



## October Challenging Planetaries

Kent Blackwell

Jerry Truitt asked me to come up with three challenging objects this month. Some of my favorites are planetary nebulae so I've selected three that I think you'll find worthy of the search. I've seen them all in my 10" f/5 Dobsonian, so let me know if you see them in your telescope.

### Campbell's Hydrogen Star

Object Type: Planetary Nebula

Apparent Position: RA. 19h34m48.3s Dec. +30° 31'01" (Cyg)

Magnitude: 9.6

Lies 2 degrees 45' north of Alberio. Discovered by William W. Campbell in 1893, this isn't really too difficult but you'll find yourself lost in a sea of Milky Way stars. Campbell's appears quite bright, and orange in color, looking only slightly larger than stellar. The Lumicon OIII nebula filter is not the best filter; I prefer the Orion Ultra-Block or perhaps the Lumicon UHC. It requires good seeing, not "soupy" skies to see Campbell's Star.

### NGC 6772

Object Type: Planetary Nebula

Apparent Position: RA. 19h14m47.9s Dec. -02° 42'01" (Aql)

Magnitude: 14.2

This wonderful planetary reminds me of M 57, but the central hole is smaller than The Ring Nebula. It's also considerably fainter. I tried without a filter but the results were less than satisfactory. The nebula shows easily, but the dark central hole doesn't show as well.

### NGC 6058

Object Type: Planetary Nebula

Apparent Position: RA. 16h04m37.0s Dec. +40° 40'07" (Her)

Magnitude: 13.3

I can faintly see this object lying in the middle of a triangle of stars. It's not visible without a nebula filter with small telescopes; I found the Lumicon UHC best. Look for a fairly small annular disc, grayish in color.

## Staggering Distance

Dr. Tony Phillips



Tonight, when the sun sets and the twilight fades to black, go outside and look southwest. There's mighty Jupiter, gleaming brightly. It looks so nearby, yet Jupiter is 830 million km away. Light from the sun takes 43 minutes to reach the giant planet, and for Earth's fastest spaceship, New Horizons, it's a trip of 13 months.

That's nothing.

Not far to the left of Jupiter is Pluto. Oh, you won't be able to see it. Tiny Pluto is almost 5 billion km away. Sunlight takes more than 4 hours to get there, and New Horizons 9 years. From Pluto, the sun is merely the brightest star in a cold, jet-black sky.

That's nothing.

A smidgen to the right of Pluto, among the stars of the constellation Ophiuchus, is Voyager 1. Launched from Florida 29 years ago, the spacecraft is a staggering 15 billion km away. It has traveled beyond all the known planets, beyond the warmth of the sun, almost beyond the edge of the solar system itself.

Now that's something.

"On August 15, 2006, Voyager 1 reached the 100 AU mark—in other words, it is 100 times farther from the Sun than Earth," says Ed Stone, Voyager project scientist and the former director of NASA's Jet Propulsion Laboratory. "This is an important milestone in our exploration of the Solar System. No other spacecraft has gone so far."

At 100 AU (astronomical units), Voyager 1 is in a strange realm called "the heliosheath."

As Stone explains, our entire solar system—planets and all—sits inside a giant bubble of gas called the heliosphere. The sun is responsible; it blows the bubble by means of the solar wind. Voyager 1 has traveled all the way from the bubble's heart to its outer edge, a gassy membrane dividing the solar system from interstellar space. This "membrane" is the heliosheath.

Before Voyager 1 reached its present location, researchers had calculated what the heliosheath might be like. "Many of our predictions were wrong," says Stone. In situ, Voyager 1 has encountered unexpected magnetic anomalies and a surprising increase in low-energy cosmic rays, among other things. It's all very strange—"and we're not even out of the Solar System yet."

To report new developments, Voyager radios Earth almost every day. At the speed of light, the messages take

*(See Voyager on page 4)*

**How to Join the Delmarva Stargazers:** Anyone with an interest in any aspect of astronomy is welcome

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY, STATE & ZIP \_\_\_\_\_

E-MAIL ADDRESS (if any) \_\_\_\_\_

Do you need the newsletter snail mailed to you (Y/N)? \_\_\_\_\_

Please attach a check for \$15 made payable to Delmarva Stargazers and mail to Kathy Sheldon, 20985 Fleatown Rd, Lincoln, DE 19960. Call club President Jerry Truitt at 410-885-3327 for more information.

