



The Royal Astronomical Society of Canada

*Observer's Calendar*

*1999*



# JANUARY

## Orion's Sword

The icy, bright, stars of Orion's Sword are stunning in binoculars and are seen here, from left to right, in NGC1977 and in the middle and outer edge of M42, the Great Orion Nebula itself. The often-neglected NGC1977 is, in this deep image, spectacular for its range of colours and glowing dust clouds.

Photo by Peter Ceravolo

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<p>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.</p> <p>Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.</p> <p>Please see back pages for photo details and additional information about this calendar.</p>	<p>DECEMBER</p> <p>S M T W T F S</p> <p>1 2 3 4 5</p> <p>6 7 8 9 10 11 12</p> <p>13 14 15 16 17 18 19</p> <p>20 21 22 23 24 25 26</p> <p>27 28 29 30 31</p>	<p>FEBRUARY</p> <p>S M T W T F S</p> <p>1 2 3 4 5 6</p> <p>7 8 9 10 11 12 13</p> <p>14 15 16 17 18 19 20</p> <p>21 22 23 24 25 26 27</p> <p>28</p>			<p>Set 7:15 6:48 Rise 16:11 16:27 Full Moon 21:49</p> <p>1</p>	<p>Set 8:13 7:47 Rise 17:14 17:29</p> <p>2</p> <p>Sunrise 8:03 7:38 Sunset 16:05 16:30</p> <p>Lunik 1, the first Moon probe, 40 years ago</p>
<p>West East Set 9:01 8:38 Rise 18:23 18:35</p> <p>3</p>	<p>Set 9:40 9:21 Rise 19:33 19:42</p> <p>4</p>	<p>Set 10:12 9:58 Rise 20:42 20:47</p> <p>5</p>	<p>Set 10:40 10:29 Rise 21:50 21:51</p> <p>6</p>	<p>Set 11:04 10:58 Rise 22:56 22:53</p> <p>7</p>	<p>Set 11:26 11:24 Rise -- 23:53</p> <p>8</p> <p><i>New Year's Day</i></p>	<p>Rise 0:00 -- Set 11:48 11:50 3rd Quarter 9:22 Sunrise 8:01 7:37 Sunset 16:14 16:37</p> <p>9</p>
<p>Earth at perihelion (147,098 Mm) 8 am Quadrantid meteors peak</p> <p>West East Rise 1:03 0:52 Set 12:11 12:16</p> <p>10</p>	<p>Rise 2:06 1:51 Set 12:35 12:44</p> <p>11</p>	<p>Rise 3:08 2:50 Set 13:02 13:15</p> <p>12</p>	<p>Rise 4:10 3:48 Set 13:34 13:49</p> <p>13</p>	<p>Rise 5:10 4:45 Set 14:12 14:29</p> <p>14</p>	<p>Rise 6:07 5:41 Set 14:57 15:14</p> <p>15</p>	<p>Rise 6:59 6:33 Set 15:49 16:06</p> <p>16</p> <p>Sunrise 7:56 7:34 Sunset 16:24 16:45</p>
<p>West East Rise 7:45 7:21 Set 16:49 17:04 New Moon 10:46</p> <p>17</p>	<p>Rise 8:26 8:04 Set 17:56 18:07</p> <p>18</p>	<p>Rise 9:01 8:43 Set 19:06 19:13</p> <p>19</p>	<p>Rise 9:31 9:18 Set 20:19 20:22</p> <p>20</p>	<p>Rise 9:59 9:51 Set 21:33 21:31</p> <p>21</p>	<p>Rise 10:25 10:21 Set 22:48 22:41</p> <p>22</p>	<p>Rise 10:52 10:52 Set -- 23:52</p> <p>23</p> <p>Sunrise 7:49 7:29 Sunset 16:35 16:55</p>
<p>West East Set 0:04 -- Rise 11:19 11:24 1st Quarter 14:15</p> <p>24</p>	<p>Set 1:20 1:04 Rise 11:50 11:59</p> <p>25</p>	<p>Set 2:36 2:15 Rise 12:25 12:38</p> <p>26</p>	<p>Set 3:50 3:25 Rise 13:07 13:23</p> <p>27</p>	<p>Set 4:58 4:32 Rise 13:57 14:14</p> <p>28</p> <p>Pluto moves closer to Sun than Neptune, till Mar. 14/99, 20 years ago Jupiter 2.3°N of Moon 7 pm</p>	<p>Set 5:59 5:33 Rise 14:56 15:12</p> <p>29</p>	<p>Set 6:51 6:27 Rise 16:01 16:15</p> <p>30</p> <p>Sunrise 7:40 7:22 Sunset 16:47 17:05</p>
<p>West East Set 7:34 7:13 Rise 17:10 17:21 Full Moon 11:06</p> <p>31</p>		<p>First photographs taken at Palomar Observatory, 50 years ago</p>	<p>Moon occults Aldebaran (visible in Quebec and west) 3 am</p>		<p>... A single misty star Which is the second in a line of stars That seem a sword beneath a belt of three, I never gazed upon it but I dreamt Of some vast charm ..."</p> <p>Tennyson Merlin and Vivien</p>	































# FEBRUARY

## An Upward Sweep of Trees and Startrails

Stars write signatures of their colours and therefore of their temperatures in the trails they leave. Between the hot blue and white stars of the Pleiades in the lower right and of Perseus in the upper middle, the reddish smudge of the California Nebula precedes Capella, just left of centre.

Photo by Ben Gendre

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					<p>JANUARY</p> <table border="0"> <tr> <td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td>1</td><td>2</td> </tr> <tr> <td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td> </tr> <tr> <td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td> </tr> <tr> <td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td> </tr> <tr> <td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td> </tr> <tr> <td>31</td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>	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							<p>MARCH</p> <table border="0"> <tr> <td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td> </tr> <tr> <td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td> </tr> <tr> <td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td> </tr> <tr> <td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td> </tr> <tr> <td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td> </tr> <tr> <td>28</td><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td> </tr> </table>	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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# MARCH

## Hale-Bopp Does Perseus

Two years ago, the blue gas tail of the comet ran parallel to Algol up to the brightest congregation of Perseus' stars. Not to be outdone, the dust tail flared out beneath the Double Cluster. Sandwiched between both tails were faint, red regions of glowing hydrogen associated to the smaller double clusters of IC1805 and IC1848.

