Observations

A Monthly Publication Of The
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 22, No. 9 Two-Time Winner of the Astronomical League's Mabel Sterns Award ☼ 2006 & 2009 September 2014

In This Issue

Membership Renewals Due

09/2014	Catalano-Johnson & Family Lurcott, Edwin
10/2014	Rosenblatt & Family Toth Zandler
11/2014	Buczynski Cavanaugh Hepler Holenstein Sigler Smith

Uranus & Its Ring System

The ring system around Uranus was discovered in 1977. For more information, see pg. 6.
Image source: http://history.nasa.gov/EP-177/ch2-3-3.html

Important September 2014 Dates

2nd • First Quarter Moon, 7:11 a.m.

8th • Full Moon, 9:38 p.m.

15th • Last Quarter Moon, 10:05 p.m.

22nd • Autumnal Equinox at 10:29 p.m.

24th • New Moon, 2:14 a.m.

CCAS Upcoming Nights Out

CCAS has several "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, September 27, 2014**. Star Party at Nottingham County Park. The event is scheduled for 7:30 PM to 8:30 PM.

☼ **Saturday, October 18, 2014**. CCAS special observing session at Anson Nixon Park, Kennett Square. The observing session is from 8:00 to 9:30 PM.

☼ **Saturday, November 22, 2014**. CCAS star party at Hoopes Park, West Chester. The observing session is from 7:00 to 9:00 PM.

Summer/Fall 2014 Society Events

September 2014

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 in Room 112, Merion Science Center, WCU. Meet & Greet over coffee and refreshments from 7:10 to 7:30 p.m. The meeting starts at 7:30 p.m. Guest Speaker: Jamie Holder, PhD U. Delaware, "Gamma Ray Bursts and High Energy Particle Astronomy."

11th-12th • The von Kármán Lecture Series: Studying Soil Moisture from Space – NASA's Soil Moisture Active Passive mission, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

20th • Open call for articles and photographs for the October 2014 edition of Observations.

22th • Autumnal Equinox (10:29 PM EDT).

26th • Deadline for newsletter submissions for the October 2014 edition of Observations.

27th • CCAS star party at Nottingham County Park. The event is scheduled for 7:30 PM to 8:30 PM.

October 2014

1st • 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.

4th • Autumn Astronomy Day. Learn more about Astronomy Day events by checking the web site of the Astronomical League.

9th-10th • The von Kármán Lecture Series: Rosetta—A Lesson on Comets, the Solar System and Mysteries of Earth, at the Jet Propulsion Laboratory, Jet Propulsion Laboratory, Pasadena, California. Live stream of free lecture presented by NASA & Caltech.

10th • West Chester University Planetarium Show: "Our Milky Way Galaxy," in the Schmucker Science Building. The show starts at 7 p.m. and run approximately one hour. For more information, visit the WCU Public Planetarium Shows webpage.

14th • CCAS monthly meeting in Room 112, Merion Science Center, WCU. Meet & Greet over coffee and refreshments from 7:10 to 7:30 p.m. The meeting starts at 7:30 p.m. Guest Speaker: TBA.

18th • CCAS Special Observing Session at Anson Nixon Park, Kennett Square. The observing session is from 8:00 to 9:30 PM.

20th • Open call for articles and photographs for the November 2014 edition of Observations.

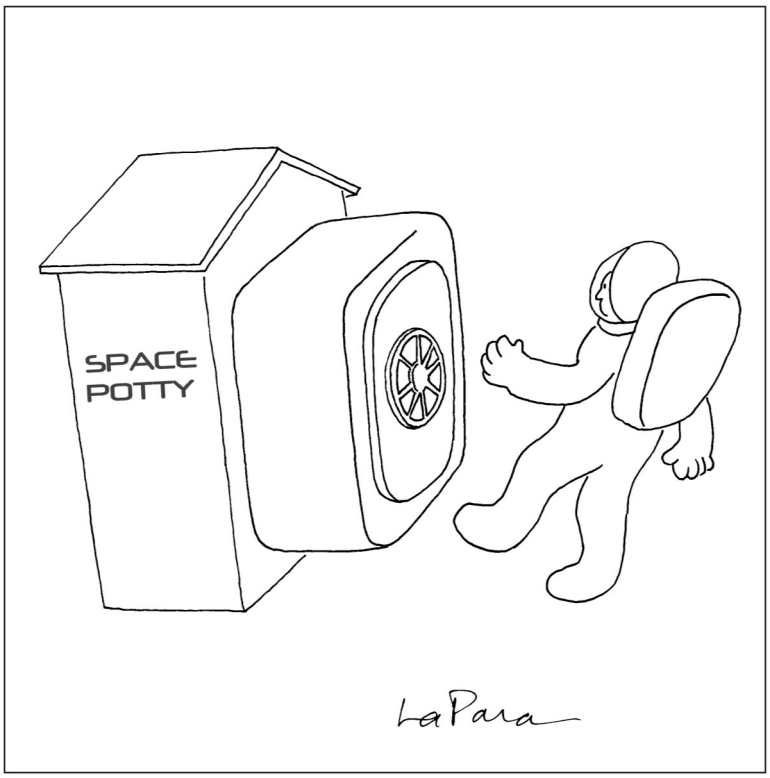
Star-Struck Socks!

by Don Knabb

What won't people think of next? Barb and I found some constellation socks. They are all the rage among fashion conscious astronomers! If you're thinking, "They're perfect!, they can be found at sock-dreams.com if you search for constellation. It just goes to show you that where there's an interest, there's someone making a buck off it!

