THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

2019

OBSERVER'S CALENDAR

JANUARY

HUNDREDS of celestial gems sparkle in the sky over the distant mountains. Silent and still under the glories of a cold, frosty winter night sky, this sentinel of the stars waits in the snow for an astronomer to arrive. If ever an observatory begged to be opened up to observe the stars, this one is it! | IMAGE BY PETER AND DEBRA CERAVOLO

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

THE PLANETS THIS MONTH

Mercury	not observable this month
Venus	low in SE in morning twilight
Mars	high in SSW at dusk, sets in W near 11 pm
Jupiter	very low in SE in morning twilight this month
Saturn	not observable this month

1 — *40°N 50°N*; Rise 3:02 3:21; Set 13:53 13:32

NEW YEAR'S DAY

2 — *40°N 50°N*; Rise 4:04 4:30; Set 14:28 14:01

Saturn in conjunction

3 — *40°N 50°N*; Rise 5:05 5:35; Set 15:08 14:36

Earth at perihelion (147,097,233 km) 00:20 ET

Quadrantid meteors (ZHR=120) 9 pm

Moon 3° left of Jupiter this morning

4 — *40°N 50°N*; Rise 6:02 6:37; Set 15:51 15:16

5 — *40°N 50°N*; Rise 6:56 7:32; Set 16:39 16:03; Sunrise 7:22 7:58; Sunset 16:49 16:13

New Moon 20:28

Partial solar eclipse visible from E Asia and W Pacific

6 — *40°N 50°N*; Rise 7:44 8:20; Set 17:32 16:57

Young crescent Moon, 20 hours after new in E, 24 hours after new in W, soon after sunset

Venus at greatest elongation (47° W) this evening

Follow Arcturus unaided into daylight this week

7 — *40°N 50°N*; Rise 8:27 9:00; Set 18:26 17:55

Uranus stationary

8 — *40°N 50°N*; Rise 9:06 9:34; Set 19:23 18:56

Moon at apogee

9 — *40°N 50°N*; Rise 9:39 10:02; Set 20:20 19:59

10 — *40°N 50°N*; Rise 10:10 10:27; Set 21:17 21:03

International Year of Astronomy was launched, 10 years ago.

11 — *40°N 50°N*; Rise 10:38 10:49; Set 22:15 22:07

12 — *40°N 50°N*; Rise 11:05 11:09; Set 23:13 23:12; Sunrise 7:21 7:55; Sunset 16:56 16:22

13 — *40°N 50°N*; Rise —— ——; Set 11:32 11:30

14 — *40°N 50°N*; Set 0:12 0:18; Rise 12:00 11:51

First Quarter 1:46

Lunar Straight Wall this evening

15 — *40°N 50°N*; Set 1:14 1:27; Rise 12:31 12:15

16 — *40°N 50°N*; Set 2:18 2:38; Rise 13:06 12:43

17 — *40°N 50°N*; Set 3:24 3:51; Rise 13:46 13:18

18 — *40°N 50°N*; Set 4:32 5:05; Rise 14:35 14:01

19 — *40°N 50°N*; Set 5:39 6:15; Rise 15:33 14:57; Sunrise 7:18 7:50; Sunset 17:03 16:32

20 — *40°N 50°N*; Set 6:42 7:18; Rise 16:39 16:04

21 — *40°N 50°N*; Set 7:39 8:10; Rise 17:51 17:21

Full Moon 0:16

MARTIN LUTHER KING JR. DAY (USA)

Total lunar eclipse, all of N. America, S. America, and northwestern Europe

Moon at perigee, large tides

Today's full Moon is the Tom Cod Moon

22 — *40°N 50°N*; Set 8:27 8:53; Rise 19:06 18:43

Venus 2.5° N of Jupiter this morning

23 — *40°N 50°N*; Set 9:09 9:27; Rise 20:21 20:06

24 — *40°N 50°N*; Set 9:46 9:56; Rise 21:33 21:26

25 — *40°N 50°N*; Set 10:20 10:22; Rise 22:43 22:44

26 — *40°N 50°N*; Set 10:51 10:46; Rise 23:50 23:59; Sunrise 7:14 7:42; Sunset 17:12 16:44

27 — *40°N 50°N*; Set 11:23 11:10; Rise —— ——

Last Quarter 16:10

28 — *40°N 50°N*; Rise 0:55 1:11; Set 11:55 11:36

29 — *40°N 50°N*; Rise 1:58 2:21; Set 12:30 12:04

30 — *40°N 50°N*; Rise 2:59 3:28; Set 13:08 12:37

31 — *40°N 50°N*; Rise 3:57 4:31; Set 13:50 13:15

Moon, Venus, and Jupiter within 8° this morning

Moon 1° right of Venus this morning, best from W of N. America

DEC	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					

FEB	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		

Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.

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Detailed instructions on adjusting times for location are given in the back pages.

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FEBRUARY

THE PINWHEEL GALAXY (Messier 101) resembles its namesake in images such as this one. Appearing only slightly smaller than a full Moon it presents a wealth of detail for imagers, from its multiple spiral arms to many HII regions. | IMAGE BY RÉMI LECASSE

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

THE PLANETS THIS MONTH

Mercury	very low in W in evening twilight, after mid-month with difficulty
Venus	low in SE in morning twilight
Mars	high in SW at dusk, sets in W near 11 pm
Jupiter	rises in SE near 4 am, in SSE near dawn
Saturn	rises in SE near 5 am, in SE near dawn

JAN	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		

MAR	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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1 — *40°N 50°N*
Rise 4:52 5:27
Set 14:36 14:00

2 — *40°N 50°N*
Rise 5:41 6:17
Set 15:26 14:51
Sunrise 7:08 7:33
Sunset 17:20 16:56
Moon, Saturn, Venus, and Jupiter form line in E this morning

3 — *40°N 50°N*
Rise 6:26 7:00
Set 16:20 15:47
Edward C. Pickering, pioneer of stellar spectra, died 100 years ago.

4 — *40°N 50°N*
Rise 7:06 7:35
Set 17:16 16:48
New Moon 16:04
Winter Star Party, Florida Keys, www.scas.org/wsp.html (through Feb 10)

5 — *40°N 50°N*
Rise 7:41 8:05
Set 18:13 17:50
CHINESE NEW YEAR (PIG)
532 Herculina at opposition (m=8.9)
Furthest Lunar Apogee of the year ~406555 km
Moon at apogee

6 — *40°N 50°N*
Rise 8:12 8:31
Set 19:10 18:54

7 — *40°N 50°N*
Rise 8:41 8:54
Set 20:08 19:58

8 — *40°N 50°N*
Rise 9:08 9:15
Set 21:06 21:02

9 — *40°N 50°N*
Rise 9:35 9:35
Set 22:04 22:07
Sunrise 7:01 7:22
Sunset 17:29 17:08

10 — *40°N 50°N*
Rise 10:02 9:56
Set 23:04 23:14
Moon 6° S of Mars this evening

11 — *40°N 50°N*
Rise 10:31 10:18
Set — —
Lunar X near crater Werner visible in W of N. America 10 pm

12 — *40°N 50°N*
Set 0:05 0:22
Rise 11:03 10:43
First Quarter 17:26
Lunar Straight Wall this evening

13 — *40°N 50°N*
Set 1:08 1:32
Rise 11:39 11:13

14 — *40°N 50°N*
Set 2:13 2:44
Rise 12:22 11:51
VALENTINE'S DAY

15 — *40°N 50°N*
Set 3:19 3:53
Rise 13:14 12:38

16 — *40°N 50°N*
Set 4:22 4:58
Rise 14:14 13:38
Sunrise 6:52 7:09
Sunset 17:37 17:20

17 — *40°N 50°N*
Set 5:21 5:55
Rise 15:22 14:49

18 — *40°N 50°N*
Set 6:13 6:42
Rise 16:36 16:09
LOUIS RIEL DAY (MB)
FAMILY DAY (AB, NB, ON, SK, BC)
HERITAGE DAY (NS)
ISLANDER DAY (PE)
PRESIDENTS' DAY (USA)
18 Venus 1.5° left of Saturn this morning

19 — *40°N 50°N*
Set 6:58 7:21
Rise 17:52 17:33
Full Moon 10:54
Closest Lunar Perigee of the year ~356761 km
Moon at perigee, large tides
Today's full Moon is the Snow Blinding Moon

20 — *40°N 50°N*
Set 7:39 7:53
Rise 19:08 18:57
Zodiacal Light readily visible from a dark site in W after evening twilight for the next 2 weeks.

21 — *40°N 50°N*
Set 8:14 8:21
Rise 20:21 20:19

22 — *40°N 50°N*
Set 8:48 8:46
Rise 21:32 21:38

23 — *40°N 50°N*
Set 9:21 9:11
Rise 22:41 22:55
Sunrise 6:43 6:56
Sunset 17:45 17:32

24 — *40°N 50°N*
Set 9:54 9:37
Rise 23:47 —

25 — *40°N 50°N*
Rise — 0:08
Set 10:28 10:05

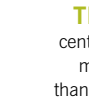
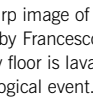
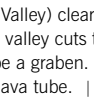
26 — *40°N 50°N*
Rise 0:51 1:18
Set 11:06 10:37
Last Quarter 6:28

27 — *40°N 50°N*
Rise 1:51 2:24
Set 11:47 11:14
Mercury at greatest elongation (18° E) this evening (m=-0.6). Best evening apparition of the year.
Moon 2° N of Jupiter this morning, best in W of N.America

28 — *40°N 50°N*
Rise 2:47 3:23
Set 12:33 11:56
Lunar Curtiss X visible in extreme E of N. America 1 am

MARCH

THIS REMARKABLY sharp image of the lunar Vallis Alpes (Alpine Valley) clearly shows the hard-to-spot central rille. Discovered in 1727 by Francesco Bianchini, the 166 km-long valley cuts through the Montes Alpes mountain range. The flat valley floor is lava-flooded, and considered to be a graben. The rille was formed later than the valley, in a separate geological event. It corresponds to a volcanic lava tube. | IMAGE BY MIKE WIRTHS