Photo by Bill Roberts

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY																																																																																					
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<p>☉ Rise 14:26 14:37 West 14:37 14:26 East 14:37 14:26</p> <p><b>14</b></p> <p>Albert Einstein born, 120 years ago Neptune moves closer to Sun than Pluto</p>	<p>☉ Rise 15:38 15:45 5:28 5:11</p> <p><b>15</b></p>	<p>☉ Rise 16:54 16:56 5:59 5:47</p> <p><b>16</b></p>	<p>☉ Rise 18:12 18:09 6:28 6:20 New Moon 13:48</p> <p><b>17</b></p>	<p>☉ Rise 19:32 19:23 6:56 6:53</p> <p><b>18</b></p>	<p>☉ Rise 20:52 20:39 7:24 7:25</p> <p><b>19</b></p> <p>Venus 2.3°N of Saturn (Cr. Moon 4.5° to south) 8 pm</p>	<p>☉ Rise 22:12 21:53 7:53 8:00</p> <p>Sunrise 6:03 6:04 Sunset 18:13 18:12</p> <p><b>20</b></p> <p>Spring Equinox 8:46 pm</p>																																																																																					
<p>☉ Rise 23:29 23:07 West 23:07 23:29 East 23:07 23:29</p> <p><b>21</b></p>	<p>☉ Rise 9:05 -- 9:19 --</p> <p><b>22</b></p> <p>F. Argelander, founder of study of variable stars, born, 200 years ago</p>	<p>☉ Rise 9:49 10:06 0:42 0:17</p> <p><b>23</b></p>	<p>☉ Rise 10:42 10:59 1:48 1:21 Set 10:42 10:59 1st Quarter 5:18</p> <p><b>24</b></p>	<p>☉ Rise 11:41 11:57 2:44 2:18</p> <p><b>25</b></p>	<p>☉ Rise 12:45 12:59 3:31 3:08</p> <p><b>26</b></p>	<p>☉ Rise 13:52 14:02 4:10 3:50</p> <p>Sunrise 5:48 5:51 Sunset 18:24 18:21</p> <p><b>27</b></p>																																																																																					
<p>☉ Set 15:00 15:07 West 15:07 15:00 East 15:07 15:00</p> <p><b>28</b></p> <p>De Laplace, known as the Newton of France, born, 250 years ago</p>	<p>☉ Set 16:08 16:10 5:10 4:58</p> <p><b>29</b></p> <p>Mariner 10 transmits first detailed photos of Mercury, 25 years ago</p>	<p>☉ Set 17:15 17:13 5:34 5:27</p> <p><b>30</b></p>	<p>☉ Set 17:15 17:49 5:57 5:54 Full Moon 18:15 17:49</p> <p><b>31</b></p>	<p>FEBRUARY</p> <table border="1"> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td></tr> <tr><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td></tr> <tr><td>28</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>		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							<p>APRIL</p> <table border="1"> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td></tr> <tr><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr> <tr><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td></td></tr> </table>	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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				<p>"If we are open only to those discoveries which will accord with what we already know, we might as well stay shut."</p> <p>Alan Watts American philosopher</p>																																																																																							





# APRIL

## A Poet's "Blood of the Moon"

The darkness or redness of a total lunar eclipse is determined by the amount of dust present in the Earth's atmosphere at the time; the Danjon number, as described in the RASC Observer's Handbook, quantifies the Moon's shading. More fancifully, the vivid hues evoke a colourful response from the poet.

Photo by Roy Bishop

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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	<p>West East</p> <p>Set 8:32 8:44</p> <p>Rise 23:34 23:13</p> <p>4</p>	<p>Set 9:02 9:17</p> <p>Rise -- --</p> <p>5</p>	<p>Rise 0:34 0:09</p> <p>Set 9:37 9:54</p> <p>6</p>	<p>Rise 1:30 1:04</p> <p>Set 10:19 10:37</p> <p>7</p>	<p>Rise 2:21 1:55</p> <p>Set 11:07 11:25</p> <p>3rd Quarter 22:51</p> <p>8</p>	<p>Good Friday</p> <p>Rise 3:08 2:43</p> <p>Set 12:03 12:19</p> <p>9</p>
<p>Easter Sunday</p> <p>Daylight Savings Time Begins 2 am</p> <p>Zodiacal Light visible in W after evening twilight for next two weeks</p> <p>West East</p> <p>Rise 4:25 4:06</p> <p>Set 14:14 14:23</p> <p>11</p>	<p>Rise 4:57 4:42</p> <p>Set 15:27 15:31</p> <p>12</p>	<p>Rise 5:26 5:16</p> <p>Set 16:43 16:43</p> <p>13</p>	<p>Rise 5:54 5:48</p> <p>Set 18:03 17:57</p> <p>14</p>	<p>Rise 6:21 6:20</p> <p>Set 19:24 19:13</p> <p>15</p>	<p>Rise 6:50 6:54</p> <p>Set 20:47 20:30</p> <p>New Moon 0:22</p> <p>16</p>	<p>Rise 7:22 7:31</p> <p>Set 22:08 21:47</p> <p>Sunrise 6:02 6:13</p> <p>Sunset 19:59 19:48</p> <p>17</p>
<p>Venus 2.8°S of Pleiades 9:30 pm</p> <p>Rise 7:59 8:11</p> <p>Set 23:27 23:02</p> <p>18</p>	<p>Rise 8:42 8:58</p> <p>Set -- --</p> <p>19</p>	<p>Set 0:38 0:11</p> <p>Rise 9:33 9:50</p> <p>20</p>	<p>Set 1:40 1:13</p> <p>Rise 10:32 10:49</p> <p>21</p>	<p>Set 2:31 2:07</p> <p>Rise 11:36 11:51</p> <p>1st Quarter 15:01</p> <p>22</p>	<p>Mercury greatest elong. W (28°) 12 pm</p> <p>Set 3:13 2:52</p> <p>Rise 12:44 12:55</p> <p>23</p>	<p>Set 3:47 3:30</p> <p>Rise 13:52 13:59</p> <p>Sunrise 5:47 6:01</p> <p>Sunset 20:10 19:56</p> <p>24</p>
<p>West East</p> <p>Set 4:15 4:03</p> <p>Rise 14:59 15:03</p> <p>25</p>	<p>Moon occults Aldebaran (visible in prairie provinces) 12 am</p> <p>Set 4:40 4:32</p> <p>Rise 16:06 16:06</p> <p>26</p>	<p>Set 5:03 4:59</p> <p>Rise 17:12 17:07</p> <p>27</p>	<p>Set 5:25 5:24</p> <p>Rise 18:16 18:07</p> <p>28</p>	<p>Lyrid meteors peak 12 pm</p> <p>Set 5:47 5:50</p> <p>Rise 19:20 19:07</p> <p>29</p>	<p>Mars at opposition 2 pm</p> <p>Set 6:10 6:17</p> <p>Rise 20:24 20:07</p> <p>Full Moon 10:55</p> <p>30</p>	


































# MAY

## The Big Dipper Wreathed in an Aurora

Springtime is a good time to stay up for auroral activity, which is on the rise again in response to a new cycle of sunspots. In this example, the colours from excited nitrogen and oxygen atoms manifest themselves as sheets of drapery 100 kilometers above the Earth's circumpolar regions.