Nicholas's Humor Corner

by Nicholas La Para



Project ASTRO Needs Astronomers!

by Dr. Karen Schwarz, West Chester University of Pennsylvania

A teacher-astronomer pairs doing some solar observing with middle school students.

It's the start of another school year, and I'm looking for volunteers to take part in Project ASTRO, a National Program that creates long-term partnerships between astronomers and teachers, or youth groups and community leaders. Project ASTRO pairs K-12 teachers and youth group leaders with visiting volunteer astronomers who have an interest in working with local schools and community organizations. A partnership usually consists of one astronomer and one or two teachers at the same school.

I'll be holding training workshops on November 7th and 8th, 2014, where teachers and their partner astronomers will meet for the first time and engage in effective classroom hands-on astronomy activities that meet the Pennsylvania state science standards. All participants will receive a copy of *The Universe at Your Fingertips*, a collection of over 90 hands-on activities for teaching the many aspects of astronomy. Partners also will

(Continued on page 9)

September 2014 CCAS Meeting Agenda

by Dave Hockenberry, CCAS Program Chair

Our next meeting will be held on September 9, 2014, starting at 7:30 p.m. The meeting will be held in Room 112, Merion Science Center (former Boucher Building), West Chester University. Our guest speaker will be Jamie Holder, PhD, from the University of Delaware. He will speak on "Gamma Ray Bursts and High Energy Particle Astronomy."

Dr. Jamie Holder

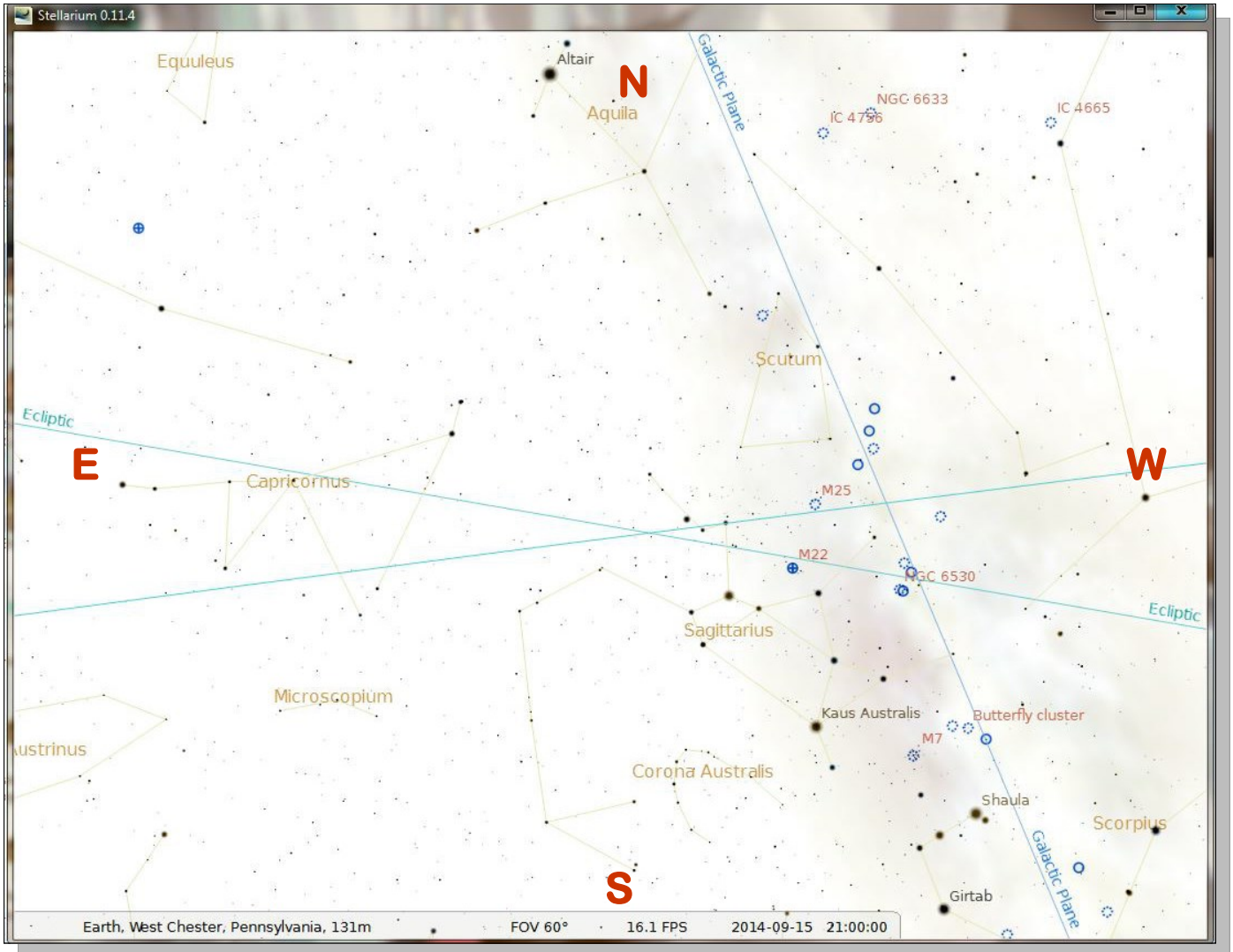
Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

We are looking for presenters for future meetings in our 2014-2015 season. If you are interested in presenting, or know someone who would like to participate, please contact me at programs@ccas.us.

