THE OBSERVER'S HANDBOOK FOR 1919

Published By

The Royal Astronomical Society of Canada

EDITED BY C. A. CHANT

ELEVENTH YEAR OF PUBLICATION

TORONTO
198 COLLEGE STREET
PRINTED FOR THE SOCIETY
1919

CALENDAR 1919

JANUARY

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

FEBRUARY

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

MARCH

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

APRIL

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

MAY

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JUNE

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

JULY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

AUGUST

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SEPTEMBER

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

OCTOBER

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

NOVEMBER

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

DECEMBER

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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PREFACE

The HANDBOOK for 1919 contains the same amount of matter as that for 1918, and is thus of rather less than half its usual size. The reduction was accomplished by omitting those portions which are not much altered from year to year, namely:—

Symbols and abbreviations.
Explanation of solar and sidereal time.
Times of sunrise and sunset.
Meteors and shooting stars.
Elements and satellites of the solar system.
List of double and variable stars.
The stars, their magnitudes, velocities, etc.
Maps and descriptions of the constellations.

These were given in volumes for past years, and any member who has not a copy containing them may obtain one free by addressing the Librarian, 198 College Street, Toronto.

Included in them are maps of the constellations, and it is suggested that the positions of the planets given at the head of pages 6, 8..., be marked on the maps, thus giving the paths of the planets amongst the stars.

The war is now happily over, and it is proposed to issue the HANDBOOK for 1920 in its former or even greater size; and those who use it will confer a favor by sending (in writing) suggestions as to improvements in the substance or arrangement of its contents.

The Editor wishes again to express his obligation to Mr. J. P. Henderson, M.A., his assistant in Astronomy at the University of Toronto, for material assistance in preparing this volume.

THE EDITOR.

Toronto, December, 1918.

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The stars, their magnitudes, velocities, etc.
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ANNIVERSARIES AND FESTIVALS, 1919

New Year's Day	Wed., Jan. 1	Pentecost (Whit Sunday)	June 8
Epiphany	Mon., Jan. 6	Trinity Sunday	June 15
Septuagesima Sunday	Feb. 16	Corpus Christi	Thur., June 19
St. David	Sat., Mar. 1	St. John Baptist	Tues., June 24
Quinquagesima (Shrove Sunday)	Mar. 2	Dominion Day	Tues., July 1
Ash Wednesday	Mar. 5	Labor Day	Mon., Sept. 1
St. Patrick	Mon., Mar. 17	St. Michael (Michaelmas Day)	Mon., Sept. 29
Palm Sunday	Apr. 13	All Saints Day	Sat., Nov. 1
Good Friday	Apr. 18	St. Andrew	Sun., Nov. 30
Easter Sunday	Apr. 20	First Sunday in Advent	Nov. 30
St. George	Wed., Apr. 23	Conception Day	Mon., Dec. 8
Victoria Day	Sat., May 24	St. Thomas Day	Sun., Dec. 21
Rogation Sunday	May 25	Christmas Day	Thur., Dec. 25
Ascension Day (Holy Thursday)	May 29		

King George V., born June 3, 1865; began to reign May 6, 1910.
Queen Mary, born May 26, 1867.
Prince of Wales, born June 23, 1894.

OCCULTATIONS OF STARS BY THE MOON, 1919

PREPARED BY R. M. MOTHERWELL

The following predictions were prepared for Ottawa by the graphic method of W. F. Rigge and include all stars down to magnitude 4·5. Observers should bear in mind that the predictions were made only for Ottawa and that the times will vary according to the latitude and longitude of the observer.

It will be noticed that some occultations occurring in the day-time are given, the observation of which may prove interesting. Attention is also directed to the fact that the hours are numbered astronomically, that is, beginning at noon.

Date		Star	Mag.	*Immersion		*Emersion		Position Angle	
								Immer.	Emer.
1919				h	m	h	m	°	°
January	25	δ Scorpii	2·5	19	54·8	20	40·8	156	221
February	10	ν Geminorum	4·1	13	54·0	14	07·0	182	207
March	12	α Cancri	4·3	14	04·6	14	23·1	42	8
April	5	ζ Tauri	3·0	2	29·2	3	33·7	122	237
July	23	ζ Tauri	3·0	16	29·1	17	07·6	35	316
September	19	α Cancri	4·3	18	14·5	18	42·5	42	358
October	1	μ Sagittarii	4·0	2	18·4	3	28·7	62	297
November	27	β Capricorni	3·2	7	41·0	7	52·2	349	331
November	28	ν Aquarii	4·5	6	59·8	8	01·8	32	276

*Eastern Standard Astronomical Time (Hours numbered from noon).

1919, EPHEMERIS OF SUN. AT GREENWICH MEAN NOON.

Date	R.A.	Equation of Time	Declination	Date	R.A.	Equation of Time	Declination
	h m s	m s	° ′ ″		h m s	m s	° ′ ″
Jan. 1	18 43 40	+ 3 19·1	S 23 4 9	May 1	2 30 35	− 2 52·7	N 14 50 17
" 4	18 56 54	4 43·6	22 48 15	" 4	2 42 3	3 13·8	15 44 12
" 7	19 10 5	6 4·6	22 28 17	" 7	2 53 37	3 30·0	16 35 47
" 10	19 23 11	7 21·1	22 4 19	" 10	3 5 15	3 41·3	17 24 52
" 13	19 36 12	8 32·5	21 36 30	" 13	3 16 59	3 47·6	18 11 19
" 16	19 49 8	9 38·2	21 4 55	" 16	3 28 47	3 48·7	18 55 2
" 19	20 1 57	10 37·7	20 29 42	" 19	3 40 41	3 44·7	19 35 53
" 22	20 14 40	11 30·8	19 51 1	" 22	3 52 40	3 35·6	20 13 44
" 25	20 27 16	12 17·2	19 8 59	" 25	4 4 43	3 21·5	20 48 29
" 28	20 39 45	12 56·6	18 23 46	" 28	4 16 52	3 2·7	21 20 2
" 31	20 52 7	13 28·8	17 35 34	" 31	4 29 5	2 40·0	21 48 15
Feb. 3	21 4 21	13 53·7	16 44 34	June 3	4 41 21	2 12·8	22 13 4
" 6	21 16 28	14 11·1	15 50 56	" 6	4 53 41	1 42·7	22 34 23
" 9	21 28 28	14 21·0	14 54 53	" 9	5 6 3	1 9·8	22 52 9
" 12	21 40 20	14 23·7	13 56 35	" 12	5 18 28	− 0 34·6	23 6 19
" 15	21 52 5	14 19·4	12 56 14	" 15	5 30 55	+ 0 2·3	23 16 49
" 18	22 3 44	14 8·4	11 53 59	" 18	5 43 23	0 40·0	23 23 37
" 21	22 15 17	13 51·3	10 50 2	" 21	5 55 51	1 19·5	23 26 43
" 24	22 26 44	13 28·5	9 44 33	" 24	6 8 20	1 58·7	23 26 5
" 27	22 38 5	13 0·3	8 37 44	" 27	6 20 49	2 37·2	23 21 44
				" 30	6 33 16	3 14·6	23 13 41
Mar. 2	22 49 22	12 27·2	7 29 46	July 3	6 45 40	3 49·8	23 1 59
" 5	23 0 34	11 49·6	6 20 50	" 6	6 58 3	4 22·4	22 46 40
" 8	23 11 42	11 7·8	5 11 8	" 9	7 10 22	4 51·8	22 27 48
" 11	23 22 46	10 22·3	4 0 50	" 12	7 22 37	5 17·5	22 5 26
" 14	23 33 47	9 33·7	2 50 6	" 15	7 34 49	5 39·2	21 39 40
" 17	23 44 45	8 42·6	1 39 6	" 18	7 46 56	5 56·6	21 10 33
" 20	23 55 42	7 49·7	S 0 27 58	" 21	7 58 58	6 9·4	20 38 12
" 23	0 6 38	6 55·5	N 0 43 6	" 24	8 10 56	6 17·3	20 2 44
" 26	0 17 32	6 0·7	1 53 58	" 27	8 22 48	6 20·2	19 24 14
" 29	0 28 27	5 5·8	3 4 28	" 30	8 34 35	6 17·7	18 42 50
Apr. 1	0 39 22	4 11·3	4 14 27	Aug. 2	8 46 17	6 9·7	17 58 41
" 4	0 50 18	3 17·6	5 23 43	" 5	8 57 53	5 56·0	17 11 55
" 7	1 1 15	2 25·1	6 32 7	" 8	9 9 23	5 36·8	16 22 38
" 10	1 12 14	1 34·4	7 39 30	" 11	9 20 49	5 12·3	15 30 59
" 13	1 23 15	+ 0 45·8	8 45 42	" 14	9 32 9	4 42·5	14 37 6
" 16	1 34 19	− 0 0·1	9 50 36	" 17	9 43 24	4 8·0	13 41 6
" 19	1 45 26	0 42·8	10 54 3	" 20	9 54 34	3 29·0	12 43 8
" 22	1 56 37	1 21·7	11 55 53	" 23	10 5 41	2 45·7	11 43 21
" 25	2 7 52	1 56·6	12 55 58	" 26	10 16 43	1 58·5	10 41 53
" 28	2 19 11	− 2 27·0	N 13 54 9	" 29	10 27 42	+ 1 7·7	N 9 38 53

WATCH FAST

WATCH SLOW

1919, EPHEMERIS OF SUN. AT GREENWICH MEAN NOON.

Date	R.A.	Equation of Time	Declination	Date	R.A.	Equation of Time	Declination
	h m s	m s	° ′ ″		h m s	m s	° ′ ″
Sept. 1	10 38 37	+ 0 13·5	N 8 34 31	Nov. 3	14 30 26	− 16 20·6	S 14 49 33
" 4	10 49 30	− 0 43·7	7 28 56	" 6	14 42 18	16 18·7	15 45 16
" 7	11 0 20	1 43·3	6 22 16	" 9	14 54 17	16 9·4	16 38 38
" 10	11 11 8	2 44·8	5 14 39	" 12	15 6 23	15 52·5	17 29 28
" 13	11 21 55	3 47·7	4 6 14	" 15	15 18 38	15 27·7	18 17 36
" 16	11 32 41	4 51·3	2 57 9	" 18	15 31 0	14 55·2	19 2 51
" 19	11 43 27	5 55·0	1 47 33	" 21	15 43 30	14 15·0	12 45 2
" 22	11 54 13	6 58·4	N 0 37 36	" 24	15 56 7	13 27·5	20 24 0
" 25	12 5 0	8 0·8	S 0 32 34	" 27	16 8 51	12 33·1	20 59 33
" 28	12 15 49	9 2·0	1 42 47	" 30	16 21 42	11 32·2	21 31 34
Oct. 1	12 26 39	10 1·4	2 52 52	Dec. 3	16 34 38	10 25·4	21 59 54
" 4	12 37 32	10 58·4	4 2 40	" 6	16 47 40	9 13·2	22 24 25
" 7	12 48 27	11 52·6	5 12 2	" 9	17 0 47	7 56·1	22 45 0
" 10	12 59 26	12 43·4	6 20 48	" 12	17 13 58	6 34·8	23 1 34
" 13	13 10 29	13 30·0	7 28 50	" 15	17 27 12	5 10·0	23 14 2
" 16	13 21 37	14 11·9	8 35 56	" 18	17 40 29	3 42·4	23 22 20
" 19	13 32 50	14 48·6	9 41 58	" 21	17 53 48	2 13·1	23 26 25
" 22	13 44 8	15 19·6	10 46 45	" 24	18 7 8	− 0 43·0	23 26 16
" 25	13 55 33	15 44·6	11 50 4	" 27	18 20 28	+ 0 46·7	23 21 52
" 28	14 7 4	16 3·3	12 51 46	" 30	18 33 46	+ 2 15·2	S 23 13 15
" 31	14 18 42	− 16 15·4	S 13 51 39				

SLOW — WATCH — SLOW

To obtain the Sidereal Time or R.A. of Mean Sun, subtract the Equation of Time from the Right Ascension.