Photo by Leo Brodeur

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<p> West 7:03 East 7:17 Set 22:27 Rise 22:03</p> <p><b>2</b></p>	<p> Set 7:36 7:53 Rise 23:24 22:59</p> <p><b>3</b></p>	<p> Set 8:15 8:33 Rise -- 23:51</p> <p><b>4</b></p>	<p> Rise 0:18 -- 9:18 Set 9:00</p> <p><b>5</b></p>	<p> Rise 1:06 0:40 Set 9:53 10:10</p> <p><b>6</b></p>	<p> Rise 1:48 1:24 Set 10:51 11:06</p> <p><b>7</b></p>	<p> Rise 2:25 2:04 Set 11:56 12:07 3rd Quarter 13:28 Sunrise 5:22 5:40 Sunset 20:32 20:14</p> <p><b>8</b></p>
<p> Rise 2:57 2:41 Set 13:05 13:12</p> <p><b>9</b></p>	<p> Rise 3:26 3:14 Set 14:18 14:20</p> <p><b>10</b></p>	<p> Rise 3:53 3:45 Set 15:34 15:31</p> <p><b>11</b></p>	<p> Rise 4:20 4:17 Set 16:53 16:45</p> <p><b>12</b></p>	<p> Rise 4:47 4:48 Set 18:15 18:01</p> <p><b>13</b></p>	<p> Rise 5:16 5:23 Set 19:38 19:19</p> <p><b>14</b></p>	<p> Rise 5:50 6:01 Set 21:00 20:36 New Moon 8:05 Sunrise 5:11 5:31 Sunset 20:43 20:22</p> <p><b>15</b></p>
<p><i>Mother's Day</i> Multiple Mirror Telescope in Arizona dedicated, 20 years ago</p> <p> Rise 6:31 6:45 Set 22:18 21:51</p> <p><b>16</b></p>	<p> Rise 7:19 7:36 Set 23:27 22:59</p> <p><b>17</b></p>	<p> Rise 8:17 8:34 Set -- 23:59</p> <p><b>18</b></p>	<p> Set 0:25 -- 9:37 Rise 9:21</p> <p><b>19</b></p>	<p> Set 1:12 0:49 Rise 10:30 10:43</p> <p><b>20</b></p>	<p> Set 1:50 1:31 Rise 11:40 11:49</p> <p><b>21</b></p>	<p> Set 2:21 2:06 Rise 12:49 12:54 1st Quarter 1:34 Sunrise 5:01 5:24 Sunset 20:53 20:30</p> <p><b>22</b></p>
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<p> Set 5:37 5:53 Rise 21:19 20:54 Full Moon 2:40</p> <p><b>30</b></p>	<p><i>Victoria Day</i></p> <p> Set 6:14 6:31 Rise 22:15 21:48</p> <p><b>31</b></p>	<p><i>Juno at opposition</i></p>				<p><i>International Astronomy Day</i> Moon occults Regulus (visible in eastern Canada) 1 am</p> <p><i>Test of General Relativity during solar eclipse, 80 years ago</i> Farthest Lunar Apogee of 1999 4 am</p>
<p><i>Pluto at opposition</i> 8 pm</p>						





# JUNE

## The Northern Coalsack

In this magnificent wide-field, medium-format portrait of eastern Cygnus, look for a large obscuring cloud of dust between the North American Nebula and the subtle red loops of hydrogen gas around Gamma Cygni (just to lower right of centre): the Northern Coalsack is the beginning of the Great Rift in Cygnus.

Photo by Ben Gendre

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# JULY

## The Veil Nebula at High Power

The braiding of strands in this supernova remnant can be observed through a telescope with high magnification and a high-contrast filter. This CCD image is additionally awash in colours, especially the characteristic blue and green of excited oxygen and the red, which eludes the visual observer, of excited hydrogen.

Photo by Jack Newton

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY																																																																																				
<p>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.</p> <p>Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.</p> <p>Please see back pages for photo details and additional information about this calendar.</p>	<p>JUNE</p> <table border="1"> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr> <tr><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td></tr> <tr><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td></tr> <tr><td>27</td><td>28</td><td>29</td><td>30</td><td></td><td></td><td></td></tr> </table>	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				<p>AUGUST</p> <table border="1"> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr> <tr><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td></tr> <tr><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td></tr> <tr><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td><td></td></tr> </table>	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						<p>☉ Set 7:38 7:52 Rise 23:05 22:45</p> <p><b>1</b></p> <p>☉ Set 8:43 8:54 Rise 23:35 23:19</p> <p><b>2</b></p> <p>☉ Set 9:52 9:58 Rise -- 23:51</p> <p><b>3</b></p> <p>Sunrise 4:51 5:18 Sunset 21:17 20:50</p>		
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<p>☉ Rise 0:02 -- Set 11:03 11:05</p> <p><b>4</b></p> <p>☉ Rise 0:27 0:20 Set 12:16 12:12</p> <p><b>5</b></p> <p>☉ Rise 0:52 0:49 Set 13:31 13:22 3rd Quarter 7:57</p> <p><b>6</b></p> <p>☉ Rise 1:17 1:19 Set 14:47 14:34</p> <p><b>7</b></p> <p>☉ Rise 1:45 1:51 Set 16:06 15:47</p> <p><b>8</b></p> <p>☉ Rise 2:17 2:28 Set 17:24 17:01</p> <p><b>9</b></p> <p>☉ Rise 2:55 3:09 Set 18:41 18:14</p> <p><b>10</b></p> <p>Sunrise 4:57 5:23 Sunset 21:13 20:47</p> <p>2 Shadows on Jupiter (visible in Newfoundland) 12:48 am</p> <p>Earth at aphelion (152,099 Mm) 6 pm</p> <p>Saskatchewan Star Party, Cypress Hills SK (through July 11)</p>																																																																																										
<p>☉ Rise 3:42 3:59 Set 19:50 19:23</p> <p><b>11</b></p> <p>☉ Rise 4:39 4:56 Set 20:50 20:24 New Moon 22:24</p> <p><b>12</b></p> <p>☉ Rise 5:45 6:01 Set 21:39 21:16</p> <p><b>13</b></p> <p>☉ Rise 6:57 7:09 Set 22:19 22:00</p> <p><b>14</b></p> <p>☉ Rise 8:11 8:19 Set 22:51 22:37</p> <p><b>15</b></p> <p>☉ Rise 9:24 9:28 Set 23:18 23:08</p> <p><b>16</b></p> <p>☉ Rise 10:35 10:35 Set 23:42 23:37</p> <p><b>17</b></p> <p>Sunrise 5:05 5:29 Sunset 21:07 20:43</p> <p>Skylab 1 crashes to Earth, 20 years ago</p> <p>Venus 1.2° S of Regulus 10:30 pm</p> <p>Venus at greatest brilliancy 3 pm</p> <p>Venus 2.4° below Moon 10 pm</p>																																																																																										
<p>☉ Rise 11:43 -- Set --</p> <p><b>18</b></p> <p>☉ Set 0:04 0:03 Rise 12:50 12:42</p> <p><b>19</b></p> <p>☉ Set 0:26 0:29 Rise 13:55 13:42 1st Quarter 5:00</p> <p><b>20</b></p> <p>☉ Set 0:49 0:56 Rise 14:59 14:42</p> <p><b>21</b></p> <p>☉ Set 1:13 1:24 Rise 16:01 15:41</p> <p><b>22</b></p> <p>☉ Set 1:41 1:54 Rise 17:03 16:39</p> <p><b>23</b></p> <p>☉ Set 2:13 2:29 Rise 18:01 17:36</p> <p><b>24</b></p> <p>Sunrise 5:14 5:36 Sunset 20:58 20:36</p> <p>Neil Armstrong first man on Moon, 30 years ago</p>																																																																																										
<p>☉ Set 2:51 3:09 Rise 18:56 18:29</p> <p><b>25</b></p> <p>☉ Set 3:36 3:55 Rise 19:45 19:19</p> <p><b>26</b></p> <p>☉ Set 4:29 4:47 Rise 20:29 20:05</p> <p><b>27</b></p> <p>☉ Set 5:29 5:44 Rise 21:06 20:45 Full Moon 7:25</p> <p><b>28</b></p> <p>☉ Set 6:34 6:45 Rise 21:39 21:21</p> <p><b>29</b></p> <p>☉ Set 7:43 7:50 Rise 22:07 21:54</p> <p><b>30</b></p> <p>☉ Set 8:54 8:57 Rise 22:33 22:25</p> <p><b>31</b></p> <p>Sunrise 5:24 5:44 Sunset 20:48 20:28</p> <p>Neptune at opposition 6 am</p> <p>Partial Lunar Eclipse, visible in western N. America 6:22 am</p> <p>S δ-Aquarid meteors peak 2 am</p>																																																																																										




































# AUGUST

## Diamond Ring and Prominences

Normally, a photograph of the Diamond Ring phase of a total solar eclipse blocks out any other details, unless, as here, a short exposure time is employed. This allows the thin, arcing prominence at the upper right and the larger ones at the upper left to have their place in the sun.