The Sky Over Chester County

September 15, 2014 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
09/01/2014	6:01 a.m. EDT	6:28 a.m. EST	7:32 p.m. EDT	8:00 p.m. EST	13h 03m 36s
09/15/2014	6:14 a.m. EDT	6:42 a.m. EDT	7:09 p.m. EDT	7:36 p.m. EDT	12h 27m 44s
09/30/2014	6:29 a.m. EDT	6:56 a.m. EDT	6:45 p.m. EDT	7:12 p.m. EDT	11h 48m 41s

Moon Phases					
First Quarter	09/02/2014	7:11 a.m. EDT	Full Moon	09/08/2014	9:38 p.m. EDT
Last Quarter	09/15/2014	10:05 p.m. EDT	New Moon	09/24/2014	2:14 a.m. EDT

September 2014 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

2	**First Quarter Moon**
8	**Full Moon**
15	**Last Quarter Moon**
22	**Autumnal equinox occurs at 10:29 p.m.**
24	**New Moon**
24-30	**Mars is close to Antares**
27	**The Moon passes 0.1 degree south of asteroid Ceres**
27	**The waxing crescent Moon is very close to Saturn**
28	**The Moon passes 0.5 degree north of asteroid Vesta and is close to Mars and Antares**
30	**The Lunar X is visible just before midnight**

The best sights this month: The Milky Way is wonderful during September as the sky darkens earlier and the nights turn crisp and clear. At a dark sky site our galaxy arcs overhead like a faint cloud. Saturn and Mars are beautiful just after darkness falls and Mars will be close to the red star Antares late in the month.

Mercury: Mercury is not in good viewing position during September.

Venus: Our sister planet is pulling ahead of us in our eternal race around the Sun so it is getting lower in the pre-dawn sky each day. Near the end of October it will slip behind the Sun to emerge as the "evening star" in November.

Mars: The red planet dims and shrinks slightly during September. Mars will be fun to watch as it passes through the claws of Scorpius and has a close encounter with its rival Antares, a star that is nearly as red as Mars, on the 27th and 28th.

Jupiter: Jupiter is rising a few hours before the Sun during September, beginning the month not too far from the Beehive Cluster and pulling away as the month progresses.

Saturn: Look for Saturn as soon as the sky darkens. Saturn is still a nice sight in the eyepiece of a telescope but it is getting lower in the sky and therefore we are looking through more of the Earth's atmosphere so the view is not as crisp as we experienced in the early summer. Enjoy the view before Saturn falls closer to the sunset near the end of the month.

Uranus and Neptune: The distant gas giants are best viewed around midnight when they are fairly high in the southern sky. There is a sky chart in the September issue of Sky and Telescope to help you find the two outermost planets.

The Moon: Full moon occurs on September 8th. This full Moon is the Harvest Moon because it is the full Moon that occurs closest to the autumn equinox. In two years out of three, the Harvest Moon comes in September, but in some years it occurs in October. At the peak of harvest, farmers can work late into the night by the light of this Moon. Usually the full Moon rises an average of 50 minutes later each night, but for the few nights around the Harvest Moon, the Moon seems to rise at nearly the same time each night: just 25 to 30 minutes later across the U.S., and only 10 to 20 minutes later for much of Canada and Europe.

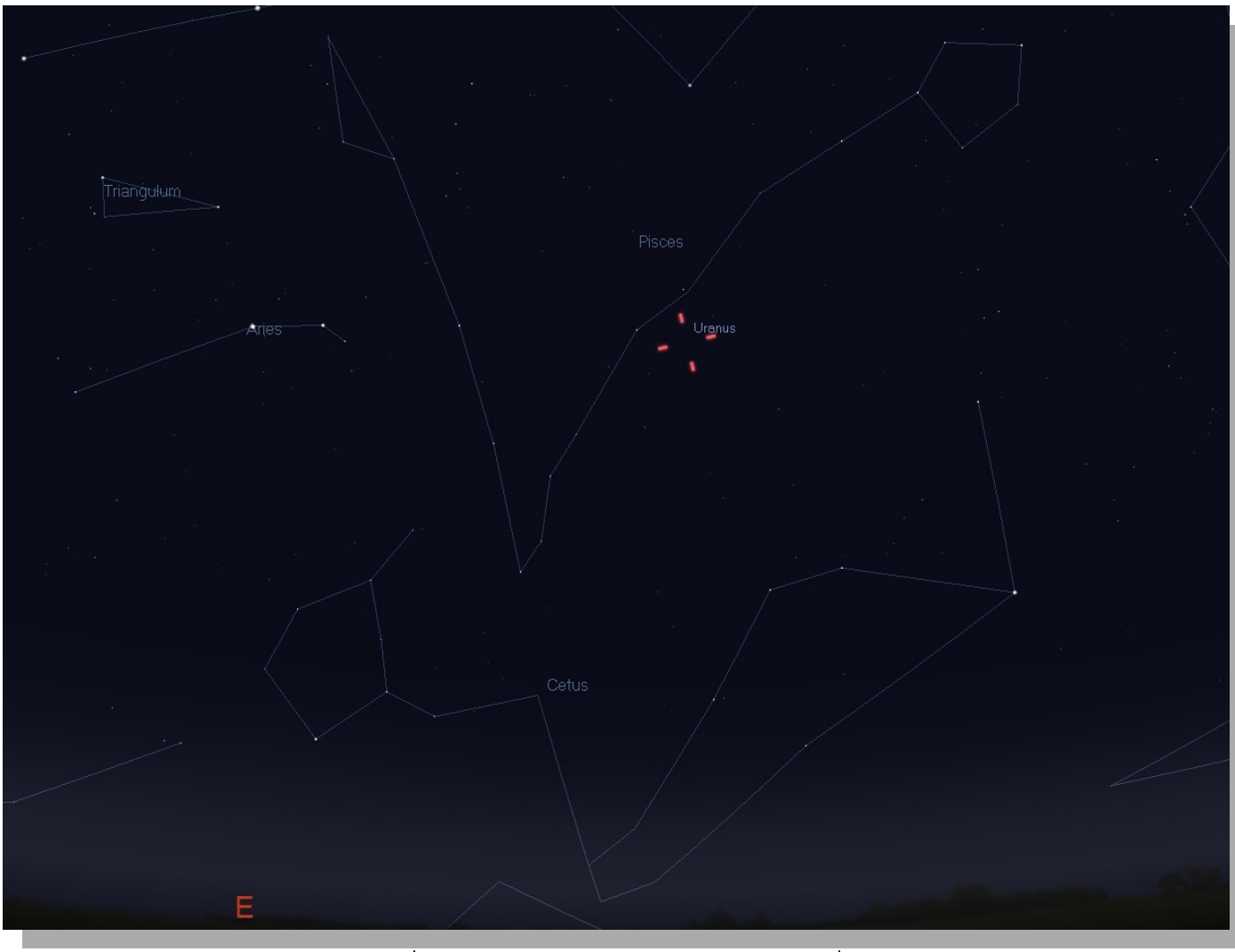
Constellations: The September sky is dominated by the constellations of the Summer Triangle; Lyra, Cygnus and Aquila. But stay out a little later and the Great Square of Pegasus is rising and you can find our neighbor galaxy Andromeda with binoculars. A bit later yet and you will get a preview of the fall and winter constellations with the beautiful Pleiades leading the charge.

