THE SKY FOR NOVEMBER, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During November the sun's R.A. increases from 14h 21m to 16h 24m, and its Decl. decreases from 14° 04′ S. to 21° 38′ S. On the 23rd the sun enters Sagittarius, the third autumn zodiacal sign. The equation of time decreases from −16m 18s to a minimum value of −16m 22s on the 4th and then increases to −11m 21s at the end of the month (see p. 6). For changes in the length of the day, see p. 20.

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 14h 23m, Decl. 12° 28′ S. and transits at 10.51. On the 2nd it reaches its greatest elongation west, being about 19° from the sun. At sunrise it will be about 20° above the horizon in the southeast.

Venus on the 15th is in R.A. 12h 20m, Decl. 1° 01′ S. and transits at 8.48. It continues to separate from the sun until the 18th when it reaches its greatest elongation west. At this time it is interesting to observe the planet before sunrise and then continue to follow it into full daylight. It rises over four hours before the sun.

Mars on the 15th is in R.A. 18h 57m, Decl. 24° 16′ S. and transits at 15.24. It is still an evening star, but low and faint in the western sky at sunset.

Jupiter on the 15th is in R.A. 15h 57m, Decl. 19° 47′ S. and transits at 12.22. It is an evening star until the 27th, when it comes into conjunction with the sun, after which it is a morning star. It is too close to the sun for observation throughout the month.

Saturn on the 15th is in R.A. 22h 25m, Decl. 11° 56′ S. and transits at 18.48. It is an evening star throughout the month, being in quadrature with the sun on the 26th, when it will be found about 2h east of the meridian at sunset at an altitude of 30° in the southeast.

Uranus on the 15th is in R.A. 2h 3m, Decl. 11° 57′ N. and transits at 22.26.

Neptune on the 15th is in R.A. 11h 12m, Decl. 6° 15′ N. and transits at 7.37.

Pluto—For information regarding this planet, see p. 28.

NOVEMBER

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					Minima of Algol	Configurations of Jupiter's Satellites
Fri.	1			.....				h m 2 40	
Sat.	2	17	..	☿	Greatest elong. W.....	18	44		
Sun.	3	18	12	☽	First Quarter.....			23 30	
Mon.	4	7	..	♀	In ♌.				
Tues.	5	13	02	☌ ♄ ☾	.....♄	6	14 S.		
Wed.	6	0	..	☿	Greatest Hel. Lat. N...			20 20	
Thur.	7			.....					
Fri.	8	4	..	♄	Stationary in R.A.				
		5	48	☾	In Perigee.				
Sat.	9	13	27	☌ ♁ ☾	.....♁	5	37 S.	17 10	
Sun.	10	9	42	☍	Full Moon.				
Mon.	11			.....					
Tues.	12			.....				14 00	
Wed.	13			.....					
Thur.	14			.....					
Fri.	15			.....				10 40	
Sat.	16			.....					
Sun.	17	19	36	☾	Last Quarter.				
Mon.	18	11	..	♂	Greatest Hel. Lat. S...			7 30	
		20	..	♀	Greatest elong. W.....	46	41		
Tues.	19	20	26	☌ ♆ ☾	.....♆	6	07 N.		
Wed.	20	1	00	☾	In Apogee.				
Thur.	21			.....				4 20	
Fri.	22	1	30	☌ ♀ ☾	.....♀	7	22 N.		
Sat.	23			.....					
Sun.	24			.....				1 10	
Mon.	25	6	54	☌ ☿ ☾	.....☿	4	28 N.		
		21	36	●	New Moon.				
Tues.	26	0	39	☌ ♃ ☾	.....♃	3	57 N.	22 00	
		19	..	□ ♄ ☉					
Wed.	27	0	..	☌ ♃ ☉					
Thur.	28			.....					
Fri.	29	11	..	☿	In ♉.....			18 50	
		20	02	☌ ♂ ☾	.....♂	2	29 S.		
Sat.	30			.....					

Jupiter being near the Sun, phenomena of the Satellites are not given from October 17 to December 17

Explanation of symbols and abbreviations on page 4

THE SKY FOR DECEMBER, 1935

The times of transit are given in Local Mean Time, 0h at midnight; to change to Standard Time, see p. 9. Estimates of altitude are for an observer in latitude 45° N.

The Sun—During December the sun's R.A. increases from 16h 24m to 18h 41m and its Decl. changes from 21° 38′ S. to its maximum southerly value of 23° 27′ on the 22nd. The sun is then at the winter solstice; it enters Capricornus and winter begins. From this date the sun moves slowly northward. The length of daylight is at its minimum and changes very slightly for several days (see p. 21). The equation of time is −11m 21s at the beginning of the month and increases to zero on the 25th (see p. 6) and to +3m 1s at the end of the month. There is an annular eclipse of the sun on December 25, invisible in North America (see p. 29).

The Moon—For its phases, perigee and apogee times and distances, and its conjunctions with the planets, see p. 7 and opp. page.

Mercury on the 15th is in R.A. 17h 37m, Decl. 24° 52′ S. and transits at 12.08. It is a morning star until the 10th when it is in superior conjunction with the sun, after which it is an evening star—too close to the sun for observation.

Venus on the 15th is in R.A. 14h 23m, Decl. 11° 32′ S. and transits at 8.52. It is a morning star about 30° above the horizon at sunrise on this date and rising nearly four hours before the sun.

Mars on the 15th is in R.A. 20h 35m, Decl. 20° 00′ S. and transits at 15.04. It is a faint evening star and is found in the constellation Capricornus, setting about three hours after the sun.

Jupiter on the 15th is in R.A. 16h 25m, Decl. 21° 02′ S. and transits at 10.52. It is a morning star throughout the month of magnitude −1.3 and at sunrise on the 15th is about 10° above the southeastern horizon.

Saturn on the 15th is in R.A. 22h 29m, Decl. 11° 27′ S. and transits at 16.55. It continues as an evening star of magnitude 1.1 during this month. On the 20th it is close to the meridian at sunset and can be seen in the southern sky about 30° above the horizon.

Uranus on the 15th is in R.A. 1h 59m, Decl. 11° 38′ N. and transits at 20.24.

Neptune on the 15th is in R.A. 11h 13m, Decl. 6° 08′ N. and transits at 5.40.

Pluto—For information regarding this planet, see p. 28.

DECEMBER

ASTRONOMICAL PHENOMENA

75th Meridian Civil Time

	d	h	m					°	′		h	m	Configurations of Jupiter's Satellites at 8h 15m
Sun.	1												
Mon.	2	13	..	☌	☿	♃	..... ☿	1	00	S.	15	40	
		19	59	☌	♄	☾	..... ♄	6	25	S.			
Tues.	3	2	28		☽		First Quarter.						
Wed.	4												
Thur.	5	17	06		☾		In Perigee				12	30	
Fri.	6	20	47	☌	♁	☾	..... ♁	5	44	S.			
Sat.	7												
Sun.	8	0	..		☿		In Perihelion				9	20	
Mon.	9	13	..	□	♆	☉							
		17	..		☿		In Aphelion.						
		22	10		♋		Full Moon.						
Tues.	10	2	..	☌	☿	☉	Superior.						
Wed.	11										6	10	
Thur.	12												
Fri.	13	11	..		♂		In Perihelion.						
Sat.	14										3	00	
Sun.	15												
Mon.	16										23	40	
Tues.	17	5	13	☌	♆	☾	..... ♆	6	19	N.			
		16	57		☾		Last Quarter.						
		21	42		☾		In Apogee.						
Wed.	18												30412
Thur.	19										20	30	32104
Fri.	20	7	..		♆		Stationary in R.A.						32014
Sat.	21												10324
Sun.	22	1	16	☌	♀	☾	..... ♀	7	11	N.	17	20	d0234
		13	37		☉		Enters ♑ Winter com.						
Mon.	23	20	09	☌	♃	☾	..... ♃	3	29	N.			20134
Tues.	24												10324
Wed.	25	..	..		☉		Annular Eclipse				14	10	30124
		12	49		●		New Moon.						
Thur.	26	6	43	☌	☿	☾	..... ☿	2	12	S.			32104
Fri.	27												43201
Sat.	28	19	03	☌	♂	☾	..... ♂	4	28	S.	11	00	41032
Sun.	29	19	..		♀		Greatest Hel. Lat. N.						40123
Mon.	30	1	..		☿		Greatest Hel. Lat. S.						4203*
		4	35	☌	♄	☾	..... ♄	6	34	S.			
		10	24		☾		In Perigee.						
Tues.	31										7	50	4103*

Jupiter being near the Sun, phenomena of the Satellites are not given from October 17 to December 17

Explanation of symbols and abbreviations on page 4

E—Eclipse, O—occultation, T—transit, S—shadow, D—disappearance, R—reappearance
I—ingress, e—egress. The Roman numerals denote the satellites.
75th Meridian Civil Time.

