

STAR GAZER NEWS

NEWSLETTER OF THE DELMARVA STARGAZERS

February 2003

WWW.DelmarvaStarGazers.Org

Volume 10 Number 8

At the January Meeting

Lyle Jones brought the meeting to order at 7:15 with about 20 members and guests attending. Many thanks to Paul Riley for taking the minutes of this meeting.

New Members

Eric Barnes- Dover, DE

John Brenner- Middletown, DE

David Corum- Silver Spring, MD

William Piepol- Rockville, MD

David Wells- Newark DE

Outreach:

Shehan Audubon Sanctuary Originally scheduled for December 4, the *Under the Stars* astronomy presentation has been rescheduled for this dark sky site near Easton, MD for Friday, February 7th. The program starts at 7:00 p.m. with Stargazing activities and ends around 9:00 p.m. with drinking coffee and hot chocolate around a campfire.

3rd Saturday Morning Astronomy Breakfast was held on January 25th devoted to the Solar System.

3rd Mid Atlantic Mirror Making Workshop
February 28 through March 2

Constellation of the Month The constellation for January was Perseus (PURR-see-us) and was presented by Gregory Lee.

In summertime, one of the nicest parts of the sky to look at is the area around Sagittarius. That's where the Milky Way is the strongest and there are a lot of things to see in that area. There is a spot just off the top of the teapot that's marked on the charts, where the center of the Milky Way exists. There's a copy of the News Journal paper, with three astronomy articles, on one page! One of them tells about the black hole at the center of the Milky Way. There's some new information that's come out about that. But that's in the summertime, when the earth is on the nighttime side of the sun, when we can see the Milky Way. Six months later, where we are right now, the Earth has gone half way around the sun, so the night time sky faces the other side of the cosmos. We

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Constellation AurigaPage 8

are looking out the opposite side, away from Milky Way towards the edge. One of the dim spiral arms of the

Milky Way goes up through Cassiopeia and Perseus. It's hard to see around here, even at Tuckahoe. Difficult to see, but they refer to that Perseus arm as one of the major arms. So in this direction, we are looking at the edge of the Milky Way. On this chart, we have Saturn near the horn of Taurus, right near M1. They say it would have been hard to see telescopically, because Saturn would have overpowered M1. We are talking about Perseus tonight, but some of the old history and legends of Perseus relate to other constellations that are in this same general vicinity. Perseus was the great hero that saved the princess Andromeda, daughter of Queen /

Monthly Meeting Tuesday, February 4th

Astronomy Website Reviews

Don Surles and others

7:00 p.m. First Presbyterian Church, Smyrna

Cassiopeia and King Cepheus. Andromeda was tied to a rock near the shore, as a sacrifice to a sea monster. Perseus came by, riding Pegasus, drove off the sea monster and saved Andromeda.

Another legend that Perseus is known for, is the battle with the Gorgon Medusa, who was the ugly one with the hair made of snakes. Medusa was claimed to be so ugly that one look from her, would turn you to stone. Perseus cut off her head and kept it in a bag. When he met his enemies, he would take the head out and petrify them. Perseus is not a real easy constellation to see. Right now it's a neck-cracker, because it is going straight overhead. Probably would have been a good constellation to do two months ago, when it was about half-way up to the zenith. Learning to get around the night sky is different for everyone, and the way I learned was noting that the 'W' of Cassiopeia stood out very brightly and the Pleiades also stood out brightly. Those became the landmarks, or skymarks that helped me locate Perseus. These two stars in Cassiopeia lead me towards the Pleiades, and towards this very shallow arc of stars. From there, some of the interesting things in Perseus, halfway to Cassiopeia is the famous double cluster. I think the double cluster looks better through binoculars than through a telescope. When you study the double cluster, you realize that it's actually two overlapping groups. One has a little more reddish stars in it. In the other, the stars seem a little more intense. Actually those two groups are about 300LY apart, one in the background, the other closer to us.

You guys with the 18 and 24-inch scopes can see the California nebula.

