# Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

*Vol. 26, No. 1* ***Three-Time*** *Winner of the Astronomical League's Mabel Sterns Award ☼ 2006, 2009 & 2016* *January 2018*


## In This Issue



## M8 Wide Field

*Interstellar dust clouds and glowing nebulae abound in the fertile constellation of Orion. One of the brightest, M78, is centered in this colorful, wide field view, covering an area north of Orion's belt. At a distance of about 1,500 light-years, the bluish reflection nebula is around 5 light-years across. Its tint is due to dust preferentially reflecting the blue light of hot, young stars. Reflection nebula NGC 2071 is just to the left of M78. To the right, and much more compact in appearance, the intriguing McNeil's Nebula is a recently recognized variable nebula associated with a young sun-like star. Deeper red flecks of emission from Herbig-Haro objects, energetic jets from stars in the process of formation, stand out against the dark dust lanes. The exposure also brings out the region's fainter pervasive glow of atomic hydrogen gas. Image Credit & Copyright: Fabian Neyer .*

## Membership Renewals Due

| | |
|---|---|
| 01/2018 | Caruso |
| | Holmstrom |
| | Kellerman |
| | Kovac |
| | Linskens |
| | McElwee |
| | Stocker |
| 02/2018 | DiGiovanni |
| | Scovill |
| | Toth |
| 03/2018 | Angelini |
| | Fulton |
| | Sterrett |

## January 2018 Dates

**1st** • Full Moon, the Full Wolf Moon and a "Super Moon", 9:24 p.m. EST

**3rd/4th** • The Quadrantid meteors peak tonight

**4th** • The Moon is very near Regulus in Leo

**8th** • Last Quarter Moon, 5:25 p.m. EST

**16th** • New Moon, 9:17 p.m. EST

**24th** • First Quarter Moon, 5:20 p.m. EST

**31st** • Full Moon, Blue Moon, also a "Super Moon", 8:26 a.m. EST

## 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.

☼ **Friday, March 16, 2018** - CCAS regular monthly observing session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

☼ **Friday, April 13, 2018** - CCAS regular monthly observing session, Myrick Conservancy Center, BRC. The observing session starts at sunset.

☼ **Saturday, April 21, 2018** - CCAS special observing session, Hoopes Park, West Chester, PA.

## Winter 2018 Society Events

### January 2018

**3rd** • 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.

**9th** • CCAS Monthly Meeting starting at 7:30 p.m. in Room 113, Merion Science Center (former Boucher Building), West Chester University. Guest Speaker: Paul Halpern, "The Quantum Labyrinth: How Richard Feynman and John Wheeler Revolutionized Time and Reality."

**20th** • Open call for articles and photographs for the February 2018 edition of Observations.

**25th-26th** • The von Kármán Lecture Series: Explorer 1's 60th Anniversary: A Celebration of Six Decades of Earth Science Discoveries, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**26th** • Deadline for newsletter submissions for the February 2018 edition of Observations.

### February 2018

**7th** • 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.

**13th** • CCAS Monthly Meeting starting at 7:30 p.m. in Room 113, Merion Science Center (former Boucher Building), West Chester University. Theme: Member's Night and presentation of a brief new film mosaic called *SkyGlow*.

**20th** • Open call for articles and photographs for the March 2018 edition of Observations.

**22nd-23rd** • The von Kármán Lecture Series: Looking Deep—The InSight Mission to Mars, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

**26th** • Deadline for newsletter submissions for the March 2018 edition of Observations.

## CCAS Original Astrophotography

*by Dave Hockenberry, CCAS Program Chair*

*Van den Bergh 4, a reflection nebula in Cassiopeia.*

Image acquired between 9/24/17 to 10/24/17 with QSI 583wsg CCD camera through a Hyperion 12.5" astrograph telescope, mounted on an AP 1200 mount. Guiding with SX Lodestar X2 camera off-axis and SX AO active optics unit. Image capture and observatory control with MaxIm DL Pro. Image processing with CCDStack and Photoshop CC. Image compiled from 7.75 hours Lum (15 minute subexposures), 4.2 hours Red, 3 hours Green, and 4.5 hours Blue Astrodon Gen 2 filter (10 minute subexposures color data). This is a busy image. Van den Bergh 4 is the blue reflection nebula in the center right. In the upper left the large stars comprise the open cluster NGC 225. In the lower right corner is an unnamed dark nebula that extends out of the field of view.

## January 2018 CCAS Meeting Agenda

*by Dave Hockenberry, CCAS Program Chair*

Our next meeting will be held on January 9, 2018, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. Our Speaker: Paul Halpern. He will present "The Quantum Labyrinth: How Richard Feynman and John Wheeler Revolutionized Time and Reality."

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.

As for future meetings, we are looking for presenters for our Spring 2018 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

**Star Struck**
*Courtesy of Washington College*

*Washington College students experience the night sky as part of their introduction to astronomy course.*

When a physics professor and a digital media master gather students at the Washington College River and Field Campus to learn the fundamentals of astrophotography, the sky is literally the limit.