# No Frills Star Party

Kent Blackwell, Jay Brown, Pj Riley



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## Observing Sky Phenomena

Doug Miller

Catching sun dogs, light pillars, colorful arcs, ice halos, and of course, the Belt of Venus, requires a bit of luck as well as skill. You can improve your chances of enjoying these often colorful sky phenomena by knowing when to look and what to expect from them. Fortunately, there are great resources in printed and electronic form. The best books—oldies but goodies—are: *Light and Color in the Outdoors* by Marcel Minnaert, and *Sunsets, Twilights and Evening Skies* by Aden and Marjorie Meinel. On the web, visit: Weather Photography ([weather-photography.com](http://weather-photography.com)), the Atmospheric Optics ([www.atoptics.co.uk](http://www.atoptics.co.uk)), and Atmospheric Phenomena ([meteoros.de/indexe.htm](http://meteoros.de/indexe.htm)) sites. It is worth noting that [SpaceWeather.com](http://SpaceWeather.com), Earth Science Picture of the Day ([epod.usra.edu](http://epod.usra.edu)), as well as Astronomy Picture of the Day ([antwrp.gsfc.nasa.gov/apod/](http://antwrp.gsfc.nasa.gov/apod/)), frequently feature sky phenomena in photos with detailed explanations. It turns out that many of these sights are not so elusive after all. Drawing on one or more of these resources is sure to increase both the likelihood of seeing and appreciation of these phenomena.

[http://www.amazon.com/Light-Color-Outdoors/dp/0387979352/sr=8-1/qid=1158762985/ref=pd\\_bbs\\_1/002-8546090-0508853?ie=UTF8&s=books](http://www.amazon.com/Light-Color-Outdoors/dp/0387979352/sr=8-1/qid=1158762985/ref=pd_bbs_1/002-8546090-0508853?ie=UTF8&s=books)

Out of print apparently:

[http://www.amazon.com/Sunsets-Twilights-Evening-Skies-Meinell/dp/0521406471/sr=1-4/qid=1158763115/ref=sr\\_1\\_4/002-8546090-0508853?ie=UTF8&s=books](http://www.amazon.com/Sunsets-Twilights-Evening-Skies-Meinell/dp/0521406471/sr=1-4/qid=1158763115/ref=sr_1_4/002-8546090-0508853?ie=UTF8&s=books)

<http://www.atoptics.co.uk/>

<http://meteoros.de/indexe.htm>

<http://weather-photography.com/index.php>

<http://spaceweather.com/>

<http://epod.usra.edu/>

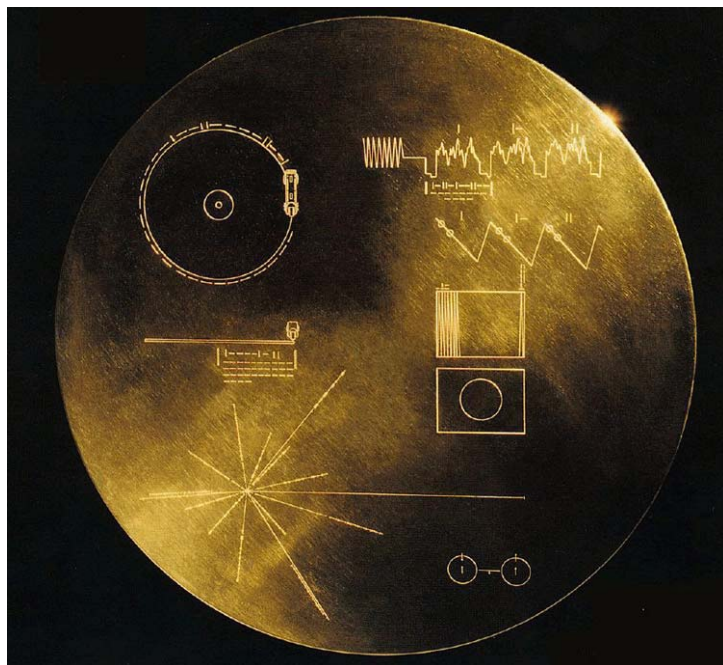
<http://antwrp.gsfc.nasa.gov/apod/>

(Voyager from page 2)

14 hours to arrive. Says Stone, "it's worth the wait."

