Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 24, No. 3 *Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009* *March 2016*

In This Issue

IC 5146: The Cocoon Nebula

Image Taken by CCAS Member Dave Hockenberry on 9/17/2012.

Membership Renewals Due

03/2016	Angelini Sterrett
04/2016	Hepler Imburgia Ruch
05/2016	Cunningham
06/2016	Hanspal Panger

March 2016 Dates

1st • Last Quarter Moon, 6:10 p.m.

8th • New Moon, 8:54 p.m.

13th • Daylight Saving Time begins at 2:00 a.m. Set clocks ahead one hour.

15th • First Quarter Moon, 1:02 p.m.

20h • Vernal Equinox, 12:30 a.m.

23rd • Full Moon, 8:00 a.m.

CCAS Upcoming Nights Out

CCAS has several special "nights out" scheduled over the next few months. Members are encouraged to help out during these events any way they can. See below for more information.

☼ **Saturday, March 12th, 2016** - Bucktoe Creek Preserve. The observing session starts at 6:30 P.M.

☼ **Saturday, April 9th, 2016** - Hoopes Park, West Chester. The observing session starts at sunset.

Winter/Spring 2016 Society Events

March 2016

2nd • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the PA Outdoor Lighting Council website.

8th • CCAS Monthly Meeting, Merion Science Center, Rm 112, West Chester University. The meeting starts at 7:30 p.m. CCAS Member Speaker & NASA Solar Ambassador Dennis O'Leary will update us on the latest data from the New Horizons flyby of Pluto.

18th • West Chester University Planetarium Show: "Other Earths." The show starts at 7 p.m. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

20th • Open call for articles and photographs for the April 2016 edition of Observations.

24th-25th • The von Kármán Lecture Series: In the Blink of the Eye: What 10 Years at Mars Can Tell Us About the Planet, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

26th • Deadline for newsletter submissions for the April 2016 edition of Observations.

April 2016

6th • PA Outdoor Lighting Council monthly meeting, 1438 Shaner Drive, Pottstown, PA 19465, starting at 7:30 p.m. For more information and directions, visit the PA Outdoor Lighting Council website.

12th • CCAS Monthly Meeting, Merion Science Center, Rm 112, West Chester University. The meeting starts at 7:30 p.m. Guest Speaker: Dr. Desik Narayana presents "How to Build the Brightest Galaxies."

15th • West Chester University Planetarium Show: "Jupiter, King of the Planets." The show starts at 7 p.m. For more information and reservations, visit the WCU Public Planetarium Shows webpage.

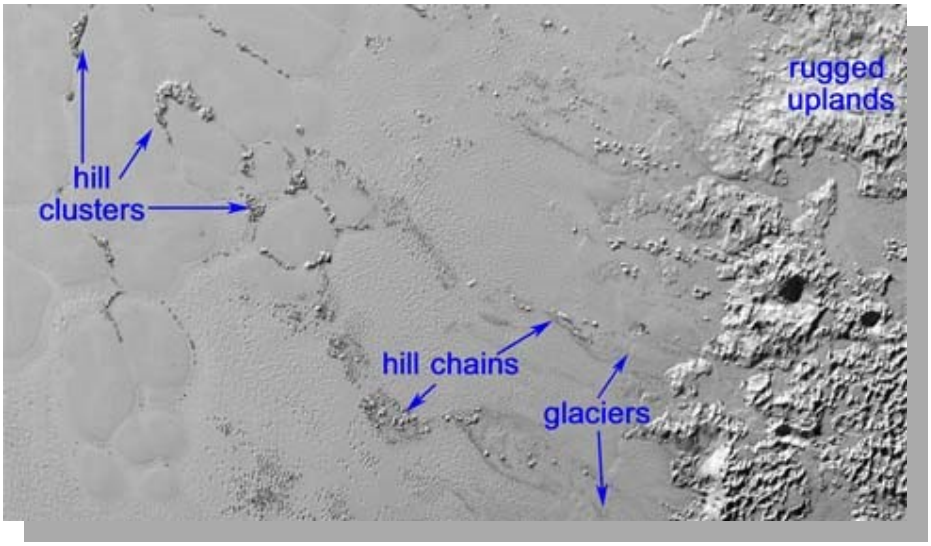
20th • Open call for articles and photographs for the May 2016 edition of Observations.

21st-22nd • The von Kármán Lecture Series: CubSats: Big Goal, Tiny Package, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

26th • Deadline for newsletter submissions for the May 2016 edition of Observations.

The Mystery of Pluto's Floating Hills

by Kelly Beatty, Sky & Telescope Magazine



These clusters and chains of hills on Pluto appear to be blocks of water ice "floating" in a higher-density "sea" dominated by frozen nitrogen, which has a higher density.
NASA / JHU-APL / SWRI

Within days of New Horizons' historic flyby of Pluto last July 14th, mission scientists released snapshots showing unexpectedly tall mountains partially rimming a vast and very flat plain. The plain, informally named Sputnik Planum, is dominated by frozen nitrogen (and some frozen carbon monoxide), whereas the surrounding uplands are mostly frozen water.