In a dimly lit classroom, students are examining a photo of the night sky that Brian Palmer has just brought up on a big screen. Everyone's faces are aglow in the weird projected light.

"There are three streaks here in the sky," says Palmer, director of Digital Media Services, which oversees IDEAWORKS, a multimedia resource for students. "Do you know what they are?"

"Planes," answers one student, and he's right, at least partly. When Palmer zooms in on one of the streaks, the repetitive blips of white, green, and red stitched across the sky reveal the navigation lights of a plane that the camera's open shutter captured. But when Palmer zooms in on the other two, the colors and patterns definitely aren't coming from anything that took off from planet Earth. They are meteors, scorching a luminous furrow across the black field of space.

"Why is the color different?" asks Charlie Kehm, chair of the Department of Physics and a physics and environmental science and studies professor. "It's in the ice, or the minerals. Potentially different materials burn in different colors." The stars, too, have different colors, he says, and when Palmer zooms in some more, what were once little white dots become clear individuals of blue, red, yellow. "Oh, yeah!" says another student.

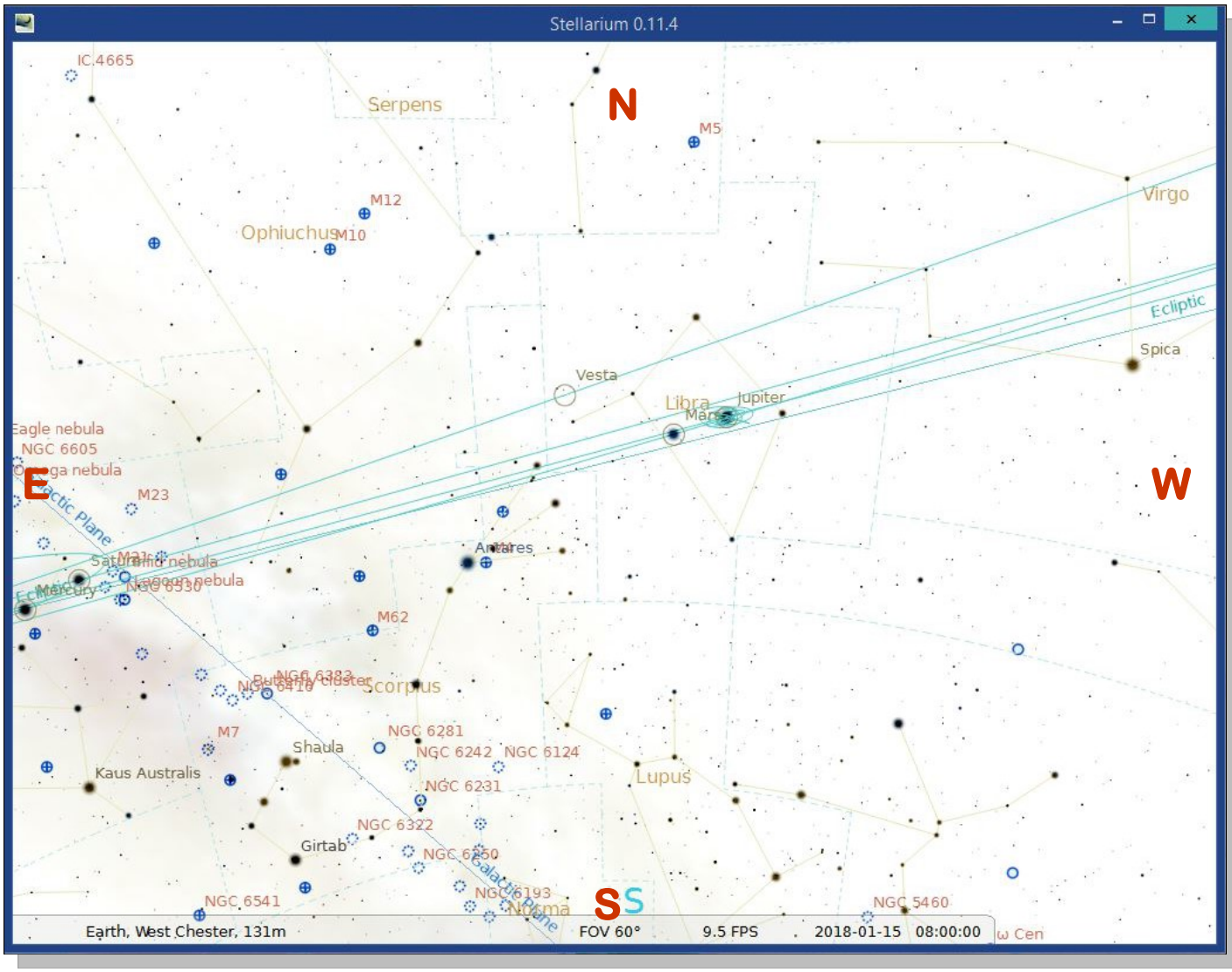
The night sky, always wondrous, starts to reveal its mysteries in this collaboration between Kehm and Palmer, who introduce students in Kehm's beginning level astronomy class to astrophotography. The students and teachers spent several hours one night this fall at the College's River and Field Campus (RAFC), using cameras and gear provided by IDEAWORKS, shooting the night sky. Tonight, they're in a lab learning how to use Camera Raw and Photoshop to process their images and, while doing so, get a closer look at the objects of their class's