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
THE PLANETS THIS MONTH **Mercury** very low in W in evening twilight, early this month with extreme difficulty, lost early this month **Venus** low in ESE in morning twilight **Mars** high in W at dusk, sets in WNW near midnight **Jupiter** rises in SE near 3 am, in S near dawn **Saturn** rises in SE near 4 am, in SE near dawn					 *40°N 50°N* Rise 3:39 4:15 Set 13:22 12:46 **1**	 *40°N 50°N* Rise 4:25 5:00 Set 14:15 13:40 Sunrise 6:32 6:42 Sunset 17:53 17:43 **2**
 40°N 50°N Rise 5:06 5:37 Set 15:10 14:40 **3** Spot Capella unaided before sunset this week	 *40°N 50°N* Rise 5:42 6:09 Set 16:07 15:42 **4** Moon at apogee	 *40°N 50°N* Rise 6:15 6:36 Set 17:04 16:45 **5** *Voyager 1 arrived at Jupiter, discovers rings, 40 years ago.*	 *40°N 50°N* Rise 6:44 6:59 Set 18:02 17:50 **6** New Moon 11:04 **ASH WEDNESDAY (BEGINNING OF LENT)** *Kepler Telescope was launched to look for extrasolar planets, 10 years ago.*	 *40°N 50°N* Rise 7:12 7:20 Set 19:00 18:54 **7** Neptune in conjunction	 *40°N 50°N* Rise 7:39 7:41 Set 19:58 20:00 **8**	 *40°N 50°N* Rise 8:06 8:01 Set 20:58 21:06 Sunrise 6:22 6:27 Sunset 18:00 17:55 **9**
 40°N 50°N Rise 9:34 9:22 Set 22:58 23:14 **10** Daylight Saving Time begins 2 am	 *40°N 50°N* Rise 10:04 9:46 Set — — **11** Jupiter with only one satellite visible in E of N. America 12:28 am	 *40°N 50°N* Set 0:00 0:23 Rise 10:38 10:14 **12**	 *40°N 50°N* Set 1:04 1:32 Rise 11:18 10:47 **13**	 *40°N 50°N* Set 2:07 2:41 Rise 12:04 11:29 **14** First Quarter 6:27 Lunar Straight Wall this evening *Albert Einstein born 140 years ago.*	 *40°N 50°N* Set 3:09 3:46 Rise 12:58 12:22 **15**	 *40°N 50°N* Set 4:08 4:44 Rise 14:01 13:26 Sunrise 7:11 7:12 Sunset 19:08 19:06 **16**
 40°N 50°N Set 5:01 5:33 Rise 15:10 14:40 **17** **ST. PATRICK'S DAY**	 *40°N 50°N* Set 5:48 6:14 Rise 16:24 16:00 **18** Two shadows on Jupiter visible in Atlantic Canada 5:33 am 18 Jupiter with only one satellite visible in E of N. America 5:06 am	 *40°N 50°N* Set 6:30 6:48 Rise 17:39 17:23 **19** Moon at perigee	 *40°N 50°N* Set 7:07 7:18 Rise 18:54 18:47 **20** Full Moon 21:43 Spring equinox 17:58 Today's full Moon is the Maple Sugar Moon	 *40°N 50°N* Set 7:42 7:44 Rise 20:07 20:09 **21** **21 BAHÁ'Í NEW YEAR (BEGINS AT SUNSET THE PREVIOUS EVENING)**	 *40°N 50°N* Set 8:15 8:09 Rise 21:19 21:29 **22** Zodiacal Light readily visible from a dark site in W after evening twilight for the next 2 weeks.	 *40°N 50°N* Set 8:48 8:35 Rise 22:28 22:47 Sunrise 6:59 6:57 Sunset 19:15 19:17 **23**
 *40°N 50°N* Set 9:23 9:02 Rise 23:36 — **24**	 *40°N 50°N* Rise — 0:01 Set 10:01 9:33 **25** Two shadows on Jupiter visible in E of N. America 4:06 am	 *40°N 50°N* Rise 0:40 1:11 Set 10:41 10:09 **26**	 *40°N 50°N* Rise 1:39 2:15 Set 11:26 10:50 **27** Moon 3.5° Left of Jupiter early this morning	 *40°N 50°N* Rise 2:34 3:11 Set 12:15 11:38 **28** Last Quarter 0:10	 *40°N 50°N* Rise 3:23 3:59 Set 13:07 12:32 **29** Moon 2.5° lower left of Saturn this morning	 *40°N 50°N* Rise 4:06 4:39 Set 14:02 13:30 Sunrise 6:48 6:42 Sunset 19:22 19:28 **30** Earth Hour (8:30–9:30 pm local) www.earthhour.org
 *40°N 50°N* Rise 4:43 5:12 Set 14:59 14:32 **31** Spot Sirius unaided before sunset this week Follow Vega unaided into daylight this week Moon at apogee						

FEB	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		

APR	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				

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APRIL

FLYING LOW in the southern sky as seen from Canada, the Seagull Nebula (IC 2177) looks like the familiar bird seen by anyone who has been to a coastal region. Its wings spread wide, this nebula is made up mostly of hydrogen and it lies some 3650 ly away. | IMAGE BY RON BRECHER

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7 *40°N 50°N* Rise 8:06 7:50 Set 21:54 22:15	**8** *40°N 50°N* Rise 8:39 8:16 Set 22:58 23:25	**9** *40°N 50°N* Rise 9:17 8:48 Set — — Moon 6° below Mars this evening	**10** *40°N 50°N* Set 0:02 0:35 Rise 10:00 9:27 Jupiter stationary	**11** *40°N 50°N* Set 1:04 1:40 Rise 10:52 10:15 Mercury at greatest elongation (28° W) this morning (m=0.2)	**12** *40°N 50°N* Set 2:03 2:40 Rise 11:50 11:14 First Quarter 15:06 Lunar X near crater Werner visible in W of N. America 12 am Lunar Straight Wall this evening	**13** *40°N 50°N* Set 2:56 3:31 Rise 12:55 12:22 Sunrise 6:26 6:12 Sunset 19:36 19:50
14 *40°N 50°N* Set 3:44 4:13 Rise 14:05 13:38	**15** *40°N 50°N* Set 4:26 4:48 Rise 15:17 14:58	**16** *40°N 50°N* Set 5:03 5:17 Rise 16:30 16:19 Mars 7° north of Aldebaran this evening Moon at perigee	**17** *40°N 50°N* Set 5:37 5:44 Rise 17:43 17:40	**18** *40°N 50°N* Set 6:10 6:09 Rise 18:54 19:00	**19** *40°N 50°N* Set 6:43 6:33 Rise 20:05 20:20 Full Moon 7:12 **GOOD FRIDAY** Today's full Moon is the Birds Lay Eggs Moon	**20** *40°N 50°N* Set 7:17 6:59 Rise 21:15 21:37 Sunrise 6:15 5:58 Sunset 19:43 20:01 **FIRST DAY OF PASSOVER (BEGINS AT SUNSET THE PREVIOUS EVENING)**
21 *40°N 50°N* Set 7:53 7:28 Rise 22:22 22:51 **EASTER SUNDAY**	**22** *40°N 50°N* Set 8:33 8:02 Rise 23:26 — **ST. GEORGE'S DAY (NL)** Uranus in conjunction Lyrid meteors (ZHR=18) 8 pm, best seen in predawn hours today	**23** *40°N 50°N* Rise — 0:00 Set 9:17 8:41 Moon 1.6° N of Jupiter this morning, best in western N. America	**24** *40°N 50°N* Rise 0:24 1:02 Set 10:05 9:27 44 Nysa at opposition (m=9.9)	**25** *40°N 50°N* Rise 1:17 1:54 Set 10:57 10:20	**26** *40°N 50°N* Rise 2:03 2:38 Set 11:52 11:18 Last Quarter 18:18	**27** *40°N 50°N* Rise 2:43 3:14 Set 12:49 12:19 Sunrise 6:06 5:44 Sunset 19:50 20:12
28 *40°N 50°N* Rise 3:18 3:44 Set 13:46 13:22 Lunar Curtiss X visible in extreme E of N. America 3 am Texas Star Party, Fort Davis, TX, www.texasstarparty.org (through May 5) Moon at apogee	**29** *40°N 50°N* Rise 3:49 4:09 Set 14:44 14:26	**30** *40°N 50°N* Rise 4:18 4:31 Set 15:42 15:31 Saturn stationary				

THE PLANETS THIS MONTH

Mercury	extremely low in E in morning twilight, near mid-month with difficulty
Venus	very low in E in morning twilight with difficulty
Mars	in W at dusk, sets in WNW near midnight
Jupiter	rises in ESE near 1 am, in S near dawn
Saturn	rises in ESE near 2 am, in SSE near dawn

MAR	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						

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	

MESSIER 10 is one of the best globular clusters of the northern sky in the centre of the constellation of Ophiuchus at a distance of 14,300 ly. At 83 ly across, it is estimated to contain 225,000 stars and appears to observers roughly 2/3 the size of the full Moon at magnitude 6.4. | IMAGE BY RON BRECHER