Photo by Murray Paulson

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
 West Set 10:06 East Rise 10:04 22:54 1	 Set 11:20 Rise 11:13 23:22 23:23 2	 Set 12:35 Rise 12:23 23:48 23:54 3	 Set 13:52 Rise 13:35 3rd Quarter -- 13:27 4	 Rise 0:18 Set 0:27 15:08 14:47 5	 Rise 0:52 Set 1:06 16:23 15:58 6	 Rise 1:34 Set 1:50 17:34 17:07 7  Sunrise 5:34 5:52 Sunset 20:36 20:19  Mount Kobau Star Party, BC (through August 15) Uranus at opposition 3 pm
α-Aurigid meteors peak 7 am	Civic Holiday					
 West Rise 2:25 East Set 2:43 18:37 18:09 8	 Rise 3:26 Set 3:43 19:30 19:05 9	 Rise 4:34 Set 4:49 20:13 19:52 10	 Rise 5:47 Set 5:58 20:48 20:32 New Moon 7:08 11	 Rise 7:01 Set 7:08 21:18 21:06 12	 Rise 8:14 Set 8:16 21:43 21:36 13	 Rise 9:25 Set 9:22 22:07 22:04 14  Sunrise 5:45 6:00 Sunset 20:23 20:09  Mercury greatest elong. W (19°) 10 am
			Total Solar Eclipse, visible in N Atlantic, Europe & Middle East Partial visible in E. N. America		Perseid meteors peak 2 am	
 West Rise 10:33 East Set 10:27 22:29 22:30 15	 Rise 11:40 Set 11:29 22:51 22:57 16	 Rise 12:45 Set 12:30 23:15 23:24 17	 Rise 13:49 Set 13:30 23:42 23:54 1st Quarter 21:47 18	 Rise 14:51 Set 14:29 -- -- 19	 Set 0:12 Rise 0:27 15:51 15:26 20	 Set 0:47 Rise 1:05 16:47 16:20 21  Sunrise 5:56 6:08 Sunset 20:09 19:57  Venus at inferior conjunction 8 am
 West Set 1:29 East Rise 1:48 17:38 17:12 22	 Set 2:19 Rise 2:37 18:24 17:59 23	 Set 3:16 Rise 3:32 19:04 18:42 24	 Set 4:19 Rise 4:33 19:39 19:20 25	 Set 5:28 Rise 5:37 20:09 19:54 Full Moon 19:48 26	 Set 6:40 Rise 6:44 20:36 20:26 27	 Set 7:53 Rise 7:53 21:02 20:56 28  Sunrise 6:07 6:17 Sunset 19:55 19:45
 West Set 9:09 East Rise 9:03 21:27 21:26 29	 Set 10:25 Rise 10:14 21:52 21:56 30	 Set 11:42 Rise 11:26 22:21 22:29 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 which are given in local 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.	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	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



# SEPTEMBER

## A Cosmic History Lesson

Stellar creation moves from dark clouds of matter to glowing HII star-factories to open clusters. At left of centre in this region of Scorpius is B48's dark nebula, then, in the middle, IC4628's fiery furnace of star-formation, and finally the finished products, such as the open cluster NGC6268 at the upper left and, more expansively, swarms of stars to the lower right of the nebulosity.

Photo by Rajiv Gupta

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	
<p>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.</p> <p>Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.</p> <p>Please see back pages for photo details and additional information about this calendar.</p>	<p>AUGUST</p> <p>S M T W T F S</p> <p>1 2 3 4 5 6 7</p> <p>8 9 10 11 12 13 14</p> <p>15 16 17 18 19 20 21</p> <p>22 23 24 25 26 27 28</p> <p>29 30 31</p>	<p>OCTOBER</p> <p>S M T W T F S</p> <p>1 2</p> <p>3 4 5 6 7 8 9</p> <p>10 11 12 13 14 15 16</p> <p>17 18 19 20 21 22 23</p> <p>24 25 26 27 28 29 30</p> <p>31</p>	<p>West East</p> <p>12:58 12:38</p> <p>Set Rise 22:53 23:06</p> <p>1</p>	<p>14:13 13:49</p> <p>Set Rise 23:32 23:48</p> <p>3rd Quarter 18:17</p> <p>2</p>	<p>15:25 14:58</p> <p>Set Rise -- --</p> <p>3</p>	<p>Rise 0:19 0:37</p> <p>Set 16:29 16:01</p> <p>Sunrise 6:18 6:25</p> <p>Sunset 19:39 19:32</p> <p>4</p>	
	<p>1:15 1:32</p> <p>Set 17:24 16:58</p> <p>5</p>	<p>Rise 2:19 2:35</p> <p>Set 18:09 17:46</p> <p>6</p>	<p>Rise 3:29 3:41</p> <p>Set 18:47 18:28</p> <p>7</p>	<p>Rise 4:41 4:50</p> <p>Set 19:18 19:04</p> <p>8</p>	<p>Rise 5:54 5:58</p> <p>Set 19:44 19:35</p> <p>New Moon 18:02</p> <p>9</p>	<p>Rise 7:06 7:05</p> <p>Set 20:08 20:03</p> <p>10</p>	<p>Rise 8:16 8:11</p> <p>Set 20:31 20:30</p> <p>Sunrise 6:29 6:33</p> <p>Sunset 19:24 19:19</p> <p>11</p>
		<p>Labour Day</p>		<p>Alberta Star Party, Caroline AB (through September 12)</p> <p>Zodiacal Light visible in E before morning twilight for next two weeks</p>			
	<p>9:24 9:15</p> <p>Set 20:53 20:57</p> <p>12</p>	<p>Rise 10:30 10:17</p> <p>Set 21:17 21:24</p> <p>13</p>	<p>Rise 11:35 11:18</p> <p>Set 21:42 21:53</p> <p>14</p>	<p>Rise 12:38 12:17</p> <p>Set 22:10 22:25</p> <p>15</p>	<p>Rise 13:39 13:15</p> <p>Set 22:43 23:00</p> <p>16</p>	<p>Rise 14:37 14:11</p> <p>Set 23:22 23:41</p> <p>1st Quarter 16:06</p> <p>17</p>	<p>Rise 15:30 15:03</p> <p>Set -- --</p> <p>Sunrise 6:39 6:42</p> <p>Sunset 19:08 19:06</p> <p>18</p>
	<p>0:08 0:27</p> <p>Set Rise 16:18 15:52</p> <p>19</p>	<p>Set Rise 1:02 1:19</p> <p>17:00 16:36</p> <p>20</p>	<p>Set Rise 2:02 2:17</p> <p>17:36 17:16</p> <p>21</p>	<p>Set Rise 3:08 3:19</p> <p>18:08 17:52</p> <p>22</p>	<p>Set Rise 4:19 4:26</p> <p>18:37 18:25</p> <p>23</p>	<p>Set Rise 5:33 5:35</p> <p>19:03 18:55</p> <p>24</p>	<p>Set 6:49 6:46</p> <p>Rise 19:28 19:26</p> <p>Full Moon 6:51</p> <p>Sunrise 6:50 6:50</p> <p>Sunset 18:52 18:52</p> <p>25</p>
	<p>8:07 7:58</p> <p>Set Rise 19:54 19:56</p> <p>26</p>	<p>Set Rise 9:26 9:12</p> <p>20:22 20:29</p> <p>27</p>	<p>Set Rise 10:45 10:26</p> <p>20:54 21:05</p> <p>28</p>	<p>Set Rise 12:03 11:40</p> <p>21:31 21:46</p> <p>29</p>	<p>Set Rise 13:17 12:51</p> <p>22:16 22:33</p> <p>30</p>		
<p>Venus at greatest brilliancy 11 am</p>			<p>Moon occults Aldebaran (visible in eastern Canada) 10 pm</p>			<p>"That man can interrogate as well as observe nature was a lesson slowly learned in his evolution."</p> <p>Sir William Osler Canadian physician/anatomist</p>	