Sputnik Planum is a fascinating expanse of Plutonian real estate. Comparable in size to Hudson Bay, it's crisscrossed with shallow fractures that carve it up into crude polygons. And it's moving, slowly, pushing outward at its margins very much like the slow inexorable downhill movement of glaciers here on Earth.

(Continued on page 3)

March 2016 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

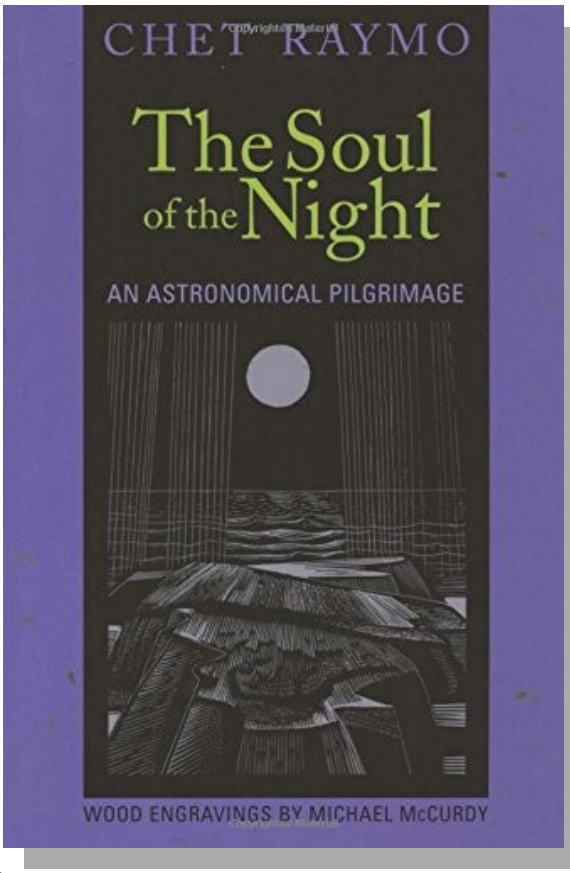
Our next meeting will be held on March 8, 2016, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. CCAS Member Speaker & NASA Solar Ambassador Dennis O'Leary will update us on the latest data from the New Horizons flyby of Pluto.

Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

We are looking for presenters for future meetings in our spring and fall 2016 seasons. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

Book Review: *The Soul of the Night*, by Chet Raymo

by Don Knabb, CCAS Treasurer & Observing Chair



Cover of the 2005 Edition

I must admit that I have been reading this book for quite some time, and I think that is an entirely appropriate way to enjoy it. It is a series of essays that cover a wide range of topics, most of which are astronomical in nature. The essays are short and unlike a novel, you don't need to remember a plot line, so weeks can go by between essays and nothing is lost.

It is clear from the start that Raymo loves the night sky as he describes the things he sees and feels in a way that I have never read before. As I read the book I would bend a corner of a page when a section really stood out as wonderful. Now that I have finished the book I have marked so many pages that I don't know which ones to mention. But first a bit about Chet Raymo.

Chet Raymo is a noted writer, educator and naturalist. He is Professor Emeritus of Physics at Stonehill College, in Easton, Massachusetts. His weekly newspaper column Science Musings appeared in the Boston Globe for twenty years. I was previously familiar with Chet Raymo from his classic book *365 Starry Nights*, in which he discusses interesting things to observe throughout an entire year. I can't recommend that book highly enough, especially for beginners.

Raymo talks about all aspects of star gazing. Here is what he has to say about M81 and M82, galaxies near the Big Dipper: "M81 is the more splendid object, resolved in observatory photographs into a dazzling pinwheel of 200 billion suns, but reduced to a misty blur in the eyepiece of the amateur's telescope; if M81 were at the distance of the seven Dipper stars it would fill our sky with a terrible light, wheeling and glittering, suns as thick as stones, bread and cheese in superabundance. Its sister galaxy, M82, is spindle-shaped, enigmatic, apparently wracked with violent convulsions, stars gone haywire, a galaxy regurgitating its own mass. The core of M82

(Continued on page 9)

Pluto (Cont'd)

(Continued from page 2)

But recently the team unveiled an image of Sputnik Planum that reveals something new, quite strange, and perhaps very telling: clusters of hills that stick up through the plain's surface. Up to a few kilometers across, they appear to be bobbing along in the icy floes and become concentrated where the polygonal slabs meet. The New Horizons team suggests that the mysterious hills might be fragments of water ice from the uplands that partially surround Sputnik Planum.

Importantly, these water-ice "islands" appear to be analogous with ocean-going icebergs here on Earth — and, as such, they might offer a hint of the depth of Sputnik Planum's frozen nitrogen "sea." If the hills are 100 m tall, then their "roots" should extend downward for at least 1 km below.

