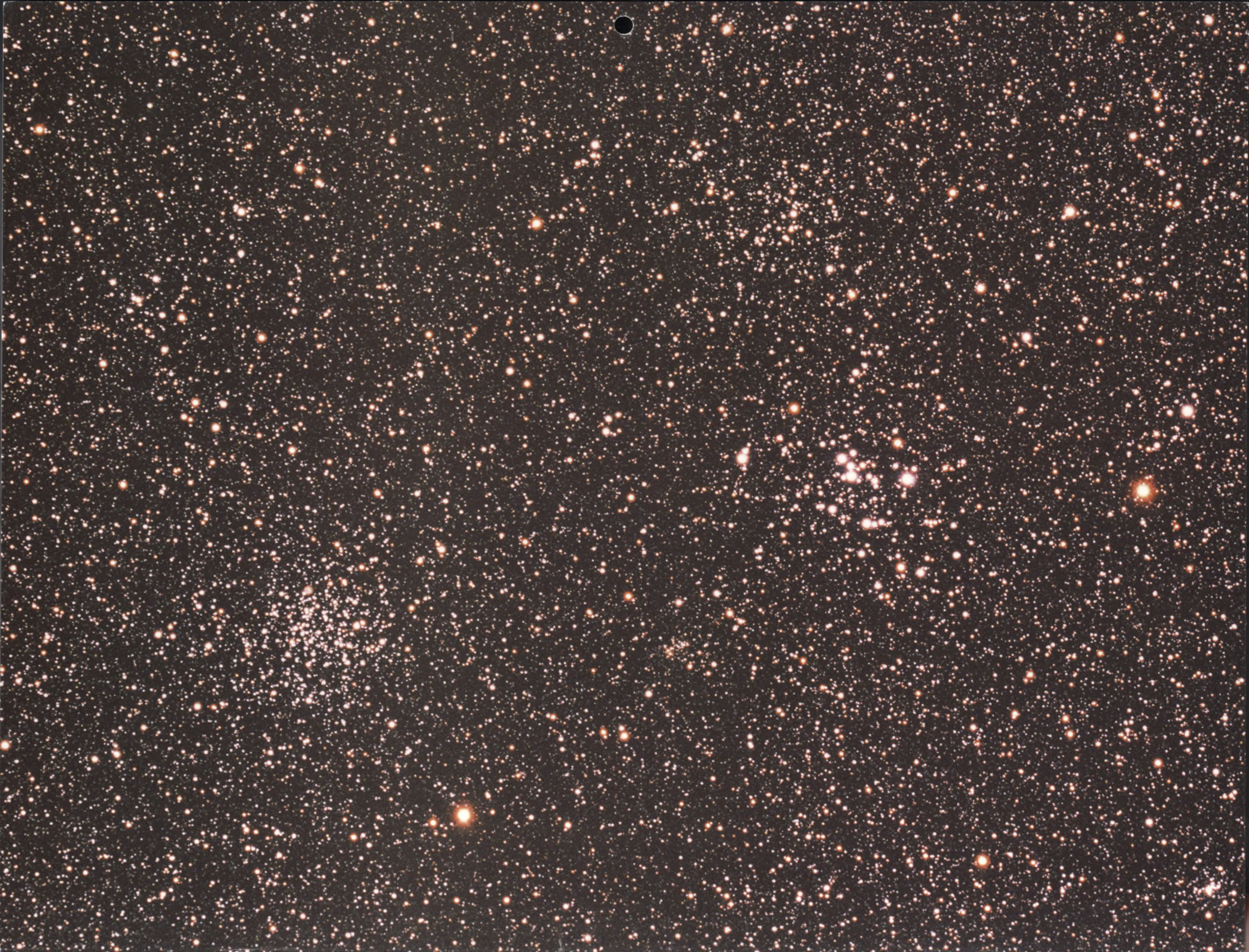
The Royal Astronomical Society of Canada

Observer's Calendar

1998



JANUARY

Binocular Clusters M46 and M47

East of Sirius, M47 in Puppis stands out as a naked-eye open cluster in the right half of this picture. Nearby clusters provide contrast: loose, open NGC 2423 above M47; small, compact NGC 2474 in the lower right corner; and large, fine M46 to the left with the foreground object, planetary NGC 2438, on its northern edge.

Photo by Peter Ceravolo

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
All times are given in the 12-hour clock; a dot to the left of an hour indicates pm. 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.*	DECEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	FEBRUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28		West East Rise 9:49 9:33 Set ˙8:05 ˙8:11 **1** *New Year's Day* ***Jupiter 2.0° S of Moon 6pm***	Rise 10:23 10:11 Set ˙9:21 ˙9:23 **2**	Rise 10:53 10:45 Set ˙10:37 ˙10:34 **3** Sunrise 8:03 7:38 Sunset ˙4:06 ˙4:31 ***Quadrantid meteors peak 12pm***
West East Rise 11:21 11:18 Set ˙11:53 ˙11:46 **4** ***Earth at perihelion (147,099 Mm) 4pm***	Rise 11:49 11:51 Set -- -- *1st Quarter* 9:18 **5**	Set 1:09 12:56 Rise ˙12:19 ˙12:24 **6** ***Mercury greatest elong. W (23°) 10am***	Set 2:23 2:06 Rise ˙12:50 ˙1:00 **7**	Set 3:35 3:15 Rise ˙1:26 ˙1:39 **8**	Set 4:44 4:21 Rise ˙2:08 ˙2:23 **9** *Death of Caroline Herschel, first major woman astronomer, 150 years ago* ***Aldebaran 1.2° above Moon 7am***	Set 5:48 5:23 Rise ˙2:56 ˙3:11 **10** Sunrise 8:00 7:37 Sunset ˙4:15 ˙4:38
West East Set 6:44 6:20 Rise ˙3:50 ˙4:05 **11**	Set 7:33 7:10 Rise ˙4:49 ˙5:03 *Full Moon* ˙12:24 **12**	Set 8:14 7:54 Rise ˙5:51 ˙6:02 **13**	Set 8:48 8:32 Rise ˙6:55 ˙7:03 **14**	Set 9:18 9:05 Rise ˙7:59 ˙8:03 **15**	Set 9:44 9:35 Rise ˙9:02 ˙9:02 **16**	Set 10:08 10:03 Rise ˙10:04 ˙10:01 **17** Sunrise 7:55 7:34 Sunset ˙4:26 ˙4:47
West East Set 10:31 10:29 Rise ˙11:06 ˙10:59 **18**	Set 10:54 10:55 Rise -- ˙11:58 **19**	Rise 12:09 -- Set 11:18 11:23 *3rd Quarter* ˙2:40 **20** ***Mars 0.2° S of Jupiter 8pm***	Rise 1:11 12:56 Set 11:44 11:52 **21**	Rise 2:14 1:56 Set ˙12:13 ˙12:25 **22**	Rise 3:18 2:56 Set ˙12:49 ˙1:03 **23**	Rise 4:20 3:56 Set ˙1:31 ˙1:46 **24** Sunrise 7:48 7:28 Sunset ˙4:37 ˙4:57
West East Rise 5:20 4:54 Set ˙2:22 ˙2:37 **25**	Rise 6:14 5:50 Set ˙3:22 ˙3:36 **26**	Rise 7:03 6:41 Set ˙4:30 ˙4:42 **27**	Rise 7:45 7:27 Set ˙5:44 ˙5:52 *New Moon* 1:01 **28**	Rise 8:22 8:08 Set ˙7:02 ˙7:05 **29** ***Mars 1.5° to left of Moon 7pm***	Rise 8:55 8:45 Set ˙8:21 ˙8:19 **30**	Rise 9:25 9:20 Set ˙9:39 ˙9:33 **31** Sunrise 7:38 7:21 Sunset ˙4:49 ˙5:06 *Explorer I: first US space satellite, 40 years ago*