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

THE SKY FOR JANUARY

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	18h 9m	20h 39m	21h 33m	6h 39m	9h 59m	21h 53m	8h 43m
Decl.	22° 49′ S.	19° 54′ S.	15° 41′ S.	23° 12′ N.	13° 49′ N.	13° 34′ S.	18° 6′ N.
Transit	10·34	13·03	13·57	23·01	2·24	14·17	1·08

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During the month the sun's R. A. increases from 18h 44m to 20h 52m, and its Decl. changes from 23° 4′ to 17° 36′ S. The equation of time (given on page 4) increases from 3m 19s to 13m 29s so rapidly that it causes the time of mean noon (expressed by our clocks) to remain at the same interval from sunrise, or, in other words, our forenoons appear to be of the same length for about the first ten days of the month. The earth is nearest the sun on the 3rd, the distance being 91,350,000 miles.

The Moon.—Its phases and conjunctions with the planets are given on the page opposite.

On January 26 at 7 55 a.m. the moon occults δ Scorpii (see p. 3).

Mercury has its greatest elongation west on the 7th, when it is 23° 13′ away from the sun. It rises nearly 2 hours before the sun on this date, but it is so far south that it is scarcely 15° above the horizon at sunrise. It should be visible for at least a week before and after this date, about 18° to the southward of the point where the sun is to appear. Field glasses and a good horizon will easily locate it.

Venus is an evening star during the month, but quite low in the sky. Its stellar magnitude is —3.4, its phase is like a full moon, but it is in the farther part of its orbit and is not so conspicuous as some months later.

Mars is an evening star this month, about 20° above the horizon at sunset, and in the constellation Capricornus. It is 203 million miles from the earth on the 15th.

Jupiter on the 15th rises about an hour before sunset and sets just before sunrise. It is very prominent all night, stellar magnitude —2.2, completely outshining Castor and Pollux, the two Twins nearby. The configurations of its satellites are given on the next page, and their eclipses, etc., on page 30.

Saturn rises nearly 3 hours after sunset and is visible the rest of the night. It is very close to Regulus, slightly over a degree to the north, but is retrograding and is moving away from it. Any magnification will show the saucer-like appearance the rings give the planet, and a good telescope should show them very distinctly. They are inclined at an angle of 11° with our line of sight, and we are looking at their southern face.

Uranus during the year is in Aquarius, moving from the border of Capricornus. It may be observed in the evening heavens in January and again towards the end of the year, or in the morning sky from April on. It reaches the meridian at midnight on Aug. 24th, when it is 1,770 million miles from the earth. Its position should be charted on a star map from data given for each month at the top of the page, and reference stars should be selected as guides in locating it in the sky.

Neptune in 1919 is in Cancer moving toward Leo. It is visible as an evening star until July, and as a morning star from September on. It reaches the meridian at midnight on Jan. 29th, and is 2,700,000,000 miles from the earth on that day. Its position should be located in a similar manner as above.

The minima of Algol are given on the next page.

JANUARY

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol	Configuration of Jupiter's satellites at 23h 15m.
			h m	
Wed.	1		15 40	○2134
☉ Thur.	2	oh ☌ ♃ ☉; 3h 24m·1 New Moon.		21○34
Fri.	3	oh 4m ☌ ☿ ☾, ☿ 4° 28′ S.; 4h ⊕ in Perihelion.		3○214
Sat.	4	14h 54m ☌ ♂ ☾, ♂ 5° 57′ S.	12 30	3○24●
Sun.	5	14h 51m ☌ ♅ ☾, ♅ 6° 6′ S.		321○4
Mon.	6	13h ☿ in Aphelion.		42○1●
Tues.	7	22h ☿ Greatest elong. W. 23° 13′.	9 10	41○23
Wed.	8	7h ♂ in Perihelion.		4○213
☽ Thur.	9	5h 55m·2 Moon's First Quarter.		421○3
Fri.	10		6 0	43○1●
Sat.	11			431○2
Sun.	12			♃342☉
Mon.	13		2 50	243○1
Tues.	14	23h 50m ☌ ♃ ☾, ♃ 2° 24′ N.		1○423
Wed.	15		23 40	○2143
♉ Thur.	16	3h 44m·4 Full Moon.		21○34
Fri.	17	5h 6m ☌ ♆ ☾, ♆ 4° 22′ N.		32○14
Sat.	18	17h 27m ☌ ♄ ☾, ♄ 6° 50′ N.	20 30	31○24
Sun.	19	15h ☿ in ♉.		♃32○4
Mon.	20			23○14
Tues.	21		17 20	1○243
Wed.	22	8h ☌ ♂ ♅, ♂ 0° 22′ S.		4○123
☾ Thur.	23	23h 22m·0 Moon's Last Quarter.		421○3
Fri.	24		14 10	423○1
Sat.	25			431○2
Sun.	26			♃43○1
Mon	27		11 0	432○●
Tues	28	16h ☍ ♆ ☉.		41○23
Wed.	29	3h ☿ Greatest Hel. Lat. S.; 21h ☿ in Aphelion.		4○123
Thur.	30	13h 4m ☌ ☿ ☾, ☿ 4° 48′ S.; 21h ☌ ☿ ♅, ☿ 0° 52′ S.	7 50	21○3●
☉ Fri.	31	18h 7m·0 New Moon;.		♃2○14

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR FEBRUARY

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	21h 29m	23h 9m	23h 6m	6h 27m	9h 50m	22h 0m	8h 39m
Decl.	17° 3′ S	6° 57′ S.	6° 43′ S.	23° 26′ N	14° 40′ N.	12° 59′ S	18° 20′ N.
Transit	11·52	13·32	13·28	20·46	0·14	12·21	22·59

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During the month the sun's R.A. increases from 20h 56m to 22h 44m and its Decl. changes from 17° 19′ to 8° 15′ S.; the equation of time reaches a maximum on the 12th, when it is 14m 24s, (see page 4).

The Moon.—For its phases and conjunctions with the planets, see opposite page.

On February 11 at 1.54 a.m. the moon occults ν Geminorum (see p. 3).

Mercury is in superior conjunction with the sun on the 23rd and too close for convenient observation during the month.

Venus is improving in position as an evening star during the month. It has a close conjunction with Mars on the 13th, when it is only 35′ south of Mars. Its stellar magnitude is —3.3 and increasing.

Mars is still an evening star this month, and although approaching the sun is only slightly lower in the sky at sunset than last month, due to the changing angle at which the ecliptic cuts the horizon from month to month. It is 212 million miles from the earth on the 15th.

Jupiter is 45° above the horizon at sunset and is visible until 3 hours before sunrise. The planet is retrograding, but its position among the stars is only slightly changed from that a month ago. Although in a portion of the heavens containing strikingly bright stars, it shines out 1.6 times as bright as Sirius, the brighest of them all. Its stellar magnitude is —2.1, nearly as bright as last month. The configurations of its satellites are given on the opposite page and their eclipses, etc., on page 30.

Saturn on the 15th rises at sunset and sets at sunrise. It is retrograding, being in opposition to the sun on the 14th, when it is 764 million miles from us. It is in its very best position for observation, the rings being inclined to us at about 12° and we are looking at their southern face.

The positions of *Uranus* and *Neptune* are given above. See note for January.

The minima of Algol are given on the next page.

FEBRUARY

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's Satellites at 22h 45m
			h	m	
Sat.	1				31○24
Sun.	2	0h 44m ☌ ♅ ☾, ♅ 6° 1′ S.; 5h 41m ☌ ☿ ☾, ☿ 6° [58′ S.; 15h 9m ☌ ♂ ☾, ♂ 6° 28′ S.	4	40	3○214
Mon.	3				231○4
Tues.	4				♃○234
Wed.	5		1	20	○1234
Thur.	6				21○43
☽ Fri.	7	13h 52m·3 Moon's First Quarter.	22	10	2○431
Sat.	8				341○2
Sun.	9				43○21
Mon.	10		19	0	4321○
Tues.	11	2h 14m ☌ ♃ ☾, ♃ 2° 20′ N.			♃4○●●
Wed.	12				4○23●
Thur.	13	9h ☌ ☿ ♂; ☿ 0° 35′ S.; 11h 57m ☌ ♆ ☾, ♆ 4° 20′ N.	15	50	421○3
♋ Fri.	14	9h ☍ ♄ ☉; 18h 38m·2 Full Moon; 22h 2m ☌ ♄ ☾, [♄ 6° 45′ N.			42○31
Sat.	15				341○2
Sun.	16		12	40	3○21●
Mon.	17	5h ☌ ♅ ☉.			321○4
Tues.	18				2○314
Wed.	19	5h ☿ Greatest Hel. Lat. S.; 22h ☌ ☿ ♅, ☿ 1° 26′ S.	9	30	○234●
Thur.	20				21○34
Fri.	21				2○134
☾ Sat.	22	20h 47m·7 Moon's Last Quarter.	6	20	31○24
Sun.	23	16h ☌ ☿ ☉ Superior.			3○124
Mon.	24				♃321○
Tues.	25		3	10	423○1
Wed.	26				41○23
Thur.	27				♃42○3
Fri.	28		0	0	42○13

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR MARCH

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	0h 37m	1h 16m	0h 26m	6h 26m	9h 42m	22h 6m	8h 37m
Decl.	5° 8′ N.	7° 26′ N.	2° 7′ N.	23° 29′ N	15° 22′ N.	12° 26′ S	18° 29′ N.
Transit	13·09	13·48	12·57	18·56	22·11	10·37	21·06

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—On March 1st the sun's R.A. is 22h 46m and its Decl. is 7° 53′ S. It crosses the equator on the 21st, the spring equinox, and by the 31st its R.A. is 0h 36m and its Decl. 3° 51′ N. During the month the equation of time decreases from 12m 39s to 4m 29s (see page 4).

The Moon.—Its phases and conjunctions with the planets are given on the opposite page.

On March 13 at 2 05 a.m. the moon occults α Cancri (see p. 3).

Mercury is at greatest elongation east on the 21st. This is the best time of the year to observe an eastern elongation, since it is 18° directly above the setting sun, in spite of the fact that it is only 18° 35′ from the sun. There should be no difficulty in locating it if the horizon is at all clear. Look for it from about the 10th until the end of the month. Its stellar magnitude is about 0. It is in rather close conjunction with Mars on the 11th, but both planets are quite low down at sunset.