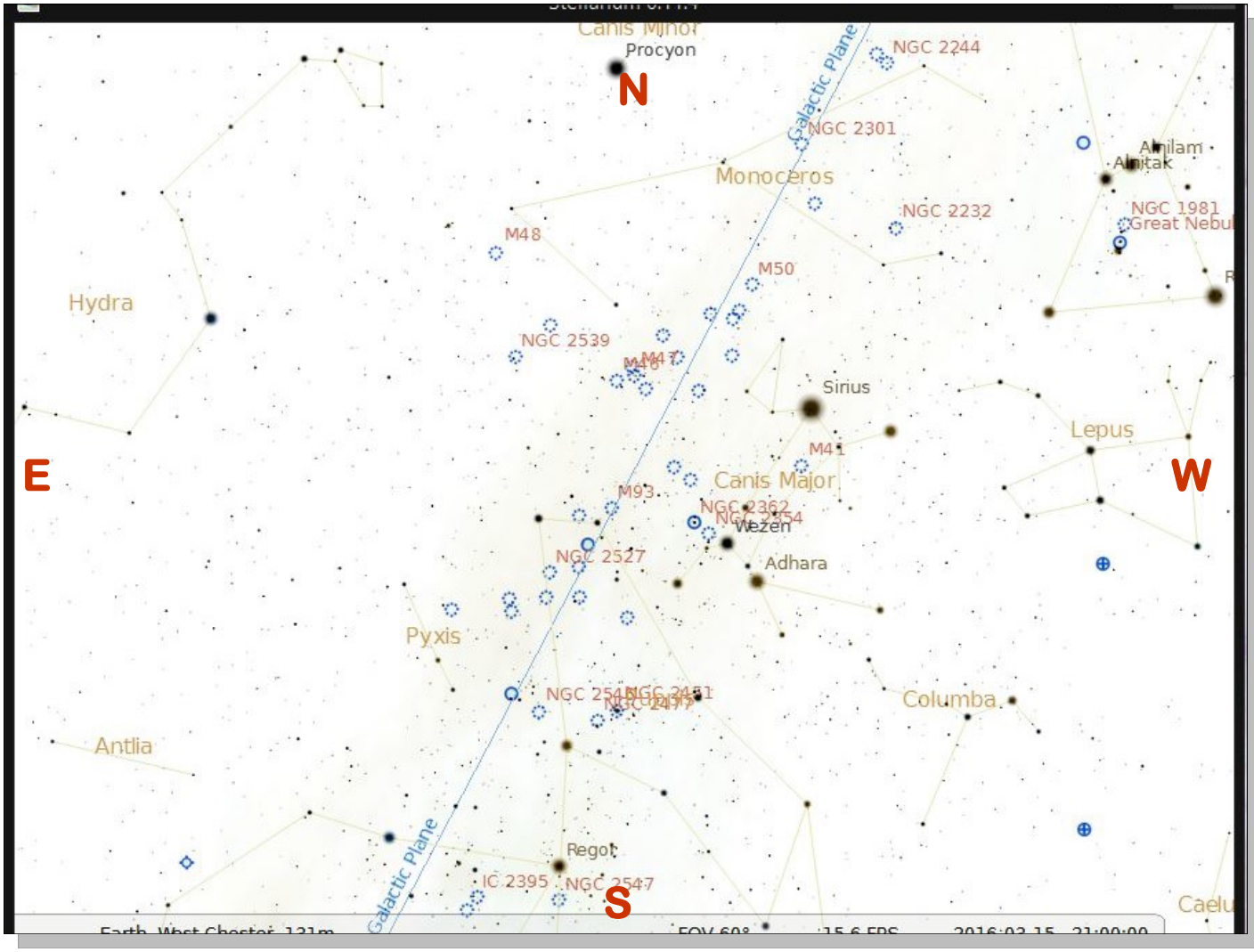
Interestingly, one large cluster, nicknamed Challenger Colles (honoring those lost aboard the Space Shuttle *Challenger* in 1986), measures 60 by 35 km. This grouping isn't out in the middle of Sputnik Planum but rather located near the eastern margin, near the uplands of central Tombaugh Regio (another informal name), so perhaps these hills became "beached" once the nitrogen ice got too shallow.

It's truly fascinating that Pluto exhibits so much geology. All this activity has surely making the (convoluted) decision to build and launch New Horizons a very sound one.

The Sky Over Chester County

March15, 2016 at 9:00 p.m. ET

Note: This screen capture is taken from Stellarium, the free planetarium software available for download at www.stellarium.org.



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
3/01/2016	6:06 a.m. EST	6:33 a.m. EST	5:53 p.m. EST	6:20 p.m. EST	11h 19m 53s
3/15/2016	6:44 a.m. EDT	7:11 a.m. EDT	7:08 p.m. EDT	7:35 p.m. EDT	11h 56m 40s
3/31/2016	6:18 a.m. EDT	6:46 a.m. EDT	7:24 p.m. EDT	7:52 p.m. EDT	12h 38m 53s

Moon Phases					
Last Quarter	3/01/2016	6:10 p.m. EST	New Moon	3/08/2016	8:54 p.m. EST
First Quarter	3/15/2016	1:02 p.m. EDT	Full Moon	3/23/2016	8:00 a.m. EDT

March 2016 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

1	**Last Quarter Moon**
8	**Jupiter shines at its brightest for 2016 and is at opposition**
8	**New Moon**
9	**A total eclipse occurs over Indonesia and the Pacific Ocean**
13	**Daylight Saving time starts at 2:00 a.m.**
14	**A double shadow transit occurs on Jupiter beginning at 10:22 p.m.**
15	**First Quarter Moon**
20	**The Vernal equinox occurs at 12:30 a.m.**
21	**The Moon is near Jupiter**
23	**Full Moon, the Full Worm Moon**
29	**The Moon, Saturn, Mars and Spica form a nice grouping in the pre-dawn sky**
31	**Last Quarter Moon**

The best sights this month: Jupiter earns its "king of the planets" name this month as it reaches opposition (the point in the sky opposite the Sun) on March 8th when it is visible all night. Any telescope and almost any pair of binoculars will show the disk of Jupiter and the four Galilean moons. For an observing challenge, use a telescope to look for a double shadow transit on March 14, beginning at 10:22 p.m.