Keep up with the Voyager mission at [voyager.jpl.nasa.gov](http://voyager.jpl.nasa.gov). To learn the language of Voyager's messages, kids (of all ages) can check out [spaceplace.nasa.gov/en/kids/vgr\\_fact1.shtml](http://spaceplace.nasa.gov/en/kids/vgr_fact1.shtml).

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



*In case it is ever found by intelligent beings elsewhere in the galaxy, Voyager carries a recording of images and sounds of Earth and its inhabitants. The diagrams on the cover of the recording symbolize Earth's location in the galaxy and how to play the record.*

### The Delmarva Stargazers Announces a Writing Contest.

The DMSG will raffle away astronomy gifts to members who submit articles to the Star Gazer News.

How to enter:

- 1 Open to DMSG members.
- 2 Members may submit original articles at least 500 words (1/2 page) for publication in the Star Gazer News.
- 3 Articles **must** be authored by the member.
- 4 Pictures can be included, but they do not count towards word count (1 picture  $\neq$  1000 words).
- 5 Must be astronomy related.

Each article = one chance in the raffle. The drawing will be made at the star parties based on the previous 6 issues – need not attend to win (but it would be nice to see you there). The editor of the Star Gazer News qualifies articles submitted.

(Solar from page 1)

a new high energy efficient model. A 100 watt incandescent light bulb draws 100 watts per hour, if it's on for 10 hours that's 1 kilowatt of energy consumed. Convert to a high energy efficiency 27 watt fluorescent light bulb and you use 0.27 kilowatts in those 10 hours that equates to 73% energy savings.

If you live in Delaware, the state has a Green Energy Program that can offset your cost by 50% on any photovoltaic systems that does not exceed \$12 per installed watt. This program will cover up to a maximum of \$22,500 for residential installations and \$250,00 for Non-residential systems.

This grant will cover the photovoltaic modules, foundation and mounting structures, wiring, inverters and utility interconnection equipment. It will also cover the labor costs for the installation of the components, cost of required permits and fees. The commercial system will be covered for 10% of total system cost for engineering of the system.

For more information go to: <http://www.delaware-energy.com> and look for the Green Energy Program.

How do you prepare to convert to solar power? You'll need a large open area that faces to the true south. A roof is ideal as it is an unused space, but if your roof doesn't face due south you may need to install it on the ground.

You'll need to calculate your average energy usage per month. If you keep the receipts from your power bills this is the time to dig them out

You'll want to find an alternate way to power things that produce heat if they currently use electricity. These are things like your furnace, water heater and stove. You can power these with natural gas, propane or even a passive solar system (which is also covered under the Green Energy Program).

The type of things you would be powering with the photovoltaic system are the refrigerator, microwave, lights, TV, computer and furnace blower, you get the idea.

Keep in mind on average power from the Delmarva grid is far cheaper which makes the idea of ever breaking even tough. Here some examples of what a system might cost, this does not include grant money.

200 Watt Module Systems					Grid tie refers to a system that is connected to the power grid. Power is banked during low demand and supplemented by the grid during high demand.	Part	Description
Grid Tie 1.8KW	Grid Tie 2.8KW	Grid Tie 5.0KW	Grid Tie 7.2KW	Grid Tie 10.0KW			
9	14	25	36	50	GEPV-200M	GE Energy 200 Watt Photovoltaic Module, Silver Frame, White Back Sheet, 25 Year Warranty	
1	1	2	0	0	GE-2.5 Inverter	GE inverter-2500 watts, 240 Vac, 60Hz	
0	0	0	0	3	GE-3.0 Inverter	GE inverter-3000 watts, 240 Vac, 60Hz	
0	0	0	2	0	GE-3.3 Inverter	GE inverter-3300 watts, 240 Vac, 60Hz	
1	1	2	4	5	GEPV LSB	GE Energy panel interconnection boxes, w/ quick connectors for module string mating	
1	2	3	4	6	R-124-6	6-124" Clear Rails (supports 9 GEPV-large modules)	
1	2	3	4	6	C-AP-12	Module mounting hardware package (10-end clamps, 22-middle clamps, hardware)	
1	2	3	4	6	TT-18S	Box of 18 Tile Trac feet with hardware -short studs for asphalt roof	
1	1	1	1	1	GEPV-M2	GE Energy Meter Duel Display (Production/ Consumption)	
\$17,100.00	\$26,600.00	\$47,500.00	\$68,400.00	\$95,000.00			

(Solar on page 6)

## Magazine Subscriptions

As a paid member of DMSG, you can sign up -or- renew your S&T or Astronomy magazines through the club for a discount over private rate. S&T, reg. \$42.95, is \$32.95 thru DMSG, Astronomy, reg. \$44, is \$34 thru DMSG. See Tony Codella for details.