FEBRUARY

Photographing a Total Solar Eclipse

Eclipse-chasers this month might hope to capture some of the detail in this picture of the July, 1991, event. Crucial to the sharpness of the solar prominence featured here, for example, are the precision of focus, the use of a finely-grained film, and, surprisingly for this calendar, a short exposure time.

Photo by Rajiv Gupta

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 West East Rise 9:54 9:53 Set ˙10:57 ˙10:46 ***Saturn 2° to right of Moon 7pm***	**2** Rise 10:23 10:27 Set -- ˙11:57	**3** Set 12:13 -- Rise 10:54 11:02 *1st Quarter* ˙5:53	**4** Set 1:26 1:07 Rise 11:29 11:40	**5** Set 2:36 2:13 Rise ˙12:08 ˙12:22	**6** Set 3:40 3:16 Rise ˙12:53 ˙1:08 *Death of photographic astronomer Edward E. Barnard, 75 years ago*	**7** Set 4:38 4:14 Rise ˙1:43 ˙1:59 Sunrise 7:27 7:12 Sunset ˙5:02 ˙5:16
8 West East Set 5:29 5:05 Rise ˙2:40 ˙2:54	**9** Set 6:12 5:50 Rise ˙3:40 ˙3:52	**10** Set 6:48 6:30 Rise ˙4:42 ˙4:52	**11** Set 7:20 7:05 Rise ˙5:46 ˙5:51 *Full Moon* 5:23 ***Regulus 2°N of Moon 7pm***	**12** Set 7:47 7:36 Rise ˙6:49 ˙6:51	**13** Set 8:12 8:05 Rise ˙7:52 ˙7:50	**14** Set 8:35 8:32 Rise ˙8:54 ˙8:49 Sunrise 7:15 7:03 Sunset ˙5:15 ˙5:26 *Valentine's Day* *Birth of astrophysicist Fritz Zwicky, 100 years ago* ***Zodiacal Light visible in W after evening twilight for next two weeks***
15 West East Set 8:58 8:58 Rise ˙9:56 ˙9:47	**16** Set 9:21 9:25 Rise ˙10:58 ˙10:45	**17** Set 9:46 9:53 Rise -- ˙11:44	**18** Rise 12:00 -- Set 10:14 10:24	**19** Rise 1:02 12:42 Set 10:46 10:59 *3rd Quarter* 10:27 ***Venus at greatest brilliancy 9pm***	**20** Rise 2:04 1:41 Set 11:23 11:38	**21** Rise 3:03 2:39 Set ˙12:09 ˙12:24 Sunrise 7:01 6:52 Sunset ˙5:27 ˙5:36
22 West East Rise 3:59 3:34 Set ˙1:02 ˙1:18	**23** Rise 4:50 4:27 Set ˙2:05 ˙2:19	**24** Rise 5:36 5:15 Set ˙3:16 ˙3:26	**25** Rise 6:15 5:59 Set ˙4:33 ˙4:39	**26** Rise 6:51 6:38 Set ˙5:53 ˙5:54 *New Moon* ˙12:26 ***Total Solar Eclipse, visible in N of S Amer. and Carribean***	**27** Rise 7:23 7:15 Set ˙7:15 ˙7:10	**28** Rise 7:53 7:51 Set ˙8:36 ˙8:27 Sunrise 6:47 6:40 Sunset ˙5:39 ˙5:46
				All times are given in the 12-hour clock; a dot to the left of an hour indicates pm. 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.*	JANUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	MARCH S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

MARCH

Comet Hale-Bopp's Closest Approach

Perseus and its prominent open cluster, M34, provided the backdrop for the Great Comet of 1997 as it rounded the Sun. The comet's impressive size dwarfs that of the bright cluster, whose diameter approximates the full Moon. In this close-up, individual strands stand out in the blue gas tail, which easily rivals the dust tail in length.

Photo by Ben Gendre

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 West East Rise 8:24 8:26 Set ˙9:55 ˙9:42 *First RASC Centre newsletter published, by Montreal Centre, 50 years ago*	**2** Rise 8:55 9:01 Set ˙11:12 ˙10:54	**3** Rise 9:29 9:40 Set -- --	**4** Set 12:26 12:04 Rise 10:08 10:21 ***Occultation Aldebaran 0.4° N of Moon (visible from parts of USA) 7pm***	**5** Set 1:33 1:09 Rise 10:51 11:06 *1st Quarter* 3:41	**6** Set 2:34 2:09 Rise 11:40 11:56	**7** Set 3:26 3:02 Rise ˙12:35 ˙12:50 Sunrise 6:32 6:27 Sunset ˙5:51 ˙5:55
8 West East Set 4:11 3:49 Rise ˙1:33 ˙1:46	**9** Set 4:49 4:30 Rise ˙2:34 ˙2:45	**10** Set 5:22 5:06 Rise ˙3:37 ˙3:44	**11** Set 5:50 5:38 Rise ˙4:40 ˙4:43	**12** Set 6:16 6:07 Rise ˙5:42 ˙5:42 *Full Moon* ˙11:34	**13** Set 6:39 6:35 Rise ˙6:45 ˙6:41	**14** Set 7:02 7:01 Rise ˙7:47 ˙7:39 Sunrise 6:16 6:15 Sunset ˙6:03 ˙6:05
15 West East Set 7:25 7:28 Rise ˙8:49 ˙8:37	**16** Set 7:49 7:55 Rise ˙9:51 ˙9:35 ***Zodiacal Light visible in W after evening twilight for next two weeks***	**17** Set 8:16 8:25 Rise ˙10:53 ˙10:34	**18** Set 8:46 8:58 Rise ˙11:53 ˙11:32 *Discovery of Comet Kohoutek, 25 years ago*	**19** Set 9:20 9:35 Rise -- -- ***Mercury greatest elong. E (19°) 11pm***	**20** Rise 12:53 12:29 Set 10:01 10:17 ***Spring Equinox 2:55pm***	**21** Rise 1:49 1:24 Set 10:50 11:06 *3rd Quarter* 2:38 Sunrise 6:01 6:02 Sunset ˙6:15 ˙6:14
22 West East Rise 2:40 2:16 Set 11:47 ˙12:02	**23** Rise 3:27 3:04 Set ˙12:52 ˙1:04	**24** Rise 4:08 3:49 Set ˙2:04 ˙2:13	**25** Rise 4:44 4:30 Set ˙3:22 ˙3:25	**26** Rise 5:17 5:07 Set ˙4:42 ˙4:41	**27** Rise 5:49 5:43 Set ˙6:04 ˙5:58 *New Moon* ˙10:14 ***Venus greatest elong. W (47°) 2pm***	**28** Rise 6:19 6:19 Set ˙7:27 ˙7:15 Sunrise 5:45 5:48 Sunset ˙6:26 ˙6:23 ***Closest Lunar Perigee of 1998 2am***
29 West East Rise 6:51 6:55 Set ˙8:48 ˙8:32	**30** Rise 7:25 7:33 Set ˙10:06 ˙9:46	**31** Rise 8:03 8:15 Set ˙11:19 ˙10:56		*All times are given in the 12-hour clock; a dot to the left of an hour indicates pm. 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.*		