Venus is a fine evening star all month, stellar magnitude —3.4 and very slowly increasing in brightness. It is 136 million miles from the earth on the 15th and approaching us rapidly.

Mars is too low down in the sky at sunset this month for convenient observation. On the 15th it is 219 million miles from the earth, on the side of its orbit most remote from us.

Jupiter is again to be found in practically the same relative position among the stars, but the sun makes a difference again of two hours in its evening location. It is an hour to the eastward of the meridian at sunset, and therefore visible for the first half of the night. Its stellar magnitude is —1.9. For the configurations of its satellites, see next page; for their eclipses, etc., see page 30.

Saturn is about 30° up from the horizon at sunset and is visible until an hour before sunrise. It is still retrograding, and well placed for observation. Its stellar magnitude is +0.3. Its great ring system is inclined 13° from our line of sight. See note for January.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the next page.

MARCH

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol h	Minima of Algol m	Configuration of Jupiter's satellites at 22h 15m.
Sat.	1	13h 5m ☌ ♅ ☾, ♅ 6° 3′ S.			413○2
Sun.	2	6h 11m·4 New Moon; 11h ♃ Stationary; 22h 4m ☌ ☿ [☾, ☿ 6° 37′ S.	20	40	43○12
Mon.	3	13h 28m ☌ ♂ ☾, ♂ 5° 51′ S.			3421○
Tues	4	3h 46m ☌ ♀ ☾, ♀ 5° 43′ S.			234○1
Wed.	5		17	30	1○423
Thur.	6				○2134
Fri.	7				2○34●
☽ Sat.	8	22h 14m·1 Moon's First Quarter.	14	20	13○24
Sun.	9				3○124
Mon.	10	6h ☿ in ♌; 6h 46m ☌ ♃ ☾, ♃ 2° 35′ N.			321○4
Tues.	11	14h ☌ ☿ ♂, ☿ 0° 59′ N.	11	10	23○14
Wed.	12	17h 5m ☌ ♆ ☾, ♆ 4° 27′ N.			1○432
Thur.	13				4○213
Fri.	14	0h 54m ☌ ♄ ☾, ♄ 6° 47′ N.; 20h ☿ in Perihelion.	8	0	42○3●
Sat.	15				♃41○●
☉ Sun.	16	10h 41m·1 Full Moon.			43○12
Mon.	17		4	50	4312○
Tues	18				432○1
Wed.	19				41○32
Thur.	20		1	40	4○123
Fri.	21	9h ☿ Greatest elong. E. 18° 35′; 11h 19m ♈ enters [Aries, Spring commences.			21○3●
Sat.	22		22	30	♃○34●
Sun.	23				3○124
☾ Mon.	24	15h 33m·9 Moon's Last Quarter.			312○4
Tues.	25	3h ☿ Greatest Hel. Lat N.	19	20	32○14
Wed.	26	10h ♀ in ♌.			1○24●
Thur.	27				○1234
Fri.	28	9h □ ♃ ♈.	16	10	21○43
Sat.	29	0h ☿ Stationary; 2h 13m ☌ ♅ ☾, ♅ 6° 11′ S.			2○143
Sun.	30				34○2●
Mon.	31	16h 4m·9 New Moon.	12	50	3412○

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ♈ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR APRIL

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	0h 45m	3h 41m	1h 53m	6h 38m	9h 37m	22h 12m	8h 36m
Decl.	5° 28′ N.	20° 40′ N.	11° 18′ N.	23° 23′ N.	15° 46′ N.	11° 56′ S.	18° 34′ N.
Transit	11·13	14·11	12·22	17·06	20·04	8·41	19·03

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During the month the sun moves in R.A. from 0h 39m to 2h 27m and in Decl. from 4° 14′ to 14° 32′ N. Due to it moving northward so rapidly, the days increase in length very fast. The equation of time is given on page 4.

The Moon.—Its phases and conjunctions with the planets are given on the next page.

On April 5 at 2.29 p.m. the moon occults ζ Tauri (see p. 3).

Mercury is in exceedingly close conjunction with the moon on the 1st, when it is only 3′ south of the center of the moon's disc as viewed from the center of the earth. Location of the observer geographically will alter this. However, both are so low in the evening sky that an extra good horizon will be necessary to observe it. On the 8th it is again in conjunction with the sun, but it will not be nearest the earth till the 11th, when it is 54 million miles distant.

Venus is a brilliant evening star all month. Careful observation should demonstrate that it is moon shaped, about 4/5 full. Stellar magnitude —3.4.

Mars is 226 million miles from us on the 15th and is too close to the sun for observation this month. Its motion in the sky is very slow with reference to the sun, because it and the earth are on opposite sides of the sun, and the earth is not moving so very much faster than Mars.

Jupiter is still just entering the constellation of Gemini and is visible the first half of the night. Its stellar magnitude is —1.7. The configurations of its satellites are given on the next page, and their eclipses, etc., on page 30.

Saturn on the 15th sets about 2½ hours before sunrise. It is retrograding till the 24th and is in Leo, near the boundary of Gemini. Its stellar magnitude is +0.5.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the next page.

APRIL

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's satellites at 21h 45m.
			h	m	
Tues.	1	10h 3m ☌ ☋ ☾, ♂ 4 17′ S.; 10h 24m ☌ ☿ ☾, ☿ 0° [13′ S.; 15h ☌ ☿ ♂, ☿ 4° 2′ N.			432○1
Wed.	2	21h 3m ☌ ♀ ☾, ♀ 1° 36′ S.			41○32
Thur.	3		9	40	4○123
Fri.	4				421○3
Sat.	5				42○13
Sun.	6	16h 5m ☌ ♃ ☾, ♃ 3° 0′ N.	6	30	431○2
☽Mon.	7	7h 38m·8 Moon's First Quarter.			31○24
Tues.	8	2h ☌ ☿ ☉ Inferior; 22h 2m ☌ ♆ ☾, ♆ 4° 39′ N.			32○14
Wed.	9		3	20	13○24
Thur.	10	4h 11m ☌ ♄ ☾, ♄ 6° 54′ N.			○1234
Fri.	11				21○34
Sat.	12		0	10	2○134
Sun.	13				31○24
Mon.	14		20	50	♃3○24
☺Tues	15	3h 25m·1 Full Moon.			32○4●
Wed.	16				413○●
Thur.	17	14h ☿ in ♉; 18h ♆ Stationary.	17	50	4○132
Fri.	18				412○3
Sat.	19				42○13
Sun.	20	12h ☿ Stationary.	14	40	413○2
Mon.	21				43○12
Tues.	22				432○●
☾Wed.	23	6h 21m·1 Moon's Last Quarter; 22h ♄ Stationary.	11	20	431○●
Thur.	24				○4132
Fri.	25	13h 57m ☌ ☊ ☾, ☊ 6° 23′ S.			12○43
Sat.	26		8	10	2○134
Sun.	27	16h □ ♆ ☉; 20h ☿ in Aphelion.			♃1○24
Mon.	28	11h 0m ☌ ☿ ☾, ☿ 6° 47′ S.; 21h ♀ in Perihelion.			3○124
Tues.	29		5	0	321○4
☉Wed.	30	0h 30m·4 New Moon; 5h 25m ☌ ♂ ☾, ♂ 2° 12′ S.			♃32○4

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth's ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellite; the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR MAY

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	1h 53m	6h 14m	3h 19m	6h 58m	9h 38m	22h 15m	8h 36m
Decl.	8° 23′ N.	25° 36′ N.	18° 22′ N.	23° 2′ N.	15° 37′ N.	11° 38′ S.	18° 32′ N.
Transit	10·24	14·46	11·50	15·28	18·08	6·46	17·06

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During the month its R.A. increases from 2h 31m to 4h 29m and its Decl. northward from 14° 50′ to 21° 48′. The equation of time changes only slightly during the month, reaching a small maximum of 3m 49s on the 15th (see page 4). On the 28th there is a total eclipse of the sun visible in South America, the southern Atlantic Ocean, and South Africa, but invisible in Canada (see page 32).

The Moon.— For its phases and conjunctions with the planets, see opposite page.

Mercury on the 6th is at greatest elongation W., 26° 36′. This is a large elongation, but as the planet is 5° 33′ south of the ecliptic it is only 10° high at sunrise. With the aid of field glasses it may be located over a good horizon, about 25° south of the point where the sun will appear.

Venus is an evening star of stellar magnitude —3.6, and is increasing in apparent diameter as it approaches us. It now appears in a telescope like our moon nearly ¾ full.

Mars is in conjunction with the sun on the 9th and too close for observation during the month. It is 231 million miles from the earth on the 15th, not quite as far as next month.

Jupiter has not moved far among the stars as yet and is visible for the first 3½ hours of the night. It is a conspicuous evening star of stellar magnitude —1.5. The configurations of its satellites are given on the next page and their eclipses, etc., on page 30.

Saturn is moving forward again, but very slowly as yet. It is about ¾ hour past the meridian at sunset on the 15th, and is visible till an hour past midnight, apparent time. Its stellar magnitude is +0.7.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the opposite page.

MAY

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's Satellites at 21h 15m
			h	m	
Thur.	1				○1324
Fri.	2	15h 16m ☌ ☿ ☾, ☿ 3° 5′ N.	1	50	♃1○43
Sat.	3				24○13
Sun.	4	6h 42m ☌ ♃ ☾, ♃ 3° 29′ N.	22	40	41○32
Mon.	5				43○12
☽Tues.	6	2h ☿ Greatest elong. W. 26° 36′; 4h 44m ☌ ♆ ☾, [♆ 4° 49′ N.; 18h 33m·9 Moon's First Quarter.			4321○
Wed.	7	10h 16m ☌ ♄ ☾, ♄ 7° 0′ N.	19	30	432○1
Thur.	8				4○2●●
Fri.	9	14h ☌ ♂ ☍.			41○23
Sat.	10		16	20	24○13
Sun.	11	3h ♂ in ☊.			1○43●
Mon.	12				3○124
Tues.	13	8h □ ♄ ☍.	13	10	321○4
♋Wed.	14	20h 1m·3 Full Moon.			32○14
Thur.	15				○24●●
Fri.	16		10	0	1○234
Sat.	17				2○134
Sun.	18	5h ☿ Greatest Hel. Lat. S.			1○34●
Mon.	19		6	40	34○12
Tues.	20	22h ♀ Greatest Hel. Lat. N.			3412○
Wed.	21				432○1
☾Thur.	22	17h 3m·9 Moon's Last Quarter; 22h 45m ☌ ♅ ☾,	3	30	431○2
Fri.	23	15h □ ♅ ☍. [♅ 6° 28′ S.			♃4○23
Sat.	24				42○13
Sun.	25	18h ☌ ♀ ♃, ♀ 2° 7′ N.	0	20	412○3
Mon.	26				43○12
Tues.	27		21	10	3142○
Wed.	28	6h 36m ☌ ☿ ☾, ☿ 2° 50′ S.			32○14
☍Thur.	29	0h 3m ☌ ☌ ☾, ☌ 0° 1′ N.; 8h 11m·9 New Moon; [☍ Total eclipse invisible in Canada, (see p. 32.)			31○24
Fri.	30		18	0	○1234
Sat.	31				2○34●

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☍ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR JUNE

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	5h 52m	8h 42m	4h 51m	7h 24m	9h 46m	22h 16m	8h 39m
Decl.	24° 50′ N.	20° 27′ N.	22° 52′ N.	22° 19′ N	14° 57′ N.	11° 36′ S	18° 22′ N.
Transit	12·22	15·12	11·20	13·53	16·14	4 45	15·07

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During the month the sun's R.A. changes from 4h 33m to 6h 33m and its Decl. rises slowly from 21° 57′ N. to a maximum of 23° 27′ on the 22nd, the summer solstice when our days are longest, then falls to 23° 14′. The equation of time reaches zero on the 15th and rises to 3m 15s by the 30th (see page 4). The increase in the equation of time, taken with the decreasing length of the day, causes the time of sunset, stated in mean time, to appear constant for several days at the end of June and the beginning of July.