## The Solar System in October

Mercury ♿ is busy this month: greatest elongation E on the 17<sup>th</sup>; greatest heliocentric lat. S on the 21<sup>st</sup>; 1.4°N of Luna ☾ on the 24<sup>th</sup>; 4° S of Jupiter ♃ on the 25<sup>th</sup>. If you have been looking for Venus ♀, the reason you can't see it is because on the 27<sup>th</sup>, it'll be in superior conjunction. Best wait until Dec. to find her. Mars ♂ is in conjunction with Sol ☼ on the 23<sup>rd</sup>. He'll be out when Ol' Man Winter arrives. Jupiter ♃ gets lost in the evening twilight. Jupiter ♃ visits Mercury ♿ on the 25<sup>th</sup> (see above). Saturn is 2° S of Luna ☾ on the 16<sup>th</sup>. If you are in Southern South America, or Central Africa, on the 5<sup>th</sup>, you can watch Luna ☾ occult Uranus ♅. From here, Uranus ♅ will be just 0.5° N of Luna ☾. Neptune ♆ is 3°N of Luna ☾ on the 30<sup>th</sup>. Special events this Month: Look for Zodiacal Light in the E before morning twilight starting on the 20<sup>th</sup> for about 2 weeks. Daylight Savings Time ends on the 29<sup>th</sup>. Hang onto Terra 🌍 as Father Time does a reboot.

(Solar from page 5)

One other thing, America is a country of inventors. New things are coming that will make solar energy more affordable. A system has been developed that prints solar cells with a technology similar to ink jet printers. These cells are not composed of silicone; they're also not as efficient but cost much less to produce. Check out: <http://www.nanosolar.com/> After you read about this technology you may want wait if you are currently considering a system.

We can all do more to conserve and cut our energy usage while saving money at the same time. If you are considering solar power, it's never been cheaper, especially if you can get grant money. It looks like it will continue you go down in price and may someday be the standard power supply for home energy.