MAY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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THE PLANETS THIS MONTH **Mercury** not observable this month **Venus** very low in E in morning twilight with difficulty, lost after mid-month **Mars** low in WNW at dusk, sets in NW near 11 pm **Jupiter** rises in SE after 10 pm, transits in S near 3 am **Saturn** rises in SE after midnight, transits in S near dawn						
5 *40ºN 50ºN* Rise 6:39 6:18 Set 20:49 21:14 International Astronomy Week begins	**6** *40ºN 50ºN* Rise 7:15 6:48 Set 21:54 22:26 **FIRST DAY OF RAMADAN (BEGINS AT SUNSET THE PREVIOUS EVENING)** 6 Eta Aquariid meteors (ZHR=50) 10 am	**7** *40ºN 50ºN* Rise 7:58 7:25 Set 22:58 23:34	**8** *40ºN 50ºN* Rise 8:47 8:10 Set 23:59 — Moon 4.5º lower left of Mars this evening	**9** *40ºN 50ºN* Set — 0:37 Rise 9:44 9:06	**10** *40ºN 50ºN* Set 0:55 1:31 Rise 10:47 10:12 First Quarter 21:12	**11** *40ºN 50ºN* Set 1:44 2:15 Rise 11:55 11:25 Sunrise 5:49 5:20 Sunset 20:04 20:33 International Astronomy Day (Spring) www.astroleague.org/al/astroday/astrodayform.html
12 *40ºN 50ºN* Set 2:26 2:51 Rise 13:05 12:43 **MOTHER'S DAY** 8 Flora at opposition (m=9.7) Lunar Straight Wall this evening	**13** *40ºN 50ºN* Set 3:04 3:22 Rise 14:16 14:01 Moon at perigee	**14** *40ºN 50ºN* Set 3:38 3:48 Rise 15:27 15:20 11 Parthenope at opposition (m=9.5)	**15** *40ºN 50ºN* Set 4:10 4:12 Rise 16:37 16:39	**16** *40ºN 50ºN* Set 4:41 4:35 Rise 17:46 17:57	**17** *40ºN 50ºN* Set 5:13 5:00 Rise 18:55 19:14 Full Moon 17:11	**18** *40ºN 50ºN* Set 5:48 5:26 Rise 20:04 20:30 Sunrise 5:43 5:11 Sunset 20:11 20:43 Today's full Moon is the Frog Croaking Moon
19 *40ºN 50ºN* Set 6:25 5:57 Rise 21:09 21:42	**20** *40ºN 50ºN* Set 7:07 6:34 Rise 22:11 22:48 **VICTORIA DAY (CANADA)** 20 Massalia at opposition (m=9.7)	**21** *40ºN 50ºN* Set 7:54 7:17 Rise 23:07 23:45	**22** *40ºN 50ºN* Set 8:45 8:07 Rise 23:57 —	**23** *40ºN 50ºN* Rise — 0:34 Set 9:40 9:04	**24** *40ºN 50ºN* Rise 0:40 1:14 Set 10:37 10:04	**25** *40ºN 50ºN* Rise 1:17 1:46 Set 11:34 11:08 Sunrise 5:37 5:02 Sunset 20:17 20:52 Last Quarter 12:34
26 *40ºN 50ºN* Rise 1:50 2:13 Set 12:32 12:12 Moon at apogee	**27** *40ºN 50ºN* Rise 2:20 2:36 Set 13:30 13:16 **MEMORIAL DAY (USA)**	**28** *40ºN 50ºN* Rise 2:47 2:57 Set 14:28 14:21 1 Ceres at opposition (m=6.9)	**29** *40ºN 50ºN* Rise 3:13 3:16 Set 15:27 15:27 *General theory of relativity tested by Eddington at solar eclipse, 100 years ago.*	**30** *40ºN 50ºN* Rise 3:39 3:36 Set 16:27 16:35	**31** *40ºN 50ºN* Rise 4:07 3:57 Set 17:29 17:44	

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JUN	S	M	T	W	T	F	S
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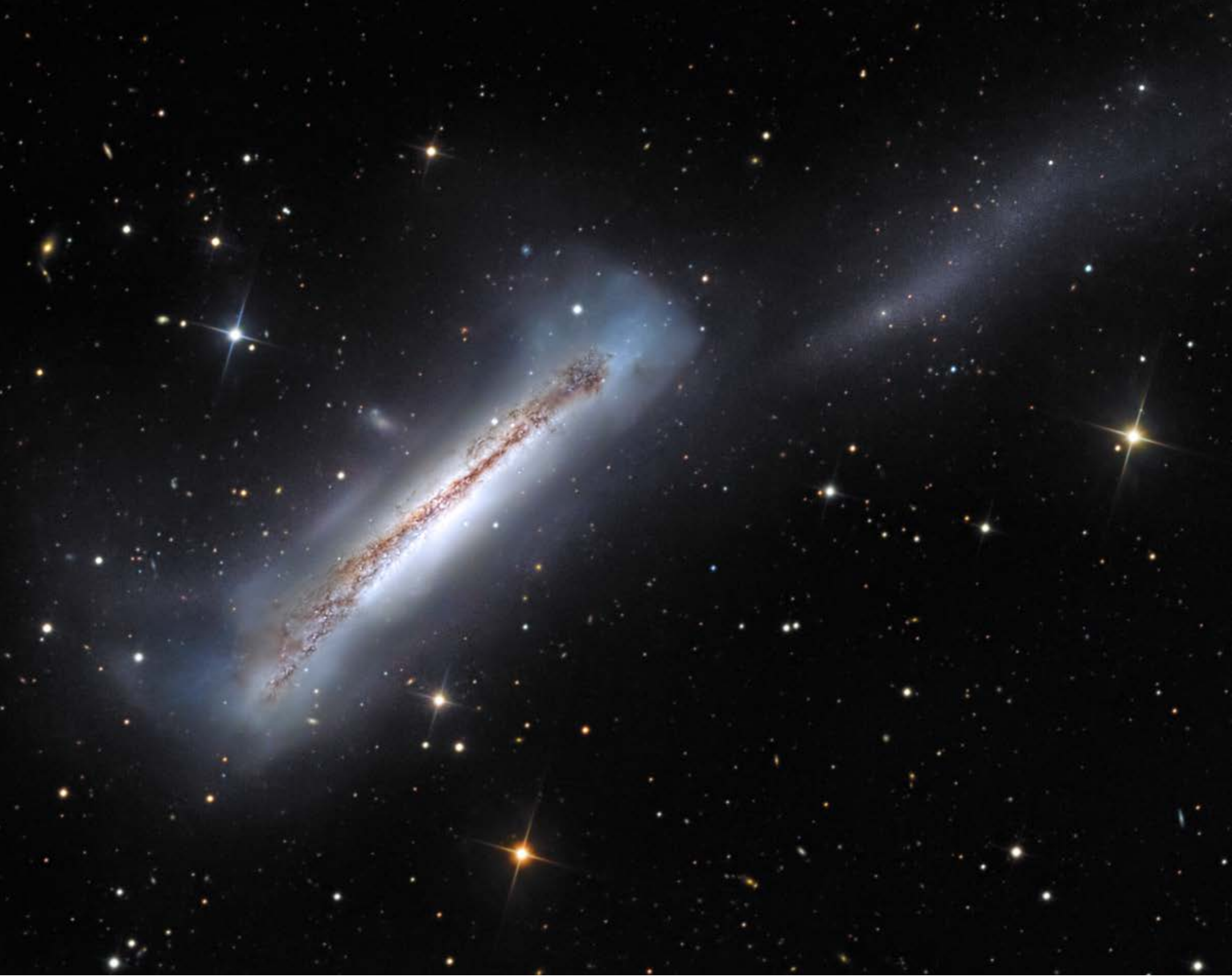

JUNE

HAMBURGER ANYONE? Often overlooked because of nearby Messiers 65 and 66, NGC 3628 (the Hamburger Galaxy) is undergoing tidal interactions, as seen in this image with its tail pointed toward its neighbours. | IMAGE BY PAUL MORTFIELD AND STEFANO CANCELLI

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

THE PLANETS THIS MONTH

Mercury	very low in WNW in evening twilight, near mid-month with difficulty
Venus	not observable this month
Mars	very low in WNW during dusk, lost after mid-month
Jupiter	in SE after dark, transits after 1 am, low in SW near dawn
Saturn	rises in ESE at dusk, transits in S near 3 am

1 — SATURDAY

	40°N	50°N
Rise	4:37	4:20
Set	18:34	18:56
Sunrise	5:34	4:56
Sunset	20:23	21:00

Watch for noctilucent clouds in N sky during twilight this month. Best N of 50° latitude

Moon 6° right of Venus this morning

2 — SUNDAY

	40°N	50°N
Rise	5:12	4:47
Set	19:40	20:09

3 — MONDAY

	40°N	50°N
Rise	5:52	5:21
Set	20:46	21:21

New Moon 6:02

4 — TUESDAY

	40°N	50°N
Rise	6:39	6:04
Set	21:50	22:28

Two shadows on Jupiter visible in extreme E of N. America during twilight 8:29 pm

Moon, Mercury, and Mars form large triangle this evening

5 — WEDNESDAY

	40°N	50°N
Rise	7:35	6:57
Set	22:50	23:27

6 — THURSDAY

	40°N	50°N
Rise	8:38	8:01
Set	23:42	—

7 — FRIDAY

	40°N	50°N
Set	—	0:16
Rise	9:46	9:14

Moon at perigee

8 — SATURDAY

	40°N	50°N
Set	0:28	0:55
Rise	10:56	10:31
Sunrise	5:31	4:52
Sunset	20:27	21:06

9 — SUNDAY

	40°N	50°N
Set	1:07	1:27
Rise	12:07	11:50

10 — MONDAY

	40°N	50°N
Set	1:42	1:54
Rise	13:17	13:08

First Quarter 1:59

Lunar X near crater Werner visible in extreme W of N. America 1 am

Lunar Straight Wall this evening

Jupiter at opposition (m=-2.6)

11 — TUESDAY

	40°N	50°N
Set	2:13	2:18
Rise	14:26	14:26

Two shadows on Jupiter visible 11:33 pm

12 — WEDNESDAY

	40°N	50°N
Set	2:44	2:41
Rise	15:35	15:42

13 — THURSDAY

	40°N	50°N
Set	3:15	3:04
Rise	16:42	16:58

RASC General Assembly hosted by the National Office in Toronto www.rasc.ca/ga2019 (through Jun 16)

14 — FRIDAY

	40°N	50°N
Set	3:47	3:29
Rise	17:49	18:13

15 — SATURDAY

	40°N	50°N
Set	4:22	3:57
Rise	18:55	19:25
Sunrise	5:31	4:51
Sunset	20:30	21:11

16 — SUNDAY

	40°N	50°N
Set	5:02	4:30
Rise	19:58	20:33

FATHER'S DAY

Moon 5° left of Jupiter this evening, best in eastern N. America

Mercury 1.0° lower right of Mars this evening

17 — MONDAY

	40°N	50°N
Set	5:46	5:10
Rise	20:57	21:35

Full Moon 4:31

Mercury 0.5° right of Mars this evening

Today's full Moon is the Trees Fully Leaved Moon

18 — TUESDAY

	40°N	50°N
Set	6:35	5:57
Rise	21:49	22:27

Mercury 0.3° above Mars this evening

19 — WEDNESDAY

	40°N	50°N
Set	7:28	6:51
Rise	22:36	23:11

Moon 1° N of Jupiter this eveving

20 — THURSDAY

	40°N	50°N
Set	8:25	7:50
Rise	23:16	23:46

21 — FRIDAY

	40°N	50°N
Set	9:23	8:53
Rise	23:50	—

NATIONAL ABORIGINAL DAY

Summer solstice 11:54 ET

22 — SATURDAY

	40°N	50°N
Rise	—	0:15
Set	10:21	9:58
Sunrise	5:32	4:51
Sunset	20:32	21:13

Neptune stationary

23 — SUNDAY

	40°N	50°N
Rise	0:21	0:40
Set	11:19	11:02

Mercury at greatest elongation (25° E) this evening. Poor apparition (m=0.4)