You also have M76, the mini dumbbell. I've never been able to see a dumbbell shape to it, just a bar shape. M34 an open cluster although it doesn't stand out as much of a cluster. Not one I would happen to notice just sweeping the area. The thing most interesting to me in Perseus is the star Algol. When I first got into stargazing, it was only to know where the constellations were, and to be able to recognize them. But the more I get into learning these things, and seeing some of the things going on out there, the more I want to learn about each of the individual things. There's an interesting story that goes along with Algol. It is one of the variable stars. It was known back in ancient times as a variable star. It got its name Algol from the ghoul or the ghost. People had picked up on the fact that this star dims in brightness about every three days. Most of the time Algol is a mag. 2.1. If you get your timing just right, you can catch it at its minimum of 3.4.

Back in the 1780's, a mathematician, John Goodrick calculated the period at 2 days, 20 hr, 47 mins. Now they have calculated it to 2 days 20 hrs 48 min 56 sec. Because of the precise period, John figured that some dim object was making an eclipse of Algol. The alignment of Earth with those two objects is almost 'in plane'. From our viewpoint, the eclipse is about 70%. Compared to the Sun, the primary star has 4 times the mass, 100 times brighter, and 3X the diameter. The secondary star is about the same mass as the sun, maybe a little dimmer, and about ~3.5X the sun's diameter. Halfway through the period, you get a slight dimming as the secondary star goes behind the primary. It takes about 10 hours to go through the eclipse, with 2 hours near the minimum.

Algol represents the eye in the severed head of Medusa. That eye in the snaky head, every now and then, winks at you. It doesn't turn you to stone, but makes you feel what's going on out there. Watching for Algol's wink is one of the fun things I enjoy in my stargazing.

Program: Astronomy Magazines

An internet search revealed a plethora of astronomy magazines beyond *Astronomy* and *Sky & Tel*. Below is a sampling of some of these.

[Amateur Astronomy](#) News for, by, and about amateur astronomers around the world!

[The AstroGraph](#) Bi-monthly magazine devoted to astronomical photography

[Astronomer](#) British magazine for advanced

amateur astronomers

[Astronomy and Space](#) General interest Astronomy club and magazine with a distinctly Irish flavour

[Astronomy Digest](#) A Free Monthly On-line magazine with current Astronomy News, Product Reviews and much more

[Astronomy Magazine](#) American astronomy magazine

[Astronomy Now](#) British astronomy magazine

[ATM Journal](#) The Amateur Telescope Making Journal

[CCD Astronomy](#) Devoted to the applications of digital imaging in astronomy.

[Icarus](#) International Journal of Solar System Studies

[Irish Astronomical Journal](#) Independent journal of astronomy and astrophysics catering for both professionals and amateurs

[Journal of The British Astronomical Association](#) founded in 1890. Look here for the track of the 1999 solar eclipse in Cornwall!

[Meteorite! Magazine](#) International Quarterly Magazine

[MeteoriteTimes.Com](#) MeteoriteTimes.com is a free monthly on-line magazine devoted to the enjoyment, education, and preservation of meteorites, tektites, and impact structures

[Night Sky Observer](#) news and articles for amateur astronomers and space buffs.

[Observatory Techniques Magazine](#) Subscription info and how to order back issues. Includes some links (down?)

[The Reflector](#) Quarterly newsletter of Astronomical League

[Science Online](#) Science Magazine

[SkyNews](#) contains star charts and maps, listings of Canadian astronomy clubs, photos, and more.

[Sky & Telescope](#) Monthly magazine containing sky maps, astrophotos, and observation tips for sky-gazers of all levels including excerpts from Sky & Telescope and CCD Astronomy magazines, tips for backyard stargazers, reviews of telescopes and

2003 Club Dues (\$15.00)

are now overdue

Make check payable to *Delmarva Stargazers* and mail to Kathy Sheldon

accessories, a weekly astronomy news bulletin [StarDate online](#) _____ Non-technical, current, astronomy information, news, and photographs. Night sky maps and viewing tips. Daily StarDate radio scripts (English and Spanish) [Sterne und Weltraum](#) Die Zeitschrift für Astronomie (magazine for astronomy) [Zenit](#) Het Nederlandse sterrenkunde-tijdschrift (The Dutch astronomy magazine)

From the President's Desk....

January 18, 2003

This is the season for Orion watchers. The great constellation is "on the meridian" just after sunset during late January and early February. A word of caution: Observe now and observe often – the brilliance of Orion's jewels will diminish as it heads westward during late winter and early spring. Aperture and power complement Orion's wonders; use your largest scope and increase the power to the max; you will not be disappointed with the Orion family. But again, please do not postpone your viewing – Orion diminishes rapidly over the next few weeks.