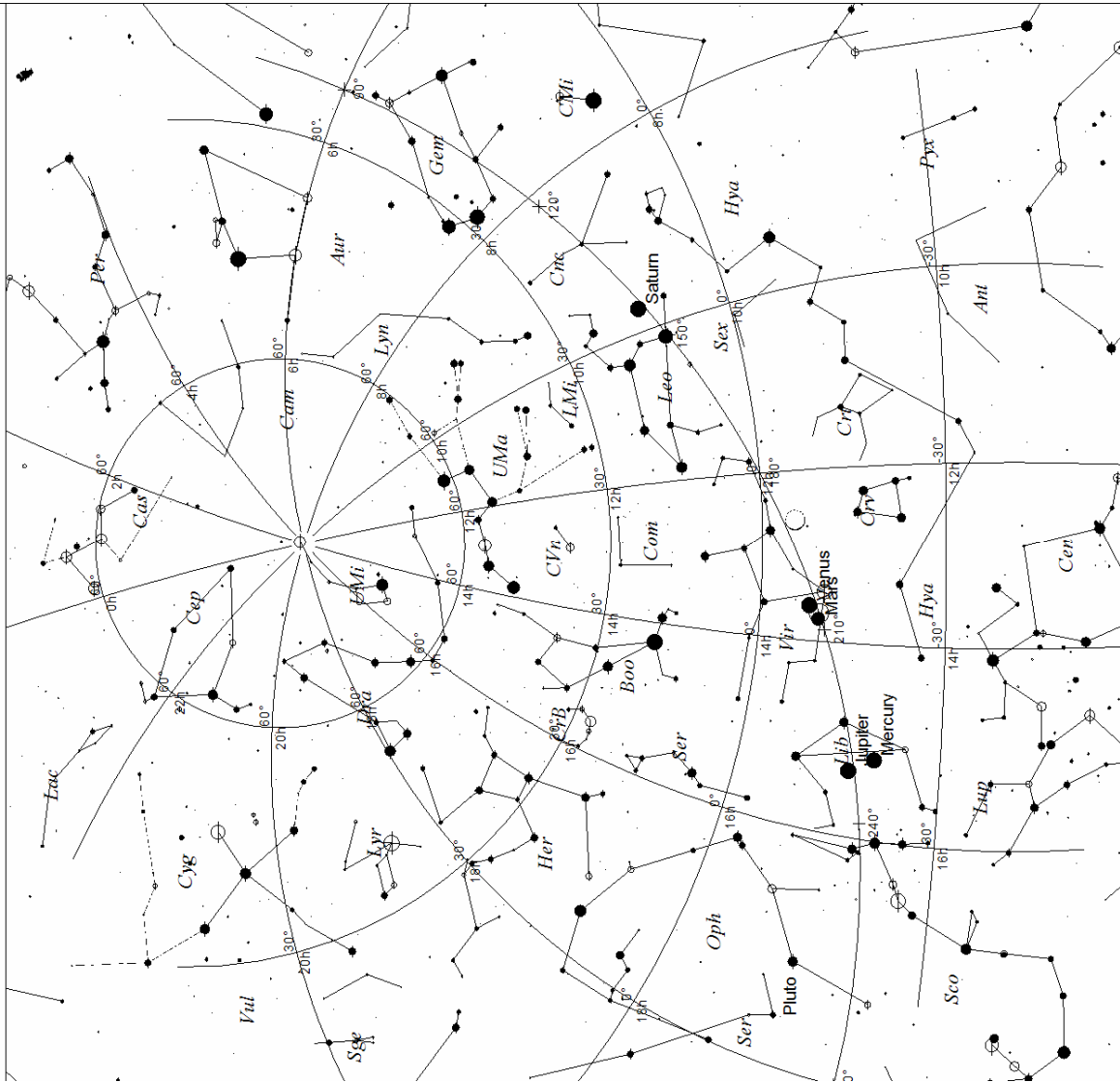


### Mars Express: Return to Cydonia

**Credit:** [G. Neukum \(FU Berlin\)](#) et al., [Mars Express](#), [DLR](#)

The unusual stone mesas of the Cydonia region on Mars are quite striking in appearance. Last week, the [Mars Express](#) project released a new close-up image of a portion of the Cydonia region on Mars. This new image, taken by the robotic [Mars Express](#) spacecraft now orbiting Mars, shows an area about 90 kilometers wide. In the far lower right of the above image, a particularly picturesque mesa can be seen as the upper right of the two mesas visible there. This mesa, when lit from just the right sun angle, can appear similar to a human face and became famous as the [Face on Mars](#) in 1976 Viking orbiter images. Better images show it to be just an interesting mesa. Such complex looking landforms in the [Cydonia region](#) are thought to be the result of landslides and erosion of the ancient Martian crust.

Skymap 20 October 2006 10 PM



Tuckahoe State Park, MD

**SYMBOLS**

- △ Radio source
- △ Dark nebula
- ⊕ Globular cluster
- ⊕ X-ray source
- ⊕ Open cluster
- ⊕ Other object
- ⊕ Comet
- ⊕ Galaxy
- ⊕ Planetary nebula
- ⊕ Bright nebula
- ⊕ Quasar