FEBRUARY

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

APRIL

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

Clockwise from above: M51 (Canes Venatici), M101 & M81 (Ursa Major)

APRIL

Three Great Spirals by the Big Dipper

So many galaxies appear in the region of the Big Dipper because there we are looking away from the obscuring plane of our own Milky Way. The three spirals featured here, which are among the brightest and closest, reveal subtle gradations in the colours of their stellar populations from nuclei to arms and even from one arm to the next.

Photos by Jack Newton

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West East Set 3:51 3:31 Rise ˙1:27 ˙1:38 **5** *Pioneer 11 launched to Jupiter and Saturn, 25 years ago* ***Daylight Savings Time Begins 2am***	Set 4:25 4:08 Rise ˙2:29 ˙2:37 **6**	Set 4:55 4:41 Rise ˙3:32 ˙3:37 **7**	Set 5:21 5:11 Rise ˙4:35 ˙4:35 **8**	Set 5:44 5:39 Rise ˙5:37 ˙5:34 **9**	Set 6:07 6:05 Rise ˙6:39 ˙6:32 **10** *Good Friday*	Set 6:30 6:31 Rise ˙7:41 ˙7:31 **11** *Full Moon* ˙6:23 Sunrise 6:14 6:23 Sunset ˙7:49 ˙7:40
West East Set 6:53 6:58 Rise ˙8:44 ˙8:29 **12** *Easter Sunday*	Set 7:19 7:27 Rise ˙9:46 ˙9:28 **13**	Set 7:47 7:59 Rise ˙10:47 ˙10:26 **14**	Set 8:20 8:34 Rise ˙11:47 ˙11:23 **15**	Set 8:59 9:15 Rise -- -- **16**	Rise 12:44 12:19 Set 9:44 10:00 **17**	Rise 1:36 1:11 Set 10:37 10:53 **18** Sunrise 5:59 6:10 Sunset ˙8:01 ˙7:49
West East Rise 2:23 2:00 Set 11:38 11:51 *3rd Quarter* ˙3:53 **19**	Rise 3:05 2:44 Set ˙12:45 ˙12:55 **20**	Rise 3:41 3:25 Set ˙1:57 ˙2:03 **21**	Rise 4:15 4:02 Set ˙3:14 ˙3:15 **22** ***Jupiter 0.6° E of Venus 5am*** ***Lyrid meteors peak 6am***	Rise 4:45 4:38 Set ˙4:33 ˙4:30 **23** ***Venus 0.5° NE of Jupiter 5am*** ***Moon 2° to E of Venus/Jupiter 5am***	Rise 5:15 5:12 Set ˙5:55 ˙5:46 **24**	Rise 5:45 5:47 Set ˙7:17 ˙7:03 **25** Sunrise 5:45 5:59 Sunset ˙8:12 ˙7:58
West East Rise 6:18 6:24 Set ˙8:38 ˙8:19 *New Moon* 7:41 **26**	Rise 6:54 7:04 Set ˙9:56 ˙9:33 **27** *Comet Meier: first comet discovered from Canada, 20 years ago*	Rise 7:35 7:48 Set ˙11:08 ˙10:43 **28**	Rise 8:22 8:38 Set -- ˙11:46 **29**	Set 12:12 -- Rise 9:16 9:31 **30**		

MAY

Darkness and Light in the Southern Milky Way

Northern observers may be surprised by the extent of the Coal Sack dark nebula, which is over 5 degrees across. To its right lie the bright stars of Crux, the Southern Cross. Other bright stars include alpha and beta Centauri in the upper left corner. Moving to the lower right of the Coal Sack, the compact glow of IC 2948 anticipates the Eta Carina Nebula, a showpiece of celestial light.

Photo by Anu Nayar

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West East Set 2:28 2:09 **3** Rise ˙12:19 ˙12:29 *1st Quarter* 6:04	Set 2:59 2:44˙ **4** Rise ˙1:23 ˙1:29 ***Mercury greatest elong. W (27°) 1pm***	Set 3:26 3:15 **5** Rise ˙2:26 ˙2:28 ***η-Aquarid meteors peak 12am***	Set 3:50 3:43 **6** Rise ˙3:28 ˙3:27	Set 4:13 4:09 **7** Rise ˙4:30 ˙4:25	Set 4:35 4:35 **8** Rise ˙5:33 ˙5:23	Set 4:58 5:02 **9** Rise ˙6:35 ˙6:22 Sunrise 5:20 5:38 Sunset ˙8:34 ˙8:15
West East Set 5:23 5:30 **10** Rise ˙7:38 ˙7:21 *Mother's Day*	Set 5:50 6:00 **11** Rise ˙8:40 ˙8:20 *Full Moon* 10:29	Set 6:21 6:35 **12** Rise ˙9:42 ˙9:19	Set 6:58 7:13 **13** Rise ˙10:40 ˙10:15	Set 7:41 7:57 **14** Rise ˙11:34 ˙11:09 *Sky Lab I launched by the United States, 25 years ago*	Set 8:31 8:48 **15** Rise -- ˙11:59	Rise 12:23 -- **16** Set 9:29 9:44 Sunrise 5:09 5:30 Sunset ˙8:45 ˙8:23
West East Rise 1:06 12:44 **17** Set 10:34 10:45	Rise 1:44 1:25 **18** Set 11:43 11:51 *Victoria Day*	Rise 2:17 2:03 **19** Set ˙12:56 ˙1:00 *3rd Quarter* 12:35	Rise 2:47 2:37 **20** Set ˙2:12 ˙2:11	Rise 3:16 3:11 **21** Set ˙3:30 ˙3:24	Rise 3:44 3:44 **22** Set ˙4:49 ˙4:38	Rise 4:14 4:18 **23** Set ˙6:09 ˙5:53 Sunrise 5:00 5:23 Sunset ˙8:54 ˙8:31 ***Saturn 2.6° above Moon 5am***
West East Rise 4:47 4:55 **24** Set ˙7:28 ˙7:08	Rise 5:25 5:37 **25** Set ˙8:44 ˙8:20 *New Moon* ˙3:32	Rise 6:09 6:23 **26** Set ˙9:54 ˙9:28	Rise 6:59 7:15 **27** Set ˙10:54 ˙10:29	Rise 7:57 8:12 **28** Set ˙11:45 ˙11:21 ***Pluto at opposition 1am*** ***Venus 0.6° W of Saturn 5am***	Rise 8:59 9:13 **29** Set -- --	Set 12:26 12:06 **30** Rise 10:04 10:15 Sunrise 4:53 5:18 Sunset ˙9:03 ˙8:38
West East Set 1:01 12:44 **31** Rise 11:09 11:16						