This year we will be offered another enticing object for extended viewing – our neighbor Mars. Currently, Mars is at +1.5 magnitude and its diameter is approximately 5 arc seconds. By April it will be mag 0 (about the brightness of Saturn). By mid June it will surpass Jupiter in brilliance and by late August it will be a -3 mag (almost as bright as Venus). On August 20 it will be at opposition to the sun, i.e., rising at sunset, and by midnight, it will be due south in the constellation Aquarius about 30 degrees (dec = -15 degrees) above the horizon shining at mag -2.8 and its diameter will be approximately 25 arc seconds. Tune your scopes and get some sleep...this will be spectacular and will require some late night viewing due to the long daylight hours of summer.

Club news: We held our Saturday morning Astro Breakfast January 25. Good food, good company, amateur astronomy...you can fill in the blanks. Upcoming events include the Shehan Audubon Star party, Easton, MD from 7:00-9:00 PM, Friday,

February 7th. Star Gazers and their families are invited to spend the night in the Sanctuary's farmhouse and explore the Sanctuary in the morning – sounds like a nice outing. The Third Mid-Atlantic Mirror Makers Conference will be Feb 28 thru Mar 2 in the Mallard Lodge, Smyrna, DE. This is a weekend that demonstrates the best of amateur astronomy. Mirror Makers learn the "ART" of making high quality optical surfaces and take home a telescope mirror they can be proud of and pass on to their children and grandchildren. Our Ninth Annual Delmarva Star Gaze will be held from Apr 30 – May 4 at Tuckahoe State Park. This will also be our Tenth Anniversary, yes, Delmarva Star Gazers is actually ten years old. Stay tuned for celebration plans. Finally, we will round out the spring with our May 6 meeting and nominate officers for our eleventh year. Also on May 6, we will offer assistance to Chesapeake Bay Maritime Museum's Eta Aquarid Meteor Shower Cruise.

So as time marches on from these cold days of winter we look forward to late February/early March observing nights when we hear the first spring peepers singing from their cold – but warming – swampy homes. Remember as we say goodbye to the brilliance of winter skies and Orion that the dim spring constellations are ushered in by Leo and warmer nights. This time of change offers opportunities for some gorgeous sunsets and night sky weather patterns. Sometimes our observing through telescopes is interrupted by fast moving fronts but when that happens you may want to put the scope in a safe and dry place, then sit back and observe Mother Nature's awesome powers to change seasons. Look for sundogs, sun pillars, moonbows, moondogs, rings, etc. Atmospheric phenomena mean so much more when we understand how they are created and the significance of them. Go to www.meteros.de/indexe.htm for all you will need to understand Mother Nature's finest atmospheric phenomena.

As our organization closes in on the final days of our ninth year it is appropriate for us to look forward to the beginning of the next ten years. It is difficult for me to imagine the possibilities for amateur astronomy during

How to Join the Delmarva Star Gazers: Anyone with an interest in any aspect of astronomy is welcome to Join.

NAME _____

ADDRESS _____

CITY, STATE & ZIP _____

E-MAIL ADDRESS (If any) _____

SPECIAL INTERESTS OR TALENTS _____

Please attach a check for \$15 made payable to Delmarva Stargazers and mail to Kathy Sheldon, 20985 Fleetown Rd, Lincoln, DE 19960. Call club President Don Surles at 302-653-9445 for more info.

the next ten years – I look back on the developments of the past years and wonder what the future holds. Outside of equipment, time, and funds I believe the most important challenge we face is the loss of our dark skies. Increasing numbers of people bring roads. Roads invite houses and houses give birth to shopping centers. People, roads, houses, and shopping centers - all bring lights. And all leave their glow on the night sky.
Enuf for now – see you at the Church or Tuckahoe.
Keep your Naglers dry...
Don...

The Editor's Quadrant....

The Solar System in December

Mercury- will be a morning star in early February just to the left of the teapot handle in Sagitarius very low in the southeast. **Venus** will also be a morning star in February, . as will **Mars**, just above Antares in Scorpius. Mars is still too dim and too small to show much detail. **Jupiter** goes into opposition as February opens reaching a magnitude of -2.6 with a disk size of 45". "Savor" Jupiter's surface, because this is as good as it gets. **Saturn** is no slouch in February at magnitude 0.2 it has the advantage of culminating before 9 p.m. Forget **Uranus** and **Neptune** in February since both are in conjunction with the Sun. **Pluto** sits dimly in Ophiuchus above Mars.