*(Continued on page 6)*

# The Sky Over Chester County

January 15, 2018 at 8:00 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 |
|---|---|---|---|---|---|
| 01/01/2018 | 6:52 a.m. EST | 7:22 a.m. EST | 4:46 p.m. EST | 5:16 p.m. EST | 9h 23m 59s |
| 01/15/2018 | 6:50 a.m. EST | 7:20 a.m. EST | 5:00 p.m. EST | 5:29 p.m. EST | 9h 39m 37s |
| 01/31/2018 | 6:41 a.m. EST | 7:09 a.m. EST | 5:18 p.m. EST | 5:47 p.m. EST | 10h 08m 51s |

| Moon Phases | | | | | |
|---|---|---|---|---|---|
| | | | Full Moon | 01/01/2018 | 9:24 p.m. EST |
| Last Quarter | 01/08/2018 | 5:25 p.m. EST | New Moon | 01/16/2018 | 9:16 p.m. EST |
| First Quarter | 01/24/2018 | 5:20 p.m. EST | Full Moon | 01/31/2018 | 8:26 a.m. EST |

## January 2018 Observing Highlights

*by Don Knabb, CCAS Treasurer & Observing Chair*

| | |
|---|---|
| **1** | **Full Moon, the Full Wolf Moon and a "Super Moon"** |
| **3/4** | **The Quadrantid meteors peak tonight** |
| **4** | **The Moon is very near Regulus in Leo** |
| **8** | **Last Quarter Moon** |
| **16** | **New Moon** |
| **24** | **First Quarter Moon** |
| **31** | **Full Moon, a Blue Moon, also a "Super Moon"** |

**The best sights this month:** During January we are treated to two so-called "Super Moons"! The first is on January 1st and the second is on January 31st. These full Moons earn that name because full moon and perigee, the point in the Moon's orbit when it is closet to Earth, coincide.

**Mercury:** If you get up early on January 1st (yeah, right!) you can find Mercury at its best for January. The planet closest to the Sun will be low in the east before the glow of the sunrise overpowers this dim planet.

**Venus:** Venus is behind the Sun for most of January, but look for our sister planet to once again be the "evening star" as winter progresses.

**Mars:** Early in January Mars and Jupiter rise around 3:00 a.m. and on January 6th the planets are only 1/3° apart.

**Jupiter:** As mentioned above, Jupiter and Mars are very close on January 6th and hang out together all through January. Jupiter is of course much brighter than Mars, with the king of the planets shining at magnitude -2.0.

**Saturn:** The other pair of planetary buddies in January is Saturn and Mercury which are only 0.6° apart on January 13th. Look for them low in the eastern sky before sunrise.

**Uranus and Neptune:** These dim gas giants are the only planets visible in a telescope during the evening hours during January. Finder charts are available at the Sky and Telescope magazine website or use your favorite astronomy app on your phone or tablet. I get cold just thinking about them.

**The Moon:** Full Moon occurs on January 1st and January 31st. According to Native Americans, the first full Moon of January is the Full Wolf Moon. Amid the cold and deep snows of midwinter, the wolf packs howled hungrily outside Indian villages, so it was named the Full Wolf Moon. Sometimes it was also referred to as the Old Moon, or the Moon after Yule. Some called it the Full Snow Moon, but most tribes applied that name to the next full Moon.

The second full Moon of January on the 31st is a Blue Moon because it is the second full Moon in a month. Both full Moons in January are so-called "Super Moons" because the full Moon is near perigee, the point at which the Moon is closest to Earth.

**Constellations:** As the last blush of twilight drains from the sky, look toward the west for Cygnus the Swan, also known as the Northern Cross. The Swan is diving head first toward the horizon so it looks like a cross in the sky, with bright Deneb at the top of the cross. In the eastern sky the most recognized constellation of the winter climbs into view, Orion the Hunter. Look for his three-star belt extending straight up from the horizon. Orange Betelgeuse is to the left of the belt with blue-white Rigel to the right. About an hour behind Orion follow the line made by the belt down toward the horizon for the brightest star in the night sky, Sirius the Dog Star, twinkling through the atmosphere.