JANUARY

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
3	5	07	I	ED	19	3	22	I	ED
4	4	25	I	Se		6	41	I	OR
	5	25	I	Te	20	3	48	I	Te
6	5	47	II	ED	22	6	06	II	SI
7	5	31	III	TI	24	5	00	II	OR
8	5	27	II	Te	25	4	06	III	OD
11	4	09	I	SI		5	51	III	OR
	5	14	I	TI	26	5	15	I	ED
	6	18	I	Se	27	3	35	I	TI
12	4	45	I	OR		4	33	I	Se
14	5	14	III	SI		5	44	I	Te
15	3	32	II	SI	28	3	06	I	OR
	5	45	II	TI	31	2	47	II	ED
	5	55	II	Se		5	11	II	ER
18	6	03	I	SI		5	14	II	OD

FEBRUARY

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
1	3	09	III	ED	16	5	32	II	TI
	5	03	III	ER	18	2	07	II	OR
2	2	45	II	Te		5	23	I	ED
3	4	17	I	SI	19	2	32	I	SI
	5	30	I	TI		2	52	III	Se
	6	26	I	Se		3	46	I	TI
4	5	00	I	OR		4	41	I	Se
5	2	07	I	Te		5	54	I	Te
7	5	21	II	ED		6	07	III	TI
9	2	54	II	Se	20	3	14	I	OR
	2	58	II	TI	23	5	38	II	SI
	5	20	II	Te	25	2	13	II	ER
10	6	11	I	SI		2	16	II	OD
11	3	30	I	ED		4	40	II	OR
12	1	53	I	TI	26	4	25	I	SI
	2	10	III	TI		4	58	III	SI
	2	48	I	Se		5	38	I	TI
	3	47	III	Te	27	1	44	I	ED
	4	01	I	Te		5	05	I	OR
16	3	04	II	SI	28	1	03	I	Se
	5	27	II	Se		2	13	I	Te

MARCH

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
2	1	31	III	OR	16	4	47	III	ER
4	2	23	II	ED	20	2	34	II	SI
6	2	06	II	Te		4	35	II	TI
	3	37	I	ED		4	57	II	Se
7	0	47	I	SI	21	4	34	I	SI
	1	56	I	TI		5	34	I	TI
	2	56	I	Se	22	1	16	II	OR
	4	04	I	Te		1	51	I	ED
8	1	23	I	OR		4	59	I	OR
9	0	50	III	ER		23	02	I	SI
	3	44	III	OD	23	0	01	I	TI
	5	13	III	OR		1	11	I	Se
11	4	58	II	ED		2	09	I	Te
13	0	01	II	SI		23	26	I	OR
	2	12	II	TI	27	0	45	III	TI
	2	24	II	Se		2	08	III	Te
	4	32	II	Te		5	07	II	SI
	5	30	I	ED	28	23	27	II	ED
14	2	40	I	SI	29	3	39	II	OR
	3	46	I	TI		3	45	I	ED
	4	49	I	Se	30	0	55	I	SI
	23	58	I	ED		1	48	I	TI
15	3	12	I	OR		3	05	I	Se
16	0	21	I	Te		3	56	I	Te
	2	53	III	ED	31	1	13	I	OR

APRIL

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
3	0	45	III	SI	15	23	09	I	OR
	2	38	III	Se	20	22	41	III	ED
	4	15	III	TI	21	0	35	III	ER
5	2	02	II	ED		0	44	III	OD
6	2	49	I	SI		2	03	II	SI
	3	34	I	TI		2	06	III	OR
	4	59	I	Se		2	57	II	TI
	22	25	II	TI		3	53	I	ED
	23	21	II	Se		4	27	II	Se
7	0	06	I	ED	22	1	05	I	SI
	0	44	II	Te		1	31	I	TI
	2	58	I	OR		3	15	I	Se
	22	01	I	TI		3	39	I	Te
	23	27	I	Se		22	21	I	ED
8	0	09	I	Te		23	45	II	OR
10	4	43	III	SI	23	0	53	I	OR
12	4	38	II	ED		21	44	I	Se
13	4	43	I	SI		22	06	I	Te
	22	45	III	OR	28	2	39	III	ED
	23	30	II	SI		4	36	II	SI
14	0	41	II	TI	29	2	59	I	SI
	1	54	II	Se		3	15	I	TI
	1	59	I	ED		23	09	II	ED
	3	01	II	Te	30	0	14	I	ED
	4	43	I	OR		2	02	II	OR
	23	11	I	SI		2	37	I	OR
	23	46	I	TI		21	28	I	SI
15	1	21	I	Se		21	41	I	TI
	1	55	I	Te		23	38	I	Se
	21	28	II	OR		23	50	I	Te

MAY

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
1	20	17	II	Se	16	0	34	III	SI
	20	37	II	Te		0	40	I	ER
	21	03	I	OR		1	05	II	Te
7	1	45	II	ED		1	25	II	Se
	2	08	I	ED		1	38	III	Te
	4	18	II	OR		2	28	III	Se
	4	21	I	OR		19	45	I	SI
	23	22	I	SI		21	44	I	Te
	23	25	I	TI		21	55	I	Se
8	1	32	I	Se	17	20	08	II	ER
	1	34	I	Te	22	2	54	I	TI
	20	26	II	SI		3	11	I	SI
	20	31	II	TI	23	0	06	I	OD
	20	36	III	SI		0	58	II	TI
	20	36	I	ED		1	33	II	SI
	20	55	III	TI		2	34	I	ER
	22	20	III	Te		3	19	II	Te
	22	29	III	Se		3	26	III	TI
	22	47	I	OR		21	20	I	TI
	22	51	II	Se		21	39	I	SI
	22	51	II	Te		23	29	I	Te
9	20	00	I	Te		23	50	I	Se
	20	01	I	Se	24	21	02	I	ER
14	3	56	I	OD		22	45	II	ER
	4	11	II	OD	30	1	50	I	OD
15	1	09	I	TI		23	05	I	TI
	1	16	I	SI		23	34	I	SI
	3	18	I	Te	31	1	14	I	Te
	3	27	I	Se		1	44	I	Se
	22	22	I	OD		20	16	I	OD
	22	44	II	TI		21	53	II	OD
	23	00	II	SI		22	56	I	ER
16	0	11	III	TI					

JUNE

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen
1	1	22	II	ER	16	20	56	II	TI
	20	13	I	Se		21	13	I	ER
2	20	22	III	OD		22	33	II	SI
	22	00	III	OR		23	19	II	Te
	22	29	III	ED	17	0	58	II	Se
3	0	24	III	ER	20	20	28	III	SI
7	0	51	I	TI		22	23	III	Se
	1	29	I	SI	22	1	35	I	OD
	22	02	I	OD		22	52	I	TI
8	0	12	II	OD		23	48	I	SI
	0	50	I	ER	23	1	01	I	Te
	21	26	I	Te		23	08	I	ER
	22	08	I	Se		23	17	II	TI
9	21	00	II	Te	24	1	07	II	SI
	22	24	II	Se		20	25	I	Se
	23	43	III	OD	25	22	32	II	ER
10	1	25	III	OR	27	20	26	III	TI
14	23	48	I	OD		22	16	III	Te
15	21	04	I	TI	28	0	27	III	SI
	21	53	I	SI	30	0	41	I	TI
	23	13	I	Te		21	50	I	OD
16	0	02	I	Se					

JULY

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
1	20	11	I	SI	15	22	50	I	TI
	21	18	I	Te	16	23	20	I	ER
	22	21	I	Se	17	20	40	I	Se
2	20	31	II	OD	18	22	09	II	SI
5	0	02	III	TI		22	11	II	Te
7	23	40	I	OD	22	21	16	III	OD
8	20	19	III	ER		23	18	III	OR
	20	59	I	TI	23	21	51	I	OD
	22	06	I	SI	24	20	26	I	SI
	23	08	I	Te		21	21	I	Te
9	0	16	I	Se		22	35	I	Se
	21	26	I	ER	25	22	16	II	TI
	22	58	II	OD	27	22	19	II	ER
11	22	00	II	Se	31	21	05	I	TI
15	22	21	III	ED		22	21	I	SI

AUGUST

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
1	21	39	I	ER	16	20	40	I	SI
2	20	21	III	SI		21	34	I	Te
	22	18	III	Se	17	19	57	I	ER
3	19	52	II	OD	19	21	47	II	Te
8	20	07	I	OD	20	20	16	III	ER
9	20	54	I	Se	21	19	27	II	ER
	21	13	III	Te	23	21	21	I	TI
12	21	40	II	Se	27	19	27	III	OR
15	22	02	I	OD	31	20	25	I	OD

SEPTEMBER

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
1	19	58	I	Te	14	20	15	III	SI
4	19	49	II	OD	16	18	52	I	OD
8	19	46	I	TI	17	19	26	I	Se
9	20	11	I	ER	20	19	29	II	TI
13	18	55	II	SI	22	19	09	II	ER
	19	14	II	Te	24	19	12	I	SI

Jupiter being near the Sun, phenomena of the Satellites are not given from September 25 to December 22.

DECEMBER

d	h	m	Sat.	Phen.	d	h	m	Sat.	Phen.
23	6	51	I	OR	31	6	04	I	Te
30	6	06	I	ED					

METEORS AND SHOOTING STARS

On almost any clear night any one observing the sky for a few minutes will see one or more shooting stars. They are particularly numerous during the autumn months and on account of the rotation of the earth are better seen during the early morning hours than in the evening.

At certain times there are striking displays, located in particular portions of the sky. These are considered to be due to *meteor swarms*. The principal ones are given in the following table.