Messier/deep sky: We lose the southern Messier objects as September moves on but the Andromeda galaxy makes up for that loss. What a sight that is!

(Continued on page 12)

Through the Eyepiece: Uranus, the Distant Green Jewel

by Don Knabb, CCAS Treasurer & Observing Chair



I'm sure most of us can list Mercury, Venus, Mars, Jupiter and Saturn on your list of planets that you have seen with your naked eyes or with the help of binoculars or a telescope. How about making an effort this month and adding Uranus to that list? September is a great time to see Uranus during late evening observing hours.

Let's clear up the first question everyone asks about Uranus: what is the correct pronunciation for this gas planet? I've looked at a few sources and most suggest one say "YOOR-a-nus", or "YER-a-nus" not "your-AY-nus" or "urine us". Using the correct pronunciation can save some embarrassment when dealing with middle school aged astronomy fans.

At magnitude 5.8 Uranus is at the threshold of naked eye vision. But with binoculars you can find Uranus relatively easily in the southeastern skies in September.

Above is a screen shot from Stellarium planetarium software for 11:00 p.m. on September 15th. The best chart to use for finding Uranus is on the Sky and Telescope website. Just go to skyandtelescope.com and search for Uranus.

I have difficulty seeing much color with regular binoculars, but with almost any telescope at 50X or higher the bluish green planet looks markedly different from a star and is a distinct greenish disk.

Uranus is the seventh planet

(Continued on page 7)

Summer Triangle (Cont'd)

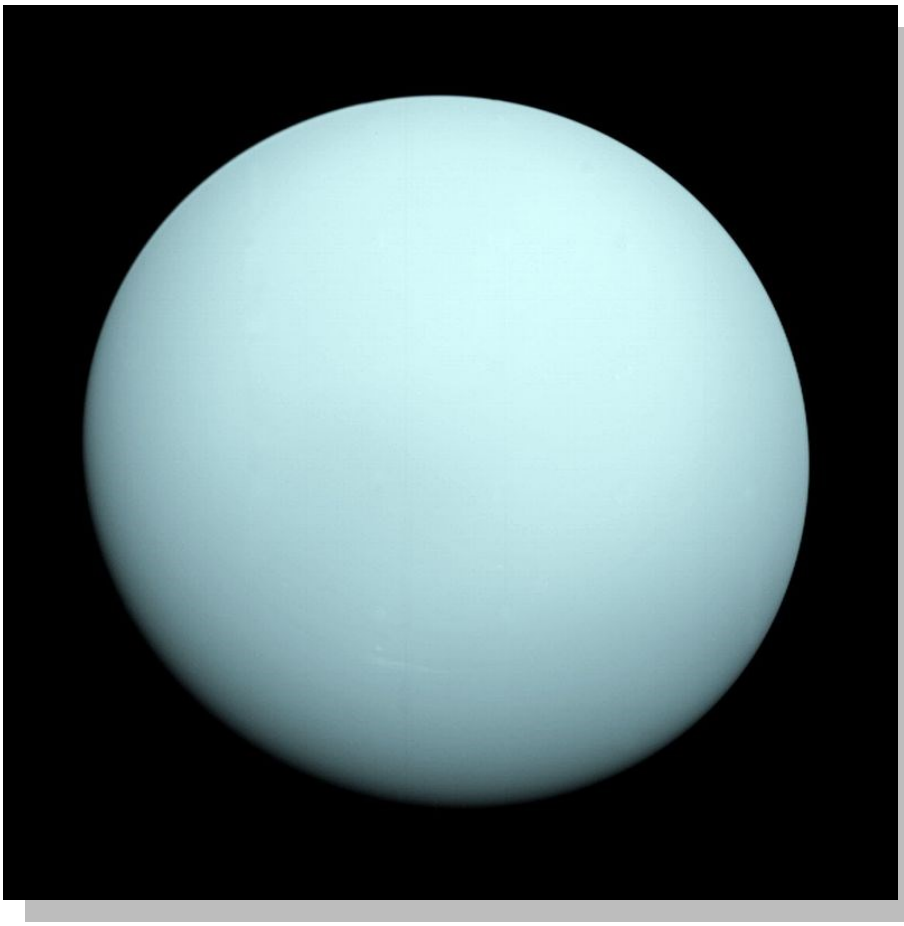


Photo credit: NASA Voyager 2

(Continued from page 6)

from the Sun and third largest planet in the solar system. It is named after the ancient Greek deity of the sky Uranus, the father of Kronos (Saturn) and grandfather of Zeus (Jupiter).