# OCTOBER

## The Great Andromeda Galaxy in Colour

The correlation between colours and ages of stars is finely evident in this portrait, which is a unique composite of Technical Pan black-and-white film (for exquisite detail) and Fuji SG800 Plus colour film (for a good range of tints). Consider, for example, how the colours in the young star cloud NGC206 (at lower right) contrast with the range of hues among other Population I stars around it.  
Photo by Peter Ceravolo and Rajiv Gupta

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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<p>☾ Rise 0:10 0:27 Set 16:09 15:45</p> <p><b>3</b></p>	<p>☾ Rise 1:18 1:32 Set 16:48 16:28</p> <p><b>4</b></p>	<p>☾ Rise 2:28 2:38 Set 17:20 17:05</p> <p><b>5</b></p>	<p>☾ Rise 3:40 3:46 Set 17:48 17:36</p> <p><b>6</b></p>	<p>☾ Rise 4:51 4:52 Set 18:12 18:05</p> <p><b>7</b></p>	<p>☾ Rise 6:01 5:58 Set 18:34 18:32</p> <p><b>8</b></p>	<p>☾ Rise 7:09 7:02 Set 18:56 18:58 New Moon Sunrise 7:13 7:08 Sunset 18:21 18:26</p> <p><b>9</b></p>
		<p>Mark Gameau first Canadian in space, 15 years ago</p>		<p>Lunik 3 produces first photos of Moon's far side, 40 years ago</p>	<p>Zodiacal Light visible in E before morning twilight for next two weeks</p>	
<p>☾ Rise 8:16 8:04 Set 19:18 19:25</p> <p><b>10</b></p>	<p>☾ Rise 9:22 9:06 Set 19:43 19:53</p> <p><b>11</b></p>	<p>☾ Rise 10:27 10:07 Set 20:10 20:23</p> <p><b>12</b></p>	<p>☾ Rise 11:29 11:06 Set 20:41 20:57</p> <p><b>13</b></p>	<p>☾ Rise 12:28 12:02 Set 21:17 21:35</p> <p><b>14</b></p>	<p>☾ Rise 13:23 12:56 Set 22:00 22:19</p> <p><b>15</b></p>	<p>☾ Rise 14:13 13:46 Set 22:49 23:08</p> <p>Sunrise 7:25 7:17 Sunset 18:06 18:14</p> <p><b>16</b></p>
	<p>Thanksgiving Day</p>				<p>Ryle and Hewish win first Nobel Prize in radioastronomy, 25 years ago</p>	<p>Siding Spring Mountain Observatory in Australia dedicated, 25 years ago</p>
<p>☾ Rise 14:56 14:31 Set 23:46 -- 1st Quarter</p> <p><b>17</b></p>	<p>☾ Rise 15:34 15:12</p> <p><b>18</b></p>	<p>☾ Rise 16:07 15:48</p> <p><b>19</b></p>	<p>☾ Rise 16:36 16:22</p> <p><b>20</b></p>	<p>☾ Rise 17:03 16:53</p> <p><b>21</b></p>	<p>☾ Rise 17:28 17:23</p> <p><b>22</b></p>	<p>☾ Rise 17:53 17:53</p> <p>Sunrise 7:36 7:26 Sunset 17:52 18:02</p> <p><b>23</b></p>
					<p>Orionid meteors peak 9 am</p>	<p>Jupiter at opposition 3 pm</p>
<p>☾ Rise 18:20 18:25 Full Moon</p> <p><b>24</b></p>	<p>☾ Rise 18:51 19:00</p> <p><b>25</b></p>	<p>☾ Rise 19:26 19:40</p> <p><b>26</b></p>	<p>☾ Rise 20:09 20:26</p> <p><b>27</b></p>	<p>☾ Rise 21:01 21:19</p> <p><b>28</b></p>	<p>☾ Rise 22:01 22:19</p> <p><b>29</b></p>	<p>☾ Rise 23:08 23:23</p> <p>Sunrise 7:48 7:35 Sunset 17:38 17:52</p> <p><b>30</b></p>
<p>Mercury greatest elong. E (24°) 6 pm</p>				<p>2 Shadows on Jupiter (visible east of Ontario) 7:05 pm</p>		<p>Venus greatest elong. W (46°) 8 pm</p>
<p>☾ Rise 23:19 23:30 3rd Quarter</p> <p><b>31</b></p>						
<p>Halloween</p> <p>Daylight Savings Time Ends 2 am</p>						



*NGC 6826 (Blinking Nebula)*



*NGC 2392 (Eskimo Nebula)*



*NGC 7009 (Saturn Nebula)*

































# NOVEMBER

## Oppositions of Planets and Planetaries

This year, both Jupiter and Saturn reach opposition in autumn and are then best placed for viewing events such as a double shadow transit on Jupiter (November 4). The historical misnomer, "planetary nebula," arose because disks of ejected material surrounding a star can look much like a planet; in particular the Saturn Nebula is strikingly similar to the planet Saturn.

Photos by Jack Newton

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY																																																																																																																		
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<p>Regulus 1.2° SW of Moon 5 am</p>				<p>*The scientific theory I like best is that the rings of Saturn are composed entirely of lost airline luggage.*</p> <p>Mark Russell</p>																																																																																																																				





# DECEMBER

## Reflection and Emission Nebulas Around B33

The refinement of detail and the subtle gradation of colours here, as in the earlier portrait of M31, emerge from combining black-and-white and colour photographs. Note how the reflection nebulas reveal blue to purple shadings in contrast to the emission nebulas, whose reds range from hot yellows and oranges to the muted russet glow of hydrogen behind the Horsehead itself. Photo by Peter Ceravolo and Rajiv Gupta