**Messier/deep sky:** During the winter months we are looking away from the center of the Milky Way, so the sky is not as full of deep sky wonders as during the summer. But, the sky is clear and there are still many beautiful objects for us to enjoy. Don't miss the trio of clusters in Auriga, and not far away is another nice cluster, M35, at the feet of the twins of Gemini. And below and behind Orion is Canis Major with the cluster M41, the Little Beehive, not far from Sirius.

*(Continued on page 10)*

## Through The Eyepiece: The Eskimo Nebula, NGC 2392

*by Don Knabb, CCAS Treasurer & Observing Chair*

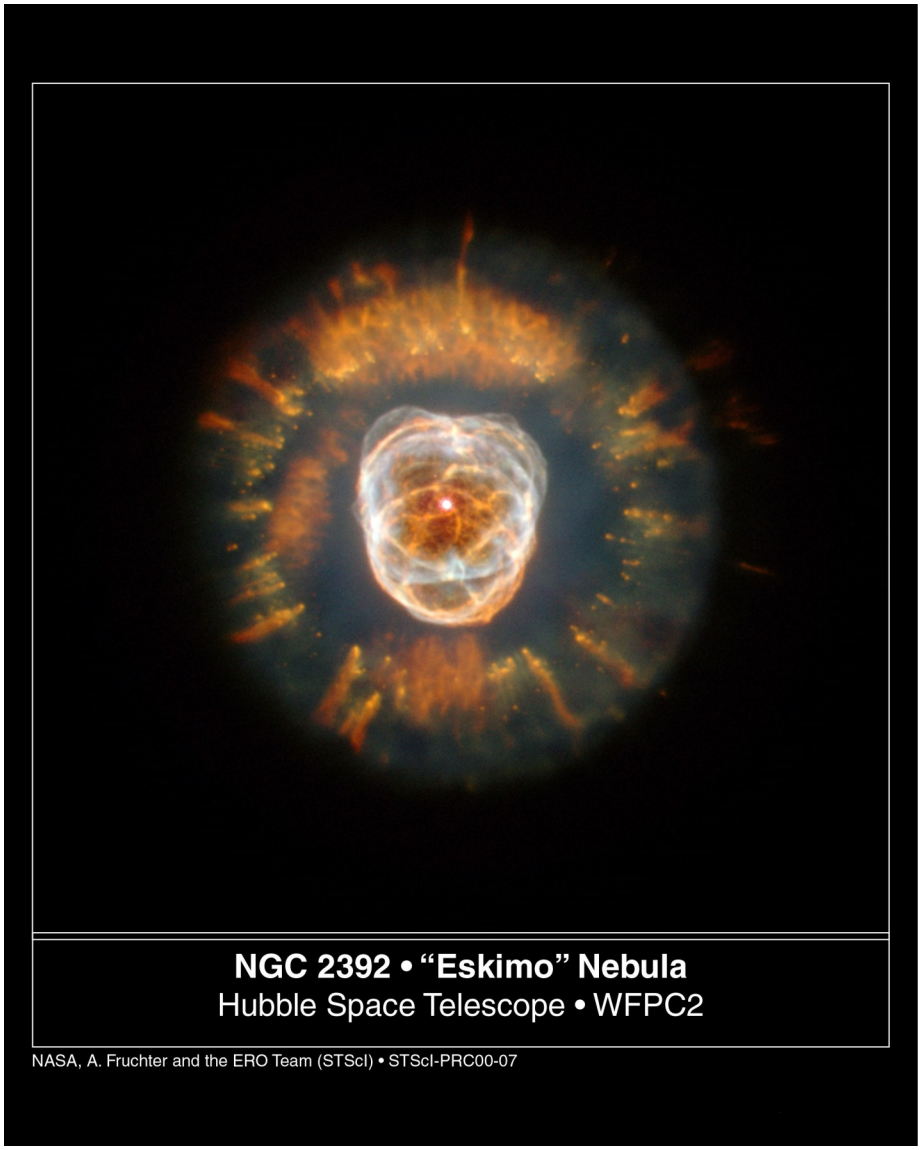
Now that we are into the really cold observing time of the year, I thought I'd write an article about the Eskimo Nebula, since the Eskimos set the standard for dealing with cold conditions. The Eskimo Nebula, NGC 2392, is also called the Clown Face Nebula.

Astronomer William Herschel discovered the Eskimo Nebula in 1787. Herschel described it as "A star 9th magnitude with a pretty bright middle, nebulosity equally dispersed all around. A very remarkable phenomenon."

From ground based telescopes the nebula resembles a person's head surrounded by a furry parka hood. In 2000, the Hubble Space Telescope provided the image above. The gas clouds of the nebula are so complex they are not fully understood.

The Eskimo Nebula is clearly a planetary nebula, and the gas seen above composed the outer layers of a Sun-like star only 10,000 years ago. The inner fila-

*(Continued on page 7)*




## Star Struck (Cont'd)

*(Continued from page 3)*

study.