Mercury: Mercury passes behind the Sun on March 23rd so this is not a good month to seek out the planet closest to the Sun.

Venus: Our sister planet continues to fall further into the glow of the rising Sun, rising only 25 minutes before sunrise by month's end.

Mars: The red planet rises around midnight and brightens significantly during March. In the pre-dawn sky around mid-month Mars, Saturn and Antares form a nice triangle in the southern sky.

Jupiter: The king of the planets reaches opposition on March 8th so it is visible all night. Jupiter blazes at magnitude -2.5 under the constellation Leo the Lion.

Saturn: Saturn draws closer to Mars as March progresses, ending the month just 9 degrees away from the red planet.

Uranus and Neptune: The outer gas giants will not be in favorable viewing position for several months.

The Moon: The Moon is full on March 23rd. This is the Full Worm Moon according to Native Americans. As the temperature begins to warm and the ground begins to thaw, earthworm casts appear (an earthworm cast is a nice word for worm poop), heralding the return of the robins. This full moon is also called the Full Crow Moon, the Full Crust Moon and the Full Sap Moon.

Constellations: Early in the evening the "big guy" Orion dominates the sky in the southwest, with bright Capella in Auriga nearly overhead. Leo the Lion is in the southeast and as the night progresses you can see some spring constellations rising such as Boötes, Corona Borealis and Hercules.

Messier/deep sky: Take a few more gazes at the Orion Nebula before it settles into the west as spring marches on. The Big Dipper is high in the sky so take this opportunity to look for galaxies M81 and M82. With a low power eyepiece in your telescope they might be in the same field of view depending on your equipment. For more of a challenge, look for the 10th magnitude galaxies M65 and M66 in Leo.

Comets: There are no bright comets in the sky during March. But if you want to seek out 8th or 9th magnitude comets Catalina or Ikeya-Murakami, finder charts for both comets are in the March issue of Astronomy magazine.

Meteor showers: There are no major meteor showers during March.

Through the Eyepiece: Jupiter, King of the Planets

by Don Knabb, CCAS Treasurer & Observing Chair

If you step outside during the next few months and look at the eastern sky the first thing you will notice is Jupiter shining brightly. Jupiter is at opposition on March 8th, which means it is opposite the Sun in our sky and therefore rises at sunset and sets around sunrise. It is highest overhead at midnight, but is in good viewing position from around 8 p.m. onward.

Jupiter is the fifth planet from the Sun and is the largest one in the solar system. It is a huge ball of hydrogen and helium without any solid continents like we have here on Earth. If Jupiter were hollow, more than one thousand Earths could fit inside. It also contains more matter than all of the other planets combined. It is believed that beneath all that gas lays a small rocky core covered by metallic hydrogen (what a weird idea – metallic hydrogen…….).

What we see when we look at Jupiter through a telescope is a quilt of multicolored clouds with ever changing dark and light bands. The most prominent area of interest on the surface of Jupiter is the Great Red Spot, a salmon-colored oval vortex that has been observed for centuries. The Great Red Spot is larger than our entire planet.

Jupiter is the fourth brightest object in the sky (after the Sun, the Moon and Venus). It has been known since prehistoric times as a bright "wandering star". In 1610 when Galileo first pointed a telescope at the sky he discovered Jupiter's four large moons Io, Europa, Ganymede and Callisto (now known as the Galilean moons) and recorded their motions back and forth around Jupiter. This was the first discovery of a center of motion not centered on the Earth. It was a major point in favor of Copernicus's heliocentric theory of the motions of the planets. Galileo's outspoken support of the Copernican theory got him in trouble with the Inquisition.

Jupiter and the four Galilean moons. Image credit: http://solarsystem.nasa.gov/planets/jupiter/galleries

Today anyone can repeat Galileo's observations (without fear of retribution). Even the smallest telescope will reveal Jupiter's four largest satellites, three of which are larger than our own Moon. The motion of these satellites is fascinating to watch and under good conditions with at least a 60mm telescope you can sometimes see the shadow of a moon on Jupiter's surface. And at latest count, there are 67 known satellites in orbit around Jupiter!

Jupiter radiates more energy into space than it receives from the Sun. The interior of Jupiter is hot, around 20,000 degrees C. The heat is generated by the slow gravitational compression of the planet. Jupiter does NOT produce energy by nuclear fusion as in the Sun; it is much too small and its interior is too cool to ignite nuclear reactions. Jupiter is just about as large in diameter as a gas planet can be. If more material were to be added, it would be compressed by gravity such that the overall radius would increase only slightly. A star can be larger only because of its internal (nuclear) heat source. But Jupiter would have to be at least 80

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Theatrical Release Poster

(Continued from page 6)
times more massive to become a star.