Moon at apogee

24 — MONDAY

	40°N	50°N
Rise	0:49	1:01
Set	12:16	12:06

LA FÊTE NATIONALE (QC)

DISCOVERY DAY (NL)

25 — TUESDAY

	40°N	50°N
Rise	1:15	1:21
Set	13:14	13:11

Last Quarter 5:46

26 — WEDNESDAY

	40°N	50°N
Rise	1:41	1:40
Set	14:13	14:17

Lunar Curtiss X visible in extreme E of N. America 1 am

27 — THURSDAY

	40°N	50°N
Rise	2:07	2:00
Set	15:13	15:25

28 — FRIDAY

	40°N	50°N
Rise	2:36	2:21
Set	16:16	16:35

29 — SATURDAY

	40°N	50°N
Rise	3:08	2:46
Set	17:21	17:47
Sunrise	5:34	4:54
Sunset	20:33	21:13

30 — SUNDAY

	40°N	50°N
Rise	3:45	3:17
Set	18:27	19:00

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	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	

JULY	S	M	T	W	T	F	S
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	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			

Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.

Eastern time is used, except for rise and set events and changes to/from Daylight Saving Time, which are given in local time.

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Please see back pages for photo details and additional information about this Calendar.

JULY

THE GALATIC CORE of the Milky Way is laced with dark nebulae in this image as taken from Chile. The Pipe Nebula forms the hindquarters of the Prancing Horse just above centre, appearing almost upside down in this view, while many clusters and nebulae are scattered across the image. | IMAGE BY LYNN HILBORN

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock. Eastern time is used, except for rise and set events and changes to/from Daylight Saving Time, which are given in local time. Times for events involving planetary satellites refer to the start time. Detailed instructions on adjusting times for location are given in the back pages. *Please see back pages for photo details and additional information about this Calendar.*	**1** *40°N 50°N* Rise 4:29 3:55 Set 19:34 20:10 **CANADA DAY** Watch for noctilucent clouds in N sky during twilight this month. Best N of 50° latitude	**2** *40°N 50°N* Rise 5:21 4:44 Set 20:37 21:15 New Moon 15:16 18 Melpomene at opposition (m=9.2) Total solar eclipse visible from S Pacific, S America, Chile and Argentina	**3** *40°N 50°N* Rise 6:22 5:44 Set 21:34 22:09 Moon, Mercury, and Mars 6° during twilight this evening, difficult	**4** *40°N 50°N* Rise 7:30 6:56 Set 22:23 22:53 **INDEPENDENCE DAY (USA)** Earth at aphelion (152,095,566 km) 18:11 ET	**5** *40°N 50°N* Rise 8:42 8:14 Set 23:06 23:29 Alberta Star-B-Q, Eccles Ranch, AB calgary.rasc.ca/starbq.html (through Jul 7) Moon at perigee	**6** *40°N 50°N* Rise 9:55 9:35 Set 23:43 23:58 Sunrise 5:38 4:59 Sunset 20:32 21:10
7 *40°N 50°N* Rise 11:08 10:56 Set — — Spot Arcturus unaided before sunset this week	**8** *40°N 50°N* Set 0:17 0:24 Rise 12:18 12:15	**9** *40°N 50°N* Set 0:48 0:47 Rise 13:27 13:32 First Quarter 6:55 **NUNAVUT DAY** Saturn at opposition (m=0.1)	**10** *40°N 50°N* Set 1:18 1:10 Rise 14:34 14:47 Lunar Straight Wall this evening	**11** *40°N 50°N* Set 1:50 1:34 Rise 15:41 16:02 *Simon Newcomb died in Washington D.C., 110 years ago.*	**12** *40°N 50°N* Set 2:24 2:00 Rise 16:46 17:14	**13** *40°N 50°N* Set 3:01 2:31 Rise 17:49 18:23 Sunrise 5:42 5:06 Sunset 20:29 21:06 Moon 4° left of Jupiter this evening
14 *40°N 50°N* Set 3:42 3:08 Rise 18:49 19:26 Pluto at opposition (m=14.2)	**15** *40°N 50°N* Set 4:29 3:51 Rise 19:43 20:21	**16** *40°N 50°N* Set 5:20 4:42 Rise 20:31 21:08 Full Moon 17:38 Total lunar eclipse, NOT visible from N. America Moon 1° S of Saturn this morning Today's full Moon is the Birds Shed Feathers Moon *Comet Shoemaker-Levy 9 crashed into Jupiter, 25 years ago.*	**17** *40°N 50°N* Set 6:15 5:40 Rise 21:13 21:46	**18** *40°N 50°N* Set 7:13 6:42 Rise 21:50 22:17	**19** *40°N 50°N* Set 8:11 7:45 Rise 22:22 22:44	**20** *40°N 50°N* Set 9:09 8:50 Rise 22:51 23:06 Sunrise 5:48 5:13 Sunset 20:25 20:59 Moon at apogee *Neil Armstrong was the first man to step on the Moon, 50 years ago.*
21 *40°N 50°N* Set 10:07 9:54 Rise 23:17 23:26	**22** *40°N 50°N* Set 11:04 10:59 Rise 23:43 23:45	**23** *40°N 50°N* Set 12:02 12:03 Rise — —	**24** *40°N 50°N* Rise 0:09 0:04 Set 13:00 13:09 Last Quarter 21:18	**25** *40°N 50°N* Rise 0:36 0:24 Set 14:01 14:16	**26** *40°N 50°N* Rise 1:05 0:47 Set 15:03 15:26	**27** *40°N 50°N* Rise 1:39 1:14 Set 16:08 16:37 Sunrise 5:54 5:22 Sunset 20:19 20:50 Mount Kobau Star Party, Osoyoos, BC (through Aug 4)
28 *40°N 50°N* Rise 2:18 1:47 Set 17:13 17:48	**29** *40°N 50°N* Rise 3:06 2:30 Set 18:18 18:55	**30** *40°N 50°N* Rise 4:02 3:24 Set 19:18 19:55	**31** *40°N 50°N* Rise 5:08 4:31 Set 20:12 20:45 New Moon 23:12			

THE PLANETS THIS MONTH

Mercury	very low in WNW in evening twilight, early-month with difficulty
Venus	not observable this month
Mars	very low in WNW in evening twilight, early-month with difficulty
Jupiter	SSE after dark, transits after 11 pm, sets in WSW after 3 am
Saturn	SE at dusk, transits in S near 1am, low in SW near dawn

JUN	S	M	T	W	T	F	S
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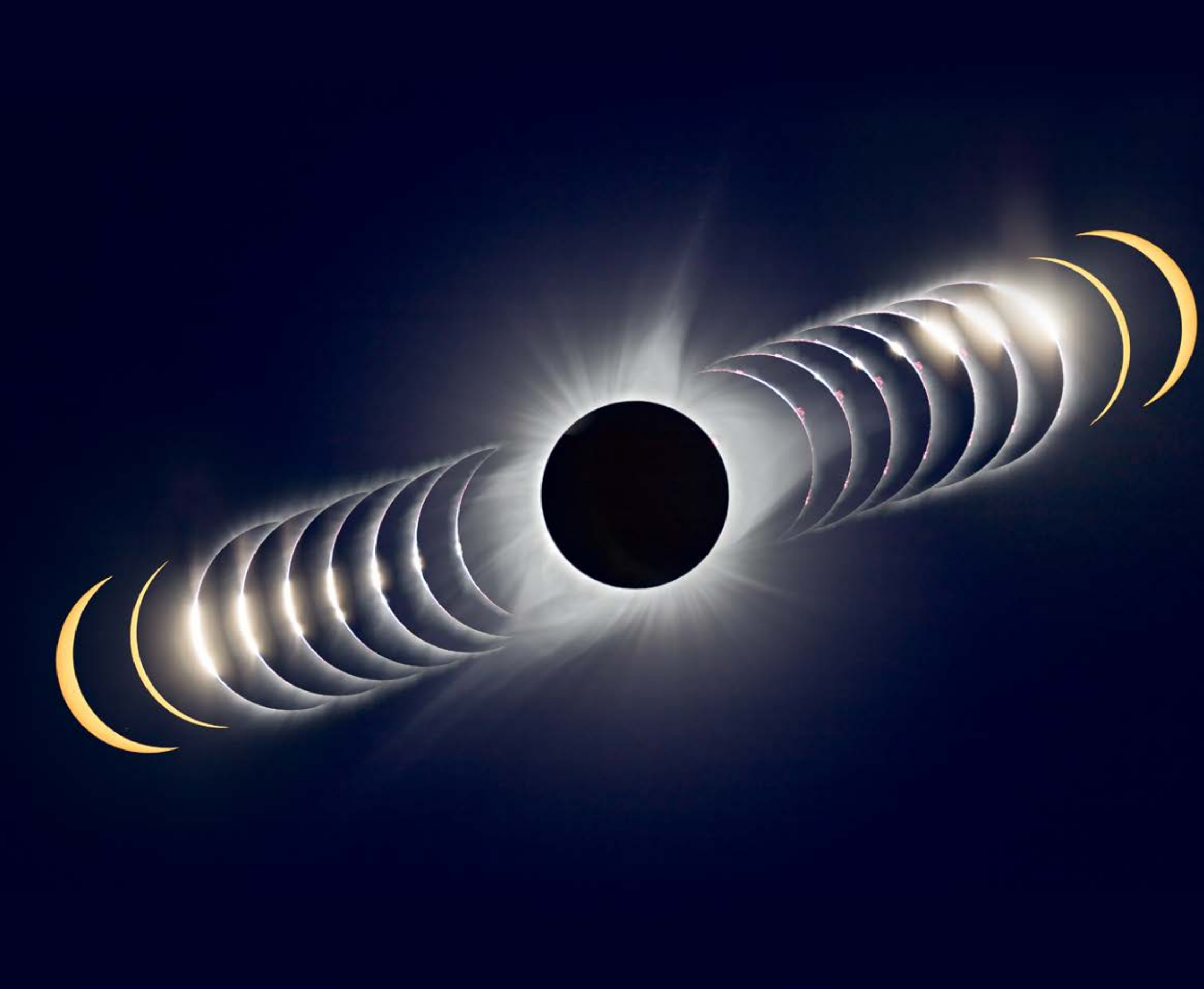