Name of Shower	Duration	Greatest Display	Radiant Point R.A. h	m	Decl. °
Quadrantids	Dec. 28-Jan. 9	Jan. 3	15	20	+ 53
Aurigids	Feb. 7-23	Feb. 10	5	0	+ 41
Lyrids	April 16-22	April 21	18	4	+ 33
η Aquarids	April 29-May 8	May 4-6	22	32	- 2
Herculids	May 13-29	May 24	16	36	+ 30
Scorpiids	May-June-July	June 4	16	48	- 21
Sagittids	June-July	July 28	20	12	+ 24
Capricornids	July-Aug.	July 22	20	20	- 12
δ Aquarids	July 18-Aug. 12	July 28-31	22	36	- 11
α β Perseids	July-Aug.-Sept.	Aug. 16	3	12	+ 43
Perseids	July 8-Aug. 25	Aug. 11-12	3	4	+ 57
Draconis	Aug. 18-25	Aug. 23	19	24	+ 61
ϵ Perseids	Aug.-Sept.	Sept. 15	4	8	+ 35
Arietids	Aug.-Sept.-Oct.	Sept. 21	2	4	+ 19
	Sept.-Oct.	Oct. 15	2	4	+ 9
Orionids	Oct. 9-29	Oct. 19	6	8	+ 15
μ Ursids Maj.	Oct.-Nov.-Dec.	Nov. 16-25	10	16	+ 41
Taurids	November	Nov. 21	4	12	+ 23
Leonids	Nov. 9 20	Nov. 14-15	10	0	+ 23
Andromedes	Nov. 20-30	Nov. 20-23	1	40	+ 43
Geminids	Dec. 1-14	Dec. 11	7	12	+ 33

Of these the chief ones are the Perseids, the Leonids and the Andromedes.

The Perseids furnish an annual display of considerable strength, and are perhaps the best known of all. The swarm appears to have an orbit identical with that of the great Comet 1862 III., the period of which is 120 years.

The Leonids follow in the orbit of Tempel's Comet of 1866, of period 33 years.

The Andromedes are thought to be remnants of Biela's Comet. They were especially numerous in 1872, 1885, 1898, but in recent years have not been so prominent.

The above table was prepared for the HANDBOOK by Mr. W. F. Denning, F.R.A.S., of Bristol, England; and for further interesting information regarding this subject (and almost any other subject in which the amateur is interested) reference may be made to his *Telescopic Work for Starlight Evenings*.

PRINCIPAL ELEMENTS OF THE SOLAR SYSTEM

Name	Mean Distance from Sun		Sidereal Period		Mean Diameter Miles	Mass	Density	Volume	Axial Rotation
	⊕ =1	Millions of Miles	Mean Solar Days	Years		⊕ =1	Water =1	⊕ =1	
☿ Mercury	0.387	36.0	87.97	0.24	3009	0.0556	4.7(?)	0.055	88d
♀ Venus	0.723	67.2	224.70	0.62	7575	0.817	4.94	0.88	30d (?)
⊕ Earth	1.000	92.9	365.26	1.00	7917.8	1.000	5.55	1.000	23h 56m 4s
♂ Mars	1.524	141.5	686.97	1.88	4216	0.108	3.92	0.151	24h 37m 23s
♃ Jupiter	5.203	483.3	4332.58	11.86	86728	318.4	1.32	1314	9h 55m ±
♄ Saturn	9.539	886.1	10759.2	29.46	72430	95.2	0.72	765	10h 14m ±
♅ Uranus	19.191	1782.8	30685.9	84.02	30878	14.6	1.22	59	10h 45m ±
♆ Neptune	30.071	2793.4	60187.6	164.79	32932	16.9	1.11	72	16 h
Pʟ Pluto	39.60	3700	....	247.7	....	1 (?)	....	....	.....
☉ Sun	....	....	....	....	864392	333400	1.39	1301100	25d 7h 48m±
☾ Moon	From ⊕238,857 mls.		27.32	0.075	2160	0.0123	3.39	0.020	27d 7h 43m 11.5s

SATELLITES OF THE SOLAR SYSTEM

Name	Stellar Magnitude.	Mean Distance in Miles	Sidereal Period d. h. m. s.	Discoverer	Date
THE EARTH					
The Moon..	..	238,840	27 7 43 11		
MARS					
1. Phobos.....	14	5,850	7 39 15	Asaph Hall....	Aug. 17, 1877
2. Deimos....	13	14,650	1 6 17 54	Asaph Hall....	Aug. 11, 1877
JUPITER					
5. (Nameless).	13	112,500	11 57 23	Barnard.....	Sept. 9, 1892
1. Io.....	6½	261,000	1 18 27 33	Galileo.....	Jan. 7, 1610
2. Europa....	6½	415,000	3 13 13 42	Galileo.....	Jan. 8, 1610
3. Ganymede.	6	664,000	7 3 42 33	Galileo.....	Jan. 7, 1610
4. Callisto....	7	1,167,000	16 16 32 11	Galileo.....	Jan. 7, 1610
6. (Nameless).	14	7,372,000	266·00 d.	Perrine	Dec. 1904
7. (Nameless).	16	7,567,900	276·67 d.	Perrine	Jan. 1905
8. (Nameless).	17	15,600,000	789 d.	Melotte.....	Jan. 1908
9. (Nameless).	19	18,900,000	3 years	Nicholson.....	July 1914
SATURN					
1. Mimas.....	15	117,000	22 37 6	W. Herschel...	July 18, 1789
2. Enceladus..	14	157,000	1 8 53 7	W. Herschel...	Aug. 29, 1789
3. Tethys.....	11	186,000	1 21 18 26	J. D. Cassini...	Mar. 21, 1684
4. Dione.....	11	238,000	2 17 41 9	J. D. Cassini...	Mar. 21, 1684
5. Rhea.....	10	332,000	4 12 25 12	J. D. Cassini...	Dec. 23, 1672
6. Titan.....	9	771,000	15 22 41 23	Huygens.....	Mar. 25, 1655
7. Hyperion...	16	934,000	21 6 39 27	G. P. Bond....	Sept. 16, 1848
8. Iapetus....	11	2,225,000	79 7 54 17	J. D. Cassini...	Oct. 25, 1671
9. Phoebe.....	17	8,000,000	546.5 d.	W.H.Pickering	1898
10. Themis.....	17	906,000	20 20 24 0	W.H.Pickering	1905
URANUS					
1. Ariel.....	15	120,000	2 12 29 21	Lassell.....	Oct. 24, 1851
2. Umbriel....	16	167,000	4 3 27 37	Lassell.....	Oct. 24, 1851
3. Titania.....	13	273,000	8 16 56 29	W. Herschel...	Jan 11, 1787
4. Oberon.....	14	365,000	13 11 7 6	W. Herschel...	Jan. 11, 1787
NEPTUNE					
1. Triton....	13	221,500	5 21 2 44	Lassell	Oct. 10, 1846

DOUBLE STARS

Close scrutiny of the sky reveals the fact that many of the stars are composed of two or more components, that is, they are *double* or *multiple* stars. Over 15,000 such objects have been discovered.

A star may appear double in two ways. First, one may just happen to be nearly in line with the other as seen from the earth. Second, the two bodies may be physically connected, each revolving about their common centre of gravity. The former are called *optical doubles*, the latter *binary stars*. In the course of time the binaries exhibit a change in the distance between the components and also in the direction of the line joining them, that is, in the position angle.

While the close pairs require a large instrument for their detection, there are many within the range of small instruments. Such observations also allow one to determine the quality of the instrument employed. It has been found that a telescope having an objective 1 inch in diameter should be able to distinguish two stars 4″.56 apart, and the resolving power is inversely proportional to the diameter of the objective. Thus a telescope of 3-inch aperture should separate stars 1/3 of 4″.56, or 1″.52 apart; for one of aperture 10 inches, stars 1/10 of 4″.56, or 0″.45 apart should be seen separate; and so on. With the Yerkes refractor, of aperture 40 inches, a double star with distance 0″.11 can be detected.

In choosing a double star for testing a telescope care should be taken not to select a binary, with varying distance between its components.

The stars in the following short lists can be identified from almost any star atlas, and observation of them will prove of great interest to the amateur.