Jupiter has rings like Saturn's, but much fainter and smaller. They were totally unexpected and were only discovered when two of the Voyager 1 scientists insisted that after traveling 1 billion km it was at least worth a quick look to see if any rings might be present. Everyone else thought that the chance of finding anything was nil, but there they were.

Jupiter and science fiction: Yes, Jupiter has been a movie star! In the movie *2010: The Year We Make Contact*, the follow up to *2001: A Space Odyssey*, we follow a group of American and Russian astronauts as they travel to Jupiter to investigate the mysterious monolith. As the movie closes, the aliens who built the monolith replicate millions of monoliths on Jupiter to increase its mass to the point that it collapses under its own gravity and bursts into nuclear fusion and becomes a second star in our sky. The new star was created to supply energy to a newly formed intelligent life form on Jupiter's moon Europa.

Another excellent science fiction movie about exploration of the Jupiter system is *Europa Report*, which came out in 2013. This is the story of a mission to investigate the suggestion from probes that a hidden ocean and single-celled life exist on Europa. Although not a blockbuster, this movie is similar to *The Martian* in that it attempts to present a realistic space flight based on extrapolation of existing technology.

So do not miss the show that Jupiter is putting on this spring and summer. Jupiter will be a highlight of all our upcoming star parties!

Did You Know?

We often think of the Asteroid Belt as being crammed full of debris like a celestial traffic jam, but if all of the asteroids were combined, the object they would form would have a diameter a little less than half that of the moon, with 1/10th the moon's volume.

The Closest New Stars to Earth

by Dr. Ethan Siegel

When you think about the new stars forming in the Milky Way, you probably think of the giant star-forming regions like the Orion Nebula, containing thousands of new stars with light so bright it's visible to the naked eye. At over 400 parsecs (1,300 light years) distant, it's one of the most spectacular sights in the night sky, and the vast majority of the light from galaxies originates from nebulae like this one. But its great luminosity and relative proximity makes it easy to overlook the fact that there are a slew of much closer star-forming regions than the Orion Nebula; they're just much, much fainter.

If you get a collapsing molecular cloud many hundreds of thousands (or more) times the mass of our sun, you'll get a nebula like Orion. But if your cloud is only a few thousand times the sun's mass, it's going to be much fainter. In most instances, the clumps of matter within will grow slowly, the neutral matter will block more light than it reflects or emits, and only a tiny fraction of the stars that form—the most massive, brightest ones—will be visible at all. Between just 400 and 500 light years away are the closest such regions to Earth: the molecular clouds in the constellations of Chamaeleon and Corona Australis. Along with the Lupus molecular clouds (about 600 light years distant), these dark, light-blocking patches are virtually unknown to most sky watchers in the northern hemisphere, as they're all southern hemisphere objects.

In visible light, these clouds appear predominantly as dark patches, obscuring and reddening the light of background stars. In the infrared, though, the gas glows brilliantly as it forms new stars inside. Combined near-infrared and visible light observations, such as those taken by the Hubble Space Telescope, can reveal the structure of the clouds as well as the young stars inside. In the Chameleon cloud, for example, there are between 200 and 300 new stars, including over 100 X-ray sources (between the Chamaeleon I and II clouds), approximately 50 T-Tauri stars and just a couple of massive, B-class stars. There's a third dark, molecular cloud (Chamaeleon III) that has not yet formed any stars at all.

While the majority of new stars form in large molecular clouds, the closest new stars form in much smaller, more abundant ones. As we reach out to the most distant quasars and galax-

(Continued on page 10)

Image credit: NASA and ESA Hubble Space Telescope. Acknowledgements: Kevin Luhman (Pennsylvania State University), and Judy Schmidt, of the Chamaeleon cloud and a newly-forming star within it—HH 909A—emitting narrow streams of gas from its poles.

Dates in History
by NASA Space Place

March 5 – In 1979, the Voyager 1 spacecraft flew past Jupiter. Learn more fun facts about Jupiter, like how this gas giant has rings that are very hard to see. http://spaceplace.nasa.gov/all-about-jupiter/

March 13 – Uranus was discovered this day in 1781. Did you know that Uranus rotates on its side? http://spaceplace.nasa.gov/all-about-uranus/

March 18 – In 1965, the first walk in space took place! Hopefully there was no bad weather up there. Protect Earth's satellites from harmful space weather in our Shields Up game. http://spaceplace.nasa.gov/shields-up

April 9 – In 1959, the first group of astronauts was announced. Check out our gallery of astronauts. http://spaceplace.nasa.gov/gallery-technology/

April 11 – Apollo 13, the third mission intended to land on the moon, was launched on this day in 1970. Why is the Moon so scarred with craters ? http://spaceplace.nasa.gov/craters/

Raymo (Cont'd)

(Continued from page 3)

has been shattered by a titanic explosion involving the mass of a million suns, stars flung like drops of water from a shaking dog, planets shaken from stars, green worlds and blue worlds blown to kingdom come."