"It was the first time I had ever seen so many stars in one place," says Kate Voynow '20, an American studies major and history minor, who's taking the class because she's always been intrigued by astronomy, and it fulfilled a distribution requirement. "It was surreal. There was something really magical about it."

The class surveys the universe, starting with Earth and moving through space and time to galactic clusters, supernovae, and black holes. Kehm says this is the second time that he and Palmer have collaborated to bring the art of photography into the science of astronomy.

"For students, this is one of the most enjoyable experiences of the semester," Kehm says. "Most students already have an affinity for photography. Very quickly Brian can bring them up to speed in the use of SLR cameras and techniques for night photography. The lab gives us an opportunity to spend some time with the night sky, view constellations, observe the Milky Way, and sometimes see some planets. We even get to see some evidence of stellar colors in our long-duration exposures."

*(Continued on page 7)*

## Eyepiece (Cont'd)

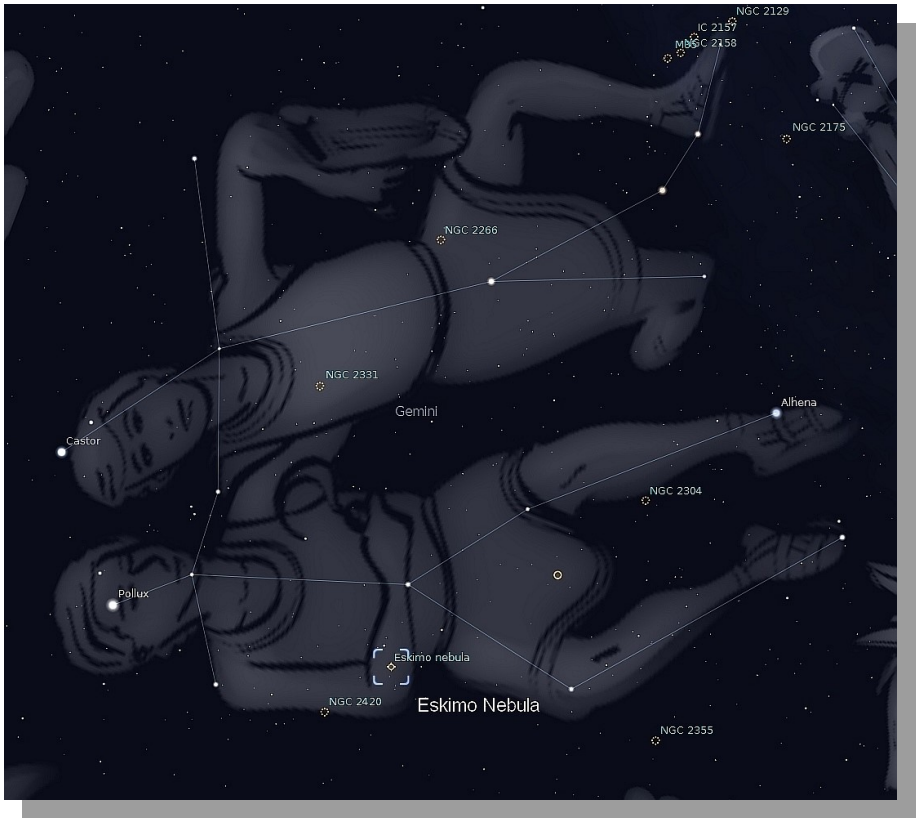



*Image credit: Stellarium.org*

NGC 2392 is included in the Astronomical League Herschel 400 observing program. It lies about 3000 light-years away and is visible with a small telescope in the constellation of Gemini. The chart on the next page is from Stellarium planetarium software.

Gemini is high in the sky during the evening hours of January, so I am looking forward to seeking out this distant fuzz ball in the sky. Of course, I will be bundled up like an Eskimo when I look to the stars!

Information sources:

http://www.nasa.gov/multimedia/imagegallery/image_feature_762.html
http://archives.cnn.com/2000/TECH/space/01/24/hubble.awakes/
http://en.wikipedia.org/wiki/Eskimo_Nebula

*(Continued from page 6)*

ments visible above are being ejected by a strong wind of particles from the central star. The outer disk contains unusual light-year long orange filaments.

## Star Struck (Cont'd)

*(Continued from page 6)*

Indeed, as the students processed their images back on campus, they found galaxies—including Andromeda, a swirl of gauzy white—meteors, and star clusters as they tweaked color, contrast, clarity, and other options to create scientifically publishable photos— what Kehm calls "an honest portrayal of the sky"—as well as versions that pushed into art photography.

"What I like most about the lab is the way it inspires the students," he says. "There's something about that pursuit of the aesthetic and the immersion under the starry sky that activates imagination and gets students excited about the subject. And even after doing this for many, many years, I'm still in awe every time I go out."

For Voynow, who says she's "not that good at STEM," the class has been fun, if challenging at times. But the astrophotography lab and the night sky at RAFC were a revelation.