The Moon.—For its phases and conjunctions with the planets, see opposite page.

Mercury is in conjunction with the sun on the 11th and too close for convenient observation during the month.

Venus is nearing its best position for observation as an evening star. Its stellar magnitude is —3.8 and still increasing. By the end of the month it appears in a telescope like our moon's first quarter.

Mars has become a morning star, but is too close to the sun as yet for convenient observation. It is 233 million miles from the earth on the 15th, or at its greatest distance at this conjunction, which takes place this month in place of last because of the relative positions of the elliptical orbits of Mars and the earth.

Jupiter is still in the constellation Gemini and is visible less than two hours in the evening. Its stellar magnitude is —1.4. By the 27th the sun is too close and the configurations of its satellites, and their eclipses are not given from this date on.

Saturn is visible for nearly 3½ hours after sunset. It is approaching Regulus, but the sun will be quite near them by the time they are together. Its stellar magnitude is +0.8.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the next page.

JUNE

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's satellites at 20h 45m.
			h	m	
Sun.	1	1h 16m ☌ ♃ ☾, ♃ 3° 55′ N.; 12h 38m ☌ ☿ ☾, ☿			21○34
Mon.	2	14h 0m ☌ ♆ ☾, ♆ 4° 52′ N. [6° 32′ N.	14	50	♃1○24
Tues.	3	20h 17m ☌ ♄ ☾, ♄ 7° 2′ N.			♃31○4
Wed.	4				32○14
☽ Thur.	5	7h 21m·9 Moon's First Quarter; 20h ☌ ☿ ♂, ☿ 0°21′ S.	11	40	314○2
Fri.	6	5h ☿ in ☊; 23h ♅ Stationary.			4○132
Sat.	7				421○3
Sun.	8		8	30	♃42○3
Mon.	9				4○312
Tues.	10	20h ☿ in Perihelion.			431○2
Wed.	11	9h ☌ ☿ ☉ Superior.	5	20	4320○1
Thur.	12				431○●
○ Fri.	13	11h 28m·2 Full Moon.			4○312
Sat.	14	13h ☌ ♀ ♆, ♀ 2° 19′ N.	2	10	21○43
Sun.	15				♃2○34
Mon.	16		22	50	○1324
Tues.	17				31○24
Wed.	18				32○14
Thur.	19	4h 39m ☌ ♅ ☾, ♅ 6° 26′ S.	19	40	31○4●
Fri.	20	[Lat. N.			○124●
☾ Sat.	21	0h 32m·9 Moon's Last Quarter; 2h ☿ Greatest Hel.			1204○3
Sun.	22	6h 54m ☉ enters Cancer, Summer commences.	16	30	24○13
Mon.	23				4○23●
Tues.	24				431○2
Wed.	25		13	20	4320○1
Thur.	26	18h 14m ☌ ♂ ☾, ♂ 2° 7′ N.			4312○
● Fri.	27	2h ☌ ☿ ♃, ☿ 1° 38′ N.; 15h 52m·6 New Moon.			Invisible
Sat.	28	21h 44m ☌ ♃ ☾, ♃ 4° 20′ N.	10	10	
Sun.	29	3h 32m ☌ ☿ ☾, ☿ 6° 6′ N.			
Mon.	30	1h 3m ☌ ♆ ☾, ♆ 4° 51′ N.			

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR JULY

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	9h 23m	10h 35m	6h 20m	7h 52m	9h 57m	22h 14m	8h 43m
Decl.	15° 10′ N.	9° 1′ N.	24° 1′ N.	21° 16′ N.	13° 57′ N.	11° 48′ S.	18° 7′ N.
Transit	13 54	15·06	10·51	12·23	14·27	2·45	13·07

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During the month the sun moves in R.A. from 6h 37m to 8h 38m and in Decl. from 23° 10′ to 18° 28′ N. The earth is 94,450,000 miles, or at its greatest distance from the sun, on July 3rd. The equation of time is given on page 4.

The Moon.—For its phases and conjunctions with the planets see opposite page.

On July 24 at 4 29 a.m. the moon occults ζ Tauri (see p. 3).

Mercury has a maximum elongation on the 18th of 26° 47′ E. It is then an evening star about 11° high and about 22° S. of the sunset point. Field glasses should be used to locate it, but it may be easily seen for some days before and after this date if the horizon is clear. Its stellar magnitude is +0.7. This is not as good a time of the year to observe an eastern elongation as in February, Mar., or Apr.

Venus on the 5th is at greatest elongation E. 45° 28′, but is not quite so high in the sky at sunset this month, due to the inclination of the ecliptic at this point. It is 65 million miles from the earth on that day. It is moving towards us very rapidly and is only 57 million miles distant by the 15th. Its stellar magnitude is —4.0 and increasing.

Mars is scarcely yet high enough at sunrise for convenient observation. On the 15th it is 232 million miles from the earth.

Jupiter is in conjunction with the sun on the 20th and is invisible during the month.

Saturn is visible 1½ hours after sunset on the 15th. It is less than a degree north of Regulus on the 31st, but the sun has also nearly caught up. Its stellar magnitude is +0.9 and it is not at all conspicuous.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the next page.

JULY

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's satellites
			h	m	
Tues.	1	7h 25m ☌ ♀ ☾, ♀ 6° 53′ N.; 9h 35m ☌ ♄ ☾, ♄ 6° 58′ N.	7	0	
Wed.	2	16h ☌ ♀ ♄, ♀ 0° 10′ S.			
Thur.	3	5h ⊕ in Aphelion.			
☽ Fri.	4	22h 17m·2 Moon's First Quarter.	3	50	
Sat.	5	2h ♀ Greatest elong. E. 45° 28′.			
Sun.	6	22h ☌ ☿ ♆, ☿ 1° 16′ N.			
Mon.	7		0	40	
Tues.	8				
Wed.	9		21	30	
Thur.	10				
Fri.	11				
Sat.	12		18	20	
☉ Sun.	13	1h 2m·2 Full Moon.			
Mon.	14	13h ☿ in ♉.			
Tues.	15	23h ♀ in ♉.	15	0	
Wed.	16	9h 7m ☌ ♅ ☾, ♅ 6° 18′ S.			
Thur.	17				
Fri.	18	12h ☿ Greatest elong. E. 26° 47′.	11	50	
Sat.	19				
☾ Sun.	20	6h 3m·0 Moon's Last Quarter; 21h ☌ ♃ ☍.			
Mon.	21		8	40	
Tues.	22				
Wed.	23				
Thur.	24	19h ☿ in Aphelion.	5	30	
Fri.	25	12h 2m ☌ ♐ ☾, ♂ 4° 0′ N.			
Sat.	26	18h 13m ☌ ♃ ☾, ♃ 4° 43′ N.			
☽ Sun.	27	0h 21m·4 New Moon; 12h 24m ☌ ♆ ☾, ♆ 4° 49′ N.	2	20	
Mon.	28	22h 8m ☌ ☿ ☾, ☿ 2° 14′ N.			
Tues.	29	0h 36m ☌ ♄ ☾, ♄ 6° 53′ N.	23	10	
Wed.	30	12h 0m ☌ ♀ ☾, ♀ 3° 7′ N.			
Thur.	31	14h ☿ Stationary.			

Invisible on account of proximity to sun.

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☍ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR AUGUST

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	9h 30m	11h 39m	7h 48m	8h 21m	10h 12m	22h 10m	8h 48m
Decl.	9° 54′ N.	2° 50′ S.	22° 3′ N.	19° 53′ N.	12° 39′ N.	12° 12′ S.	17° 49′ N.
Transit	11·57	14·06	10·17	10·49	12·40	0·39	11·15

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During the month the sun's R.A. increases from 8h 42m to 10h 35m, and its Decl. changes from 18° 14′ to 8° 56′ N. The equation of time falls from 6m 13s to 0m 32s (see page 4).

The Moon.—For its phases and conjunctions with the planets, see opposite page.

Mercury on the 15th is in inferior conjunction with the sun and is too close for convenient observation till the last week of the month, when it is becoming nearly its best as a morning star. It then rises about 7° south of the sunrise point and is fairly high before the sun "extinguishes" it.

Venus is at greatestb rilliancy on the 7th, its stellar magnitude being —4.2. This is the time to pick it up during the daytime. It is better to try locating it earlier and earlier each evening till some day it can be picked up in broad sunlight, especially with the aid of field glasses at first. It appears in a small telescope like our new moon, whose crescent is rapidly narrowing, at the same time that its apparent diameter is increasing. On the 7th it is 41 million miles from the earth, on the 15th 36 million, and on the 31st, when it is nearest, only 28,600,000 miles distant. On the 20th it starts to retrograde.

Mars on the 15th is 226 million miles from the earth, and is about 20° above the horizon at sunrise. It is almost on a line with Castor and Pollux, southward, but moving rapidly eastward from Gemini.

Jupiter is now in Cancer and rises less than 2 hours before the sun. The configurations of its satellites are given on the next page, their eclipses, etc., on page 30.

Saturn is in conjunction with the sun on the 25th and invisible all month.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the next page.