JUNE

IC 2948: A Southern Star Factory

Midway between the Coal Sack and the Eta Carina Nebula is IC 2948, here seen in detail. The star-forming concentrations of hydrogen are interconnected by subtle arcs and loops which contrast with streaks and fingers of dark nebulosity. The open cluster NGC 3766 stands out among the 100,000 stars recorded in the digital processing of this image.

Photo by Rajiv Gupta

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7 West East Set 3:53 4:02 Rise ·6:30 ·6:11	**8** Set 4:22 4:34 Rise ·7:33 ·7:10	**9** Set 4:57 5:11 Rise ·8:33 ·8:09	**10** Set 5:38 5:54 Rise ·9:30 ·9:05 *Full Moon* 12:18	**11** Set 6:26 6:43 Rise ·10:22 ·9:57	**12** Set 7:22 7:38 Rise ·11:07 ·10:45	**13** Set 8:25 8:38 Rise ·11:47 ·11:27 Sunrise 4:45 5:13 Sunset ·9:15 ·8:48
14 West East Set 9:34 9:43 Rise -- --	**15** Rise 12:21 12:06 Set 10:45 10:51	**16** Rise 12:52 12:41 Set ·12:00 ·12:00 *Valentina Tereshkova first woman in space, 35 years ago*	**17** Rise 1:20 1:14 Set ·1:15 ·1:11 *3rd Quarter* 6:38 ***Jupiter 2.2° to left of Moon*** ***3am***	**18** Rise 1:48 1:46 Set ·2:32 ·2:23 *RASC General Assembly, Victoria (through June 22)*	**19** Rise 2:16 2:18 Set ·3:49 ·3:35	**20** Rise 2:46 2:53 Set ·5:06 ·4:48 Sunrise 4:45 5:13 Sunset ·9:18 ·8:50
21 West East Rise 3:20 3:31 Set ·6:22 ·6:00 *Father's Day* ***Summer Solstice*** ***10:03am***	**22** Rise 4:00 4:13 Set ·7:34 ·7:09 *James Christy discovered Pluto's moon Charon, 20 years ago*	**23** Rise 4:46 5:02 Set ·8:39 ·8:13 *New Moon* ·11:50	**24** Rise 5:40 5:56 Set ·9:34 ·9:10 *St.-Jean-Baptiste Day*	**25** Rise 6:40 6:55 Set ·10:21 ·9:59	**26** Rise 7:45 7:57 Set ·10:59 ·10:40	**27** Rise 8:51 9:00 Set ·11:31 ·11:16 Sunrise 4:48 5:15 Sunset ·9:18 ·8:51
28 West East Rise 9:57 10:03 Set ·11:58 ·11:48	**29** Rise 11:02 11:04 Set -- --	**30** Set 12:23 12:16 Rise ·12:06 ·12:04 *Birth of J. D. Cassini IV, 250 years ago*				

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						

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	

JULY

Star-Cloud M24 and Region

Near the centre of this image of the Milky Way in northwestern Sagittarius, the small, dark nebula B92 rests incongruously along one edge of M24's intense swarm of stars. A fine sight in binoculars, M24 is surrounded by several other Messier objects: the hydrogen regions of M16 and M17 at the left, and the open clusters M18 at the centre and M25 prominent at the lower right.

Photo by Murray Paulson

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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West East Set 2:23 2:34 Rise ˙5:19 ˙4:58 **5**	Set 2:55 3:09 Rise ˙6:21 ˙5:57 **6**	Set 3:33 3:49 Rise ˙7:20 ˙6:55 **7**	Set 4:18 4:35 Rise ˙8:15 ˙7:50 **8**	Set 5:12 5:28 Rise ˙9:04 ˙8:40 *Full Moon* ˙12:01 **9**	Set 6:14 6:28 Rise ˙9:47 ˙9:26 **10**	Set 7:22 7:32 Rise ˙10:24 ˙10:07 **11** Sunrise 4:58 5:24 Sunset ˙9:12 ˙8:47
West East Set 8:34 8:41 Rise ˙10:56 ˙10:44 **12**	Set 9:49 9:51 Rise ˙11:26 ˙11:18 **13**	Set 11:04 11:02 Rise ˙11:54 ˙11:50 **14**	Set ˙12:21 ˙12:13 Rise -- -- **15**	Rise 12:21 12:22 Set ˙1:37 ˙1:25 *3rd Quarter* 11:13 **16** ***Mercury greatest elong. E (27°) 11pm***	Rise 12:50 12:55 Set ˙2:53 ˙2:36 **17** ***Saturn 2.9°N of Moon 1am***	Rise 1:22 1:31 Set ˙4:08 ˙3:47 **18** Sunrise 5:06 5:30 Sunset ˙9:05 ˙8:42
West East Rise 1:58 2:10 Set ˙5:19 ˙4:55 **19**	Rise 2:40 2:55 Set ˙6:25 ˙6:00 **20**	Rise 3:30 3:46 Set ˙7:24 ˙6:59 **21**	Rise 4:26 4:42 Set ˙8:14 ˙7:50 **22**	Rise 5:28 5:42 Set ˙8:56 ˙8:35 *New Moon* 9:44 **23** ***Neptune at opposition 4pm***	Rise 6:33 6:44 Set ˙9:30 ˙9:14 **24**	Rise 7:40 7:47 Set ˙10:00 ˙9:47 **25** Sunrise 5:16 5:37 Sunset ˙8:56 ˙8:35
West East Rise 8:46 8:50 Set ˙10:26 ˙10:17 **26**	Rise 9:51 9:51 Set ˙10:49 ˙10:45 **27**	Rise 10:55 10:50 Set ˙11:12 ˙11:11 **28** ***S δ-Aquarid meteors peak 8pm***	Rise 11:58 11:49 Set ˙11:35 ˙11:37 **29**	Rise ˙1:00 ˙12:48 Set ˙11:58 -- **30**	Set -- 12:05 Rise ˙2:02 ˙1:47 *1st Quarter* 8:05 **31**	

AUGUST

Barnard's Snake (B72)

E. E. Barnard observed and catalogued many dark nebulae, which abound in this region of Ophiuchus. The Snake itself is just above centre. Its unusual shape contrasts with more typically amorphous examples. Observing dark nebulae visually is a challenge that depends on the large-scale contrast provided by transparent skies and a rich stellar background.