Clear Skies! Frank Sheldon *f.a.sheldon@att.net*

TUCKAHOE ACCESS

Fellow Star Gazers:

This is a friendly reminder of the correct procedure for accessing the Tuckahoe State Park baseball field observing site.

The Park Superintendent has asked us to:

- 1) Call the Park office (410-820-1668) before 3:00 PM to notify them that you will be observing in the baseball field
- 2) Observe from the baseball field only - do not go to the Youth Camping Area
- 3) If you know the combination to the gate keep it to yourself - DO NOT share the gate combination with non-Delmarva Star Gazer observers
- 4) Close and lock the gate after you enter

- do this for your own protection since there will not be any rangers on duty. I would also like to ask that each observer "leave nothing but tracks", ie,do a Nagler check to make sure there are no Naglers and/or other debris left on the field. Please follow these rules so that we may continue to enjoy the use of Tuckahoe for our star gazing activities.Thanks,
Don Surles, President, Delmarva Star Gazers

Club Activities..

Club Meetings- We meet in the First Presbyterian Church in Smyrna, DE (653-8000) on the first Tuesday of each month from 7-9 PM. From US 13, turn west at Wendy's and go one stoplight on Commerce Street; the church is on the right directly across from the Fire Hall.

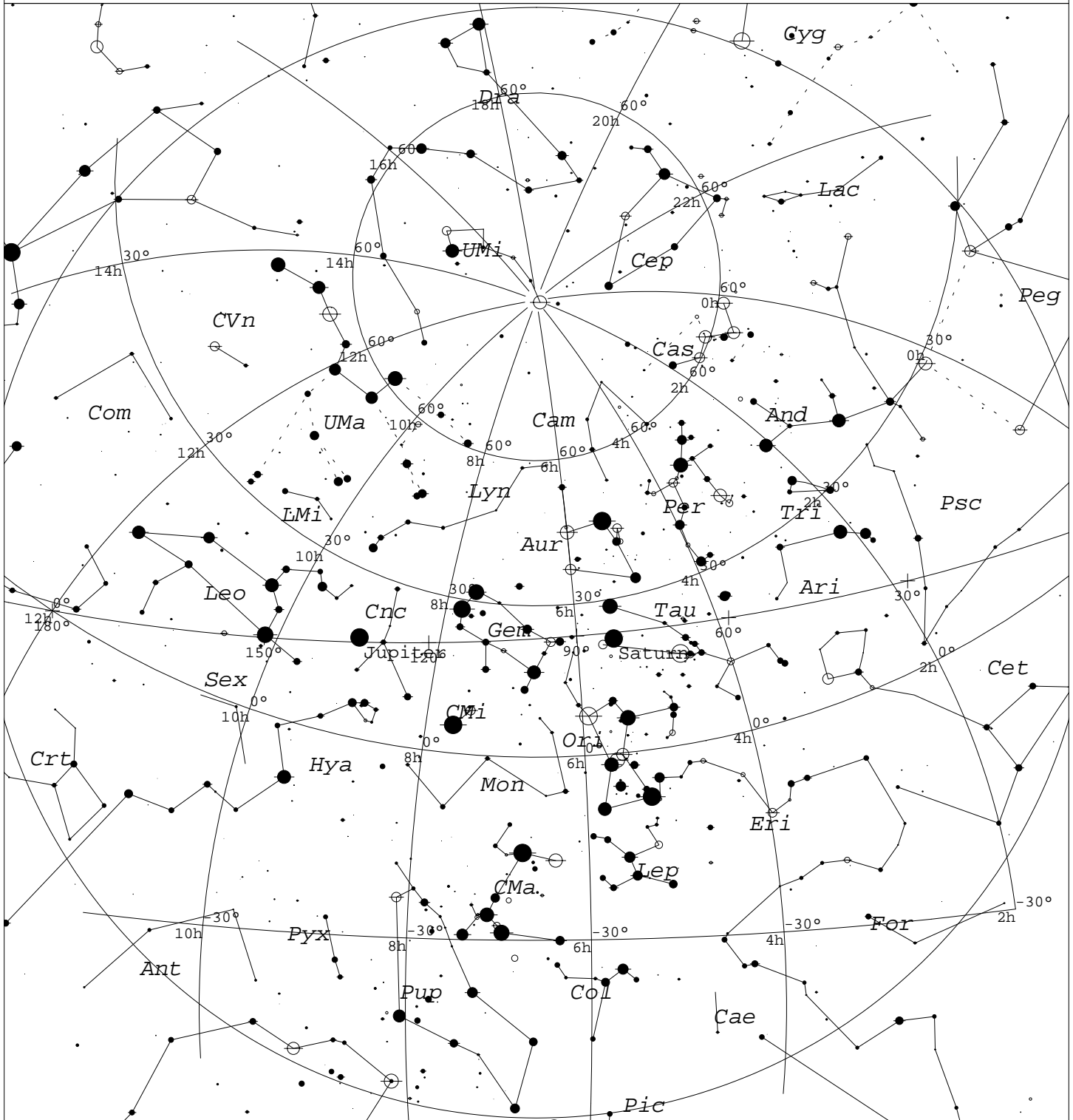
Future Meetings...The remaining meeting dates for 2003 will be: February 04, March 04, April 01, May 06, June 03, July 05 (Picnic at Tuckahoe), August 05 (No meeting at church - schedule special event) September 02, October 07, November 04 and December 02 The regular meeting format includes discussion of club activities, observing highlights and an advertised presentation. We solicit suggestions for topics and presenters.