AUGUST

THE GREAT AMERICAN ECLIPSE was seen by millions, including many Canadians who travelled south to be in the shadow of the Moon and witness one of the astronomy's greatest natural events. During the few minutes of totality, does the man in the Moon have his place in the Sun? | IMAGE BY ALAN DYER

THE PLANETS THIS MONTH

Mercury	very low in ENE in morning twilight with difficulty, lost by mid-month
Venus	not observable this month
Mars	not observable this month
Jupiter	in SSW at dusk, sets in WSW near 1 am
Saturn	in SSE at dusk, transits in S near 11 pm, sets in WSW near 3 am

JUL	S	M	T	W	T	F	S
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SEP	S	M	T	W	T	F	S
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	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30					

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				1 Rise 6:20 5:48 Set 20:59 21:25 Stellafane Convention, Springfield, VT (through Aug 4)	2 Rise 7:35 7:11 Set 21:40 21:58	3 Rise 8:50 8:35 Set 22:16 22:26 Sunrise 6:00 5:32 Sunset 20:12 20:39
4 Rise 10:04 9:57 Set 22:49 22:51	5 Rise 11:16 11:18 Set 23:20 23:14 **CIVIC HOLIDAY (AB, BC, MB, NB, NS, NT, NU, ON, PE, SK)**	6 Rise 12:25 12:36 Set 23:52 23:38	7 Rise 13:33 13:52 Set — — First Quarter 13:31 16 Psyche at opposition (m=9.3) Lunar X near crater Werner visible in all of N. America 11 pm Moon at perigee *Harkness & Young discovered green emission line during total solar eclipse, 150 years ago.*	8 Set 0:25 0:04 Rise 14:39 15:05	9 Set 1:01 0:34 Rise 15:43 16:15 Lunar Straight Wall this evening Mercury at greatest elongation (19° W) this morning. Poor apparition (m=0.0) Butterpot Star Party, Butterport Provincial Park, NL (through Aug 10) Moon 2° upper left of Jupiter this evening	10 Set 1:41 1:08 Rise 16:43 17:20 Sunrise 6:07 5:42 Sunset 20:03 20:28 *Bessel predicted existence of Sirius B, dwarf companion to Sirius, 175 years ago.*
11 Set 2:26 1:49 Rise 17:39 18:17 11 Jupiter stationary	12 Set 3:16 2:37 Rise 18:29 19:06 15 Eunomia at opposition (m=8.2) Uranus stationary Moon 3° right of Saturn tonight, closing	13 Set 4:09 3:33 Rise 19:12 19:46 Perseid meteors (ZHR=150) 12 am, best seen in predawn hours yesterday or today	14 Set 5:06 4:33 Rise 19:50 20:20 Venus at superior conjunction	15 Set 6:04 5:36 Rise 20:24 20:47 Full Moon 8:29 Today's full Moon is the Ripening Moon	16 Set 7:02 6:40 Rise 20:53 21:11	17 Set 8:00 7:45 Rise 21:21 21:31 Sunrise 6:14 5:53 Sunset 19:54 20:15 39 Laetitia at opposition (m=9.2) Moon at apogee
18 Set 8:57 8:49 Rise 21:46 21:50	19 Set 9:54 9:53 Rise 22:12 22:09 **DISCOVERY DAY (YT)**	20 Set 10:52 10:58 Rise 22:37 22:28	21 Set 11:51 12:04 Rise 23:05 22:49	22 Set 12:51 13:11 Rise 23:36 23:14	23 Set 13:53 14:20 Rise — 23:43 Last Quarter 10:56 Lunar Curtiss X visible in extreme E of N. America 11 pm Terra Nova Star Party, Terra Nova National Park, NL (through Aug 24)	24 Rise 0:12 — Set 14:57 15:30 Sunrise 6:20 6:03 Sunset 19:44 20:01
25 Rise 0:55 0:20 Set 16:00 16:37 *Voyager 2 arrived at Neptune, 30 years ago.*	26 Rise 1:45 1:08 Set 17:01 17:39	27 Rise 2:45 2:07 Set 17:57 18:33	28 Rise 3:53 3:19 Set 18:47 19:17 Saskatchewan Summer Star Party, Cypress Hills, SK (through Sep 2)	29 Rise 5:07 4:39 Set 19:31 19:54	30 Rise 6:24 6:04 Set 20:10 20:24 New Moon 6:37 Spruce Woods Star Party, Spruce Woods Park, MB (through Sep 2) Nova East Star Party, Smiley's Park, NS (through Sep 2) *Francis Baily, who identified bright spots during total solar eclipses, died, 175 years ago.*	31 Rise 7:40 7:29 Set 20:45 20:51 Sunrise 6:27 6:13 Sunset 19:33 19:46

THE ALGONQUIN RADIO Observatory scans the skies as Canada's National Radio Observatory, while the stars trail across them from its wilderness spot in the north of Algonquin Park on Lake Travers. Its 46-m antenna is the largest in Canada and was completed in 1965. | IMAGE BY STEVE MCKINNEY

SEPTEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 *40°N 50°N* Rise 8:55 8:54 Set 21:18 21:15 **ISLAMIC NEW YEAR (BEGINS AT SUNSET THE PREVIOUS EVENING)**	**2** *40°N 50°N* Rise 10:08 10:16 Set 21:50 21:40 **LABOUR DAY**	**3** *40°N 50°N* Rise 11:20 11:36 Set 22:24 22:05	**4** *40°N 50°N* Rise 12:29 12:53 Set 23:00 22:34	**5** *40°N 50°N* Rise 13:35 14:06 Set 23:39 23:07 First Quarter 23:10 Moon 4° right of Jupiter this evening, best in eastern N. America	**6** *40°N 50°N* Rise 14:38 15:13 Set — 23:47 135 Hertha at opposition (m=9.6)	**7** *40°N 50°N* Set 0:23 — Rise 15:35 16:14 Sunrise 6:33 6:24 Sunset 19:22 19:31 Lunar Straight Wall this evening
8 *40°N 50°N* Set 1:12 0:33 Rise 16:27 17:05	**9** *40°N 50°N* Set 2:04 1:26 Rise 17:12 17:48	**10** *40°N 50°N* Set 3:00 2:25 Rise 17:52 18:23 Neptune at opposition (m=7.8)	**11** *40°N 50°N* Set 3:57 3:28 Rise 18:26 18:52	**12** *40°N 50°N* Set 4:55 4:32 Rise 18:57 19:16	**13** *40°N 50°N* Set 5:53 5:36 Rise 19:24 19:37 Moon at apogee	**14** *40°N 50°N* Set 6:51 6:41 Rise 19:50 19:56 Sunrise 6:40 6:34 Sunset 19:11 19:16 Full Moon 0:33 Today's full Moon is the Moose Calling Moon
15 *40°N 50°N* Set 7:48 7:46 Rise 20:15 20:15 Follow Capella unaided into daylight this week	**16** *40°N 50°N* Set 8:46 8:50 Rise 20:41 20:34	**17** *40°N 50°N* Set 9:45 9:56 Rise 21:08 20:54	**18** *40°N 50°N* Set 10:44 11:03 Rise 21:37 21:16 Saturn stationary	**19** *40°N 50°N* Set 11:45 12:10 Rise 22:10 21:43	**20** *40°N 50°N* Set 12:47 13:19 Rise 22:49 22:16	**21** *40°N 50°N* Set 13:49 14:25 Rise 23:35 22:58 Sunrise 6:47 6:45 Sunset 18:59 19:01 Last Quarter 22:41
22 *40°N 50°N* Set 14:49 15:28 Rise — 23:51	**23** *40°N 50°N* Rise 0:30 — Set 15:46 16:23 Fall equinox, 03:50 ET	**24** *40°N 50°N* Rise 1:32 0:55 Set 16:37 17:10 Northern Prairie Star Party, AB, edmontonrasc.com/northern-prairie-star-party (through Sep 29)	**25** *40°N 50°N* Rise 2:42 2:10 Set 17:22 17:49 *Olaus Roemer, first person to measure the speed of light, was born, 375 years ago.*	**26** *40°N 50°N* Rise 3:56 3:31 Set 18:02 18:21	**27** *40°N 50°N* Rise 5:11 4:56 Set 18:38 18:48 Zodiacal Light readily visible from a dark site in E before morning twilight for the next two weeks. Alberta Star Party, Starland, AB calgary.rasc.ca/asp.htm (through Sep 29) Try to spot Uranus (m=5.7) unaided this weekend	**28** *40°N 50°N* Rise 6:28 6:21 Set 19:12 19:14 Sunrise 6:53 6:55 Sunset 18:48 18:45 New Moon 14:26 21 Lutetia at opposition (m=9.4) Moon at perigee
29 *40°N 50°N* Rise 7:43 7:46 Set 19:45 19:38 Follow Sirius unaided into daylight this week	**30** *40°N 50°N* Rise 8:57 9:09 Set 20:19 20:03 **ROSH HASHANAH (BEGINS AT SUNSET THE PREVIOUS EVENING)**					

THE PLANETS THIS MONTH

Mercury	not observable this month
Venus	not observable this month
Mars	not observable this month
Jupiter	low in SSW during twilight, sets in WSW near 11 pm
Saturn	in S at dusk, sets in WSW near 1 am

AUG	S	M	T	W	T	F	S
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OCT	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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STEVE and its green "picket fence aurora" sweep across the starry night. The pink swath seen here was provisionally called "Steve" after an animated movie titled "*Over the Hedge.*" STEVE now enjoys the "backronym" of "Strong Thermal Emission Velocity Enhancement." Steve is not an aurora. It is a fast flowing (6 km/s) ribbon of glowing, 3000 °C hot gases, moving at an altitude of 450 km. | IMAGE BY PETER AND DEBRA CERAVOLO

OCTOBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
THE PLANETS THIS MONTH **Mercury** very low in WSW in evening twilight, near mid-month with difficulty **Venus** very low in WSW in evening twilight after mid-month **Mars** very low in ESE in morning twilight with difficulty **Jupiter** low in SW during twilight, sets in WSW near 9 pm **Saturn** low in SSW at dusk, sets in WSW near 11 pm		**1** *40°N 50°N* Rise 10:10 10:30 Set 20:55 20:31	**2** *40°N 50°N* Rise 11:20 11:48 Set 21:34 21:03	**3** *40°N 50°N* Rise 12:27 13:01 Set 22:17 21:41 Moon 1.2° above Jupiter this evening, best in eastern N. America	**4** *40°N 50°N* Rise 13:28 14:06 Set 23:05 22:26	**5** *40°N 50°N* Rise 14:23 15:02 Set 23:57 23:18 Sunrise 7:00 7:06 Sunset 18:36 18:30 First Quarter 12:47 Lunar X near crater Werner visible in all of N. America 11 pm Moon 2° above right Saturn this evening, best in eastern N. America *Marc Garneau became 1st Canadian in outer space, 35 years ago.*
6 *40°N 50°N* Rise 15:11 15:48 Set — — Lunar Straight Wall this evening Spot Vega unaided before sunset this week	**7** *40°N 50°N* Set 0:53 0:16 Rise 15:53 16:26	**8** *40°N 50°N* Set 1:50 1:18 Rise 16:29 16:56	**9** *40°N 50°N* Set 2:48 2:22 Rise 17:00 17:21 **YOM KIPPUR (BEGINS AT SUNSET THE PREVIOUS EVENING)**	**10** *40°N 50°N* Set 3:46 3:27 Rise 17:28 17:43 S Taurid meteors (ZHR=5) Moon at apogee	**11** *40°N 50°N* Set 4:44 4:32 Rise 17:54 18:03	**12** *40°N 50°N* Set 5:42 5:36 Rise 18:20 18:21 Sunrise 7:07 7:17 Sunset 18:25 18:15
13 *40°N 50°N* Set 6:40 6:42 Rise 18:45 18:40 Full Moon 17:08 Two shadows on Jupiter visible, difficult in evening twilight 7:53 pm Today's full Moon is the Animal Fattening Moon *Lunik 2 first images far side of Moon and impacts Moon, 60 years ago.*	**14** *40°N 50°N* Set 7:39 7:48 Rise 19:11 18:59 **THANKSGIVING DAY (CANADA)** **COLUMBUS DAY (USA)**	**15** *40°N 50°N* Set 8:38 8:55 Rise 19:39 19:21	**16** *40°N 50°N* Set 9:40 10:03 Rise 20:11 19:46	**17** *40°N 50°N* Set 10:42 11:12 Rise 20:48 20:17	**18** *40°N 50°N* Set 11:44 12:19 Rise 21:31 20:55 Galileo, *which made 1st close flybys of an asteroid, was launched, 30 years ago.*	**19** *40°N 50°N* Set 12:44 13:23 Rise 22:22 21:43 Sunrise 7:15 7:28 Sunset 18:15 18:01
20 *40°N 50°N* Set 13:41 14:20 Rise 23:20 22:42 Two shadows on Jupiter visible in extreme W of N. America during twilight 9:47 pm Mercury at greatest elongation (25° E) this evening. Poor apparition (m=-0.1)	**21** *40°N 50°N* Set 14:32 15:08 Rise — 23:51 Last Quarter 8:39	**22** *40°N 50°N* Rise 0:25 — Set 15:18 15:48 Lunar Curtiss X visible in E of N. America 12 am Orionid meteors (ZHR=15) 6 pm, best seen in predawn hours today	**23** *40°N 50°N* Rise 1:35 1:07 Set 15:58 16:21	**24** *40°N 50°N* Rise 2:48 2:28 Set 16:34 16:49	**25** *40°N 50°N* Rise 4:02 3:51 Set 17:07 17:14 Try to spot Uranus (m=5.7) unaided this weekend	**26** *40°N 50°N* Rise 5:16 5:14 Set 17:40 17:37 Sunrise 7:22 7:40 Sunset 18:05 17:48 9 Metis at opposition (m=8.6) Moon at perigee
27 *40°N 50°N* Rise 6:30 6:37 Set 18:12 18:01 New Moon 23:38 Zodiacal Light readily visible from a dark site in E before morning twilight for the next two weeks. 4 Vesta unaided eye this week, a challenge (m=6.5) Old crescent Moon, 17 hours before new in E, 13 hours before new in W, a difficult challenge just before sunrise	**28** *40°N 50°N* Rise 7:44 8:00 Set 18:47 18:28 New Moon – Gegenschein visible from a very dark site – highest in S at midnight this week Uranus at opposition (m=5.7)	**29** *40°N 50°N* Rise 8:57 9:22 Set 19:25 18:57 Jupiter with only one satellite visible in E of N. America with difficulty 5:25 pm Moon, Mercury and Venus 5° during twilight this evening, difficult	**30** *40°N 50°N* Rise 10:08 10:40 Set 20:07 19:33	**31** *40°N 50°N* Rise 11:14 11:51 Set 20:54 20:16 **HALLOWE'EN**		

SEP	S	M	T	W	T	F	S
	1	2	3	4	5	6	7
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	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30					

NOV	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

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NOVEMBER

THE SOUL NEBULA (Westerhout 5) gets its name from the resemblance of a fetus in development. Often incorrectly referred to as IC 1848, the nebula is comprised of several other designated objects. IC 1848, correctly identified, is the open cluster of stars within the body part of the soul. | IMAGE BY KEVIN BLACK

THE PLANETS THIS MONTH

Mercury	very low in ESE in morning twilight, after mid-month with difficulty
Venus	very low in SW in evening twilight
Mars	very low in ESE in morning twilight
Jupiter	very low in SW soon after sunset, lost in twilight mid-month
Saturn I	low in SSW at dusk, sets in WSW near 8 pm

OCT	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		

DEC	S	M	T	W	T	F	S
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	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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SUNDAY

3
Rise 40°N 12:51 50°N 13:27
Set 22:39 22:05

Daylight Saving Time ends 2 am

10
Set 40°N 4:29 50°N 4:36
Rise 16:14 16:04

17
Set 40°N 11:31 50°N 12:09
Rise 21:17 20:40

24
Rise 40°N 4:21 50°N 4:33
Set 15:42 15:27

Moon, Mars, and Mercury form large triangle in morning twilight

Venus 1.5° lower left of Jupiter in evening twilight

MONDAY

4
Rise 40°N 13:29 50°N 14:00
Set 23:38 23:10

First Quarter 5:23

11
Set 40°N 5:29 50°N 5:43
Rise 16:41 16:25

REMEMBRANCE DAY (CANADA)
VETERANS DAY (USA)

Mercury at inferior conjunction, transiting the Sun, best from S. America and eastern N. America

1st Canadian comet discovered by Sydney van den Bergh, 45 years ago.

18
Set 40°N 12:18 50°N 12:50
Rise 22:25 21:54

Leonid meteors (ZHR=15) 12 am, best seen in predawn hours today

25
Rise 40°N 5:33 50°N 5:54
Set 16:17 15:54

TUESDAY

5
Rise 40°N 14:02 50°N 14:27
Set — —

Lunar Straight Wall this evening

12
Set 40°N 6:31 50°N 6:52
Rise 17:12 16:49

Full Moon 8:34

4 Vesta at opposition (m=6.5)

N Taurid meteors (ZHR=5)

Today's full Moon is the Rivers Freezing Moon

19
Set 40°N 12:59 50°N 13:24
Rise 23:35 23:12

Last Quarter 16:11

26
Rise 40°N 6:45 50°N 7:13
Set 16:57 16:26

New Moon 10:06

New Moon – Gegenschein visible from a very dark site – highest in S at midnight.

WEDNESDAY

6
Set 40°N 0:37 50°N 0:15
Rise 14:31 14:49

13
Set 40°N 7:34 50°N 8:02
Rise 17:48 17:18

20
Set 40°N 13:35 50°N 13:53
Rise — —

Edwin Hubble born 130 years ago.

27
Rise 40°N 7:54 50°N 8:29
Set 17:41 17:05

Neptune stationary

THURSDAY

7
Set 40°N 1:35 50°N 1:20
Rise 14:58 15:09

Moon at apogee

14
Set 40°N 8:37 50°N 9:11
Rise 18:29 17:54

21
Rise 40°N 0:46 50°N 0:31
Set 14:08 14:17

28
Rise 40°N 8:58 50°N 9:37
Set 18:32 17:52

THANKSGIVING DAY (USA)

Mercury at greatest elongation (20° W) this morning (m=-0.6) Best morning apparition of the year.

Moon, Jupiter, Venus, and Saturn form line in evening twilight

FRIDAY

1
Rise 40°N 12:14 50°N 12:53
Set 21:46 21:06

8
Set 40°N 2:33 50°N 2:25
Rise 15:23 15:28

Mars 2.5° upper left of Spica this morning

15
Set 40°N 9:39 50°N 10:18
Rise 19:18 18:39

22
Rise 40°N 1:57 50°N 1:51
Set 14:39 14:40

Try to spot Uranus (m=5.7) unaided this weekend

Sir Arthur Eddington, prominent English astrophysicist, died, 75 years ago.