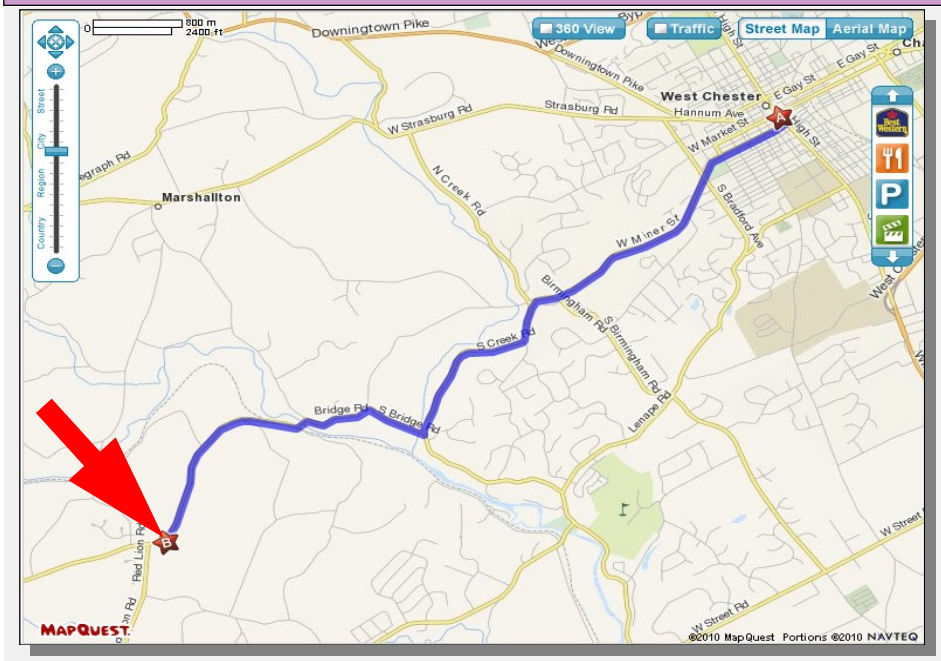
Here are the first two paragraphs of the chapter Hidden Matter:

"On the night of the peak of August's Perseid meteor shower, my son and I slept under the open sky. It was a night of exceptional clarity, far from the lights and haze of the city. Meteors flashed against a background of stars so numerous that the heavens seemed more light than darkness.

"Above our heads the Milky Way arched from Cassiopeia in the north to Sagittarius in the south It was a dark-shoaled river of light, a luminous drapery, diamond dust on black velvet. As the hours passed and the stars tilted toward the west, we could almost feel ourselves whirled in the bright vortex of the Galaxy".

The book was written in 1992, so the science can be slightly dated at times, but not as much as one might think. The beauty of Raymo's writing vastly overshadows any "old knowledge" and this is a book I will keep handy for re-reading, just a bit at a time, whenever I feel the need for some inspiration for the night sky.

CCAS Directions



Brandywine Red Clay Alliance
1760 Unionville Wawaset Rd
West Chester, PA 19382
(610) 793-1090
http://brandywinewatershed.org/

BRC was founded in 1945 and is committed to promoting and protecting the natural resources of the Brandywine Valley through educational programs and demonstrations for all ages.

Brandywine Red Clay Alliance

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Red Clay Alliance.