Photo by John Mirtle

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
All times are given in the 12-hour clock; a dot to the left of an hour indicates pm. 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				Rise ˙3:05 ˙2:45 Set -- -- Sunrise 5:26 5:45 Sunset ˙8:46 ˙8:27 **1** ***α*-Aurigid meteors peak 1am**
West East Set 12:54 1:06 Rise ˙4:06 ˙3:44 **2**	Set 1:29 1:43 Rise ˙5:06 ˙4:42 **3** *Civic Holiday* ***Uranus at opposition 3am***	Set 2:10 2:26 Rise ˙6:03 ˙5:38 **4** ***Venus 0.9° S of Mars 5am***	Set 3:00 3:16 Rise ˙6:55 ˙6:30 **5**	Set 3:58 4:13 Rise ˙7:41 ˙7:19 **6**	Set 5:04 5:16 Rise ˙8:22 ˙8:03 *Full Moon* ˙10:10 **7**	Set 6:16 6:24 Rise ˙8:57 ˙8:42 Sunrise 5:36 5:53 Sunset ˙8:34 ˙8:17 **8**
West East Set 7:32 7:36 Rise ˙9:28 ˙9:18 **9** ***Saturn's rings at max. inclination of 1998 (16.72° S)***	Set 8:49 8:48 Rise ˙9:57 ˙9:52 **10**	Set 10:07 10:02 Rise ˙10:25 ˙10:25 **11** ***Jupiter 3.1° W of Moon 12am***	Set 11:25 11:15 Rise ˙10:54 ˙10:58 **12** ***Perseid meteors peak 8pm***	Set ˙12:42 ˙12:27 Rise ˙11:25 ˙11:33 **13**	Set ˙1:58 ˙1:38 Rise -- -- *3rd Quarter* ˙3:48 **14**	Rise 12:00 12:11 Set ˙3:10 ˙2:47 Sunrise 5:47 6:02 Sunset ˙8:21 ˙8:07 **15**
West East Rise 12:39 12:54 Set ˙4:17 ˙3:52 **16**	Rise 1:25 1:41 Set ˙5:17 ˙4:52 **17**	Rise 2:18 2:34 Set ˙6:09 ˙5:45 **18**	Rise 3:17 3:32 Set ˙6:53 ˙6:31 **19** *Mount Kobau Star Party, B.C. (through August 23)*	Rise 4:20 4:33 Set ˙7:30 ˙7:12 **20** *Starfest, Mount Forest, Ont. (through August 23)*	Rise 5:26 5:35 Set ˙8:01 ˙7:47 *New Moon* ˙10:03 **21** ***Annular Solar Eclipse (visible from eastern Asia)***	Rise 6:32 6:37 Set ˙8:28 ˙8:18 Sunrise 5:58 6:10 Sunset ˙8:07 ˙7:55 **22** ***2 Shadows on Jupiter 10:20pm (visible in E of N America)***
West East Rise 7:37 7:38 Set ˙8:53 ˙8:46 **23**	Rise 8:42 8:39 Set ˙9:16 ˙9:13 **24**	Rise 9:45 9:38 Set ˙9:38 ˙9:39 **25**	Rise 10:48 10:37 Set ˙10:01 ˙10:06 **26**	Rise 11:50 11:36 Set ˙10:26 ˙10:34 **27**	Rise ˙12:52 ˙12:34 Set ˙10:54 ˙11:05 **28**	Rise ˙1:53 ˙1:32 Set ˙11:26 ˙11:40 Sunrise 6:09 6:18 Sunset ˙7:52 ˙7:43 **29**
West East Rise ˙2:53 ˙2:29 Set -- -- *1st Quarter* 1:06 **30** ***Venus 2.6° E of Mercury 5am***	Set 12:03 12:19 Rise ˙3:50 ˙3:25 **31** ***Mercury greatest elong. W (18°) 5am***					

In the image of Hyakutake (below) note the detached tail segment and galaxy M101 nearby. Further along and below the tail a keen eye may also discern M51.

Sharing the portrait of Hale-Bopp (above) is the Double Cluster in Perseus.

5-minute exposures on Kodak Gold 400 film, 50 mm lens at f/2.0

SEPTEMBER

A Tale of Two Comets

There could be no better way of comparing the Great Comets of 1996 and 1997 than this: portraits on the same scale using identical equipment, exposures, and film from the same location. What a contrast there is between the delicate but dramatic extension of Hyakutake's tail in a dark sky and the classic structure of Hale-Bopp's twin gas and dust tails.

Photos by Gary Seronik

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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West East Set 6:25 6:26 Rise ˙7:56 ˙7:49 *Full Moon* 7:21 **6** ***Venus 0.8° N of Regulus*** ***6am*** ***Jupiter 1.5° N of Moon*** ***11pm***	Set 7:45 7:42 Rise ˙8:26 ˙8:23 **7** *Labour Day*	Set 9:06 8:57 Rise ˙8:55 ˙8:57 **8**	Set 10:26 10:12 Rise ˙9:26 ˙9:32 **9**	Set 11:45 11:26 Rise ˙10:00 ˙10:10 **10** ***Mercury 0.4° to left of Venus*** ***7am***	Set ˙1:00 ˙12:38 Rise ˙10:39 ˙10:52 **11**	Set ˙2:10 ˙1:45 Rise ˙11:23 ˙11:39 *3rd Quarter* ˙9:58 **12** Sunrise 6:30 6:35 Sunset ˙7:21 ˙7:17 ***Occultation Aldebaran 0.4° N of Moon (visible in eastern N Amer.)*** ***3am***
West East Set ˙3:13 ˙2:47 Rise -- -- **13**	Rise 12:14 12:30 Set ˙4:07 ˙3:42 **14**	Rise 1:11 1:26 Set ˙4:53 ˙4:30 **15** ***Jupiter at opposition*** ***11pm***	Rise 2:12 2:26 Set ˙5:31 ˙5:12 **16** *Alberta Star Party, Caroline Alberta (through September 20)*	Rise 3:16 3:26 Set ˙6:03 ˙5:48 **17** ***Mars 2.9° N of Moon*** ***7am***	Rise 4:22 4:28 Set ˙6:31 ˙6:20 **18** ***Regulus 1.0° N of Moon*** ***6am***	Rise 5:26 5:29 Set ˙6:56 ˙6:49 **19** Sunrise 6:41 6:43 Sunset ˙7:05 ˙7:03 ***Zodiacal Light visible in E before morning twilight for next two weeks***
West East Rise 6:31 6:30 Set ˙7:20 ˙7:16 *New Moon* ˙1:01 **20**	Rise 7:34 7:29 Set ˙7:42 ˙7:42 **21**	Rise 8:37 8:28 Set ˙8:05 ˙8:08 **22**	Rise 9:40 9:27 Set ˙8:29 ˙8:36 **23** ***Fall Equinox*** ***1:37am***	Rise 10:42 10:25 Set ˙8:55 ˙9:06 **24**	Rise 11:43 11:23 Set ˙9:25 ˙9:38 **25**	Rise ˙12:43 ˙12:20 Set ˙10:00 ˙10:15 **26** Sunrise 6:52 6:52 Sunset ˙6:49 ˙6:50
West East Rise ˙1:40 ˙1:16 Set ˙10:41 ˙10:57 **27** *First comet photo (Donali's Comet) taken, 140 years ago*	Rise ˙2:34 ˙2:09 Set ˙11:29 ˙11:46 *1st Quarter* ˙5:11 **28**	Rise ˙3:23 ˙2:59 Set -- -- **29**	Set 12:25 12:41 Rise ˙4:07 ˙3:45 **30**		AUGUST S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	OCTOBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