29
Rise 40°N 9:55 50°N 10:35
Set 19:27 18:47

Moon 1.7° lower left of Saturn this evening during twilight

SATURDAY

2
Rise 40°N 13:06 50°N 13:45
Set 22:42 22:03
Sunrise 7:30 7:51
Sunset 17:57 17:35

Moon 4° right of Saturn tonight, closing, best in western N. America

9
Set 40°N 3:31 50°N 3:30
Rise 15:48 15:46
Sunrise 6:38 7:03
Sunset 16:49 16:24

16
Set 40°N 10:38 50°N 11:18
Rise 20:14 19:35
Sunrise 6:46 7:14
Sunset 16:43 16:15

23
Rise 40°N 3:09 50°N 3:12
Set 15:10 15:03
Sunrise 6:54 7:25
Sunset 16:38 16:07

Moon at perigee

30
Rise 40°N 10:45 50°N 11:23
Set 20:25 19:48
Sunrise 7:02 7:35
Sunset 16:36 16:02

THE COALSACK, Southern Cross, and Eta Carinae are three highlights of the southern skies that all observers who travel south should see. Highlighted in this photo is the Southern Cross, while the dark Coalsack is lower left centre, and the pinkish glow of hydrogen makes Eta Carinae stand out in the upper right. | IMAGE BY LYNN HILBORN

DECEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 Rise 11:27 12:00 Set 21:25 20:53	**2** Rise 12:02 12:30 Set 22:25 21:59 97 Klotho at opposition (m=9.9)	**3** Rise 12:33 12:54 Set 23:23 23:05	**4** Rise 13:01 13:15 Set — — First Quarter 1:58 Lunar X near crater Werner visible in W of N. America 1 am	**5** Set 0:21 0:10 Rise 13:26 13:33 Moon at apogee	**6** Set 1:19 1:15 Rise 13:51 13:51 Lunar Straight Wall this evening	**7** Set 2:17 2:20 Rise 14:16 14:09 Sunrise 7:08 7:44 Sunset 16:34 15:59 7
8 Set 3:16 3:27 Rise 14:42 14:29	**9** Set 4:17 4:35 Rise 15:11 14:51	**10** Set 5:20 5:45 Rise 15:45 15:18	**11** Set 6:24 6:56 Rise 16:24 15:51 Venus 1.7° lower left of Saturn this evening during twilight	**12** Set 7:28 8:06 Rise 17:11 16:33 Full Moon 0:12 Today's full Moon is the Chief Moon	**13** Set 8:30 9:10 Rise 18:06 17:26 Geminid meteors (ZHR=120) 4 pm, best seen in predawn hours today	**14** Set 9:27 10:06 Rise 19:08 18:30 Sunrise 7:14 7:51 Sunset 16:35 15:58 14
15 Set 10:17 10:51 Rise 20:16 19:43	**16** Set 11:00 11:28 Rise 21:26 21:00	**17** Set 11:38 11:58 Rise 22:37 22:20	**18** Set 12:11 12:24 Rise 23:48 23:39 Last Quarter 23:57 Moon at perigee	**19** Set 12:42 12:46 Rise — — 19	**20** Rise 0:58 0:57 Set 13:12 13:08 20	**21** Rise 2:07 2:16 Set 13:43 13:31 Sunrise 7:18 7:56 Sunset 16:38 16:00 Winter solstice, 23:19 ET
22 Rise 3:17 3:34 Set 14:15 13:55 Lunar Curtiss X visible in E of N. America 4 am	**23** Rise 4:27 4:52 Set 14:52 14:24 Ursid meteors (ZHR=10) 12 am, best seen in predawn hours today	**24** Rise 5:36 6:08 Set 15:33 14:59	**25** Rise 6:41 7:19 Set 16:20 15:41 **CHRISTMAS DAY** Old crescent Moon, 18 hours before new in E, 14 hours before new in W, a challenge just before sunrise	**26** Rise 7:42 8:22 Set 17:13 16:32 New Moon 0:13 **BOXING DAY (CANADA)** New Moon – Gegenschein visible from a very dark site – highest in S at midnight. Annular solar eclipse visible from Southeast Asia	**27** Rise 8:35 9:15 Set 18:10 17:31 Jupiter in conjunction	**28** Rise 9:21 9:57 Set 19:10 18:36 Sunrise 7:21 7:59 Sunset 16:42 16:05 28
29 Rise 10:00 10:30 Set 20:11 19:42 Moon 1.7° lower left of Venus this evening during twilight, best in western N. America	**30** Rise 10:33 10:57 Set 21:10 20:49	**31** Rise 11:02 11:19 Set 22:09 21:55 **NEW YEAR'S EVE** *John Flamsteed, who laid the foundations of modern astronomy, died, 300 years ago.*				

THE PLANETS THIS MONTH

Mercury	very low in ESE in morning twilight, lost by mid-month
Venus	low in SW in evening twilight
Mars	rises in ESE after 4 am, low SE near dawn
Jupiter	not observable this month
Saturn	very low in SW after sunset, lost in twilight late this month

NOV	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

JAN	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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January — A single 6-second exposure with a 20-mm Sigma lens at *f*/1.4, ISO 800 on a Canon 6D. Image taken by Peter Ceravolo early morning 2017 November 29 at Debra and Peter's backyard observatory, Osoyoos, British Columbia.

February — An image made from 15 × 5-min R, 15 × 5-min B, 15 × 5-min G, and 1- × 10-min Hα for a total exposure of 6.6 hours. Image was acquired with a 12.5-inch RCOS telescope at *f*/9 and a SBIG STX 16803 camera mounted on a Paramount ME II. Processed with Pixinsight and Photoshop. Imaged from the MIRABILIS Observatory in the Laurentians, north of Montréal, Québec, by Rémi Lecasse.

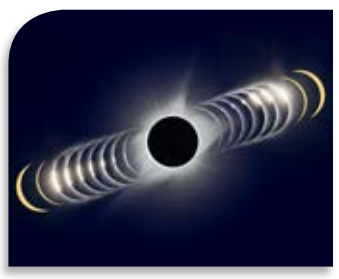
March — An image made from a stack of 1100 frames from a 10,000 frame video with a ASI174mm camera mounted on a 457-mm *f*/4.5 Starstructure Dobsonian and a 4× Powermate Barlow with a red filter. Captured using Firecapture, stacked in AS3 and processed in Photo Shop CS2. Imaged from northern Baja California by Mike Wirths.

April — An image made from 12 × 10-min R, G, and B and 8 × 20-min Hα for a total exposure of 8 hours 40-min. Image was taken with a Takahashi FSQ-106 ED IV at *f*/3.6 and a Moravian G3-16200 EC camera using Optolong Filters on a Paramount MX, guided with a QHY5 175-mm guide scope. Acquisition with The SkyX, FocusMax, and CCD Commander. All pre-processing and processing in PixInsight. Imaged between December 2016 and February 2017 from Guelph, Ontario, by Ron Brecher.

May — An image made from 5 × 10-min R, G, and B and 1 × 15-m L and 13 × 10-min L for a total exposure of 4 hours 55-min. Image was taken with a *f*/6.8 ASA astrograph SBIG STL-11000M camera, Baader LRGB on a Paramount MX, guided with STL-11000 remote guide head using 80-mm *f*/6 refractor. Acquisition, guiding and calibration with Maxim-DL. All pre-processing and processing in PixInsight. Imaged from Guelph, Ontario, by Ron Brecher.

June — An image made from 11 hours of unbinned Luminance and 3 hours of binned RGB for a total exposure of 14 hours! Image was taken with a RCOS 16″ at *f*/8.9 and an Apogee U16M CCD with Astrodon LRGB filters mounted on a Paramount ME mount. Captured with Maxim DL, CCD Autopilot, FocusMax, and The Sky 6. Processed using PixInsight, Photoshop and Lightroom. Imaged from Sierra Remote Observatories in California by Stefano Cancelli & Paul Mortfield.

July — Image made from 36 × 3-min frames for a total exposure of 1.8 hours. Image acquired with Canon 6D and a Sigma 50-mm ART lens at *f*/2.8 and ISO 1600. Imaged from the Atacama Desert, Chile, on 2018 April 13 by Lynn Hilborn.



August — A composite of the total solar eclipse of 2018. Partial phases are 1/2500-second exposures through a Thousand Oaks metal-on-glass solar filter. The Contact 2 and 3 images were taken in rapid-fire continuous mode, most are 1/4000th second exposures. Totality is a blend of 7 exposures, from 1/1600 second to 1/15 second. All taken with a Canon 6D MkII, Astro-Physics 106mm apochromatic refractor with a 0.85× field flattener/reducer for an effective focal length of 500mm at *f*/5 on a AP Mach One mount. Imaged from north of Driggs, Idaho, in the Teton Valley by Alan Dyer.

September — A composite image made from 209 × 30-sec for a total exposure of 1.75 hours. Image was acquired with a Canon 6D and Rokinon 14-mm *f*/2.8 lens at *f*/4 and ISO 3200. Images were combined with StarStax. Image captured September 2016 by Steve McKinney.

October — A single 30-second exposure with a 20-mm Sigma Lens at *f*/1.4, ISO 800 on a Canon 6D. Image taken 2018 April 13, over the South Okanagan, British Columbia, by Debra Ceravolo.

November — Image made from 48 × 150-sec for a total exposure of 2 hours. Image acquired with a Hutech Astrodon modded Canon 6D and a FSQ106EDX4 at *f*/3.3 mounted on an AP1100ae mount. Processed with PixInsight, ImagesPlus, and PhotoShop CS6. Imaged by Kevin Black.

December — Image made from 13 × 2-min frames for a total exposure of 26 minutes. Image acquired with Canon 6D and a Sigma 50-mm ART lens at *f*/2.8 and ISO 1600. Image was stacked and processed in Photoshop CS6 and Lightroom. Imaged from the Atacama Desert, Chile, on 2018 April 9 by Lynn Hilborn.

Most of the data appearing in the monthly grid was generated using custom software written by David Lane, Alister Ling, and Larry McNish. The Moon images were created using custom software written by Alister Ling. The Moon names were researched and provided by Cathy LeBlanc (Mi'kmaq First Nation) and David Chapman.

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The Royal Astronomical Society of Canada

Since it was founded in 1868, the RASC has filled a special role in both amateur and professional astronomy. Today, it has over 5000 members worldwide who share a passion for the night sky and make contributions to astronomy in many ways.

The RASC has a long tradition of high-quality, volunteer-produced publications. The *Observer's Handbook* has been published since 1907 and is recognized worldwide as the leading handbook of its type. The *Journal*, also published since 1907, contains articles of interest to amateur astronomers. The *Observer's Calendar* is a forum for astrophotography by amateur astronomers, and *Skyways* (available in French as *Explorons l'Astronomie*) is an astronomy teacher's guide. The RASC now owns and publishes *SkyNews*, Canada's only adult science magazine.