I. THE MOST LUMINOUS PAIRS

Star	Mags.	Dist. ″	Star	Mags.	Dist. ″
Mizar....	2.4, 4.0	14.5	γ Leonis....	2.5, 4.0	3.0
Castor...	2.5, 3.0	5.6	β Scorpii...	2.5, 5.5	13.0
γ Virginis .	3.0, 3.2	5.0	θ Serpentis.	4.4, 6.0	21.0
γ Arietis...	4.2, 4.5	8.9	44i Boötis....	5.0, 6.0	4.8
ζ Aquarii..	3.5, 4.4	3.5	π Boötis....	4.3, 6.0	6.0

II. THE FINEST COLORED PAIRS

Star	Magnitudes	Distance ″	Colors
γ Andromedæ..	2.2, 5.5	10	Orange, Green.
α CanumVenat.	3.2, 5.7	20	Golden, Lilac.
β Cygni.....	3.3, 5.5	34	Golden, Sapphire.
ε Boötis.....	2.4, 6.5	2.9	Golden, Sapphire.
95 Herculis.....	5.5, 5.8	6	Golden, Azure.
α Herculis.....	4, 5.5	4.7	Ruby, Emerald.
γ Delphini.....	3.4, 5	11	Golden, Bluish Green.
32 Eridani.....	4.7, 7	6.7	Topaz, Bright Green.
ε Hydræ.....	3.5, 7.5	3.5	Yellow, Blue.
ζ Lyræ.....	4.5, 5.5	44	Yellow, Green.
ι Cancri.....	4.5, 5	30	Pale Orange, Blue.
o Cygni.....	4.3,7.5,5.5	337.8,106.8	Yellow, Blue.
24 Coma Beren..	5.6, 7	21	Orange, Lilac.
o Cephei.....	5.4, 8	2.5	Golden, Azure.
94 Aquarii.....	5.5, 7.5	11	Rose, Greenish.
39 Ophiuchi.....	5.7, 7.5	12	Yellow, Blue.
41 Aquarii.....	5.8, 8.5	4.8	Yellow Topaz, Blue.
2 Canum Venat	6, 9	11	Golden, Azure
52 Cygni.....	4.6, 9	7	Orange, Blue.
55 Piscium.....	6, 9	6	Orange, Blue.
κ Geminorum..	3.8, 9	9	Orange, Blue.
ρ Orionis.....	5.1, 9	6.8	Orange, Blue.
54 Hydræ.....	5.2, 8	9	Yellow, Violet.
η Persei.....	4.2, 8.5	28	Yellow, Blue.
ϕ Draconis.....	4.8, 6	31	Yellow, Lilac.
o Draconis.....	4.7, 8.5	32	Golden, Lilac.
η Cassiopeiæ...	4.7, 7	5.7	Golden, Purple.
23 Orionis.....	5.4, 7	32	White, Blue.
δ Herculis.....	3.6, 8	18	White, Violet.
o Capricorni...	6.3, 7	22	Bluish.
17 Virginis.....	6.5, 7	20	Rose.
ξ Boötis.....	4.5, 6.5	4.2	Reddish Yellow.

The colors given above are according to Flammarion. For slight variations and also for a much longer list consult Webb's "Celestial Objects."

VARIABLE STARS

By FRANK S. HOGG

Of the naked eye stars visible to a northern observer, nearly a hundred are known to undergo variations in their light. With field glasses or a small telescope the number of variables is enormously increased. Thus there is no dearth of material with which an inquisitive amateur may satisfy himself as to the reality and nature of the fluctuations of the light of stars. Further this curiosity may be turned to real scientific value, in that the study of variable stars is one of the best organized and most fruitful fields of research for amateur observers. For years the professional astronomer has entrusted the visual observation of many of the most important variable stars entirely to amateurs, as organized into societies in England in 1890, America in 1911, and France in 1921. The American Association of Variable Star Observers has charts of the fields of 350 of these stars, and in general supervises the work of amateur observers. The Recorder is Mr. Leon Campbell, at the Harvard Observatory, Cambridge, Massachusetts. New observers are welcomed, and supplied with charts.

In our galaxy there are already known about 5,000 variables, while in globular clusters and outside systems there are some 3,000 more. Almost all those which have been sufficiently studied may be conveniently classified, according to their light variation into ten groups, by Ludendorff's classification. His classes, with their typical stars, are listed as follows:

I. New or temporary stars: Nova Aquilae 3, 1918.
II. Nova-like variables: T Pyxidis, RS Ophiuchi.
III. R Coronae stars: R Coronae Borealis. Usually at constant maximum, with occasional sharp minima.
IV. U Geminorum stars: U Geminorum. Usually at constant minimum, with occasional sharp maxima.
V. Mira stars: oCeti. Range of several magnitudes, fairly regular period of from 100 to 600 days.
VI. μCephei stars: μCephei. Red stars with irregular variations of a few tenths of a magnitude.
VII. RV Tauri stars: RV Tauri. Usually a secondary minimum occurs between successive primary minima.
VIII. Long period Cepheids: δCephei. Regular periods of one to forty-five days. Range about 1.5 magnitudes.
IX. Short period Cepheids: RR Lyrae. Regular periods less than one day. Range about a magnitude.
X. Eclipsing stars: βPersei. Very regular periods. Variations due to covering of one star by companion.

REPRESENTATIVE BRIGHT VARIABLE STARS

Name	Design.	Max.	Min.	Sp.	Period	Type	Date	Discoverer
.. Aql	194700	3.7	4.3	G4	7.17668	VIII	1784	Pigott
N Aql	184300	-0.2	10.9	Q	Irr.	I	1918	Bower
.. Aur	045443	3.3	4.1	F5p	9900.	X	1821	Fritsch
.. Cep	222557	3.6	4.3	G0	5.36640	VIII	1784	Goodricke
U Cep	005381	6.8	9.2	A0	2.49293	X	1880	W. Ceraski
.. Cet[1]	0214*o3*	2.0	9.6	M5e	329.5	V	1596	Fabricius
RR Cet	012700	8.4	9.0	F0	0.55304	IX	1906	Oppolzer
R CrB	154428	5.8	13.8	Goe	Irr.	III	1795	Pigott
.. Cyg	194632	4.2	13.4	M7e	408.3	V	1686	Kirch
P Cyg	201437a	3.5	6.0	B1qk	Irr.	II	1600	Blaeu
SS Cyg	213843	8.1	12.0	Pec.	Irr.	IV	1896	Wells
XX Cyg	200158	11.4	12.1	A	0.13486	IX	1904	L. Ceraski
.. Gem	065820	3.7	4.1	cG1	10.15353	VII	1847	Schmidt
.. Gem	060822	3.3	4.2	M2	235.15	V	1865	Schmidt
R Gem	070122a	6.5	13.5	Se	370.1	V	1848	Hind
U Gem	074922	8.8	13.8	Pec.	Irr.	IV	1855	Hind
.. Her	171014	3.1	3.9	M5	Irr.	VI	1795	W. Herschel
R Hya	1324*22*	3.5	10.1	M7e	413.6	V	1670	Montanari
R Leo	094211	5.0	10.5	M7e	310.3	V	1782	Koch
Lyr	184633	3.5	4.1	B5e	12.90801	X	1784	Goodricke
RR Lyr	192242	7.1	7.8	A5	0.56684	IX	1901	Fleming
.. Ori[2]	054907	0.2	1.2	M2	Irr.	VI	1840	J. Herschel
U Ori	054920	5.4	12.2	M7e	376.1	V	1885	Gore
.. Per[3]	030140	2.3	3.5	B8	2.86731	X	1669	Montanari
.. Per	025838	3.3	4.1	M4	Irr.	VI	1854	Schmidt
R Sge	200916	8.4	10.4	cG7	70.84	VII	1859	Baxendell
R Sct	1842*o5*	4.5	9.0	K5e	141.5	VII	1795	Pigott
.. Tau	035512	3.8	4.2	B3	3.95294	X	1848	Baxendell
RV Tau	044126	8.7	11.8	K0	78.60	VII	1905	L. Ceraski
SU Tau	054319	9.5	15.4	G0e	Irr.	III	1908	Cannon
.. UMi[4]	012288	2.3	2.4	cF7	3.96815	VIII	1911	Hertzsprung

[1]0Cet (Mira); [2]aOri (Betelgeuse); [3]..Per (Algol); [4]aUMi (Polaris).

Most of the data in this Table are from Prager's 1931 *Katalog und Ephemeriden Veranderlicher Sterne*. The stars are arranged alphabetically in order of constellations. The second column, the Harvard designation, gives the 1900 position of the star. The first four figures of the designation give the hour and minute of right ascension, the last two the declination in degrees, italicised for stars south of the equator. Thus the position of the fourth star of the list, .Cephei, is R.A. 22h 25m, Dec. +57 , (222557). The remaining columns give the maximum and minimum magnitudes, spectral class, the period in days and decimals of a day, the classification on Ludendorff's system, and the discoverer and date. In the case of eclipsing stars, the spectrum is that of the brighter component.

THE DISTANCES OF THE STARS

The measurement of the distances of the stars is one of the most important problems in astronomy. Without such information it is impossible to form any idea as to the magnitude of our universe or the distribution of the various bodies in it.

The parallax of a star is the apparent change of position in the sky which the star would exhibit as one would pass from the sun to the earth at a time when the line joining earth to sun is at right angles to the line drawn to the star; or, more accurately, it is the angle subtended by the semi-major axis of the earth's orbit when viewed perpendicularly from the star. Knowing the parallax, the distance can be deduced at once.

For many years attempts were made to measure stellar parallaxes, but without success. The angle to be measured is so exceedingly small that it was lost in the unavoidable instrumental and other errors of observation. The first satisfactory results were obtained by Bessel, who in 1838, by means of a heliometer, succeeded in determining the parallax of 61 Cygni, a 6th magnitude star with a proper motion of 5″ a year. On account of this large motion the star was thought to be comparatively near to us, and such proved to be the case. At about the same time Henderson, at the Cape of Good Hope, from meridian-circle observations, deduced the parallax of Alpha Centauri to be 0″.75. For a long time this was considered to be the nearest of all the stars in the sky, but in 1913 Innes, director of the Union Observatory, Johannesburg, South Africa, discovered a small 11th mag. star, 2° 13′ from Alpha Centauri, with a large proper motion and to which, from his measurements, he assigned a parallax of 0″.78. Its brightness is only 1/20,000 that of Alpha Centauri. In 1916 Barnard discovered an 11th mag. star in Ophiuchus with a proper motion of 10″ per year, the greatest on record, and its parallax is about 0″.53. It is believed to be next to Alpha Centauri in distance from us.