Uranus was the first planet discovered in modern times. It was discovered by William Herschel while systematically searching the sky with his 6 inch Newtonian reflector telescope on March 13, 1781. It had actually been seen many times before but ignored as simply another star. Herschel named it "the Georgium Sidus" (the Georgian Planet) in honor of his patron, King George III of England. Others called it "Herschel". The name "Uranus" was first proposed by Bode in conformity with the other planetary names from classical mythology but didn't come into common use until 1850.

The picture below is from Voyager 2, the only spacecraft that has been to Uranus. Voyager 2 was launched in 1977 and took this picture while performing a flyby in January 1986.

Like the other gas planets, Uranus has rings. Like Jupiter's, they are very dark but like Saturn's they are composed of fairly large particles ranging up to 10 meters in diameter in addition to fine dust. There are 11 known rings, all very faint. The Uranian rings were the first after Saturn's to be discovered. This was of considerable importance since we now know that rings are a common feature of planets, not a peculiarity of Saturn alone. The rings cannot be seen from Earth, other than with electronically amplified imaging equipment.

The Uranian system is unique in the solar system because its axis of rotation is tilted sideways, nearly into the plane of its revolution about the Sun; its north and south poles lie where the other planets have their equators. Seen from Earth, Uranus' rings appear to circle the planet like an archery target and its moons revolve around it like the hands of a clock. In addition to the rings, Uranus has 27 moons, the largest being Miranda, Ariel, Umbriel, Titania and Oberon.

Information sources:

http://www.nineplanets.org/uranus.html
http://en.wikipedia.org/wiki/Uranus
Pasachoff, Jay M. 2000. *A Field Guide to the Stars and Planets.* New York, NY. Houghton Mifflin.
Dickinson, Terence 2006. *Nightwatch: a practical guide to viewing the universe.* Buffalo, NY. Firefly Books.

Book Review: *The Martian,* by Andy Weir
by Don Knabb

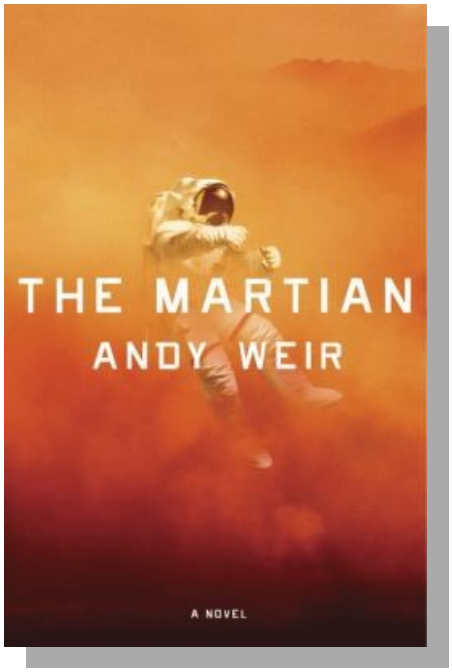
I am a regular listener to a podcast called *Science Friday*. This is a wonderful podcast that covers all aspects of science news. Astronomy subjects in the news are often featured, as are movies and books related to science.

A few weeks ago I heard an interview with author Andy Weir, a software engineer who is a self-described lifelong space nerd and a devoted hobbyist of subjects like relativistic physics, orbital mechanics, and the history of manned spaceflight. *The Martian* is his first novel.

He began writing the book in 2009 and did extensive research in orbital mechanics, astronomy and the history of manned spaceflight in order to make the book as realistic as possible. All the equipment he describes in the book has some basis in current technology.

I thoroughly enjoyed this book. It was a page turner from front to back. One reviewer describes it as "*Apollo 13* meets *Cast Away* in this grippingly detailed, brilliantly ingenious man-vs-nature survival thriller, set on the surface of Mars."

This is a book that I classify as "hard science fiction". That is, although it is obviously fiction it is not a fairy tale of swash buckling space travelers but is a "down to Earth," or rather "down to Mars," adventure story as the main character works his way through serious, life threatening difficulties in his quest to survive on Mars after being left behind when his fellow astronauts thought him dead.



I read the book through the Apple iBook app, but it is also available in hardcover, paperback, Kindle or audio book format. When Weir wrote the book, his first, he put the book online for free at his website. At the request of fans he made an Amazon Kindle version available through Amazon.com at 99 cents (the minimum he could set the price). The Kindle edition rose to the top of Amazon's list of best-selling science-fiction titles where it sold 35,000 copies in three months. This garnered the attention of publishers: Podium Publishing, an audiobook publisher, signed for the audiobook rights in January, 2013, and Weir sold the print rights to Crown in March 2013.

Here is a description of the book from Andy Weir's website:

Six days ago, astronaut Mark Watney became one of the first people to walk on Mars. Now, he's sure he'll be the first person to die there.

After a dust storm nearly kills him and forces his crew to evacuate while thinking him dead, Mark finds himself stranded and completely alone with no way to even signal Earth that he's alive—and even if he could get word out, his supplies would be gone long before a rescue could arrive.

Chances are, though, he won't have time to starve to death. The damaged machinery, unforgiving environment, or plain-old "human error" are much more likely to kill him first.