"As a history student, it's kind of interesting because we learn about societies and we learn about the rise and fall of empires or how the United States began, all the things you learn about in history classes," she says. "This is like Big History. Uber History. It's fun to look at it that way. 'Now, let's look at the history of everything.' And it kind of makes what I'm learning, it puts it into perspective. Look at all this fighting, look at all this war. What's the point? It's not Big History. The universe is so big, and how small we are compared to it. I take

*(Continued on page 9)*

## Snowy Worlds Beyond Earth

*by Linda Hermans-Killiam*

*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!*

There are many places on Earth where it snows, but did you know it snows on other worlds, too? Here are just a few of the places where you might find snow beyond Earth:

### Mars

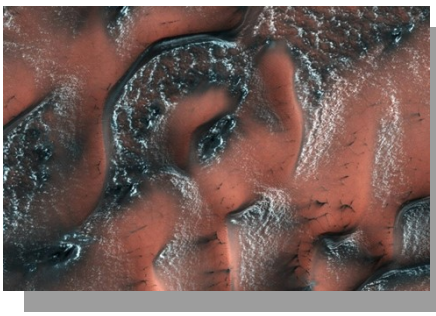
The north pole and south pole of Mars have ice caps that grow and shrink with the seasons. These ice caps are made mainly of water ice—the same kind of ice you'd find on Earth. However, the snow that falls there is made of carbon dioxide—the same ingredient used to make dry ice here on Earth. Carbon dioxide is in the Martian atmosphere and it freezes and falls to the surface of the planet as snow. In 2017, NASA's Mars Reconnaissance Orbiter took photos of the sand dunes around Mars' north pole. The slopes of these dunes were covered with carbon dioxide snow and ice.

### A Moon of Jupiter: Io

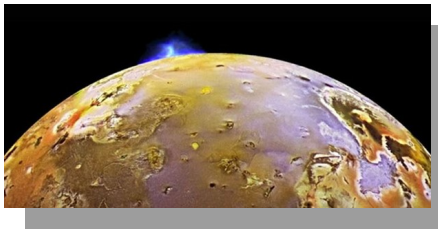
There are dozens of moons that orbit Jupiter and one of them, called Io, has snowflakes made out of sulfur. In 2001, NASA's Galileo spacecraft detected these sulfur snowflakes just above Io's south pole. The sulfur shoots into space from a volcano on Io's surface. In space, the sulfur quickly freezes to form snowflakes that fall back down to the surface.

### A Moon of Saturn: Enceladus

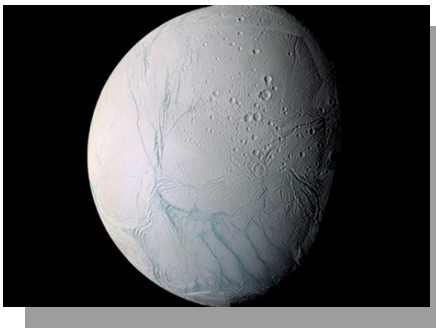
Saturn's moon, Enceladus, has geysers that shoot water vapor out into space. There it freezes and falls back to the surface as snow. Some of the ice also escapes Enceladus to become part of Saturn's rings. The water vapor comes from a heated ocean which lies beneath the moon's icy surface. (Jupiter's moon Europa is also an icy world with a liquid ocean below the frozen surface.) All of this ice and snow make Enceladus one of the brightest objects in our solar system.



*NASA's Mars Reconnaissance Orbiter captured this image of carbon dioxide snow covering dunes on Mars. Credit: NASA/JPL/University of Arizona*



*A volcano shooting molten sulfur out from the surface of Io. Credit: NASA/JPL-Caltech*



*Enceladus as viewed from NASA's Cassini spacecraft. Credit: NASA*

### A Moon of Neptune: Triton

Neptune's largest moon is Triton. It has the coldest surface known in our solar system. Triton's atmosphere is made up mainly of nitrogen. This nitrogen freezes onto its surface covering Triton with ice made of frozen nitrogen. Triton also has geysers like Enceladus, though they are smaller and made of nitrogen rather than water.

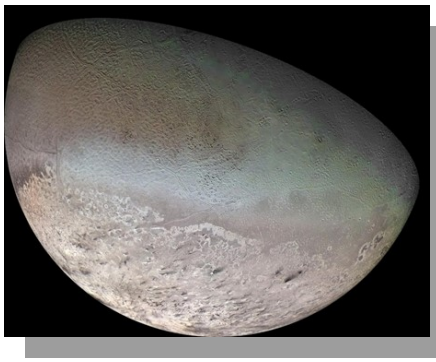
### Pluto

Farther out in our solar system lies the dwarf planet Pluto. In 2016, scientists on the New Horizons mission discovered a mountain chain on Pluto where the mountains were capped with methane snow and ice.