The distances of the stars are so enormous that a very large unit has to be chosen to express them. The one generally used is the light-year, that is, the distance travelled by light in a year, or 186,000x60x60x24x365¼ miles. A star whose parallax is 1″ is distant 3.26 light years; if the parallax is 0″.1, the distance is 32.6 l.-y.; if the parallax is 0″.27 the distance is 3.26 ÷ .27 = 12 l.-y. In other words, the distance is inversely proportional to the parallax. In recent years the word *parsec* has been introduced to express the distances of the stars. A star whose distance is 1 parsec is such that its *par*-allax is 1 *sec*-ond. Thus 1 parsec is equivalent to 3.26 l.-y., 10 parsecs = 32.6 l.-y., etc.

In later times much attention has been given to the determination of parallaxes, chiefly by means of photography, and now several hundred are known with tolerable accuracy.

THE SUN'S NEIGHBOURS—STARS NEARER THAN FIVE PARSECS

This table includes all stars known to be nearer than five Parsecs = 16.3 l−y. The apparent magnitudes m, and type are taken from Luyten's Study of the Nearby Stars, H.A. *85*, 73. The parallaxes, π, and proper motions, μ, are taken from Schlesinger's Catalogue of Parallaxes. M is the absolute magnitude and L the luminosity, the Sun being taken as unity. Sirius A, Procyon A and Altair are the only giant stars, the remainder being dwarfs. Wolf 359, the fifth star nearest the Sun, is intrinsically the faintest star known. It is also noteworthy that fifty per cent. of the stars are members of binary systems.

Name	(1900)α		(1900)δ		m	Type	π	μ	M	L
	h	m	°	′			″	″		
Sun.....					−26.7	Go			4.8	1.00
Prox. Cen.....	14	22.8	−62	15	11.2	M(?)	0.765	3.76	15.6	.00005
αCen. A.....	14	32.8	−60	25	0.3	G2	.758	3.68	4.7	1.10
αCen. B.....	14	32.8	−60	25	1.7	K3	.760	3.68	6.1	0.30
Barnard.....	17	52.9	+ 4	25	9.7	Mb	.538	10.30	13.3	.0004
Wolf 359.....	10	51.6	+ 7	36	13.5	M4e	.404	.....	16.5	.00002
L1 21185.....	10	57.9	+36	38	7.6	Mb	.392	4.78	10.6	.005
Sirius A.....	6	40.7	−16	35	−1.6	A0	.371	1.32	1.2	28.
Sirius B.....	6	40.7	−16	35	8.4	F	.371	.....	11.2	.0028
B.D.−12.4523	16	24.8	−12	24	9.5	M5	.349	.....	12.2	.001
Innes.....	11	12.0	−57	02	12	.....	.340	2.69	14.7	.0001
C.Z.−5h243..	5	7.7	−44	59	9.2	K2	.317	8.75	11.7	.002
τCet.....	1	39.4	−16	28	3.6	K0	.315	1.92	6.1	.30
Procyon A....	7	34.1	+ 5	29	0.5	F5	.312	1.24	3.0	5.2
Procyon B....	7	34.1	+ 5	29	12.5	.....	.312	.....	15.0	.00008
εEri.....	3	28.2	− 9	48	3.8	K0	.310	.97	6.3	.25
61 Cyg. A.....	21	02.4	+38	15	5.6	K7	.300	5.20	8.0	.052
61 Cyg. B.....	21	02.4	+38	15	6.3	K8	.300	5.20	8.7	.028
Lac 9352.....	22	59.4	−36	26	7.1	Ma	.292	6.90	9.4	.014
Bu 8798A.....	18	41.7	+59	29	9.3	Mb	.287	2.31	11.6	.002
Bu 8798B.....	18	41.7	59	29	10.0	Mb	.287	.....	12.3	.001
Grmb 34A....	0	12.7	+43	27	8.1	Ma	.282	2.89	10.3	.006
Grmb 34B....	0	12.7	+43	27	10.7	Mb	.282	.....	12.9	.0006
ε Indi.....	21	55.7	−57	12	4.7	K5	.281	4.70	6.9	.14
Kruger 60A...	22	24.4	+57	12	9.6	Mb	.257	.87	11.6	.002
Kruger 60B...	22	24.4	+57	12	11.3	.....	.....	.....	13.3	.0004
van Maanen..	0	43.9	+ 4	55	12.3	Fo	.255	3.01	14.3	.0002
Lac 8760.....	21	11.4	−39	15	6.6	Ma	.253	3.53	8.6	.030
Anon.....	2	50.3	+52	05	9.2	.....	.239	0.49	11.1	.003
Gould 32416..	23	59.5	−37	15	8.2	Ma	.220	6.11	9.9	.009
Oe. Arg. 17415	17	37.0	+68	26	9.1	Mb	.213	1.33	10.7	.004
+20.2465....	10	14.2	+20	22	9.2	Ma	.207	.49	10.8	.004
Altair.....	19	45.9	+ 8	36	0.9	A5	.204	.66	2.4	9.1
o²Eri A.....	4	10.7	− 7	49	4.5	G5	.203	4.08	6.0	.33
o²Eri B.....	4	10.7	− 7	49	9.7	Ao	.203	4.08	11.2	.003
o²Eri C.....	4	10.7	− 7	49	10.8	Mb	.203	4.08	12.3	.001

THE BRIGHTEST STARS

Their Magnitudes, Types, Proper Motions, Distances and Radial Velocities

By W. E. HARPER

The accompanying table contains the principal facts regarding 257 stars brighter than apparent magnitude 3.51 which it is thought may be of interest to our amateur members. The various columns should be self-explanatory but some comments may be in order.

The first column gives the name of the star and if it is preceded by the sign || such means that the star is a visual double and the combined magnitude is entered in the fourth column. Besides the 44 thus indicated there are 12 others on the list with faint companions but for these it is not thought that there is any physical connection. In the case of the 13 stars variable in light this fourth column shows their maximum and minimum magnitudes. The 20 first magnitudes stars are set up in bold face type.

In the fifth column are given the types as revised at various observatories—principally at our own, but omitting the *s* and *n* designations descriptive of the line character. The annual proper motion follows in the next column and these may not necessarily be correct to the third decimal place.

The parallaxes are taken from Schlesinger's Catalogue of Bright Stars, 1930. The distance is given also in light years in the eighth column as to the lay mind that seems a fitting unit. In only one case (α Cygni) was the parallax negative and it was entered as formerly as ″.005. The absolute magnitudes in the ninth column are the magnitudes the stars would have if all were at a uniform distance of 32.6 light years ($\pi = 0.''1$). At that distance the sun would appear as a star of magnitude 4.8.

The radial velocities in the last column have been taken from Vol. 18 of the Lick Publications. An asterisk * following the velocity means that such is variable. In these cases the velocity of the system, if known, is given; otherwise a mean velocity for the observations to date is set down.

Of the 257 stars or star systems here listed 144 are south and 113 north of the equator. This is to be expected from the fact that the northern half of the sky includes less of the Milky Way than the southern.

The number in each spectral class, apart from the one marked peculiar, is as follows: O, 3; B, 72; A, 55; F, 22; G, 43; K, 42 and M, 19. The B-stars are intrinsically luminous and appear in this list out of all proportion to their total number. The stars of Classes A and K are by far the most numerous but the revision of types throws many originally labelled K back into the G group.

From the last column we see that 92 velocities are starred, indicating that 36 per cent. of the bright stars, or at least one in every three, are binary in character. For visual binaries the proportion has usually been listed as one in nine. Our list shows one in six but it is only natural to expect that we would observe a higher proportion among the nearby stars, such as these are on the average.

Other relationships can be established from the list if our amateur members care to study it.