Club Observing... Observing is (usually) scheduled for the Friday nearest the New Moon to maximize the hours of *deepnight* without the moon in the sky. Unless otherwise stated, the monthly observing site will be at the baseball field in the camping area at Tuckahoe State Park. The observing days for the year 2003 will be: January 31, February 28, April 4, April 30 - May 5 (Star Gaze IX), May 30, June 27, July 25, August 1, August 29, September 24 - 28 (No-Frills VII) October 24, November 21, December 19. The cloud or rain date for the monthly Friday observing will be the following Saturday, but don't trust the weather man! Go outside and look for yourself or check the CNN weather link on our web page. If you still can't decide, Call Don Surles (302) 653-9445 or Lyle Jones (302) 736-9842.

Delmarva Star Gazers Officers for 2001-2002

President.....Don Surles 302 653 9445
Vice President.....Lyle Jones 302 736 9842
Secretary.....Keith Lohmeyer 410 482 6077
Treasurer.....Kathy Sheldon 302 422 4695

SKYMAP FOR FEBRUARY 2003



<p>STARS</p> <ul style="list-style-type: none"> ● <1 ● 1.5 ● 2 ● 2.5 ● 3 ● 3.5 ● 4 ● 4.5 ● >5 	<p>SYMBOLS</p> <ul style="list-style-type: none"> ● Multiple star ○ Variable star ☄ Comet ○ Galaxy □ Bright nebula ⊞ Dark nebula ⊕ Globular cluster ⊙ Open cluster ⊖ Planetary nebula ⊞ Quasar △ Radio source × X-ray source ○ Other object 	<p>TUCKAHOE STATE PARK JANUARY 31, 2200 HOURS EST</p>
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Local Time: 22:00:00 31-Jan-2003
 Location: 38° 58' 0" N 76° 56' 0" W