For information on joining the Society, or to order an RASC publication, visit www.rasc.ca or contact the Society Office at:

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How to Use this Calendar

A graphical representation of the Moon's appearance in the late evening is given in each daily box. In addition to the varying phase, the depicted size of the Moon varies, reflecting the change in the apparent size of the Moon in the sky as it moves closer to or farther from Earth. The depicted face of the Moon also changes slightly to reflect lunar libration, the rocking motion of the Moon, which means that over time approximately 59% of the lunar surface can be seen from Earth. A small dot of size proportional to the amount of libration appears near the lunar limb that is librated.

This year's moon names are those of the Mi'kmaq First Nation, indgenous to Canada's Atlantic Provinces and the Gaspé Pennisula of the Province of Québec.

Daily Moon and weekly Sun rise and set times, and the times of Moon phases, are shown in the top portion of the boxes. If no Moon rise or set time is given, this event occurs the next day.

A summary of the naked-eye visibility and position of the planets is given each month. Descriptions are for approximate latitude 45° and, unless otherwise stated, apply to midmonth; rise and set times at the beginning or end of the month may vary by an hour or more from those given. Times and compass directions may also differ somewhat from the given ones at other latitudes.

Special astronomical events are given at the bottom of the daily boxes. Events observable in some part of Canada or the continental United States are listed. Days on which particularly interesting phenomena or events occur are highlighted with a green corner under the date. Detailed information on all events, including their visibility from particular locations, may be determined by consulting the *Observer's Handbook*, which is published annually by the RASC.

Adjustments for Actual Location

When it is in effect, times are adjusted for Daylight Saving Time. Moon phases and special events are given in Eastern time. The user's local time for events other than Moon and Sun rise and set may be determined by converting the given time to the user's time zone (e.g. Pacific time is Eastern time minus 3 hours). For occultations, a further adjustment of an hour or more may be needed for any particular geographical location because of parallax effects. Parallax also means that actual angular separations for events involving the Moon may vary by close to 1° from those given. Also, the Moon's rapid movement of approximately 0.5° per hour means that separations may be considerably larger at a time that is even a few hours away from the given time.

Two sets of rise and set times are given to accommodate North American observers in midnorthern latitudes. Times are displayed for locations 40°N latitude and 75°W longitude and for 50°N, 75°W. The actual times for a given location must be calculated using the tables at the right.

The tables give (longitude) corrections in minutes to the tabulated rise and set times for selected Canadian and U.S. cities. In the column labelled **Correction**, an entry such as 50°N + 25 means add 25 minutes to the displayed 50°N time. This computed time is an approximation. In the column labelled **Accuracy**, the approximate maximum error in minutes for Moon rise and set using this method is indicated. The error for Sun rise and set is less. These errors can be substantially reduced by interpolating according to latitude, as explained in the following section. Note that the rise and set times calculated using the above method will be local times. It is not necessary to adjust them for time zone.

Other Locations, and Improving Accuracy

For locations not listed in the tables at right, the user should calculate a correction factor. This amount is +4 minutes for each degree that the user's location is west of the central meridian of the user's time zone or – 4 minutes for each degree that it is east. This correction factor should be added to the displayed 50°N or 40°N time for the location whose latitude is nearest that of the user's site. The accuracy in minutes for Moon rise and set can be calculated by multiplying the difference between the user's latitude and 50°N/40°N respectively by 4.5, and then adding 0.2 times the difference between the user's longitude and 75°W.

Improvement in accuracy may be obtained for many sites by interpolating or extrapolating the 50°N and 40°N times depending on the user's latitude. For example, the latitude of Ottawa is approximately midway between 50°N and 40°N. An observer in Ottawa can improve accuracy to better than 5 minutes by averaging the given 50°N and 40°N times and then adding the correction factor for Ottawa, which is 3 minutes. Western observers may gain additional accuracy by adding about 10% of the difference between the listed time and the next day's time.

Canadian Locations

City	Correction	Accuracy	Latitude
Calgary	50°N + 36	15	51
Charlottetown	40°N + 12	20	46
Edmonton	50°N + 34	25	54
Halifax	40°N + 14	25	45
Hamilton	40°N + 20	15	43
Kelowna	50°N – 3	10	50
Kingston	40°N + 6	20	44
Kitchener	40°N + 22	15	43
London	40°N + 25	15	43
Moncton	40°N + 19	20	46
Montréal	50°N – 6	20	46
Niagara	40°N + 16	15	43
Ottawa	50°N + 3	20	45
Prince George	50°N + 11	25	54
Québec	50°N – 15	15	47
Regina	50°N + 58*	10	50
St. John's	50°N + 1	20	48
Sarnia	40°N + 30	15	43
Saskatoon	50°N + 67*	15	52
Thunder Bay	50°N + 57	10	48
Toronto	40°N + 18	20	44
Vancouver	50°N + 12	15	49
Victoria	50°N + 13	20	49
Whitehorse	50°N + 60	60	61
Windsor	40°N + 32	15	42
Winnipeg	50°N + 29	5	50

U.S. Locations

City	Correction	Accuracy	Latitude
Atlanta	40°N + 37	30	34
Boston	40°N – 16	10	42
Chicago	40°N – 10	15	42
Cincinnati	40°N + 38	10	39
Denver	40°N + 0	10	40
Flagstaff	40°N + 27*	30	35
Kansas City	40°N + 18	10	39
Los Angeles	40°N – 7	35	34
Minneapolis	40°N + 13	25	45
New York	40°N – 4	5	41
San Francisco	40°N + 10	20	38
Seattle	50°N + 9	20	48
Tucson	40°N + 24*	40	32
Washington	40°N + 8	5	39

**Subtract 60 minutes in the summer.*

2019

JAN	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		

FEB	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		

MAR	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						

APR	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	

JUN	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						

JUL	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			

AUG	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

SEP	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					

OCT	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		

NOV	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

DEC	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				

New Moon dates (UT) are displayed in **blue**.

2020

JAN	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	

FEB	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

MAR	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				

APR	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						

JUN	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				

JUL	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	

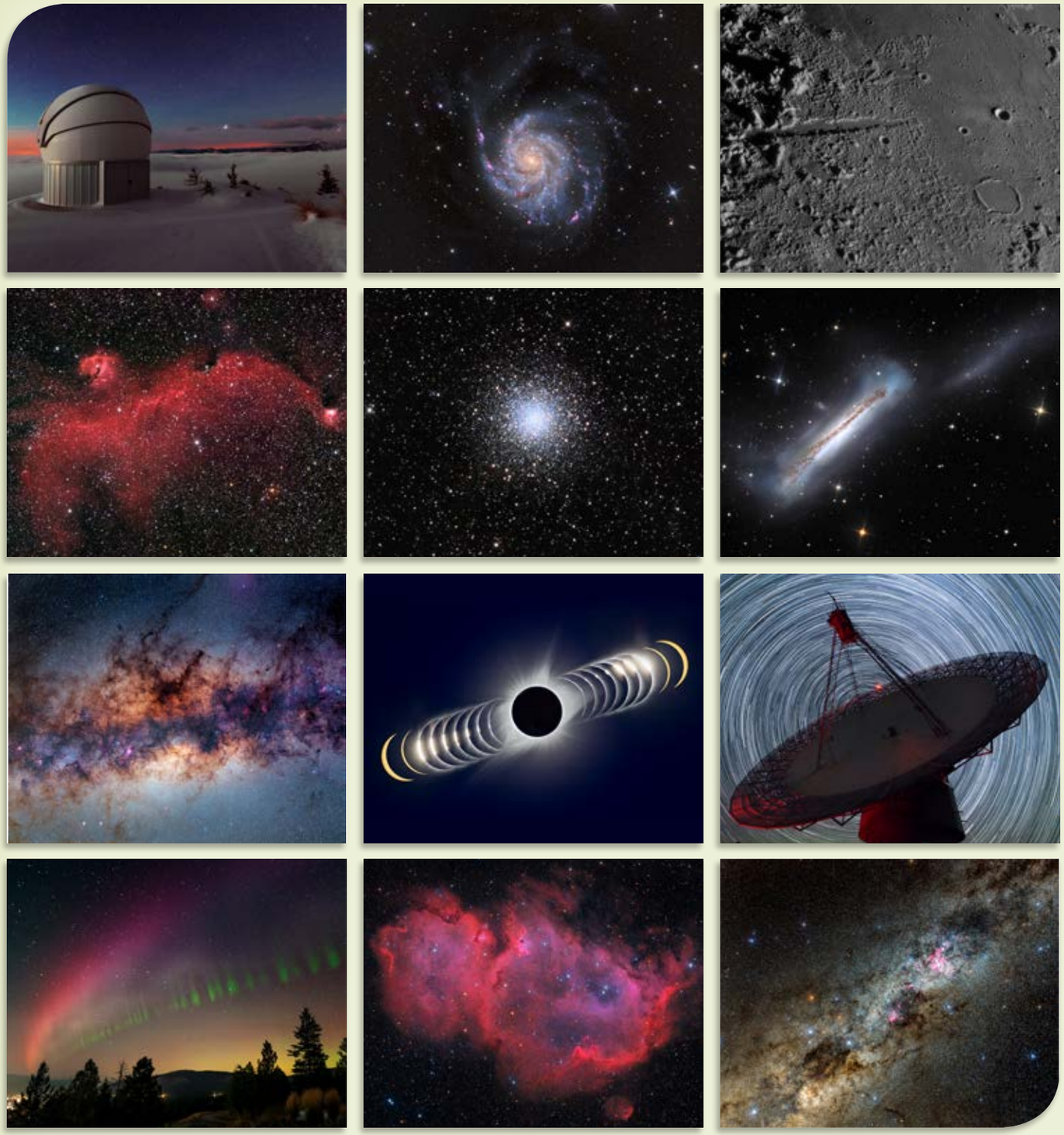
AUG	S	M	T	W	T	F	S
							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					

SEP	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			

OCT	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

NOV	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					

DEC	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		



The Royal Astronomical Society of Canada

Observer's Calendar 2019

All photos in this unique Calendar were taken by members of The Royal Astronomical Society of Canada (RASC) who are astronomy enthusiasts. It was produced by volunteer members of The Royal Astronomical Society of Canada.

This Calendar includes comprehensive listings of astronomical data, such as lunar and planetary conjunctions, Sun and Moon rise and set times, eclipses, meteor showers, and Moon phases.

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