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	
<p>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.</p> <p>Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.</p> <p>Please see back pages for photo details and additional information about this calendar.</p>	<p>NOVEMBER</p> <p>S M T W T F S</p> <p>1 2 3 4 5 6</p> <p>7 8 9 10 11 12 13</p> <p>14 15 16 17 18 19 20</p> <p>21 22 23 24 25 26 27</p> <p>28 29 30</p>	<p>JANUARY</p> <p>S M T W T F S</p> <p>1</p> <p>2 3 4 5 6 7 8</p> <p>9 10 11 12 13 14 15</p> <p>16 17 18 19 20 21 22</p> <p>23 24 25 26 27 28 29</p> <p>30 31</p>	<p>West East</p> <p>Rise 0:41 0:41</p> <p>Set 13:47 13:42</p> <p>1</p>	<p>Rise 1:50 1:45</p> <p>Set 14:08 14:08</p> <p>2</p>	<p>Rise 2:56 2:48</p> <p>Set 14:29 14:33</p> <p>3</p>	<p>Rise 4:02 3:49</p> <p>Set 14:51 14:59</p> <p>4</p> <p>Sunrise 7:45 7:21</p> <p>Sunset 15:55 16:19</p>	
	<p>West East</p> <p>Rise 5:07 4:50</p> <p>Set 15:15 15:26</p> <p>5</p>	<p>Rise 6:11 5:50</p> <p>Set 15:42 15:57</p> <p>6</p>	<p>Rise 7:13 6:49</p> <p>Set 16:14 16:32</p> <p>New Moon</p> <p>17:32</p> <p>7</p>	<p>Rise 8:12 7:45</p> <p>Set 16:52 17:11</p> <p>8</p>	<p>Rise 9:06 8:38</p> <p>Set 17:36 17:56</p> <p>9</p>	<p>Rise 9:54 9:27</p> <p>Set 18:27 18:46</p> <p>10</p>	<p>Rise 10:36 10:10</p> <p>Set 19:25 19:41</p> <p>11</p> <p>Sunrise 7:53 7:28</p> <p>Sunset 15:53 16:18</p>
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	<p>Mars 2.0°W of Moon</p> <p>7 pm</p> <p>West East</p> <p>Set 3:40 3:23</p> <p>Rise 14:12 14:22</p> <p>19</p>	<p>Set 5:01 4:39</p> <p>Rise 14:47 15:00</p> <p>20</p>	<p>Set 6:22 5:56</p> <p>Rise 15:30 15:46</p> <p>21</p>	<p>Set 7:39 7:10</p> <p>Rise 16:23 16:41</p> <p>Full Moon</p> <p>12:31</p> <p>22</p>	<p>Set 8:47 8:18</p> <p>Rise 17:27 17:45</p> <p>23</p>	<p>Set 9:42 9:16</p> <p>Rise 18:40 18:55</p> <p>24</p>	<p>Set 10:26 10:04</p> <p>Rise 19:56 20:07</p> <p>25</p> <p>Sunrise 8:02 7:37</p> <p>Sunset 15:58 16:23</p>
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<p>Boxing Day</p>		<p>Aldebaran 0.7°E of Moon</p> <p>4 am</p>	<p>Winter Solstice</p> <p>Closest Lunar Perigee of 1999</p> <p>Largest Full Moon of 1999</p> <p>Ursid meteors peak</p> <p>2:44 am</p> <p>6 am</p> <p>7 pm</p>	<p>Mercury greatest elong. W (20°)</p> <p>(best morning view in 1999)</p> <p>8 pm</p>		<p>E. Hubble's discovery of cepheid variables announced, 75 years ago</p>	

# The Royal Astronomical Society of Canada Observer's Calendar

## How to Use this Calendar

A pictorial representation of the Moon's phase at midday is given in each daily box. The size of the Moon in the Calendar varies from day to day reflecting the change in the apparent size of the Moon in the sky as it moves closer to or further from the Earth.

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. Special astronomical events, such as eclipses, meteor showers, occultations, interesting planetary events, and equinoxes and solstices, are given at the bottom of the boxes.

The Calendar lists events observable in some part of Canada. Days on which particularly interesting phenomena occur are highlighted with a light green shading. Detailed information on all events, including their visibility from particular locations, may be determined by consulting the *RASC Observer's Handbook*.

### Adjusting Times for Actual Location

All times are adjusted for Daylight Savings 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).

Two sets of rise and set times are given to accommodate observers across Canada. The *West* times displayed are computed for location 51° N latitude and 105° W longitude (near Regina). The *East* times are for 45° N, 75° W (near Ottawa). The actual times for a given location must be calculated using the table above.

The table gives a correction in minutes to the tabulated rise and set times for each RASC Centre. In the column labelled **Correction**, an entry such as *East + 25* means add 25 minutes to the displayed *East* time. This computed time is an approximation. In the column labelled **Accuracy**, the maximum error in minutes for Moon rise and set using this method is indicated. The error for Sun rise and set is less.

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.

Location	Correction	Accuracy	Latitude
Victoria	West + 13	19	47.8
Vancouver	West + 12	13	49.2
Okanagan	West - 2	9	49.7
Calgary	West + 36	2	51.1
Edmonton	West + 34	15	53.6
Saskatoon	West + 67 <sup>(1)</sup>	5	52.1
Regina	West + 58 <sup>(1)</sup>	3	50.5
Winnipeg	West + 29	7	49.9
Thunder Bay	West + 57	16	48.4
Windsor	East + 32	15	42.3
Sarnia	East + 30	12	42.9
London	East + 25	12	43.0
Kitchener	East + 22	10	43.4
Hamilton	East + 20	11	43.2
Toronto	East + 18	7	43.7
Niagara	East + 16	11	43.1
Kingston	East + 6	4	44.2
Ottawa	East + 3	3	45.4
Montreal	East - 6	3	45.5
Quebec	East - 15	9	46.8
Halifax	East + 14	6	44.6
St. John's	East + 1	17	47.5

<sup>(1)</sup> Subtract 60 min. from these computed times in the summer.

For other locations, 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. A table with values for various locations can be found in the *RASC Observer's Handbook*. This correction factor should be added to the displayed *West* or *East* time corresponding to the closest of these two locations to the user's site. The accuracy in minutes for Moon rise and set can be calculated by multiplying the difference in latitude between the user's location and that of the *West* or *East* site used by 5 and adding 0.2 times the difference in longitude.

Further improvement in accuracy may be obtained for some sites by interpolating or extrapolating the *West* and *East* times depending on the user's latitude. Latitudes of all RASC Centres are given in the table. For example, the latitude of Thunder Bay is approximately midway between those of the *West* and *East* sites. An observer in Thunder Bay can improve accuracy to 3 minutes by averaging the given *West* and *East* times and then adding the correction factor for Thunder Bay, which is 57 minutes.

## The Royal Astronomical Society of Canada

Since it was founded in 1890, the RASC has filled a special role in astronomy. Its amateur and professional astronomers have made significant observational contributions to astronomical research. The RASC also takes pride in the role it plays in educating the general public about astronomy. Today the RASC consists of over 3200 members, most of whom are attached to one of its 23 Centres across Canada.

### National Publications

The *RASC Observer's Handbook* has been published since 1908 and is recognized worldwide as the leading handbook of its type. It lists the astronomical events of the year and other astronomical data, and is indispensable to amateur and professional astronomers alike. The *Beginner's Observing Guide* is an introduction to the night sky for the novice observer.

The RASC also publishes the bimonthly *Journal*, which contains articles of interest to amateur and professional astronomers. These include survey articles, original research papers, and items of an historical, biographical or educational nature.

### An Invitation for Membership in the Royal Astronomical Society of Canada

Anyone with an interest in astronomy would benefit from membership in the Society. An applicant may affiliate with one of the 23 Centres across Canada, located in the cities shown in the table above. For the addresses of any of the Centres, information on joining the Society, or to order an RASC publication, please contact the National Office at:

136 Dupont Street  
 Toronto, Ontario, M5R 1V2  
 888-924-7272 (toll free) or 416-924-7973  
 Email: rasc@rasc.ca  
 Web: <http://www.rasc.ca>

Production of the Calendar was computer assisted. The monthly grids with data were almost entirely computer-generated, using custom software. Photos were scanned using a flatbed scanner and digitally processed using *Adobe Photoshop*.