But Mark isn't ready to give up yet. Drawing on his ingenuity, his engineering skills—and a relentless, dogged refusal to quit—he steadfastly confronts one seemingly insurmountable obstacle after the next. Will his resourcefulness be enough to overcome the impossible odds against him?

In May 2014 it was reported that Ridley Scott was in negotiations to direct an adaptation that would star Matt Damon as Mark Watney. The film is scheduled for release on November 25, 2015. The film is classified as

(Continued on page 9)

UN-Sponsored International Event Scheduled for 4-10 October

Submitted by World Space Week Association

Since its United Nations declaration in 1999, World Space Week has grown into the largest public space event on Earth. More than 1,400 events in 80 countries celebrated the benefits of space and excitement about space exploration in 2013. With our new satellite navigation theme "Space: Guiding Your Way" we aim to inspire even more events around the world in October 2014.

To learn more, visit http://www.worldspaceweek.org

CCAS Summer Picnic

Barb and Don Knabb have again graciously offered to host the annual CCAS summer picnic at their home on Saturday, September 13th, at 6:00 p.m. Their address is 988 Meadowview Lane and their phone number is 610-436-5702. A Google Maps search will provide good directions to their house. Their home is at the end of a cul-de-sac and 988 is on the mailbox. They have a long driveway and the house has a garage facing the street. Please RSVP to dknabb00@comcast.net if you plan to attend.

Mars (Cont'd)

(Continued from page 8)

"in development", so I certainly hope this film survives the studio selection process and makes it to the big screen!

Information sources:

http://www.andyweirauthor.com/books/the-martian-hc
http://www.goodreads.com/book/show/18007564-the-martian
http://en.wikipedia.org/wiki/The_Martian_%28Andy_Weir%29

Project ASTRO (Cont'd)

(Continued from page 3)

receive a variety of astronomy resources for use in the classroom. During the workshop, partners will develop a strategy for working together, in and out of the classroom, and start planning their astronomy lessons and the astronomer's first visit. There is no cost to attend the workshop. Teachers may receive Act 48 credit for attending the workshop, if they wish.

The astronomers commit to making at least four visits to the same one or two classrooms or youth groups. During these visits, they answer students' questions and lead or assist the teacher with astronomy activities. Examples of activities include the reason for the seasons, modeling the phases of the moon, making a scale model of our Solar System, observing the moons of Jupiter, making a comet and modeling the life cycle of the stars.

Other visits may include going on field trips, creating an astronomy club or helping with science fair projects. Many partnerships organize evening stargazing parties during the school year, which are excellent opportunities to include parents and other classes in the school. Students and their families look through telescopes, locate the constellations, and share class projects.

For more information, contact Dr. Karen Schwarz at kschwarz@wcupa.edu or 610-436-2788. More detailed information is available at http://www.astrosociety.org/education/k12-educators/project-astro/.

Droughts, Floods and the Earth's Gravity, by the GRACE of NASA

by Dr. Ethan Siegel

When you think about gravitation here on Earth, you very likely think about how constant it is, at 9.8 m/s^2 (32 ft/s^2). Only, that's not quite right. Depending on how thick the Earth's crust is, whether you're slightly closer to or farther from the Earth's center, or what the density of the material beneath you is, you'll experience slight variations in Earth's gravity as large as 0.2%, something you'd need to account for if you were a pendulum-clock-maker.

But surprisingly, the amount of *water content* stored on land in the Earth actually changes the gravity field of where you are by a significant, measurable amount. Over land, water is stored in lakes, rivers, aquifers, soil moisture, snow and glaciers. Even a change of just a few centimeters in the water table of an area can be clearly discerned by our best space-borne mission: NASA's twin Gravity Recovery and Climate Experiment (GRACE) satellites.

(Continued on page 11)