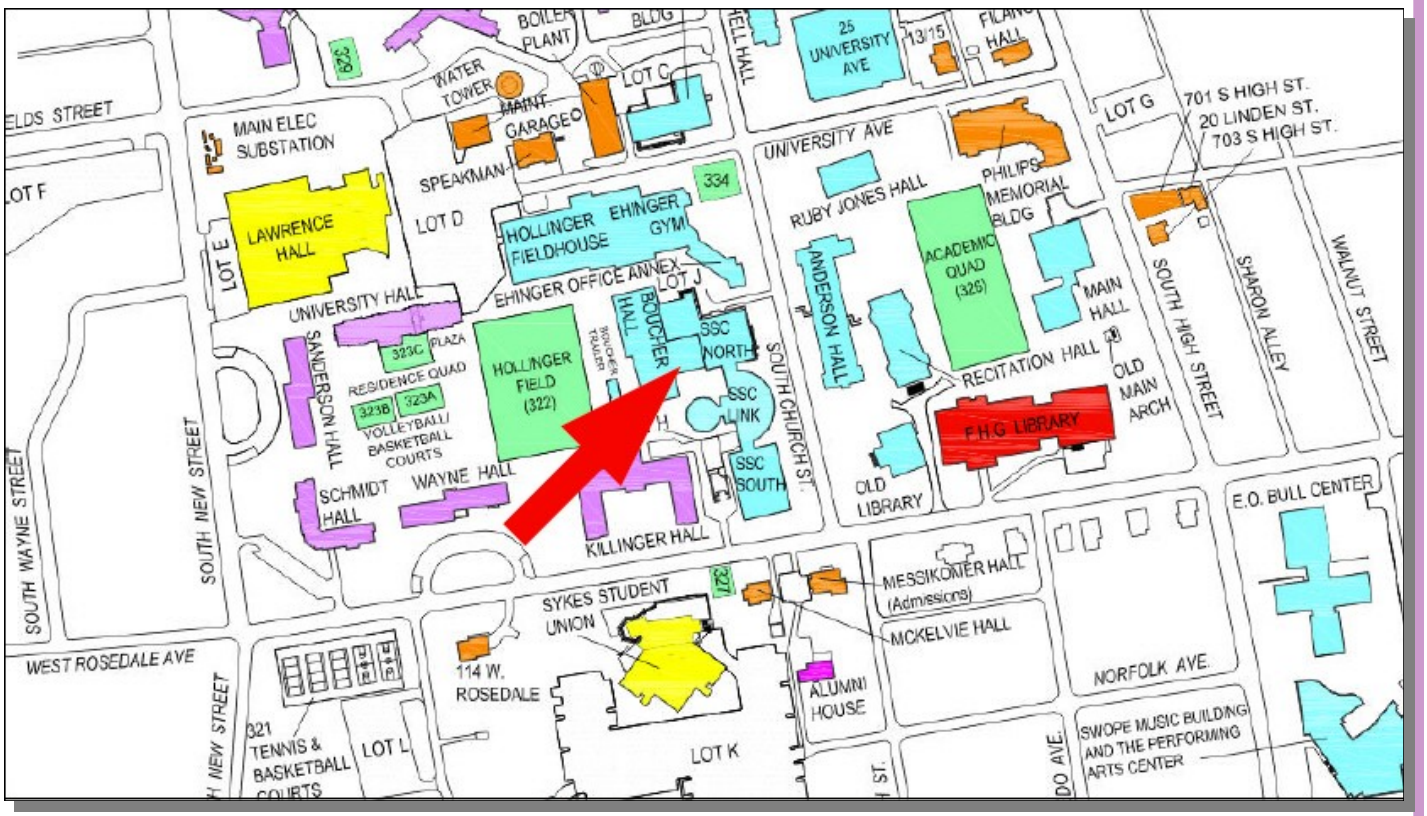
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 842 into the parking lot by the office: look for the signs to the office along Route 842. From that parking lot, go left through the gate and drive up the farm lane about 800 feet to the top of the hill. The observing area is on the right.

If you arrive after dark, *please turn off your headlights and just use parking lights* as you come up the hill (so you don't ruin other observers' night vision).

CCAS Directions

West Chester University Campus

The monthly meetings (September through May) are held in Room 112 in Merion Science Center (formerly the Boucher Building), attached to the Schmucker Science Center. The Schmucker Science Center is located at the corner of S. Church St & W. Rosedale Ave. Parking is generally available across Rosedale in the Sykes Student Union parking lot (Lot K).



Space Place (Cont'd)

(Continued from page 8)

ies in the universe, remember that there are still star-forming mysteries to be solved right here in our own backyard.

*This article is provided by **NASA Space Place.** With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.*

*Visit **spaceplace.nasa.gov** to explore space and Earth science!*

CCAS Membership Information and Society Financials

Treasurer's Report
by Don Knabb

Feb. 2016 Financial Summary

Beginning Balance	$2,797
Deposits	$174
Disbursements	$119
Ending Balance	$2,852

New Member Welcome!

Welcome new CCAS member Jim Fulton from Exton, PA. We're glad you decided to join us under the stars! Clear skies to you!

Membership Renewals

You can renew your CCAS membership by writing a check payable to "Chester County Astronomical Society" and sending it to our Treasurer:

Don Knabb
988 Meadowview Lane
West Chester PA 19382

The current dues amounts are listed in the *CCAS Information Directory*. Consult the table of contents for the directory's page number in this month's edition of the newsletter.

CCAS Information Directory

Join the Fight for Dark Skies!

You can help fight light pollution, conserve energy, and save the night sky for everyone to use and enjoy. Join the nonprofit International Dark-Sky Association (IDA) today. Individual memberships start at $30.00 for one year. Send to:

International Dark-Sky Association
3225 North First Avenue
Tucson, AZ 85719

Phone: **520-293-3198**
Fax: **520-293-3192**
E-mail: **ida@darksky.org**

For more information, including links to helpful information sheets, visit the IDA web site at:

http://www.darksky.org

Dark-Sky Website for PA

The Pennsylvania Outdoor Lighting Council has lots of good information on safe, efficient outdoor security lights at their web site:

http://www.POLCouncil.org

Find out about Lyme Disease!

Anyone who spends much time outdoors, whether you're stargazing, or gardening, or whatever, needs to know about Lyme Disease and how to prevent it. You can learn about it at:

http://www.LymePA.org

Take the time to learn about this health threat and how to protect yourself and your family. It is truly "time well spent"!

Good Outdoor Lighting Websites

One of the biggest problems we face in trying to reduce light pollution from poorly designed light fixtures is easy access to good ones. When you convince someone, a neighbor or even yourself, to replace bad fixtures, where do you go for good lighting fixtures? Check out these sites and pass this information on to others. Help reclaim the stars! And save energy at the same time!

Light pollution from poor quality outdoor lighting wastes billions of dollars and vast quantities of valuable natural resources annually. It also robs us of our heritage of star-filled skies. Starry Night Lights is committed to fighting light pollution. The company offers the widest selection of ordinance compliant, night sky friendly and neighbor friendly outdoor lighting for your home or business. Starry Night Lights is located in Park City, Utah.