A variety of equipment was used for the photos, with details given at the right. All photographs were taken by members of the RASC, using personal equipment. The centre affiliation of each photographer is given in the credits below.

#### Editing and Production

Rajiv Gupta

#### Editorial Assistance

David Lane  
Gary Seronik  
Anu Nayar  
Doug George

#### Photographs

Roy Bishop (Halifax)  
Leo Brodeur (Kingston)  
Peter Ceravolo (Ottawa)  
Ben Gendre (Edmonton)  
Rajiv Gupta (Vancouver)  
Jack Newton (Victoria)  
Murray Paulson (Edmonton)  
Bill Roberts (Vancouver)

#### Monthly Grids and Astronomical Data

Rajiv Gupta  
David Lane  
Patrick Kelly

#### Captions

Lee Johnson

#### Historical Anniversaries

Diane Brooks  
David Chapman

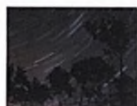
Comments about the Calendar, and enquiries about photo submissions may be sent via electronic mail to [gupta@interchange.ubc.ca](mailto:gupta@interchange.ubc.ca) or by contacting the RASC National Office.



**Cover/December:** *Reflection and Emission Nebulas Around B33.* 45-minute exposure on medium-format Kodak Pro 100 film using a 7.2-inch f/2.4 Maksutov astrograph (Peter Ceravolo) and a 70-minute exposure on medium-format gas-hypersensitized Kodak Technical Pan black-and-white film using a 5-inch f/6 Astrophysics refractor (Rajiv Gupta), digitally combined using the software package *RegiStar*.



**January:** *Orion's Sword.* 45-minute exposure on medium-format Kodak Pro 100 film using a 7.2-inch f/2.4 Maksutov astrograph.



**February:** *An Upward Sweep of Trees and Star-Tracks.* 50-minute exposure on medium-format Kodak PPF Pro 400 film, fixed-tripod using a Mamiya 645 camera with a 55-mm lens at f/5.6.



**March:** *Hale-Bopp Does Perseus.* 5-minute exposure on medium-format Kodak Pro PMZ 1000 film, unguided piggyback using a Bronica ETRSI 645 camera with a 75-mm lens at f/2.8.



**April:** *A Poet's "Blood of the Moon."* 15-second exposure on Kodachrome 200 film using a 4-inch f/6.6 Astrophysics refractor, September 26/27, 1996.



**May:** *The Big Dipper Wreathed in Aurora.* 14-second exposure on Fuji Super G 800 film, fixed-tripod using a 28-mm f/2.8 lens, November 9, 1997.



**June:** *The Northern Coalsack.* 30-minute exposure on medium-format Kodak Pro PPF 400 film using a Mamiya 645 camera with a 150-mm lens at f/4.5.



**July:** *The Veil Nebula at High Power.* 5-minute red-filtered, 20-minute green-filtered, and 20-minute blue-filtered exposures on a Meade Pictor 1616XT CCD-camera using a Meade LX200 16-inch SCT at f/6.3.



**August:** *Diamond Ring and Prominences.* 1/125-second exposure on Kodak Royal Gold 100 film using a 3.7-inch Brandon refractor with a 2X tele-extender.



**September:** *A Cosmic History Lesson.* 50- and 70-minute yellow-filtered exposures and 100-minute red-filtered exposures on gas-hypersensitized medium-format Kodak Technical Pan black-and-white film using a 5-inch f/6 Astrophysics refractor, digitally combined using *RegiStar*.



**October:** *The Great Andromeda Galaxy in Colour.* 60-minute exposure on Fuji SG 800 Plus colour film using a 5.7-inch f/4.5 Maksutov Newtonian (Peter Ceravolo) and a 70-minute exposure on medium-format gas-hypersensitized Kodak Technical Pan black-and-white film using a 5-inch f/6 Astrophysics refractor (Rajiv Gupta), digitally combined using *RegiStar*.



**November:** *Oppositions of Planets and Planetaries.* Jupiter and Saturn: 3/100-second red-filtered, 3/10-second green-filtered, and 1-2/10-second blue-filtered exposures on a Meade 1616XT CCD-camera using a Meade LX200 16-inch SCT at f/30, taken Aug. 24, 1997 and Sep. 21, 1997 respectively. Planetaries: 1-minute red, 5-minute green, and 5-minute blue exposures as above, at f/10.

1999

January							February							March										
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S				
					1	2				1	2	3	4	5	6				1	2	3	4	5	6
3	4	5	6	7	8	9	7	8	9	10	11	12	13	7	8	9	10	11	12	13				
10	11	12	13	14	15	16	14	15	16	17	18	19	20	14	15	16	17	18	19	20				
17	18	19	20	21	22	23	21	22	23	24	25	26	27	21	22	23	24	25	26	27				
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31																								
April							May							June										
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4	5	6	7	8	9	10	2	3	4	5	6	7	4	5	6	7	8	9	10	11	12			
11	12	13	14	15	16	17	9	10	11	12	13	14	13	14	15	16	17	18	19					
18	19	20	21	22	23	24	16	17	18	19	20	21	20	21	22	23	24	25	26					
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31							30	31																
July							August							September										
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18	19	20	21	22	23	24	22	23	24	25	26	27	19	20	21	22	23	24	25					
25	26	27	28	29	30	31	29	30	31				26	27	28	29	30							
October							November							December										
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S				
					1	2						1												
3	4	5	6	7	8	9	7	8	9	10	11	12	5	6	7	8	9	10	11					
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17	18	19	20	21	22	23	21	22	23	24	25	26	19	20	21	22	23	24	25					
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31																								