OCTOBER

Aurora with Comet

Comet Hale-Bopp was gratifyingly sturdy, even in twilight or, as here, during an auroral display. Note the delicate tints of red at the top and bottom of the finely detailed curtains of the aurora. A fixed-tripod shot such as this is a starting point for astrophotography but can present great challenges in artistic composition.

Photo by Murray Paulson

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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West East Set 5:15 5:14 Rise ·6:22 ·6:17 **4** ***Jupiter 1.4° above Moon 5am***	Set 6:37 6:30 Rise ·6:52 ·6:51 **5** *Full Moon* ·4:12 *Edwin Hubble proved Andromeda Nebula is extragalactic, 75 years ago*	Set 7:59 7:47 Rise ·7:23 ·7:27 **6** ***Mars 1.0° N of Regulus 5am*** ***Saturn 2.8° N of Moon 9pm***	Set 9:21 9:05 Rise ·7:56 ·8:05 **7**	Set 10:41 10:21 Rise ·8:34 ·8:46 **8** *Birth of Ejnar Hertzsprung, 125 years ago*	Set 11:57 11:33 Rise ·9:18 ·9:33 **9**	Set ·1:05 ·12:39 Rise ·10:08 ·10:24 **10** Sunrise 7:15 7:09 Sunset ·6:18 ·6:24
West East Set ·2:04 ·1:38 Rise ·11:04 ·11:20 **11**	Set ·2:53 ·2:29 Rise -- -- *3rd Quarter* 7:11 **12** *Thanksgiving Day*	Rise 12:05 12:19 Set ·3:34 ·3:13 **13**	Rise 1:09 1:20 Set ·4:07 ·3:51 **14**	Rise 2:14 2:21 Set ·4:36 ·4:23 **15**	Rise 3:18 3:22 Set ·5:02 ·4:53 **16**	Rise 4:23 4:23 Set ·5:25 ·5:20 **17** Sunrise 7:27 7:18 Sunset ·6:03 ·6:12
West East Rise 5:26 5:22 Set ·5:47 ·5:46 **18**	Rise 6:29 6:21 Set ·6:09 ·6:12 **19** ***Zodiacal Light visible in E before morning twilight for next two weeks***	Rise 7:32 7:20 Set ·6:33 ·6:39 **20** *New Moon* 6:09	Rise 8:34 8:18 Set ·6:58 ·7:07 **21** ***Furthest Lunar Apogee of 1998 1am***	Rise 9:36 9:17 Set ·7:26 ·7:39 **22** ***Orionid meteors peak 3am***	Rise 10:36 10:14 Set ·7:59 ·8:14 **23** ***Saturn at opposition 3pm***	Rise 11:35 11:10 Set ·8:37 ·8:54 **24** Sunrise 7:38 7:27 Sunset ·5:49 ·6:00
West East Rise 11:29 11:04 Set ·8:22 ·8:39 **25** ***Daylight Savings Time Ends 2am***	Rise ·12:20 11:54 Set ·9:14 ·9:31 **26**	Rise ·1:04 ·12:41 Set ·10:14 ·10:28 **27**	Rise ·1:44 ·1:23 Set ·11:20 ·11:30 **28** *1st Quarter* 6:46	Rise ·2:19 ·2:02 Set -- -- **29**	Set 12:31 12:37 Rise ·2:50 ·2:38 **30**	Set 1:46 1:48 Rise ·3:20 ·3:12 **31** Sunrise 6:50 6:37 Sunset ·4:36 ·4:50 *Halloween*

NOVEMBER

The Heart of Winter

This sweeping panorama of the winter Milky Way encompasses all of Orion on the right half and Monoceros on the left. Barnard's Loop of red nebulosity sweeps in an arc past the bright Orion Nebula at the lower right and seems to have echoes of its subtle luminosity in the head of Orion as well as in the upper left of the picture just beyond the Rosette Nebula.