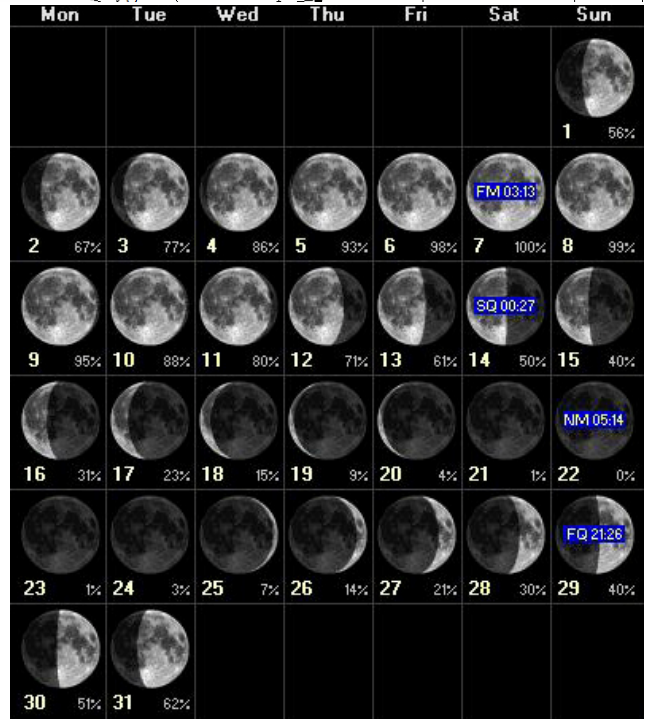
**STARS**

- <1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- >5

Local Time: 22:00:00 20-Oct-2006  
 UTC: 16:00:00 20-Oct-2006  
 Sidereal Time: 12:52:09  
 Location: 38° 58' 0" N 75° 56' 0" W  
 RA: 12h52m10s Dec: +38° 57' Field: 182.0°  
 Julian Day: 2454029.1667

**Sun and Moon Data for October 2006**  
 Tuckahoe MD  
 38.97°N 75.93°W 5hrW  
 Daylight Time Civil Twilight

Date	Twilight	Rise	Sun Transit	Set	Twilight	Rise	Moon Transit	Set	%
10/1/2006	6:33a	7:00a	12:53p	6:47p	7:13p	3:48p	8:27p	*****	63
10/2/2006	6:34a	7:01a	12:53p	6:45p	7:12p	4:27p	9:23p	1:12a	73
10/3/2006	6:35a	7:01a	12:53p	6:43p	7:10p	5:00p	10:17p	2:28a	83
10/4/2006	6:36a	7:02a	12:52p	6:42p	7:08p	5:29p	11:10p	3:45a	91
10/5/2006	6:37a	7:03a	12:52p	6:40p	7:07p	5:56p	*****	5:02a	97
10/6/2006	6:38a	7:04a	12:52p	6:39p	7:05p	6:22p	12:01a	6:19a	100
10/7/2006	6:39a	7:05a	12:52p	6:37p	7:04p	6:50p	12:53a	7:37a	100
10/8/2006	6:40a	7:06a	12:51p	6:36p	7:02p	7:22p	1:46a	8:55a	96
10/9/2006	6:40a	7:07a	12:51p	6:34p	7:01p	7:59p	2:41a	10:14a	91
10/10/2006	6:41a	7:08a	12:51p	6:33p	6:59p	8:43p	3:39a	11:30a	83
10/11/2006	6:42a	7:09a	12:50p	6:31p	6:58p	9:36p	4:39a	12:41p	74
10/12/2006	6:43a	7:10a	12:50p	6:30p	6:56p	10:36p	5:39a	1:41p	64
10/13/2006	6:44a	7:11a	12:50p	6:28p	6:55p	11:40p	6:36a	2:30p	54
10/14/2006	6:45a	7:12a	12:50p	6:27p	6:54p	*****	7:29a	3:10p	44
10/15/2006	6:46a	7:13a	12:49p	6:25p	6:52p	12:45a	8:18a	3:42p	34
10/16/2006	6:47a	7:14a	12:49p	6:24p	6:51p	1:48a	9:03a	4:06p	25
10/17/2006	6:48a	7:15a	12:49p	6:22p	6:49p	2:50a	9:45a	4:30p	17
10/18/2006	6:49a	7:16a	12:49p	6:21p	6:48p	3:49a	10:25a	4:51p	11
10/19/2006	6:50a	7:17a	12:49p	6:20p	6:47p	4:48a	11:04a	5:10p	6
10/20/2006	6:51a	7:18a	12:49p	6:18p	6:45p	5:46a	11:43a	5:30p	2
10/21/2006	6:52a	7:19a	12:48p	6:17p	6:44p	6:45a	12:23p	5:51p	0
10/22/2006	6:53a	7:20a	12:48p	6:16p	6:43p	7:46a	1:05p	6:15p	0
10/23/2006	6:54a	7:21a	12:48p	6:14p	6:41p	8:49a	1:49p	6:43p	2
10/24/2006	6:55a	7:22a	12:48p	6:13p	6:40p	9:54a	2:38p	7:17p	6
10/25/2006	6:56a	7:23a	12:48p	6:12p	6:39p	10:58a	3:30p	7:59p	11
10/26/2006	6:57a	7:25a	12:48p	6:10p	6:38p	12:00p	4:25p	8:50p	18
10/27/2006	6:58a	7:26a	12:48p	6:09p	6:36p	12:56p	5:22p	9:51p	27
10/28/2006	6:59a	7:27a	12:48p	6:08p	6:35p	1:44p	6:19p	10:59p	37
10/29/2006	7:00a	7:28a	12:47p	6:07p	6:34p	2:25p	7:14p	*****	48
10/30/2006	7:01a	7:29a	12:47p	6:05p	6:33p	2:59p	8:07p	12:11a	59
10/31/2006	7:02a	7:30a	12:47p	6:04p	6:32p	3:28p	8:58p	1:25a	70