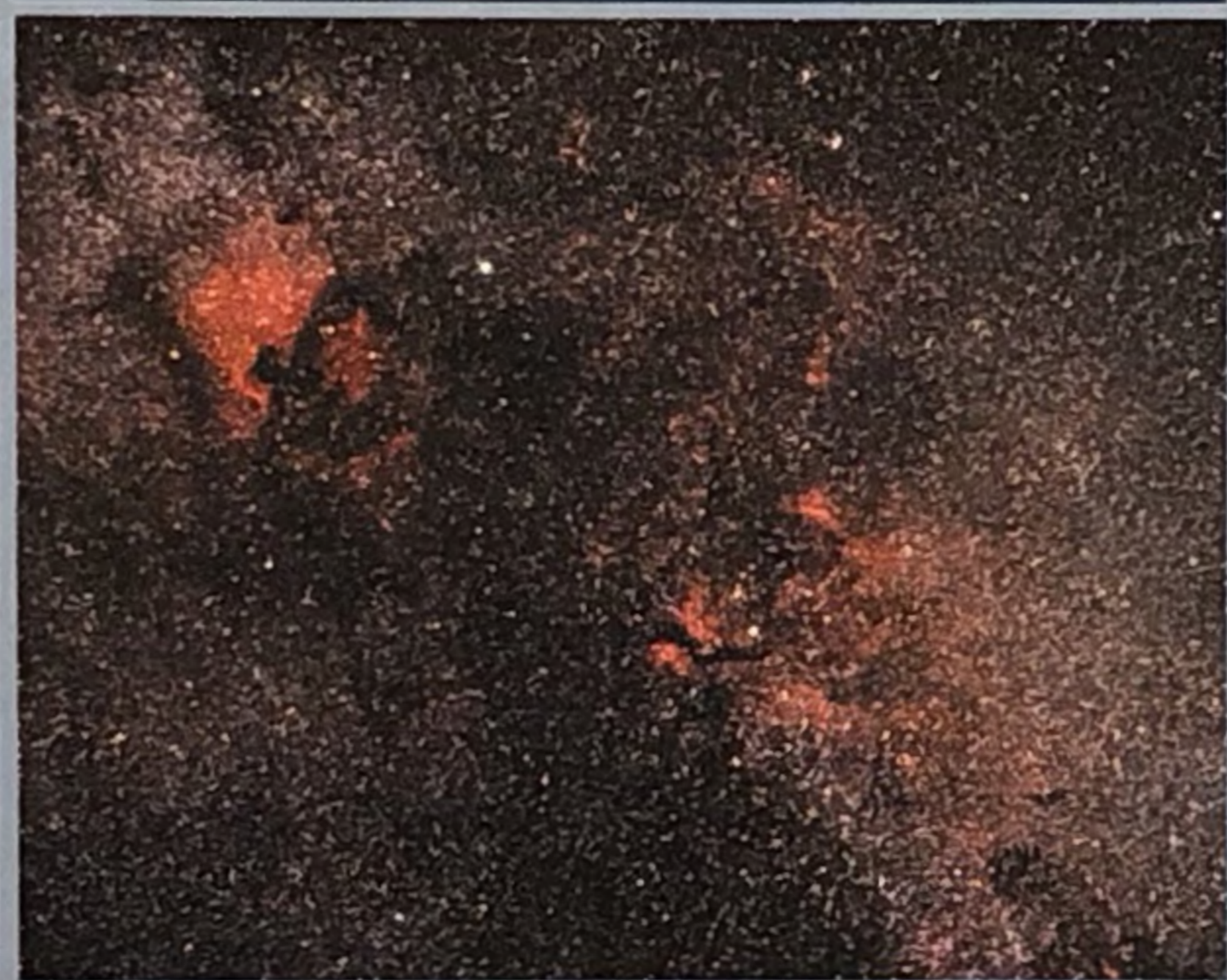
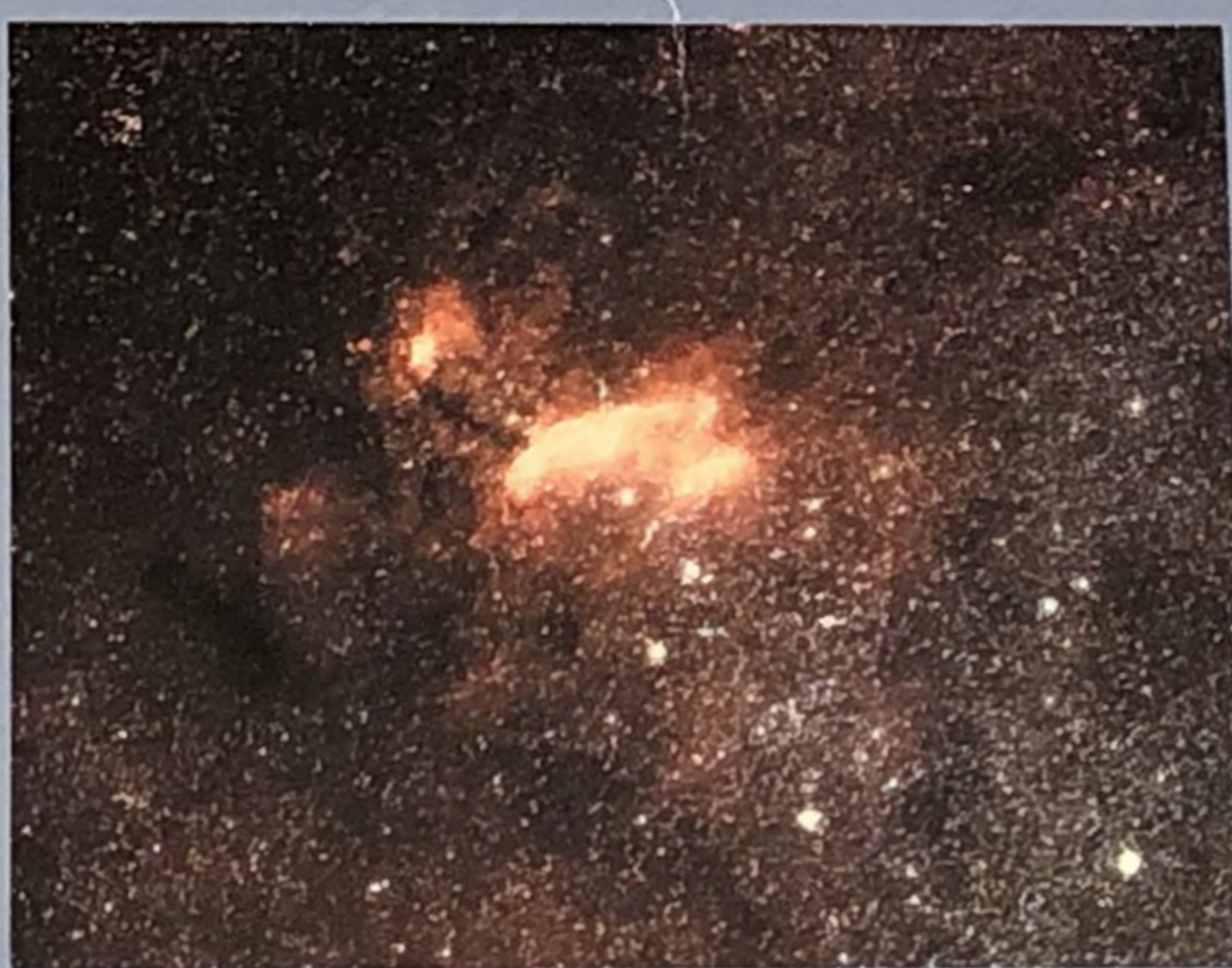
2000

January							February							March									
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S			
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April							May							June									
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					1	2						1											
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9	10	11	12	13	14	15	14	15	16	17	18	19	11	12	13	14	15	16	17				
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23	24	25	26	27	28	29	28	29	30	31			25	26	27	28	29	30					
30																							
July							August							September									
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S			
					1	2						1											
3	4	5	6	7	8	9	6	7	8	9	10	11	3	4	5	6	7	8	9				
10	11	12	13	14	15	16	13	14	15	16	17	18	10	11	12	13	14	15	16				
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30	31																						
October							November							December									
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					1	2						1											
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22	23	24	25	26	27	28	19	20	21	22	23	24	17	18	19	20	21	22	23				
29	30	31					26	27	28	29	30		24	25	26	27	28	29	30				

New Moon Dates are displayed in bold.

*"Before the heavens and Earth existed  
There was something nebulous.  
Silent, infinite, unfathomable,  
Without beginning or end ..."*

Book of Tao



*This award-winning calendar was created by members of the Royal Astronomical Society of Canada. All photographs were taken by amateur astronomers using ordinary camera lenses and small telescopes.*

*This calendar is designed with the observer in mind. An informative caption accompanies every photograph. Comprehensive astronomical data such as significant lunar and planetary conjunctions, daily Moon rise and set times, eclipses, and meteor showers, is included.*

	Rise	1 14	1 15	<b>13</b>		Rise
	Set	2 31	2 25			Set
Einstein X-ray Observatory launched 20 years ago						
N Taurid meteors peak 1am						
Mars 3.5° E of Moon 5am						
	Rise	8 30	8 06	<b>20</b>		Rise
	Set	5 36	5 53			Set

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