Photo by Ben Gendre

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 West East Set 3:05 3:01 Rise 3:48 3:45	**2** Set 4:26 4:17 Rise 4:17 4:19	**3** Set 5:49 5:34 Rise 4:49 4:55 *Mariner 10 launched to Mercury and Venus, 25 years ago* ***S Taurid meteors peak 2am*** ***Saturn 2.1° N of Moon 4am***	**4** Set 7:11 6:52 Rise 5:25 5:35 *Full Moon* 12:18 ***Largest Full Moon of 1998***	**5** Set 8:32 8:09 Rise 6:06 6:20 ***Occultation Aldebaran 0.2° N of Moon (visible in eastern N Amer.) 9pm***	**6** Set 9:47 9:21 Rise 6:55 7:11	**7** Set 10:53 10:27 Rise 7:51 8:07 Sunrise 7:03 6:47 Sunset 4:24 4:40
8 West East Set 11:48 11:23 Rise 8:52 9:07	**9** Set 12:34 12:11 Rise 9:57 10:10	**10** Set 1:11 12:52 Rise 11:03 11:12 *3rd Quarter* 7:28	**11** Set 1:41 1:27 Rise -- --	**12** Rise 12:09 12:15 Set 2:08 1:57	**13** Rise 1:14 1:15 Set 2:31 2:25 *Einstein X-ray Observatory launched, 20 years ago* ***N Taurid meteors peak 1am*** ***Mars 3.5° E of Moon 5am***	**14** Rise 2:18 2:15 Set 2:53 2:51 Sunrise 7:15 6:56 Sunset 4:14 4:32
15 West East Rise 3:21 3:14 Set 3:15 3:16 *Birth of William Herschel, 260 years ago*	**16** Rise 4:24 4:13 Set 3:38 3:43	**17** Rise 5:26 5:12 Set 4:02 4:10 ***Leonid meteors peak 12pm***	**18** Rise 6:28 6:10 Set 4:29 4:40 *New Moon* 11:27 *Remembrance Day* ***Mercury greatest elong. E (23°) 4am***	**19** Rise 7:30 7:09 Set 5:00 5:14	**20** Rise 8:30 8:06 Set 5:36 5:53	**21** Rise 9:27 9:01 Set 6:19 6:36 Sunrise 7:26 7:05 Sunset 4:05 4:26
22 West East Rise 10:19 9:53 Set 7:09 7:26	**23** Rise 11:05 10:41 Set 8:05 8:21	**24** Rise 11:46 11:24 Set 9:08 9:20	**25** Rise 12:21 12:03 Set 10:16 10:24	**26** Rise 12:53 12:38 Set 11:27 11:31 *1st Quarter* 7:22	**27** Rise 1:21 1:11 Set -- -- ***Jupiter 1.3° N of Moon 8pm***	**28** Set 12:42 12:41 Rise 1:48 1:43 Sunrise 7:37 7:14 Sunset 3:59 4:21
29 West East Set 1:59 1:53 Rise 2:16 2:15	**30** Set 3:18 3:07 Rise 2:45 2:49			*All times are given in the 12-hour clock; a dot to the left of an hour indicates pm. 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.*	OCTOBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	DECEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

DECEMBER

The Rosette Nebula

In this detailed consideration of the Rosette Nebula in Monoceros, the open cluster NGC 2244, which is visible in binoculars, lies at its heart and may help to account for the generally symmetrical shape of the entire complex. Note the small but intense dark patches within the nebulosity; also known as Bok Globules, they are probably the locations of forming proto-stars.

Photo by Rajiv Gupta

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
All times are given in the 12-hour clock; a dot to the left of an hour indicates pm. 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.*		West East Set 4:39 4:23 Rise ·3:17 ·3:25 **1**	Set 6:00 5:39 Rise ·3:54 ·4:07 **2**	Set 7:19 6:54 Rise ·4:39 ·4:54 *Full Moon* 10:19 **3** ***Occultation Aldebaran 0.2° N of Moon (visible in NW of N Amer.)*** ***8am***	Set 8:32 8:05 Rise 5:32 5:48 **4** *Pioneer 10 closest approach to Jupiter, 25 years ago*	Set 9:35 9:08 Rise ·6:32 ·6:48 **5** Sunrise 7:46 7:22 Sunset ·3:55 ·4:19
West East Set 10:27 10:03 Rise ·7:38 ·7:52 **6**	Set 11:09 10:48 Rise ·8:46 ·8:57 **7**	Set 11:43 11:27 Rise ·9:54 ·10:01 **8**	Set ·12:12 ·12:00 Rise ·11:01 ·11:04 **9** ***Regulus 0.5° N of Moon*** ***12am***	Set ·12:37 ·12:29 Rise -- -- *3rd Quarter* ·12:53 **10**	Rise 12:07 12:06 Set ·1:00 ·12:55 **11**	Rise 1:10 1:06 Set ·1:21 ·1:21 **12** Sunrise 7:54 7:29 Sunset ·3:53 ·4:18 ***Mars 1.3° to left of Moon*** ***3am***
West East Rise 2:14 2:05 Set ·1:43 ·1:47 **13**	Rise 3:16 3:03 Set ·2:06 ·2:14 **14** ***Geminid meteors peak*** ***7am***	Rise 4:19 4:02 Set ·2:32 ·2:43 **15**	Rise 5:21 5:01 Set ·3:01 ·3:15 **16**	Rise 6:22 5:59 Set ·3:35 ·3:51 **17**	Rise 7:21 6:55 Set ·4:16 ·4:33 *New Moon* 5:42 **18**	Rise 8:15 7:49 Set ·5:04 ·5:21 **19** Sunrise 8:00 7:34 Sunset ·3:55 ·4:20 ***Mercury greatest elong. W (22°) 11pm***
West East Rise 9:05 8:39 Set ·5:59 ·6:15 **20**	Rise 9:48 9:25 Set ·7:00 ·7:14 **21** ***Winter Solstice*** ***8:56pm***	Rise 10:25 10:05 Set ·8:07 ·8:17 **22** ***Ursid meteors peak*** ***1pm***	Rise 10:58 10:42 Set ·9:17 ·9:23 **23**	Rise 11:27 11:15 Set ·10:29 ·10:30 **24**	Rise 11:53 11:47 Set ·11:43 ·11:40 **25** *Christmas Day*	Rise ·12:19 ·12:17 Set -- -- *1st Quarter* 5:46 **26** Sunrise 8:03 7:37 Sunset ·3:59 ·4:24
West East Set 12:59 12:50 Rise ·12:46 ·12:48 **27** ***Saturn 2.9° N of Moon*** ***6pm***	Set 2:16 2:03 Rise ·1:15 ·1:22 **28** *Comet Kohoutek at perihelion, 25 years ago*	Set 3:35 3:16 Rise ·1:49 ·1:59 **29**	Set 4:52 4:30 Rise ·2:28 ·2:42 **30** ***Occultation Aldebaran 0.2° N of Moon (visible in eastern N Amer.)*** ***6pm***	Set 6:07 5:41 Rise ·3:15 ·3:31 **31**	NOVEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	JANUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

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. The distance between the left edge of the Moon and the left border of the box can be used as an aid in discerning the size of the Moon.

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 given in the 12-hour clock and 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 (1)	5	52.1
Regina	*West* + 58 (1)	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

(1) 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 about 3000 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 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 page: http://www.rasc.ca

Production of the Calendar was computer assisted. The monthly grids with data were computer-generated. Photos were scanned using a flatbed scanner and in some cases enhanced using commercial software.

A variety of equipment was used for the photos, with details given at the right. Nine contributors from six RASC Centres provided photographs:

Peter Ceravolo (Ottawa);
Ben Gendre (Edmonton);
Rajiv Gupta (Vancouver);
John Mirtle (Calgary);
Anu Nayar (Vancouver);
Jack Newton (Victoria);
Murray Paulson (Edmonton);
Gary Seronik (Vancouver);
Darren Talbot (Halifax).

Also contributing were:

Diane Brooks (anniversaries);
Peter Broughton (anniversaries);
David Chapman (anniversaries);
Antoine van Dijck (editorial assistance);
Lee Johnson (captions);
Patrick Kelly (Jupiter shadow events);
David Lane (editorial assistance);
Gary Seronik (editorial assistance).