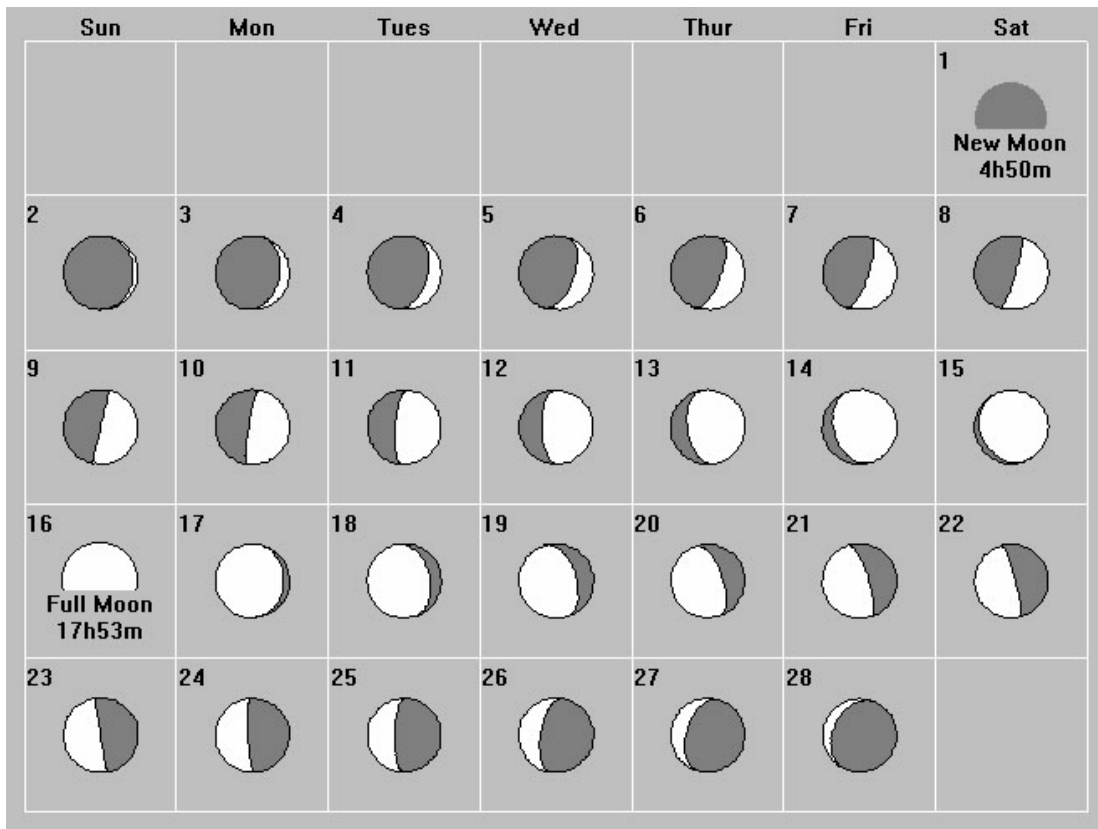
UTC: 03:00:00 1-Feb-2003
 RA: 6h35m55s Dec: +38° 57' Field: 182.0°

Sidereal Time: 06:35:54
 Julian Day: 2452671.6250

Sun and Moon Data for February 2003 Tuckahoe Park, MD

38.59°N 75.56°W 4.5hrW Standard Time Astronomical Twilight

Date	Sun				Moon				%
	Twil.	Rise	Transit	Set	Twil.	Rise	Transit	Set	
02/01/2003	6:07a	7:38a	12:46p	5:54p	7:25p	8:08a	1:05p	6:08p	0
02/02/2003	6:06a	7:37a	12:46p	5:55p	7:26p	8:43a	1:55p	7:13p	2
02/03/2003	6:06a	7:36a	12:46p	5:56p	7:27p	9:13a	2:40p	8:16p	5
02/04/2003	6:05a	7:35a	12:46p	5:57p	7:28p	9:39a	3:23p	9:16p	11
02/05/2003	6:04a	7:34a	12:46p	5:58p	7:29p	10:02a	4:04p	10:15p	17
02/06/2003	6:03a	7:33a	12:46p	6:00p	7:30p	10:25a	4:44p	11:13p	25
02/07/2003	6:02a	7:32a	12:46p	6:01p	7:31p	10:48a	5:25p	****	34
02/08/2003	6:01a	7:31a	12:46p	6:02p	7:32p	11:13a	6:07p	12:11a	43
02/09/2003	6:01a	7:30a	12:46p	6:03p	7:33p	11:40a	6:50p	1:10a	52
02/10/2003	6:00a	7:29a	12:46p	6:04p	7:34p	12:12p	7:37p	2:10a	62
02/11/2003	5:59a	7:28a	12:46p	6:05p	7:35p	12:50p	8:28p	3:11a	71