Star	R.A. 1900	Decl. 1900	Mag.	Type	Ann. Proper Motion	Parallax	Distance in Light Years	Abs. Mag.	Rad. Vel.
	h m	° ′			″	″			km./sec.
α Andromedae	0 3	+28 32	2.2	A1	.217	.040	81	0.2	−13.0*
β Cassiopeiae	4	+58 36	2.4	F2	.561	.071	46	1.7	+11.4
γ Pegasi	8	+14 38	2.9	B2	.010	.010	326	−2.1	+ 5.0*
β Hydri	20	−77 49	2.9	G0	2.243	.141	23	3.6	+22.8
α Phoenicis	21	−42 51	2.4	G5	.446	.045	72	0.7	+74.6*
δ Andromedae	34	+30 19	3.5	K3	.167	.028	116	0.7	− 7.1*
α Cassiopeiae	35	+55 59	2.2-2.8	G8	.062	.017	192	−1.6	− 3.8
β Ceti	39	−18 32	2.2	G7	.230	.040	81	0.3	+13.1
||γ Cassiopeiae	51	+60 11	2.2	B0e	.031	.036	91	0.0	− 6.8
||β Phoenicis	1 2	−47 15	3.4	G4	.042	.021	155	0.0	− 1.2
β Andromedae	4	+35 5	2.4	M0	.219	.044	74	0.6	+ 0.1
δ Cassiopeiae	19	+59 43	2.8	A3	.306	.030	109	0.2	+ 6.8
||α Ursae Minoris	23	+88 46	2.1	F7	.043	.012	272	−2.3	−17.4*
γ Phoenicis	24	−43 50	3.4	M1	.222	.024	136	0.3	+25.7*
α **Eridani**	34	−57 44	0.6	B9	.093	.045	72	−1.1	+19
ε Cassiopeiae	47	+63 11	3.4	B5	.043	.013	251	−1.0	− 8.1
β Arietis	49	+20 19	2.7	A3	.150	.066	49	1.8	− 0.6*
α Hydri	56	−62 3	3.0	A7	.256	.067	49	2.2	+ 7.0*
||γ Andromedæ	1 58	+41 51	2.3	K0	.073	.015	217	−1.0	−11.7
α Arietis	2 2	+22 59	2.2	K2	.242	.040	81	0.2	−14.3
β Trianguli	4	+34 31	3.1	A6	.161	.027	121	0.2	+10.4*
||ο Ceti	14	− 3 26	1.7-9.6	M6e	.239	.013	251	−2.7	+59.8*
||θ Eridani	54	−40 42	3.4	A2	.071	.022	148	0.1	+11.9*
α Ceti	57	+ 3 42	2.8	M1	.080	.017	192	−0.1	−25.7
γ Persei	58	+53 7	3.1	F9	.012	.017	192	−0.8	+ 1.0*
ρ Persei	59	+38 27	3.4-4.2	M6	.176	.018	181	−0.3	+28.2
β Persei	3 2	+40 34	2.1-3.2	B8	.011	.025	130	−0.9	+ 5.7*
α Persei	17	+49 30	1.9	F4	.041	.020	163	−1.6	− 2.4
δ Persei	36	+47 28	3.1	B5	.047	.015	217	−1.0	−10.0*
||η Tauri	41	+23 48	3.0	B5p	.053	.013	251	−1.5	+10.3
ζ Persei	48	+31 35	2.9	B1	.023	.006	543	−3.2	+20.9
γ Hydri	49	−74 33	3.2	M3	.128	.012	272	−1.4	+16.0
||ε Persei	51	+39 43	3.0	B2	.041	.006	543	−3.2	− 6. *
γ Eridani	53	−13 47	3.2	M0	.133	.021	155	−0.2	+61.7
λ Tauri	55	+12 12	3.3-4.2	B3	.015	.006	543	−2.8	+13.0*
α Reticuli	4 13	−62 43	3.4	G5	.069	.022	148	0.1	+35.6

Star	R.A. 1900	Decl. 1900	Mag.	Type	Ann. Proper Motion	Parallax	Distance in Light Years	Abs. Mag.	Rad. Vel.
	h m	° ′			″	″			km./sec.
α **Tauri**	4 30	+16 18	1.1	K8	.205	.057	57	−0.1	+54.1
α Doradus	32	−55 15	3.5	A0p	.003	....	....	.....	+25.6
π^3 Orionis	44	+ 6 47	3.3	F5	.474	.124	26	3.0	+24.6
ι Aurigae	50	+33 0	2.9	K4	.030	.021	155	−0.5	+17.6
ε Aurigae	55	+43 41	3.4–4.1	F2	.015	.006	543	−2.8	− 4.1*
η Aurigae	5 0	+41 6	3.3	B3	.082	.012	272	−1.3	+ 7.8
ε Leporis	1	−22 30	3.3	K5	.074	.026	125	0.4	+ 1.0
β Eridani	3	− 5 13	2.9	A1	.117	.052	63	1.5	− 7.
μ Leporis	8	−16 19	3.3	A0p	.053	.030	109	0.7	+27.7
‖α **Aurigae**	9	+45 54	0.2	G1	.439	.068	48	−0.6	+30.2*
‖β **Orionis**	10	− 8 19	0.3	B8p	.005	.006	543	−5.8	+23.6*
‖η Orionis	19	− 2 29	3.4	B0	.009	.007	466	−2.3	+19.5*
γ Orionis	20	+ 6 16	1.7	B2	.019	.017	192	−2.2	+18.0
β Tauri	20	+28 31	1.8	B8	.180	.035	93	−0.5	+ 8.0
β Leporis	24	−20 50	3.0	G2	.095	.021	155	−0.4	−13.5
‖δ Orionis	27	− 0 22	2.4	B0	.006	.009	362	−2.8	+19.9*
α Leporis	28	−17 54	2.7	F6	.006	.017	192	−1.2	+24.7
ι Orionis	31	− 5 59	2.9	O8	.007	.007	466	−2.9	+21.5*
ε Orionis	31	− 1 16	1.8	B0	.004	.008	407	−.73	+25.8
ζ Tauri	32	+21 5	3.0	B3e	.028	.014	233	−1.3	+16.4*
‖ζ Orionis	36	− 2 0	1.8	B0	.012	.008	407	−3.4	+18.0
α Columbae	36	−34 8	2.8	B8	.040	.022	148	−0.5	+34.6
κ Orionis	43	− 9 42	2.2	B0	.009	.013	251	−2.2	+20.1
β Columbae	47	−35 48	3.2	K0	.397	.019	172	−0.4	+89.4
α **Orionis**	50	+ 7 23	0.5–1.1	M2	.032	.012	272	−4.1	+21.0*
β Aurigae	52	+44 56	2.1	A0p	.046	.029	112	−0.4	−18.1*
θ Aurigae	53	+37 12	2.7	A1	.106	.032	102	0.2	+28.6
η Geminorum	6 9	+22 32	3.2–4.2	M2	.062	.013	251	−1.2	+21.4*
μ Geminorum	17	+22 34	3.2	M3	.129	.016	204	−0.8	+54.8
β Canis Majoris	18	−17 54	2.0	B1	.003	.012	272	−2.6	+34.4*
α **Carinae**	22	−52 38	−0.9	F0	.022	.016	204	−4.8	+20.5
γ Geminorum	32	+16 29	1.9	A2	.066	.047	69	0.3	−11.3*
ν Puppis	35	−43 6	3.2	B8	.020	.025	130	0.2	+28.2*
ε Geminorum	38	+25 14	3.2	G9	.020	.010	326	−1.8	+ 9.9
ξ Geminorum	40	+13 0	3.4	F5	.230	.048	68	1.8	+25.1
‖α **Canis Majoris**	41	−16 35	−1.6	A2	1.315	.375	9	1.3	− 7.5*
α Pictoris	47	−61 50	3.3	A5	.271	....	....	.....	+20.9

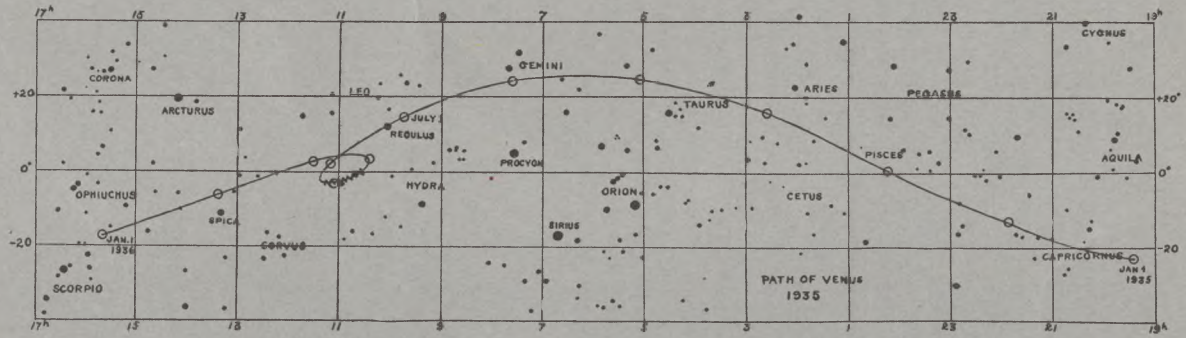
Star	R.A. 1900	Decl. 1900	Mag.	Type	Ann. Proper Motion	Parallax	Distance in Light Years	Abs. Mag.	Rad. Vel.
	h m	° ′			″	″			km./sec.
τ Puppis	6 47	−50 30	2.8	G8	.094	.031	105	0.3	+36.4*
||ϵ Canis Majoris	55	−28 50	1.6	B1	.005	.012	272	−3.0	+27.4
ζ Geminorum	58	+20 43	3.7–4.3	G0p	.007	.004	815	−3.3	+ 6.7*
o^2 Can. Majoris	59	−23 41	3.1	B5p	.000	.007	466	−2.7	+48.6
δ Can. Majoris	7 4	−26 14	2.0	G4p	.005	.010	326	−2.9	+34.3*
L^2 Puppis	10	−44 29	3.4–6.2	M5e	.334	....	....	.....	+53.0
π Puppis	14	−36 55	2.7	K5	.012	.023	142	−0.4	+15.8
β Can. Minoris	22	+ 8 29	3.1	B8	.063	.024	136	0.0	+23.
σ Puppis	26	−43 6	3.3	M0	.192	.027	121	0.4	+88.1
α_2 Geminorum	28	+32 6	2.0	A2	.201	.074	44	1.4	+ 6.0*
α_1 Geminorum	28	+32 6	2.8	A0	.209	.074	44	2.2	−1.2*
||α **Can. Minoris**	34	+ 5 29	0.5	F5	1.242	.310	10	2.9	− 3.0*
β **Geminorum**	39	+28 16	1.2	G9	.623	.110	30	1.4	+ 3.3
ξ Puppis	45	−24 37	3.5	K1	.007	.004	815	−3.5	+ 3.7*
ζ Puppis	8 0	−39 43	2.3	O8	.036	....	....	.....	−24.
ρ Puppis	3	−24 1	2.9	F6	.097	.016	204	−1.1	+46.6
||γ Velorum	6	−47 3	2.2	OW9	.002	....	....	.....	+35.
||ϵ Carinae	20	−59 11	1.7	K0	.032	.014	233	−2.5	+11.5
o Urs. Majoris	22	+61 3	3.5	G2	.166	.011	296	−1.3	+19.8
||ϵ Hydrae	41	+ 6 47	3.5	F9	.193	.024	136	0.4	+36.8*
δ Velorum	42	−54 20	2.0	A0	.093	.030	109	−0.6	+ 2.2
ζ Hydrae	50	+ 6 20	3.3	G7	.101	.016	204	−0.7	+22.6
ι Urs. Majoris	52	+48 26	3.1	A4	.500	.070	47	2.3	+12.6
λ Velorum	9 4	−43 2	2.2	K4	.022	.018	181	−1.5	+18.4
β Carinae	12	−69 18	1.8	A0	.192	....	....	.....	− 5.
ι Carinae	14	−58 51	2.2	F0	.023	....	....	.....	+13.3
α Lyncis	15	+34 49	3.3	K8	.214	.023	142	0.1	+37.4
κ Velorum	19	−54 35	2.6	B3	.017	.015	217	−1.5	+21.7*
α Hydrae	23	− 8 14	2.2	K4	.036	.016	204	−1.8	− 4.4
θ Urs. Majoris	26	+52 8	3.3	F7	1.096	.060	54	2.2	+15.8
N Velorum	28	−56 36	3.0	K5	.041	.039	84	1.4	−13.9
ϵ Leonis	40	+24 14	3.1	G0	.045	.012	272	−1.4	+ 5.1
||υ Carinae	45	−64 36	3.1	F0	.019	....	....	.....	+13.6
α **Leonis**	10 3	+12 27	1.3	B6	.244	.055	59	0.0	+ 2.6
q Carinae	14	−60 50	3.4	K5	.045	.012	272	−1.2	+ 8.6
||γ Leonis	14	+20 21	2.3	G8	.347	.024	136	−0.7	−36.8