AUGUST

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's satellites at 4h 30m.
			h	m	
Fri.	1		20	0	Invisible on account of proximity to sun.
Sat.	2	5h ☌ ♆ (Sun).			
☽ Sun.	3	15h 11m·5 Moon's First Quarter.			
Mon.	4		16	50	
Tues.	5				
Wed.	6				
Thur.	7	20h ♀ Greatest Brilliancy.	13	40	
Fri.	8				
Sat.	9				
Sun.	10		10	20	
♋ Mon.	11	12h 39m·5 Full Moon.			
Tues.	12	14h 8m ☌ ♁ ☾, ♁ 6° 12′ S.			
Wed.	13		7	10	
Thur.	14	4h ☿ Greatest Hel. Lat. S.			432○●
Fri.	15	8h ☌ ☿ (Sun) Inferior.			4321○
Sat.	16		4	0	43○12
Sun.	17				41○2●
☾ Mon.	18	10h 56m·1 Moon's Last Quarter.			42○13
Tues.	19	7h ♀ in Aphelion.	0	50	412○3
Wed.	20	10h ♀ Stationary.			4○132
Thur.	21		21	40	2431○4
Fri.	22				2432○4
Sat.	23	5h 15m ☌ ♂ ☾, ♂ 5° 32′ N.; 13h 17m ☌ ♃ ☾, ♃ 5° [8′ N.; 17h ☍ ♁ (Sun); 22h 33m ☌ ♆ ☾, ♆ 4° 53′ N.			3○124
Sun.	24	9h 28m ☌ ☿ ☾, ☿ 2° 29′ N.; 12h ☿ Stationary.	18	30	13○24
(Sun) Mon	25	10h 37m·1 New Moon; 15h 38m ☌ ♄ ☾, ♄ 6° 51′ N.; [19h ☌ ♄ (Sun).			2○134
Tues.	26				12○34
Wed.	27	7h 34m ☌ ♀ ☾, ♀ 2° 47′ S.	15	20	○1234
Thur.	28				13○24
Fri.	29				324○1
Sat.	30		12	10	34○2●
Sun.	31				431○2

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; (Sun) Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♁ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR SEPTEMBER

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	10h 54m	11h 2m	9h 10m	8h 47m	10h 27m	22h 5m	8h 52m
Decl.	9° 1′ N.	3° 9′ S.	17° 32′ N.	18° 22′ N	11° 17′ N.	12° 37′ S.	17° 33′ N.
Transit	11 20	11·28	9·37	9·14	10·53	22·29	9·18

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—The sun's R.A. increases during the month from 10h 39m to 12h 23m, and moves southward in Decl. from 8° 35′ N. to 2° 30′ S., crossing the equator on the 24th, the autumn equinox. The equation of time is given on page 5.

The Moon.—Its phases and conjunctions with the planets are given on the opposite page.

On September 20 at 6.14 a.m. the moon occults α Cancri (see p. 3).

Mercury is at greatest elongation, 18° 8′ W., on the 1st, and although this is not a large elongation it is worth most, so to speak, in apparent altitude at this time of the year in the morning, since it is 16° high and only 7° south of the sunrise point. There should be little difficulty in locating it if the horizon is clear at this point. Its stellar magnitude is 0.0. It has a very close conjunction with Saturn on the 11th, being only 7′ north. On the 27th it is again in conjunction with the sun.

Venus is in inferior conjunction with the sun on the 12th, this being the exact date on which it changes from an evening to a morning star, although being too near the sun for a couple of weeks before and after this date for convenient observation. However, its stellar magnitude is —3.3, which is a great aid in locating it even in the dawn or the twilight.

Mars on the 15th is 215 million miles from the earth. It is approaching Regulus in the sky and rises about 3½ hours before sunrise. On the 2nd it is in close conjunction with Jupiter, being only 41′ N.

Jupiter is now a prominent morning star, being visible for nearly 4 hours before sunrise. Its stellar magnitude is —1.4. The configurations of satellites are given on the next page, their eclipses, etc., on page 30.

Saturn by the 30th is up above the horizon nearly 30° when the sun rises. It is very nearly vertically above the rising sun.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the next page.

SEPTEMBER

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's Satellites at 4h 0m
			h	m	
Mon.	1	15h ☿ Greatest elong. W. 18° 8′.			42○13
☽ Tues.	2	4h ☿ in ♌; 4h ☌ ♂, ♃, ☌ 0° 41′ N.; 9h 21m·9	9	0	421○3
Wed.	3	[Moon's First Quarter.			4○123
Thur.	4				41○32
Fri.	5		5	40	432○1
Sat.	6	19h ☿ in Perihelion.			314○●
Sun.	7	19h ☌ ♂, ♆, ☌ 1° 12′ N.			2●3○42
Mon.	8	20h 57m ☌ ♅ ☾, ♅ 6° 12′ S.	2	30	2○134
♍ Tues.	9	22h 54m·3 Full Moon.			21○34
Wed.	10	20h ♀ Greatest Hel. Lat. S.	23	20	○1234
Thur.	11	3h ☌ ☿, ♄, ☿ 0° 7′ N.			1○324
Fri.	12	22h ☌ ♀ ♍ Inferior.			32○14
Sat.	13		20	10	312○4
Sun.	14				3○142
Mon.	15				42○13
☾ Tues.	16	4h ☌ ☿ ♀, ☿ 11° 17′ N.; 16h 31m·7 Moon's Last	17	0	421○3
Wed.	17	2h ☿ Greatest Hel. Lat .N. [Quarter.			4○213
Thur.	18				41○32
Fri.	19		13	50	423○1
Sat.	20	5h 58m ☌ ♃ ☾, ♃ 5° 33′ N.; 6h 45m ☌ ♆ ☾, ♆ 5° 13′ N.; 21h 33m ☌ ♂ ☾, ♂ 6° 35′ N.			4312○
Sun.	21				43○12
Mon.	22	5h 23m ☌ ♄ ☾, ♄ 6° 55′ N.; 14h 29m ☌ ♀ ☾, ♀ 3° 18′ S.; 23h ☌ ♃ ♆, ♃ 0° 32′ N.	10	40	2●4 ○●●
● Tues.	23	21h 36m ♍ enters Libra, Autumn commences; 23h 20m ☌ ☿ ☾, ☿ 6° 21′ N.; 23h 33m·9 New Moon.			21○3●
Wed.	24				○2143
Thur.	25		7	30	1○324
Fri.	26				23○14
Sat.	27	3h ☌ ☿ ♎ Superior.			321○4
Sun.	28		4	20	3○124
Mon.	29				1○24●
Tues.	30				2●2○34

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ● 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.

THE SKY FOR OCTOBER

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	14h 4m	10h 53m	10h 23m	9h 8m	10h 40m	22h 2m	8h 55m
Decl.	13° 11′ S.	3° 18′ N.	11° 37′ N.	17° 3′ N	10° 4′ N.	12° 54′ S.	17° 21′ N.
Transit	12·32	9·22	8·51	7·36	9·08	20·29	19·23

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—The sun's R.A. increases during October from 12h 27m to 14h 19m, and its Decl. changes from 2° 53′ to 13° 52′ S. The equation of time rises from 10m 1s to 16m 15s, to be subtracted from apparent time. For fuller details see page 5.

The Moon.—For the phases of the moon and its conjunctions with the planets, see opposite page.

On October 1 at 2 18 p.m. the moon occults μ Sagittarii (see p. 3).

Mercury during the month is not well placed for observation. It is very low in the evening sky, and although it improves slightly towards the end of the month it will be very difficult to locate during this elongation. On the morning of the 25th it is in conjunction with the moon, being 1° 3′ to the south and very low in the sky. If any aid would locate it, that fact would on the evening of the 24th.

Venus ceases to retrograde on the 2nd. It improves in position for observation and becomes a very prominent morning star, reaching its greatest brilliancy on the 20th, when its stellar magnitude is —4.3, or slightly greater than that in August, being only 40 million miles distant. At this time it is interesting to watch it more or less continuously at intervals after daybreak to see how late in the day it can still be picked up. The crescent is like our moon a few days before new, and is widening.

Mars on the 15th is 199 million miles from the earth and rises about 4 hours before the sun. It is slightly less than 1° north of Regulus on the 7th, and has a very close conjunction with Saturn on the 24th, when it is only 5′ to the south. Its stellar magnitude is +1.8 and increasing slowly.

Jupiter rises ½ hour after midnight (apparent time) and shines brightly the rest of the night. Its stellar magnitude is —1.6. The configurations of its satellites are given on the next page and their eclipses, etc., on page 31.

Saturn by the 15th is about 45° high in the sky when the sun rises, very suitably situated for observation for nearly 4 hours before sunrise.

The positions of *Uranus* and *Neptune* are given in the above table.

The minima of Algol are given on the next page.

OCTOBER

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's satellites at 3h 45m.
			h	m	
Wed.	1		1	10	○2143
☽ Thur.	2	3h 37m·3 Moon's First Quarter; 5h ☿ Stationary.			41○23
Fri.	3		21	50	423○1
Sat.	4				4321○
Sun.	5				43○12
Mon.	6	5h 27m ☌ ♅ ☾, ♅ 6° 19′ S.	18	40	431○2
Tues	7				42○13
Wed.	8				4○3●●
☽ Thur.	9	8h 38m·6 Full Moon.	15	30	41○23
Fri.	10	13h ☿ in ♍			♃2○41
Sat.	11				321○4
Sun.	12		12	20	3○124
Mon.	13				31○24
Tues.	14				2○134
Wed.	15		9	10	2○34●
☾ Thur.	16	0h 4m·7 Moon's Last Quarter.			1○234
Fri.	17	13h 24m ☌ ♆ ☾, ♆ 5° 15′ N.; 19h 54m ☌ ♃ ☾, ♃			2○314
Sat.	18	[5° 56′ N.	6	0	321○4
Sun.	19	12h 38m ☌ ♂ ☾, ♂ 7° 0′ N.; 17h 14m ☌ ♄ ☾, ♄ 7° 3′ N			34○21
Mon.	20	1h ☿ Greatest Brilliancy; 4h 4m ☌ ☿ ☾, ☿ 2° 27′ N.; 19h ☿ in Aphelion.			431○2
Tues	21		2	50	42○31
Wed.	22				421○3
● Thur.	23	15h 39m·5 New Moon.	23	40	♃4○23
Fri.	24	7h ☌ ☍ ♄, ♂ 0° 5′ S.			♃4○13
Sat.	25	5h 11m ☌ ☿ ☾, ☿ 1° 3′ S.			423○
Sun.	26		20	30	34○21
Mon.	27				31○42
Tues.	28				2○14●
Wed.	29		17	10	21○34
Thur.	30				○1234
☽ Fri.	31	20h 43m·2 Moon's First Quarter.			○234●

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR NOVEMBER

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	16h 51m	12h 22m	11h 31m	9h 21m	10h 50m	22h 1m	8h 56m
Decl.	25° 9′ S.	1° 18′ S.	4° 50′ N.	16° 11′ N	9° 10′ N.	12° 57′ S.	17° 17′ N.
Transit	13 17	8·48	7·57	5·46	7·16	18·25	17·18

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—The sun's R.A. during the month increases from 14h 23m to 16h 22m, and its Decl. changes from 14° 11′ to 21° 32′ S. The equation of time rises to a maximum, 16m 21s on the 4th, the true sun crossing the meridian this much earlier than the mean sun (see page 5). On the 22nd there is an annular eclipse of the sun, visible in southern central United States, Cuba, middle Atlantic, and western north Africa, and as a partial eclipse in all except the western part of Canada. See page 32.

The Moon.—For its phases and conjunctions with the planets see opposite page. On the 7th there is a partial eclipse of the moon partly visible in Canada except in the extreme west. See page 32.

On November 27 at 7.41 p.m. the moon occults β Capricorni (see p. 3).

On November 28 at 7 00 p.m. the moon occults ν Aquarii (see p. 3).

Mercury is at greatest elongation E. 22° 48′ on the 12th, but is quite unsuitably placed for observation, being 20° S. of the setting sun and only 8° high. However, if field glasses are used over a clear horizon it should be possible to locate it. Toward the end of the month it again approaches the sun.

Venus is in conjunction with the moon on the 18th, but is 5° 26′ N. On the 23rd it is at greatest elongation W., being 63 million miles from us, and appears through a small telescope like our moon about at last quarter. Its stellar magnitude is —4.1, a very prominent morning star.