### Beyond Our Solar System

There might even be snow far outside our solar system! Kepler-13Ab is a hot, giant planet 1,730 light years from Earth. It's nine times more massive than Jupiter and it orbits very close to its star. The Hubble Space Telescope detected evidence of titanium oxide—the mineral used in sunscreen—in this planet's upper atmosphere. On the cooler side of Kepler-13Ab that faces away

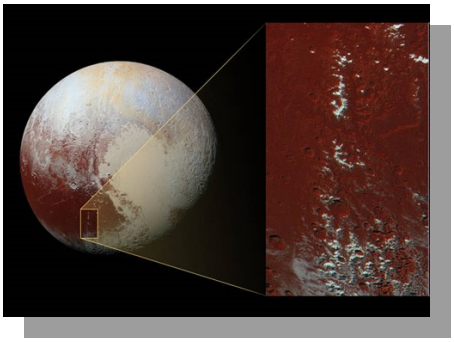
## Space Place (Cont'd)



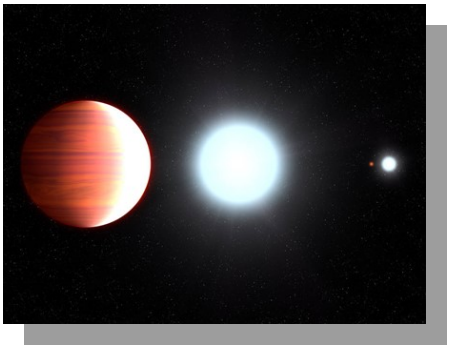
*The Voyager 2 mission captured this image of Triton. The black streaks are created by nitrogen geysers. Credit: NASA/JPL/USGS*

from its host star, the planet's strong gravity might cause the titanium oxide to fall down as "snow."

Want to learn more about weather on other planets? Check out NASA Space Place: https://spaceplace.nasa.gov/planet-weather



The snowy Cthulhu (pronounced kuh-THU-lu) mountain range on Pluto. Credits: NASA/JHUAPL/SwRI



*This is an artist's illustration of what Kepler-13Ab might look like. Credit: NASA/ESA/G. Bacon (STScI)*

## Star Struck (Cont'd)

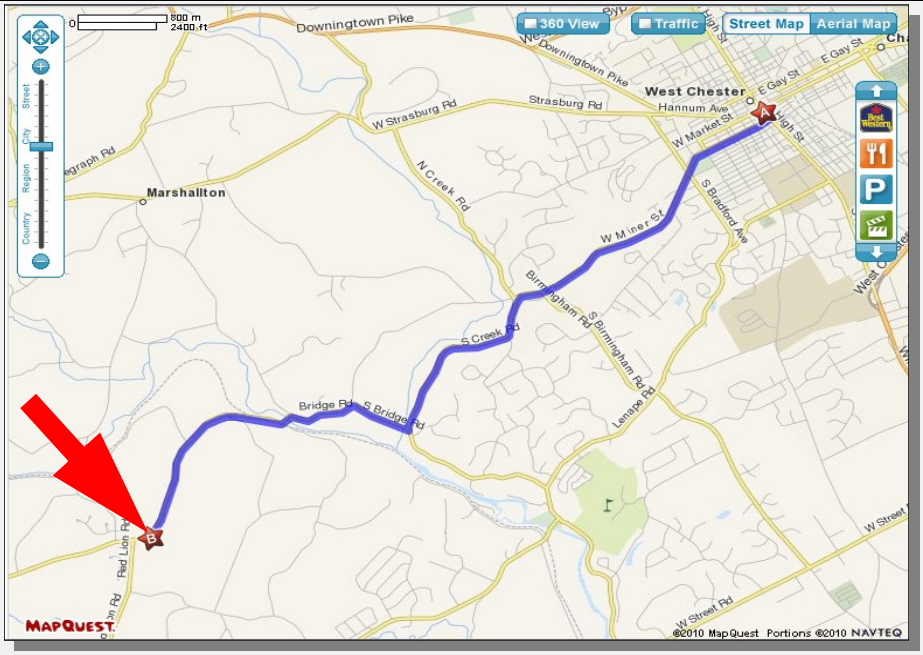
*(Continued from page 7)*

comfort in that. There's something nice about it."

Kehm says RAFC "offers some of the darkest skies in the region, and it's only minutes from campus. It is an absolutely fantastic resource for us. One of my long-term goals is to develop a permanent observing platform at the River and Field Campus, which would make it easier for us to use telescopes more routinely at the site. The property offers a lot of promise for astronomy at the College. We're only starting to realize that potential."

Palmer says the lab is fun for him because it lets him teach students how to use cameras and technologies supplied by IDEA-WORKS that help them imagine new possibilities for their work.