The Calendar was edited and produced by Rajiv Gupta (gupta@interchange.ubc.ca). Comments and enquiries about photo submissions may be sent to him via electronic mail or by contacting the RASC National Office.

Front Cover

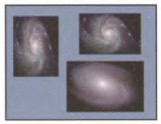
This portrait of an aurora and a comet is a triumph of a fine eye for composition combined with a command of technique applied to accessible piggyback photography. It unites various elements: rich star fields, a landscape, the delicate coloration of the aurora, and a spectacular view of a comet. Photo by Darren Talbot.

2-minute exposure on Kodak Royal Gold 1000 film, piggyback with a 28-mm lens at f/2.8, taken March 28, 1997.

January: *Binocular Clusters M46 and M47.* 20-minute exposure on Fuji SG800 film using a 7.5-inch f/2.3 field corrected Maksutov-Newtonian astrograph.

February: *Photographing a Total Solar Eclipse.* 1/60-second exposure on Kodak Ektar 25 film using a 5-inch Astro-Physics refractor working at f/11, taken July 11 1991 at the start of totality from Baja California.

March: *Comet Hale-Bopp's Closest Approach.* 5-minute exposure on Kodak Royal Gold 100 film using a 5.5-inch f/1.65 Schmidt camera.

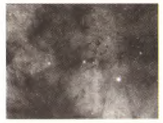


April: *Three Great Galaxies by the Big Dipper.* 10-minute red, 20-minute green, and 40-minute blue exposures on a Meade Pictor 1616XT CCD-camera using a Meade 16-inch LX200 SCT at f/6.5, images digitally processed using *Hidden Image*.

May: *Darkness and Light in the Southern Milky Way.* 5-minute exposure on Kodak Ektachrome EPH 1600, piggyback with a 50-mm lens at f/2.

June: *IC 2948: A Southern Star Factory.* Two 50-minute yellow-filtered and two 100-minute red-filtered exposures on hypered medium-format Kodak Technical Pan black-and-white film using a 5-inch f/6 Astro-Physics refractor, digitally combined using an image-processing package written by David Hare.

July: *Star-Cloud M24 and Region.* 15-minute exposure on Fuji SG800 film, piggyback with a 135-mm lens at f/2.8.



August: *Barnard's Snake (B72).* 7-minute exposure on hypered Kodak Technical Pan film using an 8-inch f/1.5 Schmidt camera.

September: *A Tale of Two Comets.* 5-minute exposures on Kodak Gold 400 film, piggyback with a 50-mm lens at f/2.0.

October: *Aurora with Comet.* 60-second exposure on Kodak Ektapress Multispeed Professional film (PJM), fixed-tripod with a 24-mm lens at f/3.5, taken April 5, 1997.

November: *The Heart of Winter.* Two 25-minute exposures on Kodak Pro 400 medium-format PPF film, piggyback with an 80-mm lens at f/4.5 using a Mamiya 645, negatives stacked before printing.

December: *The Rosette Nebula.* 50-minute light-yellow-filtered, 70-minute dark-yellow-filtered, and 100-minute red-filtered exposures on hypered medium-format Kodak Technical Pan black-and-white film using a 5-inch f/6 Astro-Physics refractor, digitally combined as for June.

1998

January

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

February

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

March

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

April

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

May

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

June

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

July

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

August

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

September

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

October

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

November

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

December

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

1999

January

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

February

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

March

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

April

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

May

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

June

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

July

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

August

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

September

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

October

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

November

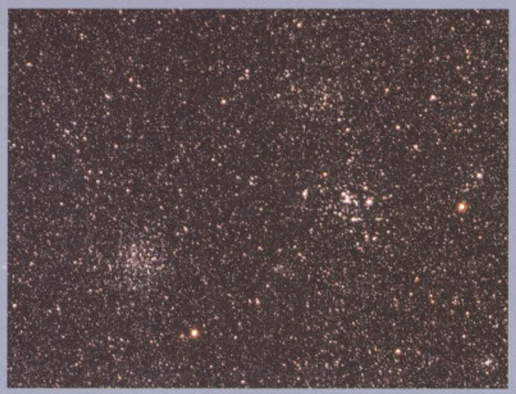
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

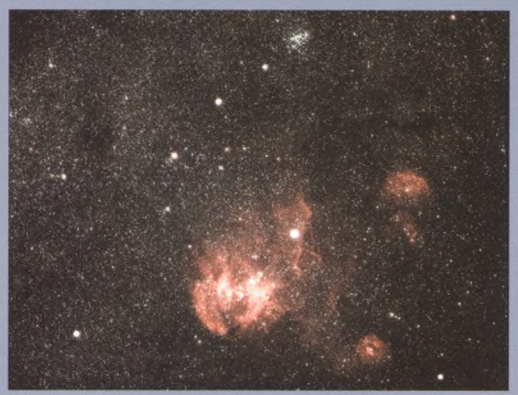
December

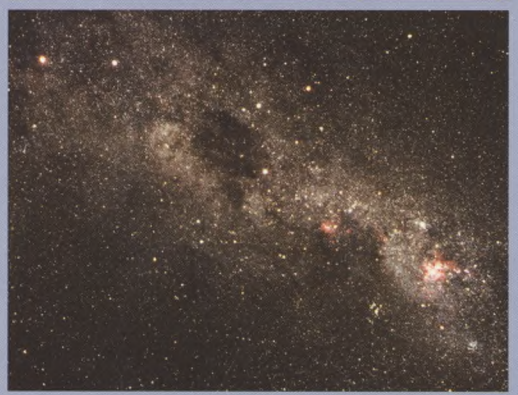
S	M	T	W	T	F	S
			1	2	3	4
5	6	***7***	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

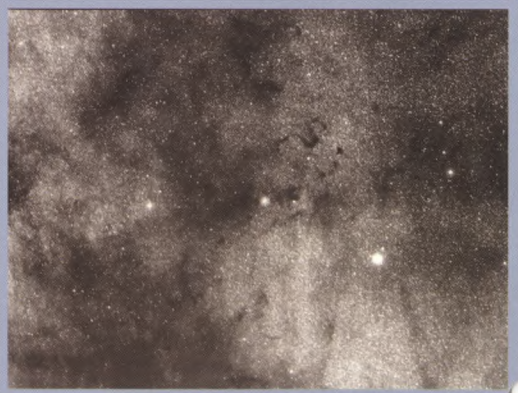
New Moon Dates are displayed in ***bold****.*








This unique 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.*

The images represent the wide spectrum of astronomical objects being observed and photographed by amateur astronomers. An informative caption accompanies every photograph.

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

The Calendar is designed with the observer in mind. It contains comprehensive astronomical data such as daily Moon rise and set times, significant lunar and planetary conjunctions, eclipses, and meteor showers.