02/12/2003	5:58a	7:27a	12:46p	6:06p	7:36p	1:35p	9:22p	4:11a	79
02/13/2003	5:57a	7:26a	12:46p	6:08p	7:37p	2:30p	10:18p	5:09a	87
02/14/2003	5:56a	7:25a	12:46p	6:09p	7:38p	3:32p	11:15p	6:03a	93
02/15/2003	5:54a	7:23a	12:46p	6:10p	7:39p	4:42p	****	6:50a	98
02/16/2003	5:53a	7:22a	12:46p	6:11p	7:40p	5:54p	12:11a	7:31a	100
02/17/2003	5:52a	7:21a	12:46p	6:12p	7:41p	7:08p	1:06a	8:07a	99
02/18/2003	5:51a	7:20a	12:46p	6:13p	7:42p	8:21p	1:59a	8:38a	96
02/19/2003	5:50a	7:19a	12:46p	6:14p	7:43p	9:33p	2:50a	9:08a	90
02/20/2003	5:49a	7:17a	12:46p	6:15p	7:44p	10:46p	3:40a	9:36a	82
02/21/2003	5:47a	7:16a	12:46p	6:16p	7:45p	11:59p	4:31a	10:06a	72
02/22/2003	5:46a	7:15a	12:46p	6:17p	7:46p	****	5:23a	10:39a	61
02/23/2003	5:45a	7:13a	12:46p	6:19p	7:47p	1:11a	6:17a	11:16a	50
02/24/2003	5:44a	7:12a	12:45p	6:20p	7:48p	2:23a	7:13a	12:00p	39
02/25/2003	5:42a	7:11a	12:45p	6:21p	7:49p	3:30a	8:11a	12:50p	29
02/26/2003	5:41a	7:09a	12:45p	6:22p	7:50p	4:31a	9:09a	1:48p	20
02/27/2003	5:40a	7:08a	12:45p	6:23p	7:51p	5:23a	10:05a	2:51p	12
02/28/2003	5:38a	7:06a	12:45p	6:24p	7:52p	6:07a	10:59a	3:56p	6