Mars on the 15th is 177 million miles from us and is about an hour east of the meridian at sunrise. Its stellar magnitude is +1.7.

Jupiter on the 15th rises an hour before midnight and is very bright the rest of the night. It is entering the constellation Leo, heading towards Regulus. Its stellar magnitude is —1.8. The configurations of its satellites are given on the next page, their eclipses, etc., on page 31.

Saturn has nearly reached the meridian when the sun rises on the 15th. It is in the constellation Leo yet, but approaching Virgo. Its stellar magnitude is +1.1.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the opposite page.

NOVEMBER

ASTRONOMICAL PHENOMENA

(75th Meridian Time, Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's satellites at 3h 15m.
			h	m	
Sat.	1		14	0	2 3 1 ○ 4
Sun.	2	14h 21m ☌ ♅ ☾, ♅ 6° 25′ S.			3 ○ 1 4 ●
Mon.	3				3 1 ○ 2 4
Tues.	4	19h □ ♆ ☉.	10	50	♃ 2 3 ○ 1
Wed.	5				4 2 1 ○ 3
Thur.	6	3h ☿ in ☊.			4 ○ 1 2 3
♋Fri.	7	18h 35m·2 Full Moon; ☾ Partial eclipse visible in	7	40	4 ○ 2 3 ●
Sat.	8	2h ♅ Stationary. [Canada, (see p. 32).			♃ 4 2 3 ○
Sun.	9				4 3 ○ 1 ●
Mon.	10	3h ♀ Greatest Hel. Lat. S.; 10h □ ♃ ☉.	4	30	4 3 1 ○ 2
Tues.	11				4 2 ○ 1 ●
Wed.	12	7h ♂ Greatest Hel. Lat. N.; 16h ☿ Greatest elong. E.			2 1 ○ 3 ●
Thur.	13	20h 1m ☌ ♆ ☾, ♆ 5° 22′ N. [22° 48′.	1	20	○ 1 2 4 3
☾Fri.	14	7h 17m ☌ ♃ ☾, ♃ 6° 11′ N.; 10h 40m·5 Moon's			1 ○ 2 3 4
		[Last Quarter; 19h ♆ Stationary.			
Sat.	15		22	10	2 3 ○ 1 4
Sun.	16	3h 17m ☌ ♄ ☾, ♄ 7° 11′ N.			3 2 ○ 1 4
Mon.	17	2h 19m ☌ ♂ ☾, ♂ 6° 45′ N.			3 1 ○ 2 4
Tues.	18	8h 28m ☌ ♀ ☾, ♀ 5° 26′ N.	19	0	♃ 3 ○ 1 4
Wed.	19				2 1 ○ 3 4
Thur.	20				○ 2 1 4 3
Fri.	21	0h □ ♅ ☉.	15	50	1 4 ○ 2 3
♌Sat.	22	10h 19m·7 New Moon; ☉ Annular eclipse visible as			♃ 4 2 ○ 1
		[partial in Canada (see p. 32).			
Sun.	23	17h ♀ Greatest elong. W. 46° 44′; 19h ☿ Stationary;			4 3 2 ○ ●
Mon	24	[23h 34m ☌ ☿ ☾, ☿ 3° 33′ S.	12	30	4 3 1 ○ 2
Tues.	25				♃ 4 3 ○ 1
Wed.	26				4 2 1 ○ ;
Thur.	27		9	20	4 ○ 2 1 3
Fri.	28				4 1 ○ 2 3
Sat.	29	3h ☿ in ☊; 22h 26m ☌ ♅ ☾, ♅ 6° 25′ S.			2 4 ○ 3 1
☽Sun.	30	11h 46m·9 Moon's First Quarter.	6	10	3 2 ○ 4 ●

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

THE SKY FOR DECEMBER

POSITION OF PLANETS ON THE 15TH.

	☿ Mercury	♀ Venus	♂ Mars	♃ Jupiter	♄ Saturn	♅ Uranus	♆ Neptune
R. A.	16h 4m	14h 22m	12h 33m	9h 23m	10h 55m	22h 3m	8h 55m
Decl.	17° 58′ S.	11° 26′ S.	1° 32′ S.	16° 9′ N.	8° 48′ N.	12° 44′ S.	17° 22′ N.
Transit	10 31	8·50	7·00	3·51	5·23	16·30	15·23

The position is given for Greenwich Mean Noon. The time of transit is in Local Mean Time, hours numbering from midnight.

The Sun.—During December the sun's R.A. increases from 16h 26m to 18h 38m. Its southward Decl. changes slowly from 21° 41′ till it reaches a maximum of 23° 27′ on the 22nd, the winter solstice. By the 31st the sun has climbed back to 23° 9′ S. The equation of time is given on page 5.

The Moon.—Its phases and conjunctions with the planets are given on the opposite page.

Mercury becomes a morning star after the 2nd, when it is in conjunction with the sun. Its greatest elongation is on the 21st, when it is 21° 47′ W., and is rather well placed for observation. It is about 15° high and about 15° S. of where the sun rises. Its conjunction with the moon on the 20th, when it is about twice the moon's diameter to the north, should make locating it exceedingly easy on that morning. Its stellar magnitude is 0.0.

Venus is getting rather far south, although still quite a fine morning star. It is in conjunction with the moon on the 18th. Stellar magnitude —3.8, about 2/3 of the disc as we see it is illuminated.

Mars crosses the meridian about 20m before sunrise on the 15th and is well situated for observation the latter half of the night. Its stellar magnitude is +1.4 and it is 152 million miles from us on the 15th.

Jupiter rises about 4 hours after sunset and is visible the remainder of the night. It started to retrograde on the 5th and will not approach nearer to Regulus for the present. Its stellar magnitude is —2.0 and increasing. The configurations of its satellites are given on the next page, their eclipses, etc., on page 31.

Saturn is visible from about 10.30, apparent time, on for the rest of the night. Its stellar magnitude is +1.0, or about 3 times as bright as Deneb, which is 12° to the northeast of it.

The positions of *Uranus* and *Neptune* are given in the above table. See note for January.

The minima of Algol are given on the next page.

DECEMBER

ASTRONOMICAL PHENOMENA

(75th Meridian Time. Hours Numbering from Midnight)

			Minima of Algol		Configuration of Jupiter's Satellites at 2h 30m
			h	m	
Mon.	1				2 4 3 ○ 2 4
Tues.	2	18h ☌ ☿ ☉ Inferior.			3 ○ 1 2 4
Wed.	3	18h ☿ in Perihelion.	3	0	2 1 ○ 3 4
Thur.	4	8h □ ♄ ☉.			○ 1 3 4 ●
Fri.	5	14h ♃ Stationary.	23	50	1 ○ 2 3 4
Sat.	6				2 ○ 3 1 4
☉ Sun.	7	5h 3m·5 Full Moon.			3 2 1 ○ 4
Mon.	8		20	40	3 4 ○ 1 2
Tues.	9	19h ♀ in Perihelion.			4 3 ○ 2 ●
Wed.	10				4 2 1 ○ ●
Thur.	11	4h 5m ☌ ♆ ☾, ♆ 5° 19′ N.; 16h 29m ☌ ♃ ☾, ♃ 6° 16′ N.	17	30	4 ○ 1 3 ●
Fri.	12	11h ☿ Stationary.			4 1 ○ 2 3
Sat.	13	12h 15m ☌ ♄ ☾, ♄ 7° 13′ N.			4 2 ○ 1 3
☾ Sun.	14	1h 2m·4 Moon's Last Quarter; 1h ☿ Greatest Hel. Lat. N.	14	20	4 2 3 1 ○
Mon.	15	14h 26m ☌ ♂ ☾, ♂ 5° 58′ N.			3 4 ○ 1 2
Tues.	16				3 ○ 4 2 ●
Wed.	17		11	10	2 1 ○ 4 ●
Thur.	18	1h ♂ in Aphelion; 4h 27m ☌ ♀ ☾, ♀ 4° 0′ N.			2 ○ 1 3 4
Fri.	19				1 ○ 2 3 4
Sat.	20	6h 29m ☌ ☿ ☾, ☿ 1° 16′ N.	8	0	2 ○ 1 3 4
Sun.	21	10h ☿ Greatest elong. W. 21° 47′.			2 1 3 ○ 4
☉ Mon.	22	5h 55m·2 New Moon; 16h 27m ☉ enters Capricornus, [Winter commences.			3 ○ 1 2 4
Tues.	23		4	40	3 1 ○ 2 4
Wed.	24	2h ♄ Stationary.			2 4 2 3 ○ 4
Thur.	25				4 2 ○ 1 3
Fri.	26		1	30	4 1 ○ 2 3
Sat.	27	5h 45m ☌ ♅ ☾, ♅ 6° 15′ S.			2 4 ○ 1 3
Sun.	28		22	20	4 2 1 3 ○
Mon.	29				4 3 ○ 2 1
☽ Tues.	30	0h 25m·0 Moon's First Quarter.			4 3 1 ○ 2
Wed.	31	15h ☿ Greatest Hel. Lat. N.	19	10	4 2 3 ○ 1

Key to Symbols.—☌ Conjunction; ☍ Opposition; □ Quadrature; ☊ Ascending Node; ☋ Descending Node; ☉ Sun; ☿ Mercury; ♀ Venus; ⊕ Earth; ♂ Mars; ♃ Jupiter; ♄ Saturn; ♅ Uranus; ♆ Neptune. For Jupiter's satellites the circle ○ represents the disc of the planet; ♃ 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.

PHENOMENA OF JUPITER'S SATELLITES

E = eclipse, O = occultation, T = transit, S = shadow, D = disappearance, R = re-appearance, I = ingress, e = egress. The numbers in the fifth column denote the satellites. Eastern Standard Time, Hours numbering from Midnight.