Star	R.A. 1900	Decl. 1900	Mag.	Type	Ann. Proper Motion	Parallax	Distance in Light Years	Abs. Mag.	Rad. Vel.
	h m	° ′			″	″			km./sec.
μ Urs. Majoris	10 16	+42 0	3.2	K4	.082	.033	99	0.8	−20.3
θ Carinae	39	−63 52	3.0	B0	.023	.008	407	−2.4	+24. *
η Carinae	41	−59 10	1.0–7.4	Pec.	.007	....	....	.....	−25.0
μ Velorum	42	−48 54	2.8	G5	.084	.028	116	0.1	+ 6.9
ν Hydrae	45	−15 40	3.3	K3	.214	.033	99	0.9	−1..0
β Urs. Majoris	56	+56 55	2.4	A3	.089	.043	76	0.6	−12.1*
α Urs. Majoris	58	+62 17	2.0	G5	.137	.030	109	−0.7	− 8.6
ψ Urs. Majoris	11 4	+45 2	3.2	K0	.067	.044	74	1.4	− 3.6
δ Leonis	9	+21 4	2.6	A2	.208	.072	45	1.9	−23.2
θ Leonis	9	+15 59	3.4	A2	.103	.025	130	0.4	+ 7.8
λ Centauri	31	−62 28	3.3	B9	.046	.022	148	0.0	+ 7.9
β Leonis	44	+15 8	2.2	A2	.507	.095	34	2.1	− 2.3
γ Urs. Majoris	49	+54 15	2.5	A0	.095	.041	79	0.6	−11.1
δ Centauri	12 3	−50 10	2.9	B3e	.044	.018	181	−0.8	+ 9.
ϵ Corvi	5	−22 4	3.2	K2	.063	.027	121	−0.4	+ 4.9
δ Crucis	10	−58 12	3.1	B3	.051	....	....	.....	+26.4
δ Urs. Majoris	10	+57 35	3.4	A0	.113	.044	74	1.7	−12.
γ Corvi	11	−16 59	2.8	B8	.159	.021	155	−0.6	− 4.2*
α^1 Crucis	21	−62 33	1.6	B1	.048	.015	217	−2.5	−12.2*
α^2 Crucis	21	−62 32	2.1	B3	.048	.015	217	−2.0	+ 0.3*
||δ Corvi	25	−15 58	3.1	A0	.249	.030	109	0.5	+ 8.7
γ Crucis	26	−56 33	1.5	M4	.270	....	....	.....	+21.3
β Corvi	29	−22 51	2.8	G5	.061	.020	163	−0.6	− 7.7
α Muscae	31	−68 35	2.9	B5	.038	.012	272	−1.7	+18.
||γ Centauri	36	−48 24	2.4	A0	.200	.032	102	−0.1	− 7.5
||γ Virginis	36	− 0 54	2.9	F0	.561	.085	38	2.6	−19.6
β Muscae	40	−67 34	3.3	B3	.041	.014	233	−1.0	+42. *
β Crucis	42	−59 9	1.5	B1	.054	.011	296	−3.3	+20.0
ϵ Urs. Majoris	50	+56 30	1.7	A2	.117	.045	72	0.0	−11.9*
||α Can. Venat.	51	+38 51	2.8	A1	.233	.025	130	−0.1	− 3.6*
ϵ Virginis	57	+11 30	3.0	G6	.270	.034	96	0.6	−14.0
γ Hydrae	13 13	−22 39	3.3	G7	.085	.017	192	−0.5	− 5.4
ι Centauri	15	−36 11	2.9	A2	.351	....	....	.....	+ 0.1
||ζ^1 Urs. Majoris	20	+55 27	2.4	A2p	.131	.043	76	0.6	− 9.9*
α **Virginis**	20	−10 38	1.2	B2	.051	.017	192	−2.6	+ 1.6*
ζ Virginis	30	− 0 5	3.4	A2	.285	.036	91	1.2	−13.1

Star	R.A. 1900	Decl. 1900	Mag.	Type	Ann. Proper Motion	Parallax	Distance in Light Years	Abs. Mag.	Rad. Vel.
	h m	° ′			″	″			km./sec
ϵ Centauri	13 34	−52 57	2.6	B2	.040	.013	251	−1.9	+ 5.6
η Urs. Majoris	44	+49 49	1.9	B3	.116	.013	251	−2.5	−10.9
μ Centauri	44	−41 59	3.3	B3e	.030	....	....	.....	+12.6
ζ Centauri	49	−46 48	3.1	B3	.079	.010	326	−1.9	*
η Boötis	50	+18 54	2.8	G1	.370	.100	33	2.8	− 0.2*
β **Centauri**	57	−59 53	0.9	B3	.039	.020	163	−2.6	+12.0*
π Hydrae	14 1	−26 12	3.5	K3	.165	.036	91	−1.3	+27.2
θ Centauri	1	−35 53	2.3	G8	.748	.067	49	−1.4	+ 1.3
α **Boötis**	11	+19 42	0.2	K0	2.287	.085	38	−0.1	− 5.1
γ Boötis	28	+38 45	3.0	A3	.182	.058	56	1.8	−35.5
η Centauri	29	−41 43	2.6	B3e	.052	.016	204	−1.3	− 0.2
$\|\|\alpha$ **Centauri**	33	−60 25	0.1	G0	3.682	.760	4	4.7	−22.2
α Circini	34	−64 32	3.4	F0	.312	.070	47	2.6	+ 7.4
α Lupi	35	−46 58	2.9	B2	.036	.009	362	−2.3	+ 7.3*
$\|\|\epsilon$ Boötis	41	+27 30	2.7	G8	.045	.018	181	−1.0	+16.4
$\|\|\alpha^2$ Librae	45	−15 38	2.9	F1	.129	.073	45	2.2	−10. *
β Urs. Minoris	51	+74 34	2.2	K4	.028	.035	93	0.0	+16.9
β Lupi	52	−42 44	2.8	B3	.066	.012	272	−1.8	− 0.3*
κ Centauri	53	−41 42	3.4	B2	.037	.009	362	−1.9	+ 9.1*
σ Librae	58	−24 53	3.4	M4	.094	.024	136	0.3	− 4.3
ζ Lupi	15 5	−51 43	3.5	G5	.132	.017	192	−0.4	− 9.7
γT Australis	10	−68 19	3.1	A0	.064	....	....	.....	0.
β Librae	12	− 9 1	2.7	B8	.108	.024	136	−0.4	−37. *
δ Lupi	15	−40 17	3.4	B3	.032	.010	326	−1.6	+ 1.6
γ Urs. Minoris	21	+72 11	3.1	A2	.017	.042	78	1.3	− 3.9*
ι Draconis	23	+59 19	3.5	K3	.010	.031	105	0.9	−11.1
$\|\|\gamma$ Lupi	28	−40 50	3.0	B3	.042	.016	204	−1.0	+ 6.
α Cor. Borealis	30	+27 3	2.3	A0	.160	.044	74	0.5	+ 1.0*
α Serpentis	39	+ 6 44	2.8	K3	.142	.045	72	1.0	+ 3.0
βT Australis	46	−63 7	3.0	F0	.440	.090	36	2.8	− 0.3
π Scorpii	53	−25 50	3.0	B3	.042	.012	272	−1.6	− 3.0*
δ Scorpii	54	−22 20	2.5	B1	.042	.011	296	−2.3	−16. *
$\|\|\beta$ Scorpii	16 0	−19 32	2.8	B3	.041	.005	652	−1.4	− 9.3*
δ Ophiuchi	9	− 3 26	3.3	K8	.159	.029	112	0.4	−19.8
ϵ Ophiuchi	13	− 4 27	3.3	G9	.088	.030	109	0.7	−10.3
$\|\|\sigma$ Scorpii	15	−25 21	3.1	B1	.033	.007	466	−2.7	− 0.4*
$\|\|\eta$ Draconis	23	+61 44	2.9	G5	.062	.038	86	0.8	−14.3