Moondark for February: *Deep Night Calendar for 2003 at Tuckahoe State Park, Maryland*

Plan your dark-sky gazing around the deep nights shown on this page: The calendar at right displays the hours of "deep night" -- the time between astronomical twilights without the Moon in the sky -- for the night *beginning* on the date indicated. Please note: asterisk * indicates Friday evenings, and [] = New moon,) = First Quarter, (= Last Quarter. These circumstances are calculated for Tuckahoe State Park, MD, located at 38° 59' N and 75° 56' W.

Graphic shading reflects the number of hours of deepnight. At the start of this year, dark nights runs are split between the first and last weeks of the months. As the Moon's phases gradually advance, deepnight runs shift ahead towards the end of the month by year's end. For example, the March column shows that Friday and Saturday nights, the 28th and 29th, will have 8.5 and 8.4 hours of deepnight, respectively, with the next New Moon on the evening of April Fool's Day. This year, Messier Marathon-ers will have to work around the Full Moon (on the night of the 17th) and the bright gibbous phases during the following week. As a result, the weekend of Friday - Saturday, the 28th and 29th is the primary weekend for this annual astronomical endurance event. *Good Luck and Clear Skies!*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	11.3	10.7	9.7	[8.3]	6.8	5.4	5.2	5.7*	6.4	6.8	5.1	4.5	1
2	[11.3]	10.7	[9.7]	8.2	6.7*	4.7	4.7	5.3	5.8]	5.8]	4.0	3.5	2
3	11.3*	9.8	9.6	7.8	6.1	3.9	4.1	4.9	5.1	4.7*	2.9	2.5	3
4	11.0	8.8	9.4	6.8*	5.1	3.2	3.7*	4.4]	4.2	3.6	1.9	1.5	4
5	9.9	7.8	8.4	5.8	4.1	2.6	3.2	3.9	3.2*	2.5	0.9	0.5*	5
6	8.8	6.8	7.5	4.7	3.2	2.1*	2.8]	3.2	2.1	1.4	--	--	6
7	7.8	5.8*	6.4*	3.7	2.4	1.6]	2.4	2.5	1.0	0.4	--*	--	7
8	6.8	4.8]	5.4	2.8	1.8]	1.2	1.9	1.5*	--	--	(--)	(--)	8
9	5.8]	3.8	4.4	1.9]	1.2*	0.7	1.3	0.5	(--)	(--)	--	--	9
10	4.9*	2.8	3.4]	1.2	0.6	0.2	0.6	--	--	--*	--	--	10
11	3.9	1.8	2.4	0.5*	0.1	--	--*	(--)	--	--	0.1	0.7	11
12	2.9	0.8	1.4	--	--	--	--	--	--*	--	0.8	1.7*	12
13	1.9	--	0.6	--	--	(--*)	(--)	--	0.1	0.3	1.7	2.8	13
14	0.8	--	--*	--	--	--	--	0.1	0.6	0.9	2.7*	3.8	14
15	--	--	--	--	(--)	--	--	0.5*	1.0	1.6	3.8	4.9	15
16	--	(--)	--	(--)	--*	0.7	0.5	0.9	1.6	2.4	[4.9	[6.0	16
17	(--)	--	(--)	--	0.5	1.3	1.0	1.3	2.2	(3.4*	6.0	7.2	17
18	--	0.6	--	1.1*	1.6	1.9	1.4*	1.7	[3.0	4.4	7.1	8.4	18
19	--	1.8	0.2	2.3	2.5	2.4	1.8	(2.3	3.9*	5.5	8.3	9.6*	19
20	1.0	3.0	1.5	3.4	3.2	(2.8*	(2.2	2.8	4.9	6.7	9.5	10.9	20
21	2.2	4.2*	2.7*	4.4	3.8	3.1	2.6	3.5	6.0	7.9	10.8*	11.4	21
22	3.3	[5.4	4.0	[5.2	[4.3	3.5	3.1	4.4*	7.2	9.1	11.0	[11.4]	22
23	4.5	6.6	5.1	5.9	4.7*	3.9	3.6	5.3	8.4	10.2	[11.1]	11.4	23
24	[5.7*	7.7	[6.2	6.4	5.1	4.3	4.2	6.4	9.0	[10.2*	11.1	11.4	24
25	6.8	8.7	7.1	6.9*	5.4	4.7	4.9*	7.5	[9.0]	10.2	11.1	10.4	25
26	8.0	9.6	7.8	7.0	5.6	5.1	5.8	7.6	9.0*	10.3	10.1	9.2*	26
27	9.2	9.8	8.4	7.0	5.6	5.1*	6.1	[7.6]	9.1	10.2	8.9	8.0	27
28	10.3	9.7*	8.5*	6.9	5.6	5.2	[6.1]	7.7	8.9	9.4	7.7*	6.9	28
29	10.8		8.4	6.9	5.5	[5.2]	6.2	7.7*	8.4	8.4	6.6	5.9]	29
30	10.8		8.4	[6.8]	[5.5*	5.2	6.2	7.4	7.6	7.3	5.5]	4.9	30
31	[10.7*]		8.3		5.5		6.2	7.0		6.2*]		3.9	31

At Tuckahoe: Latest sunrise, 5 and 6 January; Latest beginning of twilight, 8 and 9 January; Shortest twilight, 1.5 h on 4 - 6 March; Earliest sunrise 14 June; Earliest beginning of twilight 17 June; Shortest nights: 15 - 27 June at 5.1 h; Longest twilight, 2.0 h on 20 to 22 June; Latest end of twilight, 25 June; Latest sunset, 27 and 28 June; Shortest twilight (again), 1.5 h on 7 - 9 October; Earliest end of twilight, 4 December; Earliest sunset, 7 December; Longest nights, 15 - 28 December at 11.4 h; Longest deep nights, 21- 24 December at 11.4 h. Eastern Standard Time is 5 hours behind Universal Time; Daylight Time, between 6 April and 26 October 2003, is 4 hours behind.

This deep night calendar is based on the "dark of the moon table" published more or less annually by Guy Ottewell in his [Astronomical Calendar](#). Most planetarium and ephemeris programs will do the necessary calculations for a specified night (twilight times, and moon rise and set), but none that I'm aware of summarize a whole year in an easy to use format for a given location. It was relatively straightforward to modify some old Quattro spreadsheets (based on Jean Meeus's [Astronomical Algorithms](#)) for calculating observing circumstances for Messier objects in order to tabulate the hours of each night without the moon in the sky. These calculated values are now reformatted with VBA in Excel and rendered as a graphic for inclusion in a Moondark web page highlighting astronomical events of the upcoming year. Now, if we could just come up with a formula for hours of clear sky... In the meantime, try Attila Danko's [Clear Sky Clock](#) linked directly from the [Delmarva Star Gazers home page](#).

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