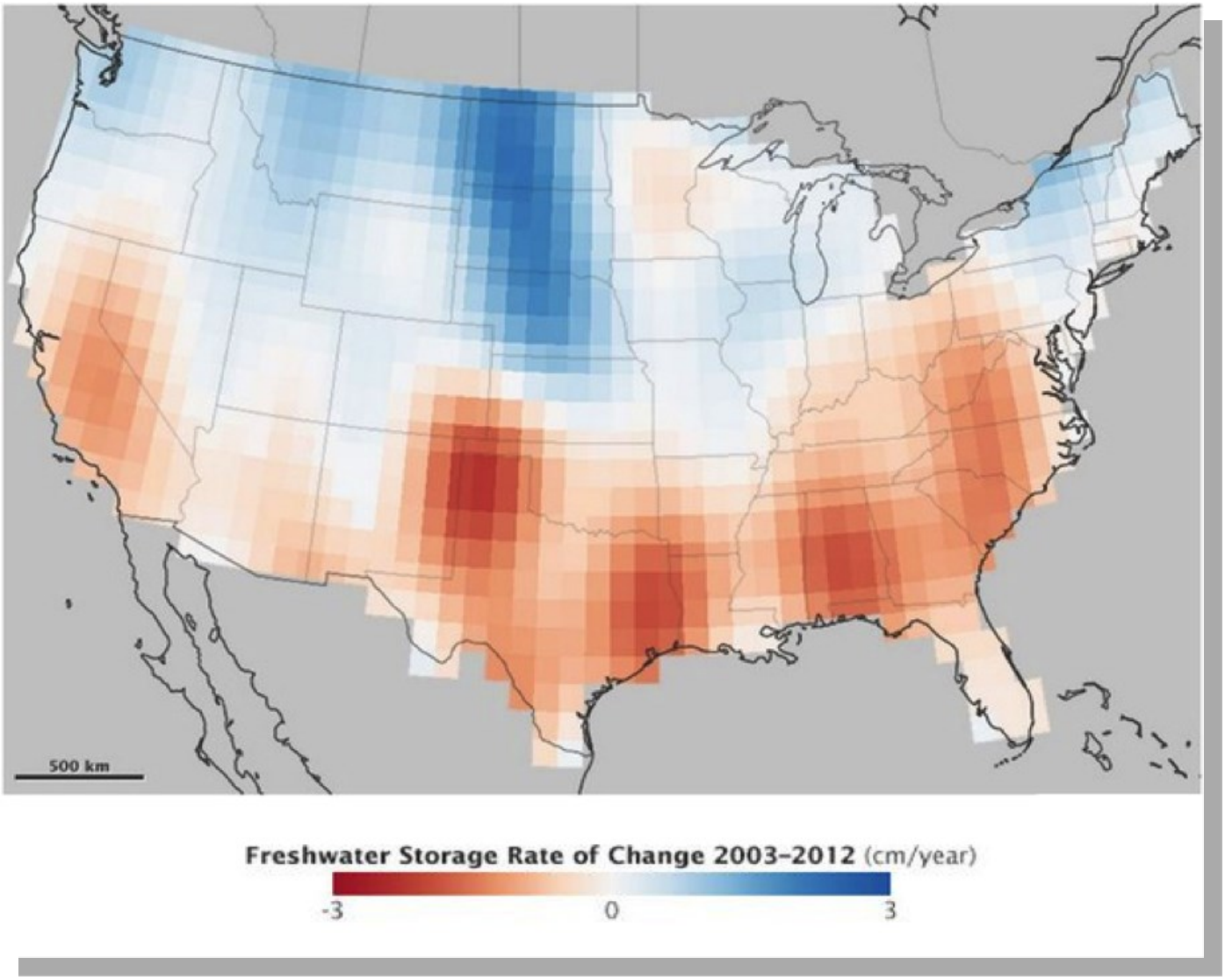


Image credit: NASA Earth Observatory image by Jesse Allen, using GRACE data provide courtesy of Jay Famigleitti, University of California Irvine and Matthew Rodell, NASA Goddard Space Flight Center. Caption by Holli Riebeek.

Space Place (cont'd)

(Continued from page 10)

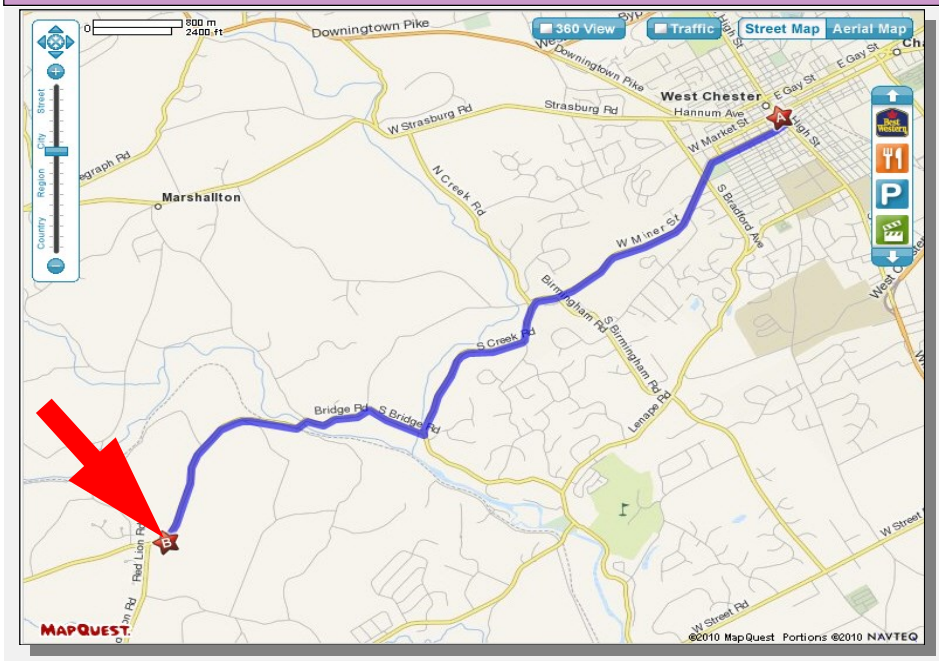
Since its 2002 launch, GRACE has seen the water-table-equivalent of the United States (and the rest of the world) change significantly over that time. Groundwater supplies are vital for agriculture and provide half of the world's drinking water. Yet GRACE has seen California's central valley and the southern high plains rapidly deplete their groundwater reserves, endangering a significant portion of the nation's food supply. Meanwhile, the upper Missouri River Basin—recently home to severe flooding—continues to see its water table rise.

NASA's GRACE satellites are the only pieces of equipment currently capable of making these global, precision measurements, providing our best knowledge for mitigating these terrestrial changes. Thanks to GRACE, we've been able to quantify the water loss of the Colorado River Basin (65 cubic kilometers), add months to the lead-time water managers have for flood prediction, and better predict the impacts of droughts worldwide. As NASA scientist Matthew Rodell says, "[W]ithout GRACE we would have no routine, global measurements of changes in groundwater availability. Other satellites can't do it, and ground-based monitoring is inadequate." Even though the GRACE satellites are nearing the end of their lives, the GRACE Follow-On satellites will be launched in 2017, providing us with this valuable data far into the future. Although the climate is surely changing, it's water availability, *not* sea level rise, that's the largest near-term danger, and the most important aspect we can work to understand!