## *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.

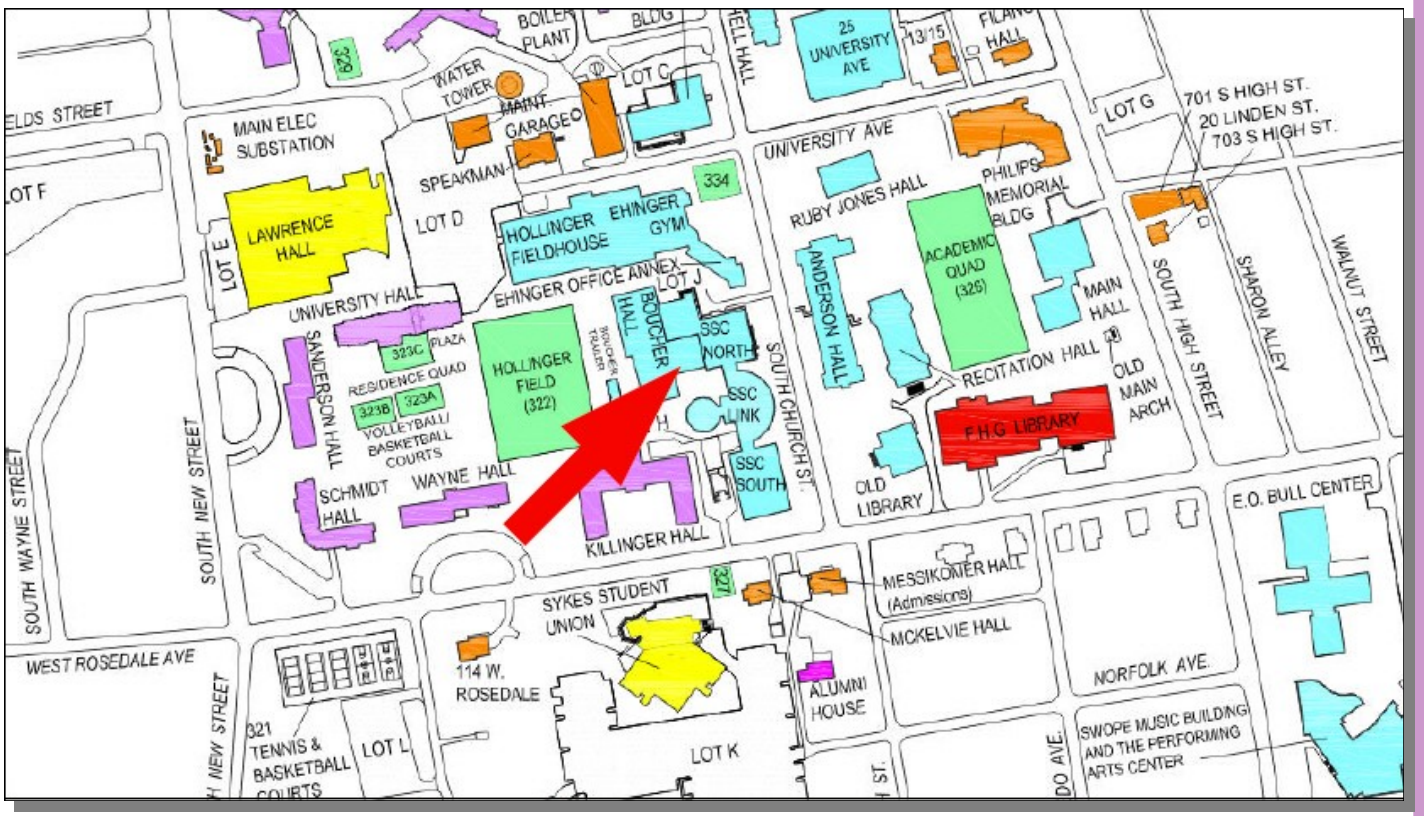
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BRC property, turn left off Route 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).




## Observing (Cont'd)

*(Continued from page 5)*

**Comets:** There are no bright comets visible during January

**Meteor showers:** The Quadrantid meteor shower peaks in the early morning hours of January 3rd. This is the briefest meteor shower of the year, so if you want to see these shooting stars you need to go out after midnight and watch the skies. Unfortunately, the bright waning gibbous Moon will wash out all but the brightest "shooting stars".

## *CCAS Membership Information and Society Financials*

### Treasurer's Report
*by Don Knabb*

**Dec. 2017 Financial Summary**

| | |
|---|---|
| Beginning Balance | $1,268 |
| Deposits | $140 |
| Disbursements | $0 |
| Ending Balance | $1,408 |

### New Member Welcome!

Welcome new CCAS members Keith Baker from Glen Mills, PA, Kathy McNeal & Walt Talunas also from West Chester, PA, Ed Damerau from West Chester, PA, and Ralph Marshall from Sarasota, FL. 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

PENNSYLVANIA OUTDOOR LIGHTING COUNCIL

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!

Starry Night Lights

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**

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LIGHTHOUSE OUTDOOR LIGHTING

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

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**

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Spectrum Scientifics
Quality Science Products for All Ages

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