Star	R.A. 1900	Decl. 1900	Mag.	Type	Ann. Proper Motion	Parallax	Distance in Light Years	Abs. Mag.	Rad. Vel.
	h m	° ′			″	″			km./sec.
‖α **Scorpii**	16 23	−26 12	1.2	M1	.032	.020	163	−2.3	− 3.2*
β Herculis	26	+21 42	2.8	G4	.104	.021	155	−0.6	−25.8*
τ Scorpii	30	−28 1	2.9	B1	.042	.007	466	−2.9	+ 0.6
ζ Ophiuchi	32	−10 22	2.7	B0	.024	.009	362	−2.5	−19. *
‖ζ Herculis	38	+31 47	3.0	G0	.601	.106	31	3.1	−70.8*
αT Australis	38	−68 51	1.9	K5	.034	.030	109	−0.7	− 3.7
ε Scorpii	44	−34 7	2.4	G9	.668	.040	81	0.4	− 2.5
μ^1 Scorpii	45	−37 53	3.1	B3	.032	.012	272	−1.5	*
ζ Arae	50	−55 50	3.1	K5	.047	.021	155	−0.3	− 6.0
κ Ophiuchi	53	+ 9 32	3.4	K3	.296	.037	88	1.3	−55.6
‖η Ophiuchi	17 5	−15 36	2.6	A2	.094	.036	91	0.4	− 1.0
η Scorpii	5	−43 6	3.4	A7	.294	.069	47	2.6	−28.4
ζ Draconis	8	+65 50	3.2	B8	.023	.026	125	0.3	−14.1
‖α Herculis	10	+14 30	3.1-3.9	M7	.030	.007	466	−2.7	−32.5
δ Herculis	11	+24 57	3.2	A2	.164	.036	91	0.9	−39. *
π Herculis	12	+36 55	3.4	K3	.021	.022	148	0.1	−25.7
θ Ophiuchi	16	−24 54	3.4	B2	.030	.009	362	−1.9	− 3.6
β Arae	17	−55 26	2.8	K1	.035	.017	192	−1.0	− 0.4
υ Scorpii	24	−37 13	2.8	B3	.040	.010	326	−2.2	+18. *
α Arae	24	−49 48	3.0	B3e	.085	.017	192	−0.9	− 2.2
λ Scorpii	27	−37 2	1.7	B2	.040	.016	204	−2.3	0. *
β Draconis	28	+52 23	3.0	G0	.012	.008	407	−2.5	−20.1
θ Scorpii	30	−42 56	2.0	F0	.010	....	....	.....	+ 1.4
α Ophiuchi	30	+12 38	2.1	A0	.264	.052	63	0.7	+15. *
κ Scorpii	36	−38 58	2.5	B3	.032	.011	296	−2.3	−10. *
β Ophiuchi	38	+ 4 37	2.9	K2	.157	.036	91	0.7	−11.9
ι^1 Scorpii	41	−40 5	3.1	F8	.004	.007	466	−2.6	−27.6
‖μ Herculis	43	+27 47	3.5	G5	.817	.112	29	3.7	−16.1
G Scorpii	43	−37 1	3.2	K2	.068	.028	116	0.5	+24.7
ν Ophiuchi	54	− 9 46	3.5	G7	.118	.023	142	0.3	+12.4
γ Draconis	54	+51 30	2.4	K5	.026	.028	116	−0.3	−27.8
γ Sagittarii	59	−30 26	3.1	K0	.206	.041	79	−1.1	+22.3*
η Sagittarii	18 11	−36 48	3.2	M4	.223	.032	102	0.7	+ 0.5
δ Sagittarii	15	−29 52	2.8	K4	.042	.035	93	0.6	−20.0
η Serpentis	16	− 2 55	3.4	G9	.898	.060	54	2.3	+ 8.9
ε Sagittarii	18	−34 26	2.0	A0	.139	....	....	.....	−10.8
λ Sagittarii	22	25 29	2.9	K1	.197	.048	68	−1.4	−43.3
α **Lyrae**	34	+38 41	0.1	A1	.348	.123	26	0.6	−13.8

Star	R.A. 1900	Decl. 1900	Mag.	Type	Ann. Proper Motion	Parallax	Distance in Light Years	Abs. Mag.	Rad. Vel.
	h m	° ′			″	″			km./sec.
ϕ Sagittarii	18 39	−27 6	3.3	B8	.053	.018	181	−0.4	+21.5*
‖β Lyrae	46	+33 15	3.4–4.1	B2p	.011	.003	1086	−4.2	−19.0*
σ Sagittarii	49	−26 25	2.1	B3	.081	.018	181	−1.6	−10.7
γ Lyrae	55	+32 33	3.3	B9p	.010	.016	204	−0.7	−21.5*
‖ζ Sagittarii	56	−30 1	2.7	A2	.026	.036	91	0.5	+22.1
τ Sagittarii	19 1	−27 49	3.4	K0	.265	.043	76	1.6	+45.4*
ζ Aquilae	1	+13 43	3.0	A0	.103	.037	88	0.9	−25. *
π Sagittarii	4	−21 11	3.0	F2	.041	.022	148	−0.3	− 9.8
δ Draconis	13	+67 29	3.2	G8	.135	.032	102	0.8	+24.8
δ Aquilae	21	+ 2 55	3.4	A3	.267	.057	57	2.2	−32.3*
‖β Cygni	27	+27 45	3.2	K0	.010	.020	163	0.3	−23.9*
γ Aquilae	42	+10 22	2.8	K3	.018	.023	142	−0.4	− 2.0
‖δ Cygni	42	+44 53	3.0	A1	.067	.034	96	0.6	−20.
α **Aquilae**	46	+ 8 36	0.9	A2	.659	.200	16	2.4	−26.1
θ Aquilae	20 6	− 1 7	3.4	A0	.035	.017	192	−0.5	−28.6*
‖β Capricorni	15	−15 6	3.2	F8	.042	.017	192	−0.6	−19.0*
α Pavonis	18	−57 3	2.1	B3	.090	.013	251	−2.3	+ 1.8*
γ Cygni	19	+39 56	2.3	F8	.006	.007	466	−3.4	− 7.6
α Indi	31	−47 38	3.2	G2	.072	.036	91	1.0	− 1.1
α **Cygni**	38	+44 55	1.3	A2p	.004	.005	652	−5.2	− 6.3*
ϵ Cygni	42	+33 36	2.6	G7	.485	.045	72	0.9	−10.5*
ζ Cygni	21 9	+29 49	3.4	G6	.061	.018	181	−0.3	+16.9*
α Cephei	16	+62 10	2.6	A2	.163	.078	42	2.1	− 8.
β Aquarii	26	− 6 1	3.1	G1	.020	.006	543	−3.0	+ 6.7
β Cephei	27	+70 7	3.3	B1	.013	.008	407	−2.2	− 7.2*
ϵ Pegasi	39	+ 9 25	2.5	K2	.028	.020	163	−1.0	+ 5.2
δ Capricorni	42	−16 35	3.0	A3	.395	.095	34	2.9	− 6.4*
γ Gruis	48	−37 50	3.2	B8	.108	.018	181	−0.6	− 2.1
α Aquarii	22 1	− 0 48	3.2	G0	.018	.007	466	−2.6	+ 7.6
α Gruis	2	−47 27	2.2	B5	.200	.028	116	−0.6	+11.8
α Tucanae	12	−60 45	2.9	K5	.085	.023	142	−0.3	+42.2*
β Gruis	37	−47 24	2.2	M6	.132	.015	217	−1.9	+ 1.6
η Pegasi	38	+29 42	3.1	G1	.039	.013	251	−1.3	+ 4.4*
α **P Australis**	52	−30 9	1.3	A3	.367	.122	26	1.7	+ 6.5
β Pegasi	59	+27 32	2.6	M3	.235	.020	163	−0.9	+ 8.6
α Pegasi	59	+14 40	2.6	A0	.077	.034	96	0.2	− 4. *
γ Cephei	23 35	+77 4	3.4	K1	.167	.069	47	2.6	−42.0



PATH OF VENUS AMONG THE STARS DURING 1935

The small circles show the positions of the planet at the first of each month. The part of the path which is hatched indicates the interval when the planet is less than one hour of right ascension away from the sun and consequently difficult to observe. The planet will pass about a half a degree north of the bright star Regulus on July 6th.

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