JANUARY

d	h	m			d	h	m		
2	1	5	II	TI	17	17	49	III	SI
	1	5	II	SI		19	23	III	Te
	3	47	II	Te		21	1	III	Se
	3	48	II	Se	18	0	26	II	OD
	6	37	I	TI		3	55.3	II	ER
	6	38	I	SI		4	31	I	TI
3	3	45	I	OD		4	55	I	SI
	6	2.9	I	ER	19	1	39	I	OD
	19	59	II	OD		4	21.5	I	ER
	22	45.7	II	ER		18	43	II	TI
4	1	3	I	TI		19	38	II	SI
	1	6	I	SI		21	26	II	Te
	3	18	I	Te		22	21	II	Se
	3	21	I	Se		22	57	I	TI
	22	11	I	OD		23	24	I	SI
5	0	31.6	I	ER	20	1	11	I	Te
	19	29	I	TI		1	38	I	Se
	19	35	I	SI		20	6	I	OD
	21	44	I	Te		22	50.3	I	ER
	21	50	I	Se	21	5	39	III	OD
6	0	37	IV	TI		17	52	I	SI
	1	34	IV	SI		19	38	I	Te
	2	49	IV	Te		20	7	I	Se
	3	49	IV	Se	22	19	32	IV	SI
	19	0.3	I	ER		22	1	IV	Se
	23	6	III	OD	24	19	33	III	TI
7	2	48.6	III	ER		21	48	III	TI
9	3	20	II	TI		22	42	III	Te
	3	42	II	SI	25	1	2	III	Se
	6	2	II	Te		2	41	II	OD
	6	25	II	Se	26	3	25	I	OD
10	5	29	I	OD		21	1	II	TI
	22	12	II	OD		22	15	II	SI
11	1	20.5	II	ER		23	43	II	Te
	2	47	I	TI	27	0	42	I	TI
	3	1	I	SI		0	58	II	SE
	5	1	I	Te		1	18	I	SI
	5	16	I	Se		2	56	I	Te
	23	55	I	OD		3	33	I	Se
12	2	26.5	I	ER		21	51	I	OD
	19	9	II	Te	28	0	45.5	I	ER
	19	43	II	Se		19	8	I	TI
	21	13	I	TI		19	47	I	SI
	21	29	I	SI		19	47.7	II	ER
	23	27	I	Te		21	23	I	Te
	23	44	I	Se		22	1	I	Se
13	18	21	I	OD	29	19	14.2	I	ER
	20	55.2	I	ER	30	21	37	IV	OD
14	2	21	III	OD		23	50	IV	OR
	17	53	I	Te	31	4	9.3	IV	ED
	18	13	I	Se		22	55	III	TI
16	5	35	II	TI					

FEBRUARY

d	h	m			d	h	m		
1	1	48	III	SI	4	2	40.8	I	ER
	2	5	III	Te		18	7	II	OD
2	23	20	II	TI		18	50.9	III	ER
3	0	53	II	SI		20	54	I	TI
	2	2	II	Te		21	41	I	SI
	2	28	I	TI		22	22.7	II	ER
	3	13	I	SI		23	9	I	Te
	3	36	II	Se		23	56	I	Se
	4	42	I	TE	5	18	4	I	OD
	23	37	I	OD		21	9.6	I	ER

FEBRUARY—(*Continued*)

d	h	m			d	h	m		
6	18	25	I	Se	19	2	53.7	III	ER
8	2	22	III	TI		3	32.9	II	ER
10	1	42	II	TI		21	41	I	OD
	3	30	II	SI	20	1	0.5	I	ER
11	1	25	I	OD		18	57	I	TI
	19	5	III	OR		19	28	II	SI
	19	35.6	III	ED		19	59	I	SI
	20	27	II	OD		20	1	II	Te
	22	42	I	TI		21	11	I	Te
	22	52.6	III	ER		22	12	II	Se
	23	36	I	SI		22	14	I	Se
12	0	56	I	Te	21	19	29.5	I	ER
	0	57.8	II	ER	24	21	22	IV	TI
	1	51	I	Se		23	44	IV	Te
	19	52	I	OD	25	23	5	III	OD
	23	5.0	I	ER	26	1	13	II	OD
13	19	23	I	Te		2	16	III	OR
	19	34	II	Se		2	19	I	TI
	20	19	I	Se		23	31	I	OD
16	22	11.0	IV	ED	27	2	56.1	I	ER
17	0	57.8	IV	ER		19	47	II	TI
18	3	13	I	OD		20	47	I	TI
	19	27	III	OD		21	54	I	SI
	22	38	III	OR		22	6	II	SI
	22	48	II	OD		22	29	II	Te
	23	35.8	III	ED		23	1	I	Te
19	0	30	I	TI	28	0	9	I	Se
	1	31	I	SI		0	50	II	Se
	2	44	I	Te		21	25.1	I	ER

MARCH

1	18	37	I	Se	16	0	36.3	II	ER
	19	25.7	II	ER		1	46	III	SI
	21	3	III	Se		19	45.2	I	ER
5	19	12.3	IV	ER	17	19	25	II	SE
6	1	22	I	OD	19	18	57.1	III	ER
	22	17	II	TI	21	22	9	IV	OD
	22	38	I	TI		23	37	I	OD
	23	49	I	SI	22	0	42	IV	OR
7	0	44	II	SI		20	52	I	TI
	0	52	I	TE		21	56	II	OD
	0	59	II	Te		22	8	I	SI
	2	3	I	Se		23	6	I	Te
	19	50	I	OD	23	0	22	I	Se
	23	20.7	I	ER		0	37	III	TI
8	19	20	I	Te		21	40.9	I	ER
	20	3	III	Te	24	19	19	II	SI
	20	32	I	Se		19	24	II	Te
	21	46	III	SI		22	3	II	Se
	22	1.0	II	ER	26	19	36.4	III	ED
9	1	4	III	Se		22	58.3	III	ER
14	0	30	I	TI	29	22	47	I	TI
	0	49	II	TI	30	0	3	I	SI
	1	32	IV	SI		0	30	II	OD
	1	44	I	SI		1	0	I	Te
	21	43	I	OD		19	33	IV	SI
15	1	16.3	I	ER		20	1	I	OD
	18	59	I	TI		22	44	IV	Se
	19	23	II	OD		23	36.5	I	ER
	20	13	I	SI	31	19	20	II	TI
	20	43	III	TI		19	29	I	Te
	21	12	I	Te		20	46	I	Se
	22	27	I	Se		21	57	II	SI
	23	53	III	Te		22	2	II	Te

APRIL

d	h	m			d	h	m		
1	0	41	II	Se	15	21	56.7	I	ER
2	19	5.0	II	ER	18	19	17	II	Se
	21	40	III	OR	20	20	7	III	Te
	23	37.4	III	ED		21	45	III	SI
6	21	57	I	OD	21	23	5	I	TI
7	19	11	I	TI	22	20	22	I	OD
	20	26	I	SI	23	19	49	I	Te
	21	25	I	Te		21	0	I	Se
	21	59	II	TI		21	45	II	OD
	22	41	I	Se	24	22	23.5	IV	ED
8	20	1.1	I	ER	25	19	30	II	Te
9	21	40.6	II	ER		21	55	II	Se
	22	30	III	OD	27	21	5	III	TI
13	21	6	III	Se	29	22	21	I	OD
	23	55	I	OD	30	19	33	I	TI
14	21	8	I	TI		20	40	I	SI
	22	21	I	SI		21	47	I	Te
	23	22	I	TE		22	55	I	Se

MAY

1	20	16.4	I	ER	11	21	21.7	II	ER
2	19	31	II	TI	15	20	50	I	OD
	21	18	IV	TI	16	20	16	I	Te
	21	47	II	SI		21	14	I	Se
	22	15	II	Te	19	20	9	IV	Te
7	21	32	I	TI	23	20	1	I	TI
	22	35	I	SI		20	53	I	SI
8	19	37.1	III	ED	24	20	30.9	I	ER
	22	11.7	I	ER	26	21	10	III	Se
9	22	17	II	TI	27	20	0	II	Te
11	20	3.0	IV	ER		21	43	II	Se

JUNE

3	20	4	II	TI	15	20	33	I	TI
8	20	48	I	Te	16	20	44.3	I	ER

AUGUST

20	4	38.8	IV	ED	28	4	34	II	SI
21	4	47	II	Se					

SEPTEMBER

4	4	25	III	TI	22	2	53.8	III	ER
	5	5	III	Se		3	9	III	OD
6	4	19.0	I	ED		3	23	II	TI
7	3	49	I	Se		4	19	II	Se
	4	34	I	Te	23	3	3	I	Te
13	4	9.4	II	ED	29	3	15.4	III	ED
14	3	25	I	SI		4	5	II	SI
	4	16	I	TI		4	27.2	I	ED
15	3	28	II	Te	30	2	44	I	TI
	3	50	I	OR		3	59	I	Se
21	5	19	I	SI		5	1	I	Te
22	2	34.0	I	ED					

OCTOBER

1	2	15	I	OR	23	1	52	I	SI
	3	42	II	OR		3	5	I	TI
7	3	36	I	SI		4	9	I	Se
	4	42	I	TI		5	22	I	Te
8	4	13	I	OR	24	1	1	II	SI
10	1	59	III	TI		2	34	I	OR
	2	11	IV	OR		3	25	II	TI
	5	36	III	Te		3	49	II	Se
14	5	30	I	SI		5	21	III	SI
15	2	41.7	I	ED	26	1	12	II	OR
	3	52.2	II	ED		4	38.1	IV	ED
16	2	15	I	Se	28	3	50	III	OR
	3	26	I	Te	30	3	46	I	SI
17	1	16	II	Se		5	0	I	TI
	1	23	III	SI	31	0	56.1	I	ED
	3	36	II	Te		3	34	II	SI
	4	58	III	Se		4	29	I	OR
22	4	34.8	I	ED		6	1	II	TI

NOVEMBER

d	h	m			d	h	m		
1	0	31	I	Se	18	0	46	II	Se
	1	46	I	Te		3	15	II	Te
2	3	51	II	OR	20	23	33	IV	Te
4	1	4	IV	TI	22	0	50	III	Se
	2	43.4	III	ER		2	14	III	TI
	4	13	III	OD		3	55	I	SI
	5	45	IV	Te		5	9	I	TI
6	5	39	I	SI		5	50	III	Te
7	2	49.1	I	ED		6	12	I	Se
	6	8	II	SI	23	1	3.5	I	ED
8	0	8	I	SI		4	35	I	OR
	1	23	I	TI		6	10.1	II	ED
	2	25	I	Se		23	36	I	TI
	3	40	I	Te	24	0	40	I	Se
9	0	51	I	OR		1	53	I	Te
	0	58.7	II	ED		23	3	I	OR
11	0	43	II	Te	25	0	31	II	SI
	3	2.9	III	ED		2	54	II	TI
12	3	15.3	IV	ER		3	19	II	Se
14	4	42.1	I	ED		5	45	II	Te
15	1	58	III	Te	27	0	49	II	OR
	2	1	I	SI	29	1	12	III	SI
	3	16	I	TI		4	4	IV	OD
	4	18	I	Se		4	48	III	Se
	5	33	I	Te		5	48	I	SI
16	2	43	I	OR		6	1	III	TI
	3	34.4	II	ED	30	2	56.6	I	ED
17	0	2	I	Te		6	26	I	OR
18	0	25	II	TI					

DECEMBER

1	0	17	I	SI	17	2	32.3	III	ER
	1	27	I	TI		2	59	III	OD
	2	34	I	Se		6	38	III	OR
	3	44	I	Te		22	57	I	OR
2	0	53	I	OR	18	3	14.0	II	ED
	3	4	II	SI	19	21	28	II	SI
	5	22	II	TI		23	22	II	TI
	5	53	II	Se	20	0	18	II	Se
	23	21	III	OR		2	14	II	Te
4	3	18	II	OR	21	21	19	II	OR
6	5	10	III	SI	22	5	57	I	SI
7	1	16	IV	SI		6	53	I	TI
	4	49.7	I	ED	23	3	4.6	I	ED
	5	51	IV	Se		6	17	I	OR
8	2	10	I	SI		23	50	IV	Se
	3	17	I	TI	24	0	26	I	SI
	4	27	I	Se		1	19	I	TI
	5	34	I	Te		2	43	I	Se
	23	18.0	I	ED		2	50.9	III	ED
9	2	42	I	OR		3	33	IV	TI
	5	37	II	SI		3	37	I	Te
	22	34.2	III	ER		6	30.1	III	ER
	22	56	I	Se		6	30	III	OD
	23	23	III	OD		21	32.9	I	ED
10	0	1	I	Te	25	0	44	I	OR
	3	2	III	OR		5	49.4	II	ED
11	0	38.6	II	ED		21	11	I	Se
	5	44	II	OR		22	3	I	Te
12	21	44	II	Se	27	0	2	II	SI
	23	51	II	Te		1	43	II	TI
14	6	42.9	I	ED		2	52	II	Se
15	4	4	I	SI		4	34	II	Te
	5	5	I	TI		20	41	III	Se
	6	21	I	Se	28	0	4	III	Te
16	1	11.2	I	ED		23	40	II	OR
	1	16	IV	OR	30	4	58.0	I	ED
	4	30	I	OR	31	2	19	I	SI
	22	32	I	SI		3	6	I	TI
	22	53.1	III	ED		4	37	I	Se
	23	32	I	TI		5	23	I	Te
17	0	49	I	Se		6	48.6	III	ED
	1	50	I	Te		23	26.4	I	ED

ECLIPSES IN 1919

PREPARED BY R. M. MOTHERWELL

There will be three eclipses, two of the sun and one of the moon.