Phone: **877-604-7377**
Fax: **877-313-2889**

http://www.starrynightlights.com

★ ★ ★ ★ ★

Lighthouse Outdoor Lighting is a dedicated lifetime corporate member of the International Dark-Sky Association. Lighthouse's products are designed to reduce or eliminate the negative effects outdoor lighting can have while still providing the light you need at night.

Phone: **484-291-1084**

https://www.lighthouse-lights.com/landscape-lighting-design/pa-west-chester/

Local Astronomy-Related Stores

Listing retail sites in this newsletter does not imply endorsement of any kind by our organization. This information is provided only as a service to our members and the general public.

Skies Unlimited is a retailer of telescopes, binoculars, eyepieces and telescope accessories from Meade, Celestron, Televue, Orion, Stellarvue, Takahashi, Vixen, Losmandy and more.

Skies Unlimited
Suburbia Shopping Center
52 Glocker Way
Pottstown, PA 19465

Phone: **610-327-3500** or **888-947-2673**
Fax: **610-327-3553**

http://www.skiesunlimited.net

★ ★ ★ ★ ★

Located in Manayunk, Spectrum Scientifics educates and entertains customers with an array of telescopes, microscopes, binoculars, science toys, magnets, labware, scales, science instruments, chemistry sets, and much more.

4403 Main Street
Philadelphia, PA 19127

Phone: **215-667-8309**
Fax: **215-965-1524**

Hours:
Tuesday thru Saturday: 10AM to 6PM
Sunday and Monday: 11AM to 5PM

http://www.spectrum-scientifics.com

CCAS Information Directory

CCAS Lending Telescopes

Contact Don Knabb to make arrangements to borrow one of the Society's lending telescopes. CCAS members can borrow a lending telescope for a month at a time; longer if no one else wants to borrow it after you. Don's phone number is 610-436-5702.

CCAS Lending Library

Contact our Librarian, Barb Knabb, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings, and on the CCAS website. Barb's phone number is 610-436-5702.

Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an e-mail message and send it to: **newsletter@ccas.us**

Or mail the contribution, typed or handwritten, to:

John Hepler
21103 Striper Run
Rock Hall, MD 21661

CCAS Newsletters via E-mail

You can receive the monthly newsletter (in full color!) via e-mail. All you need is a PC or Mac with an Internet e-mail connection. To get more information about how this works, send an e-mail request to John Hepler, the newsletter editor, at: **newsletter@ccas.us**.

CCAS Website

John Hepler is the Society's Webmaster. You can check out our Website at:

http://www.ccas.us

John welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work; no copyrighted material! Give your contributions to John Hepler at (410) 639-4329 or e-mail to webmaster@ccas.us

CCAS Purpose

The Chester County Astronomical Society was formed in September 1993, with the cooperation of West Chester University, as a non-profit organization dedicated to the education and enjoyment of astronomy for the general public. The Society holds meetings (with speakers) and observing sessions once a month. Anyone who is interested in astronomy or would like to learn about astronomy is welcome to attend meetings and become a member of the Society. The Society also provides telescopes and expertise for "nights out" for school, scout, and other civic groups.

CCAS Executive Committee

For further information on membership or society activities you may call:

President:	Roger Taylor 610-430-7768
Vice President:	Liz Smith 610-842-1719
ALCor, Observing, and Treasurer:	Don Knabb 610-436-5702
Secretary:	Ann Miller 610-558-4248
Librarian:	Barb Knabb 610-436-5702
Program:	Dave Hockenberry 610-558-4248
Education:	Kathy Buczynski 610-436-0821
Webmaster and Newsletter:	John Hepler 410-639-4329
Public Relations:	Deb Goldader 610-304-5303

CCAS Membership Information

The present membership rates are as follows:

REGULAR MEMBER……$25/year
SENIOR MEMBER…….$10/year
STUDENT MEMBER……..$ 5/year
JUNIOR MEMBER……..$ 5/year
FAMILY MEMBER…….$35/year

Membership Renewals

Check the Membership Renewals on the front of each issue of *Observations* to see if it is time to renew. If you need to renew, you can mail your check, made out to "Chester County Astronomical Society," to:

Don Knabb
988 Meadowview Lane
West Chester PA 19382-2178

Phone: **610-436-5702**
e-mail: **treasurer@ccas.us**

*Sky & Tele*scope Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **$32.95,** much less than the newsstand price of $66.00, and also cheaper than individual subscriptions ($42.95)! Buying a subscription this way also gets you a 10% discount on other Sky Publishing merchandise.

To **start** a **new** subscription, make **sure** you make out the check to the **Chester County Astronomical Society**, note that it's for *Sky & Telescope*, and mail it to Don Knabb.

To **renew** your "club subscription" contact Sky Publishing directly. Their phone number and address are in the magazine and on their renewal reminders. If you have **any** questions call Don first at 610-436-5702.

Astronomy Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **$34.00** which is much less than the individual subscription price of $42.95 (or $60.00 for two years). If you want to participate in this special Society discount offer, **contact our Treasurer Don Knabb.**