Learn more about NASA's GRACE mission here: http://www.nasa.gov/mission_pages/Grace/

Kids can learn all about launching objects into Earth's orbit by shooting a (digital) cannonball on NASA's Space Place website. Check it out at: http://spaceplace.nasa.gov/how-orbits-work/

CCAS Directions



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

BVA 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 Valley Association

The monthly observing sessions (held February through November) are held at the Myrick Conservation Center of the Brandywine Valley Association.

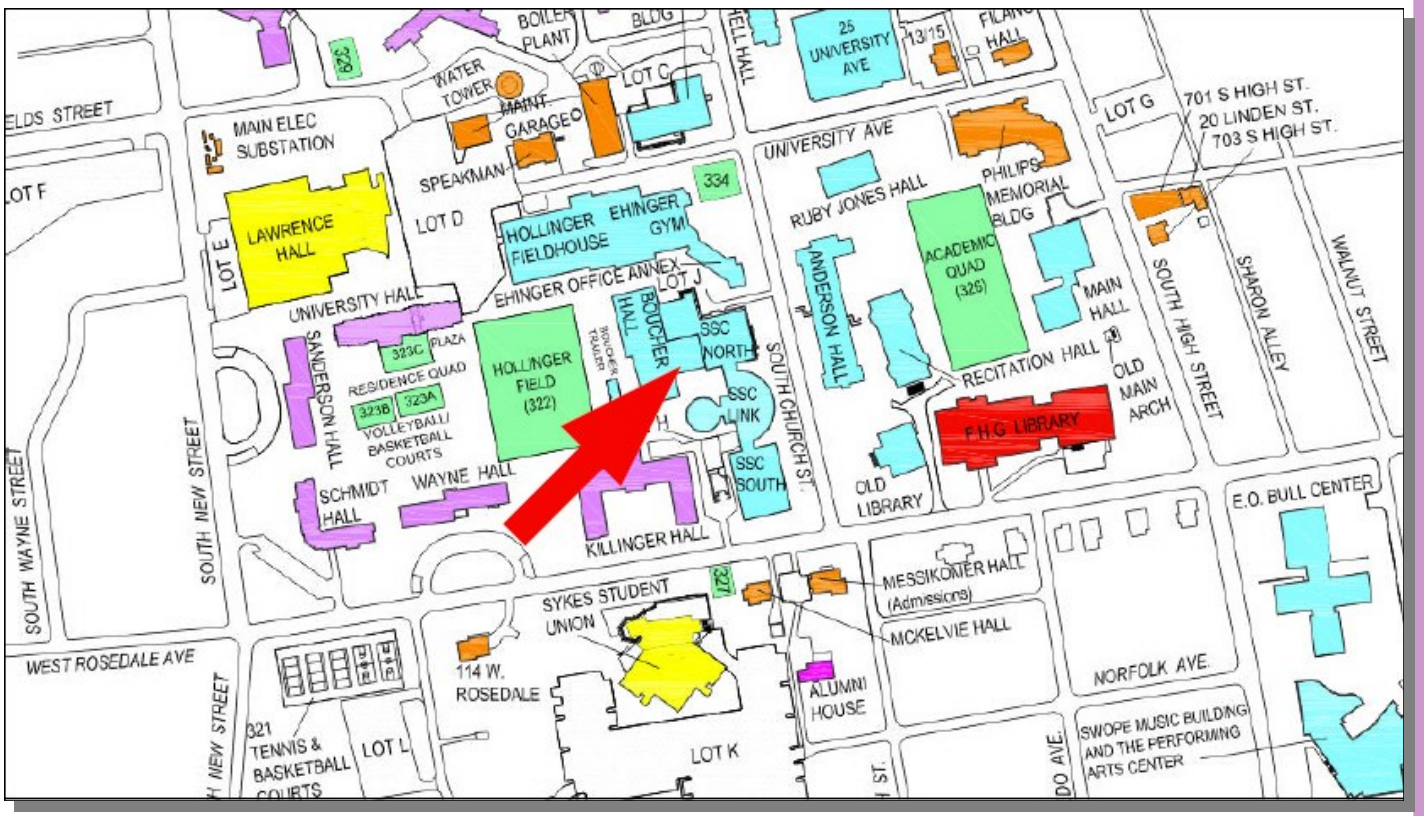
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route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



Landings (cont'd)

(Continued from page 5)

The Double Cluster in Perseus is a worthwhile target and late at night the clusters in Auriga rise out of the eastern horizon

Comets: There are no bright comets in the evening sky during September, but you can find 6th magnitude PANSTARRS (C/2012 K1) just before dawn near M48.

Meteor showers: There are no significant meteor showers during September.

CCAS Membership Information and Society Financials

Treasurer's Report

by Don Knabb

Aug 2014 Financial Summary

Beginning Balance	$2,186
Deposits	$60
Disbursements	$320
Ending Balance	$1,926

New Member Welcome!

Welcome new CCAS member Ann Buki from Exton. 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

Note that our CCAS Webmaster John Hepler has a link to the IDA home page set up on our Society's home page at **http://www.ccas.us**.

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"!

CCAS Event Information

We've set up a special phone number you can dial to find out if our monthly observing session and other scheduled events will be held or postponed. Call **610-436-0829** after 5 PM ET to hear a recording to find out the latest news.

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

★ ★ ★ ★ ★

Green Earth Lighting
Formerly
Outdoor Lighting Associates

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

Green Earth Lighting LLC
620 Onion Creek Ranch Rd
Driftwood, Texas 78619

Phone: **512-944-7354**

http://www.greenearthlighting.com

Local Astronomy-Related Stores

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

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

★ ★ ★ ★ ★

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
313 South Queen St.
Chestertown MD 21620

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 **(443) 282-0619** 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 443-282-0619
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.**