1. A Total Eclipse of the Sun on May 29, 1919, invisible in North America. The path of totality begins just west of Chili, crosses Brazil and the Atlantic Ocean, enters Africa at the equator, and ends near Madagascar.

2. A Partial Eclipse of the Moon, Nov. 7, 1919, visible in a portion of Canada; the beginning visible generally in Asia except the eastern portion, Europe, Africa, the eastern part of North America, and South America, except the extreme western part; the ending visible generally in western Asia, Europe, Africa, South America, and North America except the extreme western part.

Circumstances of the Eclipse:—

Moon enter penumbra	Nov. 7th 16h 33.6m (E.S.T., hours from midnight)
Moon enters umbra	" 7th 17h 58.3m
Middle of the eclipse	" 7th 18h 44.1m
Moon leaves umbra	" 7th 19h 29.9m
Moon leaves penumbra	" 7th 20h 55.0m

Magnitude of the eclipse 0.184 (Moon's diameter 1.0).

3. An Annular Eclipse of the Sun, Nov. 22, 1919, visible in a portion of Canada as a partial eclipse. The central path of eclipse begins in Texas, passes over Cuba, skirts the shores of Guiana, crosses the Atlantic Ocean, enters Africa in Senegal, and ends near Timbuktu. Havana, Cuba, is near the centre of the line.

APRIL

d	h	m			d	h	m		
1	0	41	II	Se	15	21	56.7	I	ER
2	19	5.0	II	ER	18	19	17	II	Se
	21	40	III	OR	20	20	7	III	Te
	23	37.4	III	ED		21	45	III	SI
6	21	57	I	OD	21	23	5	I	TI
7	19	11	I	TI	22	20	22	I	OD
	20	26	I	SI	23	19	49	I	Te
	21	25	I	Te		21	0	I	Se
	21	59	II	TI		21	45	II	OD
	22	41	I	Se	24	22	23.5	IV	ED
8	20	1.1	I	ER	25	19	30	II	Te
9	21	40.6	II	ER		21	55	II	Se
	22	30	III	OD	27	21	5	III	TI
13	21	6	III	Se	29	22	21	I	OD
	23	55	I	OD	30	19	33	I	TI
14	21	8	I	TI		20	40	I	SI
	22	21	I	SI		21	47	I	Te
	23	22	I	TE		22	55	I	Se

MAY

	1	20	16.4	I	ER	11	21	21.7	II	ER
	2	19	31	II	TI	15	20	50	I	OD
		21	18	IV	TI	16	20	16	I	Te
		21	47	II	SI		21	14	I	Se
		22	15	II	Te	19	20	9	IV	Te
	7	21	32	I	TI	23	20	1	I	TI
		22	35	I	SI		20	53	I	SI
	8	19	37.1	III	ED	24	20	30.9	I	ER
		22	11.7	I	ER	26	21	10	III	Se
	9	22	17	II	TI	27	20	0	II	Te
	11	20	3.0	IV	ER		21	43	II	Se

JUNE

3	20	4	II	TI	15	20	33	I	TI
8	20	48	I	Te	16	20	44.3	I	ER

AUGUST

20	4	38.8	IV	ED	28	4	34	II	SI
21	4	47	II	Se					

SEPTEMBER

4	4	25	III	TI	22	2	53.8	III	ER
	5	5	III	Se		3	9	III	OD
6	4	19.0	I	ED		3	23	II	TI
7	3	49	I	Se		4	19	II	Se
	4	34	I	Te	23	3	3	I	Te
13	4	9.4	II	ED	29	3	15.4	III	ED
14	3	25	I	SI		4	5	II	SI
	4	16	I	TI		4	27.2	I	ED
15	3	28	II	Te	30	2	44	I	TI
	3	50	I	OR		3	59	I	Se
21	5	19	I	SI		5	1	I	Te
22	2	34.0	I	ED					

OCTOBER

1	2	15	I	OR	23	1	52	I	SI
	3	42	II	OR		3	5	I	TI
7	3	36	I	SI		4	9	I	Se
	4	42	I	TI		5	22	I	Te
8	4	13	I	OR	24	1	1	II	SI
10	1	59	III	TI		2	34	I	OR
	2	11	IV	OR		3	25	II	TI
	5	36	III	Te		3	49	II	Se
14	5	30	I	SI		5	21	III	SI
15	2	41.7	I	ED	26	1	12	II	OR
	3	52.2	II	ED		4	38.1	IV	ED
16	2	15	I	Se	28	3	50	III	OR
	3	26	I	Te	30	3	46	I	SI
17	1	16	II	Se		5	0	I	TI
	1	23	III	SI	31	0	56.1	I	ED
	3	36	II	Te		3	34	II	SI
	4	58	III	Se		4	29	I	OR
22	4	34.8	I	ED		6	1	II	TI

NOVEMBER

d	h	m			d	h	m		
1	0	31	I	Se	18	0	46	II	Se
	1	46	I	Te		3	15	II	Te
2	3	51	II	OR	20	23	33	IV	Te
4	1	4	IV	TI	22	0	50	III	Se
	2	43.4	III	ER		2	14	III	TI
	4	13	III	OD		3	55	I	SI
	5	45	IV	Te		5	9	I	TI
6	5	39	I	SI		5	50	III	Te
7	2	49.1	I	ED		6	12	I	Se
	6	8	II	SI	23	1	3.5	I	ED
8	0	8	I	SI		4	35	I	OR
	1	23	I	TI		6	10.1	II	ED
	2	25	I	Se		23	36	I	TI
	3	40	I	Te	24	0	40	I	Se
9	0	51	I	OR		1	53	I	Te
	0	58.7	II	ED		23	3	I	OR
11	0	43	II	Te	25	0	31	II	SI
	3	2.9	III	ED		2	54	II	TI
12	3	15.3	IV	ER		3	19	II	Se
14	4	42.1	I	ED		5	45	II	Te
15	1	58	III	Te	27	0	49	II	OR
	2	1	I	SI	29	1	12	III	SI
	3	16	I	TI		4	4	IV	OD
	4	18	I	Se		4	48	III	Se
	5	33	I	Te		5	48	I	SI
16	2	43	I	OR		6	1	III	TI
	3	34.4	II	ED	30	2	56.6	I	ED
17	0	2	I	Te		6	26	I	OR
18	0	25	II	TI					

DECEMBER

1	0	17	I	SI	17	2	32.3	III	ER
	1	27	I	TI		2	59	III	OD
	2	34	I	Se		6	38	III	OR
	3	44	I	Te		22	57	I	OR
2	0	53	I	OR	18	3	14.0	II	ED
	3	4	II	SI	19	21	28	II	SI
	5	22	II	TI		23	22	II	TI
	5	53	II	Se	20	0	18	II	Se
	23	21	III	OR		2	14	II	Te
4	3	18	II	OR	21	21	19	II	OR
6	5	10	III	SI	22	5	57	I	SI
7	1	16	IV	SI		6	53	I	TI
	4	49.7	I	ED	23	3	4.6	I	ED
	5	51	IV	Se		6	17	I	OR
8	2	10	I	SI		23	50	IV	Se
	3	17	I	TI	24	0	26	I	SI
	4	27	I	Se		1	19	I	TI
	5	34	I	Te		2	43	I	Se
	23	18.0	I	ED		2	50.9	III	ED
9	2	42	I	OR		3	33	IV	TI
	5	37	II	SI		3	37	I	Te
	22	34.2	III	ER		6	30.1	III	ER
	22	56	I	Se		6	30	III	OD
	23	23	III	OD		21	32.9	I	ED
10	0	1	I	Te	25	0	44	I	OR
	3	2	III	OR		5	49.4	II	ED
11	0	38.6	II	ED		21	11	I	Se
	5	44	II	OR		22	3	I	Te
12	21	44	II	Se	27	0	2	II	SI
	23	51	II	Te		1	43	II	TI
14	6	42.9	I	ED		2	52	II	Se
15	4	4	I	SI		4	34	II	Te
	5	5	I	TI		20	41	III	Se
	6	21	I	Se	28	0	4	III	Te
16	1	11.2	I	ED		23	40	II	OR
	1	16	IV	OR	30	4	58.0	I	ED
	4	30	I	OR	31	2	19	I	SI
	22	32	I	SI		3	6	I	TI
	22	53.1	III	ED		4	37	I	Se
	23	32	I	TI		5	23	I	Te
17	0	49	I	Se		6	48.6	III	ED
	1	50	I	Te		23	26.4	I	ED

ECLIPSES IN 1919

PREPARED BY R. M. MOTHERWELL

There will be three eclipses, two of the sun and one of the moon.

1. A Total Eclipse of the Sun on May 29, 1919, invisible in North America. The path of totality begins just west of Chili, crosses Brazil and the Atlantic Ocean, enters Africa at the equator, and ends near Madagascar.

2. A Partial Eclipse of the Moon, Nov. 7, 1919, visible in a portion of Canada; the beginning visible generally in Asia except the eastern portion, Europe, Africa, the eastern part of North America, and South America, except the extreme western part; the ending visible generally in western Asia, Europe, Africa, South America, and North America except the extreme western part.

Circumstances of the Eclipse:—

Moon enter penumbra	Nov. 7th 16h 33.6m (E.S.T., hours from midnight)
Moon enters umbra	" 7th 17h 58.3m
Middle of the eclipse	" 7th 18h 44.1m
Moon leaves umbra	" 7th 19h 29.9m
Moon leaves penumbra	" 7th 20h 55.0m

Magnitude of the eclipse 0.184 (Moon's diameter 1.0).

3. An Annular Eclipse of the Sun, Nov. 22, 1919, visible in a portion of Canada as a partial eclipse. The central path of eclipse begins in Texas, passes over Cuba, skirts the shores of Guiana, crosses the Atlantic Ocean, enters Africa in Senegal, and ends near Timbuktu. Havana, Cuba, is near the centre of the line.

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For further information, address W. E. W. Jackson, Secretary, at the same address.