## Moondark for October:

### “It’s Not Easy Bein’ Green”

As far as I know, [Kermit the Frog](#) hasn’t been peering through a telescope, and he isn’t singing about the heavens. But it sure fits: why is green, such a prominent color on this planet, so rare in the night sky? And [why are there no green stars](#)?

Light we call the [color green](#) is an electromagnetic wave with crests around 520 nanometers apart, a mere 20 millionths of an inch. [Visible light](#) has wavelengths from about 400 to 700 nm, which we see as colors from indigo through to red, respectively, in the familiar sequence of the [spectrum](#). While light can be characterized precisely by wavelength, frequency or energy, the color we perceive, especially when wavelengths are mixed is a complicated result of [microscopic cells and pigment molecules](#) in our eyes. Although physics and physiology can be exacting, color is a subjective experience and very difficult to explain in precise terms.

Some stars appear green: [Zuben Elschemali](#) (“northern claw”), Beta in the constellation of [Libra](#), The Scales, has been reported to be green. [Alpha Herculis](#) is a beautiful double star, an orange-red 3rd magnitude star paired with a green 6th magnitude secondary. [Antares](#) is a double with similar in colors, but much more difficult to split because of a smaller separation and the 6-magnitude difference in brightness. Shades of green, pastels and evocative colors, appear in the descriptions of [many double stars](#). The fact that descriptions differ among observers certainly suggests that some subjectivity and subtleness are involved.

[Stars emit green light](#), after all, that’s why [leaves appear green](#) and why rainbows have green in their middle. The amount of each color emitted by a star depends on its temperature according to the well-known [Planck or blackbody relationship](#), and at any given temperature, there is a wavelength where emission peaks, mathematically described by [Wien’s displacement law](#). Hot stars emit a lot more blue light, cooler stars more red, and their visual appearance reflects this. Mid-temperature stars, for example like the Sun, emit throughout the visible spectrum, but even at a temperature peaking in the green, that [color does not dominate over the others](#). It is a contrast effect: stars emit green light, but not enough to appear green, only white-ish.

[Color](#) is critical to human existence and the capture and display of color is a major thrust of [vision science](#). When all that [engineering](#) is brought to bear on [star colors as determined by black-body formulae](#), there are [demonstrably blue and red and even more pink than orange colored stars](#), but [no green](#). [A bit disappointing](#), isn’t it?

The best “green” I’ve ever seen in the sky was the striking aqua of [Comet Hyakutake](#). Fluorescence at narrow blue and green wavelengths, combined with the response of our eye’s cones cells produces a genuine green or blue-green perception. See this for yourself in the brightest regions of [M42, the Orion Nebula](#), or even [M57, the Ring Nebula](#), which always appears to me as a blue-green donut. Perhaps the rarest green occurrence in the sky is that of [green flash](#) at sunset over the Pacific—but that’s another story entirely...

What if [Kermit](#) is “[physically-correct](#)”? Any way you look at it, green is a rarity in the palette of the night sky. And while the detection of color is certainly a challenge at nighttime, the [sky is much more beautiful](#) and [heck of a lot more interesting](#) for those subtle shades we must strain to see.

Moondark is written by Doug Miller, published at the [Moondark web site](#), and printed in the [Delmarva Star Gazers’ Star Gazer News](#). This document was last revised on 24 September 2006. Text and images copyright © 2006 by Douglas C. Miller, All Rights Reserved. This material may not be reproduced in any form without prior permission.